



## Managing 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 38](#). To locate documentation for other commands that might appear in the course of performing a configuration task, search online in *Cisco ASR 9000 Series Aggregation Services Router Commands Master List*.

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

Release	Modification
Release 3.7.2	This feature was introduced.
Release 3.9.0	No modification.

This module contains the following topics:

- [Prerequisites for Managing Router Hardware, on page 2](#)
- [Displaying Hardware Status, on page 2](#)
- [RSP Redundancy and Switchover, on page 18](#)
- [Console Management Port, on page 22](#)
- [CPAK, on page 25](#)
- [Reloading, Shutting Down, or Power Cycling a Node, on page 27](#)
- [Flash Disk Recovery, on page 29](#)
- [Using Controller Commands to Manage Hardware Components, on page 30](#)
- [Formatting Hard Drives, Flash Drives, and Other Storage Devices, on page 30](#)
- [Removing and Replacing Cards, on page 31](#)
- [Proactive Line Card Shut Down, on page 34](#)
- [Upgrading the CPU Controller Bits, on page 36](#)
- [Configure Single Feed Power Mode, on page 37](#)
- [Additional References, on page 38](#)

# 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 designated shelf controller (DSC) 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/RSP0/CPU0:router# show diag
Mon Jun 29 00:36:41.576 PST
NODE module 0/RSP0/CPU0 :
MAIN: board type 0x100302
S/N: FOC1230803H
Top Assy. Number: 68-3160-04
PID: A2K-RSP-4G-HDD=
UDI_VID: VP4
HwRev: V4.8
New Deviation Number: 0
CLEI: IPUCARJBAA
Board State : IOS XR RUN
PLD: Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
MONLIB: QNXFFS Monlib Version 3.2
ROMMON: Version 1.0(20081208:173612) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
Compact Flash : V1.0
XbarSwitch0 : V1.3
XbarSwitch1 : V1.3
XbarArbiter : V1.0
XbarInterface : V0.0
IntCtrl : V1.14
ClkCtrl : V1.13
PuntFPGA : V1.5
HD : V3.0
USB0 : V77.20
USB1 : V77.20
CPUCtrl : V1.17
UTI : V1.6
LIU : V1.0
```

```
MLANSwitch : V0.0
EOBCSwitch : V2.0
CBC (active partition) : v1.2
CBC (inactive partition) : v1.1
```

NODE module 0/1/CPU0 :

```
MAIN: board type 0x20207
S/N: FOC123081J6
Top Assy. Number: 68-3182-03
PID: A9K-40GE-B
UDI_VID: V1D
HwRev: V0.0
New Deviation Number: 0
CLEI:
Board State : IOS XR RUN
PLD: Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
ROMMON: Version 1.0(20081208:174521) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
  NP0 : V3.194
  NP1 : V3.194
  NP2 : V3.194
  NP3 : V3.194
  XbarInterface : V18.4
  Bridge0 : V0.38
  Bridge1 : V0.38
  CPUCtrl : V0.15
  USB : V77.20
  PortCtrl : V0.8
  PHYCtrl : V0.6
  40 Port Gigabit Ethernet Daughter board : V0.0
  CBC (active partition) : v2.2
  CBC (inactive partition) : v2.1
```

NODE module 0/4/CPU0 :

```
MAIN: board type 0x2020a
S/N: FOC123081JA
Top Assy. Number: 68-3183-02
PID: A9K-8T/4-B
UDI_VID: V1D
HwRev: V0.0
New Deviation Number: 0
CLEI: IPU3AE0CAA
Board State : IOS XR RUN
PLD: Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
ROMMON: Version 1.0(20081208:174521) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
  NP0 : V3.194
  NP1 : V3.194
  NP2 : V3.194
  NP3 : V3.194
  XbarInterface : V18.4
  Bridge0 : V0.38
  Bridge1 : V0.38
  CPUCtrl : V0.15
  USB : V77.20
  PortCtrl : V0.10
  PHYCtrl : V0.7
  PHY0 : V0.16
  PHY1 : V0.16
  PHY2 : V0.16
  PHY3 : V0.16
  PHY4 : V0.16
```

```

PHY5 : V0.16
PHY6 : V0.16
PHY7 : V0.16
8 Port Ten Gigabit Ethernet Daughter board : V0.0
CBC (active partition) : v2.2
CBC (inactive partition) : v2.1

NODE module 0/6/CPU0 :

MAIN: board type 0x20208
S/N: FHH12250033
Top Assy. Number: 68-3184-02
PID: A9K-4T-B
UDI_VID: V1D
HwRev: V0.0
New Deviation Number: 0
CLEI:
Board State : IOS XR RUN
PLD: Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
ROMMON: Version 1.0(20081208:174521) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
  NP0 : V3.194
  NP1 : V3.194
  NP2 : V3.194
  NP3 : V3.194
XbarInterface : V18.4
Bridge0 : V0.38
Bridge1 : V0.38
CPUCtrl : V0.15
USB : V77.20
PHY0 : V0.16
PHY1 : V0.16
PHY2 : V0.16
PHY3 : V0.16
PortCtrl : V0.10
PHYCtrl : V0.7
4 Port Ten Gigabit Ethernet Daughter board : V0.0
CBC (active partition) : v2.2
CBC (inactive partition) : v2.1

```

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

```

RP/0/RSP0/CPU0:router# show diag 0/6/cpu0

Mon Jun 29 00:41:43.450 PST

NODE module 0/6/CPU0 :

MAIN: board type 0x20208
S/N: FHH12250033
Top Assy. Number: 68-3184-02
PID: A9K-4T-B
UDI_VID: V1D
HwRev: V0.0
New Deviation Number: 0
CLEI:
Board State : IOS XR RUN
PLD: Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
ROMMON: Version 1.0(20081208:174521) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
  NP0 : V3.194

```

```

NP1 : V3.194
NP2 : V3.194
NP3 : V3.194
XbarInterface : V18.4
Bridge0 : V0.38
Bridge1 : V0.38
CPUCtrl : V0.15
USB : V77.20
PHY0 : V0.16
PHY1 : V0.16
PHY2 : V0.16
PHY3 : V0.16
PortCtrl : V0.10
PHYCtrl : V0.7
4 Port Ten Gigabit Ethernet Daughter board : V0.0
CBC (active partition) : v2.2
CBC (inactive partition) : v2.1

```

## 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 RSPs, 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/RSP0/CPU0:router(admin)# show diag

Mon Jun 29 01:21:04.571 PST

NODE module 0/RSP0/CPU0 :

MAIN: board type 0x100302
S/N: FOC1230803H
Top Assy. Number: 68-3160-04
PID: A2K-RSP-4G-HDD=
UDI_VID: VP4
HwRev: V4.8
New Deviation Number: 0
CLEI: IPUCARJBAA
Board State : IOS XR RUN
PLD: Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A

```

```

MONLIB: QNXFFS Monlib Version 3.2
ROMMON: Version 1.0(20081208:173612) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:

```

```

  Compact Flash : V1.0
  XbarSwitch0   : V1.3
  XbarSwitch1   : V1.3
  XbarArbiter   : V1.0
  XbarInterface : V0.0
  IntCtrl       : V1.14
  ClkCtrl       : V1.13
  PuntFPGA      : V1.5
  HD            : V3.0
  USB0          : V77.20
  USB1          : V77.20
  CPUCtrl       : V1.17
  UTI           : V1.6
  LIU           : V1.0
  MLANSwitch    : V0.0
  EOBCSwitch    : V2.0
  CBC (active partition) : v1.2
  CBC (inactive partition) : v1.1

```

```

NODE fantray 0/FT0/SP :

```

```

  MAIN: board type 0x900211
  S/N:
  Top Assy. Number: 32-0000-00
  PID:
  UDI_VID:
  HwRev: V32.0
  New Deviation Number: 0
  CLEI:
  PLD: Motherboard: N/A, Processor: N/A, Power: N/A
  ROMMON:
  Board FPGA/CPLD/ASIC Hardware Revision:
    CBC (active partition) : v4.0
    CBC (inactive partition) : v0.13

```

```

NODE fantray 0/FT1/SP :

```

```

  MAIN: board type 0x900211
  S/N:
  Top Assy. Number: 32-0000-00
  PID:
  UDI_VID:
  HwRev: V32.0
  New Deviation Number: 0
  CLEI:
  PLD: Motherboard: N/A, Processor: N/A, Power: N/A
  ROMMON:
  Board FPGA/CPLD/ASIC Hardware Revision:
    CBC (active partition) : v4.0
    CBC (inactive partition) : v0.13

```

```

NODE module 0/1/CPU0 :

```

```

  MAIN: board type 0x20207
  S/N: FOC123081J6
  Top Assy. Number: 68-3182-03
  PID: A9K-40GE-B
  UDI_VID: V1D
  HwRev: V0.0
  New Deviation Number: 0
  CLEI:

```

```
Board State : IOS XR RUN
PLD:   Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
ROMMON: Version 1.0(20081208:174521) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
  NP0 : V3.194
  NP1 : V3.194
  NP2 : V3.194
  NP3 : V3.194
  XbarInterface : V18.4
  Bridge0 : V0.38
  Bridge1 : V0.38
  CPUCtrl : V0.15
  USB : V77.20
  PortCtrl : V0.8
  PHYCtrl : V0.6
  40 Port Gigabit Ethernet Daughter board : V0.0
  CBC (active partition) : v2.2
  CBC (inactive partition) : v2.1
```

NODE module 0/4/CPU0 :

```
MAIN: board type 0x2020a
S/N:   FOC123081JA
Top Assy. Number: 68-3183-02
PID:   A9K-8T/4-B
UDI_VID: V1D
HwRev: V0.0
New Deviation Number: 0
CLEI:  IPU3AE0CAA
Board State : IOS XR RUN
PLD:   Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
ROMMON: Version 1.0(20081208:174521) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
  NP0 : V3.194
  NP1 : V3.194
  NP2 : V3.194
  NP3 : V3.194
  XbarInterface : V18.4
  Bridge0 : V0.38
  Bridge1 : V0.38
  CPUCtrl : V0.15
  USB : V77.20
  PortCtrl : V0.10
  PHYCtrl : V0.7
  PHY0 : V0.16
  PHY1 : V0.16
  PHY2 : V0.16
  PHY3 : V0.16
  PHY4 : V0.16
  PHY5 : V0.16
  PHY6 : V0.16
  PHY7 : V0.16
  8 Port Ten Gigabit Ethernet Daughter board : V0.0
  CBC (active partition) : v2.2
  CBC (inactive partition) : v2.1
```

NODE module 0/6/CPU0 :

```
MAIN: board type 0x20208
S/N:   FHH12250033
Top Assy. Number: 68-3184-02
PID:   A9K-4T-B
UDI_VID: V1D
HwRev: V0.0
```

```

New Deviation Number: 0
CLEI:
Board State : IOS XR RUN
PLD:   Motherboard: N/A, Processor: 0x8004 (rev: 2.2), Power: N/A
ROMMON: Version 1.0(20081208:174521) [ASR9K ROMMON]
Board FPGA/CPLD/ASIC Hardware Revision:
  NP0 : V3.194
  NP1 : V3.194
  NP2 : V3.194
  NP3 : V3.194
  XbarInterface : V18.4
  Bridge0 : V0.38
  Bridge1 : V0.38
  CPUCtrl : V0.15
  USB : V77.20
  PHY0 : V0.16
  PHY1 : V0.16
  PHY2 : V0.16
  PHY3 : V0.16
  PortCtrl : V0.10
  PHYCtrl : V0.7
  4 Port Ten Gigabit Ethernet Daughter board : V0.0
  CBC (active partition) : v2.2
  CBC (inactive partition) : v2.1

```

NODE power-module 0/PM0/SP :

```

MAIN: board type 0xf00188
S/N:
Top Assy. Number: 341-00032-01
PID: A9K-3KW-AC
UDI_VID: V00
HwRev: V0.0
New Deviation Number: 0
CLEI: ACACACACAC
PLD:   Motherboard: N/A, Processor: N/A, Power: N/A
ROMMON:
Board FPGA/CPLD/ASIC Hardware Revision:

```

NODE power-module 0/PM1/SP :

```

MAIN: board type 0xf00188
S/N:
Top Assy. Number: 341-00032-01
PID: A9K-3KW-AC
UDI_VID: V00
HwRev: V0.0
New Deviation Number: 0
CLEI: ACACACACAC
PLD:   Motherboard: N/A, Processor: N/A, Power: N/A
ROMMON:
Board FPGA/CPLD/ASIC Hardware Revision:

```

NODE power-module 0/PM2/SP :

```

MAIN: board type 0xf00188
S/N:
Top Assy. Number: 341-00032-01
PID: A9K-3KW-AC
UDI_VID: V00
HwRev: V0.0
New Deviation Number: 0
CLEI: ACACACACAC
PLD:   Motherboard: N/A, Processor: N/A, Power: N/A

```



```

ROMMON:
Board FPGA/CPLD/ASIC Hardware Revision:

Rack 0 - ASR-9010 Chassis, Includes Accessories
RACK NUM: 0
S/N:
PID: ASR-9010 Backplane
VID: 0.1
Desc: ASR-9010 Chassis, Includes Accessories
CLEI: NOCLEI
Top Assy. Number: 68-1234-56

```

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

```

RP/0/RSP0/CPU0:router(admin)# show diag chassis

Mon Jun 29 01:25:05.711 PST

Rack 0 - ASR-9010 Chassis, Includes Accessories
RACK NUM: 0
S/N:
PID: ASR-9010 Backplane
VID: 0.1
Desc: ASR-9010 Chassis, Includes Accessories
CLEI: NOCLEI
Top Assy. Number: 68-1234-56

```

## 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/RP0/CPU0:router# show version

Sat Aug 1 22:52:39.089 DST

Cisco IOS XR Software, Version 3.9.0.16I[DT_IMAGE]
Copyright (c) 2009 by Cisco Systems, Inc.

ROM: System Bootstrap, Version 1.1(20090521:183759) [ASR9K ROMMON],

router uptime is 1 day, 2 hours, 34 minutes
System image file is "bootflash:disk0/asr9k-os-mbi-3.9.0.16I/mbiasr9k-rp.vm"

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

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

```

```

Configuration register on node 0/RSP0/CPU0 is 0x102
Boot device on node 0/RSP0/CPU0 is disk0:
Package active on node 0/RSP0/CPU0:
asr9k-scfclient, V 3.9.0.16I[DT_IMAGE], Cisco Systems, at disk0:asr9k-scfclient-3.9.0.16I
    Built on Thu Jul 30 12:09:40 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.16I.DT_IMAGE/asr9k/workspace for
c4.2.1-p0

asr9k-adv-video, V 3.9.0.16I[DT_IMAGE], Cisco Systems, at disk0:asr9k-adv-video-3.9.0.16I
    Built on Thu Jul 30 13:49:37 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.16I.DT_IMAGE/asr9k/workspace for
c4.2.1-p0

asr9k-fpd, V 3.9.0.16I[DT_IMAGE], Cisco Systems, at disk0:asr9k-fpd-3.9.0.16I
    Built on Thu Jul 30 12:26:21 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.16I.DT_IMAGE/asr9k/workspace for
c4.2.1-p0

asr9k-diags, V 3.9.0.16I[DT_IMAGE], Cisco Systems, at disk0:asr9k-diags-3.9.0.16I
    Built on Thu Jul 30 12:09:43 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.16I.DT_IMAGE/asr9k/workspace for
c4.2.1-p0

asr9k-k9sec, V 3.9.0.16I[DT_IMAGE], Cisco Systems, at disk0:asr9k-k9sec-3.9.0.16I
    Built on Thu Jul 30 12:25:25 DST 2009
    By sjc-lds-208 in /auto/ioxbuild7/production/3.9.0.16I.DT_IMAGE/asr9k/workspace for
c4.2.1-p0

asr9k-mgbl, V 3.9.0.16I[DT_IMAGE], Cisco Systems, at disk0:asr9k-mgbl-3.9.0.16I
    Built on Thu Jul 30 13:48:16 DST 2009
--More--

```

## Displaying SDR Node IDs and Status

In EXEC mode, the **show platform** command displays information for all nodes assigned to the owner 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 [node-id]
```

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

```

RP/0/RSP0/CPU0:router# show platform
Mon Aug  3 07:39:01.416 DST
Node           Type                               State           Config State
-----
0/RSP0/CPU0   A9K-RSP-4G (Active)               IOS XR RUN      PWR, NSHUT, MON
0/1/CPU0     A9K-40GE-B                         IOS XR RUN      PWR, NSHUT, MON
0/4/CPU0     A9K-8T/4-B                         IOS XR RUN      PWR, NSHUT, MON
0/6/CPU0     A9K-4T-B                           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 11 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 physical slot in which the card is installed)	Module (the entity on the card that is the target of the command)
Route switch processor	0	RSP0 and RSP1	CPU0
40-Port Gigabit Ethernet Line Card 8-Port 10-Gigabit Ethernet Line Card 4-Port 10-Gigabit Ethernet Line Card	0-255	4-7 (6-slot chassis) 0-7 (10-slot chassis)	0-X (SFP and XFP module number on the line card)
Power Modules	0	PM0-PM5 (10-slot chassis) PM0-PM2 (6-slot chassis)	—
Fan controller cards	0	FC0-FC1	—

## 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 [node-id]
```

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

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

```
Sat Mar 24 05:02:18.569 DST
Node          Type                               State          Config State
-----
0/RSP0/CPU0   A9K-RSP-4G(Active)                IOS XR RUN     PWR, NSHUT, MON
0/1/CPU0      A9K-40GE-B                         IOS XR RUN     PWR, NSHUT, MON
0/4/CPU0      A9K-8T/4-B                         IOS XR RUN     PWR, NSHUT, MON
0/6/CPU0      A9K-4T-B                          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 11 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, LED indications, 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/RSP0/CPU0:router (admin) # show environment

Mon Jun 29 04:32:07.587 PST

Temperature Information
-----
R/S/I   Modules           Inlet           Hotspot
        Temperature    Temperature
        (deg C)        (deg C)

0/1/*
  host           31.5            39.5

0/RSP0/*
  host           26.6            36.6

0/4/*
  host           29.8            38.8

0/6/*
  host           32.7            42.0

0/FT0/*
  host           27.2            28.2

0/FT1/*
  host           27.4            30.2

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

0/1/*
  host   IBV           10647   n/a
  host   5.0V          4929   n/a
  host   VP3P3_CAN    3288   n/a
  host   3.3V          3301   n/a
  host   2.5V          2516   n/a
  host   1.8VB         1810   n/a
```

host	1.2VB	1193	n/a
host	1.8VA	1800	n/a
host	0.9VB	884	n/a
host	1.2V_LDO_BRG0	1193	n/a
host	1.2V_LDO_BRG1	1195	n/a
host	1.8VC	1811	n/a
host	1.5VB	1505	n/a
host	1.5VA	1503	n/a
host	1.1V(1.05V_CPU)	1052	n/a
host	0.75VA	751	n/a
host	0.75VB_0.75VC	754	n/a
host	1.1VB	1102	n/a
host	1.2V_TCAM0	1003	n/a
host	1.2V_TCAM1	1000	n/a
host	1.0V_Bridge_LDO	998	n/a
host	1.0VB	1043	n/a
host	0.75VD_and_0.75VE	752	n/a
host	1.2V_TCAM2	1005	n/a
host	1.2V_TCAM3	1002	n/a
host	1.5VC	1504	n/a
host	1.8VD	1803	n/a
host	1.1VC	1099	n/a
host	ZARLINK_3.3V	3272	n/a
host	ZARLINK_1.8V	1808	n/a
host	1.2V_DB	1195	n/a
host	3.3V_DB	3316	n/a
host	2.5V_DB	2534	n/a
host	1.5V_DB	1509	n/a
0/RSP0/*			
host	0.75VTT	749	n/a
host	0.9VTT_A	910	n/a
host	0.9VTT_B	904	n/a
host	IBV	10586	n/a
host	5.0V	5013	n/a
host	VP3P3_CAN	3277	n/a
host	3.3V	3299	n/a
host	2.5V	2518	n/a
host	1.8VB	1807	n/a
host	1.2VA	1205	n/a
host	1.2VB	1202	n/a
host	1.05V	1047	n/a
host	1.2VD	1205	n/a
host	1.8VA	1811	n/a
host	1.5V	1496	n/a
host	1.9V	1887	n/a
0/4/*			
host	IBV	10627	n/a
host	5.0V	4917	n/a
host	VP3P3_CAN	3279	n/a
host	3.3V	3296	n/a
host	2.5V	2522	n/a
host	1.8VB	1805	n/a
host	1.2VB	1188	n/a
host	1.8VA	1796	n/a
host	0.9VB	881	n/a
host	1.2V_LDO_BRG0	1192	n/a
host	1.2V_LDO_BRG1	1195	n/a
host	1.8VC	1806	n/a
host	1.5VB	1510	n/a
host	1.5VA	1503	n/a
host	1.1V(1.05V_CPU)	1048	n/a
host	0.75VA	753	n/a

```

host      0.75VB_0.75VC          757  n/a
host      1.1VB                      1105 n/a
host      1.2V_TCAM0                 1003 n/a
host      1.2V_TCAM1                 1000 n/a
host      1.0V_Bridge_LDO           997  n/a
host      1.0VB                      1037 n/a
host      0.75VD_and_0.75VE        755  n/a
host      1.2V_TCAM2                 1004 n/a
host      1.2V_TCAM3                 1005 n/a
host      1.5VC                      1505 n/a
host      1.8VD                      1808 n/a
host      1.1VC                      1104 n/a
host      ZARLINK_3.3V               3285 n/a
host      ZARLINK_1.8V             1806 n/a
host      1.2V_DB                    1205 n/a
host      3.3V_DB                    3318 n/a
host      2.5V_DB                    2493 n/a
host      1.5V_DB                    1497 n/a
host      1.8V_DB                    1825 n/a
host      5.0V_XFP_DB               5001 n/a
host      1.2VB_DB                  1228 n/a

0/6/*
host      IBV                    10628 n/a
host      5.0V                      4893 n/a
host      VP3P3_CAN                  3281 n/a
host      3.3V                      3297 n/a
host      2.5V                      2524 n/a
host      1.8VB                      1804 n/a
host      1.2VB                      1204 n/a
host      1.8VA                      1795 n/a
host      0.9VB                      881  n/a
host      1.2V_LDO_BRG0             1194 n/a
host      1.2V_LDO_BRG1             1193 n/a
host      1.8VC                      1815 n/a
host      1.5VB                      1495 n/a
host      1.5VA                      1503 n/a
host      1.1V(1.05V_CPU)           1052 n/a
host      0.75VA                     752  n/a
host      0.75VB_0.75VC          749  n/a
host      1.1VB                      1001 n/a
host      1.2V_TCAM0                 999  n/a
host      1.2V_TCAM1                 1002 n/a
host      1.0V_Bridge_LDO           995  n/a
host      1.0VB                      1050 n/a
host      0.75VD_and_0.75VE        752  n/a
host      1.2V_TCAM2                 1002 n/a
host      1.2V_TCAM3                 995  n/a
host      1.5VC                      1502 n/a
host      1.8VD                      1802 n/a
host      1.1VC                      1101 n/a
host      ZARLINK_3.3V               3273 n/a
host      ZARLINK_1.8V             1804 n/a
host      1.2V_DB                    1200 n/a
host      3.3V_DB                    3314 n/a
host      2.5V_DB                    2496 n/a
host      1.5V_DB                    1496 n/a
host      1.8V_DB                    1824 n/a
host      5.0V_XFP_DB               5004 n/a
host      1.2VB_DB                  1227 n/a

```

LED Information

-----

```
R/S/I  Modules LED           Status
0/RSP0/*
      host  Critical-Alarm Off
      host  Major-Alarm  Off
      host  Minor-Alarm  Off
      host  ACO          Off
```

Fan Information

```
-----
Fan speed (rpm):
      FAN0  FAN1  FAN2  FAN3  FAN4  FAN5  FAN6  FAN7  FAN8  FAN9
FAN10  FAN11
0/FT0/*
3510   3510  3510  3540  3510  3570  3480  3570  3510  3510
0/FT1/*
3480   3540  3510  3450  3540  3480  3600  3480  3450  3540  3540
```

Power Supply Information

```
-----
R/S/I  Modules Sensor       Watts
0/PM0/*
      host  PM             3000
0/PM1/*
      host  PM             3000
0/PM2/*
      host  PM             3000
```

Power Shelves Type: AC

```
Total Power Capacity: 9000W
Protected Power Capacity: 4500W
Worst Case Power Used: 3145W
```

Slot	Max Watts
----	-----
0/1/CPU0	375
0/RSP0/CPU0	250
0/RSP1/CPU0	350
0/4/CPU0	375
0/6/CPU0	375
0/FT0/SP	710 (default)
0/FT1/SP	710 (default)

Worst Case Protected Power Available: 1355W

## Configuring the Chassis Altitude

To allow your router to adjust the fan speed to compensate for lower cooling capabilities at higher altitudes, you should configure the chassis altitude setting. Use the **environment altitude** command in administration configuration mode. The default setting is 1800 meters.

The syntax for the environment altitude command is:

**environment altitude** *altitude rack rack-no*

## Displaying RP Redundancy Status

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

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 RSP pair:

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

Mon Jun 29 04:49:26.098 PST
Redundancy information for node 0/RSP0/CPU0:
=====
Node 0/RSP0/CPU0 is in ACTIVE role
Node 0/RSP0/CPU0 has no valid partner

Reload and boot info
-----
A9K-RSP-4G reloaded Thu Jun 11 15:20:50 2009: 2 weeks, 3 days, 13 hours, 28 minutes ago
Active node booted Thu Jun 11 15:20:50 2009: 2 weeks, 3 days, 13 hours, 28 minutes 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/RSP0/CPU0:router# ios#show hw-module fpd
Tue Jan 22 13:56:55.082 UTC

                                     FPD Versions
                                     =====
Location   Card type           HWver FPD device           ATR Status   Running Programd
-----
0/RP0      NCS-55A2-MOD-S     0.3   MB-MIFPGA              CURRENT      0.19        0.19
0/RP0      NCS-55A2-MOD-S     0.3   Bootloader             CURRENT      1.10        1.10
0/RP0      NCS-55A2-MOD-S     0.3   CPU-IOFPGA            CURRENT      1.18        1.18
0/RP0      NCS-55A2-MOD-S     0.3   MB-IOFPGA             CURRENT      0.18        0.18
0/PM0      NC55-1200W-ACFW    1.0   LIT-PrimCU-ACFW      NEED UPGD   2.08        2.08
0/PM1      NC55-1200W-ACFW    1.0   LIT-PrimCU-ACFW      NEED UPGD   2.08        2.08
RP/0/RP0/CPU0:ios#.
```



**Note** After Release 5.3.x, Upg/Dng? will display Yes only for upgrade.

The following example shows the FPD for which upgrade will be skipped.



```
RP/0/RP0/CPU0:router# show hw-module fpd location all
```

```

===== Existing Field Programmable Devices =====
Location      Card Type      HW Version  Type  Subtype  Inst  Current SW  Upg/
=====  =====  =====  =====  =====  =====  =====  =====
0/SM1/SP      140G-4-S1S2S3  0.1       lc   rommonA  0     2.08        Yes
-----
                                1c   rommon   0     2.08        Yes
-----
                                1c   fpqa1   0     6.04^       No
-----
                                1c   fpga2   0     4.01        No
=====
    
```

NOTES:

1. ^ One or more FPD will be intentionally skipped from upgrade using CLI with option "all" or during "Auto fpd".

It can be upgraded only using the "admin> upgrade hw-module fpd <fpd> location <loc>" CLI with exact location.

The following example shows how to display FPD compatibility for a specific module in the router:

**Table 3: show hw-module fpd Field Descriptions**

Field	Description
Location	Location of the module in the rack/slot/module notation.
Card Type	Module part number.
HW Version	Hardware model version for the module.
Type	Hardware type. Can be one of the following types: <ul style="list-style-type: none"> <li>• spa—Shared port adapter</li> <li>• lc—Line card</li> </ul>
Subtype	FPD type. Can be one of the following types: <ul style="list-style-type: none"> <li>• fabldr—Fabric downloader</li> <li>• fpga1—Field-programmable gate array</li> <li>• fpga2—Field-programmable gate array 2</li> <li>• fpga3—Field-programmable gate array 3</li> <li>• fpga4—Field-programmable gate array 4</li> <li>• fpga5—Field-programmable gate array 5</li> <li>• rommonA—Read-only memory monitor A</li> <li>• rommon—Read-only memory monitor B</li> </ul>
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.

Field	Description
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.

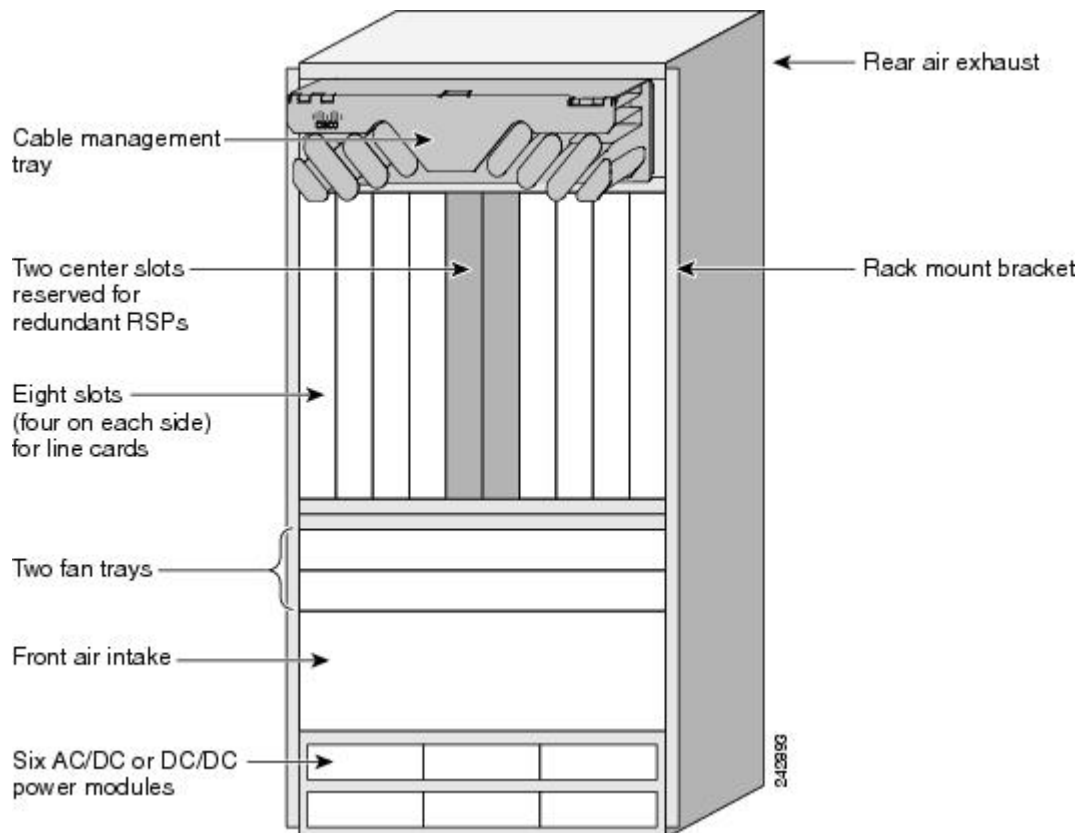
## RSP Redundancy and Switchover

This section describes RSP redundancy and switchover commands and issues.

### Establishing RSP Redundancy

Your router has two slots for RSPs: RSP0 and RSP1 (see [Figure 1: Redundant Set of RSPs Installed in Slots RSP0 and RSP1 in an 8-Slot Chassis, on page 18](#)). RSP0 is the slot on the left, facing the front of the chassis, and RSP1 is the slot on right. These slots are configured for redundancy by default, and the redundancy cannot be eliminated. To establish RSP redundancy, install RSPs into both slots.

**Figure 1: Redundant Set of RSPs Installed in Slots RSP0 and RSP1 in an 8-Slot Chassis**



## Determining the Active RP in a Redundant Pair

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

- The active RSP can be identified by the green Primary LED on the faceplate of the card. The active RSP is indicated when the Primary LED is on. The alphanumeric LED display on the RSP displays ACTV RP.
- The slot of the active RSP is indicated in the CLI prompt. For example:

```
RP/0/RSP1/CPU0:router#
```

In this example, the prompt indicates that you are communicating with the active RSP in slot RSP1. See *Cisco ASR 9000 Series Aggregation Services Router Getting Started Guide* 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 RSP status. For example:

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

```
Mon Jun 29 04:49:26.098 PST
Redundancy information for node 0/RSP0/CPU0:
=====
Node 0/RSP0/CPU0 is in ACTIVE role
Node 0/RSP0/CPU0 has no valid partner
```

```
Reload and boot info
-----
```

```
A9K-RSP-4G reloaded Thu Jun 11 15:20:50 2009: 2 weeks, 3 days, 13 hours, 28 minutes ago
Active node booted Thu Jun 11 15:20:50 2009: 2 weeks, 3 days, 13 hours, 28 minutes ago
```

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

## Role of the Standby RSP

The second RSP to boot in a redundant pair automatically becomes the standby RSP. While the active RSP manages the system and communicates with the user interface, the standby RSP maintains a complete backup of the software and configurations for all cards in the system. If the active RSP fails or goes off line for any reason, the standby RSP immediately takes control of the system.

## Summary of Redundancy Commands

RSP redundancy is enabled by default in the Cisco IOS XR software, but you can use the commands described in [Table 4: RSP Redundancy Commands, on page 19](#) to display the redundancy status of the cards or force a manual switchover.

**Table 4: RSP Redundancy Commands**

Command	Description
<b>show redundancy</b>	Displays the redundancy status of the RSPs. This command also displays the boot and switch-over history for the RSPs.

Command	Description
<b>redundancy switchover</b>	Forces a manual switchover to the standby RSP. This command works only if the standby RSP is installed and in the “ready” state.
<b>show platform</b>	Displays the status for node, including the redundancy status of the RSP 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 RSP to the standby RSP occurs only if the active RSP encounters a serious system error, such as the loss of a mandatory process or a hardware failure. When an automatic switchover occurs, the RSPs respond as follows:

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

## RSP Redundancy During RSP Reload

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

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



### Caution

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

### Related Topics

[Reloading, Shutting Down, or Power Cycling a Node](#), on page 27

## Manual Switchover

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

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

```
RP/0/RSP0/CPU0:router# show redundancy
```

```

This node (0/RSP0/CPU0) is in ACTIVE role
Partner node (0/RSP1/CPU0) is in STANDBY role
Standby node in 0/RSP1/CPU0 is ready

RP/0/RSP0/CPU0:router# redundancy switchover
Updating Commit Database. Please wait...[OK]
Proceed with switchover 0/RSP0/CPU0 -> 0/RSP1/CPU0? [confirm]
Initiating switch-over.
RP/0/RSP0/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: xxxxxx
Password: xxxxxx
Last switch-over Sat Apr 15 12:26:47 2009: 1 minute ago

RP/0/RSP1/CPU0:router#

```

If the standby RSP 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/RSP0/CPU0:router# show redundancy

Redundancy information for node 0/RP1/CPU0:
=====
Node 0/RSP0/CPU0 is in ACTIVE role
Partner node (0/RSP1/CPU0) is in UNKNOWN role

Reload and boot info
-----
RP reloaded Wed Mar 29 17:22:08 2009: 2 weeks, 2 days, 19 hours, 14 minutes ago
Active node booted Sat Apr 15 12:27:58 2009: 8 minutes ago
Last switch-over Sat Apr 15 12:35:42 2009: 1 minute ago
There have been 4 switch-overs since reload

RP/0/RSP0/CPU0:router# redundancy switchover

Switchover disallowed: Standby node is not ready.

```

## Communicating with a Standby RP

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

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

## Console Management Port

The Console Management Port (CMP) feature enables console access to the RSP and RP network devices through an ethernet port on the router using the Secure Shell (SSH).

To enable CMP feature the IPU and ROMMON must be upgraded to the latest version available in the Cisco IOS XR Software Release 5.3.2 through FPD upgrade for IOS XR 32-bit image, and Cisco IOS XR Software Release 6.4.1 for IOS XR 64-bit image. .

For information about FPD upgrade, see *Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide*, chapter *Upgrading FPD*.



### Note

- CMP feature helps troubleshoot the RP and RSP issues when IOS XR CLI is unavailable or when the CPU is inaccessible. On the contrary, using the CMP feature otherwise will result in unpredictable behavior of the router.
- CMP is supported only on RSP 880, RSP880-LT, RSP5, RP2, and RP3 hardware.

The CMP feature enables:

- Connection to route processor console port.
- Connection to route processor auxiliary port (32-bit image) or system admin plane (64-bit image).
- installation of new software image through SCP (32-bit image) or PXE (64-bit image) without a terminal server connected to the console port.
- CMP password recovery by using the **resetcmp** command on the CMP shell. This clears CMP data (user IDs, passwords, DNS name, hostname, SSH Key) to default settings.



**Note** The default login username is `cmp` and password is `cisco`.

You can download a new IOS XR 32-bit image using the **scpboot** command (image will be turbo booted), and a new IOS XR 64-bit image using the **pxeboot** command. You must provide the server IPv6 address and filename when using **scpboot** command. The image is copied from the server directly to the route processor CPU memory. If route processor CPU side is in ROMMON or already in IOS XR, it is reset and held in ROMMON until the image is copied. This image is automatically booted (turbo boot for 32-bit and pxeboot for 64-bit image) on the route processor CPU side. The image download options (scpboot and pxeboot) provided by the CMP can only download and boot a complete image. Subsequent image upgrades, pie downloads (32-bit image) and VM downloads (64-bit image) must be done through system admin (32-bit image), XR (64-bit image) and using the management ports.

CMP implements zero-configuration networking concepts such as mDNS and DNS-SD to ease the booting of a supervisor (RSP, RP) card. See the section [Zero Configuration Networking, on page 25](#) for information on zero-configuration networking.

For information on CMP shell, see the section [CMP Shell, on page 23](#).

## CMP Shell

CMP is accessed using IPv6 SSH. Use the default username/password to login to CMP shell. This table describes the commands available on the CMP shell:

*Table 5: CMP Shell Commands*

Command	Description
<b>adduser</b>	Adds a new CMP user ID/password.
<b>aux</b>	Connects to route processor CPU auxiliary port for 32-bit image. Connects to system admin plane for 64-bit image.
<b>con</b>	Connects to route processor CPU console port. Although multiple SSH sessions to the CMP shell are allowed, the <b>con</b> , <b>aux</b> , or <b>lc</b> command execution is allowed for only single user at a time.
<b>copykey</b>	SCP a key.
<b>deluser</b>	Deletes a user ID. It is recommended that you delete the default username <b>cmp</b> after a new user is created.
<b>desc_err</b>	Shows description of command error codes.
<b>debug</b>	Enables CMP console logging functionality.
<b>dns</b>	Changes DNS name. The initial service advertisement uses the domain name of chassis serial number + RSP/RP slot. This can be changed using the <b>dns</b> command.
<b>exit</b>	Logs out of CMP.
<b>fanspeed</b>	Shows information about fan trays in the chassis.
<b>help</b>	Displays available CMP commands.
<b>hostname</b>	Changes a host name.
<b>lc_con</b>	Connects to a line card console.
<b>lcslotinfo</b>	Shows line card slot ID information.
<b>passwd</b>	Changes password (minimum 5 and maximum 8 characters).

Command	Description
<b>priv</b>	Enters privileged EXEC mode.
<b>pxeboot</b>	PXE boots a 64-bit Cisco IOS XR image to Route processor CPU memory.
<b>resetcmp</b>	Clears CMP data (user IDs, passwords, DNS name, hostname and SSH key) to default settings.
<b>run</b>	Runs diagnostic commands ping/ping6/traceroute/traceroute6 to diagnose basic network connectivity problems.
<b>scpboot</b>	SCP boots 32-bit IOS XR image and TURBOBOOT to route processor CPU memory.
<b>show</b>	Shows all CMP data. Displays ip/key/cmp configuration.
<b>showinv</b>	Shows the physical inventory.
<b>showtemp</b>	Shows the temperature information.
<b>slotmap</b>	Displays physical slot and card mapping information.
<b>sshkeygen</b>	Generates a new SSH key.
<b>unlock</b>	Removes all system locks.  From CMP shell only one user is allowed to login to the console port, auxiliary port or LC console, and that user holds the lock and there is no access to other users.
<b>warmreset</b>	Warm resets local route processor.

Return Material Authorization (RMA) - In the event of a RMA of the supervisor (RSP/RP) card, since the CMP information is tied to the chassis serial number, all the modified information using the CMP shell is reverted back to factory default values. This means that the username/password database would be erased and the default username/password is in effect. The domain name used in service advertisement reverts to the chassis serial number plus slot ID.

## Limitations

These are the limitation of CMP:

- CMP supports only SSH service.
- Only one SSH session has console, auxiliary or system admin port.
- CMP does not support software image upgrade, pie or VM downloads.
- IPv6 link local address is preferred by Avahi application rather than the IPv6 global address.



- There is no authentication performed on users logging into the CMP shell.
- Warm reload causes loss of CMP SSH session only in A9K-RSP880-TR/SE or A99-RP2-TR/SE.

## Zero Configuration Networking

CMP configures the network devices using zero-configuration networking model and eliminates the need to have serial terminal servers. The zero-configuration networking enables:

- automatic IP address selection for network device—If a network device does not have an IP address assigned to it, then zero-configuration networking supports DHCP to obtain IPv6 Stateless Address Autoconfiguration (SLAAC), IPv4 and IPv6 addresses. The CMP port when connected to a IPv6 network obtains a link local address and also IPv6 global auto address based on IPv6 SLAAC.
- automatic domain name resolution and distribution of computer host names—The zero-configuration networking implements multicast DNS (mDNS). mDNS allows a network device to select a domain name in the local namespace and then broadcast that name using a special multicast IP address, allowing other devices on the network to connect to it by name instead of by numbered IP address. This eliminates the need to configure a DNS server.
- automatic location of network services through DNS service discovery—The zero-configuration networking enables a network device to use standard DNS queries to discover devices registered on the network that are broadcasting the services that they provide. This eliminates the need to set up a directory server.

These are the zero-configuration networking applications that are supported:

- For Windows and MAC OS—Bonjour
- For Linux OS—Avahi

## CPAK

CPAKs are the Cisco's innovation for 100G pluggable optics, which is built with the industry leading smallest form factor, in full compliant with IEEE802.3ae specification for 100GE-SR10, -LR4, and can interoperate with all IEEE 802.3ba compliant CFP-SR10 or CFP-LR4 100G optics.

The key new functionality is that CPAK variants are being constructed that represent 10 x 10GE ports. A single physical port on the linecard needs to instantiate multiple breakout Ethernet interfaces, very much similar to serial interface channelization.

## Modes Supported on CPAKs

This table clearly lists the modes supported with the relevant PID:

CPAK (PID)	Modes Supported
CPAK-100G-SR10	100 GE, 10 GE, 40 GE
CPAK-100G-LR	100 GE

CPAK (PID)	Modes Supported
CPAK-10X10G-LR	10 GE.

The standard R/S/I/P format is 4-tuple. 5-tuple interfaces are represented as - R/S/I/P/SP. P is the CPAK port and SP indicates the breakout port. A CPAK which is configured as 5 tuple after executing the **breakout** command can be configured as 0x10G configuration. A CPAK, without the breakout mode can only be configured as 100G, represents a 4 tuple configuration. The default interface type is HundredGigE. If there is no configuration, then Hundred GigE interface would be created for the CPAK ports.

## Configuring Breakout

This task enables the user to configure the breakout option.

### SUMMARY STEPS

1. **configure**
2. **hw-module location preconfigure** *location port breakout interface*

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>configure</b>	
<b>Step 2</b>	<b>hw-module location preconfigure</b> <i>location port breakout interface</i>  <b>Example:</b> <pre>RP/0/RSP0/CPU0:router (config) # hw-module location 0/0/CPU0 port 0 breakout 10x TenGigE</pre>	Configures the breakout option.  <b>Note</b> The optional keyword, <b>preconfigure</b> enables the user to preconfigure breakout on an empty slot.  SR10 CPAK can operate in the following modes - 1x100GE or 10x10GE. 1x100GE is the default option. 10x10 CPAK can also support 10x10GE.

## Power saving mode

8x100GE Line card consists of 4 Slices (0,1,2,3). Each slice has two physical ports. Slice-1, 2 and 3 can be configured into power save mode. Power save option is not applicable to Slice-0. Use the **hw-module power saving** command to configure the required slice to power saving mode.

Once a slice is configured in the power saving mode, the interfaces will be deleted and hence all traffic passing through the interfaces will be dropped.

**Table 6: Slice-Port mapping table**

Slice 1	Ports 2,3
Slice 2	Ports 4,5
Slice 3	Ports 6,7

## To configure the power save option

This task enables the user to configure the power save option.

### SUMMARY STEPS

1. **admin**
2. **configure**
3. **hw-module power saving location** *location slice number*

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>admin</b> <b>Example:</b> RP/0/RSP0/CPU0:router# admin	Enters administration EXEC mode.
Step 2	<b>configure</b>	
Step 3	<b>hw-module power saving location</b> <i>location slice number</i> <b>Example:</b> RP/0/RSP0/CPU0:router (admin-config) # <b>hw-module power saving location</b> 0/1/CPU0 slice 3	Configures the power saving option for the specified slice. The available options are Slice1, 2, 3. <b>Note</b> Power save option is not applicable for Slice 0.

#### What to do next

Use the **show plat slices** command to get the status of the slices.

## 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 RSP 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 7: Commands to Reload, Shut Down, or Power Cycle a Node, on page 27](#) summarizes the commands described in this section.

**Table 7: Commands to Reload, Shut Down, or Power Cycle a Node**

Command	Description
<b>hw-module location</b> <i>node-id</i> <b>power disable</b>	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 <b>commit</b> command.  To power on a node, use the <b>no</b> form of this command.  <b>Note</b> This command cannot be used to disable power on the RSP from which the command is entered.

Command	Description
<b>hw-module location</b> <i>node-id</i> <b>reload</b>	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 <b>all</b> keyword in place of the <i>node-id</i> argument. The node reloads with the current running configuration and active software set for that node.

## Reloading the Active RSP

The **reload** command causes the active RSP to reload the Cisco IOS XR software according to the configuration register setting. This setting determines how the active RSP 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 *ROM Monitor Configuration Guide for Cisco ASR 9000 Routers*.



**Caution** Because the **reload** command causes the active RSP 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 RSP is installed and in “ready” state. To display the status of the standby RSP, use the **show redundancy** command in EXEC mode.

### SUMMARY STEPS

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

### DETAILED STEPS

	Command or Action	Purpose
<b>Step 1</b>	<b>show redundancy</b>  <b>Example:</b>  RP/0/RSP0/CPU0:router# show redundancy	Displays the RSP redundancy status.  • If a standby RSP is in “ready” redundancy state, the <b>reload</b> command also causes the router to gracefully fail over to the standby RSP.
<b>Step 2</b>	<b>admin</b>  <b>Example:</b>  RP/0/RSP0/CPU0:router# admin	Enters administration EXEC mode.
<b>Step 3</b>	<b>show variables boot</b>  <b>Example:</b>	Displays the configuration register setting.  • Enter this command in administration EXEC mode.

	Command or Action	Purpose
	<pre>RP/0/RSP0/CPU0:router(admin)# show variables boot</pre>	<ul style="list-style-type: none"> <li>For normal operations, the configuration register setting is 0x102 or 0x2102, which causes the active RSP to reload the Cisco IOS XR software.</li> <li>Verify that the configuration register setting is 0x102 or 0x2102. If it is not, complete <a href="#">Step 4, on page 29</a> to reset the configuration register to 0x102 or 0x2102.</li> </ul> <p><b>Note</b> For instructions on how to enter ROM Monitor bootstrap mode, see <i>ROM Monitor Configuration Guide for Cisco ASR 9000 Routers</i>.</p>
<b>Step 4</b>	<p>(Optional) <b>config-register</b> <i>register-value</i></p> <p><b>Example:</b></p> <pre>RP/0/RSP0/CPU0:router(admin)# config-register 0x102</pre>	<p>Sets the configuration register to the respective value. This step is necessary only if the register is not set to the respective value (0x102 or 0x2102) in the running configuration. You can use either 0x102 or 0x2102. Both these values specify the same functionality, as bit 13 in 0x2102 is not significant for Cisco IOS XR software.</p>
<b>Step 5</b>	<p><b>admin</b></p> <p><b>Example:</b></p> <pre>RP/0/RSP0/CPU0:router# admin</pre>	<p>Enters administration EXEC mode.</p>
<b>Step 6</b>	<p><b>reload</b></p> <p><b>Example:</b></p> <pre>RP/0/RSP0/CPU0:router# reload</pre>	<p>Reloads the active RSP according to the configuration register setting.</p> <ul style="list-style-type: none"> <li>If the setting is 0x102 or 0x2102, then the RSP reloads the Cisco IOS XR software.</li> <li>If the standby RSP is in “ready” redundancy state, the router switches over to the standby RSP.</li> <li>If a standby RSP is not installed or not in a “ready” state, the router experiences a loss of service while the active RSP is reloading the Cisco IOS XR software.</li> </ul>

## Flash Disk Recovery

When an RSP 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 RSP 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 RSP 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 ASR 9000 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 *Interface and Hardware Component Command Reference for Cisco ASR 9000 Series Routers*.

## 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 8: format command Syntax Description, on page 31](#) describes the **format** command syntax.

Table 8: format command Syntax Description

Variable	Description
<i>filesystem</i>	Specifies the memory device to format. The supported file systems are: <ul style="list-style-type: none"> <li>• <b>bootflash:</b></li> <li>• <b>compactflash:</b></li> <li>• <b>configflash:</b></li> <li>• <b>harddisk:</b></li> <li>• <b>harddiska:</b></li> <li>• <b>disk0:</b></li> <li>• <b>disk1:</b></li> </ul> Enter <b>format ?</b> to see the devices supported on your router.
<i>options</i>	Enter <b>format filesystem: ?</b> to see the available options. For more information, see <i>System Management Command Reference for Cisco ASR 9000 Series Routers</i> .

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

```
RP/0/RSP0/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/RSP0/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 31](#) 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 31](#) 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/RSP0/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 31](#) apply. Review the running configuration in the router and revise the configuration as necessary for the new media type.

## Examples: Breakout and Power saving options

The following are the examples for the **power save** and **breakout** options:

### Power saving mode

Configuring the power saving option:

```

admin
config
  hw-module power saving location 0/0/CPU0 slice 3
!

show platform slices
Line Card      Slice  Config      Status
0/0/CPU0      0      Power on    Completed
              1      Power on    Completed
              2      Power on    Completed
              3      Power saving Completed

```

### Breakout option

Configuring the breakout option:

```

config
  hw-module location 0/0/CPU0 port 0 breakout 10xTenGigE
!

```

show command output indicating the breakout ports:

```
RP/0/RSP0/CPU0:TD02#show ipv4 interface brief | include Hun
Sun Sep  7 15:59:33.446 PST
HundredGigE0/0/0/0          34.34.34.2          Down          Down
HundredGigE0/0/0/1          100.0.1.1           Up            Up
HundredGigE0/0/0/2          unassigned           Up            Up
HundredGigE0/0/0/3          unassigned           Up            Up
HundredGigE0/0/0/4          unassigned           Shutdown      Down
HundredGigE0/0/0/5          unassigned           Shutdown      Down
HundredGigE0/0/0/6          unassigned           Shutdown      Down
HundredGigE0/0/0/7          unassigned           Shutdown      Down
```

```
RP/0/RSP0/CPU0:router(config)#hw-module location 0/0/CPU0 port 2 breakout 10xTenGigE
RP/0/RSP0/CPU0:router(config)#commit
```

```
RP/0/RSP0/CPU0:router#show ipv4 interface brief | include Ten
TenGigE0/0/0/2/0           unassigned           Shutdown      Down
TenGigE0/0/0/2/1           unassigned           Shutdown      Down
TenGigE0/0/0/2/2           unassigned           Shutdown      Down
TenGigE0/0/0/2/3           unassigned           Shutdown      Down
TenGigE0/0/0/2/4           unassigned           Shutdown      Down
TenGigE0/0/0/2/5           unassigned           Shutdown      Down
TenGigE0/0/0/2/6           unassigned           Shutdown      Down
TenGigE0/0/0/2/7           unassigned           Shutdown      Down
TenGigE0/0/0/2/8           unassigned           Shutdown      Down
TenGigE0/0/0/2/9           unassigned           Shutdown      Down
```

## Proactive Line Card Shut Down

The proactive line card shutdown feature enables powering down line cards automatically when the power that is drawn by the router exceeds configured threshold. The sequence of powering down LCs is based on the shutdown priorities that are assigned to them. The LC, however, does not boot automatically even after the router power draw is back to normal below the shutdown threshold. Therefore, you must manually bring up the LC by either reloading or OIR method.

Instead of provisioning more power to the router in worst case power draw scenarios, this feature helps in saving power by powering down the LC.

As part of this feature, you must configure two threshold values:

- **Syslog Threshold**—This value serves as a syslog warning threshold. If the router power draw exceeds the syslog threshold, then a warning error message is captured at the console. This warning message facilitates the user to take any preventive action.
- **Shutdown Threshold**—This value triggers the shutdown of line cards. If the router power draw exceeds the shutdown threshold, then the line cards are shutdown based on the priorities that are assigned to them. The system monitors the power draw for every 10 seconds.

### Shut Down Priorities for Powering Down the LC

You can configure a shutdown priority value of 0 to 19. A line card with lower value has the highest priority. By default, a priority of 20 is assigned to all the LC in the router.

When two or more LCs have equal priorities that are assigned, then the slot number takes precedence in the priority calculation. A lower slot number has the highest priority. For instance, when two LCs at slot 0 and slot 19 have the priority set as 10, then LC in slot 0 has higher priority than the LC in slot 19.

## Proactive Line Card Shut Down Implementation Consideration

Consider the following points while configuring proactive line card shut down feature:

- Shutdown threshold must be greater than the current system power draw.
- Shutdown threshold must be greater than the syslog threshold.
- Shutdown threshold must not be less than 3500 Watts.
- In Cisco IOS XR 32-bit OS, the priority of a LC is checked only when the LC is in **IOS XR RUN** state.
- In Cisco IOS XR 64-bit OS, the priority of a LC is checked only when the LC is in **Operational** state.

## Configure Proactive Line Card Shut Down

### Cisco IOS XR 32-bit

Configuring proactive line card shutdown includes:

- Assigning priorities to the line cards
- Configuring syslog threshold
- Configuring shutdown threshold

In this example, syslog threshold of 5000 W and shutdown threshold of 6000 W is configured along with the LC priorities:

```

config
power budget enforcement progressive
priority 1
  location 0/1/CPU0
  location 0/5/CPU0
!
priority 5
  location 0/4/CPU0
!
priority 11
  location 0/2/CPU0
!
priority 20
  location 0/3/CPU0
!
syslog-threshold 5000 W
shutdown-threshold 6000 W

```

The following error message is seen when power draw exceeds the shutdown threshold:

```

RP/0/RP0/CPU0:Mar  8 11:42:00.146 : shelfmgr[406]: %PLATFORM-SHELFMGR-1-INRESET_ALARM :
Power off node 0/10/CPU0 due to multiple critical alarms, putting into IN_RESET state
RP/0/RP0/CPU0:Mar  8 11:42:10.948 : envmon[209]: %PLATFORM-ENVMON-2-PWR_EXCEEDED_SHUTDOWN
: Slot 0/3/CPU0 priority 20 is being shutdown,current power usage 6746 W exceeds the

```

configured threshold of 6000 W

### Cisco IOS XR 64-bit

Configuring proactive line card shutdown includes:

- Configuring syslog threshold
- Configuring shutdown threshold
- Assigning priorities to the line cards

In this example, syslog threshold of 3300 W and shutdown threshold of 3500 W is configured along with LC priorities:

```
sysadmin config
power-mgmt progressive enable
  syslog-threshold 3300      /* syslog generated when power crosses this value */
  shutdown-threshold 3500  /* LCs shut down based on priority once power draw crosses
this limit */
priority location 0/0 10   /* Priority assigned for each LC */
!
priority location 0/1 5
!
priority location 0/4 4
!
priority location 0/6 2
!
priority location 0/7 1
!
```

The following error message is seen when power draw exceed the syslog threshold:

```
0/RSP0/ADMIN0:Feb 22 11:44:38.566 UTC: envmon[4202]: %PWR_MGMT-ENVMON-3-PWR_EXCEEDED_WARN
:
Chassis power usage 3448 W has exceeded the configured warning threshold of 3300 W
```

The following error message is seen when power draw exceeds the shutdown threshold:

```
0/RSP0/ADMIN0:Feb 22 11:44:38.567 UTC: envmon[4202]: %PKT_INFRA-FM-3-FAULT_MAJOR :
ALARM_MAJOR :Node shutdown by Progressive power-mgmt mode :DECLARE :0/0:
Node priority 10, Chassis power draw 3570 W exceeded shutdown threshold 3500 W
```

## 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	<b>admin</b> <b>Example:</b> RP/0/RSP0/CPU0:router# admin	Enters administration EXEC mode.
Step 2	<b>upgrade cpuctrlbits {all   location node-id}</b> <b>Example:</b> RP/0/RSP0/CPU0:router(admin)# upgrade cpuctrlbits all	Upgrades the CPU controller bits on all nodes in the router. Use the <b>location node-id</b> 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/RSP0/CPU0:router# admin
RP/0/RSP0/CPU0:router(admin)# upgrade cpuctrlbits 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.

## Configure Single Feed Power Mode

Cisco ASR 9000 series router supports the operating of one or all power modules. For example, V1 DC, V2 DC, V3 AC and V3 DC.

Ideally, you're expected to connect all the power modules (or feed) to power supply. If you don't connect any one feed, the system raises an alarm or error message.

You can configure the single-feed power mode to suppress the error message or an alarm for any missing feeds.

### Configuration Example

The following example enables the single power feed mode for the 0/PS2/M0/SP power module:

```
Router#admin
Router(admin)#config
Router(admin-config)#power single-feed location 0/PS2/M0/SP
```

## 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 <i>the Cisco ASR 9000 Series Router</i> module of <i>System Management Command Reference for Cisco ASR 9000 Series Routers</i>
Cisco IOS XR hardware documentation	See Cisco Carrier Routing System Install and Upgrade Guides at: <a href="http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html">http://www.cisco.com/en/US/products/ps5763/prod_installation_guides_list.html</a>
Information about getting started with Cisco IOS XR software	<i>Cisco ASR 9000 Series Aggregation Services Router Getting Started Guide</i>
ROM Monitor	<i>ROM Monitor Configuration Guide for Cisco ASR 9000 Routers</i>
Cisco IOS XR command master list	<i>Cisco ASR 9000 Series Aggregation Services Router Commands Master List</i>
Information about user groups and task IDs	<i>Configuring AAA Services on the Cisco ASR 9000 Series Router</i> module of <i>System Security Configuration Guide for Cisco ASR 9000 Series Routers</i>

### 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: <a href="http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml">http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml</a>

**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.	<a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a>

