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 62. 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.
Release 6.5.2	The Cisco CPAK 100GBASE-ER4 Lite (CPAK-100G-ER4L) module is supported on Cisco IOS XR 64-bit operating system with the following line cards: • A9K-8X100G-LB-SE • A9K-8X100G-LB-TR • A9K-8X100G-SE • A9K-8X100G-TR • A9K-8X100G-CM • A99-8X100G-SE • A99-8X100G-TR • A99-8X100G-CM • A9K-4X100G-TR • A9K-4X100G-SE

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 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**]

$\mathcal{Q}$

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:

For Cisco ASR 9000 64 bit environment:

```
RP/0/RSP0/CPU0:Router#show version
Cisco IOS XR Software, Version 7.5.2
Copyright (c) 2013-2022 by Cisco Systems, Inc.

Build Information:
 Built By     : ingunawa
 Built On     : Tue Apr 26 18:26:36 PDT 2022
 Built Host   : iox-ucs-055
 Workspace    : /auto/srcarchive14/prod/7.5.2/asr9k-x64/ws
 Version      : 7.5.2
 Location     : /opt/cisco/XR/packages/
 Label        : 7.5.2

cisco ASR9K () processor
System uptime is 4 weeks 2 hours 31 minutes
```

For Cisco ASR9000 32 bit environment:

```
RP/0/RSP0/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.

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
3510    3510
0/FT1/*
        3540    3510    3450    3540    3480    3600    3480    3450    3540    3540
3480    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 upgrage will be skipped.

```
RP/0/RP0/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/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
--------------------------------------------------------------------------------
                                             lc   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.


RP/0/RSP1/CPU0:router# show hw-module fpd location all

Mon Jun 29 05:38:50.332 PST
```

```
================================== ========================================
                                   Existing Field Programmable Devices
                                   ========================================
                                   HW                      Current SW Upg/
Location       Card Type           Version Type Subtype Inst   Version Dng?
============   =====================   ======= ==== ======= ==== =========== ====
0/RSP0/CPU0    A9K-RSP-4G              4.8    lc   fpga3   0      1.13     No
                                              lc   fpga1   0      1.5      No
                                              lc   fpga2   0      1.14     No
                                              lc   cbc     0      1.2      No
                                              lc   fpga4   0      1.6      No
                                              lc   rommon  0      1.0      No
--------------------------------------------------------------------------------
0/RSP0/CPU0    ASR-9010-FAN           1.0    lc   cbc     1      4.0      No
--------------------------------------------------------------------------------
0/RSP0/CPU0    ASR-9010-FAN           1.0    lc   cbc     2      4.0      No
--------------------------------------------------------------------------------
0/1/CPU0       A9K-40GE-B             1.0    lc   fpga1   0      0.38     No
                                              lc   fpga2   0      0.8      No
                                              lc   cbc     0      2.2      No
                                              lc   cpld1   0      0.15     No
                                              lc   rommon  0      1.0      No
--------------------------------------------------------------------------------
0/1/CPU0       A9K-40GE-B             1.0    lc   fpga1   1      0.38     No
--------------------------------------------------------------------------------
0/4/CPU0       A9K-8T/4-B             1.0    lc   fpga1   0      0.38     No
                                              lc   fpga2   0      0.10     No
                                              lc   cbc     0      2.2      No
                                              lc   cpld2   0      0.7      No
                                              lc   cpld1   0      0.15     No
                                              lc   cpld3   0      0.3      No
                                              lc   rommon  0      1.0      No
                                              lc   fpga3   0      14.42    No
--------------------------------------------------------------------------------
0/4/CPU0       A9K-8T/4-B             1.0    lc   fpga1   1      0.38     No
--------------------------------------------------------------------------------
0/6/CPU0       A9K-4T-B               1.0    lc   fpga1   0      0.38     No
                                              lc   fpga2   0      0.10     No
                                              lc   cbc     0      2.2      No
                                              lc   cpld2   0      0.7      No
                                              lc   cpld1   0      0.15     No
                                              lc   cpld3   0      0.3      No
                                              lc   rommon  0      1.0      No
                                              lc   fpga3   0      14.42    No
--------------------------------------------------------------------------------
0/6/CPU0       A9K-4T-B               1.0    lc   fpga1   1      0.38     No
--------------------------------------------------------------------------------
```

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.

Field	Description
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.

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 20). 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.
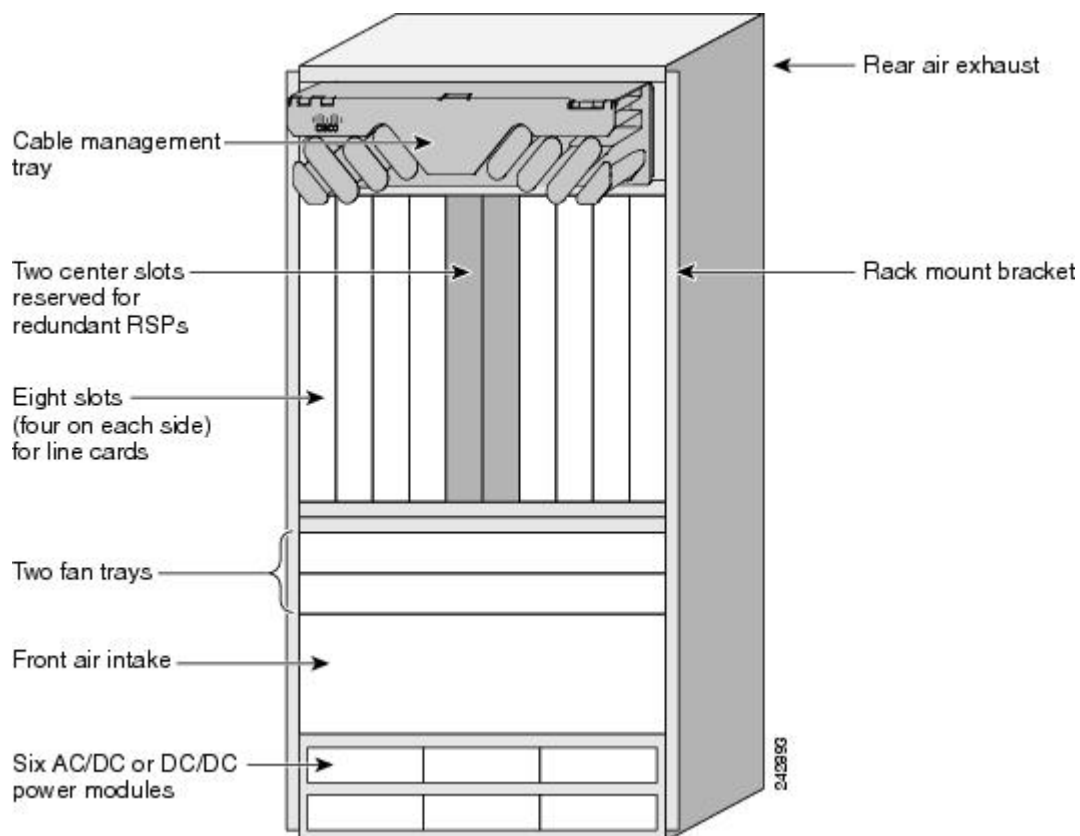
Determining the Active RP in a Redundant Pair

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 to display the redundancy status of the cards or force a manual switchover.

Table 4: RSP Redundancy Commands

Command	Description
show redundancy	Displays the redundancy status of the RSPs. This command also displays the boot and switch-over history for the RSPs.
redundancy switchover	Forces a manual switchover to the standby RSP. This command works only if the standby RSP is installed and in the "ready" state.
show platform	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 36

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: xxxxx
  Password: xxxxx
  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.
```

System Logs during RSP Switchover

Table 5: Feature History Table

Feature Name	Release Information	Feature Description
RSP Slot Location in Syslog	Release 7.8.1	When an RSP switchover occurs, the router logs the active RSP slot location in the syslog message. This helps you quickly identify the active RSP slot from your router's system log messages. In earlier releases, the RSP switchover syslog message didn't include the active RSP slot location.

In the event of an RSP switchover, the router logs the following syslog messages:

```
RP/0/1/CPU0:Feb 19 09:08:00.655 UTC: rmf_svr[436]: %HA-REDCON-6-GO_ACTIVE : this card going
 active
RP/1/1/CPU0:Mar 8 11:43:29.041 UTC: rmf_svr[147]: %HA-REDCON-6-GO_STANDBY : this card going
 standby, location RP/1/1/CPU0
```

From Cisco IOS XR Release 7.8.1 onwards, the RSP switchover syslog message for the active RSP includes the RSP slot location as well:

```
RP/0/1/CPU0:Mar  8 11:42:50.876 UTC: rmf_svr[165]: %HA-REDCON-6-GO_ACTIVE : this card going
 active , location RP/0/1/CPU0:
```

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.

PFM Alarm on OCXO Failure

Table 6: Feature History Table

Feature Name	Release Information	Feature Description
PFM Alarm on OCXO Failure	Release 6.7.35	You now get notified via Platform Fault Manager (PFM) alarms when the internal oscillator Oven-Controlled Crystal Oscillator (OCXO) fails. OCXO failure causes timing loss in internal devices leading to possible interface flaps. This feature covers two scenarios: • In the case of a single RSP, you only receive a notification via the PFM alarm. • In the case of dual RSPs, RSP switchover takes place along with the notification. Use the show reboot command to view the Onboard Failure Logging (OBFL) logs and track the PFM alarms.

The function of the OCXO, which is an internal Oscillator, is to provide clock to the Phased-Locked Loop (PLL). OCXO is connected to PLL which is further connected to many hardware components. When OCXO fails to deliver the clock output, timing loss occurs. This may lead to further problems in the system such as interface flaps.

When the OCXO failure is detected, the PFM alarms are displayed on the router console. Contact the Cisco Support team when you see PFM alarms on router console as this is a hardware failure and you must get your hardware checked.

![Note icon]

Note When OCXO fails, local oscillator clock output is unstable and the line card interfaces state might be unpredictable.

PFM Alarms

The following are the examples of the PFM alarms that are generated on the router console:

- Dual RSP

```
Reboot Reason: Cause code 0x2c00001b Cause: Card reset requested by: Process ID: 102448
  (dao_tmp), Target node: 0/RSP0/CPU0, CondID: 637, Fault Reason: RSP PLL error log:
Local oscillator clock output is unstable, Reloading the board. Process: pfm_node_rp
```

- Standalone RSP

```
RP/0/RSP1/CPU0:Mar 15 11:22:13.647 UTC: pfm_node_rp[365]:
%PLATFORM-CLKCTRL_T-3-RSP_OCXO_FAILURE_ALARM : Set|dao_tmp[102448]|0x1039000|RSP PLL
error log: Local oscillator clock output is unstable. Line card interfaces may be
unpredictable
```

Restrictions for PFM Alarms on OCXO Failure

PFM alarm generation during OCXO failure is supported on the following Route Processor (RP)/Route Switch Processor (RSP) only:

- A9K-RSP880-LT-SE/TR

- A99-RP2-SE/TR

- A9K-RSP880-SE/TR

Mitigation

The router tries to recover from OCXO failure by performing switchover of RSPs in the case of Dual RSPs.

Use the **show platform** command to detect whether your router has standalone RSP or dual RSPs.

Here, is an example of command output for dual RSP:

```
Router#show platform
Node            Type                   State            Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0     A9K-RSP880-SE(Active)  IOS XR RUN       NSHUT
0/RSP1/CPU0     A9K-RSP880-SE(Standby) IOS XR RUN       NSHUT
0/FT0           ASR-9904-FAN           OPERATIONAL      NSHUT
0/0             A9K-48X10GE-1G-TR      SW_INACTIVE      NSHUT
0/1/CPU0        A9K-4X100GE-SE         IOS XR RUN       NSHUT
0/PT0           A9K-AC-PEM-V2          OPERATIONAL      NSHUT
Router#
```

Here, is an example of command output for standalone RSP:

```
Router#show platform
Node            Type                   State            Config state
--------------------------------------------------------------------------------
0/RSP0/CPU0     A9K-RSP880-SE (Active)  IOS XR RUN       NSHUT
0/FT0           ASR-9901-FAN           OPERATIONAL      NSHUT
0/FT1           ASR-9901-FAN           OPERATIONAL      NSHUT
```

```
0/FT2            ASR-9901-FAN            OPERATIONAL        NSHUT
0/0/CPU0         ASR9901-LC              IOS XR RUN         NSHUT
0/PT0            A9K-AC-PEM              OPERATIONAL        NSHUT
Router#
```

Dual RSPs

When the router has High Availabilty (HA) RSPs or Dual RSPs, there are two RSPs: RSP0 and RSP1. One of them is active RSP and other is standby RSP. When OCXO fails, you can see a PFM alarm on the router console. The router performs RSP switchover to recover from the OCXO failure and to maintain the timing accuracy. During switchover, the active RSP becomes the standby RSP and the standby RSP takes the role of active RSP. RSP switchover takes maximum 10 seconds.

However, you must contact Cisco Support team.

To track the fatal PFM alarms generated, the router maintains OBFL logs. .

Use the **Router# show reboot history location 0/RSP0/CPU0** command to view the OBFL logs.

Here, is a sample output of reboot history.

```
No Time Cause code reason
01 Thu Nov 11 13:54:54 2021  0x2c00001b Cause: Card reset requested by: Process ID: 102448
 (dao_tmp), Target node: 0/RSP0/CPU0, CondID: 637, Fault Reason: RSP PLL error log: Local
oscillator clock output is unstable, Reloading the board.
Process: pfm_node_rp

02 Fri Nov 12 04:26:11 2021  0x0400004f Cause: MBI-HELLO reloading node on receiving reload
 notification
Process: mbi-hello
```

Standalone RSP

When only one RSP is in use, you can only see the PFM alarm on the router console. This alarm indicates that OCXO failure has occurred and you must contact Cisco Support team.

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 29 for information on zero-configuration networking.

For information on CMP shell, see the section CMP Shell, on page 27.

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 7: CMP Shell Commands

Command	Description
adduser	Adds a new CMP user ID/password.
aux	Connects to route processor CPU auxiliary port for 32-bit image. Connects to system admin plane for 64-bit image.
con	Connects to route processor CPU console port. Although multiple SSH sessions to the CMP shell are allowed, the **con** , **aux**, or **lc** command execution is allowed for only single user at a time.
copykey	SCP a key.

Command	Description
deluser	Deletes a user ID.
	It is recommended that you delete the default username cmp after a new user is created.
desc_err	Shows description of command error codes.
debug	Enables CMP console logging functionality.
dns	Changes DNS name.
	The initial service advertisement uses the domain name of chassis serial number + RSP/RP slot. This can be changed using the **dns** command.
exit	Logs out of CMP.
fanspeed	Shows information about fan trays in the chassis.
help	Displays available CMP commands.
hostname	Changes a host name.
lc_con	Connects to a line card console.
lcslotinfo	Shows line card slot ID information.
passwd	Changes password (minimum 5 and maximum 8 characters).
priv	Enters privileged EXEC mode.
pxeboot	PXE boots a 64-bit Cisco IOS XR image to Route processor CPU memory.
resetcmp	Clears CMP data (user IDs, passwords, DNS name, hostname and SSH key) to default settings.
run	Runs diagnostic commands ping/ping6/traceroute/traceroute6 to diagnose basic network connectivity problems.
scpboot	SCP boots 32-bit IOS XR image and TURBOBOOT to route processor CPU memory.
show	Shows all CMP data.
	Displays ip/key/cmp configuration.
showinv	Shows the physical inventory.
showtemp	Shows the temperature information.
slotmap	Displays physical slot and card mapping information.

Command	Description
sshkeygen	Generates a new SSH key.
unlock	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.
warmreset	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-10X10G-LR	10 GE.
CPAK-100G-ER4L	100 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**
Step 1	**configure**	
Step 2	**hw-module location preconfigure** *location* **port breakout** *interface* **Example:** `RP/0/RSP0/CPU0:router (config) # hw-module location 0/0/CPU0 port 0 breakout 10x TenGigE`	Configures the breakout option. **Note** The optional keyword, **preconfigure** 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 8: 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	**admin** **Example:** `RP/0/RSP0/CPU0:router# admin`	Enters administration EXEC mode.

	Command or Action	Purpose
Step 2	configure	
Step 3	**hw-module power saving location** *location* **slice** *number* **Example:** `RP/0/RSP0/CPU0:router (admin-config) #` **hw-module power saving location 0/1/CPU0 slice 3**	Configures the power saving option for the specified slice. The available options are Slice1, 2, 3. **Note** 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.

Configuring Breakout on a 400GE Port

Table 9: Feature History Table

Feature Name	Release Information	Description
Breakout in a 400GE Port	Release 7.4.1	You can configure breakout on a 400GE port for use the QSFP-28 transceiver module in a 1x100G mode. This feature is supported on Cisco ASR 9900 5th Generation 4Tb line cards (A99-10X400GE-X-SE/TR).
Configuring 4x100GE Breakout for ASR 9000 2T Combo Line Card (A9K-20HG-FLEX) and 800G Combo Line Card (A9K-8HG-FLEX)	Release 7.4.1	This release introduces support for 4x100 breakout on the ASR 9000 2T Combo Line Card (A9K-20HG-FLEX) and 800G Combo Line Card (A9K-8HG-FLEX). You can configure 4x100G breakout on a QSFP-DD port and use it as four individual 100G interfaces.

1x100GE Breakout

You can configure breakout on a 400GE port for use the QSFP-28 transceiver module in a 1x100G mode. This feature is supported on Cisco ASR 9900 5th Generation 4Tb line cards (A99-10X400GE-X-SE/TR). As part of this enhancement, 400GE ports support these QSFP28 optics:

- QSFP-100G-SR4-S

- QSFP-100G-PSM4-S

- QSFP-100G-CWDM4-S

- QSFP-100G-FR-S

- QSFP-100G-LR4-S

- QSFP-100G-ER4L-S

- QSFP-40/100-SRBD

- QSFP-100G-SM-SR

- QSFP-100G-LR-S

This task enables you to configure the breakout option:

```
RP/0/RSP0/CPU0:router# configure
RP/0/RSP0/CPU0:router(config)# hw-module location 0/2/CPU0 port 1 breakout 1xHundredGige
```

Here's the **show** command output indicating the breakout configuration:

```
RP/0/RSP0/CPU0:router# show ipv4 interface brief | include Hun
Tue May  4 07:59:56.996 UTC
FourHundredGigE0/1/0/2      unassigned      Down        Down      default
HundredGigE0/2/0/0          198.127.6.1     Up          Up        vpn6
HundredGigE0/2/0/1          198.127.12.1    Up          Up        vpn12
HundredGigE0/2/0/2          198.127.10.1    Up          Up        vpn10
HundredGigE0/2/0/3          198.127.11.1    Up          Up        vpn11
HundredGigE0/2/0/4          198.127.9.1     Up          Up        vpn9
HundredGigE0/2/0/5          198.127.5.1     Up          Up        vpn5
HundredGigE0/2/0/6          198.127.1.1     Up          Up        vpn1
HundredGigE0/2/0/7          198.127.7.1     Up          Up        vpn7
HundredGigE0/2/0/8          198.127.4.1     Up          Up        vpn4
```

Here's the **show** command output indicating the 100G optics plugged in the QSFP-DD port number 2:

```
RP/0/RSP0/CPU0:router#show inventory loc 0/2
Tue May  4 07:58:58.461 UTC
NAME: "0/2", DESCR: "ASR 9900 10-port 400GE SE linecard"
PID: A99-10X400GE-X-SE , VID: V00, SN: FOC2423NXUH

NAME: "HundredGigE0/2/0/0", DESCR: "100GE-SR4-S QSFP Module"
PID: QSFP-100G-SR4-S    , VID: V03, SN: INL23332207

NAME: "HundredGigE0/2/0/1", DESCR: "100GE-LR4-S QSFP Module"
PID: QSFP-100G-LR4-S    , VID: V01, SN: FNS213210US

NAME: "HundredGigE0/2/0/2", DESCR: "100GE-SM-SR QSFP Module"
PID: QSFP-100G-SM-SR    , VID: V02, SN: FNS22151794

NAME: "HundredGigE0/2/0/3", DESCR: "100GE-FR-S QSFP Module"
PID: QSFP-100G-FR-S     , VID: V01, SN: INL24080848

NAME: "HundredGigE0/2/0/4", DESCR: "100GE-CWDM4-S QSFP Module"
PID: QSFP-100G-CWDM4-S , VID: V01, SN: JFQ210530CN

NAME: "HundredGigE0/2/0/5", DESCR: "100GE-ER4L QSFP Module"
PID: QSFP-100G-ER4L-S   , VID: V01, SN: FLJ2150J00V

NAME: "HundredGigE0/2/0/6", DESCR: "100GE-40/100-SRBD QSFP Module"
PID: QSFP-40/100-SRBD   , VID: V01, SN: FOF2145N0LA

NAME: "HundredGigE0/2/0/7", DESCR: "100GE-PSM4 QSFP Module"
PID: QSFP-100G-PSM4-S   , VID: V01, SN: CVR220500MB

NAME: "HundredGigE0/2/0/8", DESCR: "100GE-LR-S QSFP Module"
PID: QSFP-100G-LR-S     , VID: V01, SN: FBN2415B004
```

4x100GE Breakout

The QSFP-DD modules support 400Gbps. You can configure 4x100G breakout on a QSFP-DD port and use it as four individual 100G interfaces.

This feature is supported on the following variant of Cisco ASR 9000 Series Line Cards:

- A99-10X400GE-X-SE

- A99-10X400GE-X-TR

- A9K-20HG-FLEX-SE

- A9K-20HG-FLEX-TR

- A9K-8HG-FLEX-SE

- A9K-8HG-FLEX-TR

This example shows how to enable 4x100GE breakout:

```
RP/0/RSP0/CPU0:router(config)# hw-module location 0/8/CPU0 port 0 breakout 4xHundredGigE
```

The following output shows the breakout configuration:

```
RP/0/RP0/CPU0:router# show ipv4 interfaces brief | i 0/8/0/0/

HundredGigE0/8/0/0/0            10.0.9.1        Up              Up        vpn9
HundredGigE0/8/0/0/1            10.0.8.1        Up              Up        vpn8
HundredGigE0/8/0/0/2            10.0.7.1        Up              Up        vpn7
HundredGigE0/8/0/0/3            10.0.2.1        Up              Up        vpn2

RP/0/RP0/CPU0:router# show interface hundredGigE 0/8/0/0/*

HundredGigE0/8/0/0/0 is up, line protocol is up
  Interface state transitions: 1
  Hardware is HundredGigE, address is 7c21.0e33.35f0 (bia 7c21.0e33.35f0)
  Layer 1 Transport Mode is LAN
  Description: noshut-interface
  Internet address is 10.0.9.1/24
  MTU 9216 bytes, BW 100000000 Kbit (Max: 100000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,
  Full-duplex, 100000Mb/s, 400GBASE-DR4, link type is force-up
  output flow control is off, input flow control is off
  Carrier delay (up) is 10 msec
  loopback not set,
  Last link flapped 08:07:28
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:00, output 00:00:00
  Last clearing of "show interface" counters never
  5 minute input rate 1000 bits/sec, 1 packets/sec
  5 minute output rate 1000 bits/sec, 1 packets/sec
     18400 packets input, 4669038 bytes, 0 total input drops
     0 drops for unrecognized upper-level protocol
     Received 1 broadcast packets, 18397 multicast packets
             0 runts, 0 giants, 0 throttles, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     19128 packets output, 4732388 bytes, 0 total output drops
     Output 1 broadcast packets, 19125 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
```

```
        1 carrier transitions

HundredGigE0/8/0/0/1 is up, line protocol is up
  Interface state transitions: 1
  Hardware is HundredGigE, address is 7c21.0e33.35f1 (bia 7c21.0e33.35f1)
  Layer 1 Transport Mode is LAN
  Description: noshut-interface
  Internet address is 10.0.8.1/24
  MTU 9216 bytes, BW 100000000 Kbit (Max: 100000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,
  Full-duplex, 100000Mb/s, 400GBASE-DR4, link type is force-up
  output flow control is off, input flow control is off
  Carrier delay (up) is 10 msec
  loopback not set,
  Last link flapped 08:07:28
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:00, output 00:00:00
  Last clearing of "show interface" counters never
  5 minute input rate 1000 bits/sec, 1 packets/sec
  5 minute output rate 1000 bits/sec, 1 packets/sec
     18408 packets input, 4677424 bytes, 5 total input drops
     0 drops for unrecognized upper-level protocol
     Received 1 broadcast packets, 18405 multicast packets
             0 runts, 0 giants, 0 throttles, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     19118 packets output, 4725316 bytes, 0 total output drops
     Output 1 broadcast packets, 19115 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
     1 carrier transitions

HundredGigE0/8/0/0/2 is up, line protocol is up
  Interface state transitions: 1
  Hardware is HundredGigE, address is 7c21.0e33.35f2 (bia 7c21.0e33.35f2)
  Layer 1 Transport Mode is LAN
  Description: noshut-interface
  Internet address is 10.0.7.1/24
  MTU 9216 bytes, BW 100000000 Kbit (Max: 100000000 Kbit)
     reliability 255/255, txload 0/255, rxload 0/255
  Encapsulation ARPA,
  Full-duplex, 100000Mb/s, 400GBASE-DR4, link type is force-up
  output flow control is off, input flow control is off
  Carrier delay (up) is 10 msec
  loopback not set,
  Last link flapped 08:07:28
  ARP type ARPA, ARP timeout 04:00:00
  Last input 00:00:00, output 00:00:00
  Last clearing of "show interface" counters never
  5 minute input rate 1000 bits/sec, 1 packets/sec
  5 minute output rate 1000 bits/sec, 1 packets/sec
     18446 packets input, 4676812 bytes, 0 total input drops
     0 drops for unrecognized upper-level protocol
     Received 1 broadcast packets, 18443 multicast packets
             0 runts, 0 giants, 0 throttles, 0 parity
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     19184 packets output, 4729960 bytes, 0 total output drops
     Output 1 broadcast packets, 19181 multicast packets
     0 output errors, 0 underruns, 0 applique, 0 resets
     0 output buffer failures, 0 output buffers swapped out
     1 carrier transitions

HundredGigE0/8/0/0/3 is up, line protocol is up
  Interface state transitions: 1
```

```
Hardware is HundredGigE, address is 7c21.0e33.35f3 (bia 7c21.0e33.35f3)
Layer 1 Transport Mode is LAN
Description: noshut-interface
Internet address is 10.0.2.1/24
MTU 9216 bytes, BW 100000000 Kbit (Max: 100000000 Kbit)
   reliability 255/255, txload 0/255, rxload 0/255
Encapsulation ARPA,
Full-duplex, 100000Mb/s, 400GBASE-DR4, link type is force-up
output flow control is off, input flow control is off
Carrier delay (up) is 10 msec
loopback not set,
Last link flapped 08:07:28
ARP type ARPA, ARP timeout 04:00:00
Last input 00:00:00, output 00:00:00
Last clearing of "show interface" counters never
5 minute input rate 1000 bits/sec, 1 packets/sec
5 minute output rate 1000 bits/sec, 1 packets/sec
   18444 packets input, 4677024 bytes, 0 total input drops
   0 drops for unrecognized upper-level protocol
   Received 1 broadcast packets, 18441 multicast packets
           0 runts, 0 giants, 0 throttles, 0 parity
   0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
   19170 packets output, 4734446 bytes, 0 total output drops
   Output 1 broadcast packets, 19167 multicast packets
   0 output errors, 0 underruns, 0 applique, 0 resets
   0 output buffer failures, 0 output buffers swapped out
   1 carrier transitions
```

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 10: 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 RSP from which the command is entered.
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.

Command	Description
hw-module shutdown location *node-id*	This command must be entered in the 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 RSP from which the command is entered.
hw-module unshut location *node-id*	This command must be entered in the configuration mode. This command is used to administratively bring up the specified node.

Note   When you use the **hw-module shutdown location** *node-id* command to a line card, you must wait until the configuration is applied before removing the line card. Removal of the line card before the shutdown may result in a hardware issue.

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
Step 1	**show redundancy**	Displays the RSP redundancy status.

	Command or Action	Purpose
	Example: `RP/0/RSP0/CPU0:router# show redundancy`	• If a standby RSP is in "ready" redundancy state, the **reload** command also causes the router to gracefully fail over to the standby RSP.
Step 2	**admin** **Example:** `RP/0/RSP0/CPU0:router# admin`	Enters administration EXEC mode.
Step 3	**show variables boot** **Example:** `RP/0/RSP0/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 0x102 or 0x2102, which causes the active RSP to reload the Cisco IOS XR software. • Verify that the configuration register setting is 0x102 or 0x2102. If it is not, complete Step 4, on page 38 to reset the configuration register to 0x102 or 0x2102. **Note** For instructions on how to enter ROM Monitor bootstrap mode, see *ROM Monitor Configuration Guide for Cisco ASR 9000 Routers*.
Step 4	(Optional) **config-register** *register-value* **Example:** `RP/0/RSP0/CPU0:router(admin)# config-register 0x102`	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.
Step 5	**admin** **Example:** `RP/0/RSP0/CPU0:router# admin`	Enters administration EXEC mode.
Step 6	**reload** **Example:** `RP/0/RSP0/CPU0:router# reload`	Reloads the active RSP according to the configuration register setting. • If the setting is 0x102 or 0x2102 , then the RSP reloads the Cisco IOS XR software. • If the standby RSP is in "ready" redundancy state, the router switches over to the standby RSP. • 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.

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 11: format command Syntax Description, on page 40 describes the **format** command syntax.

Table 11: format command Syntax Description

Variable	Description
filesystem	Specifies the memory device to format. The supported file systems are: • **bootflash:** • **compactflash:** • **configflash:** • **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 *System Management Command Reference for Cisco ASR 9000 Series Routers*.

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 40 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 40 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 40 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-threshhold 5000 W
shutdown-threshhold 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
```

Advanced Power Management

Advanced power management feature enables powering down the unused line card slices.

This feature helps to manage power consumption, as the slices that do not have any services enabled are power down. Later these slices can be powered when a new service is enabled on them.

This feature is supported on the Cisco ASR 9000 4th Generation Ethernet line cards.

Configuring Advance Power Management

This procedure shows how to configure advance power management.

In this example these slices are powered down:

- slice 0, and 7 of the line card in the node 0 location

- slice 3, and 6 of the line card in the node 1 location

You should reload the line card for the configuration changes to take effect.

```
Router# configure
Router (config)# hw-module location 0/0/CPU0 slice 0 power-down
Router (config)# hw-module location 0/0/CPU0 slice 7 power-down
Router (config)# hw-module location 0/1/CPU0 slice 3 power-down
Router (config)# hw-module location 0/1/CPU0 slice 6 power-down
Router (config)# commit
Router (config)# end
Router # admin
Router (sysadmin-vm)# hw-module location 0/0 reload
Router (sysadmin-vm)# hw-module location 0/1 reload
```

Running Configuration

```
config
hw-module location 0/0/CPU0 slice 0 power-down
hw-module location 0/0/CPU0 slice 7 power-down
hw-module location 0/1/CPU0 slice 3 power-down
hw-module location 0/1/CPU0 slice 6 power-down
```

Verification

```
Router# show apm psm status

PSM Status
----------
PSM Client Status
        DIAG0:          Not registered
        DIAG1:          Registered
        0/1 PSA:        Registered

LC Status
---------
Line Card        Slice   Config  Status          DIAG0           DIAG1           PSA
```

0/0/CPU0	0	On	Completed	Not registered	Completed	Not present
	1	On	Completed	Not registered	Completed	Not present
	2	On	Completed	Not registered	Completed	Not present
	3	On	Completed	Not registered	Completed	Not present
	4	On	Completed	Not registered	Completed	Not present
	5	On	Completed	Not registered	Completed	Not present
	6	On	Completed	Not registered	Completed	Not present
	7	On	Completed	Not registered	Completed	Not present
0/1/CPU0	0	On	Completed	Not registered	Completed	Completed
	1	On	Completed	Not registered	Completed	Completed
	2	On	Completed	Not registered	Completed	Completed
	3	On	Completed	Not registered	Completed	Completed
	4	On	Completed	Not registered	Completed	Completed
	5	On	Completed	Not registered	Completed	Completed
	6	On	Completed	Not registered	Completed	Completed
	7	On	Completed	Not registered	Completed	Completed

```
New configuration after line card reboots
-----------------------------------------
Line Card      Slice   New Config
0/0/CPU0       0       Down
               7       Down
0/1/CPU0       3       Down
               6       Down
```

Overview of Erase and Wipeout Disk Memory

Below two methods are used to delete the data from a RSP and line card. These methods are used based on your requirements:

- Erase Disk Memory

- Wipe Out Disk Memory

Erase Disk Memory

The Erase Disk Memory operation clears the disk memory of RSPs and line cards. However, the deleted data is recoverable using recovery tools. The erase disk memory operation can be performed for quick sanitization of the card before reusing it in another device within the control space of your network or organization.

How to Erase Disk Memory

Erasing disk memory operation uses zapdisk feature to erase the disk memory from the RSP and line card.

Erasing disk memory is done in three steps. First, you enable the zapdisk feature, later identify the card where zapdisk is supported. Next, activate the zapdisk operation on the card:

1. Enable zapdisk feature on the router.

   Example:

   ```
   sysadmin-vm# zapdisk set
   ```

2. Find out the card location where the zapdisk feature is supported using the **show zapdisk locations** command.

   Example:

   ```
   Router# show zapdisk locations

   0/RSP1    Fully qualified location specification
   0/7       Fully qualified location specification
   0/4       Fully qualified location specification
   all       all locations
   ```

3. Start the zapdisk operation on a specific node location or all node locations to erase disk memory.

   > **Note** You can run the zapdisk operation on all RSPs and line cards except the active RSP where zapdisk service is running in an active role.

   After the zapdisk process is completed, the system clears all data and shuts down the card.

   This example runs the zapdisk operation on the node location 0/4:

   ```
   Router# zapdisk start location 0/4
   Action on designated location is in progress, more detail logs will be located in sysadmin
    at
   /misc/disk1/tftpboot/zapdisk.log once action is completed
   ```

   > **Note** After deleting the data, remove the card from the slot, and do not reload the card or the router. If you reload the card or the router without removing the card, the data is reloaded into the card.

In the event when you must return or trash a card, the data in the disk memory should be permanently deleted. Therefore, the erase disk memory feature is not advice. You should use the enhanced version of the erase disk memory feature called Wipe Out Disk Memory.

Wipe Out Disk Memory

The Wipe Out Disk Memory feature deletes data permanently from the disk memory of RSPs and line cards. The erased data is non-recoverable. We recommmend this action when you perform a return material authorization (RMA) of a card to prevent pilferage of sensitive data.

How to Wipe out Disk Memory

Wiping out disk memory actions are performed in the ROMMON mode. Generally to boot into ROMMON mode, the **config-register boot-mode rom-monitor** command is executed from the admin mode. However, the command is not available in Cisco IOS XR 64 bit OS. Therefore you must follow the below sequence to boot into ROMMON mode:

1. Reload the router

2. Break into the BIOS menu and select ROMMON

3. Wipe out disk memory in ROMMON

Reload the router

Before reloading the router, ensure that the redundant RP is disabled in dual-RP routers and console is connected:

```
sysadmin-vm:0_RSP0# hw-module location all reload
```

Break into the BIOS menu and select ROMMON

1. While the router boots, press CTRL+C to break into BIOS menu.

2. To enter into ROMMON mode, select the Boot to ROMMON option from the available boot options:

```
Please select the operating system and the boot device:
    1) Boot to ROMMON
    2) IOS-XR 64 bit Boot previously installed image
    3) IOS-XR 64 bit Mgmt Network boot using DHCP server
    4) IOS-XR 64 bit Mgmt Network boot using local settings (iPXE)
    (Press 'p' for more option)
Selection [1/2/3/4]: 1
Selected Boot to ROMMON , Continue ? Y/N: y

rommon 1 >
```

Wipe out disk memory in ROMMON

1. Go to Privilege Mode.

    ```
    rommon > priv
    ```

2. Select the **hderase** option.

    ```
    rommon > hderase
            SATA HD(0x4,0x0,0x0):
        Model    : <Model number>
      Serial No : <serial number>

      Sanitize Crypto Scramble Erase Supported
      Sanitize State : Idle

    All the contents on this Drive will be Erased
    Do you wish to continue?(Y/N)
    Y
    ```

The data is permanently erased.

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/RSP0/CPU0:router# admin`	Enters administration EXEC mode.
Step 2	**upgrade cpuctrlbits** {**all**	**location** *node-id*} **Example:** `RP/0/RSP0/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/RSP0/CPU0:router# admin
RP/0/RSP0/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.
```

Configuring Port Modes

This section describes how to configure the various port modes on a router, port expansion card, or a line card.

Table 12: Feature History Table

Feature Name	Release Information	Description
1GbE Port Mode on SFP+ and SFP28 Ports	Release 7.9.1	It is now possible to use the 10GbE SFP+ and SFP28 ports to transmit 1GbE traffic on the routers or line cards. The number of ports on which you can enable 1GbE port mode has been increased from the previous releases. The details of the number of ports on which you can configure 1GbE port mode on the Cisco ASR 9000 Series routers, port expansion card, and line cards is as follows: • Cisco ASR 9903 - 20 SFP+ ports • Cisco ASR 9902 - 24 SFP+ and 16 SFP28 ports • A9903-8HG-PEC - 40 SFP+ ports • A9K-4HG-FLEX-SE/TR - 24 SFP+ and 16 SFP28 ports • A99-4HG-FLEX-SE/TR - 24 SFP+ and 16 SFP28 ports • A9K-4HG-FLEX-FC - 24 SFP+ and 16 SFP28 ports • A99-4HG-FLEX-FC - 24 SFP+ and 16 SFP28 ports Use the **hw-module location breakout** and **hw-module location slice config mode** commands to enable 1GbE port mode configuration.

Configuring Port Mode in Cisco A9903-8HG-PEC

You can configure the SFP+ ports on the Cisco A9903-8HG-PEC (0.8T PEC card) in 10GbE, 25GbE, or 1GbE mode. By default, all ports are in 10GbE mode.

For more information on the ports, see the Installing Modules and Cables in the Chassis chapter in the *Cisco ASR 9000 Series Fixed-Port Routers Hardware Installation Guide*.

To configure a port, use the **hw-module location slice config mode** command.

The port mode configuration is per slice and not per port. Also, the 48 ports on Cisco A9903-8HG-PEC are available in slices 4 and 5. Each slice can be configured for 10GbE, 25GbE, or 1GbE port mode.

The number of ports available on the card depends on the port mode configured on each slice. This table shows the port mode, and available ports on Cisco A9903-8HG-PEC:

Table 13: Port Modes, and Available Ports on Cisco A9903-8HG-PEC

Port Mode	Number of Ports	Available Port Numbers
1GbE	48 24 on each slice	On slice 4: port numbers 0–23 On slice 5: port numbers 24–47
10GbE	48 24 on each slice	On slice 4: port numbers 0–23 On slice 5: port numbers 24–47
25GbE	32 16 on each slice	On slice 4: port numbers 0–15 On slice 5: port numbers 32–47

Configuration

This sample configuration shows how to configure all ports on Cisco A9903-8HG-PEC in 25GbE mode:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 4 config-mode
4x25GE,4x25GE,4x25GE,4x25GE
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 5 config-mode
4x25GE,4x25GE,4x25GE,4x25GE
RP/0/RP0/CPU0:ios(config)#commit
```

This sample configuration shows how to configure all ports on Cisco A9903-8HG-PEC in 1GbE mode:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 4 config-mode
10x1GE,10x1GE,4x10GE,UNUSED
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 5 config-mode
10x1GE,10x1GE,4x10GE,UNUSED
RP/0/RP0/CPU0:ios(config)#commit
```

By default, all ports are in 10GbE mode. To revert to the default mode, use **no** form of the `hw-module location <node> slice <number> config-mode` command. This sample shows how to revert slice 4 ports to the default 10GbE mode:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#no hw-module location 0/0/CPU0 slice 4 config-mode
4x25GE,4x25GE,4x25GE,4x25GE
RP/0/RP0/CPU0:ios(config)#commit
```

Verification

Use the **show interface brief** command to verify the ports in slice 4 and 5 configured in 25GbE mode:

```
RP/0/RP0/CPU0:ios#show interfaces brief
Intf      Intf       LineP       Encap MTU     BW
Name      State      State       Type (byte) (Kbps)
--------------------------------------------------------------------------------
[SNIP]
TF0/0/1/0 admin-down admin-down ARPA 1514 25000000 /* slice 4 port numbers starts here */
TF0/0/1/1 admin-down admin-down ARPA 1514 25000000
TF0/0/1/2 admin-down admin-down ARPA 1514 25000000
TF0/0/1/3 admin-down admin-down ARPA 1514 25000000
```

```
TF0/0/1/4 admin-down admin-down ARPA 1514 25000000
TF0/0/1/5 admin-down admin-down ARPA 1514 25000000
TF0/0/1/6 admin-down admin-down ARPA 1514 25000000
TF0/0/1/7 admin-down admin-down ARPA 1514 25000000
TF0/0/1/8 admin-down admin-down ARPA 1514 25000000
TF0/0/1/9 admin-down admin-down ARPA 1514 25000000
TF0/0/1/10 admin-down admin-down ARPA 1514 25000000
TF0/0/1/11 admin-down admin-down ARPA 1514 25000000
TF0/0/1/12 admin-down admin-down ARPA 1514 25000000
TF0/0/1/13 admin-down admin-down ARPA 1514 25000000
TF0/0/1/14 admin-down admin-down ARPA 1514 25000000
TF0/0/1/15 admin-down admin-down ARPA 1514 25000000
TF0/0/1/32 admin-down admin-down ARPA 1514 25000000 /* slice 5 port numbers starts here */

TF0/0/1/33 admin-down admin-down ARPA 1514 25000000
TF0/0/1/34 admin-down admin-down ARPA 1514 25000000
TF0/0/1/35 admin-down admin-down ARPA 1514 25000000
TF0/0/1/36 admin-down admin-down ARPA 1514 25000000
TF0/0/1/37 admin-down admin-down ARPA 1514 25000000
TF0/0/1/38 admin-down admin-down ARPA 1514 25000000
TF0/0/1/39 admin-down admin-down ARPA 1514 25000000
TF0/0/1/40 admin-down admin-down ARPA 1514 25000000
TF0/0/1/41 admin-down admin-down ARPA 1514 25000000
TF0/0/1/42 admin-down admin-down ARPA 1514 25000000
TF0/0/1/43 admin-down admin-down ARPA 1514 25000000
TF0/0/1/44 admin-down admin-down ARPA 1514 25000000
TF0/0/1/45 admin-down admin-down ARPA 1514 25000000
TF0/0/1/46 admin-down admin-down ARPA 1514 25000000
TF0/0/1/47 admin-down admin-down ARPA 1514 25000000
```

This show command displays all 48 ports on Cisco A9903-8HG-PEC in 10GbE mode:

```
RP/0/RP0/CPU0:ios#show interfaces brief
Intf     Intf     LineP     Encap MTU    BW
Name     State    State     Type (byte) (Kbps)
--------------------------------------------------------------------------------
Te0/0/1/0 admin-down admin-down ARPA 1514 10000000 /* slice 4 port numbers starts here  */
Te0/0/1/1 admin-down admin-down ARPA 1514 10000000
Te0/0/1/2 admin-down admin-down ARPA 1514 10000000
Te0/0/1/3 admin-down admin-down ARPA 1514 10000000
Te0/0/1/4 admin-down admin-down ARPA 1514 10000000
Te0/0/1/5 admin-down admin-down ARPA 1514 10000000
Te0/0/1/6 admin-down admin-down ARPA 1514 10000000
Te0/0/1/7 admin-down admin-down ARPA 1514 10000000
Te0/0/1/8 admin-down admin-down ARPA 1514 10000000
Te0/0/1/9 admin-down admin-down ARPA 1514 10000000
Te0/0/1/10 admin-down admin-down ARPA 1514 10000000
Te0/0/1/11 admin-down admin-down ARPA 1514 10000000
Te0/0/1/12 admin-down admin-down ARPA 1514 10000000
Te0/0/1/13 admin-down admin-down ARPA 1514 10000000
Te0/0/1/14 admin-down admin-down ARPA 1514 10000000
Te0/0/1/15 admin-down admin-down ARPA 1514 10000000
Te0/0/1/16 admin-down admin-down ARPA 1514 10000000
Te0/0/1/17 admin-down admin-down ARPA 1514 10000000
Te0/0/1/18 admin-down admin-down ARPA 1514 10000000
Te0/0/1/19 admin-down admin-down ARPA 1514 10000000
Te0/0/1/20 admin-down admin-down ARPA 1514 10000000
Te0/0/1/21 admin-down admin-down ARPA 1514 10000000
Te0/0/1/22 admin-down admin-down ARPA 1514 10000000
Te0/0/1/23 admin-down admin-down ARPA 1514 10000000
Te0/0/1/24 admin-down admin-down ARPA 1514 10000000 /* slice 5 port numbers starts here */
Te0/0/1/25 admin-down admin-down ARPA 1514 10000000
Te0/0/1/26 admin-down admin-down ARPA 1514 10000000
Te0/0/1/27 admin-down admin-down ARPA 1514 10000000
```

```
Te0/0/1/28 admin-down admin-down ARPA 1514 10000000
Te0/0/1/29 admin-down admin-down ARPA 1514 10000000
Te0/0/1/30 admin-down admin-down ARPA 1514 10000000
Te0/0/1/31 admin-down admin-down ARPA 1514 10000000
Te0/0/1/32 admin-down admin-down ARPA 1514 10000000
Te0/0/1/33 admin-down admin-down ARPA 1514 10000000
Te0/0/1/34 admin-down admin-down ARPA 1514 10000000
Te0/0/1/35 admin-down admin-down ARPA 1514 10000000
Te0/0/1/36 admin-down admin-down ARPA 1514 10000000
Te0/0/1/37 admin-down admin-down ARPA 1514 10000000
Te0/0/1/38 admin-down admin-down ARPA 1514 10000000
Te0/0/1/39 admin-down admin-down ARPA 1514 10000000
Te0/0/1/40 admin-down admin-down ARPA 1514 10000000
Te0/0/1/41 admin-down admin-down ARPA 1514 10000000
Te0/0/1/42 admin-down admin-down ARPA 1514 10000000
Te0/0/1/43 admin-down admin-down ARPA 1514 10000000
Te0/0/1/44 admin-down admin-down ARPA 1514 10000000
Te0/0/1/45 admin-down admin-down ARPA 1514 10000000
Te0/0/1/46 admin-down admin-down ARPA 1514 10000000
Te0/0/1/47 admin-down admin-down ARPA 1514 10000000
```

This show command displays ports in slice 4 configured in 25GbE mode and slice 5 in 10GbE mode:

```
RP/0/RP0/CPU0:ios#show interfaces brief
Intf      Intf       LineP      Encap MTU    BW
Name      State      State      Type (byte) (Kbps)
--------------------------------------------------------------------------------
TF0/0/1/0 admin-down admin-down ARPA 1514 25000000  /* slice 4 port numbers starts here */
TF0/0/1/1 admin-down admin-down ARPA 1514 25000000
TF0/0/1/2 admin-down admin-down ARPA 1514 25000000
TF0/0/1/3 admin-down admin-down ARPA 1514 25000000
TF0/0/1/4 admin-down admin-down ARPA 1514 25000000
TF0/0/1/5 admin-down admin-down ARPA 1514 25000000
TF0/0/1/6 admin-down admin-down ARPA 1514 25000000
TF0/0/1/7 admin-down admin-down ARPA 1514 25000000
TF0/0/1/8 admin-down admin-down ARPA 1514 25000000
TF0/0/1/9 admin-down admin-down ARPA 1514 25000000
TF0/0/1/10 admin-down admin-down ARPA 1514 25000000
TF0/0/1/11 admin-down admin-down ARPA 1514 25000000
TF0/0/1/12 admin-down admin-down ARPA 1514 25000000
TF0/0/1/13 admin-down admin-down ARPA 1514 25000000
TF0/0/1/14 admin-down admin-down ARPA 1514 25000000
TF0/0/1/15 admin-down admin-down ARPA 1514 25000000
Te0/0/1/24 admin-down admin-down ARPA 1514 10000000 /* slice 5 port numbers starts here */

Te0/0/1/25 admin-down admin-down ARPA 1514 10000000
Te0/0/1/26 admin-down admin-down ARPA 1514 10000000
Te0/0/1/27 admin-down admin-down ARPA 1514 10000000
Te0/0/1/28 admin-down admin-down ARPA 1514 10000000
Te0/0/1/29 admin-down admin-down ARPA 1514 10000000
Te0/0/1/30 admin-down admin-down ARPA 1514 10000000
Te0/0/1/31 admin-down admin-down ARPA 1514 10000000
Te0/0/1/32 admin-down admin-down ARPA 1514 10000000
Te0/0/1/33 admin-down admin-down ARPA 1514 10000000
Te0/0/1/34 admin-down admin-down ARPA 1514 10000000
Te0/0/1/35 admin-down admin-down ARPA 1514 10000000
Te0/0/1/36 admin-down admin-down ARPA 1514 10000000
Te0/0/1/37 admin-down admin-down ARPA 1514 10000000
Te0/0/1/38 admin-down admin-down ARPA 1514 10000000
Te0/0/1/39 admin-down admin-down ARPA 1514 10000000
Te0/0/1/40 admin-down admin-down ARPA 1514 10000000
Te0/0/1/41 admin-down admin-down ARPA 1514 10000000
Te0/0/1/42 admin-down admin-down ARPA 1514 10000000
Te0/0/1/43 admin-down admin-down ARPA 1514 10000000
```

```
Te0/0/1/44 admin-down admin-down ARPA 1514 10000000
Te0/0/1/45 admin-down admin-down ARPA 1514 10000000
Te0/0/1/46 admin-down admin-down ARPA 1514 10000000
Te0/0/1/47 admin-down admin-down ARPA 1514 10000000
```

This show command displays all 48 ports on Cisco A9903-8HG-PEC in 1GbE mode:

```
RP/0/RP0/CPU0:ios#show interfaces brief
-------------------------------------------------------------------
Fri Feb 24 10:33:06.517 UTC

Intf        Intf   LineP  Encap MTU        BW
Name        State  State  Type (byte)    (Kbps)
-------------------------------------------------------------------
Nu0           up   up     Null 1500          0
Mg0/RP0/CPU0/0up   up     ARPA 1514    1000000
Hu0/0/0/0    down  down   ARPA 1514  100000000
Hu0/0/0/1    down  down   ARPA 1514  100000000
Hu0/0/0/2    down  down   ARPA 1514  100000000
Hu0/0/0/3    down  down   ARPA 1514  100000000
Hu0/0/0/4    down  down   ARPA 1514  100000000
Hu0/0/0/5    up    up     ARPA 9216  100000000
Hu0/0/0/6    down  down   ARPA 1514  100000000
Hu0/0/0/7    down  down   ARPA 1514  100000000
Hu0/0/0/8    down  down   ARPA 1514  100000000
Hu0/0/0/9    down  down   ARPA 1514  100000000
Hu0/0/0/11   down  down   ARPA 1514  100000000
Hu0/0/0/12   down  down   ARPA 1514  100000000
Hu0/0/0/13   down  down   ARPA 1514  100000000
Hu0/0/0/15   up    up     ARPA 9216  100000000
Te0/0/0/16   down  down   ARPA 1514   10000000
Te0/0/0/17   down  down   ARPA 1514   10000000
Te0/0/0/18   down  down   ARPA 1514   10000000
Te0/0/0/19   down  down   ARPA 1514   10000000
Te0/0/0/20   down  down   ARPA 1514   10000000
Te0/0/0/21   down  down   ARPA 1514   10000000
Te0/0/0/22   down  down   ARPA 1514   10000000
Te0/0/0/23   down  down   ARPA 1514   10000000
Te0/0/0/24   down  down   ARPA 1514   10000000
Te0/0/0/25   down  down   ARPA 1514   10000000
Te0/0/0/26   down  down   ARPA 1514   10000000
Te0/0/0/27   down  down   ARPA 1514   10000000
Te0/0/0/28   down  down   ARPA 1514   10000000
Te0/0/0/29   down  down   ARPA 1514   10000000
Te0/0/0/30   down  down   ARPA 1514   10000000
Te0/0/0/31   down  down   ARPA 1514   10000000
Te0/0/0/32   down  down   ARPA 1514   10000000
Te0/0/0/33   down  down   ARPA 1514   10000000
Te0/0/0/34   down  down   ARPA 1514   10000000
Te0/0/0/35   down  down   ARPA 1514   10000000
Gi0/0/1/0    down  down   ARPA 1514    1000000/* slice 4 port numbers starts here  */
Gi0/0/1/1    down  down   ARPA 1514    1000000
Gi0/0/1/2    down  down   ARPA 1514    1000000
Gi0/0/1/3    down  down   ARPA 1514    1000000
Gi0/0/1/4    down  down   ARPA 1514    1000000
Gi0/0/1/5    down  down   ARPA 1514    1000000
Gi0/0/1/6    down  down   ARPA 1514    1000000
Gi0/0/1/7    down  down   ARPA 1514    1000000
Gi0/0/1/8    down  down   ARPA 1514    1000000
Gi0/0/1/9    down  down   ARPA 1514    1000000
Gi0/0/1/10   down  down   ARPA 1514    1000000
Gi0/0/1/11   down  down   ARPA 1514    1000000
Gi0/0/1/12   down  down   ARPA 1514    1000000
Gi0/0/1/13   up    up     ARPA 9216    1000000
Gi0/0/1/14   down  down   ARPA 1514    1000000
```

```
Gi0/0/1/15   up     up     ARPA  9216   1000000
Gi0/0/1/16   down   down   ARPA  1514   1000000
Gi0/0/1/17   down   down   ARPA  1514   1000000
Gi0/0/1/18   down   down   ARPA  1514   1000000
Gi0/0/1/19   down   down   ARPA  1514   1000000
Gi0/0/1/24   down   down   ARPA  1514   1000000/* slice 5 port numbers starts here  */
Gi0/0/1/25   down   down   ARPA  1514   1000000
Gi0/0/1/26   down   down   ARPA  1514   1000000
Gi0/0/1/27   down   down   ARPA  1514   1000000
Gi0/0/1/28   down   down   ARPA  1514   1000000
Gi0/0/1/29   down   down   ARPA  1514   1000000
Gi0/0/1/30   down   down   ARPA  1514   1000000
Gi0/0/1/31   down   down   ARPA  1514   1000000
Gi0/0/1/32   down   down   ARPA  1514   1000000
Gi0/0/1/33   down   down   ARPA  1514   1000000
Gi0/0/1/34   down   down   ARPA  1514   1000000
Gi0/0/1/35   down   down   ARPA  1514   1000000
Gi0/0/1/36   down   down   ARPA  1514   1000000
Gi0/0/1/37   down   down   ARPA  1514   1000000
Gi0/0/1/38   down   down   ARPA  1514   1000000
Gi0/0/1/39   down   down   ARPA  1514   1000000
Gi0/0/1/40   down   down   ARPA  1514   1000000
Gi0/0/1/41   down   down   ARPA  1514   1000000
Gi0/0/1/42   down   down   ARPA  1514   1000000
Gi0/0/1/43   down   down   ARPA  1514   1000000
Te0/0/1/20   down   down   ARPA  1514   10000000
Te0/0/1/21   down   down   ARPA  1514   10000000
Te0/0/1/22   down   down   ARPA  1514   10000000
Te0/0/1/23   down   down   ARPA  1514   10000000
Te0/0/1/44   down   down   ARPA  1514   10000000
Te0/0/1/45   down   down   ARPA  1514   10000000
Te0/0/1/46   down   down   ARPA  1514   10000000
Te0/0/1/47   down   down   ARPA  1514   10000000
```

Configuring Port Mode in Cisco ASR 9902 Router

The router has 48 ports with maximum of 800G data bandwidth capacity. You can configure the 48 ports in various port modes (100GbE, 25GbE, 10GbE, 40GbE and 1GbE) using the **hw-module location <node> slice <number> config-mode** command.

The port mode configuration is per slice and not per port. Also, the 48 ports on the Cisco ASR 9902 router are available in slice 0 and 1. Each slice can be configured for a mix of 1GbE, 10GbE, 25GbE, 40GbE or 100GbE port modes. The default configuration is 1x100GE, 1x100GE, 10x10GE, and 10x10GE.

For more information on the ports, see the Installing Modules and Cables in the Chassis chapter in the *Cisco ASR 9000 Series Fixed-Port Routers Hardware Installation Guide*.

The number of ports available on the router depends on the port mode configured on each slice. This table shows the configuration options and supported port modes on Cisco ASR 9902 router:

Table 14: Configuration Options, and Supported Port Modes on Cisco ASR 9902 Router

Configuration Options	Supported Port Modes on Slice 0 and Slice 1
Default	1x100GE, 1x100GE, 10x10GE, and 10x10GE
Option 1	1x100GE/1X40G/4X10GE, 1x100GE/1X40GE/4X10GE, 10x10GE or 5x1GE_5x10GE or 10x1GE, and 10x10GE or 5x1GE_5x10GE or 10x1GE

Configuration Options	Supported Port Modes on Slice 0 and Slice 1
Option 2	1x100GE/1X40GE/4X10GE, 1x100GE/1X40G/4X10GE, 4x25GE, and 10x10GE or 5x1GE_5x10GE
Option 3	1x100GE/1X40GE/4X10GE, 4x25GE, 4x25GE, and 1x100GE/1x40GE/4x10GE
Option 4	1x100GE/1X40GE/4X10GE, 1x100GE/1X40GE/4X10GE, 1x100GE/1X40GE, and 1x100GE/1X40GE/4X10GE

This sample shows how to configure Configuration Option 1:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 0 config-mode
1x100GE,1x100GE,5x1GE_5x10GE,5x1GE_5x10GE
RP/0/RP0/CPU0:ios(config)#commit
```

This sample shows how to configure Configuration Option 1 with 10x1GE optics speed:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 0 config-mode
1x100GE,1x100GE,10x1GE,10x1GE
RP/0/RP0/CPU0:ios(config)#commit
```

To revert to the default mode, use **no** form of the **hw-module location <node> slice <number> config-mode** command.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#no hw-module location 0/0/CPU0 slice 0 config-mode
1x100GE,1x100GE,5x1GE_5x10GE,5x1GE_5x10GE
RP/0/RP0/CPU0:ios(config)#commit
```

Use the **show interface brief** command to verify the ports configured using **config-mode** command.

Note The 40G port mode on the Cisco ASR 9902 router works only with Cisco IOS XR software version 7.8.x or higher. So, if you want to use the 40G port mode on the Cisco ASR 9902 router, you should update the Cisco IOS XR software version to 7.8.x or higher.

Configuring Port Modes in Cisco ASR 9903 Router and Cisco ASR 9000 Series Line Cards

Table 15: Feature History Table

Feature Name	Release Information	Description
1GbE Port Mode	Release 7.7.1	You can now use the 1GbE port mode option to configure 10GbE optics speed on the SFP+ ports. This allows you to enable SFP+ ports on the line cards or router to deliver 1GbE standard traffic by using the **hw-module location breakout** command. This option is enabled on the following Cisco ASR 9000 Series router and line cards: • ASR 9903 • A9K-4HG-FLEX-SE/TR • A99-4HG-FLEX-SE/TR • A9K-4HG-FLEX-FC • A99-4HG-FLEX-FC

The Cisco ASR 9903 router has 16 QSFP28 ports and 20 integrated SFP+ ports with a maximum of 1.6T data bandwidth capacity. You can configure the ports in various port modes (100GbE, 25GbE, 10GbE, and 1GbE) using the **hw-module location** *<node id>* **bay** *<bay number>* **port** *<port number>* **breakout** *<interface>* command.

For more information on the ports, see the Installing Modules and Cables in the Chassis chapter in the *Cisco ASR 9000 Series Fixed-Port Routers Hardware Installation Guide*.

This table shows the configuration options and supported port modes on Cisco ASR 9903 router and Cisco ASR 9000 Series line cards.

Table 16: Configuration Options and Supported Port Modes

Configuration Options	Supported Port Modes
Default	1x100GE, 1x100GE, 10x10GE, and 10x10GE
Option 1	1x100GE, 1x100GE, 10x10GE or 5x1GE_5x10GE or 10x1GE, and 10x10GE or 5x1GE_5x10GE or 10x1GE
Option 2	1x100GE, 1x100GE, 4x25GE, and 10x10GE or 5x1GE_5x10GE or 10x1GE
Option 3	1x100GE, 4x25GE, 4x25GE, and 1x100GE
Option 4	1x100GE, 1x100GE, 1x100GE, and 1x100GE

Configuring Supported Port Modes on Routers

To configure 1GbE port mode on Cisco ASR 9903 router, use the QSFP28 ports 10 and 14. You can configure the ports for a mix of 1GbE, 10GbE, 25GbE, or 100GbE port modes.

This sample shows how to configure port mode of 1GbE on ports 10 with 5x1GE-5x10GE option for Cisco ASR 9903 router:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 bay 0 port 10 breakout
5x1GE-5x10GE
RP/0/RP0/CPU0:ios(config)#commit
```

This sample shows how to configure port mode of 1GbE on ports 10 with 10x1GE option for Cisco ASR 9903 router:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 bay 0 port 10 breakout 10x1GE
RP/0/RP0/CPU0:ios(config)#commit
```

Configuring Supported Port Modes on Line Cards

To configure 1GbE port mode on the Cisco ASR 9000 Series line cards, use the **hw-module location** *<node>* **slice** *<number>* **config-mode** command. On these cards, the port mode configuration is done per slice and not per port.

For more information on the ports, see the Overview chapter in the *Cisco ASR 9000 Series Aggregation Services Router Ethernet Line Card Installation Guide*.

This sample shows how to configure Option 1 on slice 0 with 1x100GE, 1x100GE, 5x1GE_5x10GE, and 5x1GE_5x10GE port modes on the line cards:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 0 config-mode
1x100GE,1x100GE,5x1GE_5x10GE,5x1GE_5x10GE
RP/0/RP0/CPU0:ios(config)#commit
```

This sample shows how to configure Option 1 on slice 0 with 1x100GE, 1x100GE, 10x10GE, and 10x1GE port modes on the line cards:

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#hw-module location 0/0/CPU0 slice 0 config-mode
1x100GE,1x100GE,10x1GE,10x1GE
RP/0/RP0/CPU0:ios(config)#commit
```

To revert to the default mode, use the **no** form of the **hw-module location** *<node>* **slice** *<number>* config-mode command.

```
RP/0/RP0/CPU0:ios#configure
RP/0/RP0/CPU0:ios(config)#no hw-module location 0/0/CPU0 slice 0 config-mode
1x100GE,1x100GE,5x1GE_5x10GE,5x1GE_5x10GE
RP/0/RP0/CPU0:ios(config)#commit
```

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
```

Excluding Sensitive Information in Show Running Configurations Output

Table 17: Feature History Table

Feature Name	Release Information	Feature Description
Excluding Sensitive Information in Show Running Configurations Command Output	Release 7.5.4	You can now exclude sensitive information such as strings, usernames, passwords, comments, or IP addresses within the **show running-configuration** command output by enabling sanitization on the nonvolatile generation (NVGEN) process. With this feature, you can achieve better data protection to prevent cybersecurity risks compared to regular router algorithms. This feature introduces the **nvgen default-sanitize** command.

The **show running configuration** command uses the nonvolatile generation (NVGEN) process in IOS-XR software to collect configuration information from every system component and construct a running configuration file to create its output. However, this file may contain sensitive information, including usernames, passwords, and IP addresses, which could pose a security threat when obfuscation algorithms in the router are weak compared to modern cryptographic standards.

In this feature, you can mask the following types of sensitive information in the show running configurations:

- Strings
- Usernames
- Passwords
- Comments
- IP Addresses

On enabling the sanitization in show running configurations, the NVGEN process replaces the corresponding information with **<removed>** string. For example, if you enable sanitization for IP Addresses, the show running configuration includes the **<removed>** string in place of all the IP Addresses in the output.

Sanitizing Strings

Configuration

```
Router# config
Router:(config)# nvgen default-sanitize strings
Router:(config)# commit
```

Running Configuration

```
Router# show run nvgen
nvgen
 default-sanitize strings
!
```

Verification

```
Router# show run int Hu0/2/0/4
interface HundredGigE0/2/0/4
 ! This is comment 1
 description <removed>
 !
```

Sanitizing Usernames

Configuration

```
Router# config
Router:(config)# nvgen default-sanitize usernames
Router:(config)# commit
```

Running Configuration

```
Router# show run nvgen
nvgen
 default-sanitize usernames
!
```

Verification

```
Router# show run username test
username <removed>
 group root-lr
 password 7 172864HJWBJHBCWH
!
```

Sanitizing Passwords

Configuration

```
Router# config
Router:(config)# nvgen default-sanitize passwords
Router:(config)# commit
```

Running Configuration

```
Router# show run nvgen
nvgen
 default-sanitize passwords
!
```

Verification

```
Router# show run username test
username test
 group root-lr
 password 7 <removed>
!
```

Sanitizing Comments

Configuration

```
Router# config
Router:(config)# nvgen default-sanitize comments
Router:(config)# commit
```

Running Configuration

```
Router# show run nvgen
nvgen
 default-sanitize comments
!
```

Verification

```
Router# show run int Hu0/2/0/4
interface HundredGigE0/2/0/4
 ! <comments removed>
 description This is bundle member
 !
```

Sanitizing IP Addresses

Configuration

```
Router# config
Router:(config)# nvgen default-sanitize ipaddrs
Router:(config)# commit
```

Verification

```
Router# show run int Hu0/2/0/4
interface HundredGigE0/2/0/4
 ! This is comment 1
 description This is bundle member
  ipv4 address <removed> <removed>
!
```

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 ASR 9000 Series Router* module of *System Management Command Reference for Cisco ASR 9000 Series Routers*

Related Topic	Document Title
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 ASR 9000 Series Aggregation Services Router Getting Started Guide*
ROM Monitor	*ROM Monitor Configuration Guide for Cisco ASR 9000 Routers*
Cisco IOS XR command master list	*Cisco ASR 9000 Series Aggregation Services Router Commands Master List*
Information about user groups and task IDs	*Configuring AAA Services on the Cisco ASR 9000 Series Router* module of *System Security Configuration Guide for Cisco ASR 9000 Series Routers*

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