Managing the Router Hardware

This chapter describes the command-line interface (CLI) techniques and commands used to manage and configure the hardware components of a router running the Cisco IOS XR software.

For complete descriptions of the commands listed in this module, see Additional References, on page 39. To locate documentation for other commands that might appear in the course of performing a configuration task, search online in *Cisco IOS XR Commands Master List for the Cisco XR 12000 Series Router*.

Table 1: Feature History for Managing Router Hardware with Cisco IOS XR Software

Release	Modification
Release 3.2	This feature was introduced. Logical router (LR) was first supported.
Release 3.3.0	The term logical router (LR) was changed to secure domain router (SDR).
Release 3.5.0	Flash disk recovery was implemented.

This module contains the following topics:

Prerequisites for Managing Router Hardware

You must be in a user group associated with a task group that includes the proper task IDs. The command reference guides include the task IDs required for each command. If you suspect user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

Displaying Hardware Status

This section describes how to display different types of hardware status information.

Displaying SDR Hardware Version Information

To display hardware version information for the components assigned to a secure domain router (SDR), connect to the appropriate designated secure domain router shelf controller (DSDRSC) and enter the **show diag** command in EXEC mode. The displayed information includes the card serial number and the ROMMON software version.

The syntax for the **show diag** command in EXEC mode is:

show diag [*node-id* | **details** | **summary**]

In the following example, the **show diag** command displays information for all nodes in the SDR:

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

Tue Jan 13 12:13:34.254 PST DST
SLOT  0 (RP/LC 0): Cisco 12000 Series - Multi-Service Blade
  MAIN: type 150,  800-25972-02 rev A0 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-9289-04 rev A0 ver 3
        HW version 1.0  S/N SAD11360218
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-ServEngCard
  L3 Engine: Service Engine - ISE OC192 (10 Gbps)
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  ROM Monitor version 1.3
  Fabric Downloader version used 3.2 (ROM version is 3.2)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Last Reset Reason: Initial load
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  FrFab SDRAM size: 1610612736 bytes
  ToFab SDRAM size: 268435456 bytes
  0 resets since restart/fault forgive

SLOT  1 (RP/LC 1): Cisco 12000 Series - Multi-Service Blade
  MAIN: type 150,  800-25972-02 rev A0 dev 90070
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-9289-04 rev A0 ver 3
        HW version 1.0  S/N SAD1124079R
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-ServEngCard
  L3 Engine: Service Engine - ISE OC192 (10 Gbps)
```

```
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  ROM Monitor version 1.3
  Fabric Downloader version used 3.2 (ROM version is 3.2)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Last Reset Reason: Card ungraceful reboot
  Insertion time: Mon Jan  5 22:33:51 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  FrFab SDRAM size: 1610612736 bytes
  ToFab SDRAM size: 268435456 bytes
  0 resets since restart/fault forgive

SLOT  2 (RP/LC 2): Cisco 12000 Series SPA Interface Processor- 601
  MAIN: type 149,  68-2647-01 rev A0 dev 85437
        HW config: 0x20    SW key: 00-00-00
  PCA:  73-9607-04 rev A0 ver 4
        HW version 1.0  S/N SAD10330441
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-SIP-601
        Route Memory: MEM-LC5-2048=
        Packet Memory: MEM-LC5-PKT-512=
  L3 Engine: 5 (MultiRate) - ISE OC192 (10 Gbps)
  Operational rate mode: 10 Gbps
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  ROM Monitor version 17.1
  Fabric Downloader version used 4.7 (ROM version is 4.7)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Last Reset Reason: Initial load
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  FrFab SDRAM size: 268435456 bytes
  ToFab SDRAM size: 268435456 bytes
  0 resets since restart/fault forgive
  SPA Information:
        subslot 0/2/0: SPA-4XOC3-POS-V2 (0x526), status is ok
        subslot 0/2/1: SPA-IPSEC-2G-2 (0x549), status is ok
        subslot 0/2/2: SPA-8X1FE (0x4c5), status is ok
        subslot 0/2/3: Empty

SLOT  4 (RP/LC 4): Cisco 12000 Series SPA Interface Processor- 601
  MAIN: type 149,  68-2647-02 rev C0 dev 0
        HW config: 0x20    SW key: 00-00-00
  PCA:  73-9607-05 rev B0 ver 4
        HW version 1.0  S/N SAD112709D6
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-SIP-601
        Route Memory: MEM-LC5-2048=
        Packet Memory: MEM-LC5-PKT-512=
  L3 Engine: 5 (MultiRate) - ISE OC192 (10 Gbps)
  Operational rate mode: 10 Gbps
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  ROM Monitor version 17.1
  Fabric Downloader version used 4.7 (ROM version is 4.7)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Last Reset Reason: Initial load
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  FrFab SDRAM size: 268435456 bytes
  ToFab SDRAM size: 268435456 bytes
  0 resets since restart/fault forgive
  SPA Information:
        subslot 0/4/0: SPA-2X1GE-V2 (0x50b), status is ok
        subslot 0/4/1: SPA-2XOC48POS/RPR (0x46f), status is ok
        subslot 0/4/2: SPA-2CHT3-CE-ATM (0x4fc), status is ok
```

```
        subslot 0/4/3: SPA-4XT3/E3 (0x40b), status is ok

SLOT  5 (RP/LC 5): Cisco 12000 Series Performance Route Processor 2
  MAIN: type 96,  800-23469-03 rev B0 dev 0
        HW config: 0x10    SW key: 00-00-00
  PCA:  73-8812-06 rev A0 ver 5
        HW version 0.0  S/N SAD091702LB
  MBUS: MBUS Agent (1)  73-8048-07 rev A0 dev 0
        HW version 0.1  S/N SAL0852811R
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: PRP-2
        Route Memory: MEM-PRP/LC-2048=
  MBUS Agent Software version 4.4 (RAM) (ROM version is 3.54)
  Using CAN Bus A
  ROM Monitor version 1.17dev(0.5)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  0 resets since restart/fault forgive
```

In the following example, the **show diag** command displays information for a single node:

```
RP/0/0/CPU0:router# show diag 0/2/1

Tue Jan 13 12:14:15.844 PST DST

SUBSLOT 0/2/1 (SPA-IPSEC-2G-2): IPSec Shared Port Adapter with 2 Gbps DES/3DES/AES
        Product Number          : SPA-IPSEC-2G-2
        Version Identifier (VID) : V01
        PCA Serial Number       : JAB1043053B
        Top Assy. Part Number   : 68-2721-02
        Top Assy. Revision      : A0
        Hardware Revision       : 1.0
        CLEI Code               : IP9IAAVCAA
        Operational Status      : ok
```

Displaying System Hardware Version Information

To display hardware version information for all or some of the components assigned in a system, connect to the designated shelf controller (DSC) and enter the **show diag** command in administration EXEC mode. When this command is entered in administration EXEC mode, you can display information on RPs, line cards, and system components such as the chassis, fan trays, and power supplies.

Note If you enter the **show diag** command in EXEC mode, the software displays only the hardware assigned to the SDR to which you are connected.

The syntax for the **show diag** command in administration EXEC mode is:

show diag [*node-id* | **chassis** | **details** | **fans** | **memory** | **power-supply** | **summary**]

Tip For information on the software version, use the **show version** command.

In the following example, the **show diag** command displays information for all nodes in the system:

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

Tue Jan 13 12:47:57.509 PST DST
SLOT  0 (RP/LC 0): Cisco 12000 Series - Multi-Service Blade
  MAIN: type 150,  800-25972-02 rev A0 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-9289-04 rev A0 ver 3
        HW version 1.0  S/N SAD11360218
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-ServEngCard
  L3 Engine: Service Engine - ISE OC192 (10 Gbps)
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  ROM Monitor version 1.3
  Fabric Downloader version used 3.2 (ROM version is 3.2)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Last Reset Reason: Initial load
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  FrFab SDRAM size: 1610612736 bytes
  ToFab SDRAM size: 268435456 bytes
  0 resets since restart/fault forgive

SLOT  1 (RP/LC 1): Cisco 12000 Series - Multi-Service Blade
  MAIN: type 150,  800-25972-02 rev A0 dev 90070
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-9289-04 rev A0 ver 3
        HW version 1.0  S/N SAD1124079R
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-ServEngCard
  L3 Engine: Service Engine - ISE OC192 (10 Gbps)
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  ROM Monitor version 1.3
  Fabric Downloader version used 3.2 (ROM version is 3.2)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Last Reset Reason: Card ungraceful reboot
  Insertion time: Mon Jan  5 22:33:51 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  FrFab SDRAM size: 1610612736 bytes
  ToFab SDRAM size: 268435456 bytes
  0 resets since restart/fault forgive

SLOT  2 (RP/LC 2): Cisco 12000 Series SPA Interface Processor- 601
  MAIN: type 149,  68-2647-01 rev A0 dev 85437
        HW config: 0x20    SW key: 00-00-00
  PCA:  73-9607-04 rev A0 ver 4
        HW version 1.0  S/N SAD10330441
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-SIP-601
        Route Memory: MEM-LC5-2048=
        Packet Memory: MEM-LC5-PKT-512=
  L3 Engine: 5 (MultiRate) - ISE OC192 (10 Gbps)
  Operational rate mode: 10 Gbps
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  ROM Monitor version 17.1
  Fabric Downloader version used 4.7 (ROM version is 4.7)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Last Reset Reason: Initial load
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  FrFab SDRAM size: 268435456 bytes
  ToFab SDRAM size: 268435456 bytes
```

```
  0 resets since restart/fault forgive
  SPA Information:
        subslot 0/2/0: SPA-4XOC3-POS-V2 (0x526), status is ok
        subslot 0/2/1: SPA-IPSEC-2G-2 (0x549), status is ok
        subslot 0/2/2: SPA-8X1FE (0x4c5), status is ok
        subslot 0/2/3: Empty

SLOT  5 (RP/LC 5): Cisco 12000 Series Performance Route Processor 2
  MAIN: type 96,  800-23469-03 rev B0 dev 0
        HW config: 0x10    SW key: 00-00-00
  PCA:  73-8812-06 rev A0 ver 5
        HW version 0.0  S/N SAD091702LB
  MBUS: MBUS Agent (1)  73-8048-07 rev A0 dev 0
        HW version 0.1  S/N SAL0852811R
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: PRP-2
        Route Memory: MEM-PRP/LC-2048=
  MBUS Agent Software version 4.4 (RAM) (ROM version is 3.54)
  Using CAN Bus A
  ROM Monitor version 1.17dev(0.5)
  Primary clock is CSC0
  Board State is IOS-XR RUN
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
  DRAM size: 2147483648 bytes
  0 resets since restart/fault forgive

SLOT 16 (CSC 0): GSR 12406 Clock Scheduler Card
  MAIN: type 29,  800-12096-03 rev A0 dev 86476
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-5702-04 rev A0 ver 4
        HW version 1.0  S/N SAL1049A6J7
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: GSR6-CSC
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  Primary clock is CSC0
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)

SLOT 18 (SFC 0): GSR 12406 Switch Fabric Card
  MAIN: type 30,  800-12097-03 rev A0 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-5703-05 rev A0 ver 5
        HW version 1.0  S/N SAL10425BKW
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: GSR6-SFC
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  Primary clock is CSC0
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)

SLOT 19 (SFC 1): GSR 12406 Switch Fabric Card
  MAIN: type 30,  800-12097-03 rev A0 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-5703-05 rev A0 ver 5
        HW version 1.0  S/N SAL10425BQ6
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: GSR6-SFC
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  Primary clock is CSC0
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)

SLOT 20 (SFC 2): GSR 12406 Switch Fabric Card
  MAIN: type 30,  800-12097-03 rev A0 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-5703-05 rev A0 ver 5
```

```
        HW version 1.0  S/N SAL10425BQ0
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: GSR6-SFC
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  Primary clock is CSC0
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)

SLOT 24 (PS A1): GSR 12406 Alarm Module
  MAIN: type 15,  800-12098-02 rev A0 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-5704-03 rev A0 ver 2
        HW version 1.0  S/N SAL10392V05
  MBUS: MBUS Agent (1)  73-2146-07 rev B0 dev 0
        HW version 1.2  S/N SAL1028UFU2
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: GSR6-ALRM
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)

SLOT 25 (PS A2): GSR 12406 Alarm Module
  MAIN: type 15,  800-12098-02 rev A0 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  73-5704-03 rev A0 ver 2
        HW version 1.0  S/N SAL10392V1A
  MBUS: MBUS Agent (1)  73-2146-07 rev B0 dev 0
        HW version 1.2  S/N SAL10360PKZ
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: GSR6-ALRM
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)

SLOT 28 (TOP FAN): GSR 12406 Blower Module
  MAIN: type 112,  800-9324-01 rev 71 dev 0
        HW config: 0x00    SW key: 00-00-00
  PCA:  00-0000-00 rev 70 ver 0
        HW version 1.0  S/N SAL095180NC
  MBUS: MBUS Agent (1)  73-2146-07 rev B0 dev 0
        HW version 1.2  S/N SAL095180NC
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: GSR6-BLOWER
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
  Using CAN Bus A
  Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
```

In the following example, the **show diag** command displays information for a single system component:

```
RP/0/0/CPU0:router(admin)# show diag 0/4/cpu0

Tue Jan 13 12:48:23.938 PST DST
SLOT  4 (RP/LC 4): Cisco 12000 Series SPA Interface Processor- 601
  MAIN: type 149,  68-2647-02 rev C0 dev 0
        HW config: 0x20    SW key: 00-00-00
  PCA:  73-9607-05 rev B0 ver 4
        HW version 1.0  S/N SAD112709D6
  MBUS: Embedded Agent
        Test hist: 0x00    RMA#: 00-00-00    RMA hist: 0x00
  DIAG: Test count: 0x00000000    Test results: 0x00000000
  FRU:  Linecard/Module: 12000-SIP-601
        Route Memory: MEM-LC5-2048=
        Packet Memory: MEM-LC5-PKT-512=
  L3 Engine: 5 (MultiRate) - ISE OC192 (10 Gbps)
  Operational rate mode: 10 Gbps
  MBUS Agent Software version 4.4 (RAM) (ROM version is 4.4)
```

```
Using CAN Bus A
ROM Monitor version 17.1
Fabric Downloader version used 4.7 (ROM version is 4.7)
Primary clock is CSC0
Board State is IOS-XR RUN
Last Reset Reason: Initial load
Insertion time: Mon Jan  5 21:58:33 2009 (1w0d ago)
DRAM size: 2147483648 bytes
FrFab SDRAM size: 268435456 bytes
ToFab SDRAM size: 268435456 bytes
0 resets since restart/fault forgive
SPA Information:
      subslot 0/4/0: SPA-2X1GE-V2 (0x50b), status is ok
      subslot 0/4/1: SPA-2XOC48POS/RPR (0x46f), status is ok
      subslot 0/4/2: SPA-2CHT3-CE-ATM (0x4fc), status is ok
      subslot 0/4/3: SPA-4XT3/E3 (0x40b), status is ok
```

Displaying Software and Hardware Information

The **show version** command displays a variety of system information, including the hardware and software versions, router uptime, boot settings (including the configuration register), and active software.

The following is sample output from the **show version** command:

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

Tue Jan 13 13:16:39.905 PST DST
Cisco IOS XR Software, Version 3.8.0.26I[SIT_IMAGE]
Copyright (c) 2008 by Cisco Systems, Inc.

ROM: System Bootstrap, Version 12.0(20051020:160303) [sjabbar-CSCsa64979_4 1.17dev(0.5)]
DEVELOPMENT SOFTWARE
Copyright (c) 1994-2005 by cisco Systems,  Inc.

router uptime is 1 week, 15 hours, 20 minutes
System image file is "disk0:c12k-os-mbi-3.8.0.26I/mbiprp-rp.vm"

cisco 12406/PRP (7457) processor with 2097152K bytes of memory.
7457 processor at 1266Mhz, Revision 1.2

2 Cisco 12000 Series - Multi-Service Blade Controllers
2 Cisco 12000 Series SPA Interface Processor-601/501/401
1 Cisco 12000 Series Performance Route Processor
3 Management Ethernet
8 PLIM_QOS
6 SONET/SDH
6 Packet over SONET/SDH
6 T3
4 Serial network interface(s)
2 GigabitEthernet/IEEE 802.3 interface(s)
6 VLAN sub-interface(s)
4 FR point-to-point sub interface
28 T1
2 Asynchronous Transfer Mode
3 ATM network sub-interface(s)
8 FastEthernet
1018k bytes of non-volatile configuration memory.
800560k bytes of disk0: (Sector size 512 bytes).
800560k bytes of disk1: (Sector size 512 bytes).
65536k bytes of Flash internal SIMM (Sector size 256k).

Boot device on node 0/0/CPU0 is mem:
Package active on node 0/0/CPU0:
c12k-sbc, V 3.8.0.26I[SIT_IMAGE], Cisco Systems, at disk0:c12k-sbc-3.8.0.26I
    Built on Thu Dec 11 07:08:15 PST 2008
    By sjc-lds-364 in /auto/ioxbuild5/production/3.8.0.26I.SIT_IMAGE/c12k/workspace for
c4.2.1-p0
```

```
c12k-ipsec-service, V 3.8.0.26I[SIT_IMAGE], Cisco Systems, at
disk0:c12k-ipsec-service-3.8.0.26I
    Built on Thu Dec 11 05:29:13 PST 2008
    By sjc-lds-364 in /auto/ioxbuild5/production/3.8.0.26I.SIT_IMAGE/c12k/workspace for
c4.2.1-p0

c12k-fpd, V 3.8.0.26I[SIT_IMAGE], Cisco Systems, at disk0:c12k-fpd-3.8.0.26I
    Built on Thu Dec 11 06:17:16 PST 2008
    By sjc-lds-364 in /auto/ioxbuild5/production/3.8.0.26I.SIT_IMAGE/c12k/workspace for
c4.2.1-p0

c12k-firewall, V 3.8.0.26I[SIT_IMAGE], Cisco Systems, at disk0:c12k-firewall-3.8.0.26I
    Built on Thu Dec 11 05:36:08 PST 2008
    By sjc-lds-364 in /auto/ioxbuild5/production/3.8.0.26I.SIT_IMAGE/c12k/workspace for
c4.2.1-p0
  --More--
```

Displaying SDR Node IDs and Status

In EXEC mode, the **show platform** command displays information for all nodes assigned to a secure domain router (SDR) . For each node, this information includes the host card type, the operational state, and the configuration state. To display information on a single node, enter the command with a node ID.

The syntax for the **show platform** command is:

show platform

The following example displays the status for all nodes in the SDR to which you are connected:

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

Tue Jan 13 13:48:51.823 PST DST
Node            Type            PLIM            State           Config State
--------------------------------------------------------------------------------
0/0/CPU0        L3 Service Eng  N/A             IOS XR RUN      PWR,NSHUT,MON
0/1/CPU0        L3 Service Eng  N/A             IOS XR RUN      PWR,NSHUT,MON
0/2/CPU0        L3LC Eng 5+     Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/2/0           SPA             SPA-4XOC3-POS-V READY           PWR,NSHUT
0/2/1           SPA             SPA-IPSEC-2G-2  READY           PWR,NSHUT
0/2/2           SPA             SPA-8XFE-TX     READY           PWR,NSHUT
0/4/CPU0        L3LC Eng 5+     Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/4/0           SPA             SPA-2X1GE-V2    READY           PWR,NSHUT
0/4/1           SPA             SPA-2XOC48POS/R READY           PWR,NSHUT
0/4/2           SPA             SPA-2CHT3-CE-AT READY           PWR,NSHUT
0/4/3           SPA             SPA-4XT3/E3     READY           PWR,NSHUT
0/5/CPU0        PRP(Active)     N/A             IOS XR RUN      PWR,NSHUT,MON
```

The *node-id* appears in the *rack*/*slot*/*module* notation, and the *node-id* components are as follows:

- *rack* —In a single-shelf system the rack number is always “0.”
- *slot* —Number of the physical slot in which the card is installed.
- *module* —Subslot number of a system hardware component.

Table 2: Node ID Components, on page 10 summarizes the *node-id* for each type of card.

Table 2: Node ID Components

Card Type (the card to which your are issuing commands)	Rack (always "0")	Slot (the logical slot number reported in command displays)	Module (the entity on the card that executes the command)
Route processor	0	0-15[1], [2]	CPU0
Cisco XR 12000 Series line cards	0	0–15[3],	CPU0
Cisco XR 12000 Series SPA Interface Processor (SIP)-600	0	0–15[4]	CPU0
1-Port 10-Gigabit Ethernet SPA 5-Port Gigabit Ethernet SPA 10-Port Gigabit Ethernet SPA 1-Port OC-192c/STM-64c POS/RPR SPA	0	0–15[5]	0-1 (SPA module number on the Cisco XR 12000 and 12000 Series SIP-600)
Clock and scheduler cards (CSCs)	0	CSC 0 and 1[6]	CPU0
Switch fabric cards (SFCs)	0	SFC 0, 1, 2, 3, and 4[7], [8]	CPU0
Consolidated switch fabric (CSF) card	0	Dedicated slot 17[9]	CPU0

1 Depends on router model.
2 RP pairs can be in any adjacent slot pairs as long as the even-numbered slot is the smaller slot number. For example, an RP pair can be installed in slots 0 and 1, 2 and 3, or 14 and 15.
3 Depends on router model.
4 Depends on router model.
5 Depends on router model.
6 Not used on Cisco XR 12404 routers.
7 Not used on Cisco XR 12404 routers.
8 Total number of SFC slots depends on router model.
9 Used only on Cisco XR 12404 routers.

Displaying Router Node IDs and Status

In administration EXEC mode, the **show platform** command displays information for all router nodes. In administration EXEC mode, the command display also includes additional node IDs such as those for fabric

cards, alarm modules, and fan controllers. For each node, this information includes the host card type, the operational state, and the configuration state. To display information on a single node, enter the command with a node ID.

The syntax for the **show platform** command is:

show platform

The following example displays the status for all nodes in the system:

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

Wed Nov  4 18:52:49.040 PST
Node            Type            PLIM            State           Config State
-----------------------------------------------------------------------------
0/0/CPU0        L3 Service Eng  N/A             Card Power down NPWR,NSHUT,MON
0/1/CPU0        L3 Service Eng  N/A             Card Power down NPWR,NSHUT,MON
0/2/CPU0        L3LC Eng 5+     Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/2/0           SPA             SPA-4XOC3-POS-V READY           PWR,NSHUT
0/2/1           SPA             SPA-IPSEC-2G-2  READY           PWR,NSHUT
0/2/2           SPA             SPA-8XFE-TX     READY           PWR,NSHUT
0/4/CPU0        L3LC Eng 5+     Jacket Card     IOS XR RUN      PWR,NSHUT,MON
0/4/0           SPA             SPA-2X1GE-V2    READY           PWR,NSHUT
0/4/1           SPA             SPA-2XOC48POS/R READY           PWR,NSHUT
0/4/2           SPA             SPA-2CHT3-CE-AT READY           PWR,NSHUT
0/4/3           SPA             SPA-4XT3/E3     READY           PWR,NSHUT
0/5/CPU0        PRP(Active)     N/A             IOS XR RUN      PWR,NSHUT,MON
```

The *node-id* appears in the *rack*/*slot*/*module* notation, and the *node-id* components are as follows:

- *rack* —In a single-shelf system the rack number is always “0.”
- *slot* —Number of the physical slot in which the card is installed.
- *module* —Subslot number of a system hardware component.

Table 2: Node ID Components, on page 10 summarizes the *node-id* argument for each type of card.

Displaying Router Environment Information

The **show environment** command displays hardware information for the system, including fan speeds, power supply voltage and current information, and temperatures.

The syntax for the **show environment** command is:

show environment [*options*]

You can use the **show environment** command options to limit the detail in the command display. To view the command options, enter the **show environment ?** command. The following example shows the full environment status report:

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

  Temperature Information
  ---------------------------------------------

  R/S/I   Modules Sensor          Temp. (deg C)

  0/0/*     host  Inlet              23.0
            host  Hot                23.0
  0/3/*     host  Inlet              24.0
            host  Hot                33.0
```

```
0/4/*     host  Inlet              24.5
          host  Hot                31.5
0/5/*     host  Inlet              23.5
          host  Hot                30.5
0/6/*     host  Hot                31.5
          host  Inlet              22.5
0/7/*     host  Inlet              20.0
          host  Hot                29.5
0/8/*     host  Inlet              20.5
          host  Hot                32.0

Threshold Information
---------------------------------------------

R/S/I   Modules Sensor          Minor           Major           Critical
                                (Lo/Hi)         (Lo/Hi)         (Lo/Hi)

0/0/*     host  InletTemp        --/  55         --/  60         --/  --
          host  HotTemp          --/  66         --/  69         --/  --
          host  PLIM_V4_1.6V     --/  --         --/  --         --/  --
          host  PLIM_V5_1.8V     --/  --         --/  --         --/  --
          host  PLIM_V3_2.5V     --/  --         --/  --         --/  --
          host  3.4V           2950/3500       2900/3600         --/  --
          host  5V             4800/5150       4700/5200         --/  --
          host  Mbus5V         4700/5300       4500/5500         --/  --
0/3/*     host  InletTemp        --/  55         --/  60         --/  70
          host  HotTemp          --/  66         --/  69         --/  75
          host  PLIM_V3_1.5V     --/  --         --/  --         --/  --
          host  PLIM_V8_1.8V     --/  --         --/  --         --/  --
          host  PLIM_V7_2.5V     --/  --         --/  --         --/  --
          host  3.4V             --/  --         --/  --         --/  --
          host  5V             4800/5200       4700/5300       4600/5400
          host  Mbus5V         4700/5300       4600/5400       4500/5500
0/4/*     host  InletTemp        --/  55         --/  60         --/  70
          host  HotTemp          --/  66         --/  69         --/  75
          host  PLIM_V3_1.5V     --/  --         --/  --         --/  --
          host  PLIM_V8_1.8V     --/  --         --/  --         --/  --
          host  PLIM_V7_2.5V     --/  --         --/  --         --/  --
          host  PLIM_V6_1.5V     --/  --         --/  --         --/  --
          host  5V               --/  --         --/  --         --/  --
          host  3.4V             --/  --         --/  --         --/  --
          host  Mbus5V         4700/5300       4600/5400       4500/5500
0/5/*     host  InletTemp        --/  55         --/  60         --/  70
          host  HotTemp          --/  66         --/  69         --/  75
          host  PLIM_V3_1.5V     --/  --         --/  --         --/  --
          host  PLIM_V8_1.8V     --/  --         --/  --         --/  --
          host  PLIM_V7_2.5V     --/  --         --/  --         --/  --
          host  PLIM_V6_1.5V     --/  --         --/  --         --/  --
          host  5V               --/  --         --/  --         --/  --
          host  3.4V             --/  --         --/  --         --/  --
          host  Mbus5V         4700/5300       4600/5400       4500/5500
0/6/*     host  HotTemp          --/  66         --/  69         --/  75
          host  InletTemp        --/  55         --/  60         --/  70
          host  PLIM_V3_1.5V     --/  --         --/  --         --/  --
          host  PLIM_V8_1.8V     --/  --         --/  --         --/  --
          host  PLIM_V7_2.5V     --/  --         --/  --         --/  --
          host  3.4V             --/  --         --/  --         --/  --
          host  Mbus5V         4700/5300       4600/5400       4500/5500
0/7/*     host  InletTemp        --/  55         --/  60         --/  70
          host  HotTemp          --/  66         --/  69         --/  75
          host  PLIM_V3_1.5V     --/  --         --/  --         --/  --
          host  PLIM_V8_1.8V     --/  --         --/  --         --/  --
          host  PLIM_V7_2.5V     --/  --         --/  --         --/  --
          host  PLIM_V6_1.5V     --/  --         --/  --         --/  --
          host  5V               --/  --         --/  --         --/  --
          host  3.4V             --/  --         --/  --         --/  --
          host  Mbus5V         4700/5300       4600/5400       4500/5500
0/8/*     host  InletTemp        --/  55         --/  60         --/  70
          host  HotTemp          --/  66         --/  69         --/  75
          host  PLIM_V3_1.5V     --/  --         --/  --         --/  --
          host  PLIM_V8_1.8V     --/  --         --/  --         --/  --
          host  PLIM_V7_2.5V     --/  --         --/  --         --/  --
          host  3.4V             --/  --         --/  --         --/  --
```

```
          host  5V             4800/5200        4700/5300        4600/5400
          host  Mbus5V         4700/5300        4600/5400        4500/5500
Voltage Information
---------------------------------------------

R/S/I   Modules Sensor          Voltage (mV)    Margin

0/0/*     host  PLIM_V4_1.6V     1612           nominal
          host  PLIM_V5_1.8V     1804           nominal
          host  PLIM_V3_2.5V     2504           nominal
          host  3.4V             3296           nominal
          host  5V               5048           nominal
          host  Mbus5V           5048           n/a
0/3/*     host  PLIM_V3_1.5V     1496           nominal
          host  PLIM_V8_1.8V     1788           nominal
          host  PLIM_V7_2.5V     2492           nominal
          host  3.4V             3284           nominal
          host  5V               5000           nominal
          host  Mbus5V           5024           n/a
0/4/*     host  PLIM_V3_1.5V     1500           nominal
          host  PLIM_V8_1.8V     1796           nominal
          host  PLIM_V7_2.5V     2488           nominal
          host  PLIM_V6_1.5V     1508           nominal
          host  5V               4976           nominal
          host  3.4V             3288           nominal
          host  Mbus5V           5048           n/a
0/5/*     host  PLIM_V3_1.5V     1504           nominal
          host  PLIM_V8_1.8V     1792           nominal
          host  PLIM_V7_2.5V     2488           nominal
          host  PLIM_V6_1.5V     1504           nominal
          host  5V               4976           nominal
          host  3.4V             3284           nominal
          host  Mbus5V           4984           n/a
0/6/*     host  PLIM_V3_1.5V     1496           nominal
          host  PLIM_V8_1.8V     1792           nominal
          host  PLIM_V7_2.5V     2476           nominal
          host  3.4V             3300           nominal
          host  Mbus5V           5016           n/a
0/7/*     host  PLIM_V3_1.5V     1504           nominal
          host  PLIM_V8_1.8V     1796           nominal
          host  PLIM_V7_2.5V     2484           nominal
          host  PLIM_V6_1.5V     1504           nominal
          host  5V               4976           nominal
          host  3.4V             3276           nominal
          host  Mbus5V           4984           n/a
0/8/*     host  PLIM_V3_1.5V     1496           nominal
          host  PLIM_V8_1.8V     1792           nominal
          host  PLIM_V7_2.5V     2492           nominal
          host  3.4V             3280           nominal
          host  5V               5000           nominal
          host  Mbus5V           5024           n/a
```

Displaying RP Redundancy Status

The **show redundancy** command displays the redundancy status of the route processors (RPs) . This command also displays the boot and switch-over history for the RPs.

The **show redundancy** operates in EXEC and administration EXEC mode.

In the following example, the **show redundancy** command displays the redundancy status for a redundant RP pair:

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

Tue Jan 13 13:57:34.696 PST DST
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 Mon Jan  5 21:56:06 2009: 1 week, 16 hours, 1 minute ago
Active node booted Mon Jan  5 21:56:06 2009: 1 week, 16 hours, 1 minute ago

Active node reload "Cause: Turboboot completed successfully"
```

Displaying Field-Programmable Device Compatibility

The **show hw-module fpd** command displays field-programmable device (FPD) compatibility for all modules or a specific module.

The syntax for the **show hw-module fpd** command is:

show hw-module fpd location {**all** | *node-id*}

The **show hw-module fpd** operates in EXEC and administration EXEC mode.

The following example shows how to display FPD compatibility for all modules in the router:

```
RP/0/0/CPU0:router# show hw-module fpd location all

===================================== ==========================================
                                      Existing Field Programmable Devices
                                      ==========================================
                                        HW                        Current SW Upg/
Location     Card Type                Version Type Subtype Inst   Version   Dng?
============ ======================== ======= ==== ======= ==== =========== ====
0/1/0        SPA-4XT3/E3                1.0   spa  fpga    0       0.24     No
                                             spa  rommon  0       2.12     No
                                             spa  fpga2   0       1.0      No
                                             spa  fpga3   0       1.0      No
-------------------------------------------------------------------------------
0/1/1        SPA-4XCT3/DS0              0.253 spa  fpga    1       2.1      No
                                             spa  rommon  1       2.12     No
                                             spa  fpga2   1       0.15     No
-------------------------------------------------------------------------------
0/3/0        SPA-2XOC48POS/RPR          1.0   spa  fpga    0       1.0      No
-------------------------------------------------------------------------------
0/3/1        SPA-1XTENGE-XFP            3.2   spa  fpga    1       1.7      No
-------------------------------------------------------------------------------


RP/0/0/CPU0:router# show hw-module fpd location 0/1/0
Sun Apr 18 10:51:33.776 DST

===================================== ==========================================
                                      Existing Field Programmable Devices
                                      ==========================================
                                        HW                        Current SW Upg/
Location     Card Type                Version Type Subtype Inst   Version   Dng?
============ ======================== ======= ==== ======= ==== =========== ====
0/1/0        SPA-1XTENGE-XFP            3.2   spa  fpga1   0       1.09     No
-------------------------------------------------------------------------------
```

Table 3: show hw-module fpd Field Descriptions

Field	Description
Location	Location of the module in the *rack*/*slot*/*module* notation.

Field	Description
Card Type	Module part number.
HW Version	Hardware model version for the module.
Type	Hardware type. Can be one of the following types: • spa—Shared port adapter • lc—Line card
Subtype	FPD type. Can be one of the following types: • fabldr—Fabric downloader • fpga1—Field-programmable gate array • fpga2—Field-programmable gate array 2 • fpga3—Field-programmable gate array 3 • fpga4—Field-programmable gate array 4 • fpga5—Field-programmable gate array 5 • rommonA—Read-only memory monitor A • rommon—Read-only memory monitor B
Inst	FPD instance. The FPD instance uniquely identifies an FPD and is used by the FPD process to register an FPD.
Current SW Version	Currently running FPD image version.
Upg/Dng?	Specifies whether an FPD upgrade or downgrade is required. A downgrade is required in rare cases when the version of the FPD image has a higher major revision than the version of the FPD image in the current Cisco IOS XR software package.

Displaying Hardware Image Compatibility

The **show upgrade** command displays the compatibility of hardware-related images running on various hardware modules and the hardware-related images bundled in the Cisco IOS XR software image currently running on the system. Use the **show upgrade** command to determine if you need to perform an upgrade of any of the following images:

- Fabric downloader
- Mbus ROM

- ROM Monitor

The syntax for the show upgrade command is:

show upgrade {**all** | **fabric-downloader** | **mbus-rom** | **rommon**} **location** {**all** | *node-id*}

The **show upgrade** command operates in administration EXEC mode.

If the output from the **show upgrade** command indicates that an upgrade is required, use the **upgrade** command in administration EXEC mode to perform the required upgrade.

The following example shows sample output from the **show upgrade** command for all modules in the router:

```
RP/0/0/CPU0:router(admin)# show upgrade all location all

Wed Jan 28 19:59:26.373 UTC
Node          Type                PLIM              Fab-Dwnldr    Mbus-Rom     Rommon
                                                     Upgrade       Upgrade      Upgrade
                                                     Required      Required     Required
-----------------------------------------------------------------------------------------
0/0/CPU0      PRP(Active)         N/A               N/A           Yes          Yes
0/1/CPU0      L3LC Eng 5+         Jacket Card       No            Yes          No
0/2/CPU0      L3LC Eng 5+         Jacket Card       Yes           Yes          No
0/3/CPU0      L3LC Eng 5+         Jacket Card       Yes           Yes          No
0/4/CPU0      L3 Service Eng      N/A               Yes           Yes          No
0/5/CPU0      L3LC Eng 5+         Jacket Card       No            Yes          No
0/6/CPU0      L3LC Eng 5          Jacket Card       Yes           Yes          No
0/7/CPU0      L3LC Eng 3          OC12-ATM-4        No            Yes          No
0/8/CPU0      PRP(Standby)        N/A               N/A           Yes          Yes
0/9/CPU0      L3LC Eng 3          OC3-POS-4         No            Yes          No
0/16/CPU0     CSC10               N/A               N/A           Yes          N/A
0/17/CPU0     CSC10(P)            N/A               N/A           Yes          N/A
0/18/CPU0     SFC10               N/A               N/A           Yes          N/A
0/19/CPU0     SFC10               N/A               N/A           Yes          N/A
0/20/CPU0     SFC10               N/A               N/A           Yes          N/A
0/21/CPU0     SFC10               N/A               N/A           Yes          N/A
0/22/CPU0     SFC10               N/A               N/A           Yes          N/A
0/24/CPU0     ALARM10             N/A               N/A           Yes          N/A
0/25/CPU0     ALARM10             N/A               N/A           Yes          N/A
0/29/CPU0     GSR16-BLOWER        N/A               N/A           Yes          N/A
```

For more information regarding the **show upgrade** command, refer to the *Hardware Redundancy and Node Administration Commands on the Cisco IOS XR Software* module in *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Series Router*.

RP Redundancy and Switchover

This section describes RP redundancy and switchover commands and issues.

Establishing RP Redundancy

Redundant RPs are formed when you insert two RP cards into paired redundancy slots. Redundancy slots are paired as follows:

- Slot 0 and Slot 1
- Slot 2 and Slot 3
- Slot 4 and Slot 5
- Slot 6 and Slot 7

- Slot 8 and Slot 9
- Slot 10 and Slot 11
- Slot 12 and Slot 13
- Slot 14 and Slot 15

RPs that are seated in paired redundancy slots cannot be assigned to different SDRs. For example, an RP that is installed in Slot 3 can be assigned to one SDR, whereas an RP that is installed in Slot 4 can be assigned to a different SDR because Slot 3 and Slot 4 are not a redundant pair. However, you cannot have the RP in Slot 3 assigned to an SDR other that of the RP in Slot 2 because Slot 2 and Slot 3 are a redundant pair.

RP redundancy is established when the Cisco IOS XR software is brought up on both cards in paired redundancy slots. For example, if you install the Cisco IOS XR software on the DSC, an RP in the paired redundancy slot comes up as the standby DSC after the minimum boot image (MBI) is loaded and the redundant RP synchronizes with the DSC.

Determining the Active RP in a Redundant Pair

During system startup, one RP in each redundant pair becomes the active RP. You can tell which RP is the active RP in the following ways:

- The alphanumeric LED display on the active Performance Route Processor (PRP) displays: PRI RP.
- The slot of the active RP is indicated in the CLI prompt. For example:

  ```
  RP/0/1/CPU0:router#
  ```

  In this example, the prompt indicates that you are communicating with the active RP in slot RP1. See *Cisco IOS XR Getting Started Guide for the Cisco XR 12000 Series Router* for a complete description of the CLI prompt.
- Enter the **show redundancy** command in EXEC mode to display a summary of the active and standby RP status. For example:

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

  Tue Jan 13 13:57:34.696 PST DST
  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 Mon Jan  5 21:56:06 2009: 1 week, 16 hours, 1 minute ago
  Active node booted Mon Jan  5 21:56:06 2009: 1 week, 16 hours, 1 minute ago

  Active node reload "Cause: Turboboot completed successfully"
  ```

Role of the Standby RP

The second RP to boot in a redundant pair automatically becomes the standby RP. While the active RP manages the system and communicates with the user interface, the standby RP maintains a complete backup of the

software and configurations for all cards in the system. If the active RP fails or goes off line for any reason, the standby RP immediately takes control of the system.

Summary of Redundancy Commands

RP redundancy is enabled by default in the Cisco IOS XR software, but you can use the commands described in Table 4: RP Redundancy Commands, on page 18 to display the redundancy status of the cards or force a manual switchover.

Table 4: RP Redundancy Commands

Command	Description
show redundancy	Displays the redundancy status of the RPs. This command also displays the boot and switch-over history for the RPs.
redundancy switchover	Forces a manual switchover to the standby RP. This command works only if the standby RP is installed and in the “ready” state.
show platform	Displays the status for node, including the redundancy status of the RP cards. In EXEC mode, this command displays status for the nodes assigned to the SDR. In administration EXEC mode, this command displays status for all nodes in the system.

Automatic Switchover

Automatic switchover from the active RP to the standby RP occurs only if the active RP encounters a serious system error, such as the loss of a mandatory process or a hardware failure. When an automatic switchover occurs, the RPs respond as follows:

- If a standby RP is installed and “ready” for switchover, the standby RP becomes the active RP. The original active RP attempts to reboot.
- If the standby RP is not in “ready” state, then both RPs reboot. The first RP to boot successfully assumes the role of active RP.

RP Redundancy During RP Reload

The **reload** command causes the active RP to reload the Cisco IOS XR software. When an RP reload occurs, the RPs respond as follows:

- If a standby RP is installed and “ready” for switchover, the standby RP becomes the active RP. The original active RP reboots and becomes the standby RP.

- If the standby RP is not in the “ready” state, then both RPs reboot. The first RP to boot successfully assumes the role of active RP.

Caution You should not use the **reload** command to force an RP switchover because the result could be a significant loss of router operations. Instead, use the **redundancy switchover** command to fail over to the standby RP, then use the **hw-module location** *node-id* **reload** command to reload the new standby RP.

Related Topics

Reloading, Shutting Down, or Power Cycling a Node, on page 20

Manual Switchover

You can force a manual switchover from the active RP to the standby RP using the **redundancy switchover** command.

If a standby RP is installed and ready for switchover, the standby RP becomes the active RP. The original active RP becomes the standby RP. In the following example, partial output for a successful redundancy switchover operation is shown:

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

  This node (0/0/CPU0) is in ACTIVE role
  Partner node (0/1/CPU0) is in STANDBY role
  Standby node in 0/1/CPU0 is ready

  RP/0/0/CPU0:router# redundancy switchover
  Updating Commit Database.  Please wait...[OK]
  Proceed with switchover 0/0/CPU0 -> 0/1/CPU0? [confirm]
  Initiating switch-over.
  RP/0/0/CPU0:router#

  <Your 'TELNET' connection has terminated>
```

In the preceding example, the Telnet connection is lost when the previously active RP resets. To continue management of the router, you must connect to the newly activated RP as shown in the following example:

```
User Access Verification

  Username: xxxxx
  Password: xxxxx
  Last switch-over Sat Apr 15 12:26:47 2009: 1 minute ago

RP/0/1/CPU0:router#
```

If the standby RP is not in “ready” state, the switchover operation is not allowed. In the following example, partial output for a failed redundancy switchover attempt is shown:

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

  Redundancy information for node 0/1/CPU0:
  ==========================================
  Node 0/0/CPU0 is in ACTIVE role
  Partner node (0/1/CPU0) is in UNKNOWN role
```

```
Reload and boot info
----------------------
RP reloaded Wed Mar 29 17:22:08 2006: 2 weeks, 2 days, 19 hours, 14 minutes ago
Active node booted Sat Apr 15 12:27:58 2006: 8 minutes ago
Last switch-over Sat Apr 15 12:35:42 2006: 1 minute ago
There have been 4 switch-overs since reload

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

Switchover disallowed: Standby node is not ready.
```

Communicating with a Standby RP

The active RP automatically synchronizes all system software, settings, and configurations with the standby RP.

If you connect to the standby RP through the console port, you can view the status messages for the standby RP. The standby RP does not display a CLI prompt, so you cannot manage the standby card while it is in standby mode.

If you connect to the standby RP through the management Ethernet port, the prompt that appears is for the active RP, and you can manage the router the same as if you had connected through the management Ethernet port on the active RP.

Reloading, Shutting Down, or Power Cycling a Node

Use the commands described in this section to reload the Cisco IOS XR software on the active RP or on any specified node in the system. This section also describes the commands used to administratively shut down a node and power a node on or off.

Table 5: Commands to Reload, Shut Down, or Power Cycle a Node, on page 20 summarizes the commands described in this section.

Table 5: Commands to Reload, Shut Down, or Power Cycle a Node

Command	Description
hw-module location *node-id* **power disable**	This command administratively turns the power off for a node. It is entered in administration configuration mode. The changes do not take effect until you enter the **commit** command. To power on a node, use the **no** form of this command. **Note** This command cannot be used to disable power on the RP from which the command is entered.

Command	Description
hw-module location *node-id* **reload**	This command works in EXEC mode and reloads the Cisco IOS XR software on a specific node or all nodes. To specify all nodes, enter the **all** keyword in place of the *node-id* argument. The node reloads with the current running configuration and active software set for that node.
hw-module shutdown location *node-id*	This command must be entered in administration configuration mode and administratively shuts down the specified node. Nodes that are shut down still have power but cannot load or operate Cisco IOS XR software. To return a node to the up state, use the **no** form of this command. **Note** This command cannot be used to shut down the RP from which the command is entered.

Reloading the Active RP

The **reload** command causes the active RP to reload the Cisco IOS XR software according to the configuration register setting. This setting determines how the active RP acts when reloaded.

This section contains instructions to reload the Cisco IOS XR software and return to EXEC mode. For instructions to use the **reload** command for entering ROM Monitor bootstrap mode, see *Cisco IOS XR ROM Monitor Guide for the Cisco XR 12000 Series Router*.

Caution Because the **reload** command causes the active RP to go off line and either reload the Cisco IOS XR software or enter ROM Monitor mode, the router experiences a loss of service unless a redundant standby RP is installed and in "ready" state. To display the status of the standby RP, use the **show redundancy** command in EXEC mode.

SUMMARY STEPS

1. **show redundancy**
2. **admin**
3. **show variables boot**
4. (Optional) **config-register 0x2102**
5. **admin**
6. **reload**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**show redundancy** **Example:** `RP/0/0/CPU0:router# show redundancy`	Displays the RP redundancy status. • If a standby RP is in "ready" redundancy state, the **reload** command also causes the router to gracefully fail over to the standby RP.
Step 2	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.
Step 3	**show variables boot** **Example:** `RP/0/0/CPU0:router(admin)# show variables boot`	Displays the configuration register setting. • Enter this command in administration EXEC mode. • For normal operations, the configuration register setting is 0x2102, which causes the active RP to reload the Cisco IOS XR software. • Verify that the configuration register setting is 0x2102. If it is not, complete Step 4, on page 22 to reset the configuration register to 0x2102. **Note** For instructions on how to enter ROM Monitor bootstrap mode, see *Cisco IOS XR ROM Monitor Guide for the Cisco XR 12000 Series Router*.
Step 4	**config-register 0x2102** **Example:** `RP/0/0/CPU0:router(admin)# config-register 0x2102`	(Optional) Sets the configuration register to 0x2102. This step is necessary only if the register is not set to 0x2102 in the running configuration.
Step 5	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.
Step 6	**reload** **Example:** `RP/0/0/CPU0:router# reload`	Reloads the active RP according to the configuration register setting. • If the setting is 0x2102, then the RP reloads the Cisco IOS XR software. • If the standby RP is in "ready" redundancy state, the router switches over to the standby RP. • If a standby RP is not installed or not in a "ready" state, the router experiences a loss of service while the active RP is reloading the Cisco IOS XR software.

Administratively Shutting Down or Powering On or Off a Node

A node can be administratively shut down by entering the **hw-module location** *node-id* **shutdown** command in administration configuration mode. A node that is shut down still has power, but it cannot load or run the Cisco IOS XR software.

You can also administratively turn power off for a node using the **hw-module location** *node-id* **power disable** command in administration configuration mode.

For more information on the use of these commands, see *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Series Router*.

Configuring the Power Manager

Cisco IOS XR software manages the power of the chassis by keeping track of the available wattage for use and how much is necessary, in the worst case scenario. The manager prevents newly discovered or inserted modules or line cards from powering up unless there is sufficient surplus power available to operate them. This means that some line cards may be held in the power down or low power state to permit the remaining cards to run. Restricting which cards come up guarantees that the chassis continues to operate if a single power supply (or several power supplies) fail.

The power manager is enabled by default to operate in redundancy mode, which means that the failure of at least one power supply is already assumed in the calculation of the available wattage for the chassis. This means that only those cards that can be powered by the redundant power supplies are allowed to power up. In this way, operation is guaranteed even if one or more power supplies fail.

Alternatively, you can configure the power management to be additive, meaning that the wattage of all power sources is summed together to compute the total available power. The decision of whether to power up a line card is based on whether there is surplus power remaining from the total sum of all the power supplies. This mode cannot guarantee any sort of power redundancy, because no power has been reserved for coping with a power supply failure. However, with sufficient power supplies, the probability of a failure is statistically lower due to the larger number of independent power supplies. The additive mode is best for power-hungry applications where card density is more important than absolute protection from a power supply fault.

SUMMARY STEPS

1. **admin**
2. **configure**
3. (Optional) **power-mgr additive**
4. (Optional) **power-mgr disable**
5. (Optional) **power-mgr scale-factor** *percentage*
6. **show power-mgr**
7. **commit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.
Step 2	**configure** **Example:** `RP/0/0/CPU0:router(admin)# configure`	Enters administration configuration mode.
Step 3	**power-mgr additive** **Example:** `power-mgr additive`	(Optional) Configures the power manager in additive mode, where the wattage of all power sources is summed together to compute the total available power. The decision of whether to power up a line card is based on whether there is surplus power available from the total sum of all the power supplies. The default operational mode is redundancy. In this mode, the failure of at least one power supply is already assumed in the calculation of the available power. In redundancy mode, only those cards that can be powered by the redundant power supplies are allowed to power up. **Note** Use the **no power-mgr additive** command to return to the default redundancy mode.
Step 4	**power-mgr disable** **Example:** `power-mgr disable`	(Optional) Disables the power manager. The power manager is enabled by default. Disabling the power manager results in a warning message to the SYSLOG indicating that redundancy protection has been disabled. **Note** In Cisco IOS XR Software Release 3.9.0, the power manager is enabled in passive mode. Cards are allowed to come up even if there is insufficient power, and warning messages are displayed indicating low power conditions.
Step 5	**power-mgr scale-factor** *percentage* **Example:** `power-mgr scale-factor 150`	(Optional) Derates or super-rates the power consumption from 50 percent to 150 percent of the actual power consumption.
Step 6	**show power-mgr**	Displays the power manager configuration for the chassis.
Step 7	**commit**	

show power-mgr Output: Example

The following example shows sample output from the **show power-mgr** command:

```
RP/0/5/CPU0:router(admin)# show power-mgr trace
```

```
Sun Jun 28 12:25:40.763 PST
97 wrapping entries (1152 possible, 0 filtered, 97 total)
Jun 12 04:27:12.426 power_manager/debug 0/5/CPU0 t33 -------power_manager starting--------
Jun 12 04:27:12.426 power_manager/debug 0/5/CPU0 t33 PM Spawning main Process
Jun 12 04:27:12.426 power_manager/debug 0/5/CPU0 t33 Performing pre-config monvar parsing
Jun 12 04:27:12.626 power_manager/debug 0/5/CPU0 t35 Power Manager EDM Bind successful
Jun 12 04:27:12.658 power_manager/debug 0/5/CPU0 t35 Power Manager Bag registration done
Jun 12 04:27:12.715 power_manager/debug 0/5/CPU0 t35 Power Manager EDM Registration is done
Jun 12 04:27:14.516 power_manager/debug 0/5/CPU0 t1  Event: DISCOVERY_DONE on zone=2 with
data 0x00000000
Jun 12 04:27:14.517 power_manager/debug 0/5/CPU0 t33 PM Dequeued Event = DISCOVERY_DONE
Jun 12 04:27:14.520 power_manager/debug 0/5/CPU0 t36 Running on primary RP
Jun 12 04:27:14.539 power_manager/debug 0/5/CPU0 t36 MBus path to PEMs now available
Jun 12 04:27:14.539 power_manager/debug 0/5/CPU0 t36 Attempting to discover powershelf type
Jun 12 04:27:15.073 power_manager/debug 0/5/CPU0 t36 PEM FAMILY determined to be =0
Jun 12 04:27:15.240 power_manager/debug 0/5/CPU0 t36 Successfully discovered powershelf
type=2
Jun 12 04:27:15.240 power_manager/debug 0/5/CPU0 t36 Discovering installed PEMs
Jun 12 04:27:19.550 power_manager/debug 0/5/CPU0 t22 Discarding LC_OIR_INSERTED for slot
25; in DISCOVERY_PHASE
Jun 12 04:27:19.551 power_manager/debug 0/5/CPU0 t16 Discarding LC_OIR_INSERTED for slot
16; in DISCOVERY_PHASE
Jun 12 04:27:19.551 power_manager/debug 0/5/CPU0 t19 Discarding LC_OIR_INSERTED for slot
19; in DISCOVERY_PHASE
Jun 12 04:27:19.552 power_manager/debug 0/5/CPU0 t25 Discarding LC_OIR_INSERTED for slot
28; in DISCOVERY_PHASE
Jun 12 04:27:19.562 power_manager/debug 0/5/CPU0 t20 Discarding LC_OIR_INSERTED for slot
20; in DISCOVERY_PHASE
Jun 12 04:27:19.564 power_manager/debug 0/5/CPU0 t12 Discarding LC_OIR_INSERTED for slot
2; in DISCOVERY_PHASE
Jun 12 04:27:19.565 power_manager/debug 0/5/CPU0 t15 Discarding LC_OIR_INSERTED for slot
5; in DISCOVERY_PHASE
Jun 12 04:27:19.565 power_manager/debug 0/5/CPU0 t10 Discarding LC_OIR_INSERTED for slot
0; in DISCOVERY_PHASE
Jun 12 04:27:19.566 power_manager/debug 0/5/CPU0 t13 Discarding LC_OIR_INSERTED for slot
3; in DISCOVERY_PHASE
Jun 12 04:27:19.575 power_manager/debug 0/5/CPU0 t21 Discarding LC_OIR_INSERTED for slot
24; in DISCOVERY_PHASE
Jun 12 04:27:19.577 power_manager/debug 0/5/CPU0 t14 Discarding LC_OIR_INSERTED for slot
4; in DISCOVERY_PHASE
Jun 12 04:27:19.583 power_manager/debug 0/5/CPU0 t11 Discarding LC_OIR_INSERTED for slot
1; in DISCOVERY_PHASE
Jun 12 04:27:19.598 power_manager/debug 0/5/CPU0 t18 Discarding LC_OIR_INSERTED for slot
18; in DISCOVERY_PHASE
Jun 12 04:27:23.418 power_manager/debug 0/5/CPU0 t36 PEM 2 open part failed ; retry count=25
Jun 12 04:27:31.335 power_manager/debug 0/5/CPU0 t36 PEM 2 open part failed ; retry count=25
Jun 12 04:27:31.536 power_manager/err 0/5/CPU0 t36 Intelligence check for pem 2 failed with
 result =4
Jun 12 04:27:31.536 power_manager/debug 0/5/CPU0 t36 PEM2 discovered as GSR6 legacy AC
Jun 12 04:27:31.683 power_manager/debug 0/5/CPU0 t36 PEM2 can supply up to 1600 watts
Jun 12 04:27:31.683 power_manager/debug 0/5/CPU0 t36 Zone discovery found 1 power zone for
 this chassis
Jun 12 04:27:31.683 power_manager/debug 0/5/CPU0 t36 Discovering cards present and populating
 slot data
Jun 12 04:27:36.684 power_manager/debug 0/5/CPU0 t36 Cardtype 150 found in slot 0, needing
 134 W
Jun 12 04:27:36.684 power_manager/debug 0/5/CPU0 t36 Cardtype 150 found in slot 1, needing
 134 W
Jun 12 04:27:36.702 power_manager/debug 0/5/CPU0 t36 Cardtype 149 found in slot 2, needing
 240 W
Jun 12 04:27:36.717 power_manager/debug 0/5/CPU0 t36 Cardtype 149 found in slot 3, needing
 240 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 149 found in slot 4, needing
 240 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 96 found in slot 5, needing
60 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 6; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 7; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 8; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 9; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 10; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 11; skipping
```

```
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 12; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 13; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 14; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 15; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 29 found in slot 16, needing
 56 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 17; marking
phantom
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 30 found in slot 18, needing
 45 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 30 found in slot 19, needing
 45 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 30 found in slot 20, needing
 45 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 21; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 22; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 23; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 15 found in slot 24, needing
 26 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 15 found in slot 25, needing
 26 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 26; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 27; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Cardtype 112 found in slot 28, needing
 178 W
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 29; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 30; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 No card present in slot 31; skipping
Jun 12 04:27:36.735 power_manager/debug 0/5/CPU0 t36 Changing phase to INIT_DECISION_PHASE
Jun 12 04:27:36.738 power_manager/debug 0/5/CPU0 t36 Powershelf capacity at 1600 watts
zone1, 0 watts zone2
Jun 12 04:27:36.738 power_manager/debug 0/5/CPU0 t36 Reserved chassis power is 477 W zone1,
 0 W zone2
Jun 12 04:27:36.738 power_manager/debug 0/5/CPU0 t36 Available power for chassis is 1123 W
 zone1,0 W zone2,
Jun 12 04:27:36.738 power_manager/debug 0/5/CPU0 t36 Starting power-on decision process
with 1123/0 W
Jun 12 04:27:36.738 power_manager/debug 0/5/CPU0 t36 Starting power-on decision process
with 5/60 W
Jun 12 04:27:36.738 power_manager/debug 0/5/CPU0 t36 After accounting for RPs, 1063/0 W
avail
Jun 12 04:27:36.738 power_manager/debug 0/5/CPU0 t36 After accounting for priority slots,
1063/0 W avail
Jun 12 04:28:46.718 power_manager/debug 0/5/CPU0 t36 slot 0 needs 134 W, 929 avail;
Jun 12 04:28:46.718 power_manager/debug 0/5/CPU0 t36 slot 1 needs 134 W, 795 avail;
Jun 12 04:28:46.735 power_manager/debug 0/5/CPU0 t36 slot 2 needs 240 W, 555 avail;
Jun 12 04:28:46.750 power_manager/debug 0/5/CPU0 t36 slot 3 needs 240 W, 315 avail;
Jun 12 04:28:46.777 power_manager/debug 0/5/CPU0 t36 slot 4 needs 240 W, 75 avail;
Jun 12 04:28:46.777 power_manager/debug 0/5/CPU0 t36 After accounting for normal slots,
75/0 W avail
Jun 12 04:28:46.777 power_manager/debug 0/5/CPU0 t36 RP in-use power is 60 W zone1, 0 W
zone2
Jun 12 04:28:46.777 power_manager/debug 0/5/CPU0 t36 Linecard in-use power is 988 W zone1,
 0 W zone2
Jun 12 04:28:46.777 power_manager/debug 0/5/CPU0 t36 Available power for chassis is 75 W
zone1,0 W zone2,
Jun 12 04:28:46.777 power_manager/debug 0/5/CPU0 t36 Starting periodic task to monitor PEMs
Jun 12 04:28:46.778 power_manager/debug 0/5/CPU0 t36 Changing phase to RUNNING_PHASE
Jun 12 04:28:47.706 power_manager/debug 0/5/CPU0 t11 Sufficient power available to bringup
 slot 1
Jun 12 04:28:47.711 power_manager/debug 0/5/CPU0 t10 Sufficient power available to bringup
 slot 0
Jun 12 04:28:47.713 power_manager/debug 0/5/CPU0 t12 Sufficient power available to bringup
 slot 2
Jun 12 04:28:47.715 power_manager/debug 0/5/CPU0 t14 Sufficient power available to bringup
 slot 4
Jun 12 04:28:47.718 power_manager/debug 0/5/CPU0 t13 Sufficient power available to bringup
 slot 3
Jun 12 04:28:59.467 power_manager/debug 0/5/CPU0 t33 PEM2 busy; skipping polling
Jun 12 04:29:10.161 power_manager/debug 0/5/CPU0 t33 PEM2 no longer busy; resuming polling
Jun 12 04:36:30.950 power_manager/debug 0/5/CPU0 t10 Sufficient power available to bringup
 slot 0
Jun 12 04:36:54.291 power_manager/debug 0/5/CPU0 t11 Sufficient power available to bringup
```

```
 slot 1
Jun 12 09:13:43.219 power_manager/debug 0/5/CPU0 t10 Sufficient power available to bringup
 slot 0
Jun 12 09:13:44.514 power_manager/debug 0/5/CPU0 t11 Sufficient power available to bringup
 slot 1
Jun 12 09:14:29.463 power_manager/debug 0/5/CPU0 t11 Sufficient power available to bringup
 slot 1
```

Flash Disk Recovery

When an RP is power cycled or experiences an ungraceful reset, the boot disk (PCMCIA flash disk used to boot the card) may experience a file-system corruption. If this occurs, an error message is displayed and the RP fails to boot. The corrupted flash disk is automatically reformatted and the Cisco IOS XR software is restored from the designated system controller (DSC) for the system.

For example, if a flash disk for an RP is corrupted, the RP fails to boot and the following error message is displayed:

```
##########################################################
              Restricted Rights Legend
Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706

Cisco IOS XR Software for the Cisco XR Cisco XR 12000 Series Router-mbirp,
Copyright (c) 2009 by Cisco Systems, Inc.
Unable to mount /disk0:, filesystem is corrupted.
Check fsck log at /tmp/chkfs_fd0.log
init: special_commands:wait for disk0: failed
```

If this occurs, then the flash disk is automatically reformatted and the Cisco IOS XR software is restored to the flash disk.

Note If the flash disk is badly damaged and cannot be reformatted, the disk must be replaced.

If the corrupted flash disk is the DSC, then the router fails over to the standby DSC. If no standby DSC is installed, then the system fails to boot.

Using Controller Commands to Manage Hardware Components

The **controller** , **controllers** , and **show controllers** commands are used to manage and display settings for various hardware components, including the switch fabric management, Ethernet control plane, and interface manager. These commands are primarily diagnostic and related to driver-level details. The information available with these commands varies widely and is hardware specific.

For information on the use of these commands, see *Cisco IOS XR Interface and Hardware Component Command Reference for the Cisco XR 12000 Series Router*.

Formatting Hard Drives, Flash Drives, and Other Storage Devices

To format a storage device on the router, use the **format** command in EXEC mode.

Caution Formatting a storage device deletes all data on that device.

The following command syntax is used:

format *filesystem:* [*options*]

Table 6: format command Syntax Description, on page 28 describes the **format** command syntax.

Table 6: format command Syntax Description

Variable	Description
filesystem	Specifies the memory device to format. The supported file systems are: • **bootflash:** • **compactflash:** • **flash:** • **harddisk:** • **harddiska:** • **disk0:** • **disk1:** Enter **format ?** to see the devices supported on your router.
options	Enter **format** *filesystem:* **?** to see the available options. For more information, see *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Series Router*.

In the following example, the **format** command is used to format the hard disk:

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

Removing and Replacing Cards

This section describes card replacement issues and procedures.

Removing Line Cards

Line cards are designed for online insertion and removal (OIR). A line card is a single card that contains all service processing functions and physical line interfaces.

The OIR feature allows you to remove and replace cards without removing power to the card or chassis. Removing a card interrupts all traffic passing through the card, but it does not remove the card configuration.

When you remove a card, the configuration remains for all interfaces, but the interfaces do not appear in the output of the **show interfaces** command. You can view interface configurations by entering the **show running-config** command. The following example shows how the configuration appears when a card is removed:

```
RP/0/0/CPU0:router# show running-config

  Building configuration...
  hostname router
  router ospf 3269
   area 0
    interface POS0/3/0/0
     cost 20
  !
  interface preconfigure POS0/3/0/0
   ipv4 address 10.10.50.1 255.255.255.0
  !
  interface preconfigure POS0/3/0/1
   description POS0/3/0/1
   shutdown
  !
  interface preconfigure POS0/3/0/2
   description POS0/3/0/2
   shutdown
  !
  interface preconfigure POS0/3/0/3
   description POS0/3/0/3
   shutdown
  !
```

In this example, the line card in slot 3 is removed, and the interface configuration for all four interfaces changes to “interface preconfigure.” However, the “router ospf” reference to a slot 3 interface does not change. If you replace a line card with another line card that uses the same media type and port count, the configuration becomes active on the replacement card.

To remove the configuration for a slot after a card is removed, use the **no interface preconfigure** command to remove all interface configuration statements for that card in the running configuration. In addition, search the configuration for any references to the removed interfaces, such as the “router ospf” reference to slot 3 in the preceding example.

To remove the configuration for a slot when a card is installed, use the **no interface** command to remove all interface configuration statements for that card in the running configuration. In addition, search the configuration for any references to the removed interfaces.

Each line card supports a specific media type (Packet over SONET/SDH [POS] or Ethernet, for example) and port count. If you replace a line card with one that supports a different media type or port count, you should review the configuration and revise it to support the replacement line card.

Replacing a Line Card with the Same Media Type and Port Count

When you replace a line card or PLIM with a card that is of the same media type and has the same port count as the replaced card, the guidelines in the Removing Line Cards , on page 29 apply. Because the replacement card is of the same media type and port count, no special procedures are required for card removal and replacement.

Replacing a Line Card with the Same Media Type and a Different Port Count

When you replace a line card with a card that is of the same media type with a different port count, the guidelines in Removing Line Cards , on page 29 apply.

If the new card has a greater port count than the replaced card, the configuration applies to the corresponding lower port numbers, and the ports that did not exist on the replaced card have no configuration and come up in the shutdown state.

If the new card supports fewer ports, the existing configuration for the corresponding number of ports on the new card set is applied. The previous configuration for the removed ports remains in interface preconfigure state, as shown in the following example:

```
RP/0/0/CPU0:router# show running-config

  Building configuration...
  hostname rtp-gsr1
  interface POS0/3/0/0
   ipv4 address 10.10.50.1 255.255.255.0
  !
  interface preconfigure POS0/3/0/1
   description POS0/3/0/1
   shutdown
  !
  interface preconfigure POS0/3/0/2
   description POS0/3/0/2
   shutdown
  !
  interface preconfigure POS0/3/0/3
   description POS0/3/0/3
   shutdown
  !
```

In the preceding example, a four-port card has been replaced with a single-port card. The configuration from port 1 on the four-port card is applied to the single port on the replacement card, and the remaining port configurations change to “interface preconfigure.” To remove the configuration for the missing interfaces, use the **no interface preconfigure** command. In addition, search for and remove any configuration references to the removed interfaces.

Whenever you replace a line card with the same media type and a different port count, review the running configuration in the router and revise the configuration as necessary.

Replacing a Line Card or PLIM with a Different Media Type

When you replace a line card or PLIM with a card that is of a different media type (for example, if you replace a POS PLIM with an Ethernet PLIM), the guidelines in Removing Line Cards , on page 29 apply. Review the running configuration in the router and revise the configuration as necessary for the new media type.

Removing and Replacing CSC and SFC Cards

On Cisco XR 12000 Series Routers that use clock and scheduler cards (CSCs) and switch fabric cards (SFCs), the CSCs and SFCs work together to provide the switch fabric for the router. Although some router cards can be removed without software preparation, it is best to shut down and remove the power from a CSC or an SFC slot before removing a card. When the new card is inserted, you can restore the power to the slot and bring up the replacement card. This section describes how to properly remove and replace CSCs and SFCs for repairs.

Before You Begin

Note On Cisco XR 12404 routers, which use consolidated switch fabric cards (CSFCs), you must power off the router before changing a CSFC card.

You should have a working knowledge of Cisco IOS XR software and have sufficient permissions to configure the software.

You must log in as root-system before starting the procedure. To confirm your login status, use the **show user group** command:

```
RP/0/0/CPU0:router# show user group

  root-system, cisco-support
```

To confirm your login status including root, use the **show user all | include root** command:

```
RP/0/0/CPU0:router# show user all | include root

  Groups: root-system, cisco-support
  Task:              root-lr  : READ    WRITE    EXECUTE    DEBUG (reserved)
  Task:          root-system  : READ    WRITE    EXECUTE    DEBUG (reserved)
```

SUMMARY STEPS

1. **admin**
2. **show platform**
3. **admin**
4. **hw-module location** *slot* **shutdown**
5. **hw-module location** *slot* **power disable**
6. **commit**
7. **end**
8. (Optional) **show platform**
9. Remove and replace the CSC or SFC.
10. **admin**
11. **no hw-module location** *slot* **power disable**
12. **commit**
13. **end**
14. (Optional) **show platform**
15. **admin**
16. **no hw-module location** *slot* **shutdown**
17. **commit**
18. **end**
19. (Optional) **show platform**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.
Step 2	**show platform** **Example:** `RP/0/0/CPU0:router(admin)# show platform`	Displays the state of all cards on the router. • Allows you to identify the CSC or SFC you want to replace. • Make note of the node ID (in the first column) for the card you want to replace. You need to enter this ID later in this procedure.
Step 3	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.

	Command or Action	Purpose
Step 4	**hw-module location** *slot* **shutdown** **Example:** `RP/0/0/CPU0:router(admin-config)# hw-module location 0/16/CPU0 shutdown` **Example:**	Configures a slot to shut down when the configuration is committed. **Caution** Shut down only one CSC or SFC from the combined set of CSCs and SFCs at a time. For example, shut down one CSC or one SFC, but do not shut down two CSCs, two or more SFCs, or cards of both types at the same time. When shutting down a CSC, shutdown the standby CSC.
Step 5	**hw-module location** *slot* **power disable** **Example:** `RP/0/0/CPU0:router(admin-config)# hw-module location 0/16/CPU0 power disable`	Configures a slot to power down when the configuration is committed.
Step 6	**commit** **Example:** `RP/0/0/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 7	**end** **Example:** `RP/0/0/CPU0:router(admin-config)# end`	Exits administration configuration mode and returns to administration EXEC mode.
Step 8	**show platform** **Example:** `RP/0/0/CPU0:router(admin)# show platform`	(Optional) Displays the state of all cards on the router. • Allows you to verify that the CSC or SFC you want to replace is shut down and the power is off.
Step 9	Remove and replace the CSC or SFC.	Replaces the physical card.
Step 10	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.
Step 11	**no hw-module location** *slot* **power disable** **Example:** `RP/0/0/CPU0:router(admin-config)# no hw-module location 0/16/CPU0 power disable`	Configures a slot to power up when the configuration is committed.
Step 12	**commit** **Example:** `RP/0/0/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.

	Command or Action	Purpose
Step 13	**end** **Example:** `RP/0/0/CPU0:router(admin-config)# end`	Exits administration configuration mode and returns to administration EXEC mode.
Step 14	**show platform** **Example:** `RP/0/0/CPU0:router(admin)# show platform`	(Optional) Displays the state of all cards on the router. • Allows you to verify that the replacement CSC or SFC has power.
Step 15	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.
Step 16	**no hw-module location** *slot* **shutdown** **Example:** `RP/0/0/CPU0:router(admin-config)# no hw-module location 0/16/CPU0 shutdown`	Configures a slot to start when the configuration is committed.
Step 17	**commit** **Example:** `RP/0/0/CPU0:router(admin-config)# commit`	Commits the target configuration to the router running configuration.
Step 18	**end** **Example:** `RP/0/0/CPU0:router(admin-config)# end`	Exits administration configuration mode and returns to administration EXEC mode.
Step 19	**show platform** **Example:** `RP/0/0/CPU0:router(admin)# show platform`	(Optional) Displays the state of all cards on the router. • Allows you to verify that the replacement CSC or SFC has power and has been brought up.

Related Topics

Additional References, on page 39

Examples

The following example shows commands to change a CSC:

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

  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
  0/3/CPU0         L3LC Eng 3       OC3-POS-8        IOS XR RUN       PWR,NSHUT,MON
  0/4/CPU0         L3LC Eng 3       GE-4             IOS XR RUN       PWR,NSHUT,MON
  0/5/CPU0         L3LC Eng 3       GE-4             IOS XR RUN       PWR,NSHUT,MON
  0/6/CPU0         L3LC Eng 3       OC48-POS         IOS XR RUN       PWR,NSHUT,MON
  0/7/CPU0         L3LC Eng 3       GE-4             IOS XR RUN       PWR,NSHUT,MON
  0/8/CPU0         L3LC Eng 3       OC12-POS-4       IOS XR RUN       PWR,NSHUT,MON
  0/16/CPU0        CSC10            N/A              PWD              PWR,NSHUT,MON
  0/17/CPU0        CSC10(P)         N/A              PWD              PWR,NSHUT,MON
  0/18/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/19/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/20/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/21/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/22/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/24/CPU0        ALARM10          N/A              PWD              PWR,NSHUT,MON
  0/25/CPU0        ALARM10          N/A              PWD              PWR,NSHUT,MON
  0/29/CPU0        GSR16-BLOWER     N/A              PWD              PWR,NSHUT,MON

  RP/0/0/CPU0:router(admin)# configure

  RP/0/0/CPU0:router(admin-config)# hw-module location 0/16/CPU0 shutdown

  RP/0/0/CPU0:router(admin-config)# hw-module location 0/16/CPU0 power disable

  RP/0/0/CPU0:router(admin-config)# commit


  Primary Clock is CSC_1
  Fabric Clock is Non Redundant
  Bandwidth Mode : Full Bandwidth

  RP/0/0/CPU0:router(admin-config)# end

  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
  0/3/CPU0         L3LC Eng 3       OC3-POS-8        IOS XR RUN       PWR,NSHUT,MON
  0/4/CPU0         L3LC Eng 3       GE-4             IOS XR RUN       PWR,NSHUT,MON
  0/5/CPU0         L3LC Eng 3       GE-4             IOS XR RUN       PWR,NSHUT,MON
  0/6/CPU0         L3LC Eng 3       OC48-POS         IOS XR RUN       PWR,NSHUT,MON
  0/7/CPU0         L3LC Eng 3       GE-4             IOS XR RUN       PWR,NSHUT,MON
  0/8/CPU0         L3LC Eng 3       OC12-POS-4       IOS XR RUN       PWR,NSHUT,MON
  0/16/CPU0        CSC10            N/A              Admin Down       NPWR,SHUT,MON
  0/17/CPU0        CSC10(P)         N/A              PWD              PWR,NSHUT,MON
  0/18/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/19/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/20/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/21/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/22/CPU0        SFC10            N/A              PWD              PWR,NSHUT,MON
  0/24/CPU0        ALARM10          N/A              PWD              PWR,NSHUT,MON
  0/25/CPU0        ALARM10          N/A              PWD              PWR,NSHUT,MON
  0/29/CPU0        GSR16-BLOWER     N/A              PWD              PWR,NSHUT,MON
```

Replace the CSC or SFC at this point.

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

  RP/0/0/CPU0:router(admin-config)# no hw-module location 0/16/CPU0 power disable
```

```
RP/0/0/CPU0:router(admin-config)# commit


Primary Clock is CSC_1
Fabric Clock is Redundant
Bandwidth Mode : Full Bandwidth

RP/0/0/CPU0:router(admin-config)# end

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
0/3/CPU0        L3LC Eng 3      OC3-POS-8       IOS XR RUN      PWR,NSHUT,MON
0/4/CPU0        L3LC Eng 3      GE-4            IOS XR RUN      PWR,NSHUT,MON
0/5/CPU0        L3LC Eng 3      GE-4            IOS XR RUN      PWR,NSHUT,MON
0/6/CPU0        L3LC Eng 3      OC48-POS        IOS XR RUN      PWR,NSHUT,MON
0/7/CPU0        L3LC Eng 3      GE-4            IOS XR RUN      PWR,NSHUT,MON
0/8/CPU0        L3LC Eng 3      OC12-POS-4      IOS XR RUN      PWR,NSHUT,MON
0/16/CPU0       CSC10           N/A             Admin Down      PWR,SHUT,MON
0/17/CPU0       CSC10(P)        N/A             PWD             PWR,NSHUT,MON
0/18/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/19/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/20/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/21/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/22/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/24/CPU0       ALARM10         N/A             PWD             PWR,NSHUT,MON
0/25/CPU0       ALARM10         N/A             PWD             PWR,NSHUT,MON
0/29/CPU0       GSR16-BLOWER    N/A             PWD             PWR,NSHUT,MON

RP/0/0/CPU0:router(admin)# configure

RP/0/0/CPU0:router(admin-config)# no hw-module location 0/16/CPU0 shutdown

RP/0/0/CPU0:router(admin-config)# commit

RP/0/0/CPU0:router(admin-config)# end

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
0/3/CPU0        L3LC Eng 3      OC3-POS-8       IOS XR RUN      PWR,NSHUT,MON
0/4/CPU0        L3LC Eng 3      GE-4            IOS XR RUN      PWR,NSHUT,MON
0/5/CPU0        L3LC Eng 3      GE-4            IOS XR RUN      PWR,NSHUT,MON
0/6/CPU0        L3LC Eng 3      OC48-POS        IOS XR RUN      PWR,NSHUT,MON
0/7/CPU0        L3LC Eng 3      GE-4            IOS XR RUN      PWR,NSHUT,MON
0/8/CPU0        L3LC Eng 3      OC12-POS-4      IOS XR RUN      PWR,NSHUT,MON
0/16/CPU0       CSC10           N/A             PWD             PWR,NSHUT,MON
0/17/CPU0       CSC10(P)        N/A             PWD             PWR,NSHUT,MON
0/18/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/19/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/20/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/21/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/22/CPU0       SFC10           N/A             PWD             PWR,NSHUT,MON
0/24/CPU0       ALARM10         N/A             PWD             PWR,NSHUT,MON
0/25/CPU0       ALARM10         N/A             PWD             PWR,NSHUT,MON
0/29/CPU0       GSR16-BLOWER    N/A             PWD             PWR,NSHUT,MON
```

Adding a Standby PRP to a Cisco XR 12000 Series Router

A second PRP card can be added to a Cisco XR 12000 Series Router for redundancy. To add a standby PRP, boot the card from ROMMON mode with the minimum boot image (MBI) software package. This will bring

up the PRP so it can be recognized by the DSC. The new standby PRP will download the appropriate software and configurations from the DSC, and reboot.

This section provides instructions to boot the standby RP after it is installed in the chassis.

Before You Begin

- The standby Performance Route Processor (PRP) must be installed in a slot next to the active PRP. For example, the PRPs can be installed in slot 0 and slot 1, slot 2 and slot 3, slot 4 and slot 5, slot 6 and slot 7, slot 8 and slot 9, and so on.
- MBI software package `mbiprp-rp.vm`. This package is used to boot any PRP other than the DSC, including the standby PRP and PRPs in named SDRs.
- ROMMON version `bfprp_romupgrade-1.14.0.91` or higher
- Bootthelper version `c12kprp-boot-mz.120-30.S` or higher
- The boothelper must be stored as the first file in the bootflash, or the ROMMON variable must be set to point to the boothelper. To set the ROMMON variable, enter the following command in ROM Monitor mode: `BOOTLDR=bootflash:/c12kprp-boot-mz.120-30.S`
- Each PRP must have at least 1024 MB of memory installed. The PRP-2 ships with 1024 MB of memory. Upgrade the memory in your PRP, if necessary.
- Flash disks:
  - The recommended flash disk setup for all PRPs is two 512-MB Sandisk flash disk in PCMCIA slot 0 and slot 1. The minimum requirement is one 512-MB Sandisk flash disk installed in slot 0 on every physical PRP card in the system. PRP cards use the flash disk to store the Cisco IOS XR software and running configurations.
  - The same flash disk size must be used in all PRPs in the Cisco XR 12000 Series Router.
  - Each flash disk must be formatted by the Cisco IOS XR software before use. To format a disk, insert the disk into a running PRP and enter the command **format** *filesystem* .

    Example: **format disk0:** .

SUMMARY STEPS

1. Attach a terminal to the standby PRP console port, and place the PRP in ROM Monitor mode.
2. **unset TURBOBOOT**
3. **unset BOOT**
4. **sync**
5. **boot tftp:**// *server*/*directory*/*filename*
6. Wait for boot process to complete.
7. **show platform**
8. **show redundancy**

DETAILED STEPS

	Command or Action	Purpose
Step 1	Attach a terminal to the standby PRP console port, and place the PRP in ROM Monitor mode.	See *Cisco IOS XR ROM Monitor Guide for the Cisco XR 12000 Series Router* for more information.
Step 2	**unset TURBOBOOT** **Example:** `rommon># unset turboboot`	Clears the TURBOBOOT variable. The TURBOBOOT variable is only used on the DSC.
Step 3	**unset BOOT** **Example:** `rommon># unset BOOT`	Clears the boot variable.
Step 4	**sync** **Example:** `rommon># sync`	Saves the changes.
Step 5	**boot tftp:**// *server*/*directory*/*filename* **Example:** `rommon># boot tftp://192.168.1.1/dir/mbiprp-rp.vm`	Retrieves the file from the TFTP server and installs it on disk0:.
Step 6	Wait for boot process to complete.	The standby PRP boots and all ROMMON variables (such as confreg and BOOT) are set. Once the standby PRP is recognized by the DSC, the appropriate software is downloaded and the standby PRP card reloads the Cisco IOS XR software from disk.
Step 7	**show platform** **Example:** `RP/0/0/CPU0:router# show platform`	Displays the status of all cards. Enter this command on the active PRP. The active and standby PRPs are operating properly when the state for each card is "IOS XR RUN."
Step 8	**show redundancy** **Example:** `RP/0/0/CPU0:router# show redundancy`	Displays the redundancy status of the PRP cards. Enter this command on the active PRP. When redundancy is fully established, the partner node is in “standby role” and the standby node is “ready.”

Related Topics

Additional References, on page 39

Upgrading the CPU Controller Bits

Use this procedure to upgrade the CPU controller bits on all nodes that are installed in the router or on a specific node.

SUMMARY STEPS

1. **admin**
2. **upgrade cpuctrlbits** {**all** | **location** *node-id*}

DETAILED STEPS

	Command or Action	Purpose
Step 1	**admin** **Example:** `RP/0/0/CPU0:router# admin`	Enters administration EXEC mode.
Step 2	**upgrade cpuctrlbits** {**all**	**location** *node-id*} **Example:** `RP/0/0/CPU0:router(admin)# upgrade cpuctrlbits all`	Upgrades the CPU controller bits on all nodes in the router. Use the **location** *node-id* keyword and argument to upgrade the CPU controller bits on a specific node.

Examples

The following example shows how to upgrade the CPU controller bits on all nodes in a router:

```
RP/0/0/CPU0:router# admin
RP/0/0/CPU0:router(admin)# upgrade cpucrtlbits all

Please do not power cycle, reload the router or reset any nodes until all upgrades are
completed.
Please check the syslog to make sure that all nodes are upgraded successfully.
If you need to perform multiple upgrades, please wait for current upgrade to be completed
before proceeding to another upgrade. Failure to do so may render the cards under upgrade
to be unusable.
```

Additional References

The following sections provide references related to hardware management on Cisco IOS XR software.

Related Documents

Related Topic	Document Title
Cisco IOS XR hardware commands	Hardware Redundancy and Node Administration Commands on *the Cisco IOS XR Software* module of *Cisco IOS XR System Management Command Reference for the Cisco XR 12000 Series Router*
Cisco IOS XR hardware documentation	See Cisco Carrier Routing System Install and Upgrade Guides at: http://www.cisco.com/en/US/products/ ps5763/ prod_installation_guides_list.html
Information about getting started with Cisco IOS XR software	*Cisco IOS XR Getting Started Guide for the Cisco XR 12000 Series Router*
ROM Monitor	*Cisco IOS XR ROM Monitor Guide for the Cisco XR 12000 Series Router*
Cisco IOS XR command master list	*Cisco IOS XR Commands Master List for the Cisco XR 12000 Series Router*
Information about user groups and task IDs	*Configuring AAA Services on the Cisco IOS XR Software* module of *Cisco IOS XR System Security Configuration Guide for the Cisco XR 12000 Series Router*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
—	To locate and download MIBs using Cisco IOS XR software, use the Cisco MIB Locator found at the following URL and choose a platform under the Cisco Access Products menu: http://cisco.com/public/ sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/cisco/web/support/index.html