Installing Modules and Cables in the Chassis

This chapter contains the procedures for installing cards and modules into the chassis, after it has been installed in a rack. It also describes how to connect cables to the ports and RP.
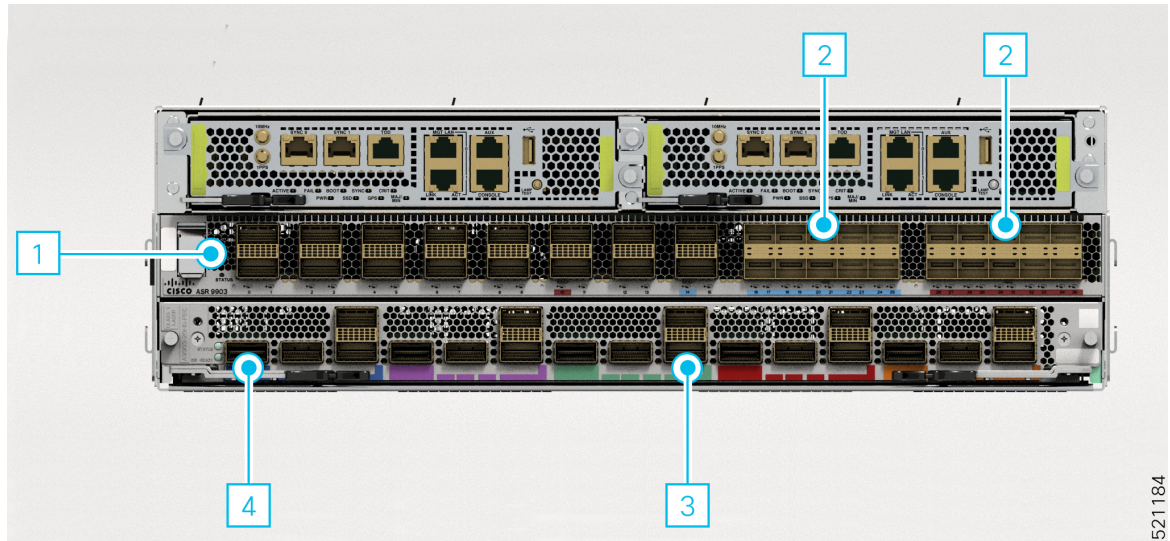
Cisco ASR 9903 Router Fixed Ports

The Cisco ASR 9903 Router has fixed-configuration ports that support the following transceivers:

- 16x100GE QSFP28

- 20x10GE SFP+

Figure 1: Cisco ASR 9903 Fixed Ports

1	QSFP28 ports (0-15)	3	QSFP28 ports
2	SFP+ ports (16-35)	4	QSFP-DD ports (0,4,8,12,16)

Note   Due to the orientation of the QSFP28 ports (20 and 21), you might not be able to disconnect fiber optic cables while the QSFP28 transceiver module is installed in the port. To disconnect fiber optic cables from the QSFP28 ports, we recommend that you first remove the QSFP28 transceiver module from the port, and then remove the cable.

Cisco ASR 9901 Router Fixed Ports

The Cisco ASR 9901 Router has 42 fixed-configuration ports that support the following transceivers:

- 16 SFP ports

- 24 SFP+ ports (supports SFP or SFP+)

- 2 QSFP28 ports

Figure 2: Cisco ASR 9901 Fixed Ports

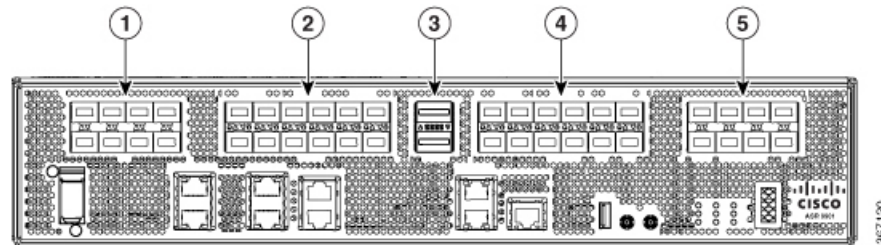| 1	SFP ports (0-7)	4	SFP/SFP+ ports (22-33)
2	SFP/SFP+ ports (8-19)	5	SFP ports (34-41)
3	QSFP28 ports (20-21)		

Note   Due to the orientation of the QSFP28 ports (20 and 21), you might not be able to disconnect fiber optic cables while the QSFP28 transceiver module is installed in the port. To disconnect fiber optic cables from the QSFP28 ports, we recommend that you first remove the QSFP28 transceiver module from the port, then remove the cable.

Cisco ASR 9001 Router Fixed Ports and Modular Port Adapters

This section describes the fixed ports and modular port adapters on the Cisco ASR 9001 Router.

Fixed 4x10-Gigabit Ethernet Ports

The Cisco ASR 9001 Router has four integrated 10 GE small form-factor pluggable (SFP+) ports that operate at a rate of 10 Gbps.

Each fixed SFP+ port has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP+ port.

Note   In Cisco ASR 9001-S Router, two 10 GE fixed SFP+ ports (SFP+2 and SFP+3) are disabled by default, and can be enabled by a license upgrade.

The following figure shows the front panel of the chassis and connectors of the fixed 4x10-Gigabit Ethernet ports.

Figure 3: 4x10-Gigabit Ethernet SFP+ Ports
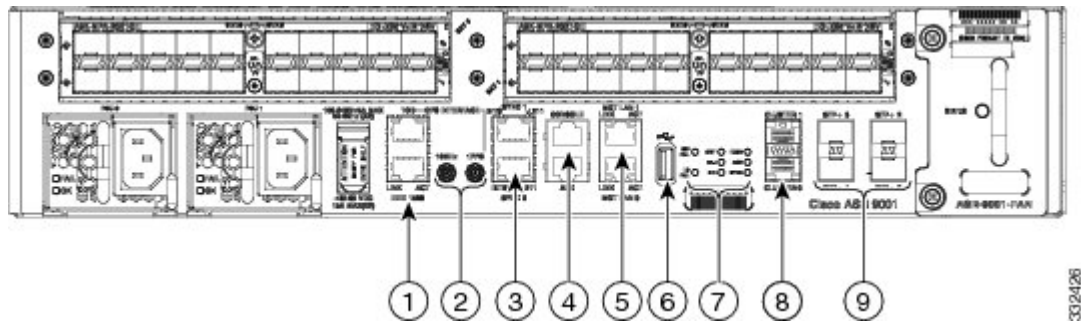
1	Service LAN and ToD ports	6	External USB port
2	10MHz and 1PPS indicators	7	Eight discrete LED indicators
3	SYNC (BITS/J.211) ports	8	CLUSTER ports
4	CONSOLE and AUX ports	9	Fixed SFP+ ports
5	Management LAN ports		

Modular Port Adapters

The Cisco ASR 9001 Router has two bays that support the following Modular Port Adapters (MPAs):

Note In the Cisco ASR 9001-S Router, one bay (MPA1) is disabled by default, and can be enabled by a license upgrade.

20-Port Gigabit Ethernet Modular Port Adapter

The 20-Port Gigabit Ethernet modular port adapter provides 10 double-stacked SFP (20 total) cages that support either fiber-optic or copper Gigabit Ethernet transceivers.

Each SFP cage on the Gigabit Ethernet modular port adapter has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated SFP port, as described in Status LEDs section.

The following figure shows an example of the 20-Port Gigabit Ethernet Modular Port Adapter.

Figure 4: 20-Port Gigabit Ethernet Modular Port Adapter
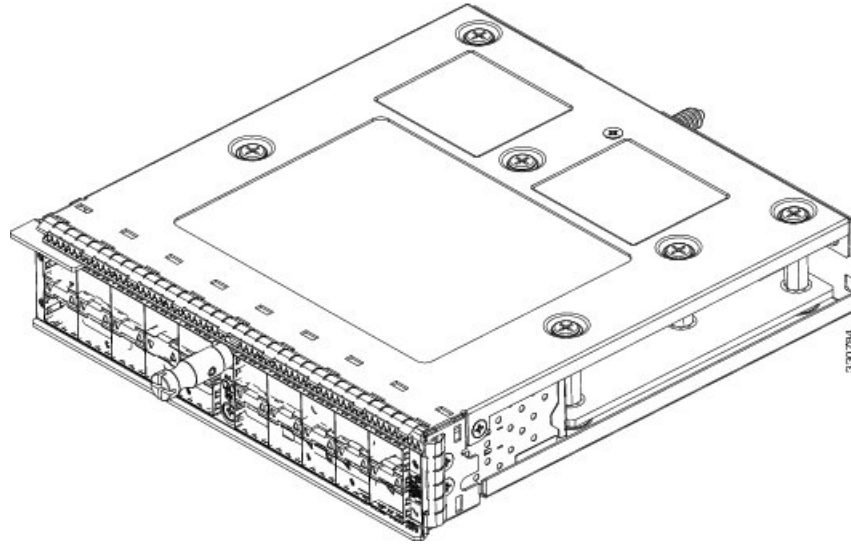
The following table describes the 20-Port Gigabit Ethernet modular port adapter LEDs.

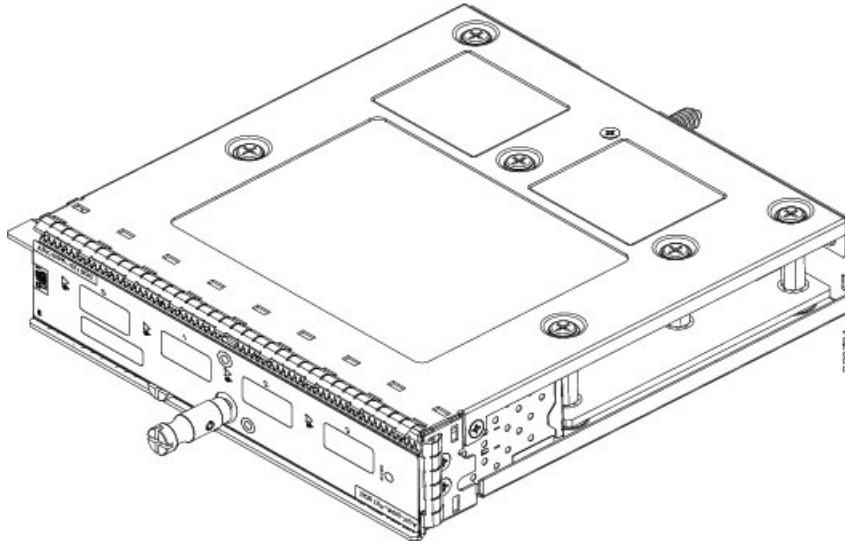Table 1: 20-Port Gigabit Ethernet Modular Port Adapter LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up. The MPA A/L LED will blink green when there is traffic activity.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and modular port adapter is being configured.

4-Port 10 Gigabit Ethernet Modular Port Adapter

The 4-Port 10 Gigabit Ethernet modular port adapter provides four cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps. The four XFP modules can be 10-Gigabit Ethernet multimode or single mode connections.

Each XFP cage on the 4-Port 10 Gigabit Ethernet modular port adapter has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated XFP port, as described in Status LEDs section.

The following figure shows an example of the 4-Port 10 Gigabit Ethernet modular port adapter.

Figure 5: 4-Port 10 Gigabit Ethernet Modular Port Adapter

The following table describes the 4-Port 10 Gigabit Ethernet modular port adapter LEDs.

Table 2: 4-Port 10 Gigabit Ethernet Modular Port Adapter LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up. The MPA A/L LED will blink green when there is traffic activity.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and the modular port adapter is being configured.

2-Port 10 Gigabit Ethernet Modular Port Adapter

The 2-Port 10 Gigabit Ethernet modular port adapter provides two cages for XFP Ethernet optical interface modules that operate at a rate of 10 Gbps. The two XFP modules can be 10-Gigabit Ethernet multimode or single mode connections.

Each XFP cage on the 2-Port 10 Gigabit Ethernet modular port adapter has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated XFP port, as described in Status LEDs section.

The following figure shows an example of the 2-Port 10 Gigabit Ethernet modular port adapter.

Figure 6: 2-Port 10 Gigabit Ethernet Modular Port Adapter

The following table describes the 2-Port 10 Gigabit Ethernet modular port adapter LEDs.

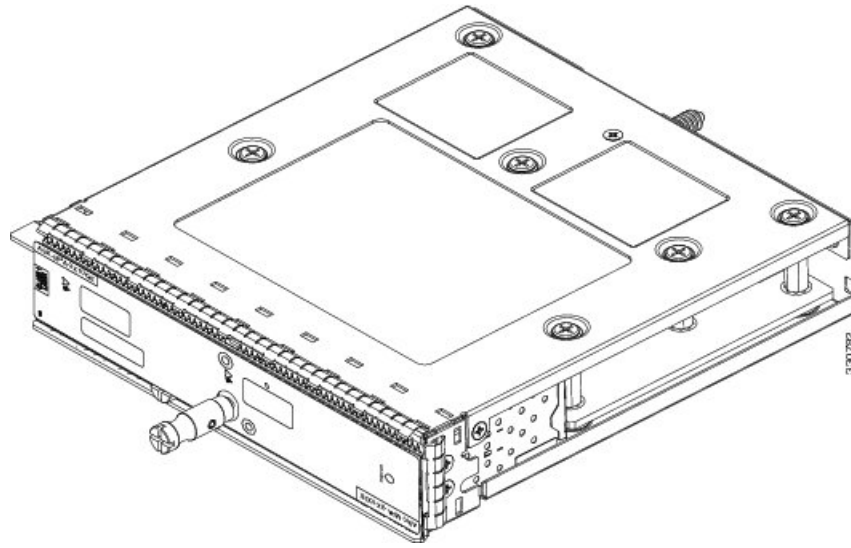Table 3: 2-Port 10 Gigabit Ethernet Modular Port Adapter LEDs

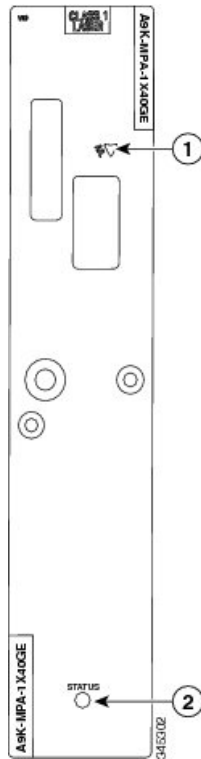| LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up. The MPA A/L LED will blink green when there is traffic activity.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and the modular port adapter is being configured.

1-Port 40 Gigabit Ethernet Modular Port Adapter

The 1-Port 40 Gigabit Ethernet modular port adapter provides a cage for a QSFP+ Ethernet optical interface module that operates at a rate of 40 Gbps.

The QSFP cage on the 1-Port 40 Gigabit Ethernet modular port adapter has an adjacent Link LED visible on the front panel. The Link LED indicates the status of the associated QSFP port, as described in Status LEDs section.

The following figure shows an example of the front panel of the 1-Port 40 Gigabit Ethernet modular port adapter.

Figure 7: 1-Port 40 Gigabit Ethernet Modular Port Adapter

1	A/L (Active/Link) LED	2	STATUS LED

The following table describes the 1-Port 40 Gigabit Ethernet modular port adapter LEDs.

Table 4: 1-Port 40 Gigabit Ethernet Modular Port Adapter LEDs

LED Label	Color	State	Meaning
A/L	Off	Off	Port is not enabled.
	Green	On	Port is enabled and the link is up.
	Amber	On	Port is enabled and the link is down.
STATUS	Off	Off	Modular port adapter power is off.
	Green	On	Modular port adapter is ready and operational.
	Amber	On	Modular port adapter power is on and good, and the modular port adapter is being configured.

Installing and Removing Modular Port Adapters

These sections describe how to install or remove modular port adapters (MPAs) on the Cisco ASR 9001 Router.

Handling Modular Port Adapters (MPAs)

Each modular port adapter (MPA) circuit board is mounted on a metal carrier, and is sensitive to electrostatic discharge (ESD) damage. Before you begin installation, refer to the Cisco ASR 9000 Series Aggregation Services Router Ethernet Line Card Installation Guide for a list of parts and tools required for installation.

⚠

Caution Always handle the modular port adapter (MPA) by the carrier edges and handle; never touch the modular port adapter (MPA) components or connector pins. (see the following figure.)

When a bay is not in use, a blank ASR 9000 MPA Slot Filler (A9K-MPA-FILR) must fill the empty bay to allow the router to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the installed modules. If you plan to install a modular port adapter (MPA) in a bay that is not in use, you must first remove the blank.

Figure 8: Handling a Modular Port Adapter (MPA)
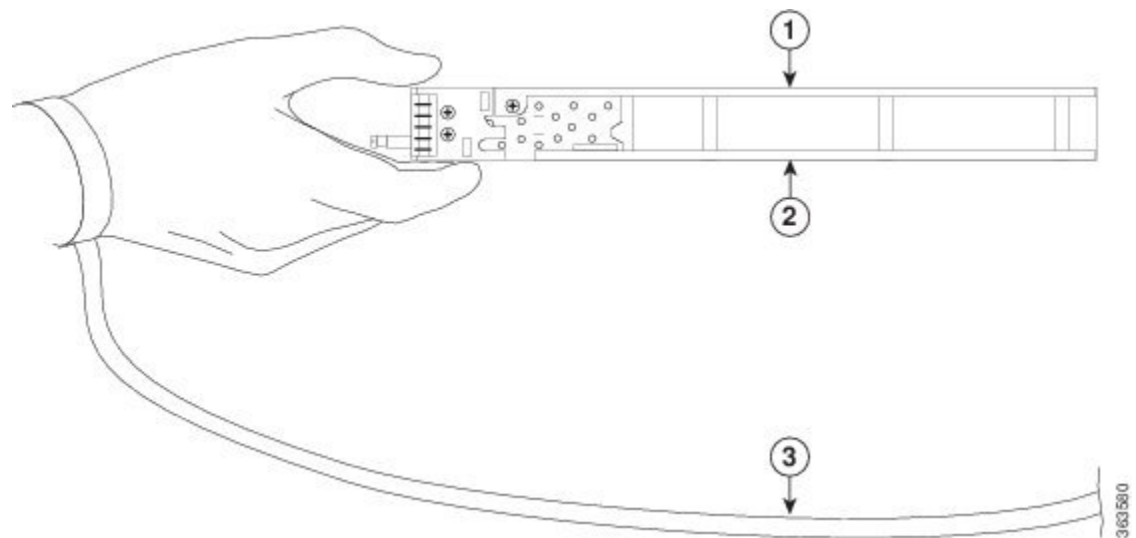
Online Insertion and Removal

✎

Note Installing an MPA in the Cisco ASR 9001 router will cause brief traffic interruption on the fixed ports due to the network processor (NP) initializing.

Cisco ASR 9001 router modular port adapters (MPAs) support online insertion and removal (OIR).

Modular port adapters (MPAs) support three types of OIR:

- Soft OIR

   Soft OIR uses the IOS XR **hw-module subslot 0/0/1 reload**, **hw-module subslot 0/0/1 shutdown**, and **no hw-module subslot 0/0/1 shutdown** commands to complete online insertion and removal. Refer to the Hardware Redundancy and Node Administration Commands on the Cisco ASR 9000 Series Router chapter of the Cisco ASR 9000 Series Aggregation Services Router System Management Command Reference online for command syntax.

- Managed OIR

  A managed online insertion and removal of Modular port adapters (MPAs) is comprised of these steps:

  1. Shut down the MPA with the **hw-module subslot 0/0/1 shutdown** command.

  2. Confirm that the LEDs have gone from green to off.

  3. Execute the **do show plat** command to verify that the MPA to be removed is in the disabled state.

  4. Physically remove the MPA to be replaced.

  5. Physically insert the replacement MPA.

  6. Return the MPA to the up state with the **no hw-module subslot 0/0/1 shutdown** command.

- Hard OIR

  Hard OIR is the physical online insertion and removal of Modular port adapters (MPAs) without software commands. Four types of hard OIR are supported:

  If the bay is empty when the Cisco ASR 9001 router modular line card (MLC) boots you can do the following:

  - Insert a 20 GE MPA

  - Remove and then insert a replacement 20 GE MPA

  If the MLC boots with a 20 GE MPA in the bay you can remove and then insert a replacement 20 GE MPA

  If the MLC boots with a 4 10-GE MPA in the bay you can remove and then insert a replacement 4 10-GE MPA

  If the MLC boots with a 2 10-GE MPA in the bay you can remove and then insert a replacement 2 10-GE MPA

  Note   Only replacement with same types of MPA is supported by Managed OIR and Hard OIR. An empty bay during the Cisco ASR 9001 Router modular line card (MLC) bootup defaults to 20 GE MPA mode.

Modular Port Adapter (MPA) Installation and Removal

This section provides step-by-step instructions for removing and installing a modular port adapter (MPA).

Caution   When performing these procedures, wear a grounding wrist strap to avoid ESD damage to the modular port adapter (MPA). Some platforms have an ESD connector for attaching the wrist strap. Do not directly touch the midplane or backplane with your hand or any metal tool, or you could shock yourself.

To remove and install a modular port adapter (MPA), perform these steps:

Procedure

Step 1 To insert the MPA, carefully slide the MPA all the way until it stops.

Note The modular port adapter (MPA) will slide easily into the slot if it is properly aligned on the tracks. If MPA does not slide easily, do NOT force it. Remove the MPA and reposition it, paying close attention to engaging it on the tracks.

Step 2 To fully seat the MPA, use a number 2 Phillips screwdriver to tighten the jackscrew on the MPA.

Note Avoid over torquing the modular port adapter (MPA) jackscrew when installing the MPA. Tighten the jackscrew on the MPA to a torque of 17 +/-1 inch-pound. Do not use a power screwdriver to tighten the MPA jackscrew.

Step 3 To remove the MPA, use a number 2 Phillips screwdriver to loosen the lock screw on the MPA. Make sure that the cables are disconnected from the MPA first.

Step 4 Grasp the MPA and pull the MPA from the slot.

Optical Device Installation and Removal

Any contamination of the fiber connection can cause failure of the component or failure of the whole system. A particle that partially or completely blocks the core generates strong back reflections, which can cause instability in the laser system. Inspection, cleaning, and reinspection are critical steps to take before making fiber-optic connections.

Cleaning Optical Devices

See the Inspection and Cleaning Procedures for Fiber-Optic Connections document for information on cleaning optical devices.

Checking the Installation

This section describes the procedures you can use to verify the modular port adapter (MPA) installation, and includes information on these topics:

Verifying the Installation

This section describes how to verify the modular port adapter (MPA) installation by observing the MPA LED states.

When the system has reinitialized all interfaces, the MPA STATUS LEDs should be on (green). The port LEDs (C/A and A/L) may be on (green), depending on your connections and configuration.

To verify that a MPA is installed correctly:

Procedure

Step 1 Observe the console display messages and verify that the system discovers the modular line card (MLC), while the system reinitializes each interface, thus:

- As the MPA is initialized, the STATUS LED will first be amber, indicating that power is on. When the modular port adapter card (MPA) is active, the STATUS LED will illuminate green.

Step 2   When the MPA STATUS LEDs are green, all associated interfaces are configurable.

- If a MPA is replaced with a module of the same type (as in an OIR or hardware swap), the previous configuration is reinstated when the MPA becomes active.
- If a MPA was not previously installed in the same slot or subslot, then the configuration for all associated interfaces is empty.

Note   New interfaces are not made available until you configure them.

Step 3   If the modular port adapters (MPAs) do not become active within three minutes, refer to the system console messages. If there is no indication that a field-programmable device (FPD) upgrade is underway, see Troubleshooting the Installation section.

Using show Commands to Verify Modular Port Adapter (MPA) Status

This procedure uses **show** commands to verify that the new modular port adapters (MPAs) are configured and operating correctly.

To verify the MPA status:

Procedure

Step 1   Use the **show running-config** command to display the system configuration. Verify that the configuration includes the new MPA interfaces.

Step 2   Use the **show diag** command to display information about the installed modular line cards (MLCs).

Step 3   Use the **show hw-module fpd location** *<rack/slot/subslot>* command to verify the FPD version information of the MPAs installed in the system.

Note   If a modular port adapter (MPA) does not meet the minimum version required, the FPD may need to be updated. See the Cisco ASR 9000 Series Aggregation Services Router System Management Configuration Guide for instructions. If the update fails, the failing module is powered down and an error message displays on the system console

Step 4   Use the **show platform** command to check the state of all boards in the chassis, including the MLC and the MPAs.

The MPA state should be "OK" and the MLC state should be "IOS XR RUN" in the **show platform** command output.

Step 5   Use the **show version** command to obtain software version information for the installed MLCs as well as interfaces available.

Using show Commands to Display Modular Port Adapter (MPA) Information

The following table describes the show commands you can use to display modular port adapter (MPA) information.

Table 5: show Commands to Display Modular Port Adapter (MPA) Information

Command	Type of Information Provided
show running-config	Router's running configuration and interfaces available in the system.
show platform	Router's installed linecard and modular port adapter (MPA) type, slot, and state information.
show diag	Modular port adapter (MPA) type in that slot, number of ports, hardware revision, part number, and EEPROM contents.
show hw-module fpd location *<rack/slot/subslot>*	FPD version information of modular port adapters (MPAs) in the system.
show version	Cisco IOS XR software version, names and sources of configuration files, and boot images.

Table 6: show Commands to Display Modular Port Adapter (MPA) Information

Command	Type of Information Provided	Example
show controllers *type rack/slot/subslot/port*	Network link status, register contents, and controller chip errors.	**show controllers GigabitEthernet 0/0/1/1**
show interfaces *type rack/slot/subslot/port*	Line status and data link protocol status for a particular modular port adapter (MPA) port. Statistics about data traffic sent and received by the port.	**show interfaces GigabitEthernet 0/0/1/1**
show diag *rack/slot/subslot/*	Modular port adapter (MPA) type in that slot, number of ports, hardware revision, part number, and EEPROM contents.	**show diag 0/0/1**
show version	Cisco IOS XR software version and boot images.	**show version**

Using the ping Command to Verify Network Connectivity

The **ping** command allows you to verify whether a modular port adapter (MPA) port is functioning properly and to check the path between a specific port and connected devices at various locations on the network.

After you verify that the system and the modular line card (MLC) have booted successfully and are operational, you can use the **ping** command to verify the status of the MPA ports. See the Cisco ASR 9000 Series Aggregation Services Router Getting Started Guide and the Cisco ASR 9000 Series Aggregation Services Router Interface and Hardware Component Configuration Guide for more information on bringing up and configuring the Cisco ASR 9000 Series Router and the Cisco ASR 9000 A9K-MOD80G-H.

The **ping** command sends an echo request out to a remote device at an IP address that you specify. After sending a series of signals, the command waits a specified time for the remote device to echo the signals. Each returned signal is displayed as an exclamation point (!) on the console terminal; each signal that is not returned before the specified timeout is displayed as a period (.). A series of exclamation points (!!!!!) indicates a good connection; a series of periods (.....) or the messages [timed out] or [failed] indicate that the connection failed.

This is an example of a successful **ping** command to a remote server with the IP address 10.1.1.60:

```
Router# ping 10.1.1.60
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 10.1.1.60, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/15/64 ms
Router#
```

If the connection fails, verify that you have the correct IP address for the destination device and that the destination device is active (powered on), and then repeat the **ping** command.

Installing and Removing Transceiver Modules

For information on installing and removing transceiver modules, see the Cisco ASR 9000 Series Aggregation Services Router Ethernet Line Card Installation Guide.

Cable Management

The Cisco ASR 9903 Router, Cisco ASR 9901 Router, and Cisco ASR 9001 Router includes a cable-management system that organizes the interface cables entering and exiting the router, keeping them out of the way, and free of sharp bends.

⚠️

Caution   Excessive bending of interface cables can damage the cables.

The cable-management system consists of these separate components:

- A cable-management bracket—Cisco ASR 9903. You can also connect a filter to the cable-management.

- A cable-management bracket—Cisco ASR 9901

- A cable-management bracket—Cisco ASR 9001

- A cable-management tray—Cisco ASR 9001

Cable Management Bracket - Cisco ASR 9903

A cable management bracket is attached to the rack mount bracket on the Cisco ASR 9903 Router.

Figure 9: Cisco ASR 9903 Router Cable Management Bracket


> ✎ **Note**   When shipped, the cable management bracket is not attached to the router chassis. Attach the cable-management bracket to the chassis before you insert the cables into the ports.

Installing a Cable Management Bracket

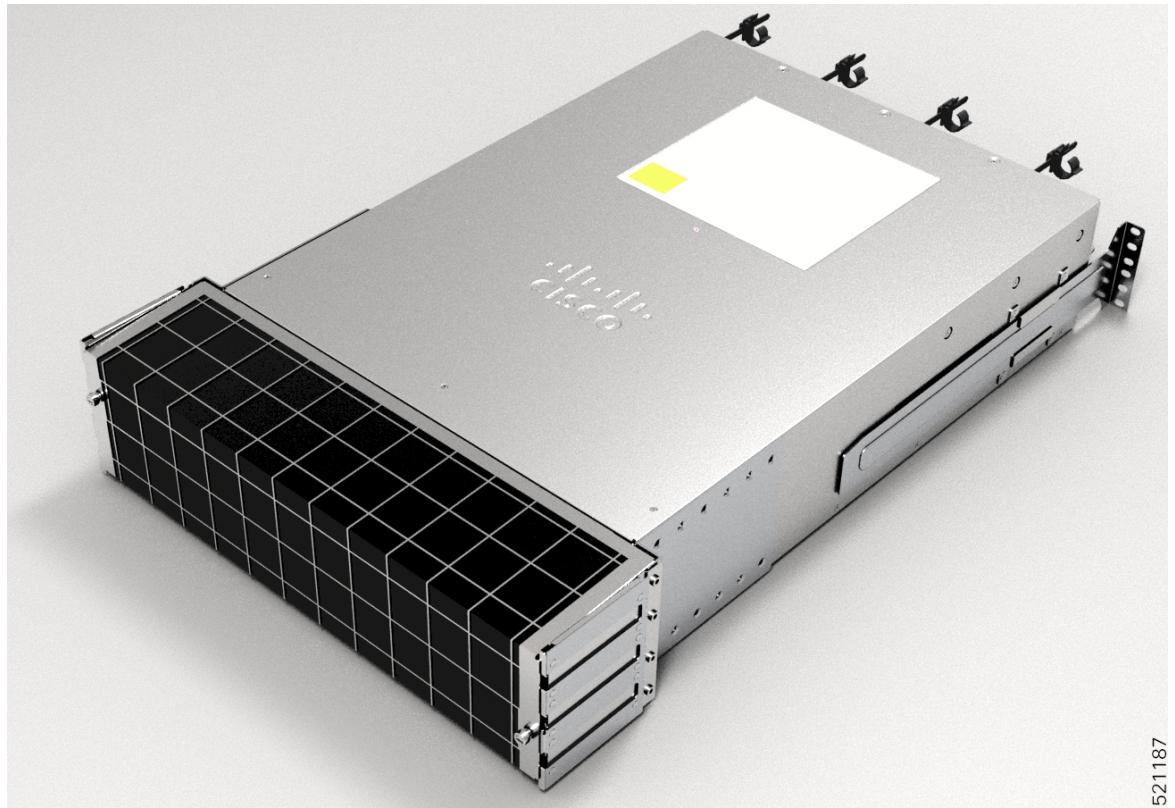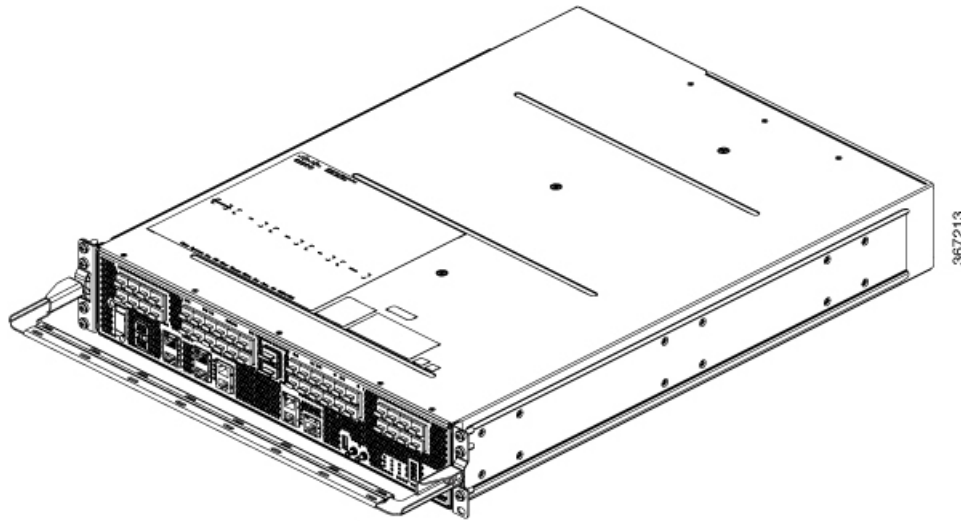To install a cable-management bracket, follow these steps:

1. Attach an ESD-preventive wrist or ankle strap, and follow its instructions for use.

2. Position the cable management bracket over the center holes of the chassis rack mount brackets. See the following figure.

Figure 10: Cable-Management Bracket Installation and Removal
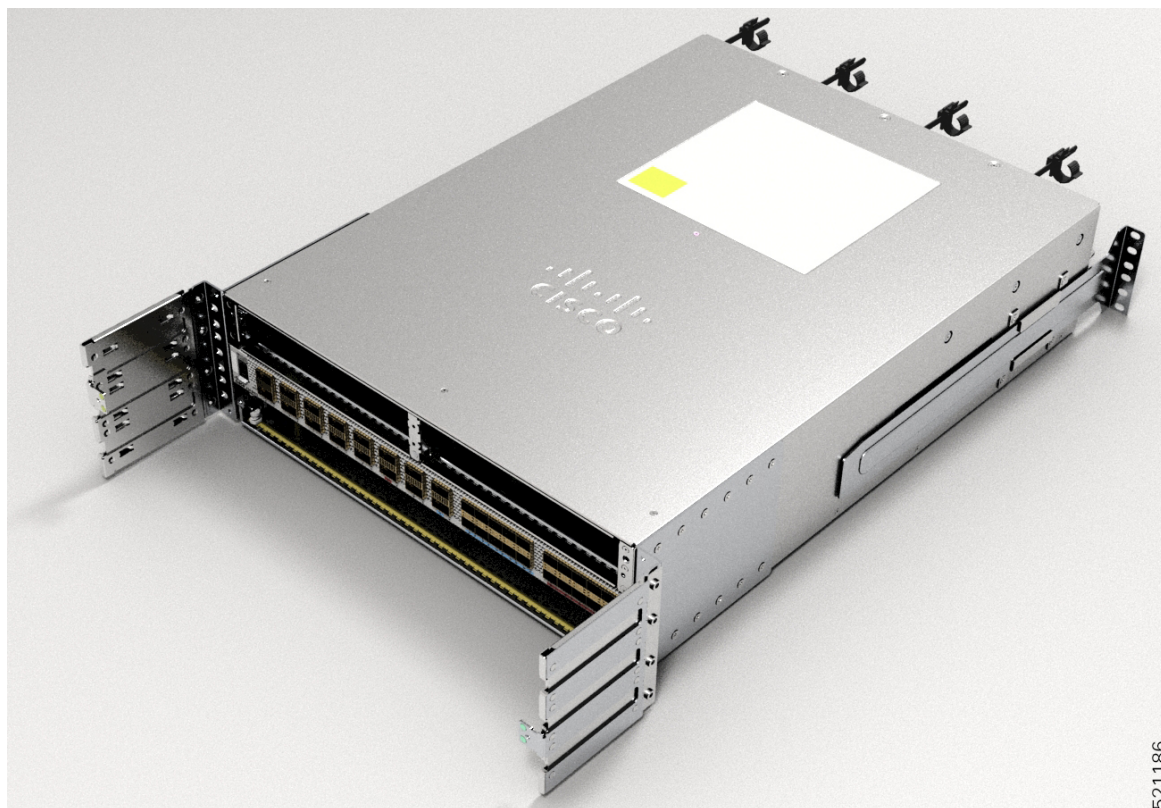
Figure 11: Cable-Management Bracket with Filter

3. Insert and tighten the provided screws to secure the bracket.

4. Install pluggables and fiber connectors, and connect all the cables to the intended ports.

5. Attach cables and fibers to the cable management bracket in an organized manner.

⚠️

Caution   Ensure the interface cables do not have any kinks or sharp bends. This can destroy or degrade the ability of the optical fiber to propagate the signal-encoded beam of light accurately from one end of the cable to the other. Always allow adequate strain relief for the interface cable.

Removing a Cable-Management Bracket

To remove a cable-management bracket, follow these steps:

1. Attach an ESD-preventive wrist or ankle strap, and follow its instructions for use.

2. Note the current interface cable connections to the ports on the RP.

3. Starting with the interface cable for the bottom port on the RP, disconnect the cable from the RP interface.

4. Repeat Step 3 for all remaining interface cables, proceeding upwards from the bottom ports.

5. Loosen the installation screws on each end of the cable-management bracket, and remove the bracket from the chassis.

Cable Management Bracket—Cisco ASR 9901

A cable management bracket is attached to the rack mount bracket on the Cisco ASR 9901 Router.

Figure 12: Cisco ASR 9901 Router Cable Management Bracket

Note   When shipped, the cable-management bracket is not attached to the router chassis. You must attach the cable-management bracket to the chassis before you insert the cables into the ports.
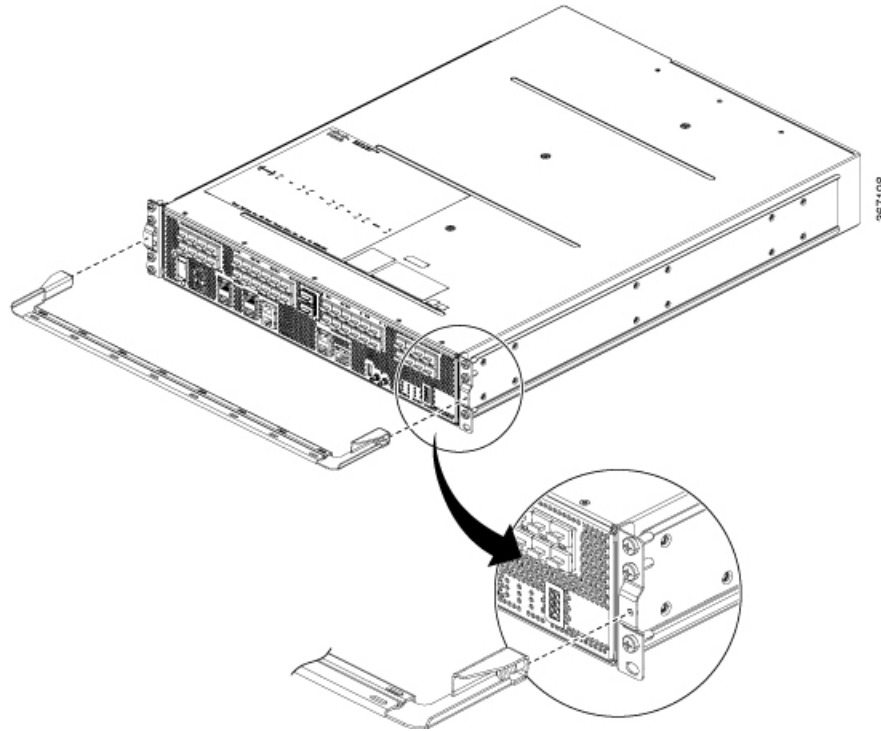
Installing a Cable Management Bracket

To install a cable-management bracket, follow these steps:

Procedure

Step 1   Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

Step 2   Position the cable management bracket over the center holes of the chassis rack mount brackets (see the following figure).

Figure 13: Cable-Management Bracket Installation and Removal

Step 3	Insert and tighten the provided screws to secure the bracket.
Step 4	Install pluggables and fiber connectors, and connect all the cables to intended ports.
Step 5	Attach cables and fibers to the cable management bracket in an organized manner.

> **Caution** Make sure the interface cables do not have any kinks or sharp bends, which can destroy or degrade the ability of the optical fiber to propagate the signal-encoded beam of light accurately from one end of the cable to the other. Always allow adequate strain relief in the interface cable.

Removing a Cable-Management Bracket

To remove a cable-management bracket, follow these steps:

Procedure

Step 1	Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
Step 2	Note the current interface cable connections to the ports on the RP.
Step 3	Starting with the interface cable for the bottom port on the RP, disconnect the cable from the RP interface.
Step 4	Repeat Step 3 for all remaining interface cables, proceeding from the bottom ports upward, then proceed to Step 5.

Step 5   Loosen the installation screws on each end of the cable-management bracket and remove the bracket from the chassis (see the above figure).

Cable Management Bracket—Cisco ASR 9001

The Cisco ASR 9001 Router provides a cable management bracket at the middle of the router chassis. The following figure shows a typical cable routing for the Cisco ASR 9001 Router.

*Figure 14: Example Cable Routing through Cisco ASR 9001 Router Cable Management Brackets*
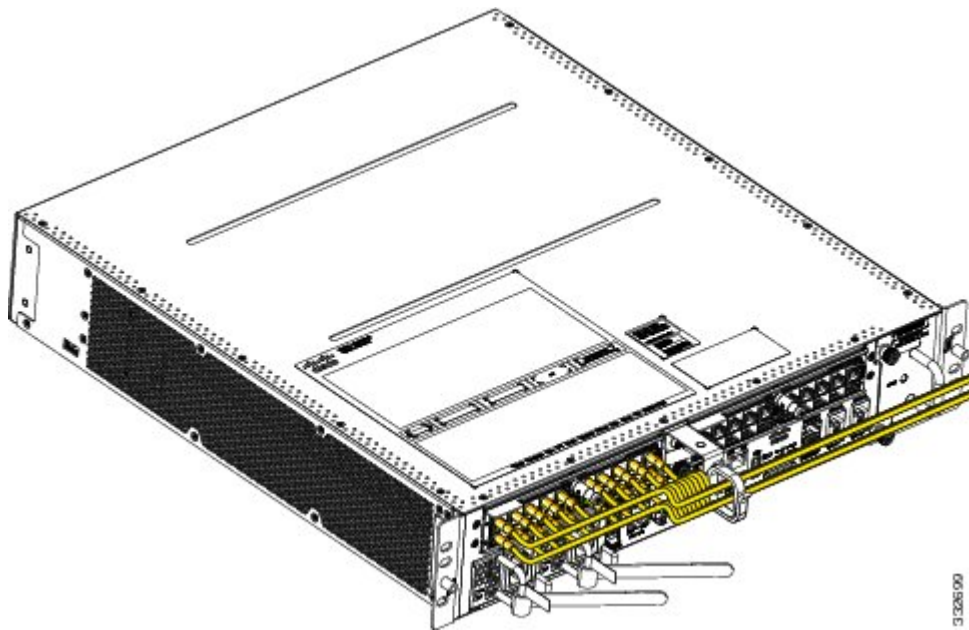
Note   When shipped, the cable-management bracket is not attached to the router chassis. You must attach the cable-management bracket to the chassis before you insert the cables into the ports.

Installing a Cable Management Bracket

To install a cable-management bracket, follow these steps:

Procedure

Step 1   Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

Step 2   Position the cable-management bracket over the front of the chassis front panel.

Figure 15: Cable-Management Bracket Installation and Removal
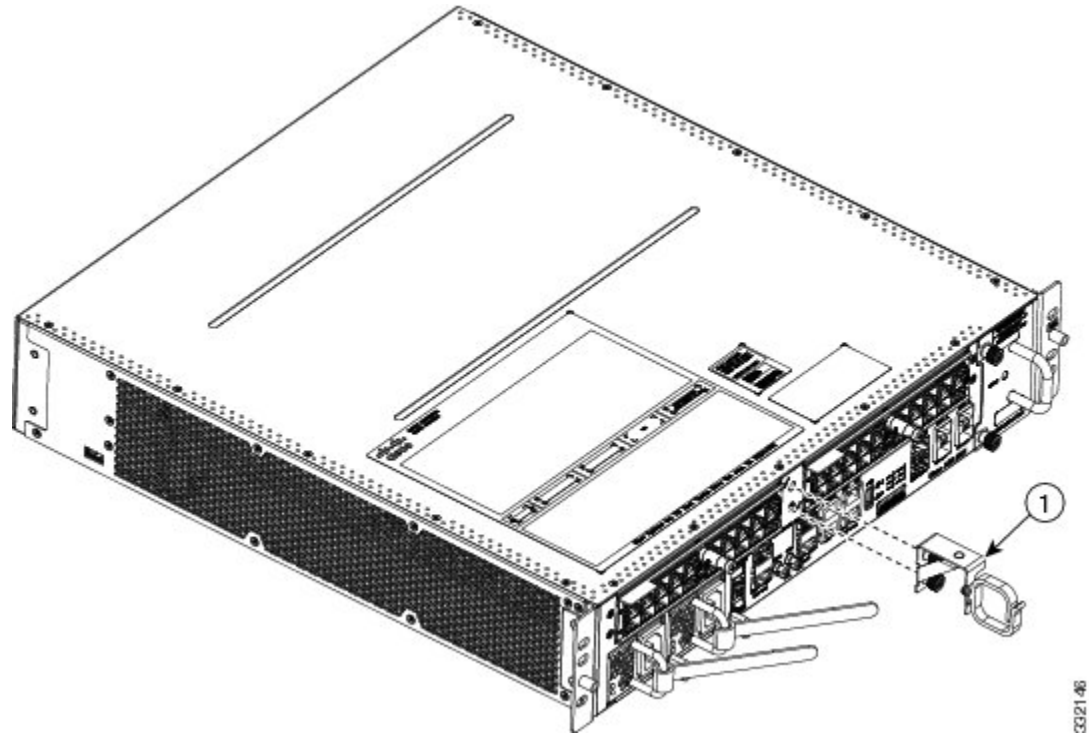
1	Cable-Management Bracket

Step 3 Insert and tighten the captive screw(s) to secure the bracket.

Step 4 Connect all the cables to the intended ports and pass them through the cable management bracket in an organized manner.

Removing a Cable-Management Bracket

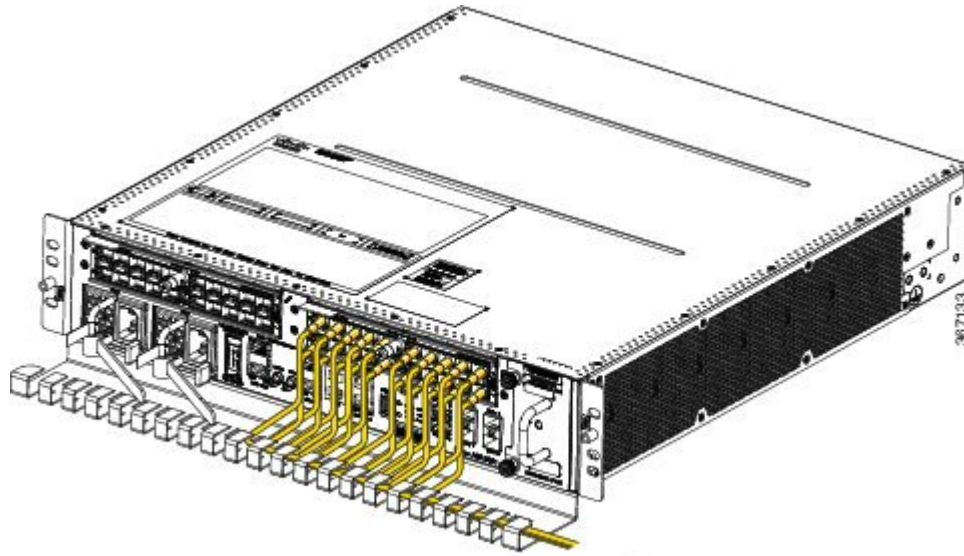To remove a cable-management bracket, follow these steps:

Procedure

Step 1 Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

Step 2 Note the current interface cable connections to the ports on the RP.

Step 3 Starting with the interface cable for the bottom port on the RP, disconnect the cable from the RP interface.

Step 4 Repeat Step 3 for all remaining interface cables, proceeding from the bottom ports upward, then proceed to Step 5.

Step 5 Loosen the captive installation screw on the cable-management bracket and remove the bracket from the chassis (see the above figure).

Cable Management Tray—Cisco ASR 9001

A cable-management tray is mounted at the bottom of the Cisco ASR 9001 Router chassis for routing interface cables to the RP. The following figure shows a typical cable routing through the cable-management tray.

Figure 16: Example Cable Routing through the Cisco ASR 9001 Router Cable Management Tray
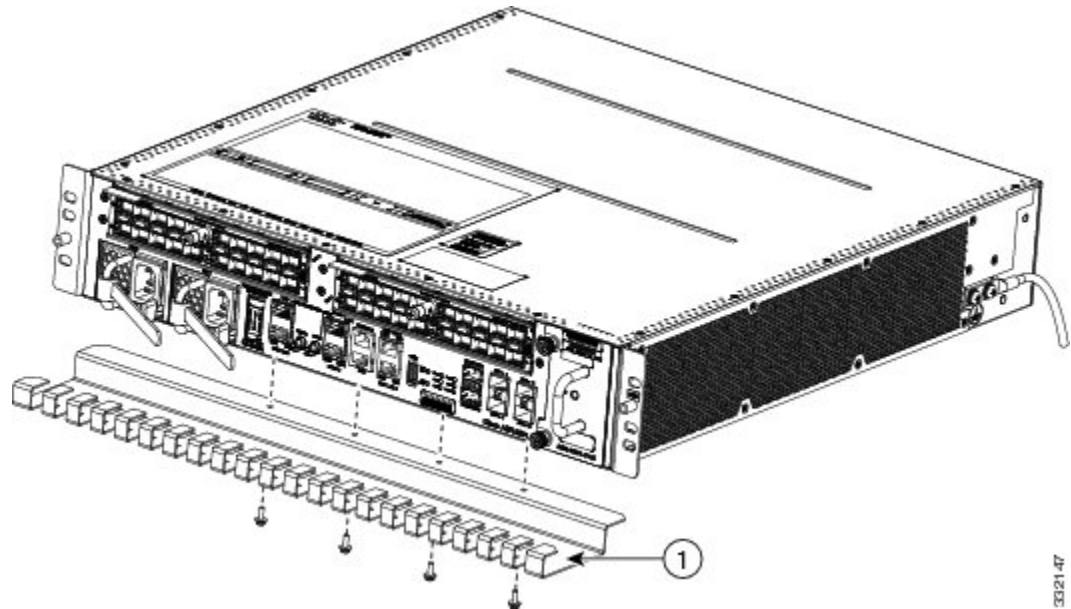

Installing a Cable Management Tray

To install a cable-management tray, follow these steps:

Procedure

Step 1   Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

Step 2   Position the cable-management tray at the bottom of the chassis front panel.

Figure 17: Cable-Management Tray Installation and Removal

    a. Cable-Management Tray

Step 3   Insert and tighten the captive screw(s) to secure the tray.

Step 4   Connect all the cables to the intended ports and pass them through the cable management tray in an organized manner.

Removing a Cable-Management Tray

To remove a cable-management tray, follow these steps:

Procedure

Step 1   Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

Step 2   Note the current interface cable connections to the ports on the RP.

Step 3   Starting with the interface cable for the bottom port on the RP, disconnect the cable from the RP interface.

Step 4   Repeat Step 3 for all remaining interface cables, proceeding from the bottom ports upward, then proceed to Step 5.

Step 5   Loosen the captive installation screw on the cable-management tray and remove the tray from the chassis (see the above figure).

Connecting Route Processor Cables

This section describes how to connect cables to the console, auxiliary, and Ethernet ports on the RP. The console and auxiliary ports are both asynchronous serial ports; any devices connected to these ports must be capable of asynchronous transmission. Most modems are asynchronous devices.

The following figure shows an example of an RP with data terminal and modem connections called out.

Figure 18: RP Console and Auxiliary Port Connections
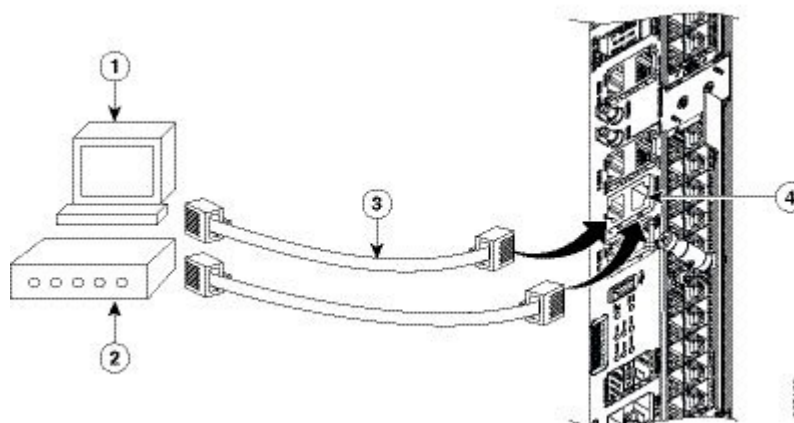
| 1 | Console terminal | 3 | RJ-45 cables |
| 2 | Modem | 4 | Console and Auxiliary port |

⚠

Caution The ports labeled Ethernet, Console, and AUX are safety extra-low voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits.

✎

Note RP cables are not available from Cisco, but they are available from external commercial cable vendors.

✎

Note To comply with the intra-building lightning surge requirements of Telecordia GR-1089-CORE, Issue 6, you must use a shielded cable when connecting to the Ethernet ports. The shielded cable is terminated by shielded connectors on both ends, with the cable shield material tied to both connectors.

Connecting to the RP Console Port

The system console port on the RP is an RJ-45 receptacle for connecting a data terminal to perform the initial configuration of the router. Depending on the cabling pinout on the terminal server end, the console port will

require either a crossover cable or a straight-through RJ-45 cable. See Port Connection Guidelines for additional information about the console port.

See the previous and follow these steps to connect a data terminal to the RP console port:

Procedure

Step 1   Set your terminal to these operational values: 115200 bps, 8 data bits, no parity, 1 stop bits (115200 8N1).

Step 2   Attach the terminal end of the cable to the interface port on the data terminal.

Step 3   Attach the other end of the cable to the RP console port.

Step 4   Power on the data terminal.

Connecting to the RP Auxiliary Port

The auxiliary port on the RP is a RJ-45 receptacle for connecting a modem or other data communication equipment (DCE) device (such as another router) to the RP. The asynchronous auxiliary port supports hardware flow control and modem control. See Port Connection Guidelines for additional information about the auxiliary port.

See the previous figure and follow these steps to connect an asynchronous serial device to the RP auxiliary port:

Procedure

Step 1   Power off the asynchronous serial device.

Step 2   Attach the device end of the cable to the interface port on the asynchronous serial device.

Step 3   Attach the other end of the cable to the RP auxiliary port.

Step 4   Power on the asynchronous serial device.

Connecting to the RP Ethernet Management Ports

To connect cables to the RP management ports, attach STP (Shielded Twisted Pair) cables directly to the MGT LAN 0 and MGT LAN 1 RJ-45 receptacles on the RP. STP cables are required to meet NEBS requirements. See Management LAN Ports Connection Guidelines for additional information about the Ethernet management LAN ports.

Note   RJ-45 cables are not available from Cisco Systems; they are available from external commercial cable vendors. Use cables that comply with EIA/TIA-568 standards.

⚠️

Caution   Ethernet management ports are primarily used as Telnet ports into the Cisco ASR 9001, and for booting or accessing Cisco software images over a network to which an Ethernet port is directly connected. We strongly caution you to consider the security implications of enabling routing functions on these ports.

✎

Note   The Ethernet interfaces on the RP are end-station devices only, not repeaters.

Use this procedure to connect an Ethernet cable to the RP RJ-45 Ethernet receptacle:

Procedure

Step 1   Plug the cable directly into the RJ-45 receptacle.

Step 2   Connect the network end of your RJ-45 cable to a switch, hub, repeater, or other external equipment.

Installing Route Processor Cards into the ASR 9903 Chassis

This section describes how to install the Route Processor (RP) cards into the Cisco ASR 9903 chassis.

Figure 19: Cisco ASR 9903 Route Processor Card

521195

Figure 20: Ejector Parts
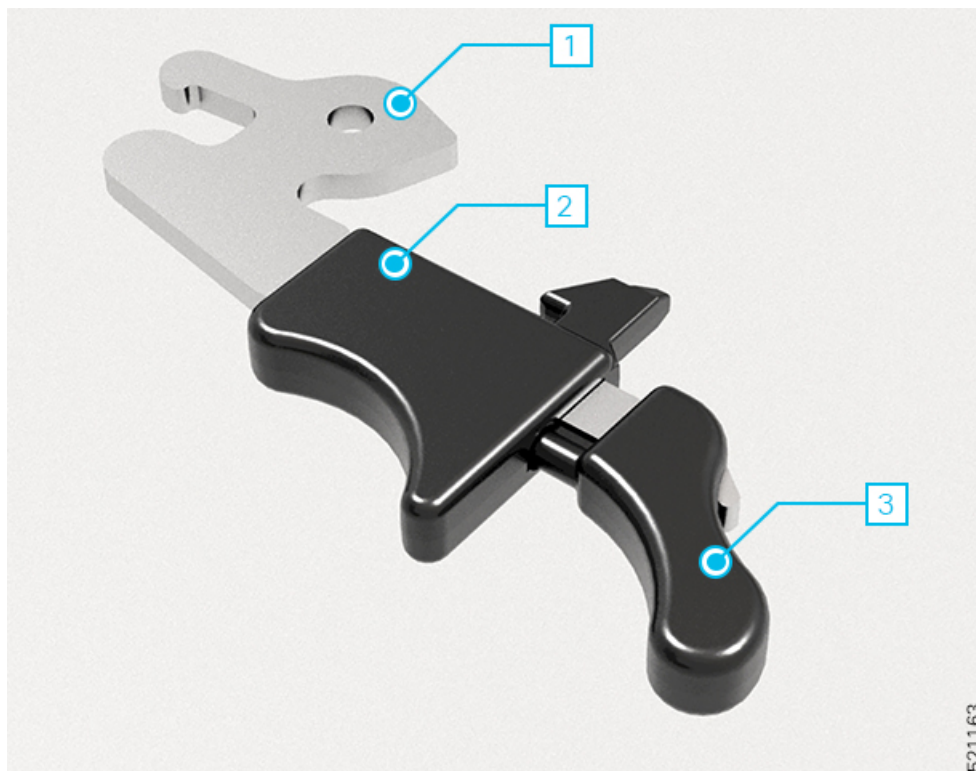
1	Lever
2	Catch
3	Handle

Prerequisite: After removing the RP card from its packaging, check for any damage and check whether the ejector has any bend.

1. Pull the ejector by sliding the catch towards your right using your thumb. The ejector handle starts rotating.
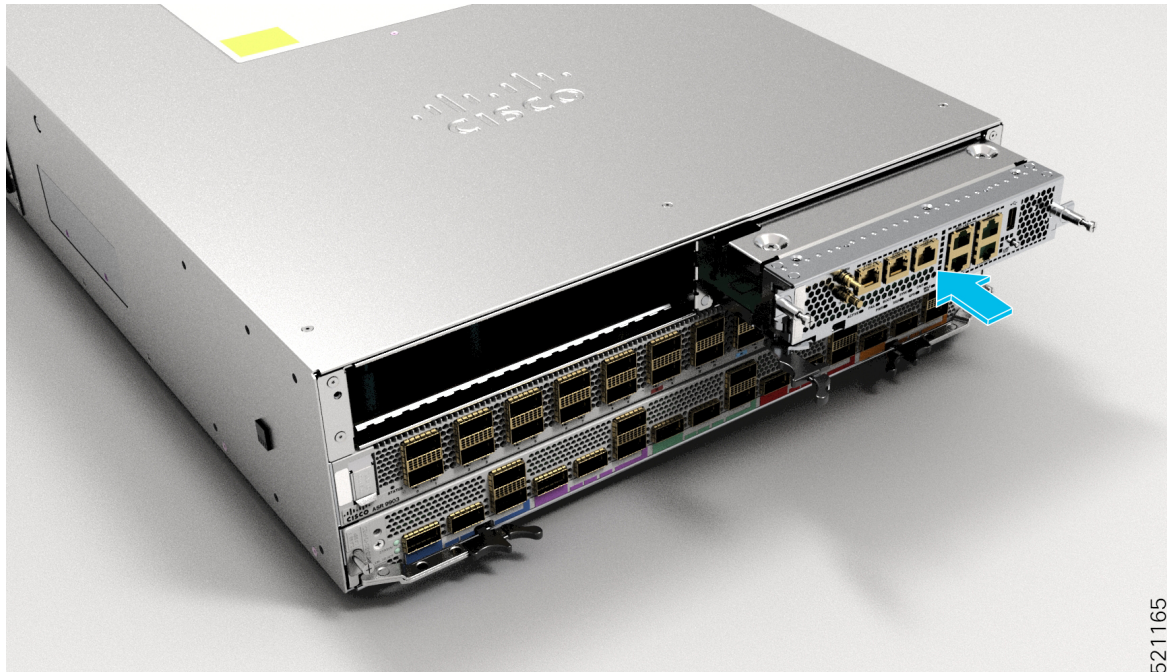
2. Pull the ejector handle until it stops rotating.

Figure 21: Slide the Catch Towards the Right-Side and Pull the Ejector
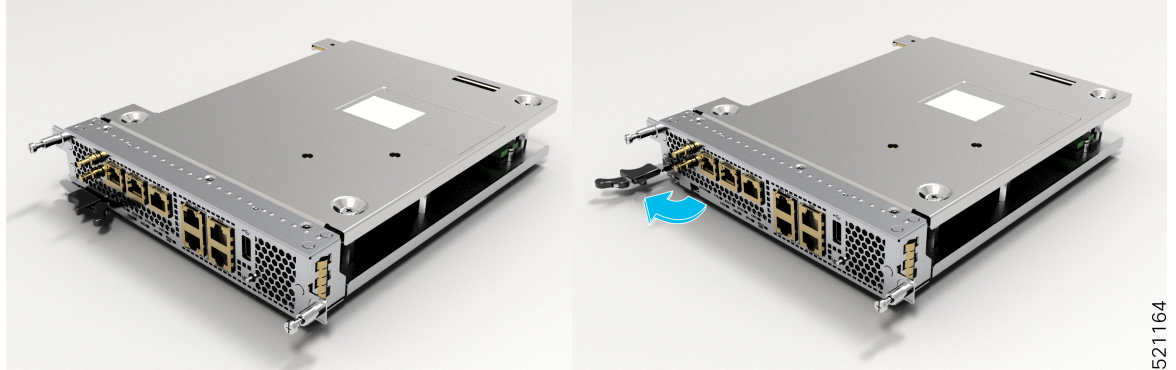
3. Insert the RP card into chassis with ejector in a fully-open position.

Figure 22: Insert RP Card into the Chassis

When you push the RP card further inside, the Ejector meets the chassis as shown in the following figure:

Figure 23: Ejector Meets the Chassis
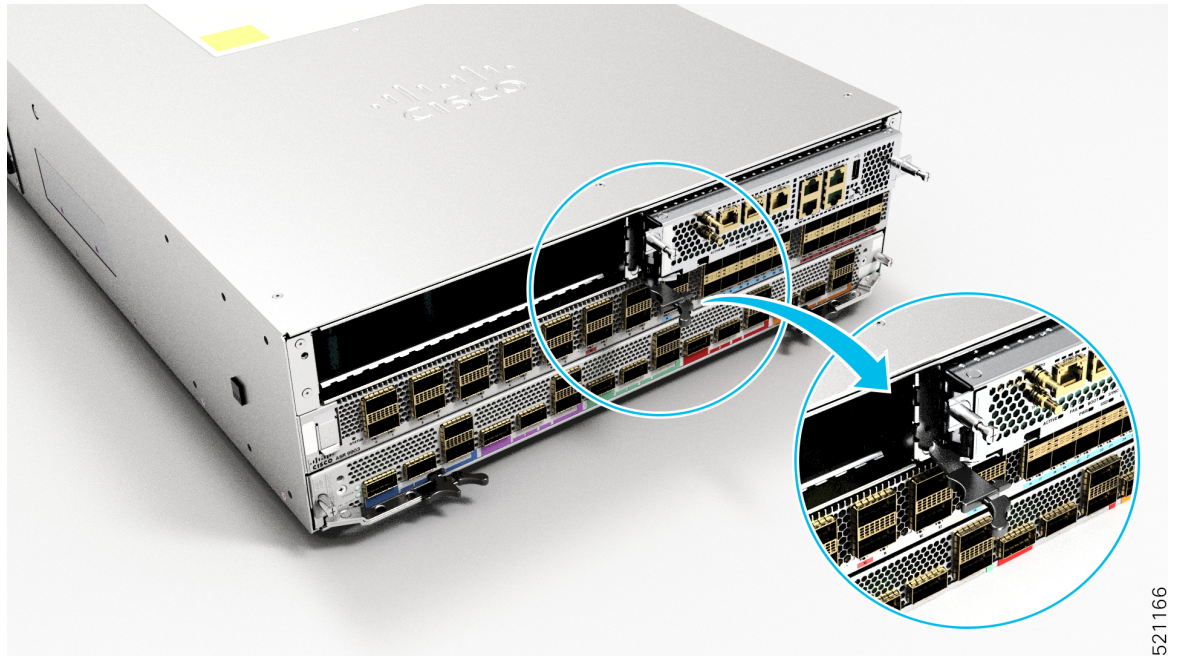
4. In the condition when the ejector meets the chassis, slowly rotate the ejector so that it grabs the chassis, and push the RP card further into the chassis.

Note Operate the ejector only by pushing the handle. Ensure the catch is fully moved and seated in its correct position.

Figure 24: Push the Handle

521168
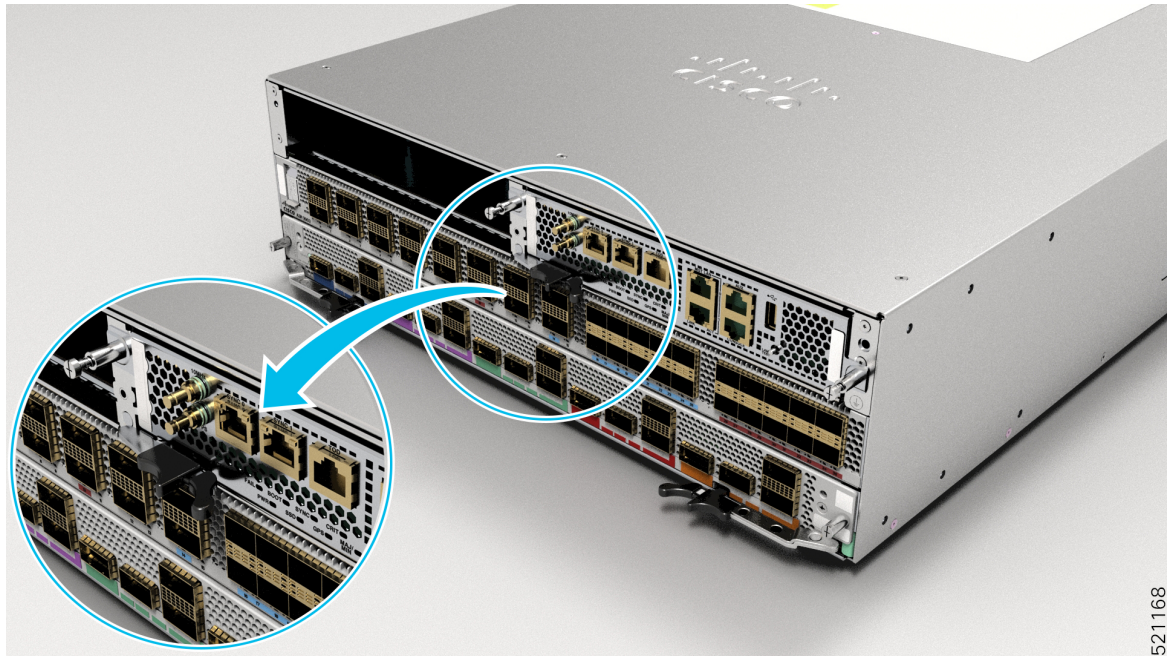
5. Tighten the Captive screw fully to secure the RP inside the chassis.
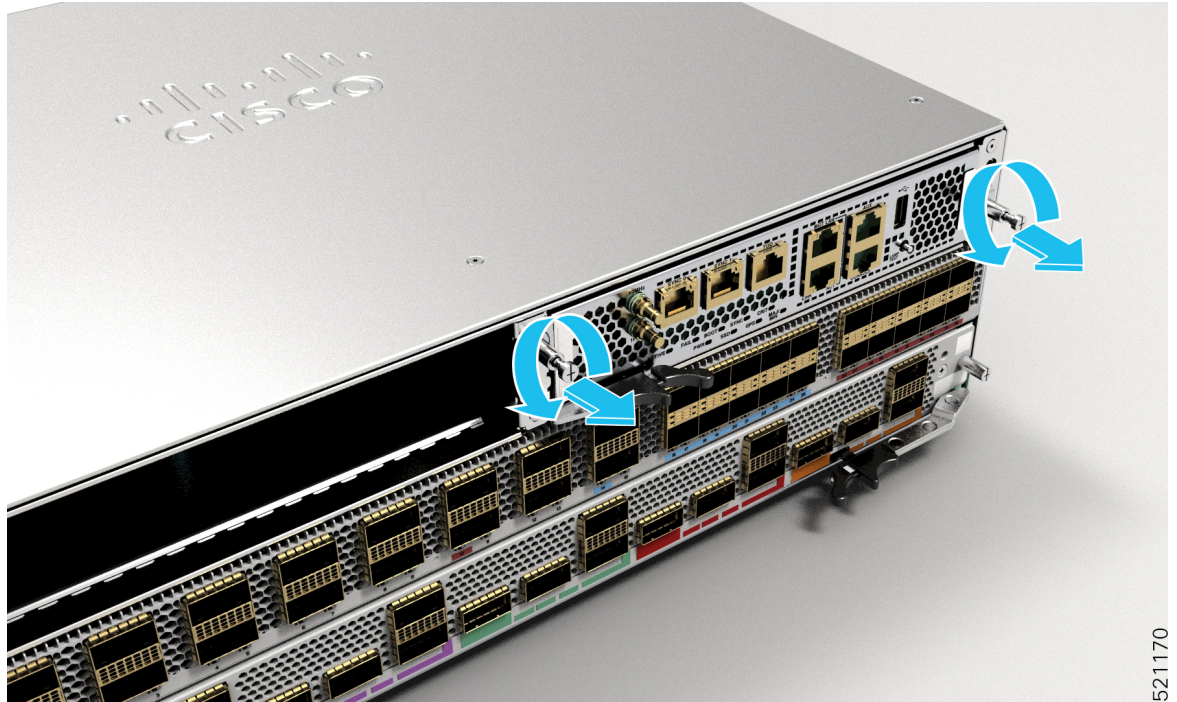
Figure 25: Tighten the Captive Screw

521169
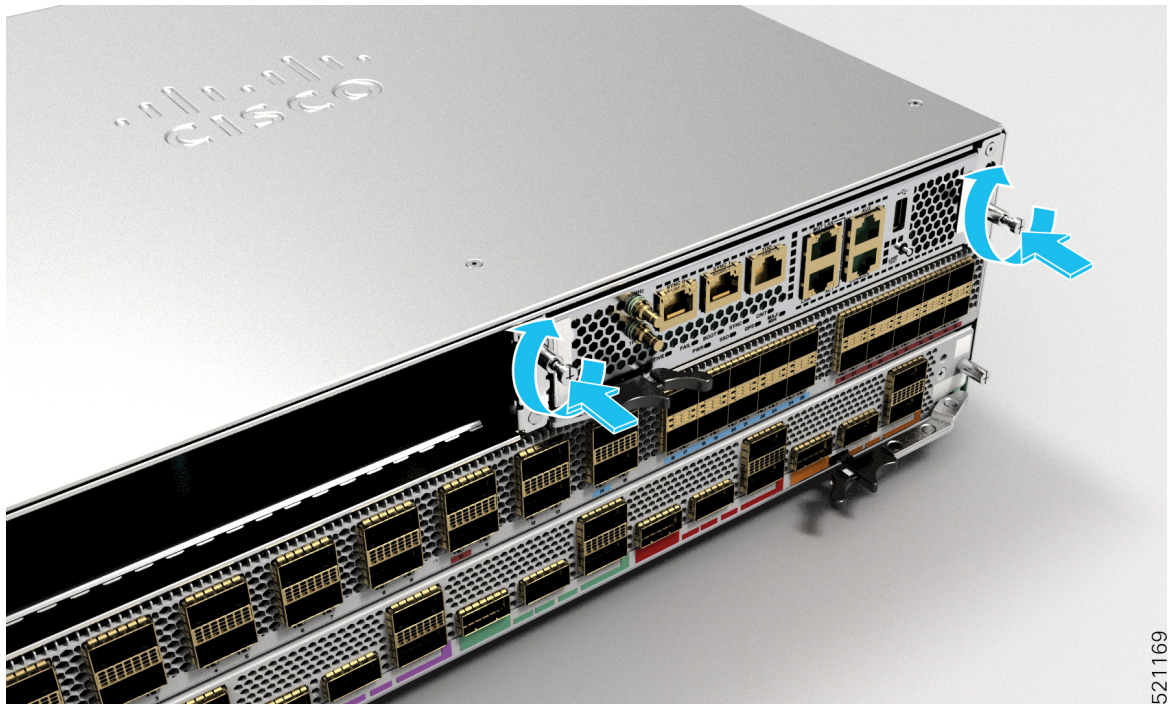
Removing the Route Processor Card from the ASR 9903 Chassis

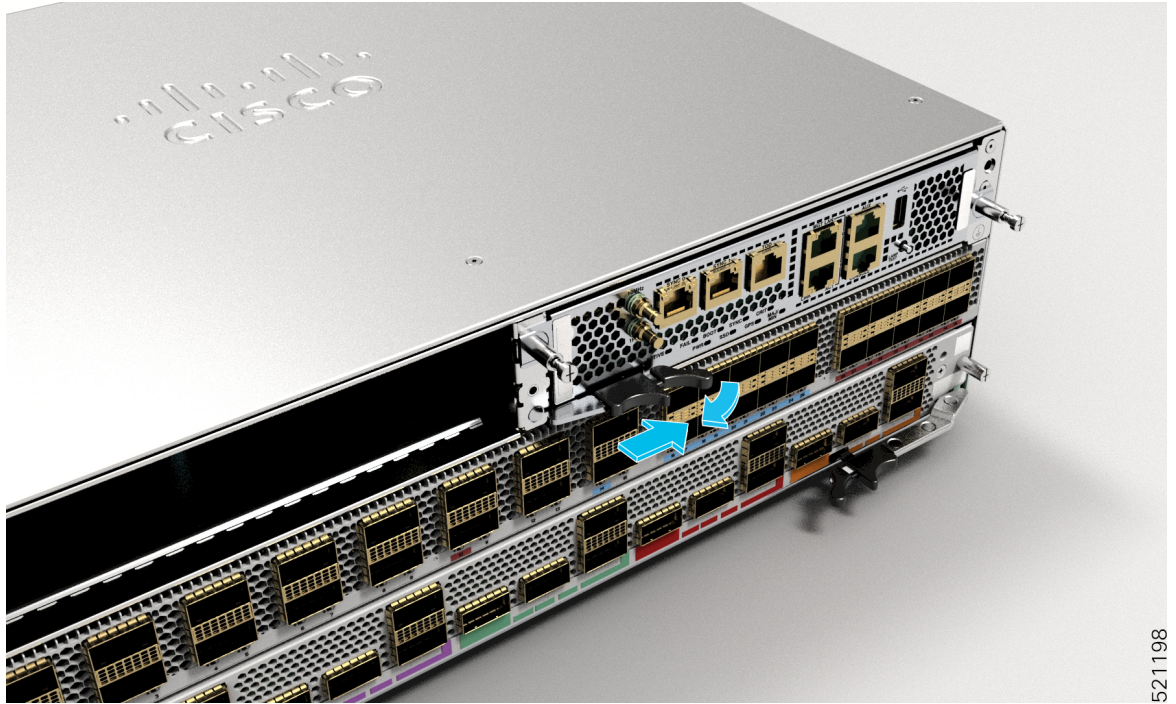This section describes how to remove the RP cards from the Cisco ASR 9903 chassis.

1. Unscrew the captive screws.

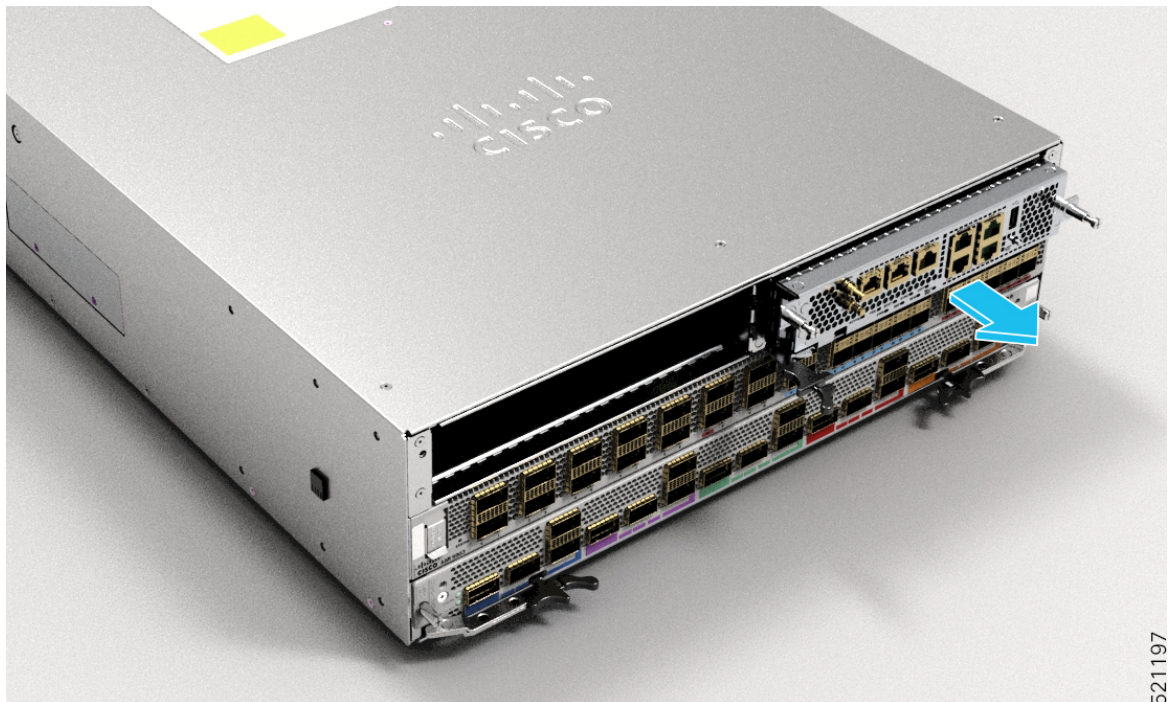   *Figure 26: Unscrew the Captive Screw*

2. Push the catch towards your right using thumb and pull the handle of the ejector.

   The RP card slowly comes out of the chassis.

Figure 27: Pull Ejector Handle

521198

3. Pull the handle until the ejector stops rotating and take the RP card out from the chassis.

Figure 28: Take RP Card Out

521197

4. If you have more RP cards that are installed on the chassis, repeat the same procedure for all the RP cards.

ASR 9903 Port Expansion Cards

The Cisco ASR 9903 Router has a 2T Port Expansion Card (PEC). It is a removable module and is available in the following configurations and different port options:

- 5 x 400G QSFP-DD ports and 15 x 100G QSFP28 ports.

- You can group the ports on 2T PEC into 5-port groups. Each group includes four ports of:
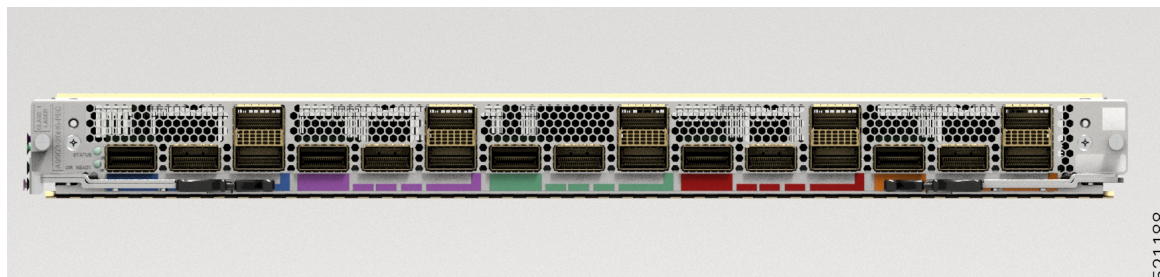   - 1 x QSFP-DD
    - 3 x QSFP28

> **Note** 100G ports support a breakout into 4x25G or 4x10G.

You can configure each group as:

- 1x400G or
- 1x200G + 2x100G or
- 4x100G

Figure 29: ASR 9903 2T Port Expansion Card – Port Layout

Figure 30: ASR 9903 2T Port Expansion Card – Top View

521189

Note You cannot use line cards from other ASR 9000 Series Routers with ASR 9903.

Installing the 2T Port Expansion Card

This section describes how to install the 2T PEC into the Cisco ASR 9903 chassis.

Note Conduct a visual inspection of back plane connectors for no visible damages.

1. Gently insert the PEC into the chassis in proper orientation.

2. Use the ejector handle to leverage final seating of connectors and then lock the ejector handle.

3. Tighten the card securing screws on either ends with proper torque 0.6 N-m.

Note • Do not over torque the screws.

• If you do not completely tighten the screws, the card will not power ON.

4. Wait for the status and OIR LED until they turn to Green from Red.

Removing the 2T Port Expansion Card

This section describes how to remove the 2T PEC from the Cisco ASR 9903 chassis.

1. Unscrew card securing screws on either ends, one after the other.

2. Wait for the OIR LED from Red to Green.

3. Unlatch ejector handle and use handle to leverage the card pushout.

4. Gently pull the card out of the Cisco ASR 9903 chassis.

5. Inspect the backplane connectors for no visible damage.

Connecting Power to the Router

Use one of these procedures to connect power to your router.

⚠️

Caution A router must be operated with all its power modules installed at all times for electromagnetic compatibility (EMC).

Connecting Power to an AC-Powered Router

Use this procedure to connect the AC power cords to the router.

✎

Note Connect each AC power supply to a dedicated power source (branch circuit). Each AC-input power supply operates at a nominal input level of 100 to 240 VAC and requires at least a 15 A service for use in North America and Japan, or a 10 A service for international use. For more information on AC power input levels, see Power Connection Guidelines.

Procedure

Step 1 Check that the power switch at the front of the chassis is set to the OFF position.

Step 2 Check that the circuit breaker assigned to the AC power source you are connecting is set to OFF.

Step 3 Connect the permanent ground connection (central office grounding system) to the NEBS grounding location on the router chassis.

Note To ensure that power remains off while you are performing this procedure, turn the circuit breaker switch in the off (0) position until you are ready to turn it on.

Step 4 Do one of the following:

• **Cisco ASR 9901**: Plug the AC power cord into the receptacle at the rear of the chassis (see the following figure).
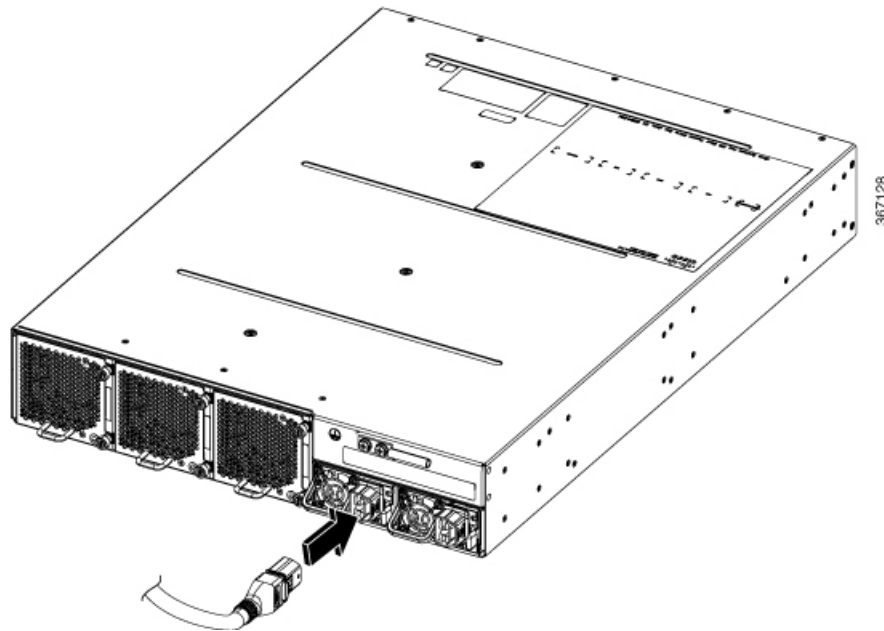
• **Cisco ASR 9001**: Plug the AC power cord into the receptacle at the front of the chassis (see the following figure).
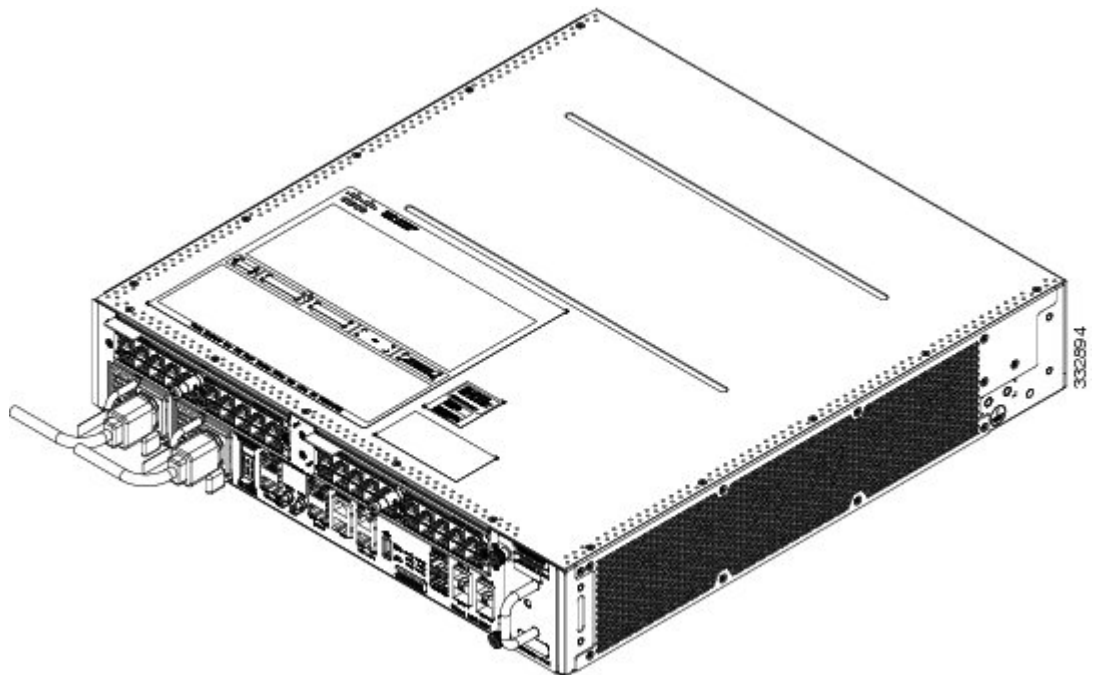
Step 5   Close the cable wrap to secure the AC power cord plug to the power module receptacle.

Step 6   Plug the other end of the AC power cord into the AC source receptacle.

Connecting Power to a DC-Powered Router

This section contains the procedures to connect the DC source power cables to a DC-powered router.

The color coding of source DC power cable leads depends on the color coding of the site DC power source. Because there is no color code standard for source DC wiring, you must be sure that power source cables are connected to the power module with the proper positive (+) and negative (–) polarity:

- In some cases, the source DC cable leads might have a positive (+) or a negative (–) label. This is a relatively safe indication of the polarity, *but you must verify the polarity by measuring the voltage between the DC cable leads* . Be sure that the positive (+) and negative (–) cable leads match the positive (+) and negative (–) labels on the power module when making the measurement.

- Green (or green and yellow) cable typically indicates that it is a ground cable.

⚠

Caution   DC power modules contain reverse voltage protection circuitry to prevent damage to the module if it detects a reverse polarity condition. No damage should occur from reverse polarity, but you should correct a reverse-polarity condition immediately.

✎

Note   The length of the cables depends on the location of your router in relation to the source of DC power. These cables are not available from Cisco Systems. They are available from external commercial cable vendors. For more information on site power and source DC cable requirements, see Power Connection Guidelines.

✎

Note   To ensure that power remains off while you are performing this procedure, follow proper lockout /tagout procedures as defined by your company in accordance with local and national laws.

Use this procedure to connect the DC source power cables to a DC power module:

Procedure

Step 1   Verify that the power switch is set to the OFF position.

Step 2   Connect the DC power cables in the following order (see the figure below):

    a.   Positive cables first.

    b.   Negative cable last.

Step 3   Repeat Step 2 for the other power modules installed in the chassis.

Caution To prevent injury and damage to the equipment, always attach the ground and source DC power cable to power module terminals in the following order: (1) ground to ground, (2) positive (+) to positive (+), (3) negative (–) to negative (–).

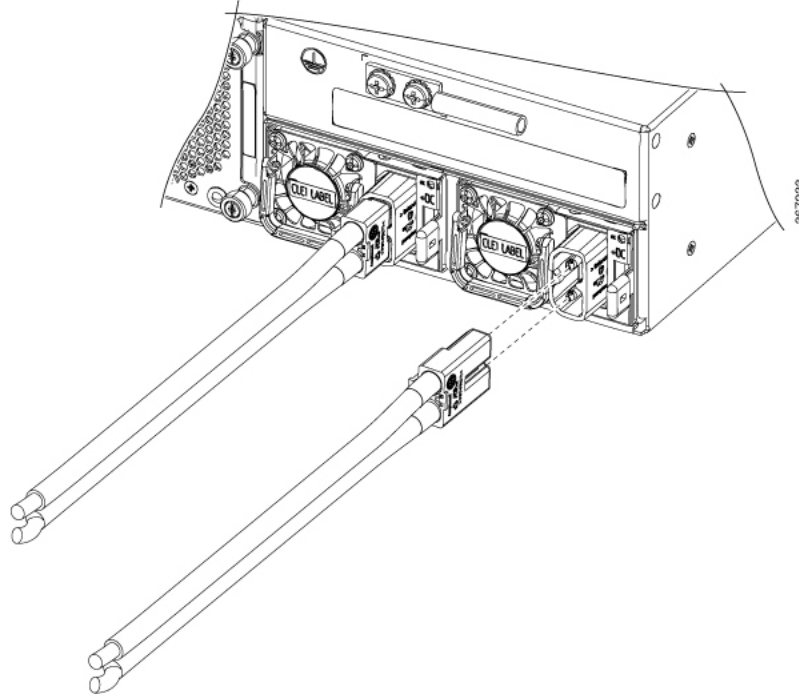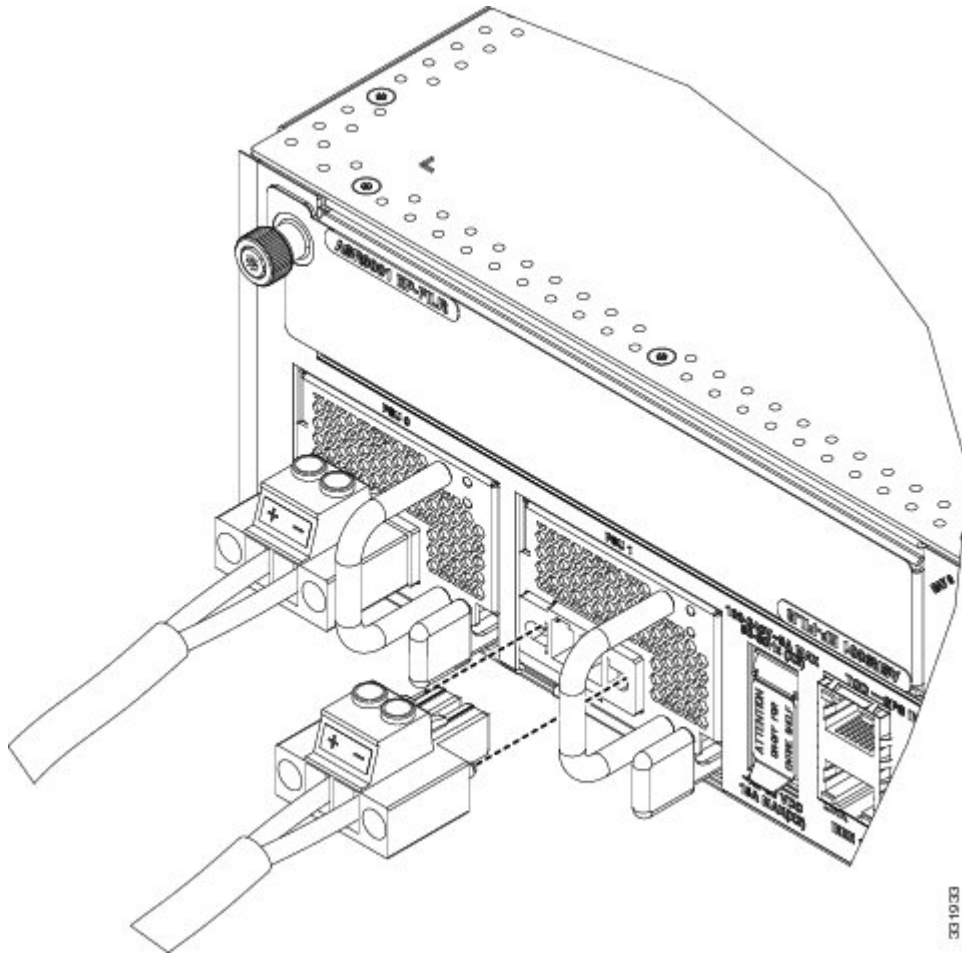*Figure 31: Cisco ASR 9901: Typical Power Connections for a Single DC Power Module*

Figure 32: Cisco ASR 9001: Typical Power Connections for a Single DC Power Module

Step 4   Proceed to the next section.

Powering on the Router

Follow these steps to turn on power to either an AC-powered or DC-powered router:

Procedure

Step 1   Switch on the circuit breaker to your power sources.

Step 2   Verify that the Power Input LED on each power module is lit.

Step 3   Set the power switch to the ON position.

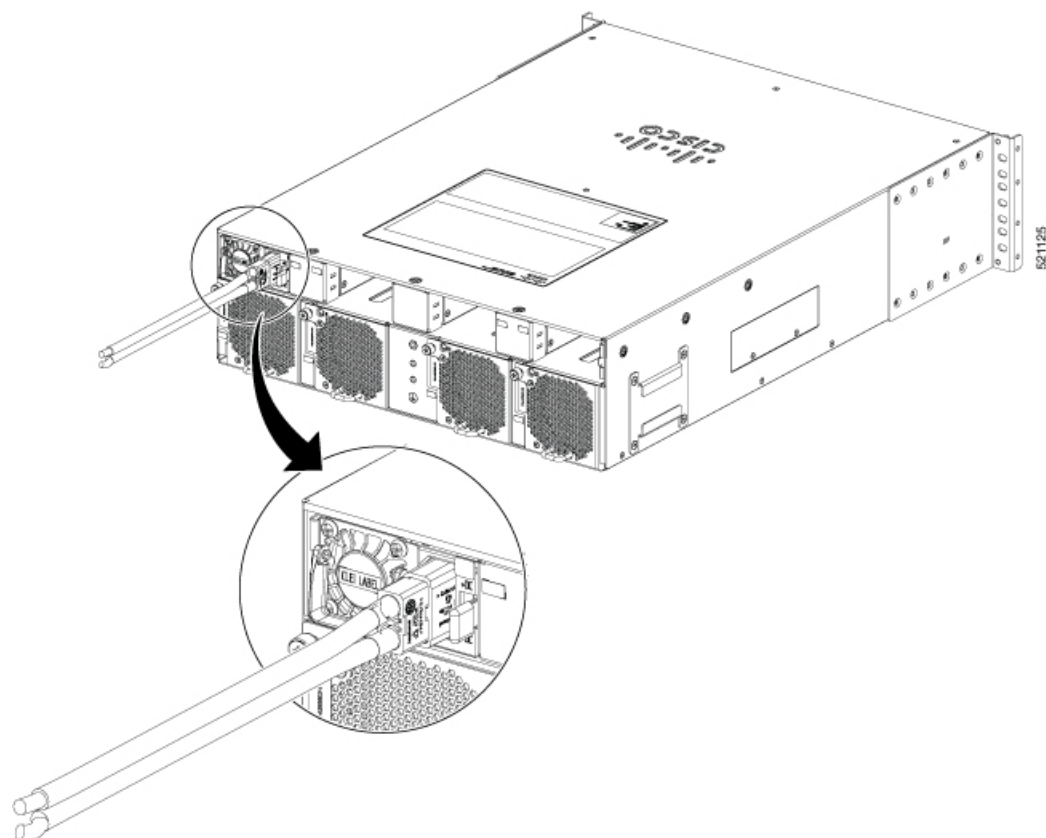*Figure 33: Power Switch on the Cisco ASR 9903*
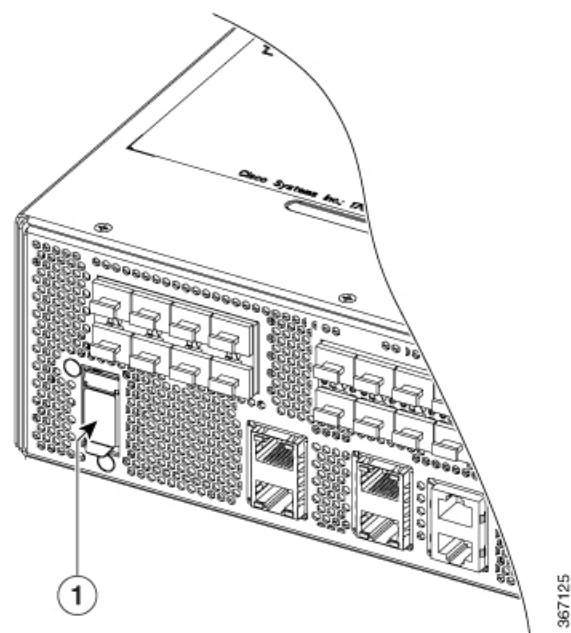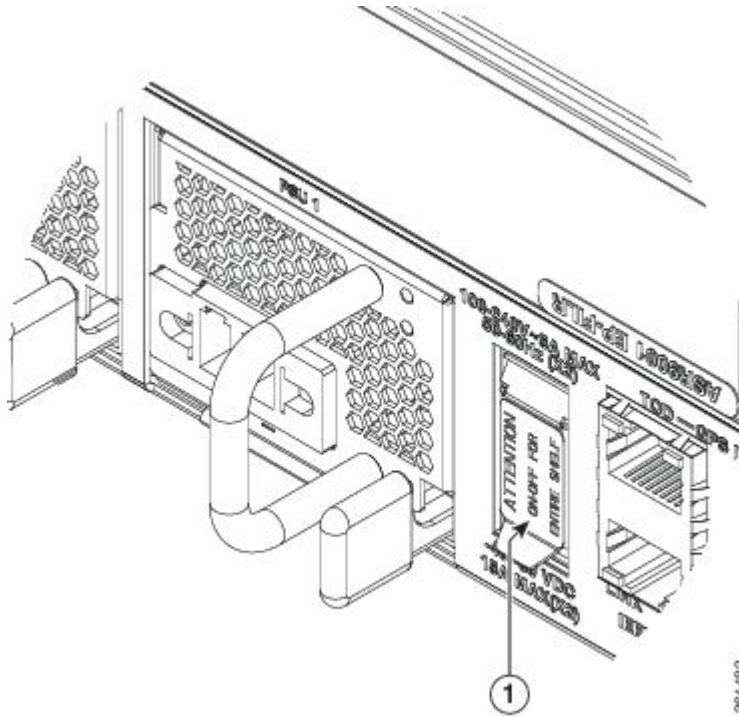

Figure 34: Power Switch on the Cisco ASR 9901

Figure 35: Power Switch on the Cisco ASR 9001

Step 4   Verify that the Green Power LED on each power module is lit.