Upgrading Field-Programmable Hardware Devices for Cisco 4000 Series ISRs

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From Cisco IOS XE Release 3.10S, Cisco 4000 Series Integrated Services Routers (ISRs) allow users to perform upgrades in the field on programmable hardware devices. Field-programmable hardware devices include the complex programmable logic device (CPLD). This document describes the procedures to perform an upgrade on a field-programmable hardware device.

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- ROMMON Overview, page 6
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Feature Information

For the latest information about features and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the “Additional References” section on page 17.
Use the Cisco Feature Navigator to find information about platform support and Cisco IOS and Cisco IOS XE operating system software image support. To access the Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Upgrading Field-Programmable Hardware Devices Overview

The hardware-programmable firmware is upgraded when Cisco 4000 Series ISR contains an incompatible version of the hardware-programmable firmware. To do this upgrade, a hardware-programmable firmware package is released to customers.

Generally, an upgrade is necessary only when a system message indicates one of the field-programmable devices on the Cisco 4000 Series ISR needs an upgrade, or a Cisco technical support representative suggests an upgrade.

From Cisco IOS XE Release 3.10S onwards, you must upgrade the CPLD firmware to support the incompatible versions of the firmware on the Cisco 4000 Series ISR. For upgrade procedures, see the “CPLD Field-Programmable Upgrade, Cisco IOS XE Release 3.10S” section on page 3.

Caution

Do not power down the router during the field-programmable upgrade. Although, the Cisco 4000 Series ISR should be able to recover from most interruptions during the upgrade, certain scenarios may cause unpredictable problems.

Displaying the CPLD Version

If you receive an error message indicating that the device needs an upgrade, and you have an incompatible CPLD version on the device, use the show platform command to display the status of your active Cisco 4000 Series ISR. The following example shows the output of the show platform command on a Cisco ISR 4000 Series Router:

Router# show platform
Chassis type: ISR4451-X/K9

<table>
<thead>
<tr>
<th>Slot</th>
<th>Type</th>
<th>State</th>
<th>Insert time (ago)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ISR4451-X/K9</td>
<td>ok</td>
<td>00:14:41</td>
</tr>
<tr>
<td>0/0</td>
<td>ISR4451-X-4x1GE</td>
<td>ok</td>
<td>00:14:06</td>
</tr>
<tr>
<td>1</td>
<td>ISR4451-X/K9</td>
<td>ok</td>
<td>00:14:41</td>
</tr>
<tr>
<td>2</td>
<td>ISR4451-X/K9</td>
<td>ok</td>
<td>00:14:41</td>
</tr>
<tr>
<td>R0</td>
<td>ISR4451-X/K9</td>
<td>ok, active</td>
<td>00:14:41</td>
</tr>
<tr>
<td>F0</td>
<td>ISR4451-X/K9</td>
<td>ok, active</td>
<td>00:14:41</td>
</tr>
<tr>
<td>P0</td>
<td>Unknown</td>
<td>ps, fail</td>
<td>never</td>
</tr>
<tr>
<td>P1</td>
<td>XXX–XXXX–XX</td>
<td>ok</td>
<td>00:14:26</td>
</tr>
<tr>
<td>P2</td>
<td>ACS-4450-FANASSY</td>
<td>ok</td>
<td>00:14:26</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slot</th>
<th>CPLD Version</th>
<th>Firmware Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>13041228</td>
<td>15.3(2r)S1</td>
</tr>
<tr>
<td>1</td>
<td>13041228</td>
<td>15.3(2r)S1</td>
</tr>
<tr>
<td>2</td>
<td>13041228</td>
<td>15.3(2r)S1</td>
</tr>
<tr>
<td>R0</td>
<td>13041228</td>
<td>15.3(2r)S1</td>
</tr>
<tr>
<td>F0</td>
<td>13041228</td>
<td>15.3(2r)S1</td>
</tr>
</tbody>
</table>
For more information on upgrading, see the “CPLD Field-Programmable Upgrade, Cisco IOS XE Release 3.10S” section on page 3.

CPLD Field-Programmable Upgrade, Cisco IOS XE Release 3.10S

This section covers the following topics:

- CPLD Field-Programmable Upgrade Overview, page 3
- Downloading the Hardware-Programmable Firmware Package, page 3
- Upgrading an Active Cisco 4000 Series ISRs, page 4
- Additional References, page 17

CPLD Field-Programmable Upgrade Overview

CPLD field-programmable upgrade can be performed on a need basis to address any specific issues with the hardware-programmable devices. The subsequent sections describe how to upgrade the Cisco 4000 Series ISRs.

To determine if one of the components has an incompatible CPLD version, use the `show platform` command. See the “Displaying the CPLD Version” section on page 2.

From Cisco IOS XE Release 3.10.S onwards, a hardware-programmable package is released to customers whose devices require a CPLD upgrade.

Downloading the Hardware-Programmable Firmware Package

To download the hardware programmable firmware package from Cisco.com, perform these steps:

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Log in to the Download Software page <a href="https://software.cisco.com/download/navigator.html">https://software.cisco.com/download/navigator.html</a>.</td>
</tr>
<tr>
<td>Step 2</td>
<td>From the Select a Software Product Category area, select &gt; Routers &gt; Branch Routers &gt; Cisco 4000 Series Integrated Services Routers, and select the appropriate router from the list.</td>
</tr>
<tr>
<td>Step 3</td>
<td>From the Select a Software Type area, select IOS XE Hardware Programmable Devices.</td>
</tr>
<tr>
<td>Step 4</td>
<td>Click Download or Add to Cart the IOS XE Software hardware programmable firmware package and follow the prompts.</td>
</tr>
</tbody>
</table>

Note

A CPLD upgrade is necessary only when a system message indicates that the Cisco 4000 Series ISR needs an upgrade. Cisco 4000 Series ISRs are shipped with Cisco IOS XE 15.3(3r)S1 image pre-installed and that ROMMON upgrade is necessary only starting with Cisco IOS Xe Denali 16.2 release.
Upgrading an Active Cisco 4000 Series ISRs

You can upgrade the CPLD firmware on Cisco 4000 Series ISRs using the `upgrade hw-programmable` command. The CPLD upgrade can take up to ten minutes for each component. You can perform the upgrade on the Cisco 4000 Series ISRs any time as long as you can access the privileged EXEC mode prompt on the router.

To upgrade a Cisco 4000 Series ISRs, perform these steps:

**Step 1**
Cold boot the active Cisco 4000 Series ISR.

**Step 2**
Copy the hardware-programmable upgrade package to your bootflash:
```
copy tftp://...isr-hw-programmables.03.13.00.S.154-3.S-ext.SPA.pkg bootflash
```

**Step 3**
Run the `hw-programmable cpld filename` command from the EXEC mode:
```
Router#upgrade hw-programmable cpld filename
bootflash:isr-hw-programmables.03.13.00.S.154-3.S-ext.SPA.pkg R0
```

**Step 4**
If you are using IOS XE 3.13.1 or later, then skip to Step 5. At the system prompt, press Enter to start the upgrade:
```
Upgrade CPLD on Route-Processor 0 from current version 13041228 to 14061635 [Press Enter to confirm]
```

This command could take up to 10 minutes, please wait and do not power-cycle the chassis or the card. Otherwise, hardware may be unrecoverable. It is recommended that all cards are running the same version IOS-XE software prior to the upgrade. At the end of upgrade you will be asked to reload the chassis. [Press Enter to confirm]
```
Upgrade cpld hw-programmable on Route-Processor 0
The cpld has been successfully upgraded on Route-Processor/0.
PLEASE RELOAD THE CHASSIS NOW.
Router#
```

**Caution**
Do not power down or interrupt the router during the CPLD upgrade. Although, the Cisco 4000 Series ISR should be able to recover from most interruptions during the CPLD upgrade, certain scenarios may cause unpredictable problems.

a. From the IOS console, use the `reload` command to gracefully shutdown the system.

b. Turn OFF and turn ON the router. After the router restarts, use the `show platform` command to check the version of the CPLD:
```
Router#show platform
Chassis type: ISR4451-X/K9

Slot Type State Insert time (ago)
---------- ------------------- --------------------- -----------------
0 ISR4451-X/K9 ok 00:01:52
0/0 ISR4451-X-4x1GE ok 00:01:18
1 ISR4451-X/K9 ok 00:01:52
2 ISR4451-X/K9 ok 00:01:52
R0 ISR4451-X/K9 ok, active 00:01:52
F0 ISR4451-X/K9 ok, active 00:01:52
P0 Unknown ps, fail never
P1 XXX-XXXX-XX ok 00:01:37
P2 ACS-4450-FANASSY ok 00:01:37
```
Step 5 At the system prompt, press Enter to start the upgrade:

Upgrade CPLD on Route-Processor 0 from current version 14062321 to 14101324 [Press Enter to confirm]
This command could take up to 10 minutes, please wait and do not power-cycle the chassis or the card. Otherwise, hardware may be unrecoverable. The system will be automatically power-cycled upon completion. [Press Enter to confirm]

Upgrade cpld hw-programmable on Route-Processor 0

Powercycling the chassis for upgrade to take effect

Initializing Hardware ...

a. After the router restarts automatically, use the show platform command to check the version of CPLD:

Router#show platform
Chassis type: ISR4451-X/K9

Slot Type State Insert time (ago)
--------- ------------------- --------------------- -----------------
0 ISR4451-X/K9 ok 00:01:52
0/0 ISR4451-X-4x1GE ok 00:01:18
1 ISR4451-X/K9 ok 00:01:52
2 ISR4451-X/K9 ok 00:01:52
R0 ISR4451-X/K9 ok, active 00:01:52
F0 ISR4451-X/K9 ok, active 00:01:52
P0 Unknown ps, fail never
P1 XXX-XXXX-XX ok 00:01:37
P2 ACS-4450-FANASSY ok 00:01:37

Slot CPLD Version Firmware Version
-------------- ------------------- ---------------------------------------
0 14061635 15.3(2r)S1
1 14061635 15.3(2r)S1
2 14061635 15.3(2r)S1
R0 14061635 15.3(2r)S1
F0 14061635 15.3(2r)S1

b. This example shows that the router is upgraded successfully.

Field-Programmable Hardware Device Commands

You can use the following field-programmable commands to perform a CPLD upgrade, display the package file version, or display progress during the upgrade:

- upgrade hw-programmable—Performs a CPLD upgrade on a Cisco ISR 4000 Series Router.
• **show hw-programmable**—Displays the current CPLD or FPGA version in a particular line card.
• **show upgrade hw-programmable file**—Displays the names and versions of individual files in the hardware-programmable package file in a Cisco 4000 Series ISR.

For command syntax and detailed information, see the *Cisco IOS Interface and Hardware Component Command Reference*.

### ROMMON Overview

The ROMMON on an Cisco 4000 Series ISR must be upgraded if a system message on the router indicates that the ROMMON on the router requires an upgrade, or a Cisco technical support representative suggests a ROMMON upgrade.

The ROM Monitor is a bootstrap program that initializes the hardware and boots the Cisco IOS XE software when you power on or reload a router. When you connect a terminal to the router that is in ROM Monitor mode, the ROM Monitor command-line interface (CLI) prompt is displayed.

### Access ROM Monitor Mode

The following sections describe how to enter the ROMMON mode, and contains the following sections:

- Checking the Current ROMMON Version, page 6
- Commonly Used ROM Monitor Commands, page 8
- Changing the ROM Monitor Prompt, page 9

### Checking the Current ROMMON Version

If you are unsure whether a ROMMON upgrade is required, use the `show rom-monitor` command or the `show platform` command.

```
Router# show rom-monitor r0
Router# show rom-monitor r0

System Bootstrap, Version 15.4(3r)S, RELEASE SOFTWARE (fc1)
Copyright (c) 1994-2014 by cisco Systems, Inc.

Router# show platform
Chassis type: ISR4451/K9

Slot Type State Insert time (ago)
------------------------ -----------------------------------------
0 ISR4451-X/K9 ok 00:03:25
0/0 ISR4451-X-4x1GE ok 00:02:46
1 ISR4451-X/K9 ok 00:03:25
2 ISR4451-X/K9 ok 00:03:25
R0 ISR4451-X/K9 ok, active 00:03:25
F0 ISR4451-X/K9 ok, active 00:03:25
P0 PWR-4450-10 ok 00:03:10
P1 Unknown ps, fail never
P2 ACS-4450-FANASSY ok 00:03:10
Slot CPLD Version Firmware Version
```
Router# `show rom-monitor r0`
System Bootstrap, Version 15.4(3r)S1, RELEASE SOFTWARE (fc1)
Copyright (c) 1994-2014 by cisco Systems, Inc.
Router# `show platform`
Chassis type: ISR4351/K9
Slot Type State Insert time (ago)
--------- ------------------- --------------------- -----------------
 0  ISR4351/K9  ok 02:16:41
 1  ISR4351/K9  ok 02:16:41
 2  ISR4351/K9  ok 02:16:41
R0  ISR4351/K9  ok, active 02:16:41
F0  ISR4351/K9  ok, active 02:16:41
P0  PWR-4450-AC  ok never
P2  ACS-4450-PANASSY  ok never
Slot CPLD Version Firmware Version
--------- ------------------- ---------------------------------------
 0  14080523  15.4(3r)S1
 1  14080523  15.4(3r)S1
 2  14080523  15.4(3r)S1
R0  14080523  15.4(3r)S1
F0  14080523  15.4(3r)S1

Router# `show romvar`
ROMMON variables:
PS1 = rommon ! >
TFTP_FILE = /noash/overlord_627.bin
DEFAULT_GATEWAY = 50.0.0.1
TFTP_SERVER = 172.18.40.12
IP_SUBNET_MASK = 255.255.255.0
MCP_STARTUP_TRACEFLAGS = 00000000:00000000
RET_2_RTS =
?=0
LICENSE_BOOT_LEVEL = adventerprise,all:esg;
IP_ADDRESS = 172.18.40.56
BSI = 0
RET_2_RCALTS =
RANDOM_NUM = 1707176976

Router# `reload`
rommon 1 > set
PS1=rommon ! >
SR_INIT_SHELL=aux_do_system_shell
TFTP_FILE=/noash/overlord_627.bin
DEFAULT_GATEWAY=50.0.0.1
TFTP_SERVER=172.18.40.12
IP_SUBNET_MASK=255.255.255.0
MCP_STARTUP_TRACEFLAGS=00000000:00000000
RET_2_RTS=
?=0
LICENSE_BOOT_LEVEL=adventerprise,all:esg;
IP_ADDRESS=172.18.40.56
BSI=0
RANDOM_NUM=1707176976
RET_2_RCALTS=1350127173
Commonly Used ROM Monitor Commands

Table 1-1 summarizes the commands commonly used in ROM Monitor. For specific instructions on using these commands, refer to the relevant procedure in this document.

Table 1-1 Commonly Used ROM Monitor Commands

<table>
<thead>
<tr>
<th>ROMMON Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>boot image</td>
<td>Manually boots a Cisco IOS XE software image.</td>
</tr>
<tr>
<td>boot image –o config-file-path</td>
<td>Manually boots the Cisco IOS XE software with a temporary alternative administration configuration file.</td>
</tr>
<tr>
<td>confreg</td>
<td>Changes the config-register setting.</td>
</tr>
<tr>
<td>dev</td>
<td>Displays the available local storage devices.</td>
</tr>
<tr>
<td>dir</td>
<td>Displays the files on a storage device.</td>
</tr>
<tr>
<td>reset</td>
<td>Resets the node.</td>
</tr>
<tr>
<td>set</td>
<td>Displays the currently set ROM Monitor environmental settings.</td>
</tr>
<tr>
<td>sync</td>
<td>Saves the new ROM Monitor environmental settings.</td>
</tr>
<tr>
<td>unset</td>
<td>Removes an environmental variable setting.</td>
</tr>
</tbody>
</table>

Table 1-2 describes the available help commands for ROM Monitor mode.

Table 1-2 Help Commands in ROMMON

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>help or ?</td>
<td>Displays a summary of all available ROM Monitor commands.</td>
</tr>
<tr>
<td>-?</td>
<td>Displays information about command syntax.</td>
</tr>
</tbody>
</table>

Note

Commands are case-sensitive. You can halt any command by pressing Ctrl-C.

Examples

The following example shows what appears when you enter the ? command on a router:

rommon 1 > ?
alias       set and display aliases command
boot        boot up an external process
break       set/show/clear the breakpoint
confreg     configuration register utility
context     display the context of a loaded image
cookie      display contents of cookie PROM in hex
dev         list the device table
dir         list files in file system
dis         display instruction stream
frame       print out a selected stack frame
help                monitor builtin command help
history             monitor command history
meminfo             main memory information
repeat              repeat a monitor command
reset               system reset
set                 display the monitor variables
showmon             display currently selected ROM monitor
stack               produce a stack trace
sync                write monitor environment to NVRAM
sysret              print out info from last system return
tsec                print out info from the ethernet driver
unalias             unset an alias
unset               unset a monitor variable

Changing the ROM Monitor Prompt

You can change the prompt in ROM Monitor mode by using the PS1= command as shown in the following example:

rommon 8 > PS1="ISR4400 rommon ! > "
ISR4400 rommon 9 >

Changing the prompt is useful if you are working with multiple routers in ROM Monitor at the same time. This example specifies that the prompt should be “ISR4400 rommon ”, followed by the line number, and then followed by “ > “ by the line number.

Displaying the Configuration Register Setting

To display the current configuration register setting, enter the confreg command without parameters as follows:

rommon > confreg

Configuration Summary
(Virtual Configuration Register:
  enabled are:
  console baud: 96009600
  boot: the ROM Monitor

do you wish to change the configuration? y/n [n]:

The configuration register setting is labeled Virtual Configuration Register. Enter the no command to avoid changing the configuration register setting.

Environment Variable Settings

The ROM Monitor environment variables define the attributes of the ROM Monitor. Environmental variables are entered like commands and are always followed by the equal sign (=). Environment variable settings are entered in capital letters, followed by a definition. For example:

IP_ADDRESS=10.0.0.2
Under normal operating conditions, you do not need to modify these variables. They are cleared or set only when you need to make changes to the way ROM Monitor operates.

This section includes the following topics:

- Frequently Used Environmental Variables, page 10
- Displaying Environment Variable Settings, page 11
- Entering Environment Variable Settings, page 12
- Saving Environment Variable Settings, page 12

### Frequently Used Environmental Variables

Table 5-3 shows the main ROM Monitor environmental variables. For instructions on how to use these variables, see the relevant instructions in this document.

#### Table 1-3  Frequently Used ROM Monitor Environmental Variables

<table>
<thead>
<tr>
<th>Environmental variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP_ADDRESS=ip_address</td>
<td>Sets the IP address for the Management Ethernet interface.</td>
</tr>
<tr>
<td>IP_SUBNET_MASK=ip_address</td>
<td>Sets the subnet mask for the Management Ethernet interface.</td>
</tr>
<tr>
<td>DEFAULT_GATEWAY=ip_address</td>
<td>Sets the default gateway that serves.</td>
</tr>
<tr>
<td>TFTP_SERVER=ip_address</td>
<td>Sets the IP address of the TFTP server where a bootable software image is located.</td>
</tr>
<tr>
<td>TFTP_FILE=path/file</td>
<td>Sets the directory and filename of a bootable software image.</td>
</tr>
<tr>
<td>BOOT=path/file</td>
<td>Identifies the boot software for a node. This variable is usually set automatically when the router boots.</td>
</tr>
</tbody>
</table>

#### Table 1-4  Frequently Used ROM Monitor Environmental Variables

<table>
<thead>
<tr>
<th>Environmental variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP_ADDRESS=ip_address</td>
<td>On the RP only. Sets the IP address for the Management Ethernet interface on the DSC.</td>
</tr>
<tr>
<td>IP_SUBNET_MASK=ip_address</td>
<td>On the RP only. Sets the subnet mask for the Management Ethernet interface on the DSC.</td>
</tr>
<tr>
<td>DEFAULT_GATEWAY=ip_address</td>
<td>On the RP only. Sets the default gateway that serves the DSC.</td>
</tr>
<tr>
<td>TFTP_SERVER=ip_address</td>
<td>Sets the IP address of the TFTP server where a bootable software image is located.</td>
</tr>
<tr>
<td>TFTP_FILE=drive:path/file</td>
<td>Sets the directory and filename of a bootable software image.</td>
</tr>
<tr>
<td>TURBOBOOT=on, boot-device, options</td>
<td>Completely replaces the existing software when the router is reloaded.</td>
</tr>
</tbody>
</table>
Environment Variable Settings

### Displaying Environment Variable Settings

To display the current environment variable settings, enter the `set` command at the ROM Monitor mode prompt:

```
rommon 1 > showmon
Current image running (0/1): Boot ROM0
System Bootstrap, Version 12.2(20120829:165313)
DEVELOPMENT SOFTWARE
Copyright (c) 1994-2012 by cisco Systems, Inc.
Compiled Wed 08/29/2012 12:53:32.67

CPLD Version : 35 (MM/DD/YY): 09/03/12 (2.3)
FPGA Version : 0x82020300 (2.3.0)
FPGA Active : read-only image
Board Version : 2 (P1C)
PCH Version : 10 (B0)
DP CPU Version : 00 (1.0)
FPGA-ENV Version: 0105
HDD Status : 0A30
MEFW Version : 6.0.50.1244
System Straps : 00000F00 BE036FF1 B2EB6E8F
Hardware Anchor : F01001R06.0116f365a2012-07-17
Certificate : 946944F17906C95E
Microloader : MA0001R04.013eb9f7f2012-06-22
Module 0/1 : Absent
Module 0/2 : Absent
Module 0/3 : Absent
Module 0/4 : Absent
Module 1/0 : Absent
Module 2/0 : Absent
PCH Enum Errs : 0
PS1=rommon ! >
TFTP_SERVER=172.23.16.81
IP_ADDRESS=172.29.52.71
IP_SUBNET_MASK=255.255.255.0
DEFAULT_GATEWAY=172.29.52.1
IOX_ADMIN_CONFIG_FILE=

```

### Table 1-4 Frequently Used ROM Monitor Environmental Variables (continued)

<table>
<thead>
<tr>
<th>Environmental variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>BOOT=drive:path/file</code></td>
<td>Identifies the boot software for a node. This variable is usually set automatically when the router boots.</td>
</tr>
<tr>
<td><code>AUX_AUTHEN_LEVEL=number</code></td>
<td>Bypasses <code>ksh</code> authentication. A reboot is required only on the card that has to bypass authentication.</td>
</tr>
<tr>
<td><code>IOX_ADMIN_CONFIG_FILE=drive:path/file</code></td>
<td>Permanently changes the location of the default administration configuration file.</td>
</tr>
<tr>
<td><code>IOX_CONFIG_FILE=drive:path/file</code></td>
<td>Permanently changes the location of the SDR configuration file.</td>
</tr>
<tr>
<td><code>IOX_CONFIG_MEDIUM=drive:path</code></td>
<td>Permanently changes the default location where configuration files are saved.</td>
</tr>
</tbody>
</table>
Environment Variable Settings

Environment variable settings are entered in capital letters, followed by a definition. The following example shows the environmental variables used to configure the control Ethernet port on a router:

Cisco CRS-1 Cisco XR 12000 Series Router:

```
rommon 1B11> IP_ADDRESS=1.1.1.1
rommon 2B22> IP_SUBNET_MASK=255.255.255.0
rommon 3B33> DEFAULT_GATEWAY=1.1.0.1
```

Saving Environment Variable Settings

To save the current environment variable settings, enter the `sync` command:

```
rommon 1B11> sync
```

**Note**

Environmental values that are not saved with the `sync` command are discarded whenever the system is reset or booted.
Exiting ROM Monitor Mode

To exit ROM Monitor mode, you must change the configuration register

SUMMARY STEPS

1. confreg
2. Respond to each prompt as instructed.
3. reset

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td>confreg</td>
</tr>
</tbody>
</table>

**Example:**

```
rommon 3> confreg
```

| **Step 2** | Respond to each prompt as instructed. | See the example that follows this procedure for more information. |

| **Step 3** | reset | Resets and initializes the router. |

**Example:**

```
rommon 3> reset
```

Configuration Example

```
rommon 3 > confreg

Configuration Summary
(Virtual Configuration Register: 0x0)
enabled are:
[ 0 ] break/abort has effect
[ 1 ] console baud: 9600
boot: ...... the ROM Monitor

do you wish to change the configuration? y/n [n]: y
enable "diagnostic mode"? y/n [n]:
enable "use net in IP bcast address"? y/n [n]:
enable "load rom after netboot fails"? y/n [n]:
enable "use all zero broadcast"? y/n [n]:
disable "break/abort has effect"? y/n [n]:
enable "ignore system conf info"? y/n [n]:
change console baud rate? y/n [n]:
change the boot characteristics? y/n [n]:

Configuration Summary
(Virtual Configuration Register: 0x0)
enabled are:
[ 0 ] break/abort has effect
[ 1 ] console baud: 9600
boot: ...... the ROM Monitor

do you wish to change the configuration? y/n [n]:
```
Upgrading ROMMON

To upgrade ROMMON, perform these steps:

**Step 1** (Optional) To display the current ROMMON version at the IOS prompt, use the following command:

```
Router# show rom-monitor R0
System Bootstrap, Version 16.8(1r), RELEASE SOFTWARE Copyright (c) 1994-2018 by cisco Systems, Inc.
```

**Step 2**
From the personal computer, copy the ROMMON `isr4400_rommon_169_1r_SPA.pkg R0` file to a USB flash drive.

**Step 3**
Insert the USB flash drive into the usb0: slot, or download the ROMMON package file to the bootflash: using the IOS `copy tftp: ` command.

**Step 4** (Optional) Use the `verify /md5 <filesystem>:<pkg filename>` command to verify the MD5 checksum of the ROMMON package file.

The `<filesystem>` is `usb0` or `bootflash:`. The `<PKG filename>` is the downloaded ROMMON package file. For example, `isr4400_rommon_168_1r_SPA.pkg` is a downloaded ROMMON package file.

**Step 5**
At the IOS prompt, run the `upgrade rom-monitor` command to begin the ROMMON upgrade process:

```
Router# upgrade rom-monitor filename bootflash:isr4400_rommon_169_1r_SPA.pkg R0.
```

**Caution**
Do not remove the hardware, turn off power, or interrupt the router during the ROMMON upgrade. Although the device recovers from most interruptions during the ROMMON upgrade, certain scenarios may cause unpredictable problems.

**Step 6**
After the device is upgraded, use the `reload` command to complete the upgrade process. When the device boots up, it validates the upgrade file before the backup copy of the ROMMON is upgraded. When the upgrade is complete, the device reboots to start running the new ROMMON.

```
ROMMON upgrade complete.
To make the new ROMMON permanent, you must restart the RP. Router# reload
Proceed with reload? [confirm]  (The ROMMON boots twice; on the second boot, the upgrade ROMMON starts)
```

**Step 7**
If an autoboot option is not configured, boot an IOS_XE image at the prompt. The IOS-XE image must successfully boot to an IOS prompt to complete the ROMMON upgrade process.

**Step 8**
At the IOS prompt, use the `show rom-monitor R0` command to verify that the ROMMON version matches the ROMMON PKG file version.

```
Router>enable
Router#show rom-monitor R0
```

```
System Bootstrap, Version 16.8(1r), RELEASE SOFTWARE Copyright (c) 1994-2018 by cisco Systems, Inc.
```

**Note**
After a device is upgraded to 16.9(1r) ROMMON release, the ROMMON cannot be downgraded to a release earlier than 16.9(1r). All future ROMMON releases can be downgraded to the 16.9(1r) release.
Resolved Caveats

The following section lists the issues resolved in each ROMMON release:

Resolved Caveats in ROMMON Release 16.12(2r)

All resolved bugs for this release are available in the Cisco Bug Search Tool.

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCvr18589</td>
<td>Cisco 4451 and 4431 ISRs ROMMON Stuck in “Initializing Hardware” loop.</td>
</tr>
</tbody>
</table>

Resolved Caveats in ROMMON Release 16.12(1r)

All resolved bugs for this release are available in the Cisco Bug Search Tool.

<table>
<thead>
<tr>
<th>Identifier</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CSCvn56059</td>
<td>Cisco 4300 ISR ROMMON: Enable FastBoot.</td>
</tr>
<tr>
<td>CSCvn67410</td>
<td>Cisco 4462 ISR UEFI: The BIOS always takes the MRC ColdBoot path.</td>
</tr>
<tr>
<td>CSCvn67286</td>
<td>Cisco 4462 ISR UEFI: Specifically enable FastBoot(Cold) and disable RMT and memory testing.</td>
</tr>
<tr>
<td>CSCvn57779</td>
<td>Cisco 4000 Series ISRs UEFI: Reduce network driver initialization time.</td>
</tr>
<tr>
<td>CSCvn75660</td>
<td>Cisco 4462 ISR ROMMON: Missing Microloader Certificate Serial Number.</td>
</tr>
<tr>
<td>CSCvm74048</td>
<td>Cisco 4200 ISR ROMMON: Enable AER support for PCIe errors.</td>
</tr>
</tbody>
</table>

Resolved Caveats in ROMMON Release 16.7(5r)

All resolved bugs for this release are available in the Cisco Bug Search Tool.

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCvp29532</td>
<td>Cisco 4000 Series ISRs ROMMON Kernel ASLR fails on SDWAN (cEdge) images.</td>
</tr>
</tbody>
</table>

Resolved Caveats in ROMMON Release 16.7(2r)

All resolved bugs for this release are available in the Cisco Bug Search Tool.
<table>
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</thead>
<tbody>
<tr>
<td>CSCve02192</td>
<td>ROMMON 16.x reports SHA-1 error when booting from packages.conf.</td>
</tr>
<tr>
<td>CSCvc81806</td>
<td>Cisco 4000 Series ISRs watchdog crash results in silent reboot and &lt;NULL&gt; reason.</td>
</tr>
</tbody>
</table>
Additional References

The following sections provide references related to this function.

Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco IOS XE commands</td>
<td>Cisco IOS Master Commands List, All Releases</td>
</tr>
</tbody>
</table>

Technical Assistance

<table>
<thead>
<tr>
<th>Description</th>
<th>Link</th>
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</thead>
<tbody>
<tr>
<td>The Cisco Support website provides extensive online resources, including documentation and tools for</td>
<td><a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a></td>
</tr>
<tr>
<td>troubleshooting and resolving technical issues with Cisco products and technologies.</td>
<td></td>
</tr>
<tr>
<td>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</td>
<td></td>
</tr>
<tr>
<td>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</td>
<td></td>
</tr>
</tbody>
</table>

Feature Information for Upgrading Field-Programmable Hardware Devices for Cisco 4000 Series ISRs

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator at www.cisco.com/go/cfn to find information about platform support and Cisco software image support. An account on Cisco.com is not required.

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrading Field-Programmable Hardware Devices for Cisco 4000 Series ISRs</td>
<td>Cisco IOS XE Release 3.10S</td>
<td>In Cisco IOS XE Release 3.10S, support for upgrading field-programmable hardware devices was introduced for the Cisco 4000 Series ISRs. The following commands were introduced: upgrade hw-programmable, show hw-programmable, show upgrade hw-programmable progress, show upgrade hw-programmable file.</td>
</tr>
</tbody>
</table>