

**ASR9000 Upgrade Procedure:**

**3.7.x to 3.9.0**

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For the latest upgrade documents please refer to the following page:

[http://www.cisco.com/web/Cisco\\_IOS\\_XR\\_Software/index.html](http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html)

## 1. Obtain Required PIE files:

Composite Mini Package is mandatory to perform the upgrade. Additional pies listed below are needed depending on the router configuration and required features:

PIE File Description	Sample PIE Filename	Default Package Name
Composite Mini Package (OS-MBI, Base, Admin, Fwdg, Ic Rout diags)	comp-asr9k-mini.pie-3.9.0	disk0:comp-asr9kk-mini-3.9.0
Multicast Package	asr9k-mcast-p.pie-3.9.0	disk0:asr9k-mcast-3.9.0
Manageability Package	asr9k-mgbl-p.pie-3.9.0	disk0:asr9k-mgbl-3.9.0
MPLS Package	asr9k-mpls-p.pie-3.9.0	disk0:asr9k-mpls-3.9.0
Security Package	asr9k-k9sec-p.pie-3.9.0	disk0:asr9k-k9sec-3.9.0
Diagnostic package	asr9k-diags-p.pie-3.9.0	disk0:asr9k-diags-3.9.0
Field Programmable Device package	asr9k-fpd.pie-3.9.0	disk0:asr9k-fpd.pie-3.9.0
Video package	asr9k-adv-video-p.pie-3.9.0	disk0:asr9k-adv-video.pie-3.9.0

*Note1: The filenames listed here may not necessarily be the filenames of the actual files since the files can be renamed. The actual filenames used will not affect the operation.*

*Note2: Check for permission required for asr9k-k9-sec.pie.*

## 2. Install Mandatory SMUs

No mandatory SMUs for 3.7.x to 3.9.0 upgrade.

If rollback is needed from 3.9.0 to 3.7.x, the following mandatory SMU must be installed and activated before upgrading to 3.9.0.

<b>SMU Filename</b>	asr9k-os-mpi-3.7.2.CSCtc98848.pie
<b>DDTS</b>	CSCtc98848
<b>Affected images</b>	This SMU is necessary for downgrades from 3.9.0 to 3.7.2 or 3.7.3
<b>SMU Package Name</b>	<boot device> asr9k-os-mpi-3.7.2.CSCtc98848-1.0.0
<b>Problem Summary</b>	Failover (Reload) encounters pkt loss - fabric vqi sequence timeout
<b>SMU Install Impact</b>	High – reload SMU.

*Note1: If you have previously upgraded to 3.9.0, reverted to 3.7.x, and are now re-upgrading to 3.9.0, you may encounter CSCtc44243. Please see the release notes for the recommended workaround.*

### 3. Check System Stability:

The following commands should be executed to verify basic system stability before the upgrade:

- (admin) `show platform` (verify that all nodes are in "IOS XR RUN" state, SPAs in "OK" state)
- `show redundancy` (verify that a Standby RSP is available and in "ready" state)
- `show ipv4 interface brief <or> show ipv6 interface brief <or> show interface summary`  
(verify that all interfaces are "UP")
- `show install active` (verify that the proper set of packages are active)
- `cfs check/clear configuration inconsistency` (verify/fix configuration file system in exec and admin mode)

*Note1: before upgrade, check for the tftp reachability*

### 4. Perform Pre-Upgrade Tasks:

- 1) Sufficient disk space is required to perform the upgrade.

Use "show filesystem" command to check the actual disk0 size:

```
RSP/0/RSP0/CPU0:router(admin)#show filesystem | i disk0:
```

```
Tue Dec 15 14:46:22.405 pst
```

```
Size(b)      Free(b)      Type      Flags Prefixes
1644150784  874095104 flash-disk  rw  disk0:
```

```
1644150784 874095104 dumper-lnk rw qsm/dumper_disk0:
```

A minimum 500M free disk0: disk space is required for the upgrade.

*Note1: if you have already loaded the installation files for the new operating system version onto the router, the 'install remove inactive' will delete these files! Therefore, only load the new packages (via 'install add') after removing the inactive packages.*

*Note2: In order to provide as much room as possible on the disk, one can remove old files from the disk. This may include files which the operator as placed on the disk device such as .pie files or temporary directory that have been created.*

When preparing for the upgrade to the next version of the operating system, the old, non-operational version should be removed.

Before removing old SMU files and old versions of the operating system use the admin-commands

```
install commit
```

to ensure all active packages are 'committed', then issue the command

```
install remove inactive
```

The 'install remove inactive test sync' commands can be used first to show which packages will be removed from the disk.

*Note3: In addition to checking the installation disk device, the bootflash device on the RSPs should also be checked. Extraneous files such as crashinfo files can be removed. To check the free space of the bootflash use the following command:*

```
dir bootflash: location 0/RSP0/CPU0
```

2) Copy the running-configuration and admin-configuration to a temporary storage location. This could be on a remote TFTP server or a device such as the harddisk: or compactflash: present on the RSP.

```
RSP/0/RSP0/CPU0:router#copy running-config tftp://...running_config.txt
```

```
RSP/0/RSP0/CPU0:router#admin
```

```
RSP/0/RSP0/CPU0:router(admin)#copy running-config tftp://...admin-  
running_config.txt
```

[RSP/0/RSP0/CPU0:router\(admin\)#exit](#)

- 3) Verify Mgmt access to the router

## 5. Upgrade:

### All install operations should be done in admin mode.

Note: A 3.7.x SMU for CSCtc98848 is required to downgrade from 3.9.0 to 3.7.x. In order to use the software rollback feature of IOS XR, the SMU for CSCtc98848 must be installed prior to the upgrade to 3.9.0. If the SMU is not installed prior to the upgrade, and a reversion to 3.7.x is required, the SMU will need to be installed while the system is running 3.9.0, and the steps in the downgrade procedure will need to be run instead of the rollback procedure. The SMUs for CSCtc98848 are posted on CCO under the 3.7.2 and 3.7.3 SMU download pages.

- 1) Add the required pies to disk:

```
RSP/0/RSP0/CPU0:router(admin)# install add <source> /<path> /<pie> sync
```

*Note1: The <source> can be one of disk0:, disk1:, tftp:, ftp: or rcp:.*

*Note2: The above step must be repeated for each pie file, or all of the pies can be added together in a single 'install add ..' command. To add all pies using a single command, list all of the pies (including their source) within the 'install add ..' command in the following manner:*

```
RSP/0/RSP0/CPU0:router(admin)# install add <source> /comp-asr9k-mini.pie-3.9.0 <source> /asr9k-mcast.pie-3.9.0 <source> /asr9k-mgbl.pie-3.9.0 <source> /asr9k-mpls.pie-3.9.0 <source> /asr9k-k9sec.pie-3.9.0 sync
```

Below is a add packages to disk command example:

```
RSP/0/RSP0/CPU0:router(admin)# install add tftp://223.255.254.245/tftpserver/images/comp-asr9k-mini.pie-3.9.0 tftp://223.255.254.245/tftpserver/images/asr9k-mcast-p.pie-3.9.0 tftp://223.255.254.245/tftpserver/images/asr9k-mgbl-p.pie-3.9.0 tftp://223.255.254.245/tftpserver/images/asr9k-mpls-p.pie-3.9.0 tftp://223.255.254.245/tftpserver/images/asr9k-k9sec.pie-3.9.0 sync
```

*Note3: The use of 'sync' option will prevent the user from executing any other command during the install operation.*

*Note4: <source> can be specified just once rather than for each package. This simplifies the command:*

```
RSP/0/RSP0/CPU0:router(admin)# install add source <source> comp-asr9k-mini.pie-3.9.0 asr9k-mcast-p.pie-3.9.0 asr9k-mgbl-p.pie-3.9.0 asr9k-mpls-p.pie-3.9.0 asr9k-k9sec-p.pie-3.9.0 sync
```

*Note5: Under idle conditions, this command may take at least 35 minutes to complete, during which the router will be fully functional.*

*Note6: In case there are any other optional packages installed prior to upgrade the current upgrade has to be done with them, so corresponding pie files have to be added and installed as well. Otherwise all optional packages have to be deactivated (following by the commit) before the upgrade. Side effect of this is loss of the configuration supported by the pie.*

- 2) Test the activation using the 'test' option. Testing the activation will give you a preview of the activation.

```
RSP/0/RSP0/CPU0:router(admin)# install activate disk0:comp-asr9k-mini-3.9.0 disk0:asr9k-mcast-3.9.0 disk0:asr9k-mgbl-3.9.0 disk0:asr9k-k9sec-3.9.0 disk0:asr9k-mpls-3.9.0 sync test
```

*Note1: No actual changes will be made when 'test' option is used.*

*Note2: Any config that is incompatible with the new version being activated will be identified. The 'show configuration removed' command can be used to view what will be removed as result of the software upgrade (see caveats section for details).*

*Note3: Such removed config can be reapplied using the 'load config removed <config>.cfg' command from config mode AFTER the upgrade has been completed (see caveats section for details).*

- 3) Activate all of the packages added in step 1:

```
RSP/0/RSP0/CPU0:router(admin)# install activate disk0:comp-asr9k-mini-3.9.0 disk0:asr9k-mcast-3.9.0 disk0:asr9k-mgbl-3.9.0 disk0:asr9k-k9sec-3.9.0 disk0:asr9k-mpls-3.9.0 sync
```

*Note1: The output of 'install add' command executed in step 1 provides the list of names of packages to be used in 'install activate ..' command.*

*Note2: The use of 'sync' option will prevent the user from executing any other command during the install operation.*

*Note3: The router will reload at the end of activation to start using the new packages.*

*Note4: Under idle conditions, this operation may take at least 20 minutes to complete.*

*Note5. A wild card option is available during packages activation:*

`RSP/0/RSP0/CPU0:router (admin)# install activate *3.9.0*`

- 4) Verify system stability through commands described under **Check System Stability** section. If system issues are detected or if the upgrade needs to be backed out for any reason, please follow the steps described in **Downgrade** section to rollback the software configuration to the starting point.

- 5) Check to see if there were any failed startup config.

`RSP/0/RSP0/CPU0:router# show configuration failed startup`

- 6) Commit the newly activated software:

`RSP/0/RSP0/CPU0:router (admin)# install commit`

- 7) Clear configuration inconsistencies from Exec and admin mode

`RP/0/RSP0/CPU0:router#clear configuration inconsistency`

`RP/0/RSP0/CPU0:router(admin)#clear configuration inconsistency`

From release 3.7.0 pies can subsequently be activated using single command based on the install operation id generated after each install command:

`RSP/0/RSP0/CPU0:router (admin)# install activate id <install_operation_id> sync`

Install operation id is printed after finishing each install command or can be obtained using "show install log" command.

Note: After software upgrade to 3.9.0, user might see licensing related error message, please refer to the 3.9.0 Release Notes for information.

## 6. Mandatory 3.9.0 FPD Upgrade

After running the install commit command on upgrade to 3.9.0 software, run the "show hw-module fpd location all" command to check which firmware files need to be upgrade. The following are the examples for "show hw-module fpd location all" command output display in 3.7.x and 3.9.0.

### Reference #1 - 3.7.2 FPD content:

`RSP/0/RSP0/CPU0:router(admin)#show hw-module fpd location all`

```
=====
Existing Field Programmable Devices
=====
```

Location	Card Type	HW Version	Type	Subtype	Inst	Current SW Version	Upg/ Dng?
0/RSP0/CPU0	A9K-RSP-4G	1.0	lc	fpga3	0	1.13	No
			lc	fpga	0	1.4	No
			lc	fpga2	0	1.14	No
			lc	cbc	0	1.1	No
			lc	fpga4	0	1.6	No
			lc	rommon	0	1.0	No
0/RSP0/CPU0	ASR-9010-FAN	1.0	lc	cbc	1	4.0	No
0/RSP0/CPU0	ASR-9010-FAN	1.0	lc	cbc	2	4.0	No
0/RSP1/CPU0	A9K-RSP-4G	1.0	lc	fpga3	0	1.13	No
			lc	fpga	0	1.4	No
			lc	fpga2	0	1.14	No
			lc	cbc	0	1.1	No
			lc	fpga4	0	1.6	No
			lc	rommon	0	1.0	No
0/0/CPU0	A9K-40GE-B	1.0	lc	fpga	0	0.38	No
			lc	fpga2	0	0.8	No
			lc	cbc	0	2.1	No
			lc	cpld1	0	0.15	No
			lc	rommon	0	1.0	No
0/0/CPU0	A9K-40GE-B	1.0	lc	fpga	1	0.38	No
0/1/CPU0	A9K-40GE-B	1.0	lc	fpga	0	0.38	No
			lc	fpga2	0	0.8	No
			lc	cbc	0	2.1	No
			lc	cpld1	0	0.15	No
			lc	rommon	0	1.0	No
0/1/CPU0	A9K-40GE-B	1.0	lc	fpga	1	0.38	No

**Reference #2 – 3.7.3 FPD content**

RSP/0/RSP0/CPU0:router(admin)#show hw-module fpd loc all

```
=====
Existing Field Programmable Devices
=====
```

Location	Card Type	HW Version	Type	Subtype	Inst	Current SW Version	Upg/ Dng?
0/RSP0/CPU0	A9K-RSP-4G	1.0	lc	fpga3	0	1.13	No

			lc fpga	0	1.4	No
			lc fpga2	0	1.14	No
			lc cbc	0	1.2	No
			lc fpga4	0	1.6	No
			lc hsbi	0	1.0	No
			lc rommon	0	1.0	No
-----						
0/RSP0/CPU0	ASR-9010-FAN	1.0	lc cbc	1	4.0	No
-----						
0/RSP0/CPU0	ASR-9010-FAN	1.0	lc cbc	2	4.0	No
-----						
0/RSP1/CPU0	A9K-RSP-4G	1.0	lc fpga3	0	1.13	No
			lc fpga	0	1.4	No
			lc fpga2	0	1.14	No
			lc cbc	0	1.2	No
			lc fpga4	0	1.6	No
			lc hsbi	0	1.0	No
			lc rommon	0	1.0	No
-----						
0/0/CPU0	A9K-40GE-B	1.0	lc fpga	0	0.38	No
			lc fpga2	0	0.8	No
			lc cbc	0	2.2	No
			lc hsbi	0	1.0	No
			lc cpld1	0	0.15	No
			lc rommon	0	1.0	No
-----						
0/0/CPU0	A9K-40GE-B	1.0	lc fpga	1	0.38	No
-----						
0/1/CPU0	A9K-40GE-B	1.0	lc fpga	0	0.38	No
			lc fpga2	0	0.8	No
			lc cbc	0	2.2	No
			lc hsbi	0	1.0	No
			lc cpld1	0	0.15	No
			lc rommon	0	1.0	No
-----						
0/1/CPU0	A9K-40GE-B	1.0	lc fpga	1	0.38	No

**Reference #3 – 3.9.0 FPD content:**

RP/0/RSP0/CPU0:router(admin)#show hw-module fpd location all  
Tue Dec 15 16:28:04.672 pst

```
=====
Existing Field Programmable Devices
=====
```

Location	Card Type	HW Version	Type	Subtype	Inst	Current SW Version	Upg/Dng?
0/RSP0/CPU0	A9K-RSP-4G	1.0	lc	fpga3	0	1.17	No

			lc	fpga1	0		1.05	No
			lc	fpga2	0		1.15	No
			lc	cbc	0		1.02	No
			lc	fpga4	0		3.08	No
			lc	hsbi	0		3.00	No
			lc	rommon	0		1.02	No
-----								
0/RSP0/CPU0	ASR-9010-FAN	1.0	lc	cbc	1		4.00	No
-----								
0/RSP0/CPU0	ASR-9010-FAN	1.0	lc	cbc	2		4.00	No
-----								
0/RSP1/CPU0	A9K-RSP-4G	1.0	lc	fpga3	0		1.17	No
			lc	fpga1	0		1.05	No
			lc	fpga2	0		1.15	No
			lc	cbc	0		1.02	No
			lc	fpga4	0		3.08	No
			lc	hsbi	0		3.00	No
			lc	rommon	0		1.02	No
-----								
0/0/CPU0	A9K-40GE-B	1.0	lc	fpga1	0		0.41	No
			lc	fpga2	0		0.09	No
			lc	cbc	0		2.02	No
			lc	hsbi	0		3.00	No
			lc	cpld1	0		0.19	No
			lc	rommon	0		1.02	No
-----								
0/0/CPU0	A9K-40GE-B	1.0	lc	fpga1	1		0.41	No
-----								
0/1/CPU0	A9K-40GE-B	1.0	lc	fpga1	0		0.41	No
			lc	fpga2	0		0.09	No
			lc	cbc	0		2.02	No
			lc	hsbi	0		3.00	No
			lc	cpld1	0		0.19	No
			lc	rommon	0	1.02	No	
-----								
0/1/CPU0	A9K-40GE-B	1.0	lc	fpga1	1		0.41	No
-----								

To upgrade FPD firmware:

- 1) Run the "show hw-module fpd location all" command to check which firmware files need to be upgrade.

```
RP/0/RSP0/CPU0:router(admin)#show hw-module fpd location all
Tue Dec 15 16:28:04.672 pst
```

```
=====
Existing Field Programmable Devices
=====
```

Location	Card Type	HW Version	Type	Subtype	Inst	Current SW Version	Upg/ Dng?
0/RSP0/CPU0	A9K-RSP-4G	1.0	lc	fpga3	0	1.17	No
			lc	fpga1	0	1.05	No
			lc	fpga2	0	1.15	No
			lc	cbc	0	1.1	Yes
			lc	fpga4	0	3.08	No
			lc	hsbi	0	1.00	Yes
			lc	rommon	0	1.02	No

... Snip ...

In the example above, the CBC firmware and hsbi needs to be upgrade.

- 2) Add package "asr9k-fpd.pie-3.9.0" (if you have not add it from **section 5** step 1):

```
RP/0/RSP0/CPU0:router(admin)#install add <device or tftp> /<path> / asr9k-fpd.pie-3.9.0 sync
```

- 3) Activate the fpd package added in step 2 :

```
RP/0/RSP0/CPU0:router(admin)#install activate disk0:asr9k-fpd.pie-3.9.0 sync
```

- 4) Commit the newly activated software

```
RP/0/RSP0/CPU0:router(admin)#install commit
```

- 5) Issus the following command to check the latest version of all FPGA/ROMMON/CPLDs

```
RP/0/RSP0/CPU0:router(admin)#show fpd package
```

For "show fpd package" example output to display latest FPD version, please refer to **Section 12**

- 6) Issus the following command to upgrade fpd:

```
RP/0/RSP0/CPU0:router(admin)#upgrade hw-module fpd all location all
```

**Note1: Except CBC, router reload is requested after running the "upgrade hw-module fpd all location all" command.**

*Note2: No reload is required after running the **upgrade hw-module fpd cbc location all** command. The new CBC firmware will be active. The software automatically resets the local CAN Bus.*

## 7. Mandatory SMUs For Downgrade

**A SMU for CSCtc98848 for downgrade from 3.9.0 to 3.7.x (SMUs available from CCO on the software download pages under asr9k releases 3.7.2 and 3.7.3)**

## 8. Downgrade

**All install operations should be done in admin mode**

**Before downgrade to 3.7.x, we recommend to backup any installed 3.9.0 Software licenses.**

**Before downgrade to 3.7.x, any installed newly supported 3.9.0 line card need to be removed.**

Below is a list of the new line cards in 3.9.0:

- A9K-SIP-700
- A9K-8T-E
- A9K-8T-L
- A9K-4T-L
- A9K-40GE-L
- A9K-8T/4-L
- A9K-2T20GE-E
- A9K-2T20GE-B

1) List the available package to downgrade:

[RP/0/RSP0/CPU0:router\(admin\)#install act ?](#)

- 2) If you previously executed 'install remove' command to permanently remove any packages after upgraded in 3.9.0, please run the following command to re-add the relevant packages to disk :

```
RP/0/RSP0/CPU0:router (admin)# install add <device or tftp>/<path>/<3.7.x.pie> sync
```

- 3) Activate to the downgrade package:

Activate all of the packages you need to downgrade to, which also available listed in step 1:

Or

Activate all of the packages added in step 2:

```
RP/0/RSP0/CPU0:router(admin)# install activate disk0:comp-asr9k-mini-3.7.x disk0:asr9k-mcast-3.7.x disk0:asr9k-mgbl-3.7.x disk0:asr9k-k9sec-3.7.x disk0:asr9k-mpls-3.7.x disk0:asr9k-os-mbi-3.7.x.CSCtc98848 sync
```

*Note1: The output of 'install add' command executed in step 2 provides the list of names of packages to be used in 'install activate ..' command.*

*Note2: The use of 'sync' option will prevent the user from executing any other command during the install operation.*

*Note3: The router will reload at the end of activation to start using the new packages.*

*Note4: Under idle conditions, this operation may take at least 20 minutes to complete.*

*Note5. A wild card option is available during packages activation:*

```
RP/0/RSP0/CPU0:router(admin)# install activate *3.7.x*
```

- 4) After router downgraded to 3.7.x, commit the newly activated software

```
RP/0/RSP0/CPU0:router(admin)#install commit
```

## 9. Downgrade with install rollback option

- 1) List the available rollback points:

RP/0/RSP0/CPU0:router(admin)# **show install rollback ?**

- 2) Identify the rollback point by executing the following show command and analyzing the software configuration at the rollback point:

RP/0/RSP0/CPU0:router(admin)# **show install rollback <rollback point>**

*Note1: A valid rollback point number must be specified. The output will show list of active packages for that rollback point.*

**Note2: As stated in the upgrade section the SMU (pie) for CSCtc98848 must be present in the rollback point for rollback from 3.9.0 to 3.7.x to work properly. For rollback to work, this SMU must have been installed while the system was running 3.7.x.**

- 3) Test the rollback operation using the 'test' option. Testing the rollback operation can give you a preview of the rollback.

RP/0/RSP0/CPU0:router (admin)# **install rollback to <rollback point> sync test**

*Note1: The output will detect if any incompatible config exist. In such cases, 'show configuration removed' command can be used to view what will be removed as result of the software downgrade.*

*Note2: Removed command can be reapplied at a later time using the 'load config removed <config>.cfg' command from config mode..*

The following is a sample output:

Warning: SDR Owner: No incompatible configuration will be removed due to the  
Warning: 'test' option

Info: SDR Owner: Detected incompatibility between the activated software  
Info: and router running configuration.  
Info: SDR Owner: Removing the incompatible configuration from the running  
Info: configuration.  
Info: SDR Owner: Saving removed configuration in file '20060316131636.cfg'  
Info: on node 'RSP/0/0/CPU0:'  
Info: Use the "show configuration removed 20060316131636.cfg" command to  
Info: view the removed config.  
Info: NOTE: You must address the incompatibility issues with the  
Info: removed configuration above and re-apply it to the running  
Info: configuration as required. To address these issues use the  
Info: "load configuration removed 20060316131636.cfg" and "commit"  
Info: commands.

Use the command suggested in the above example to display the config that will potentially be removed after the downgrade.

- 4) Perform the rollback operation executing commands:

```
RP/0/RSP0/CPU0:router(admin)# install rollback to <rollback point> sync
```

*Note1: Based on the set of packages being activated and deactivated as part of the rollback operation, one or more nodes may be reloaded. Please be patient as this operation could take some time.*

*Note2: If you previously executed 'install remove' command to permanently remove any packages in the rollback configuration then the rollback operation will not proceed. To resolve this issue, please run the following command to re-add the relevant packages to disk :*

```
RP/0/RSP0/CPU0:router(admin)# install add <device or tftp> /<path> /<pie> sync
```

*Note3: The use of 'sync' option will prevent the user from executing any other command during the install operation.*

- 5) Restore the original configuration that was backed up in **Special Upgrade Instructions** section.

```
RP/0/RSP0/CPU0:router #config
RP/0/RSP0/CPU0:router (config)#load <source/filename>
RP/0/RSP0/CPU0:router (config)#commit replace
RP/0/RSP0/CPU0:router (config)#show configuration failed
Verify any rejected configuration
RP/0/RSP0/CPU0:router (config)#exit
Restore the admin-running-configuration as follows
RP/0/RSP0/CPU0:routerr#admin
RP/0/RSP0/CPU0:router (admin)#config
RP/0/RSP0/CPU0:router (admin-config)#load <source/filename>
RP/0/RSP0/CPU0:router (admin-config)#commit replace
RP/0/RSP0/CPU0:router r(admin-config)#show configuration failed
Verify any rejected configuration
RP/0/RSP0/CPU0:router (admin-config)#exit
RP/0/RSP0/CPU0:router (admin)#exit
```

- 6) Install commit the newly activated software.

```
RP/0/RSP0/CPU0:router (admin)# install commit
```

- 7) Verify system stability through commands described in **Check System Stability** Section.
- 8) install rollback in a section
- 9) force downgrade fpd

## 10. 3.7.x FPD force Downgrade

After running the install commit command on downgraded to 3.7.x software, run the `show hw-module fpd location all` command to check for firmware files. To downgrade fpd firmware to meet 3.7.x needs, downgrade fpd command with force option is requested for the downgrade process.

To downgrade FPD firmware:

- 1) Run the `show hw-module fpd location all` command to check current firmware files.
- 2) Add package "asr9k-fpd.pie-3.7.x" (if you have not added in **section 8**, step 2) :

```
RP/0/RSP0/CPU0:router(admin)#install add <device or tftp>/<path>/asr9k-fpd.pie-3.7.x sync
```

- 3) Activate package added in step 2:

```
RP/0/RSP0/CPU0:router(admin)#install activate disk0:asr9k-fpd.pie-3.7.x sync
```

- 4) Commit the newly activated software

```
RP/0/RSP0/CPU0:router(admin)#install commit
```

- 5) Issus the following command to downgrade fpd:

```
RP/0/RSP0/CPU0:router(admin)#upgrade hw-module fpd all force location all
```

*Note1: Except CBC, router reload is requested after running the "upgrade hw-module fpd all force location all" command.*

## 11. Post-Upgrade / Post-Downgrade Procedure:

### 1) Disk cleanup (optional)

Once software upgrade or downgrade has been completed, disk space can be recovered by removing any inactive packages that are no longer needed (if the packages are required at a later time, they can be re-added):

- Obtain the list of inactive packages and note the names of packages that are not needed:

```
RP/0/RSP0/CPU0:router(admin)#show install inactive summary
```

- Remove the unnecessary inactive packages:

```
RP/0/RSP0/CPU0:router(admin)# install remove disk0:<package_name1>  
disk0:<package_name2> .. disk0:<pkg_nameN> sync
```

or

```
RP/0/RSP0/CPU0:router(admin)#install remove inactive (to remove all inactive  
packages)
```

*Note1: The use of 'sync' option will prevent the user from executing any other command during the install operation.*

### 2) Verify/fix configuration file system (mandatory)

```
RP/0/RSP0/CPU0:router(admin)#cfs check
```

If "max-metric" or "set overload bit" is set during pre-upgrade task restore the metric using commands specified in section 4.

### 3) Upgrade firmware (mandatory)

Both ROMMON and FPGA firmware needs to be upgraded after the 3.9.0 image installation on the system. For detailed upgrade procedure please refer "IOS XR Firmware Upgrade Guide" document which can be accessed at:

[http://www.cisco.com/web/Cisco\\_IOS\\_XR\\_Software/index.html](http://www.cisco.com/web/Cisco_IOS_XR_Software/index.html)

## 12. Reference

### Reference #1 - 3.9.0 software "show version" output:

```
RP/0/RSP0/CPU0:router#show version
Wed Dec 16 10:15:47.483 pst
```

```
Cisco IOS XR Software, Version 3.9.0[00]
Copyright (c) 2009 by Cisco Systems, Inc.
```

```
ROM: System Bootstrap, Version 1.2(20090903:202931) [ASR9K ROMMON],
```

```
Tanya_RO uptime is 26 minutes
System image file is "bootflash:disk0/asr9k-os-mbi-3.9.0/mbiasr9k-rp.vm"
```

```
cisco ASR9K Series (MPC8641D) processor with 4194304K bytes of memory.
MPC8641D processor at 1333MHz, Revision 2.2
```

```
4 Management Ethernet
80 GigabitEthernet
219k bytes of non-volatile configuration memory.
975M bytes of compact flash card.
33994M bytes of hard disk.
1605616k bytes of disk0: (Sector size 512 bytes).
1605616k bytes of disk1: (Sector size 512 bytes).
```

```
Configuration register on node 0/RSP0/CPU0 is 0x3922
```

```
Boot device on node 0/RSP0/CPU0 is disk0:
```

```
Package active on node 0/RSP0/CPU0:
```

```
asr9k-scfclient, V 3.9.0[00], Cisco Systems, at disk0:asr9k-scfclient-3.9.0
```

```
  Built on Sun Dec 13 23:38:43 pst 2009
```

```
  By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0
```

```
asr9k-fpd, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fpd-3.9.0
```

```
  Built on Mon Dec 14 00:34:15 pst 2009
```

```
  By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0
```

```
asr9k-diags, V 3.9.0[00], Cisco Systems, at disk0:asr9k-diags-3.9.0
```

```
  Built on Sun Dec 13 23:38:44 pst 2009
```

```
  By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0
```

```
asr9k-mgbl, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mgbl-3.9.0
```

```
  Built on Mon Dec 14 00:33:28 pst 2009
```

```
  By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0
```

```
asr9k-mcast, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mcast-3.9.0
```

```
  Built on Mon Dec 14 00:33:02 pst 2009
```

```
  By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0
```

asr9k-mpls, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mpls-3.9.0  
Built on Mon Dec 14 00:31:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-rout, V 3.9.0[00], Cisco Systems, at disk0:asr9k-rout-3.9.0  
Built on Sun Dec 13 23:38:56 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-lc, V 3.9.0[00], Cisco Systems, at disk0:asr9k-lc-3.9.0  
Built on Mon Dec 14 00:28:31 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-fwdg, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fwdg-3.9.0  
Built on Sun Dec 13 23:34:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-admin, V 3.9.0[00], Cisco Systems, at disk0:asr9k-admin-3.9.0  
Built on Sun Dec 13 23:29:39 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-base, V 3.9.0[00], Cisco Systems, at disk0:asr9k-base-3.9.0  
Built on Sun Dec 13 23:32:17 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-os-mpi, V 3.9.0[00], Cisco Systems, at disk0:asr9k-os-mpi-3.9.0  
Built on Sun Dec 13 23:12:19 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

Configuration register on node 0/RSP1/CPU0 is 0x3922  
Boot device on node 0/RSP1/CPU0 is disk0:  
Package active on node 0/RSP1/CPU0:  
asr9k-scfclient, V 3.9.0[00], Cisco Systems, at disk0:asr9k-scfclient-3.9.0  
Built on Sun Dec 13 23:38:43 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-fpd, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fpd-3.9.0  
Built on Mon Dec 14 00:34:15 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-diags, V 3.9.0[00], Cisco Systems, at disk0:asr9k-diags-3.9.0  
Built on Sun Dec 13 23:38:44 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-mgbl, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mgbl-3.9.0  
Built on Mon Dec 14 00:33:28 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-mcast, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mcast-3.9.0  
Built on Mon Dec 14 00:33:02 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-mpls, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mpls-3.9.0

Built on Mon Dec 14 00:31:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-rout, V 3.9.0[00], Cisco Systems, at disk0:asr9k-rout-3.9.0  
Built on Sun Dec 13 23:38:56 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-lc, V 3.9.0[00], Cisco Systems, at disk0:asr9k-lc-3.9.0  
Built on Mon Dec 14 00:28:31 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-fwdg, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fwdg-3.9.0  
Built on Sun Dec 13 23:34:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-admin, V 3.9.0[00], Cisco Systems, at disk0:asr9k-admin-3.9.0  
Built on Sun Dec 13 23:29:39 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-base, V 3.9.0[00], Cisco Systems, at disk0:asr9k-base-3.9.0  
Built on Sun Dec 13 23:32:17 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-os-mpi, V 3.9.0[00], Cisco Systems, at disk0:asr9k-os-mpi-3.9.0  
Built on Sun Dec 13 23:12:19 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

Boot device on node 0/0/CPU0 is mem:  
Package active on node 0/0/CPU0:

asr9k-scfclient, V 3.9.0[00], Cisco Systems, at disk0:asr9k-scfclient-3.9.0  
Built on Sun Dec 13 23:38:43 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-fpd, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fpd-3.9.0  
Built on Mon Dec 14 00:34:15 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-diags, V 3.9.0[00], Cisco Systems, at disk0:asr9k-diags-3.9.0  
Built on Sun Dec 13 23:38:44 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-mcast, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mcast-3.9.0  
Built on Mon Dec 14 00:33:02 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-mpls, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mpls-3.9.0  
Built on Mon Dec 14 00:31:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-lc, V 3.9.0[00], Cisco Systems, at disk0:asr9k-lc-3.9.0  
Built on Mon Dec 14 00:28:31 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-fwdg, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fwdg-3.9.0  
Built on Sun Dec 13 23:34:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-admin, V 3.9.0[00], Cisco Systems, at disk0:asr9k-admin-3.9.0  
Built on Sun Dec 13 23:29:39 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-base, V 3.9.0[00], Cisco Systems, at disk0:asr9k-base-3.9.0  
Built on Sun Dec 13 23:32:17 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-os-mpi, V 3.9.0[00], Cisco Systems, at disk0:asr9k-os-mpi-3.9.0  
Built on Sun Dec 13 23:12:19 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

Boot device on node 0/1/CPU0 is mem:  
Package active on node 0/1/CPU0:  
asr9k-scfclient, V 3.9.0[00], Cisco Systems, at disk0:asr9k-scfclient-3.9.0  
Built on Sun Dec 13 23:38:43 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-fpd, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fpd-3.9.0  
Built on Mon Dec 14 00:34:15 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-diags, V 3.9.0[00], Cisco Systems, at disk0:asr9k-diags-3.9.0  
Built on Sun Dec 13 23:38:44 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-mcast, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mcast-3.9.0  
Built on Mon Dec 14 00:33:02 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-mpis, V 3.9.0[00], Cisco Systems, at disk0:asr9k-mpis-3.9.0  
Built on Mon Dec 14 00:31:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-ic, V 3.9.0[00], Cisco Systems, at disk0:asr9k-ic-3.9.0  
Built on Mon Dec 14 00:28:31 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-fwdg, V 3.9.0[00], Cisco Systems, at disk0:asr9k-fwdg-3.9.0  
Built on Sun Dec 13 23:34:50 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-admin, V 3.9.0[00], Cisco Systems, at disk0:asr9k-admin-3.9.0  
Built on Sun Dec 13 23:29:39 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-base, V 3.9.0[00], Cisco Systems, at disk0:asr9k-base-3.9.0  
Built on Sun Dec 13 23:32:17 pst 2009  
By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

asr9k-os-mbi, V 3.9.0[00], Cisco Systems, at disk0:asr9k-os-mbi-3.9.0  
 Built on Sun Dec 13 23:12:19 pst 2009  
 By sjc-lds-524 in /auto/srcarchive3/production/3.9.0/asr9k/workspace for c4.2.1-p0

**Reference #2 - 3.9.0 "show fpd package" example output:**

RP/0/RSP0/CPU0:router(admin)#show fpd package  
 Wed Dec 16 10:43:54.378 pst

```
=====
                          Field Programmable Device Package
=====
```

Card Type	FPD Description	Type	Subtype	SW Version	Min Req SW Ver	Min Req HW Vers
A9K-40GE-B	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.06	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.09	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONA LC2	lc	rommonA	1.01	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
A9K-4T-B	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.03	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.10	0.0	0.1
	PHY LC2	lc	fpga3	14.42	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
A9K-8T/4-B	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.03	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.10	0.0	0.1
	PHY LC2	lc	fpga3	14.42	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
A9K-2T20GE-B	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1

	PHYCtrl LC2	lc	cpld2	0.09	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.09	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.16	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
-----						
A9K-40GE-E	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.06	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.09	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONA LC2	lc	rommonA	1.01	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
-----						
A9K-4T-E	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.03	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.10	0.0	0.1
	PHY LC2	lc	fpga3	14.42	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
-----						
A9K-8T/4-E	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.03	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.10	0.0	0.1
	PHY LC2	lc	fpga3	14.42	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
-----						
A9K-2T20GE-E	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.09	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.09	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.16	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
-----						
A9K-8T-E	Can Bus Ctrl (CBC) LC3	lc	cbc	6.02	0.0	0.1
	CPUCtrl LC3	lc	cpld1	0.07	0.0	0.0
	PHYCtrl LC3	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC3	lc	cpld3	0.03	0.0	0.1
	CPUCtrl LC3	lc	cpld4	0.05	0.0	0.0
	PortCtrl LC3	lc	fpga2	0.11	0.0	0.1
	Raven LC3	lc	fpga1	0.05	0.0	0.1
	HSBI LC3	lc	hsbi	3.00	0.0	0.1

	ROMMONB LC3	lc	rommon	1.02	0.0	0.1
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A9K-40GE-L	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.06	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.09	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
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A9K-4T-L	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.03	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.10	0.0	0.1
	Serdes Upgrade LC2	lc	fpga3	14.42	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
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A9K-8T/4-L	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.03	0.0	0.1
	PortCtrl LC2	lc	fpga2	0.10	0.0	0.1
	Serdes Upgrade LC2	lc	fpga3	14.42	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
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A9K-2T20GE-L	Can Bus Ctrl (CBC) LC2	lc	cbc	2.02	0.0	0.1
	CPUCtrl LC2	lc	cpld1	0.19	0.0	0.1
	PHYCtrl LC2	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC2	lc	cpld3	0.09	0.0	0.1
	Tomcat LC2	lc	fpga2	0.16	0.0	0.1
	Bridge LC2	lc	fpga1	0.41	0.0	0.1
	HSBI LC2	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC2	lc	rommon	1.02	0.0	0.1
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A9K-8T-L	Can Bus Ctrl (CBC) LC3	lc	cbc	6.02	0.0	0.1
	CPUCtrl LC3	lc	cpld1	0.07	0.0	0.0
	PHYCtrl LC3	lc	cpld2	0.08	0.0	0.1
	LCClkCtrl LC3	lc	cpld3	0.03	0.0	0.1
	CPUCtrl LC3	lc	cpld4	0.05	0.0	0.0
	PortCtrl LC3	lc	fpga2	0.11	0.0	0.1
	Raven LC3	lc	fpga1	0.05	0.0	0.1
	HSBI LC3	lc	hsbi	3.00	0.0	0.1
	ROMMONB LC3	lc	rommon	1.02	0.0	0.1
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A9K-SIP-700	Can Bus Ctrl (CBC) LC5	lc	cbc	3.03	0.0	0.1
	CPUCtrl LC5	lc	cpld1	0.14	0.0	0.1
	QFPCPUBridge LC5	lc	fpga2	5.14	0.0	0.1
	NPUXBarBridge LC5	lc	fpga1	0.22	0.0	0.1

	HSBI LC5	lc	hsbi	3.00	0.0	0.1
	ROMMONA LC5	lc	rommonA	1.02	0.0	0.1
	ROMMONB LC5	lc	rommon	1.02	0.0	0.1
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A9K-RSP-2G	Can Bus Ctrl (CBC) RSP2	lc	cbc	1.02	0.0	0.1
	CPUCtrl RSP2	lc	cpld2	1.17	0.0	0.1
	IntCtrl RSP2	lc	fpga2	1.15	0.0	0.1
	ClkCtrl RSP2	lc	fpga3	1.17	0.0	0.1
	UTI RSP2	lc	fpga4	3.08	0.0	0.1
	PUNT RSP2	lc	fpga1	1.05	0.0	0.1
	HSBI RSP2	lc	hsbi	3.00	0.0	0.1
	ROMMONA RSP2	lc	rommonA	1.01	0.0	0.1
	ROMMONB RSP2	lc	rommon	1.02	0.0	0.1
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A9K-RSP-4G	Can Bus Ctrl (CBC) RSP2	lc	cbc	1.02	0.0	0.1
	CPUCtrl RSP2	lc	cpld2	1.17	0.0	0.1
	IntCtrl RSP2	lc	fpga2	1.15	0.0	0.1
	ClkCtrl RSP2	lc	fpga3	1.17	0.0	0.1
	UTI RSP2	lc	fpga4	3.08	0.0	0.1
	PUNT RSP2	lc	fpga1	1.05	0.0	0.1
	HSBI RSP2	lc	hsbi	3.00	0.0	0.1
	ROMMONA RSP2	lc	rommonA	1.01	0.0	0.1
	ROMMONB RSP2	lc	rommon	1.02	0.0	0.1
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A9K-RSP-8G	Can Bus Ctrl (CBC) RSP2	lc	cbc	1.02	0.0	0.1
	CPUCtrl RSP2	lc	cpld2	1.17	0.0	0.1
	IntCtrl RSP2	lc	fpga2	1.15	0.0	0.1
	ClkCtrl RSP2	lc	fpga3	1.17	0.0	0.1
	UTI RSP2	lc	fpga4	3.08	0.0	0.1
	PUNT RSP2	lc	fpga1	1.05	0.0	0.1
	HSBI RSP2	lc	hsbi	3.00	0.0	0.1
	ROMMONA RSP2	lc	rommonA	1.01	0.0	0.1
	ROMMONB RSP2	lc	rommon	1.02	0.0	0.1
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ASR-9010-FAN	Can Bus Ctrl (CBC) FAN	lc	cbc	4.00	0.0	0.1
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ASR-9006-FAN	Can Bus Ctrl (CBC) FAN	lc	cbc	5.00	0.0	0.1
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SPA-2XCHOC12/DS0	SPA FPGA swv1.00	spa	fpga2	1.00	0.0	0.0
	SPA FPGA swv1.36	spa	fpga1	1.36	0.0	0.49
	SPA ROMMON swv2.2	spa	rommon	2.02	0.0	0.49
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SPA-10X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.0	0.0
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SPA-5X1GE-V2	SPA FPGA swv1.10	spa	fpga1	1.10	0.0	0.0
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SPA-1X10GE-L-V2	SPA FPGA swv1.9	spa	fpga1	1.09	0.0	0.0
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SPA-1X10GE-WL-V2	SPA FPGA swv1.9	spa	fpga1	1.09	0.0	0.0
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