Cisco XR 12000 Series Router and Cisco CRS-1 Router Flash Disk Upgrade Tasks

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Product Numbers: Cisco XR 12000 Series Router: MEM-FD2G= and MEM-FD4G= ; Cisco CRS-1 router: CRS-FLASH-DISK-2G= and CRS-FLASH-DISK-4G=

The flash disk on the route processor (RP) stores Cisco IOS XR software images and the configuration information that is used to boot up the system on either the Cisco CRS-1 router or the Cisco XR 12000 Series Router. The current flash disk size is 1 gigabyte (GB). A typical flash disk stores two releases (the current release and the previous release) of Cisco IOS XR software images and software maintenance updates (SMUs).

The total flash disk storage used for Cisco IOS XR Software Release 3.5.0 and Release 3.6.0 software images and SMUs is nearly 1 GB. The flash disk is partitioned into two parts, with the following allocations:

- 80 percent—The boot/config/system files are stored here.
- 20 percent—Logs system-critical information.

From IOS XR Release 3.6, disk partitioning is supported. Partitioning of a 2 GB disk is possible but not required. Partitioning of a 4 GB disk is required. In order to partition the flash disk, you must manually enter the **format diskx: partition** command.

The available flash disk size of 0.8 GB is not sufficient to store Cisco IOS XR software images of both versions and system configuration information. For this reason, you should upgrade the flash disk on your Cisco XR 12000 Series Router or Cisco CRS-1 router from 1 GB to 2 GB or 4 GB. Table 1 specifies the change history of this document.

Table 1 Changes to this Document

Release	Platforms Supported
Release 3.6.0	Introduced for the Cisco XR 12000 platform
Release 3.6.1	Introduced for the Cisco CRS-1 platform

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Table 1 Changes to this Document (continued)

Release	Platforms Supported
Release 3.6.2	Added support for upgrading the Cisco CRS-1 platform from Release 3.5.4 to Release 3.6.2 and support for the 4 GB flash disk on both the Cisco XR 12000 and Cisco CRS-1 platforms.
Release 3.7.0	Included Table 2 and the changes related to flash disk for the Cisco XR 12000 and Cisco CRS-1 platforms.
Release 3.8.0	Added 4 GB upgrade information and ROMMON upgrade requirement information.
Release 3.8.1	Added flash disk upgrade procedure for Cisco IOS XR 3.6 or 3.7 (4G FAT16) to 3.8 (4G FAT32) software. Added flash disk downgrade procedure for Cisco IOS XR 3.8 (4G FAT32) to 3.7 or 3.6 (4G FAT16) software.

Table 2 specifies the Cisco IOS XR software releases on which the flash disk upgrade is mandatory for the Cisco CRS-1 router and the Cisco XR 12000 Series Router.

Table 2 Cisco IOS XR Releases Requiring Compulsory Flash Disk Upgrade

Release	Platforms
3.6.2 (when upgrading from 3.5.4)	Cisco CRS-1 platform
Release 3.6.0 and later releases	Cisco XR 12000 platform
Release 3.7.0 and later releases	Cisco CRS-1 platform

Note The upgrade procedure works only if the disks are not corrupt. If the disks are corrupt, we recommend that you perform a new turbo-boot using the new flash cards. Refer to the "Flash Disk Recovery" section in *Cisco IOS XR System Management Configuration Guide* for more information.

The flash disk size of a Cisco XR 12000 Series Router or Cisco CRS-1 router which runs Cisco IOS XR Software Release 3.4.0, Release 3.5.0, or Release 3.6.0 can be either 1 GB, 2 GB, or 4 GB. However, when Cisco IOS XR software is upgraded to Release 3.7.0 and later releases, the minimum size of the flash disk must be 2 GB.

The flash disk upgrade from 2 GB to 4 GB is supported for any Cisco IOS XR software release for both Cisco CRS-1 routers and Cisco XR 12000 Series Routers.

Cisco IOS XR Software Release 3.4.0 and Release 3.5.0 support the 4-GB flash disk but the flash disk must be pre-partitioned and formatted into two 2-GB partitions with FAT 16 file system. This file system can use only 2 GB to save the IOS XR image, configuration information, and SMUs. The 4-GB flash disks must arrive from Cisco Manufacturing this way. Cisco IOS XR Software Release 3.4.0 and Release 3.5.0 do not have the capability to repartition the flash disk. Cisco IOS XR Software Release 3.4.0 and Release 3.5.0 have only one of the two partitions. Cisco IOS XR Software Release 3.6.0, Release 3.7.0, and Release 3.8.0 have both partitions and can be repartitioned as necessary.

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Resolving Flash Disk Space Shortage

When you attempt to resolve a flash disk space shortage, use the following guidelines:

- Do not turn on the disk mirroring feature in Cisco IOS XR Software Release 3.6.0. If the flash disk mirroring feature is turned on, then it takes an additional 100 MB of space.
- If 1 GB is not enough disk space, trim down the image and remove software maintenance updates that are not currently being used to conserve flash disk space. Refer to the *Cisco IOS XR System Management Configuration Guide* for more information on how to remove software maintenance updates.

Prerequisites for Upgrading a Flash Disk

The prerequisites for upgrading a flash disk are as follows:

- Physical access to the router
- Console access to the Active (ACTV) and Standby (STBY) route processor
- Two new replacement flash disks; each with 2-GB or 4-GB space
- Phillips screw driver in case the disk cover is screwed in place

Note Upgrading to a 4 GB flash disk on a Cisco CRS-1 router running Cisco IOS XR Software Release 3.8.0 requires ROMMON version 1.52.

Note Refer to the “How to Install or Remove a PCMCIA Card” section in *Cisco CRS-1 Carrier Routing System 8-Slot Line Card Chassis Installation Guide* to identify the locations of disk0/disk1 and to remove flash disks from, or insert into, the Cisco CRS-1 router. Refer to the “Removing and Installing a Flash Disk in the PRP” section in *Performance Route Processor Installation and Configuration Note* to identify the locations of disk0/disk1 and to remove flash disks from, or insert into, the Cisco XR 12000 Series Router.

Flash Disk Graceful Upgrade Procedure

You must perform the flash disk upgrade by first upgrading the standby route processor to 2 GB or 4 GB, so that system operation is not affected. A summary of high-level steps for performing the flash disk upgrade follows:

1. Copy the mbi image from the active disk0 to each of the new 2-GB flash disks on disk1. (Cisco XR 12000 Series Router only)
2. Take the standby route processor to ROMMON.
3. Insert one of the 2-GB flash disks to disk0 of the standby route processor in ROMMON. For the Cisco XR 12000 Series Router, boot from the copied mbi image. For the Cisco CRS-1 router, reset the standby route processor which downloads the mbi image from the active route processor.
4. When the standby route processor comes up and is ready, execute the **redundancy switchover** command.
5. Ensure that the new active and standby flash disks are up.
6. Go to Step 3.

Warning **Interruptions while upgrading your existing disk0 could result in the router being left in a catastrophic state. Before upgrading the disks, back up all files. Be sure to follow the upgrade procedure carefully.**

The examples below are from console port sessions on a Cisco XR 12000 Series Router running Cisco IOS XR software with the active route processor installed in slot 5 and the standby route processor installed in slot 0.

Note The example below shows the output of a Cisco XR 12000 Series Router. The steps shown in this procedure are the same for the Cisco CRS-1 router. Any differences are mentioned in the affected steps.

Step 1 Use the **show version | inc register** command on the active route processor in slot 5 to record the configuration register setting of the router:

```
RP/0/5/CPU0:router# show version | inc register
Configuration register on node 0/0/CPU0 is 0x102
Configuration register on node 0/5/CPU0 is 0x102
RP/0/5/CPU0:router#
```

Note Configuration register settings may vary from customer to customer.

Step 2 In admin mode, enter the **config-register** command on the active route processor in slot 5 to change the configuration registers of both the active and standby route processors to 0x0:

```
RP/0/5/CPU0:router# admin
RP/0/5/CPU0:router(admin)# config-register 0x0

Successfully set config-register to 0x0 on node 0/0/CPU0
Successfully set config-register to 0x0 on node 0/5/CPU0
RP/0/5/CPU0:router(admin)#
```

Step 3 Cisco XR 12000 Series Router only—Use the **show version | inc image** command on the active route processor in slot 5 to determine the location of the mbi image.

```
RP/0/5/CPU0:router(admin)# show version | inc image

System image file is "disk0:c12k-os-mbi-3.6.0/mbiprp-rp.vm"
RP/0/5/CPU0:router(admin)#
```

The BOOT variable indicates that the location of the mbi image is located at disk0:c12k-os-mbi-3.6.0/mbiprp-rp.vm. Copy this location into a file. If the old flash disk needs to be restored, you may need this location.

Step 4 Remove the flash disk from slot 0 on the standby route processor in slot 0. Label this flash disk and store it in a safe place. If the old flash disk needs to be restored, use this flash disk.

Step 5 Insert the new replacement flash disk into slot 1 of the active route processor in slot 5.

Step 6 Format the new flash disk in slot 1 using the **format** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router# format disk1:

Format will destroy all data on "disk1:". Continue? [confirm]
Device partition disk1: is now formated and is available for use.
RP/0/5/CPU0:router#
```

Note The Cisco XR 12000 Series Router supports 4-GB flash disks in Cisco IOS XR Software Release 3.7.0, but it should be partitioned when the flash disk is formatted. This leads to two 2-GB partitions. The command to form partitions is **format disk1: partition**. The partition option is supported only in Cisco IOS XR Software Release 3.6.0 and later releases.

Step 7 Run a consistency check on the file system created on the new flash disk in slot 1 by entering the **run chkdosfs -n** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router# run chkdosfs -n disk1:

Phase 1 - Read and compare FATs
Phase 2 - Check cluster chains
Phase 3 - Check directories
Phase 4 - Check for lost files

96 kb used, 2049888 kb free, 0 files, 2 directories
Filesystem is clean.
RP/0/5/CPU0:router#
```

Note The boot media could be disk0 or disk1. This document is based on disk0 as a boot media.

Step 8 Cisco XR 12000 Series Router only—Copy the mbi image from disk0: on the active route processor in slot 5 to the new flash disk in slot 1: using the location of the mbi image in Step 3 of this procedure:

```
RP/0/5/CPU0:router# copy disk0:c12k-os-mbi-3.6.0/mbiprp-rp.vm disk1:

Destination filename [/disk1:/mbiprp-rp.vm]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCC
10298984 bytes copied in     16 sec (   633744)bytes/sec
RP/0/5/CPU0:router#
```

To verify that the mbi image is on the new flash disk in slot 1, use the **dir** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router# dir disk1:

Directory of disk1:

2           drwx  32768       Tue Oct 23 00:56:29 2007  LOST.DIR
65632       -rwx  10298984    Tue Oct 23 00:54:48 2007  mbiprp-rp.vm

2099118080 bytes total (2088763392 bytes free)
RP/0/5/CPU0:router#
```

Step 9 Remove the new flash disk from slot 1 on the active route processor in slot 5 and insert it into slot 0 on the standby route processor in slot 0.

Step 10 Insert the second new replacement flash disk into slot 1 of the active route processor in slot 5.

Step 11 To format the second new flash disk in slot1, use the **format** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router# format disk1:

Format will destroy all data on "disk1:". Continue? [confirm]

Device partition disk1: is now formatted and is available for use.
RP/0/5/CPU0:router#
```

Step 12 Run a consistency check on the file system created on the second new flash disk in slot 1 by entering the **run chkdosfs -n** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router# run chkdosfs -n disk1:

Phase 1 - Read and compare FATs
Phase 2 - Check cluster chains
Phase 3 - Check directories
Phase 4 - Check for lost files

96 kb used, 2049888 kb free, 0 files, 2 directories
Filesystem is clean.
RP/0/5/CPU0:router#
```

Step 13 Cisco XR 12000 Series Router only—Copy the mbi image from disk0: on the active route processor in slot 5 to the second new flash disk in slot 1 using the location of the mbi image in Step 3 of this procedure:

```
RP/0/5/CPU0:router# copy disk0:c12k-os-mbi-3.6.0/mbiprp-rp.vm disk1:

Destination filename [/disk1:/mbiprp-rp.vm]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCC
10298984 bytes copied in     16 sec (   633744)bytes/sec
RP/0/5/CPU0:router#
```

Verify that the mbi image is on the second new flash disk in slot1, using the **dir** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router# dir disk1:

Directory of disk1:

2           drwx  32768       Tue Oct 23 00:56:29 2007  LOST.DIR
65632       -rwx  10298984    Tue Oct 23 00:54:48 2007  mbiprp-rp.vm
```

```
2099118080 bytes total (2088763392 bytes free)
RP/0/5/CPU0:router#
```

Step 14 Bring the standby route processor in slot 0 to rommon mode using the **reload location** command in admin mode on the active route processor in slot 5:

```
RP/0/5/CPU0:router(admin)# reload location 0/0/CPU0

Preparing system for backup. This may take a few minutes [done]
Proceed with reload? [confirm]
RP/0/5/CPU0:router(admin)#
```

Verify that the standby route processor in slot 0 is in rommon mode, using the **show platform** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router(admin)# show platform

Node            Type            PLIM            State           Config State
-------------------------------------------------------------------------------
0/0/CPU0        PRP             N/A             Card Present    PWR,NSHUT,MON
0/2/CPU0        L3LC Eng 5+     Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/2/3           SPA             SPA-8XCHT1/E1   READY           PWR,NSHUT
0/3/CPU0        L3LC Eng 5      Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/3/0           SPA             SPA-5X1GE-V2    READY           PWR,NSHUT
0/5/CPU0        PRP(Active)     N/A             IOS XR RUN      PWR,NSHUT,MON
0/16/CPU0       CSC6(P)         N/A             PWD             PWR,NSHUT,MON
0/18/CPU0       SFC6            N/A             PWD             PWR,NSHUT,MON
0/19/CPU0       SFC6            N/A             PWD             PWR,NSHUT,MON
0/20/CPU0       SFC6            N/A             PWD             PWR,NSHUT,MON
0/24/CPU0       ALARM6          N/A             PWD             PWR,NSHUT,MON
0/25/CPU0       ALARM6          N/A             PWD             PWR,NSHUT,MON
0/28/CPU0       GSR6-BLOWER     N/A             PWD             PWR,NSHUT,MON
RP/0/5/CPU0:router(admin)#
```

Step 15 Cisco XR 12000 Series Router only—Locate the mbi image on the new flash disk in slot 0 using the rommon **dir** command on the standby route processor in slot 0:

```
rommon 1 > dir disk0:

  File size   Perms    File name
  0           drw-     LOST.DIR
  10298984    -rw-     mbiprp-rp.vm
rommon 2 >
```

Step 16 On the Cisco XR 12000 Series Router, boot the mbi image on the new flash disk in slot 0 by using the rommon **boot** command on the standby route processor in slot 0:

```
rommon 2 > boot disk0:mbiprp-rp.vm
```

On the Cisco CRS-1 router, a simple boot boots the mbi image on the new flash disk in slot 0:

```
rommon 2 > boot
```

Wait for the standby route processor in slot 0 to install all Cisco IOS XR software, sync up with the active route processor in slot 5, and become ready.

Note The standby route processor may take over one hour to become ready, depending upon the size of the configuration and routing table.

Step 17 Determine if the standby route processor in slot 0 is in the ready state, using the **show redundancy** command on the active route processor in slot 5:

The following example shows that the standby route processor in slot 0 is not ready:

```
RP/0/5/CPU0:router# show redundancy

Redundancy information for node 0/5/CPU0:
==========================================
Node 0/5/CPU0 is in ACTIVE role
Node 0/5/CPU0 has no valid partner

Reload and boot info
----------------------
PRP reloaded Fri Oct 12 19:24:14 2007: 1 week, 3 days, 6 hours, 25 minutes ago
Active node booted Fri Oct 12 19:24:14 2007: 1 week, 3 days, 6 hours, 25 minutes ago
Standby node lost Tue Oct 23 00:19:12 2007: 1 hour, 30 minutes ago

RP/0/5/CPU0:router#
```

The following example shows that the standby route processor in slot 0 is ready:

```
RP/0/5/CPU0:router# show redundancy

Redundancy information for node 0/5/CPU0:
==========================================
Node 0/5/CPU0 is in ACTIVE role
Partner node (0/0/CPU0) is in STANDBY role
Standby node in 0/0/CPU0 is ready
Standby node in 0/0/CPU0 is NSR-ready

Reload and boot info
----------------------
PRP reloaded Fri Oct 12 19:24:14 2007: 1 week, 3 days, 6 hours, 36 minutes ago
Active node booted Fri Oct 12 19:24:14 2007: 1 week, 3 days, 6 hours, 36 minutes ago
Standby node boot Tue Oct 23 01:54:55 2007: 5 minutes ago
Standby node last went not ready Tue Oct 23 02:00:01 2007:  27 seconds ago
Standby node last went ready Tue Oct 23 02:00:01 2007:  27 seconds ago
Standby node last went not NSR-ready Tue Oct 23 02:00:01 2007:  27 seconds ago
Standby node last went NSR-ready Tue Oct 23 02:00:01 2007:  27 seconds ago
There have been 0 switch-overs since reload

RP/0/5/CPU0:router#
```

Note After the standby route processor enters the ready state, go to the next step in this procedure. If the standby route processor does not enter the ready state, use the "Flash Disk Upgrade Abort Procedure" section on page 11 to restore the old standby flash disk.

Step 18 After the standby route processor in slot 0 is in the ready state, enter the **config-register** command in admin mode on the active route processor in slot 5 to change the configuration register of the standby route processor in slot 0 to the value recorded in Step 1 of this procedure:

```
RP/0/5/CPU0:router(admin)# config-register 0x102 location 0/0/CPU0

Successfully set config-register to 0x102 on node 0/0/CPU0
RP/0/5/CPU0:router(admin)#
```

Step 19 Reset the standby route processor in slot 0 to become the new active route processor, using the **redundancy switchover** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router# redundancy switchover

Proceed with switchover 0/5/CPU0 -> 0/0/CPU0? [confirm]
Initiating switch-over.
```

The route processor in slot 5 is now the new standby route processor and is in rommon mode. Verify that the standby route processor in slot 5 is in rommon mode, using the **show platform** command on the new active route processor in slot 0:

```
RP/0/0/CPU0:router(admin)# show platform

Node              Type              PLIM              State             Config State
--------------------------------------------------------------------------------
0/0/CPU0          PRP(Active)       N/A               IOS XR RUN        PWR,NSHUT,MON
0/2/CPU0          L3LC Eng 5+       Jacket Card       IOS XR RUN        PWR,NSHUT,MON
0/2/3             SPA               SPA-8XCHT1/E1     READY             PWR,NSHUT
0/3/CPU0          L3LC Eng 5        Jacket Card       IOS XR RUN        PWR,NSHUT,MON
0/3/0             SPA               SPA-5X1GE-V2      READY             PWR,NSHUT
0/5/CPU0          PRP               N/A               Card Present      PWR,NSHUT,MON
0/16/CPU0         CSC6(P)           N/A               PWD               PWR,NSHUT,MON
0/18/CPU0         SFC6              N/A               PWD               PWR,NSHUT,MON
0/19/CPU0         SFC6              N/A               PWD               PWR,NSHUT,MON
0/20/CPU0         SFC6              N/A               PWD               PWR,NSHUT,MON
0/24/CPU0         ALARM6            N/A               PWD               PWR,NSHUT,MON
0/25/CPU0         ALARM6            N/A               PWD               PWR,NSHUT,MON
0/28/CPU0         GSR6-BLOWER       N/A               PWD               PWR,NSHUT,MON
RP/0/0/CPU0:router(admin)#
```

Step 20 Remove the flash disk from slot 0 on the standby route processor in slot 5. Label this flash disk and store it in a safe place. If the old flash disk needs to be restored, use this flash disk.

Step 21 Remove the second, new replacement flash disk from slot 1: on the standby route processor in slot 5, and insert it into slot 0: of the standby route processor in slot 5.

Step 22 Cisco XR 12000 Series Router only—Locate the mbi image on the second, new flash disk in slot 0 using the rommon **dir** command on the standby route processor in slot 5:

```
rommon 1 > dir disk0:

  File size   Perms    File name
  0           drw-     LOST.DIR
  10298984    -rw-     mbiprp-rp.vm
rommon 2 >
```

Step 23 On the Cisco XR 12000 Series Router, boot the mbi image on the new flash disk in slot 0 by using the rommon **boot** command on the standby route processor in slot 0:

```
rommon 2 > boot disk0:mbiprp-rp.vm
```

On the Cisco CRS-1 router, a simple boot boots the mbi image on the new flash disk in slot 0:

```
rommon 2 > boot
```

Wait for the standby route processor in slot 5 to install all Cisco IOS XR software, sync up with the active route processor in slot 0, and become ready.

Note The standby route processor may take over one hour to become ready, depending upon the size of the configuration and routing table.

Step 24 Determine if the standby route processor in slot 5 is in the ready state, using the **show redundancy** command on the active route processor in slot 0. This example shows that the standby route processor in slot 5 is not ready:

```
RP/0/0/CPU0:router# show redundancy

Redundancy information for node 0/0/CPU0:
```

```
=========================================
Node 0/0/CPU0 is in ACTIVE role
Node 0/0/CPU0 has no valid partner

Reload and boot info
----------------------
PRP reloaded Fri Oct 12 19:24:14 2007: 1 week, 3 days, 9 hours, 13 minutes ago
Active node booted Tue Oct 23 01:54:55 2007: 2 hours, 42 minutes ago
Last switch-over Tue Oct 23 03:21:15 2007: 1 hour, 16 minutes ago

RP/0/0/CPU0:router#
```

This example shows that the standby route processor in slot 5 is ready:

```
RP/0/0/CPU0:router# show redundancy

Redundancy information for node 0/0/CPU0:
=========================================
Node 0/0/CPU0 is in ACTIVE role
Partner node (0/5/CPU0) is in STANDBY role
Standby node in 0/5/CPU0 is ready
Standby node in 0/5/CPU0 is NSR-ready
Reload and boot info
----------------------
PRP reloaded Fri Oct 12 19:24:14 2007: 1 week, 3 days, 9 hours, 30 minutes ago
Active node booted Tue Oct 23 01:54:55 2007: 2 hours, 59 minutes ago
Last switch-over Tue Oct 23 03:21:15 2007: 1 hour, 33 minutes ago
Standby node boot Tue Oct 23 04:50:20 2007: 4 minutes ago
Standby node last went not ready Tue Oct 23 04:54:05 2007:  32 seconds ago
Standby node last went ready Tue Oct 23 04:54:05 2007:  32 seconds ago
Standby node last went not NSR-ready Tue Oct 23 04:54:05 2007:  32 seconds ago
Standby node last went NSR-ready Tue Oct 23 04:54:05 2007:  32 seconds ago
There has been 1 switch-over since reload

RP/0/0/CPU0:router#
```

Step 25 After the standby route processor in slot 5 enters the ready state, enter the **config-register** command in admin mode on the active route processor in slot 0. This changes the configuration register of both the active route processor in slot 0 and the standby route processor in slot 5 to the value recorded in Step 1 of this procedure:

```
RP/0/0/CPU0:router(admin)# config-register 0x102 location all

Successfully set config-register to 0x102 on node 0/0/CPU0
Successfully set config-register to 0x102 on node 0/5/CPU0
RP/0/0/CPU0:router(admin)#
```

Step 26 Verify the status of both route processors by entering the **show platform** command from the active route processor in slot 0:

```
RP/0/0/CPU0:router(admin)# show platform

Node            Type            PLIM            State           Config State
-----------------------------------------------------------------------------
0/0/CPU0        PRP(Active)     N/A             IOS XR RUN      PWR,NSHUT,MON
0/2/CPU0        L3LC Eng 5+     Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/2/3           SPA             SPA-8XCHT1/E1   READY           PWR,NSHUT
0/3/CPU0        L3LC Eng 5      Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/3/0           SPA             SPA-5X1GE-V2    READY           PWR,NSHUT
0/5/CPU0        PRP(Standby)    N/A             IOS XR RUN      PWR,NSHUT,MON
0/16/CPU0       CSC6(P)         N/A             PWD             PWR,NSHUT,MON
0/18/CPU0       SFC6            N/A             PWD             PWR,NSHUT,MON
0/19/CPU0       SFC6            N/A             PWD             PWR,NSHUT,MON
0/20/CPU0       SFC6            N/A             PWD             PWR,NSHUT,MON
```

```
0/24/CPU0        ALARM6          N/A              PWD              PWR,NSHUT,MON
0/25/CPU0        ALARM6          N/A              PWD              PWR,NSHUT,MON
0/28/CPU0        GSR6-BLOWER     N/A              PWD              PWR,NSHUT,MON
RP/0/0/CPU0:router(admin)#
```

Both route processors should be in the IOS XR RUN state and the active and standby route processor roles should be reversed. Optionally, if the route processor in slot 5 is the preferred active route processor, enter the **redundancy switchover** command on the active route processor in slot 0 to reverse the current roles to the original route processor redundancy configuration.

Flash Disk Upgrade Abort Procedure

If the standby route processor in slot 0 fails to come up to a ready state as shown in the "Flash Disk Graceful Upgrade Procedure" section on page 4, Step 17, and it is necessary to restore the old flash disk, use this procedure.

The examples in this procedure are from console port sessions on a Cisco XR 12000 Series Router running Cisco IOS XR software, with the active route processor installed in slot 5 and the standby route processor installed in slot 0.

Step 1 To change the configuration register of the standby route processor in slot 0 to the value of 0x0, enter the **config-register** command in admin mode on the active route processor in slot 5:

```
RP/0/5/CPU0:router(admin)# config-register 0x0 location 0/0/CPU0

Successfully set config-register to 0x0 on node 0/0/CPU0
RP/0/5/CPU0:router(admin)#
```

Step 2 Bring the standby route processor in slot 0 to rommon mode, using the **reload location** command in admin mode on the active route processor in slot 5:

```
RP/0/5/CPU0:router(admin)# reload location 0/0/CPU0

Preparing system for backup. This may take a few minutes [done]
Proceed with reload? [confirm]
RP/0/5/CPU0:router(admin)#
```

Verify that the standby route processor in slot 0 is in rommon mode, using the **show platform** command on the active route processor in slot 5:

```
RP/0/5/CPU0:router(admin)# show platform

Node             Type             PLIM             State            Config State
-----------------------------------------------------------------------------
0/0/CPU0         PRP              N/A              Card Present     PWR,NSHUT,MON
0/2/CPU0         L3LC Eng 5+      Jacket Card      IOS XR RUN       PWR,NSHUT,MON
0/2/3            SPA              SPA-8XCHT1/E1    READY            PWR,NSHUT
0/3/CPU0         L3LC Eng 5       Jacket Card      IOS XR RUN       PWR,NSHUT,MON
0/3/0            SPA              SPA-5X1GE-V2     READY            PWR,NSHUT
0/5/CPU0         PRP(Active)      N/A              IOS XR RUN       PWR,NSHUT,MON
0/16/CPU0        CSC6(P)          N/A              PWD              PWR,NSHUT,MON
0/18/CPU0        SFC6             N/A              PWD              PWR,NSHUT,MON
0/19/CPU0        SFC6             N/A              PWD              PWR,NSHUT,MON
0/20/CPU0        SFC6             N/A              PWD              PWR,NSHUT,MON
0/24/CPU0        ALARM6           N/A              PWD              PWR,NSHUT,MON
0/25/CPU0        ALARM6           N/A              PWD              PWR,NSHUT,MON
0/28/CPU0        GSR6-BLOWER      N/A              PWD              PWR,NSHUT,MON
```

```
RP/0/5/CPU0:router(admin)#
```

Step 3 Replace the new flash disk in slot 0 with the old flash disk on the standby route processor in slot 0.

Step 4 Boot the mbi image located on the old flash disk in slot 0, using the rommon **boot** command on the standby route processor in slot 0. Use the BOOT variable from "Flash Disk Graceful Upgrade Procedure" section on page 4, Step 4:

```
rommon 2 > boot disk0:c12k-os-mbi-3.6.0/mbiprp-rp.vm
```

Wait for the standby route processor in slot 0 to sync up with the active route processor in slot 5 and become ready.

Step 5 Determine if the standby route processor in slot 0 is in the ready state, using the **show redundancy** command on the active route processor in slot 5. This example shows that the standby route processor in slot 0 is not ready:

```
RP/0/5/CPU0:router(admin)# show redundancy

Redundancy information for node 0/5/CPU0:
==========================================
Node 0/5/CPU0 is in ACTIVE role
Partner node (0/0/CPU0) is in STANDBY role
Standby node in 0/0/CPU0 is not ready
Standby node in 0/0/CPU0 is NSR-ready

Details
--------
Current active redcon state: 4 (I_READY)
  <jid>       <node>       <name> Reason for standby not ready
    413     0/0/CPU0 vi_config_replicator VICR copying Virtual Interface config to standby
        Not ready set Tue Oct 23 06:28:24 2007:  12 seconds ago
     87     0/0/CPU0       sysmgr Software activation in progress
        Not ready set Tue Oct 23 06:25:11 2007: 3 minutes ago

Current active redcon state for NSR: Ready
All not-ready NSR bits clear - standby should be NSR-ready

Reload and boot info
----------------------
PRP reloaded Fri Oct 12 19:24:14 2007: 1 week, 3 days, 11 hours, 4 minutes ago
Active node booted Tue Oct 23 04:49:07 2007: 1 hour, 39 minutes ago
Last switch-over Tue Oct 23 05:53:08 2007: 35 minutes ago
Standby node boot Tue Oct 23 06:24:00 2007: 4 minutes ago
Standby node last went not ready Tue Oct 23 06:25:08 2007: 3 minutes ago
Standby node last went ready Tue Oct 23 05:58:31 2007: 30 minutes ago
Standby node last went not NSR-ready Tue Oct 23 05:58:30 2007: 30 minutes ago
Standby node last went NSR-ready Tue Oct 23 05:58:30 2007: 30 minutes ago
There have been 2 switch-overs since reload

RP/0/5/CPU0:router(admin)#
```

This example shows that the standby route processor in slot 0 is ready:

```
RP/0/5/CPU0:router(admin)# show redundancy

Redundancy information for node 0/5/CPU0:
==========================================
Node 0/5/CPU0 is in ACTIVE role
Partner node (0/0/CPU0) is in STANDBY role
Standby node in 0/0/CPU0 is ready
Standby node in 0/0/CPU0 is NSR-ready

Reload and boot info
```

```
----------------------
PRP reloaded Fri Oct 12 19:24:14 2007: 1 week, 3 days, 11 hours, 6 minutes ago
Active node booted Tue Oct 23 04:49:07 2007: 1 hour, 41 minutes ago
Last switch-over Tue Oct 23 05:53:08 2007: 37 minutes ago
Standby node boot Tue Oct 23 06:24:00 2007: 7 minutes ago
Standby node last went not ready Tue Oct 23 06:29:22 2007: 1 minute ago
Standby node last went ready Tue Oct 23 06:29:22 2007: 1 minute ago
Standby node last went not NSR-ready Tue Oct 23 06:29:29 2007: 1 minute ago
Standby node last went NSR-ready Tue Oct 23 06:29:29 2007: 1 minute ago
There have been 2 switch-overs since reload

RP/0/5/CPU0:router(admin)#
```

Step 6 After the standby route processor in slot 0 enters the ready state, enter the **config-register** command in admin mode on the active route processor in slot 5. This changes the configuration register of the standby route processor in slot 0 to the value recorded in the "Flash Disk Graceful Upgrade Procedure" section on page 4, Step 1:

```
RP/0/5/CPU0:router(admin)# config-register 0x102 location 0/0/CPU0

Successfully set config-register to 0x102 on node 0/0/CPU0
RP/0/5/CPU0:router(admin)#
```

Upgrading a Flash Disk from Cisco IOS XR 3.6 or 3.7 (4G FAT16) to 3.8 (4G FAT32) Software

To upgrade a flash disk from Cisco IOS XR 3.6 or 3.7 software images (4G FAT16) to IOS XR 3.8 software image (4G FAT32) on active and standby RPs, DRPs, and SC-GE22 cards, follow these steps.

Active/Standby RP

You must perform the following checks before upgrading the flash disk on active or standby RP:

- Both ROMMON B and A are upgraded to 1.52
- Disk0 is the boot device

A summary of high-level steps for performing the flash disk upgrade follows:

Step 1 Install and activate Cisco IOS XR 3.8 software image; router reloads as part of install.

```
# hd -n1b /dev/disk0t6
0000000 eb 3c 90 43 49 53 43 4f 20 20 20 00 02 40 76 00 .<.CISCO.....@v.
0000010 02 00 02 00 00 f8 fb 00 3f 00 10 00 3f 00 00 00 ........?...?...
0000020 11 ad 3e 00 80 01 29 e3 19 12 28 43 49 53 43 4f ..>...)...(CISCO
0000030 5f 49 4f 53 20 20 46 41 54 31 36 20 20 20 fa 31 _IOS..FAT16....1
0000040 c0 8e d0 bc 00 7c fb 8e d8 e8 00 00 5e 83 c6 19 .....|......^...
0000050 bb 07 00 fc ac 84 c0 74 06 b4 0e cd 10 eb f5 30 .......t.......0
0000060 e4 cd 16 cd 19 0d 0a 4e 6f 6e 2d 73 79 73 74 65 .......Non-syste
0000070 6d 20 64 69 73 6b 0d 0a 50 72 65 73 73 20 61 6e m.disk..Press.an
0000080 79 20 6b 65 79 20 74 6f 20 72 65 62 6f 6f 74 0d y.key.to.reboot.
0000090 0a 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
00000A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
*
00001F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 55 aa ..............U.
0000201
```

```
#
# uname -a
QNX node0_RP0_CPU0 6.4.0 2008/04/29-15:54:52PDT hfr-rp ppcbe
```

Step 2 Format disk1 with FAT32 fs and partition it into 3.5 G : 0.5G, using **format disk1: partition filesystem** command in admin mode on the active route processor.

```
RP/0/RP0/CPU0:ios(admin)# format disk1: partition filesystem fat32 location 0/rp0/cpu0

This operation will destroy all data on "disk1:" and partition device. Continue? [confirm]

Device partition disk1: is now formated and is available for use.
RP/0/RP0/CPU0:ios(admin)#

RP/0/RP0/CPU0:Jun 18 20:24:31.949 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 491932 kB available.
RP/0/RP0/CPU0:Jun 18 20:24:39.700 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 3607592 kB available.

# hd -n1b /dev/disk1t6
0000000 eb 58 90 43 49 53 43 4f 20 20 20 00 02 08 20 00 .X.CISCO........
0000010 02 00 00 00 00 f8 00 00 3f 00 10 00 3f 00 00 00 ........?...?...
0000020 81 4f 6e 00 87 1b 00 00 00 00 00 00 02 00 00 00 .On.............
0000030 02 00 01 00 20 20 20 20 20 20 20 20 20 20 20 20 ................
0000040 80 00 29 f0 1b 12 24 43 49 53 43 4f 5f 49 4f 53 ..)...$CISCO_IOS
0000050 20 20 46 41 54 33 32 20 20 20 fa 31 c0 8e d0 bc ..FAT32....1....
0000060 00 7c fb 8e d8 e8 00 00 5e 83 c6 19 bb 07 00 fc .|......^.......
0000070 ac 84 c0 74 06 b4 0e cd 10 eb f5 30 e4 cd 16 cd ...t.......0....
0000080 19 0d 0a 4e 6f 6e 2d 73 79 73 74 65 6d 20 64 69 ...Non-system.di
0000090 73 6b 0d 0a 50 72 65 73 73 20 61 6e 79 20 6b 65 sk..Press.any.ke
00000A0 79 20 74 6f 20 72 65 62 6f 6f 74 0d 0a 00 00 00 y.to.reboot.....
00000B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
*
00001F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 55 aa ..............U.
0000201
#
```

Formatting with a partition is required for disk mirroring. It sets up 3.5G FAT32 and .4G FAT16. If disk mirroring is not used in a system, the flash disk can be set up without any partition to fully utilize all the space on the flash disk using **format disk0: unpartition filesystem FAT32 location 0/RP0/CPU0** command. It creates a single 3.9G partition.

```
RP/0/RP0/CPU0:ios(admin)# format disk0: unpartition filesystem FAT32 location 0/RP0/CPU0
RP/0/RP0/CPU0:a2# run show_media

Media Information for 0/RP0/CPU0.
                    Image   Current  Part
   Mountpoint       FsType  FsType   Size   State         DrvrPid  Mirror Flags
==============================================================================
   /disk0:          FAT16   FAT32    3.9G Mounted         0036890  Enabled Formatted
```

Step 3 Configure and enable disk mirroring, using **mirror location 0/RP0/CPU0 disk0: disk1:** command.

```
RP/0/RP0/CPU0:ios(config)# mirror location 0/rp0/CPU0 disk0:disk1:
RP/0/RP0/CPU0:ios(config)# commit

RP/0/RP0/CPU0:Jun 18 20:27:47.040 : config[65714]: %MGBL-CONFIG-6-DB_COMMIT :
Configuration committed by user 'cisco'. Use 'show configuration commit changes
1000000003' to view the changes.
RP/0/RP0/CPU0:ios(config)# RP/0/RP0/CPU0:Jun 18 20:27:47.244 : redfs_svr[80]:
%OS-REDFS-6-MIRROR_ENABLED : Mirroring has been enabled with configured devices of disk0:
and disk1:.
```

Step 4 Wait for mirror state to be redundant. Check mirror state, using **sh mirror** command.

```
RP/0/RP0/CPU0:ios# sh mirror loc 0/rp0/cpu0

Mirror Information for 0/RP0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk0:
   Configured Secondary:       disk1:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk0:
   Current Physical Secondary: disk1:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk0:;disk1:
 BOOT_DEV_SEQ_OPER = disk0:;disk1:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#
```

Step 5 To make disk1 primary disk, change the configuration using **mirror location 0/RP0/CPU0 disk1: disk0:** command.

```
RP/0/RP0/CPU0:ios(config)# mirror location 0/rp0/CPU0 disk1:disk0:
RP/0/RP0/CPU0:ios(config)# commit

RP/0/RP0/CPU0:Jun 18 21:05:47.589 : redfs_svr[80]: %OS-REDFS-6-MIRROR_ENABLED : Mirroring
has been enabled with configured devices of disk1: and disk0:.
RP/0/RP0/CPU0:Jun 18 21:05:49.078 : config[65716]: %MGBL-CONFIG-6-DB_COMMIT :
Configuration committed by user 'cisco'. Use 'show configuration commit changes
1000000009' to view the changes.

P/0/RP0/CPU0:ios# sh mirror location 0/rp0/cpU0

Mirror Information for 0/RP0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk1:
   Configured Secondary:       disk0:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk1:
   Current Physical Secondary: disk0:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available
  disk1a:          Available     Formatted
  compactflasha:   Not Present
```

```
Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk1:;disk0:
 BOOT_DEV_SEQ_OPER = disk1:;disk0:
 MIRROR_ENABLE = Y
```

Step 6 Pause mirroring, using **mirror pause** command.

```
RP/0/RP0/CPU0:ios# mirror pause location 0/rp0/cpu0

RP/0/RP0/CPU0:Jun 18 21:18:05.534 : redfs_svr[80]: %OS-REDFS-5-MIRROR_PAUSED : Mirroring
has been paused. Please do 'mirror resume' to restart mirroring.

Info: Disk mirroring now paused for 0/RP0/CPU0.
```

Step 7 Unmount disk0, using **unmount disk0:** command.

```
RP/0/RP0/CPU0:ios# unmount disk0: location 0/rp0/CPU0

Device /disk0: is now unmounted and is safe to remove.
```

Step 8 Partition disk0, using **format disk0: partition force** command.

```
RP/0/RP0/CPU0:ios# format disk0: partition location 0/rp0/CPU0 force

This operation will destroy all data on "disk0:" and partition device. Continue? [confirm]
RP/0/RP0/CPU0:Jun 18 21:18:44.613 : syslog_dev[82]: mkdosfs:
RP/0/RP0/CPU0:Jun 18 21:18:44.613 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 491932 kB available.
RP/0/RP0/CPU0:Jun 18 21:18:52.415 : syslog_dev[82]: mkdosfs:
RP/0/RP0/CPU0:Jun 18 21:18:52.415 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 3607592 kB available.

Device partition disk0: is now formated and is available for use.
```

Step 9 Resume mirroring, using **mirror resume** command.

```
RP/0/RP0/CPU0:ios# mirror resume location 0/rp0/cpu0

RP/0/RP0/CPU0:Jun 18 21:19:04.073 : redfs_svr[80]: %OS-REDFS-6-MIRROR_RESUMED : Mirroring
has been resumed after being paused.

Info: Disk mirroring now resumed for 0/RP0/CPU0.
```

Step 10 Wait for mirror state to be redundant.

Step 11 To make disk0 primary disk, change the configuration using **mirror location 0/RP0/CPU0 disk0: disk1:** command.

```
RP/0/RP0/CPU0:ios# sh mirror location 0/rp0/cpu0

Mirror Information for 0/RP0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk1:
   Configured Secondary:       disk0:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk1:
   Current Physical Secondary: disk0:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled Formatted
```

```
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available     Formatted
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk1:;disk0:
 BOOT_DEV_SEQ_OPER = disk1:;disk0:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#
```

Step 12 You can leave mirror enabled or disabled in configuration.

Note Step 2 to Step 12 can be performed on both Active and Standby RPs in parallel.

Active/Standby DRP

The procedure for upgrading the flash disk on active or standby DRP is same as of RP.

Example:

```
# attach 0/1/cpu0

attach: Starting session 1 to node 0/1/cpu0
# hd -n1b /dev/disk1t6

0000000 eb 3c 90 43 49 53 43 4f 20 20 20 00 02 40 76 00 .<.CISCO.....@v.
0000010 02 00 02 00 00 f8 fb 00 3f 00 10 00 3f 00 00 00 ........?...?...
0000020 11 ad 3e 00 80 01 29 0f 08 12 24 43 49 53 43 4f ..>...)...$CISCO
0000030 5f 49 4f 53 20 20 46 41 54 31 36 20 20 20 fa 31 _IOS..FAT16....1
0000040 c0 8e d0 bc 00 7c fb 8e d8 e8 00 00 5e 83 c6 19 .....|......^...
0000050 bb 07 00 fc ac 84 c0 74 06 b4 0e cd 10 eb f5 30 .......t.......0
0000060 e4 cd 16 cd 19 0d 0a 4e 6f 6e 2d 73 79 73 74 65 .......Non-syste
0000070 6d 20 64 69 73 6b 0d 0a 50 72 65 73 73 20 61 6e m.disk..Press.an
0000080 79 20 6b 65 79 20 74 6f 20 72 65 62 6f 6f 74 0d y.key.to.reboot.
0000090 0a 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
00000A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ................
*
00001F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 55 aa ..............U.
0000201

RP/0/RP0/CPU0:ios(admin)# format disk1: partition filesystem fat32 location 0/rp0/cpu0

This operation will destroy all data on "disk1:" and partition device. Continue? [confirm]

DRP/0/1/CPU0:Jun 18 20:51:14.489 : syslog_dev[76]: mkdosfs:
DRP/0/1/CPU0:Jun 18 20:51:14.489 : syslog_dev[76]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 3607592 kB available.

Device partition disk1: is now formated and is available for use.
RP/0/RP0/CPU0:ios(admin)#DRP/0/1/CPU0:Jun 18 20:51:15.903 : syslog_dev[76]: mkdosfs:
DRP/0/1/CPU0:Jun 18 20:51:15.903 : syslog_dev[76]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 491932 kB available.

RP/0/RP0/CPU0:ios(config)# mirror location 0/1/cpu0 disk0:disk1:
RP/0/RP0/CPU0:ios(config)# commit

DRP/0/1/CPU0:Jun 18 20:52:42.307 : redfs_svr[74]: %OS-REDFS-6-MIRROR_ENABLED : Mirroring
has been enabled with configured devices of disk0: and disk1:.
```

```
RP/0/RP0/CPU0:Jun 18 20:52:43.312 : config[65716]: %MGBL-CONFIG-6-DB_COMMIT :
Configuration committed by user 'cisco'. Use 'show configuration commit changes
1000000005' to view the changes.

RP/0/RP0/CPU0:ios# sh mirror location 0/1/cpu0

Mirror Information for 0/1/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk0:
   Configured Secondary:       disk1:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk0:
   Current Physical Secondary: disk1:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk0:;disk1:
 BOOT_DEV_SEQ_OPER = disk0:;disk1:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#

RP/0/RP0/CPU0:ios(config)# mirror location 0/1/cpu0 disk1:disk0:
RP/0/RP0/CPU0:ios(config)# commit

DRP/0/1/CPU0:Jun 18 21:31:08.863 : redfs_svr[74]: %OS-REDFS-6-MIRROR_ENABLED : Mirroring
has been enabled with configured devices of disk1: and disk0:.

RP/0/RP0/CPU0:ios# sh mirror location 0/1/cpu0

Mirror Information for 0/1/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk1:
   Configured Secondary:       disk0:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk1:
   Current Physical Secondary: disk0:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk1:;disk0:
```

```
 BOOT_DEV_SEQ_OPER = disk1:;disk0:
 MIRROR_ENABLE = Y

RP/0/RP0/CPU0:ios# mirror pause location 0/1/CPU0
DRP/0/1/CPU0:Jun 18 21:42:00.360 : redfs_svr[74]: %OS-REDFS-5-MIRROR_PAUSED : Mirroring
has been paused. Please do 'mirror resume' to restart mirroring.

Info: Disk mirroring now paused for 0/1/CPU0.
RP/0/RP0/CPU0:ios# unmount disk0: location 0/1/cpu0

Device /disk0: is now unmounted and is safe to remove.

RP/0/RP0/CPU0:ios# format disk0: partition location 0/1/cpu0 force

This operation will destroy all data on "disk0:" and partition device. Continue? [confirm]
DRP/0/1/CPU0:Jun 18 21:42:50.867 : syslog_dev[76]: mkdosfs:
DRP/0/1/CPU0:Jun 18 21:42:50.867 : syslog_dev[76]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 491932 kB available.
DRP/0/1/CPU0:Jun 18 21:42:58.131 : syslog_dev[76]: mkdosfs:
DRP/0/1/CPU0:Jun 18 21:42:58.131 : syslog_dev[76]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 3607592 kB available.

Device partition disk0: is now formated and is available for use.
RP/0/RP0/CPU0:ios# mirror resume location 0/1/CPU0

DRP/0/1/CPU0:Jun 18 21:43:05.113 : redfs_svr[74]: %OS-REDFS-6-MIRROR_RESUMED : Mirroring
has been resumed after being paused.
Info: Disk mirroring now resumed for 0/1/CPU0.

RP/0/RP0/CPU0:ios# sh mirror location 0/1/cpu0

Mirror Information for 0/1/CPU0.
=========================================================
 Mirroring Enabled
   Configured Primary:         disk1:
   Configured Secondary:       disk0:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk1:
   Current Physical Secondary: disk0:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
---------------------------------------------------------
  disk0:           Available     Enabled Formatted
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available     Formatted
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk1:;disk0:
 BOOT_DEV_SEQ_OPER = disk1:;disk0:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#
```

Active/Standby SC-GE22

The procedure for upgrading the flash disk on active or standby SC-GE22 card is same as of RP.

Note You need to upgrade to SC-GE22 card first to support SC upgrade to 4G.

Example:

```
RP/0/RP0/CPU0:ios(admin)# format disk1: partition filesystem fat32 location 0/rp0/cpu0

This operation will destroy all data on "disk1:" and partition device. Continue? [confirm]
SC/F0/SC0/CPU0:Jun 18 20:57:12.869 : syslog_dev[82]: mkdosfs:
SC/F0/SC0/CPU0:Jun 18 20:57:12.869 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 491932 kB available.
SC/F0/SC0/CPU0:Jun 18 20:57:19.002 : syslog_dev[82]: mkdosfs:
SC/F0/SC0/CPU0:Jun 18 20:57:19.002 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 3607592 kB available.
RP/0/RP1/CPU0:Jun 18 20:57:19.048 : online_diag_hfr_rp[290]: %DIAG-HFRDIAG-3-ERROR :
Failure detected in node0_0_CPU0

Device partition disk1: is now formated and is available for use.
RP/0/RP0/CPU0:ios(admin)#

RP/0/RP0/CPU0:ios(config)# mirror location f0/sc0/cpu0 disk0:disk1:
RP/0/RP0/CPU0:ios(config)# commit

SC/F0/SC0/CPU0:Jun 18 20:58:11.943 : redfs_svr[80]: %OS-REDFS-6-MIRROR_ENABLED : Mirroring
has been enabled with configured devices of disk0: and disk1:.

RP/0/RP0/CPU0:ios# sh mirror location f0/sc0/cpu0

Mirror Information for F0/SC0/CPU0.
=========================================================
 Mirroring Enabled
   Configured Primary:         disk0:
   Configured Secondary:       disk1:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk0:
   Current Physical Secondary: disk1:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
---------------------------------------------------------
  disk0:           Available     Enabled
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk0:;disk1:
 BOOT_DEV_SEQ_OPER = disk0:;disk1:
 MIRROR_ENABLE = Y

RP/0/RP0/CPU0:ios(config)# mirror location f0/sc0/cpu0 disk1:disk0:
RP/0/RP0/CPU0:ios(config)# commit

SC/F0/SC0/CPU0:Jun 18 21:38:13.336 : redfs_svr[80]: %OS-REDFS-6-MIRROR_ENABLED : Mirroring
has been enabled with configured devices of disk1: and disk0:.

RP/0/RP0/CPU0:ios# sh mirror location f0/sc0/cpu0

Mirror Information for F0/SC0/CPU0.
```

```
=======================================================
 Mirroring Enabled
   Configured Primary:         disk1:
   Configured Secondary:       disk0:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk1:
   Current Physical Secondary: disk0:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk1:;disk0:
 BOOT_DEV_SEQ_OPER = disk1:;disk0:
 MIRROR_ENABLE = Y

RP/0/RP0/CPU0:ios# mirror pause location f0/sc0/cpu0

SC/F0/SC0/CPU0:Jun 18 21:48:29.123 : redfs_svr[80]: %OS-REDFS-5-MIRROR_PAUSED : Mirroring
has been paused. Please do 'mirror resume' to restart mirroring.

Info: Disk mirroring now paused for F0/SC0/CPU0.
RP/0/RP0/CPU0:ios# unmount disk0: location f0/sc0/cpu0

Device /disk0: is now unmounted and is safe to remove.
RP/0/RP0/CPU0:ios# format disk0: partition location f0/sc0/cpu0 force

This operation will destroy all data on "disk0:" and partition device. Continue? [confirm]
SC/F0/SC0/CPU0:Jun 18 21:49:06.538 : syslog_dev[82]: mkdosfs:
SC/F0/SC0/CPU0:Jun 18 21:49:06.538 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 491932 kB available.
SC/F0/SC0/CPU0:Jun 18 21:49:14.364 : syslog_dev[82]: mkdosfs:
SC/F0/SC0/CPU0:Jun 18 21:49:14.364 : syslog_dev[82]: mkdosfs: Format complete: FAT32
(4096-byte clusters), 3607592 kB available.

Device partition disk0: is now formated and is available for use.
RP/0/RP0/CPU0:ios# mirror resLC/0/0/CPU0:Jun 18 21:49:17.549 : hfr_pm[152]:
%PLATFORM-HFR_PM-3-ERROR : hfr_pm: error encountered, reason=hfr_pm_replay_pics: lock
failed , errno=17
LC/0/0/CPU0:Jun 18 21:49:17.557 : sysmgr[77]: %OS-SYSMGR-3-ERROR : sysmgr_sync_msg_hdlr:
Unknown request with code 254 from pid 1211108952, node
RP/0/RP0/CPU0:ios# mirror resume location f0/sc0/cpu0

SC/F0/SC0/CPU0:Jun 18 21:49:25.227 : redfs_svr[80]: %OS-REDFS-6-MIRROR_RESUMED : Mirroring
has been resumed after being paused.

Info: Disk mirroring now resumed for F0/SC0/CPU0.

RP/0/RP0/CPU0:ios# sh mirror location f0/sc0/cpu0

Mirror Information for F0/SC0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk1:
   Configured Secondary:       disk0:
```

```
 Current Mirroring State:      Redundant
   Current Physical Primary:   disk1:
   Current Physical Secondary: disk0:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled Formatted
  disk1:           Available     Enabled Formatted
  compactflash:    Not Present
  disk0a:          Available     Formatted
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk1:;disk0:
 BOOT_DEV_SEQ_OPER = disk1:;disk0:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#
```

Downgrading a Flash Disk from Cisco IOS XR 3.8 (4G FAT32) to 3.7 or 3.6 (4G FAT16) Software

To downgrade a flash disk from IOS XR 3.8 software image (4G FAT32) to IOS XR 3.7 or 3.6 software images (4G FAT16) on all active and standby RPs, DRPs, and SC-GE22 cards, follow these steps:

Step 1 Configure and enable disk mirroring, using **mirror location 0/RP0/CPU0 disk0: disk1:** command.

```
RP/0/RP0/CPU0:ios(config)# mirror location 0/rp0/CPU0 disk0:disk1:

RP/0/RP0/CPU0:ios(config)#RP/0/RP0/CPU0:Jun 12 18:48:10.806 : redfs_svr[80]:
%OS-REDFS-6-MIRROR_ENABLED : Mirroring has been enabled with configured devices of disk0:
and disk1:.

REDUNDANT : Mirroring is now fully redundant for devices disk0: and disk1:.
```

Step 2 Wait for mirror state to be redundant. Check using **sh mirror** command.

```
RP/0/RP0/CPU0:ios# sh mirror

Mirror Information for 0/RP0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk0:
   Configured Secondary:       disk1:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk0:
   Current Physical Secondary: disk1:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled Formatted
  disk1:           Available     Enabled Formatted
```

```
  compactflash:    Not Present
  disk0a:          Available     Formatted
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk0:;disk1:
 BOOT_DEV_SEQ_OPER = disk0:;disk1:
 MIRROR_ENABLE = Y
```

Step 3 Enter **show filesystem** command to make sure that the total unused space on disk0 is more than 1.5G.

```
RP/0/RP0/CPU0:ios# sh filesystem

File Systems:

     Size(b)     Free(b)        Type  Flags  Prefixes
           -           -     network     rw  qsm/dev/fs/tftp:
           -           -     network     rw  qsm/dev/fs/rcp:
           -           -     network     rw  qsm/dev/fs/ftp:
   503738368   503717888  flash-disk     rw  disk0a:
  3694174208  3445559296  flash-disk     rw  disk1:
   503738368   503730176  flash-disk     rw  disk1a:
     1043456      987136  dumper-lnk     rw  qsm/dumper_nvram:
 39929724928 39869997056  dumper-lnk     rw  qsm/dumper_harddisk:
   503738368   503730176  dumper-lnk     rw  qsm/dumper_disk1a:
  3694174208  3445559296  dumper-lnk     rw  qsm/dumper_disk1:
   503738368   503717888  dumper-lnk     rw  qsm/dumper_disk0a:
  3694174208  3445559296  dumper-lnk     rw  qsm/dumper_disk0:
    62390272    39891924  dumper-lnk     rw  qsm/dumper_bootflash:
 39929724928 39869997056    harddisk     rw  harddisk:
  3694174208  3445559296  flash-disk     rw  disk0:
    62390272    39891924       flash     rw  bootflash:
     1043456      987136       nvram     rw  nvram:
RP/0/RP0/CPU0:ios# sh filesystem location 0/rp1/CPU0

File Systems:

     Size(b)     Free(b)        Type  Flags  Prefixes
           -           -     network     rw  qsm/dev/fs/tftp:
           -           -     network     rw  qsm/dev/fs/rcp:
           -           -     network     rw  qsm/dev/fs/ftp:
   503738368   503730176  flash-disk     rw  disk0a:
  3694174208  3446382592  flash-disk     rw  disk1:
   503738368   503730176  flash-disk     rw  disk1a:
     1043456      987136  dumper-lnk     rw  qsm/dumper_nvram:
 39929724928 39869997056  dumper-lnk     rw  qsm/dumper_harddisk:
   503738368   503730176  dumper-lnk     rw  qsm/dumper_disk1a:
  3694174208  3445559296  dumper-lnk     rw  qsm/dumper_disk1:
   503738368   503717888  dumper-lnk     rw  qsm/dumper_disk0a:
  3694174208  3445559296  dumper-lnk     rw  qsm/dumper_disk0:
    62390272    39891924  dumper-lnk     rw  qsm/dumper_bootflash:
 39929724928 39756812288    harddisk     rw  harddisk:
  3694174208  3446382592  flash-disk     rw  disk0:
     1043456     1011712       nvram     rw  nvram:
    62390272    42134748       flash     rw  bootflash:
```

Step 4 Pause mirroring, using **mirror pause loc 0/RP0/CPU0** command.

```
RP/0/RP0/CPU0:ios# mirror pause location 0/rp0/cpU0
RP/0/RP0/CPU0:Jun 12 20:39:30.315 : redfs_svr[80]: %OS-REDFS-5-MIRROR_PAUSED : Mirroring
has been paused. Please do 'mirror resume' to restart mirroring.

Info: Disk mirroring now paused for 0/RP0/CPU0.
```

Step 5 Unmount or repartition disk1, using **unmount disk1:** command on the router prompt and then enter following commands:

- **#fdisk /dev/disk1 delete -a**
- **#fdisk /dev/disk1 add -t6 -p50**
- **#fdisk /dev/disk1 add -t4 -p100**
- **mount -e /dev/disk1**
- **mkdosfs -C4096 -F16 -D/pkg/etc/hfr-atamonlib-m /dev/disk1t6**
- **mkdosfs -C4096 -F16 /dev/disk1t4**
- At the router prompt, enter **unmount disk1: undo** command.

Following example shows the steps:

```
RP/0/RP0/CPU0:ios# unmount disk1: location 0/rp0/cpu0

Device /disk1: is now unmounted and is safe to remove.
RP/0/RP0/CPU0:ios#

# fdisk /dev/disk1 delete -a
# fdisk /dev/disk1 add -t6 -p50
# fdisk /dev/disk1 add -t4 -p100
# mount -e /dev/disk1
# mkdosfs -C4096 -F16 -D/pkg/etc/hfr-atamonlib-m /dev/disk1t6

Format complete: FAT16 (32768-byte clusters), 2053440 kB available.
# mkdosfs -C4096 -F16 /dev/disk1t4

Format complete: FAT16 (32768-byte clusters), 2053504 kB available.
#

RP/0/RP0/CPU0:ios# unmount disk1: undo

Device /disk1: is now remounted and is available for use.
RP/0/RP0/CPU0:ios#
```

Step 6 Resume mirroring, using **mirror resume loc 0/RP0/CPU0** command.

```
RP/0/RP0/CPU0:ios# mirror resume

RP/0/RP0/CPU0:Jun 12 20:45:09.384 : redfs_svr[80]: %OS-REDFS-6-MIRROR_RESUMED : Mirroring
has been resumed after being paused.

Info: Disk mirroring now resumed for local node.
RP/0/RP0/CPU0:ios#
```

Step 7 Wait for mirroring to become redundant. Check using **sh mirror** command.

```
RP/0/RP0/CPU0:ios# sh mirror location 0/rp0/cpU0

Mirror Information for 0/RP0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk0:
   Configured Secondary:       disk1:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk0:
   Current Physical Secondary: disk1:

 Mirroring Logical Device:     disk0:
```

```
 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled Formatted
  disk1:           Available     Enabled Repaired Formatted
  compactflash:    Not Present
  disk0a:          Available     Formatted
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk0:;disk1:
 BOOT_DEV_SEQ_OPER = disk0:;disk1:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#
```

Step 8 Configure and enable disk mirroring, using **mirror location 0/RP0/CPU0 disk1: disk0:** command.

```
RP/0/RP0/CPU0:ios(config)# mirror location 0/rp0/CPU0 disk1:disk0:
RP/0/RP0/CPU0:ios(config)# commit

RP/0/RP0/CPU0:Jun 12 21:57:49.758 : redfs_svr[80]: %OS-REDFS-6-MIRROR_ENABLED : Mirroring
has been enabled with configured devices of disk1: and disk0:.
```

Step 9 Unmount or repartition disk0, using **unmount disk0:** command on the router prompt and then enter following commands.

- **#fdisk /dev/disk0 delete -a**
- **#fdisk /dev/disk0 add -t6 -p50**
- **#fdisk /dev/disk0 add -t4 -p100**
- **mount -e /dev/disk0**
- **mkdosfs -C4096 -F16 -D/pkg/etc/hfr-atamonlib-m /dev/disk0t6**
- **mkdosfs -C4096 -F16 /dev/disk0t4**
- At the router prompt, enter **unmount disk0: undo** command.

Following example shows the steps:

```
RP/0/RP0/CPU0:ios# unmount disk0: location 0/rp0/cpu0

Device /disk0: is now unmounted and is safe to remove.
RP/0/RP0/CPU0:ios#

#
# fdisk /dev/disk0 delete -a
# fdisk /dev/disk0 add -t6 -p50
# fdisk /dev/disk0 add -t4 -p100
# mount -e /dev/disk0
# mkdosfs -C4096 -F16 -D/pkg/etc/hfr-atamonlib-m /dev/disk0t6

Format complete: FAT16 (32768-byte clusters), 2053440 kB available.
# mkdosfs -C4096 -F16 /dev/disk0t4

Format complete: FAT16 (32768-byte clusters), 2053504 kB available.
# uname -a
QNX node0_RP0_CPU0 6.4.0 2008/04/29-15:54:52PDT hfr-rp ppcbe
#

RP/0/RP0/CPU0:ios# unmount disk0: undo location 0/rp0/cpu0

Device /disk0: is now remounted and is available for use.
```

```
RP/0/RP0/CPU0:ios# mirror resume location 0/rp0/cpu0
RP/0/RP0/CPU0:Jun 12 22:14:23.000 : redfs_svr[80]: %OS-REDFS-6-MIRROR_RESUMED : Mirroring
has been resumed after being paused.

Info: Disk mirroring now resumed for 0/RP0/CPU0.
RP/0/RP0/CPU0:ios#
```

Step 10 Wait for mirroring to become redundant.

Step 11 To make disk0 primary disk, change configuration using **mirror location 0/RP0/CPU0 disk0: disk1:** command.

```
RP/0/RP0/CPU0:ios# sh mirror location 0/rp0/CPU0

Mirror Information for 0/RP0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk1:
   Configured Secondary:       disk0:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk1:
   Current Physical Secondary: disk0:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
  disk0:           Available     Enabled Formatted
  disk1:           Available     Enabled Repaired Formatted
  compactflash:    Not Present
  disk0a:          Available     Formatted
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk1:;disk0:
 BOOT_DEV_SEQ_OPER = disk1:;disk0:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#

RP/0/RP0/CPU0:ios(config)# mirror location 0/rp0/CPU0 disk0:disk1:
RP/0/RP0/CPU0:ios(config)# commit
RP/0/RP0/CPU0:Jun 13 00:00:08.593 : redfs_svr[80]: %OS-REDFS-6-MIRROR_ENABLED : Mirroring
has been enabled with configured devices of disk0: and disk1:.
RP/0/RP0/CPU0:ios(config)#
RP/0/RP0/CPU0:ios(config)#

RP/0/RP0/CPU0:ios# sh mirror location 0/rp0/cpu0

Mirror Information for 0/RP0/CPU0.
=======================================================
 Mirroring Enabled
   Configured Primary:         disk0:
   Configured Secondary:       disk1:

 Current Mirroring State:      Redundant
   Current Physical Primary:   disk0:
   Current Physical Secondary: disk1:

 Mirroring Logical Device:     disk0:

 Physical Device     State       Flags
-------------------------------------------------------
```

```
  disk0:           Available     Enabled Formatted
  disk1:           Available     Enabled Repaired Formatted
  compactflash:    Not Present
  disk0a:          Available     Formatted
  disk1a:          Available     Formatted
  compactflasha:   Not Present

Mirroring Rommon Variable
 BOOT_DEV_SEQ_CONF = disk0:;disk1:
 BOOT_DEV_SEQ_OPER = disk0:;disk1:
 MIRROR_ENABLE = Y
RP/0/RP0/CPU0:ios#
```

Step 12 You can leave mirror enabled or disabled in configuration.

```
RP/0/RP0/CPU0:ios(admin)# sh hfr
Node            Type            PLIM            State           Config State
-------------------------------------------------------------------------------
0/0/SP          MSC(SP)         N/A             IOS XR RUN      PWR,NSHUT,MON
0/0/CPU0        MSC             4OC192-POS/DPT  IOS XR RUN      PWR,NSHUT,MON
0/1/SP          DRP(SP)         N/A             IOS XR RUN      PWR,NSHUT,MON
0/1/CPU0        DRP(Standby)    DRP-ACC         IOS XR RUN      PWR,NSHUT,MON
0/1/CPU1        DRP(Standby)    DRP-ACC         IOS XR RUN      PWR,NSHUT,MON
0/2/SP          DRP(SP)         N/A             IOS XR RUN      PWR,NSHUT,MON
0/2/CPU0        DRP(Active)     DRP-ACC         IOS XR RUN      PWR,NSHUT,MON
0/2/CPU1        DRP(Active)     DRP-ACC         IOS XR RUN      PWR,NSHUT,MON
0/3/SP          MSC(SP)         N/A             IOS XR RUN      PWR,NSHUT,MON
0/3/CPU0        MSC             UNKNOWN         IOS XR RUN      PWR,NSHUT,MON
0/RP0/CPU0      RP(Active)      N/A             IOS XR RUN      PWR,NSHUT,MON
0/RP1/CPU0      RP(Standby)     N/A             IOS XR RUN      PWR,NSHUT,MON
0/SM0/SP        FC/M(SP)        N/A             IOS XR RUN      PWR,NSHUT,MON
0/SM1/SP        FC/S(SP)        N/A             IOS XR RUN      PWR,NSHUT,MON
F0/SM2/SP       FCC-SFC(SP)     FCC-FM-1S       IOS XR RUN      PWR,NSHUT,MON
F0/SM7/SP       UNKNOWN(SP)     N/A             IN-RESET        PWR,NSHUT,MON
F0/SM19/SP      FCC-SFC(SP)     N/A             IOS XR RUN      PWR,NSHUT,MON
F0/SC0/CPU0     FCC-SC(Standby) N/A             IOS XR RUN      PWR,NSHUT,MON
F0/SC1/CPU0     FCC-SC(Active)  N/A             IOS XR RUN      PWR,NSHUT,MON
F0/AM1/SP       ALARM(SP)       N/A             IOS XR RUN      PWR,NSHUT,MON
F0/LM0/SP       FCC-LED(SP)     N/A             IOS XR RUN      PWR,NSHUT,MON
F0/LM1/SP       FCC-LED(SP)     N/A             IOS XR RUN      PWR,NSHUT,MON
RP/0/RP0/CPU0:ios(admin)#
```

Step 13 Install, add, and activate 3.7 pie.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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