Install the Cisco 8404-SYS-D router

This chapter describes how to install the various components in the Cisco 8404-SYS-D router and includes the following sections:

Prerequisites

Before installing the Cisco 8404-SYS-D Router, it is important to prepare for the installation by:

- Preparing the site (site planning) and reviewing the installation plans or method of procedures (MOP). For more information, see the *Prepare for Installation* section.
- Unpacking and inspecting the Cisco 8404-SYS-D Router
- Gathering the tools and test equipment required to properly install the Cisco 8404-SYS-D Router

Install the router in a rack

The following sections describe how to install the Cisco 8404-SYS-D Router in a rack:

Procedure

Step 1 Remove the rack-mount brackets from the accessory kit and position them beside the router chassis.

Step 2 Position one of the brackets against the chassis side and align the screw holes.

Step 3 Secure the bracket to the chassis with the screws removed when performing Step 1. The recommended maximum torque is 6.2 in.-lb (0.7 N-m).

The following figures show how to attach the brackets on the Cisco 8404-SYS-D router for a ETSI rack and a 23-inch EIA rack.

Figure 1: Installing the Mounting Brackets for n ETSI Rack

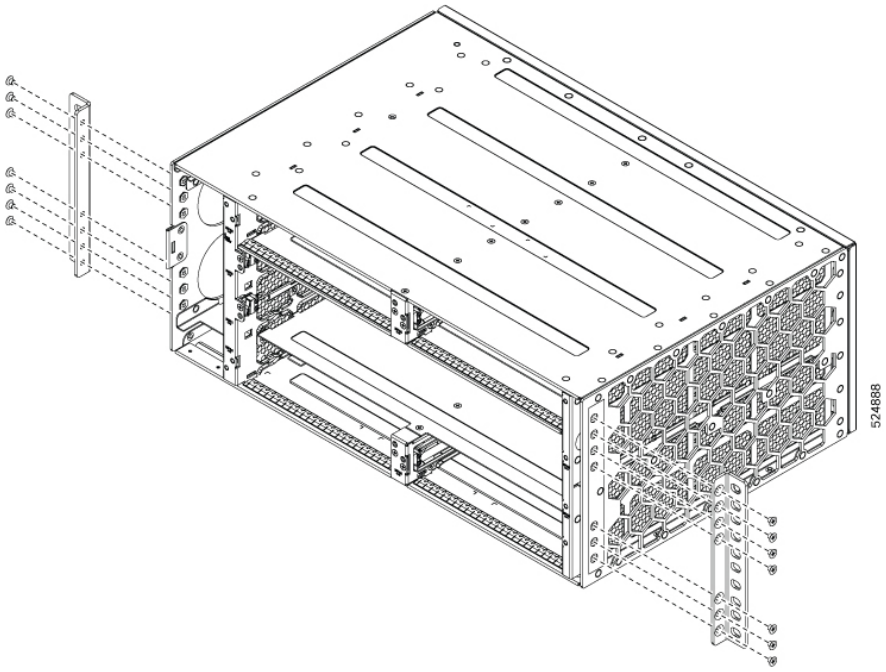
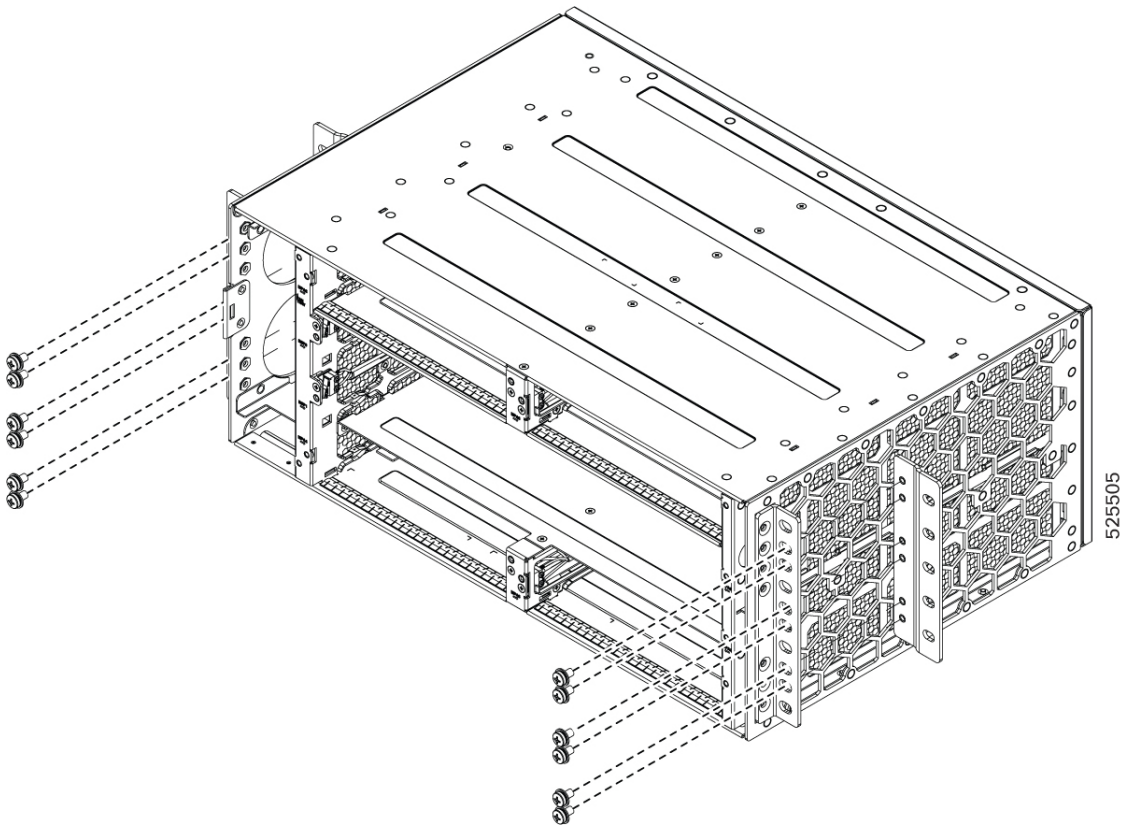


Figure 2: Installing the Mounting Brackets for the 23-inch EIA Rack



Step 4 Position the chassis in the rack as follows:

- If the front of the chassis (front panel) is at the front of the rack, insert the rear of the chassis between the mounting posts.
- If the rear of the chassis is at the front of the rack, insert the front of the chassis between the mounting posts.

Step 5 Align the mounting holes in the bracket with the mounting holes in the equipment rack.

Do not use module ejector lever as handles to lift the modules.

Note
The router can be mounted in an ETSI rack but the required bend radius for the cables and fibers within the 300 mm ETSI specification cannot be maintained.

If you want to mount the router in ETSI cabinets, you need to have a custom-made cabinet front door to meet the fiber bend radius requirement.

Step 6 Install chassis using 12 no rack screws. These screws can be arranged based on the rack used.

Step 7 Use a tape measure and level to verify that the chassis is installed straight and level.

Install the chassis ground connection

Before you connect the power or turn on the power to the Cisco 8404-SYS-D Router, you must provide an adequate chassis ground (earth) connection to your router.

This section describes how to ground the Cisco 8404-SYS-D Router. The router provides two locations for attaching a 2-hole grounding lug according to the rack-mounting brackets you use to install the router.

Figure 3: Attaching a Grounding Lug to the rear of the Router

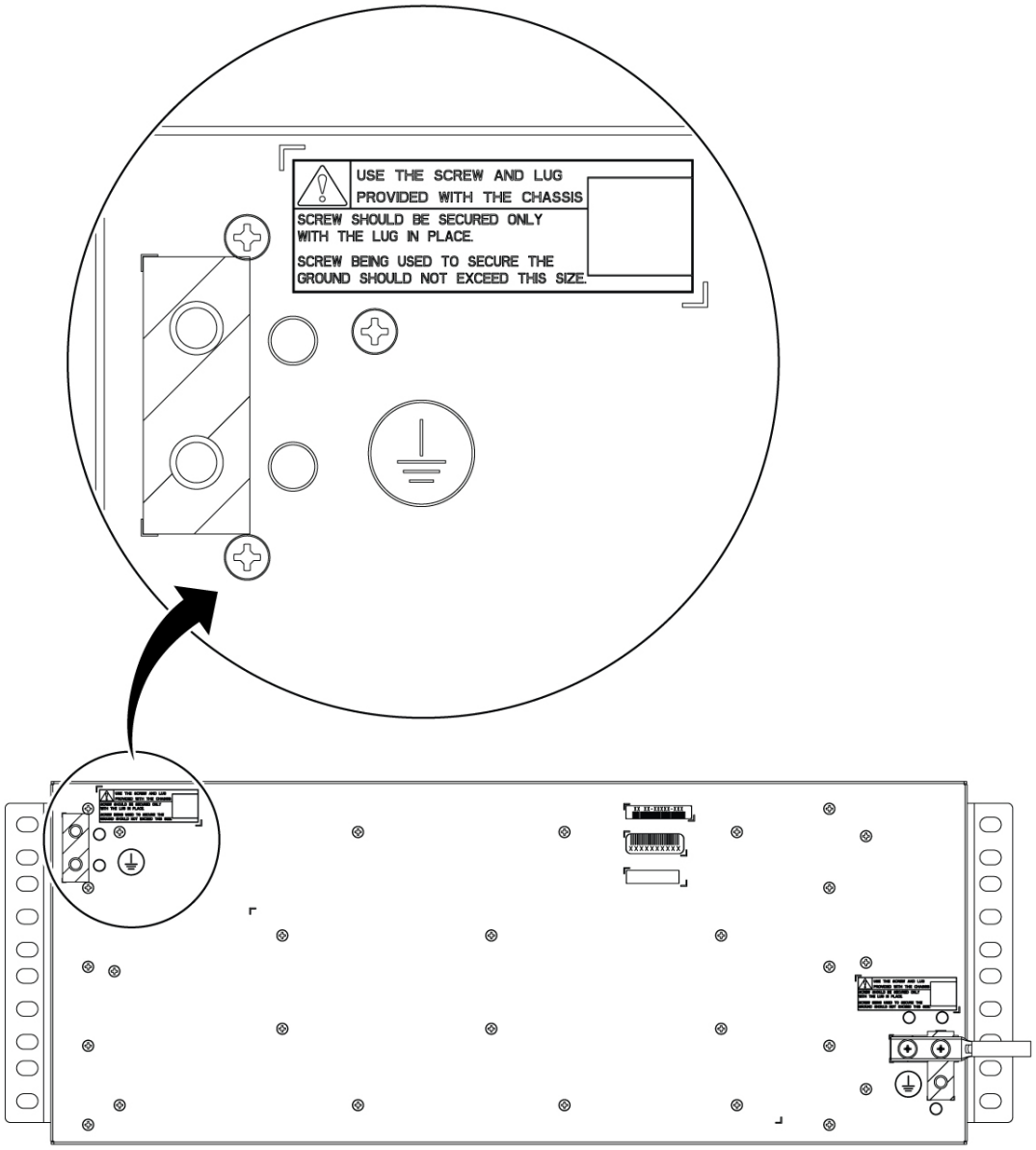
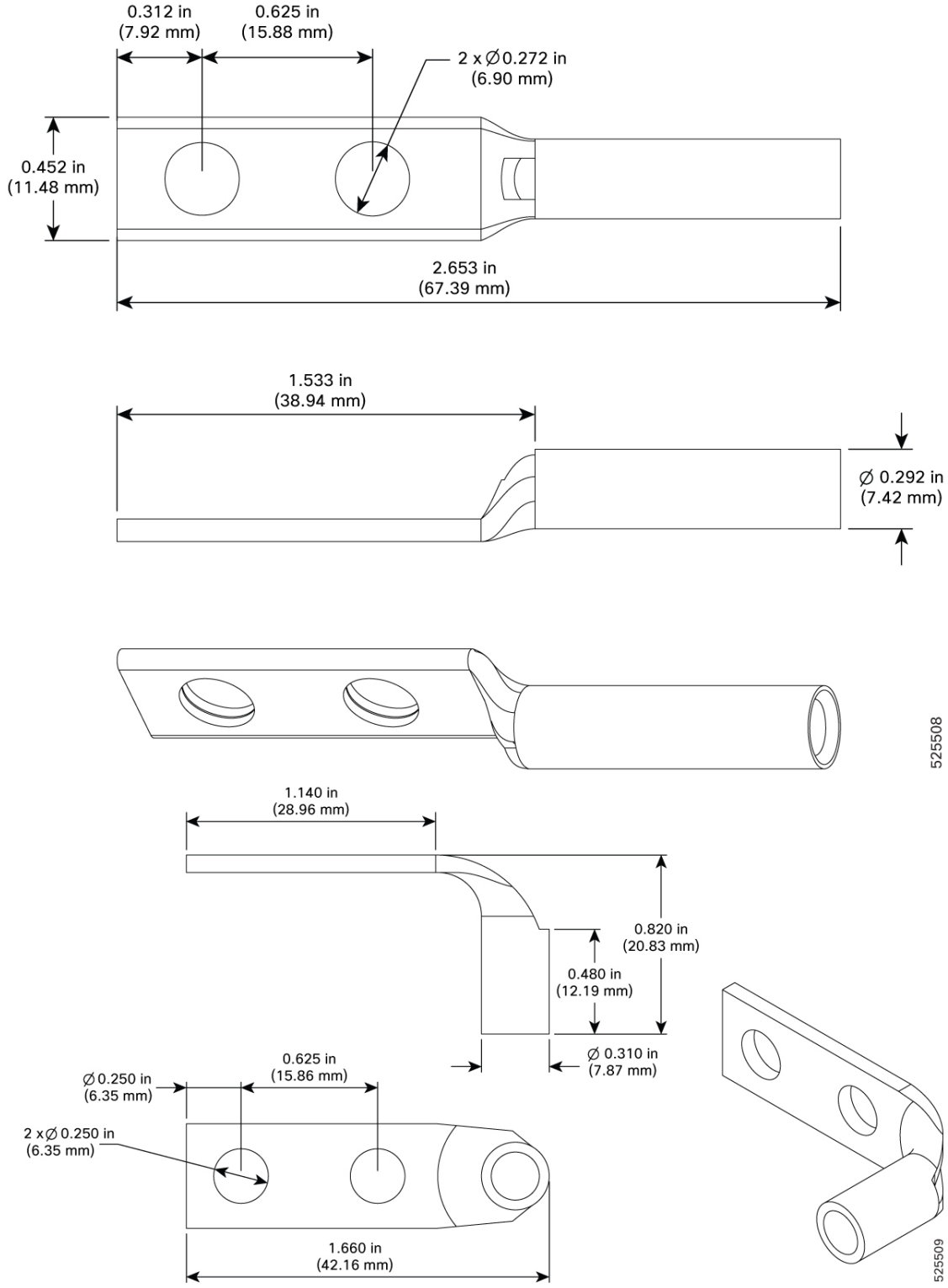


Figure 4: Grounding Lug Dimensions



To ensure that the chassis ground connection that you provide is adequate, you need the following parts and tools:

- Ratcheting torque screwdriver with Phillips head that exerts up to 20 in.-lb (2.25 N-m) of pressure for attaching the ground wire to the router

Caution Ensure that you secure the lugs only with the Cisco-provided screw or a Phillips head screw with an integrated washer of 10-32 x 0.3125 inch. Secure the screws only while assembling the lugs.

- Crimping tool as specified by the ground lug manufacturer
- 6 AWG or larger copper wire for the ground wire
- Wire-stripping tools appropriate to the wire you are using

Caution Before making connections to the Cisco 8404-SYS-D Router, ensure that you disconnect the power at the circuit breaker. Otherwise, severe injury to you or damage to the router may occur.

Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

Warning Use copper conductors only. Statement 1025

Warning When installing the unit, the ground connection must always be made first and disconnected last. Statement 42

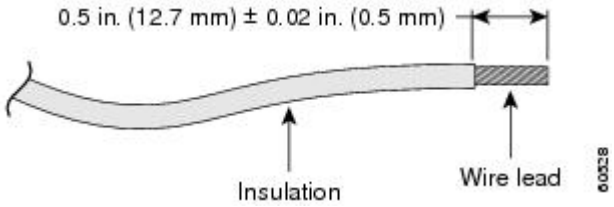
This unit is to be installed in a restrictive access location and must be permanently grounded to minimum 6 AWG copper ground wire.

Perform the following procedure to ground the router using a 2-hole lug and the corresponding mounting point. Most carriers require a minimum 6 AWG ground connection. Verify your carrier's requirements for the ground connection.

Procedure

Step 1 If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch ± 0.02 inch (12.7 mm ±0.5 mm) As shown in the figure below.

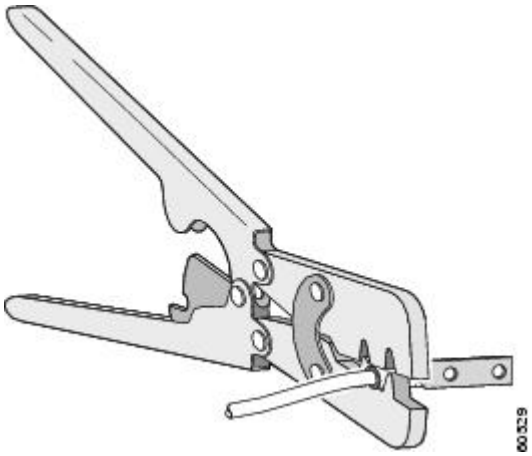
Figure 5: Stripping a Ground Wire



Step 2 Slide the open end of your 2-hole ground lug over the exposed area of the ground wire.

Step 3 Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire as shown in figure below.

Figure 6: Crimping a Ground Lug onto the Ground Wire



Step 4 Use a Phillips head screwdriver to attach the 2-hole ground lug and wire assembly to the router with the 2 pan-head Phillips head screws. For all racks, attach the 2-hole ground lug to the rear of the router.

Step 5 Connect the other end of the ground wire to a suitable grounding point at your site.

Attach the cable management brackets

The router supports the following bracket:

- 8404-CBLMGMT—This bracket helps in routing the cables from the interface modules, router switch processors (RSPs), and PEM units; thereby enabling a proper cable bending radius.

Note You can install the cable brackets along with the rack mount screws while installing the chassis. Or, you can install the cable brackets after the chassis is monted on the rack. However, ensure the brackets are positioned such that they aid cable routing and provide enough slack for fan trays and air filter removal.

Procedure

Step 1 Position the cable management brackets against the front of the chassis and align the four screw holes, as shown in the figure below.

Figure 7: Attaching Cable Management Brackets to the 19-inch Rack

Step 2 Secure the cable management brackets with four M4 screws. The recommended maximum torque is 10 in.-lb (1.12 N-m).

Install MPA

There are four MPA slots: slots 2, 3 at the chassis top and slots 4,5 on the bottom side of the chassis.

To install an MPA module in the router chassis, perform the following steps:

Procedure

Step 1 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

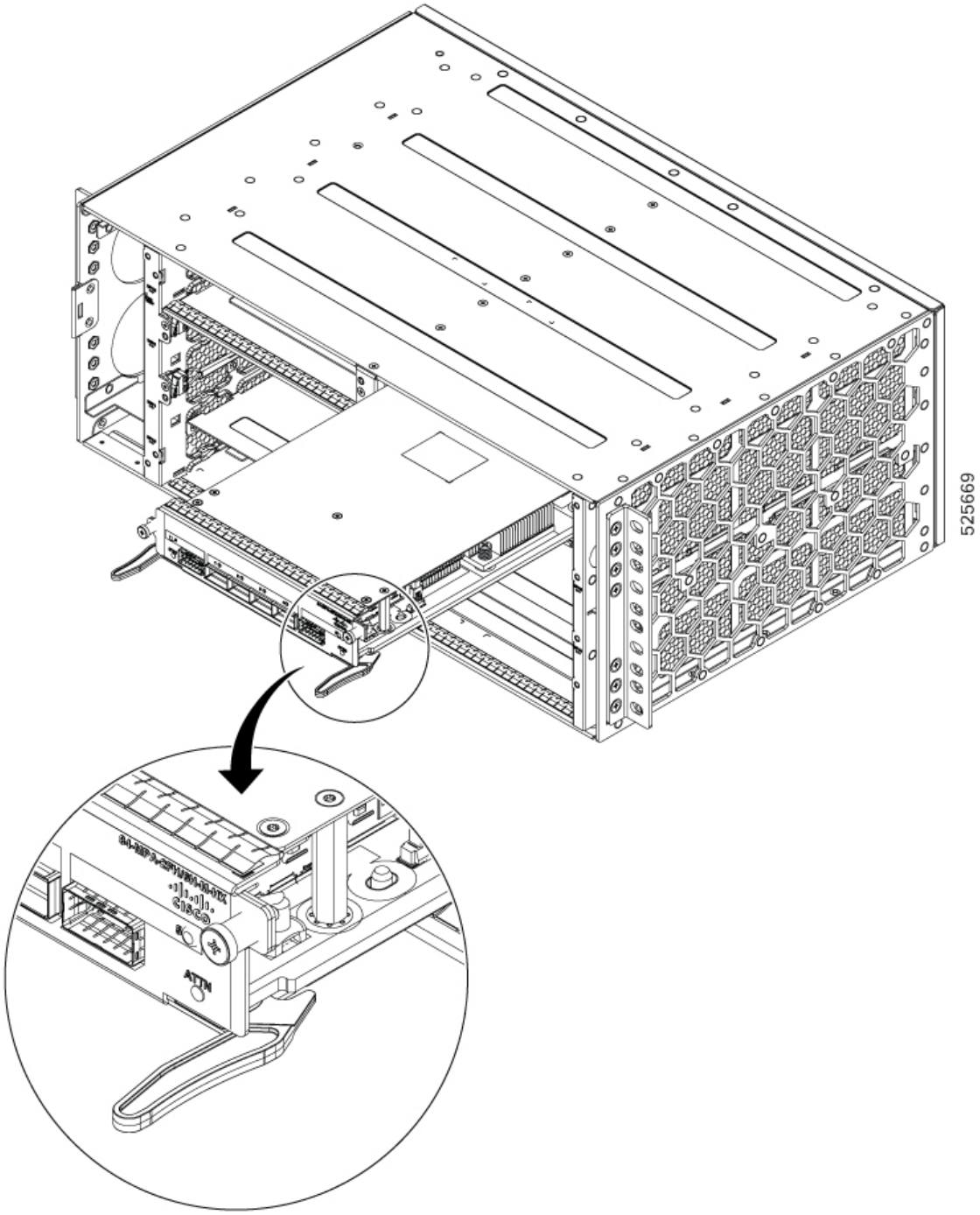
Step 2 Choose a slot for the module. Make sure that there is enough clearance to accommodate any equipment that will be connected to the ports on the module. If a blank module filler plate is installed in the slot in which you plan to install the module, remove the plate by removing its 2 Phillips pan-head screws.

Step 3 Fully open both the ejector levers on the new module.

Caution
To prevent ESD damage, handle modules by carrier edges only.

Step 4 Position the module in the slot. Make sure that you align the sides of the module with the guides on each side of the slot, as shown in the figure below.

Figure 8: MPA Installation



Step 5 Carefully slide the module into the slot until the EMI gasket on the module makes contact with the module in the adjacent slot and both the ejector levers have closed to approximately 45 degrees with respect to the module faceplate.

Caution
If the top slot already has an MPA module installed, and you install a second MPA module in the slot below it, be careful not to damage the EMI gasket of the bottom MPA module against the ejector levers of the top MPA during insertion.

Step 6 While pressing down, simultaneously close both the ejector levers to fully seat the module in the backplane connector. The ejector levers are fully closed when they are flush with the module faceplate.

Step 7 Tighten the two captive installation screws on the module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

Note
Make sure that the ejector levers are fully closed before tightening the captive installation screws.

Step 8 Tighten the captive screw within three minutes after the full insertion of the card. After three 3 minutes, the card will be shown as *shutdown*. Reload the chassis with the force option using the **reload location** command to bring the card to the operational mode.

```
RP/0/RP0/CPU0:ios##reload location 0/<slot #> force
```

Step 9 Verify that the captive installation screws are tightened on all of the modules installed in the chassis. This step ensures that the EMI gaskets on all the modules are fully compressed in order to maximize the opening space for the new or replacement module.

Note
If the captive installation screws are loose, the EMI gaskets on the installed modules will push adjacent modules toward the open slot, which reduces the size of the opening and makes it difficult to install the new module.

Note
When installing the cabling to an MPA, we recommend that you leave a service loop of extra cabling sufficient to allow for fan tray removal.

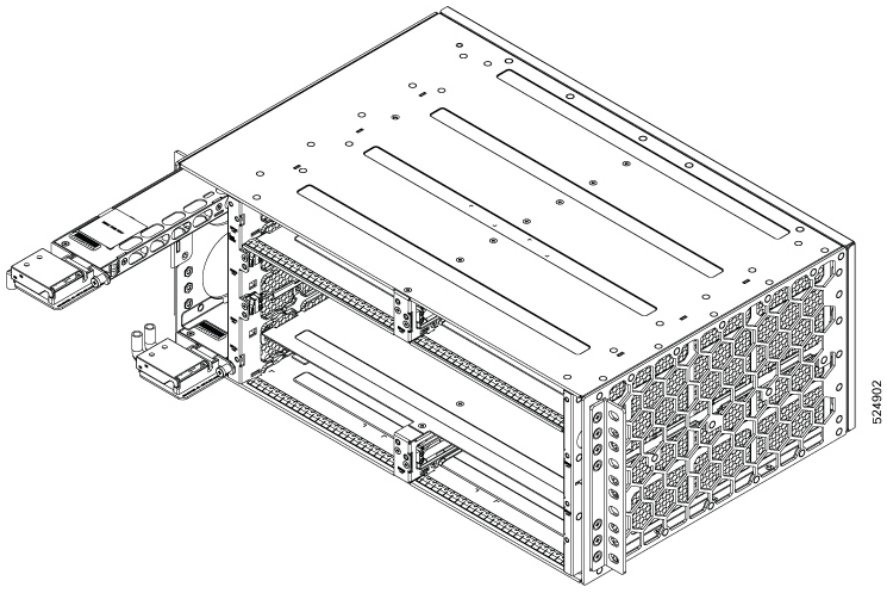
Note
Close all unused optics ports on the MPA module using the appropriate dust caps to prevent dust from accumulating inside the cage. For information on dust caps, see the *Installing dust caps*.

Install PEM

On the chassis above and below fan tray, there are two slots for the DC PEM card. PEM1 at bottom of fan tray and PEM0 on top of the tray. The chassis is shipped with the PEMs installed .

This procedure provides steps required to install a PEM on the slot.

Figure 9: PEM



Procedure

Step 1 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

Step 2 Choose a slot for the module.Position the module in the slot. Ensure that you align the sides of the module with the guides on each side of the slot, as shown in the figure below.

Step 3 Slide the module carefully into the slot until the EMI gasket on the module makes contact with the chassis and the captive screws on both sides of the module are aligned with the chassis screw holes.

Step 4 Tighten the captive screws.The recommended maximum torque is <Value> . Ensure that the EMI gaskets are fully compressed.

Note
The chassis gets its DC power from the PEM's. To connet the DC power to PEM's, see *Install the DC Power Cables*. Ensure that the PEM is powered from the right DC source and maintained within the operating voltage range as specificed in the *Table 2. DC Power Entry Module Specifications*.

Install the DC PEM Cables

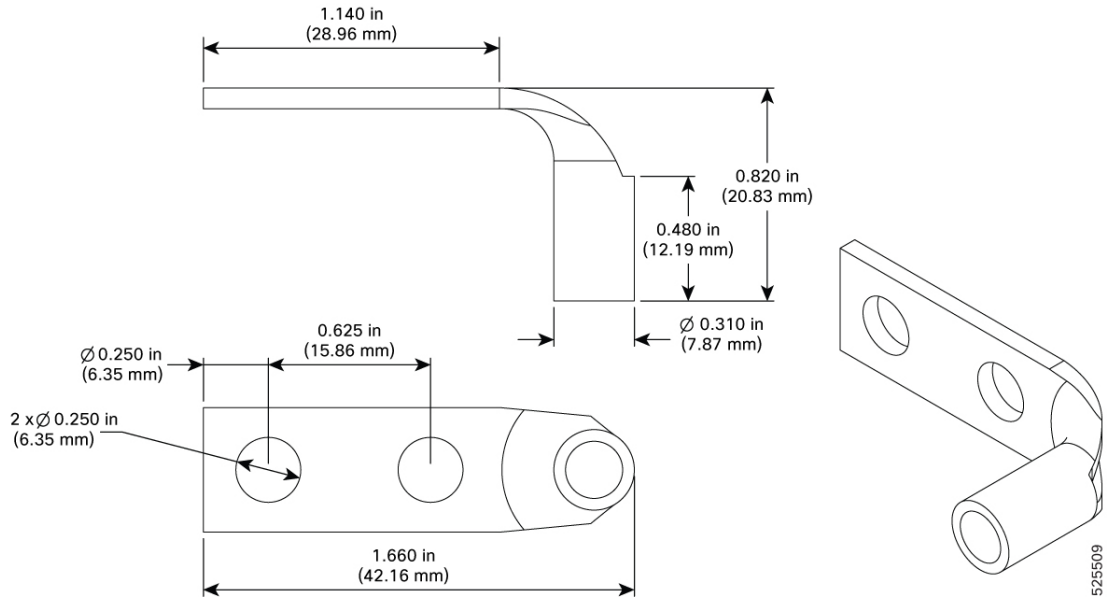
Note When installing DC PEM, use 6AWG for longer cables and 8AWG for shorter cables, 90°C temperature rated cable. The recommended cable length is three meters maximum from source.

Note

- Always ensure that the building's installation for short-circuit (overcurrent) protection does not exceed 60A.
- We recommend you to use a circuit breaker or a fast acting fuse with a maximum DC rating, based on the router variants for over current protection.

Note We recommend that you do not install the lugs while the PEM is mounted on the chassis. First, remove the PEM from the chassis to ensure safe and proper handling. With the PEM removed, attach the lugs securely to the PEM. After the lugs are attached and all connections are secure, insert the PEM back into the chassis carefully.

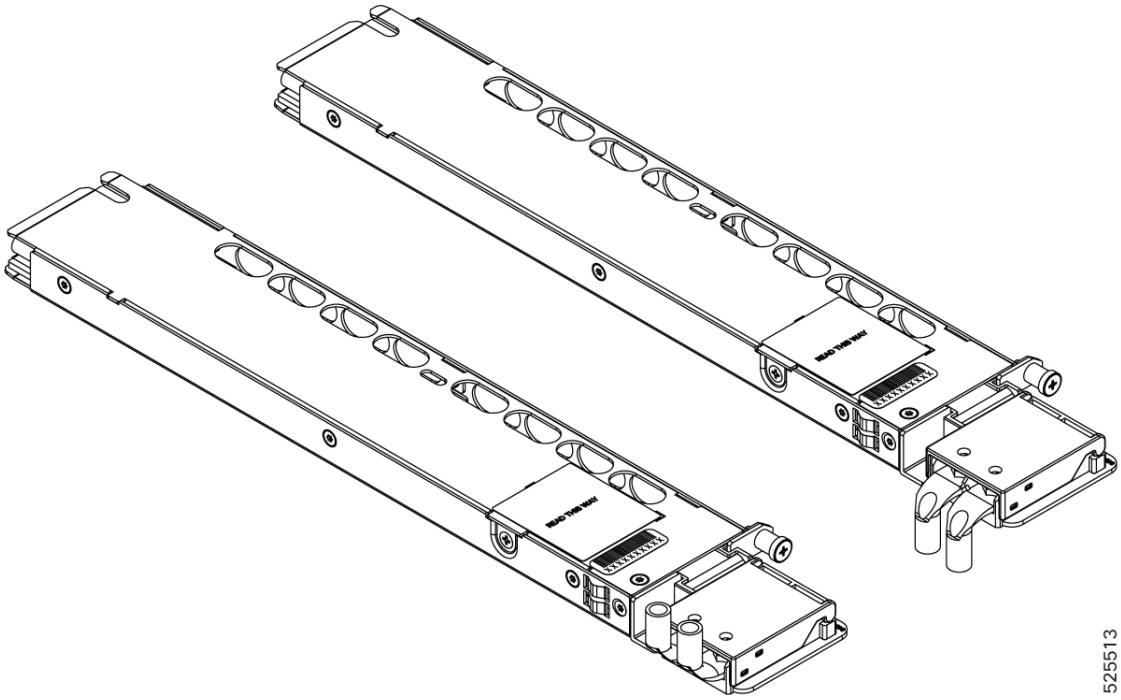
Figure 10: DC Lug Dimensions



To attach the DC PEM:

1. Locate the terminal block plug.
2. Insert the DC-input power source wires into the terminal block plug.
3. Attach the DC supply wires using the designated screws.
4. Use a ratcheting torque screwdriver to torque the terminal block plug captive screw. (See the following figure.)

Figure 11: DC PEM



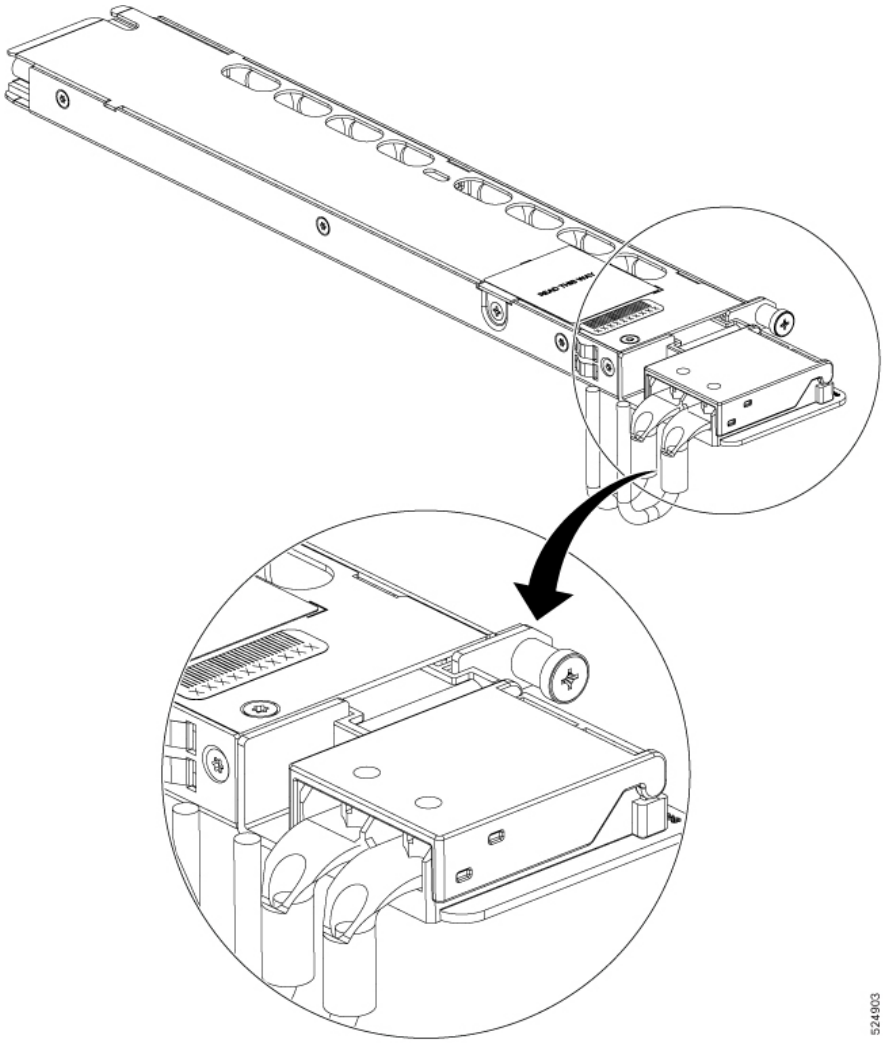

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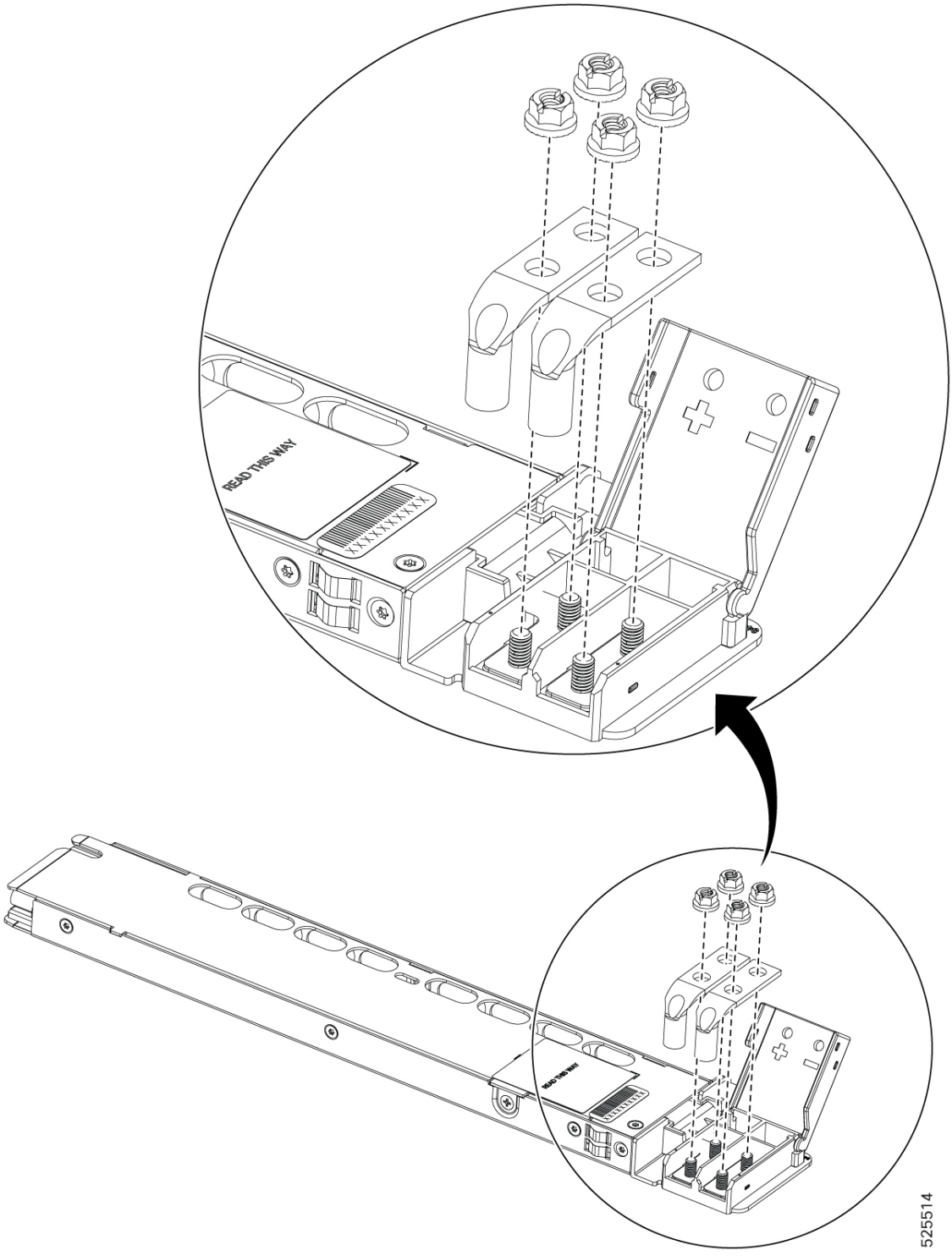
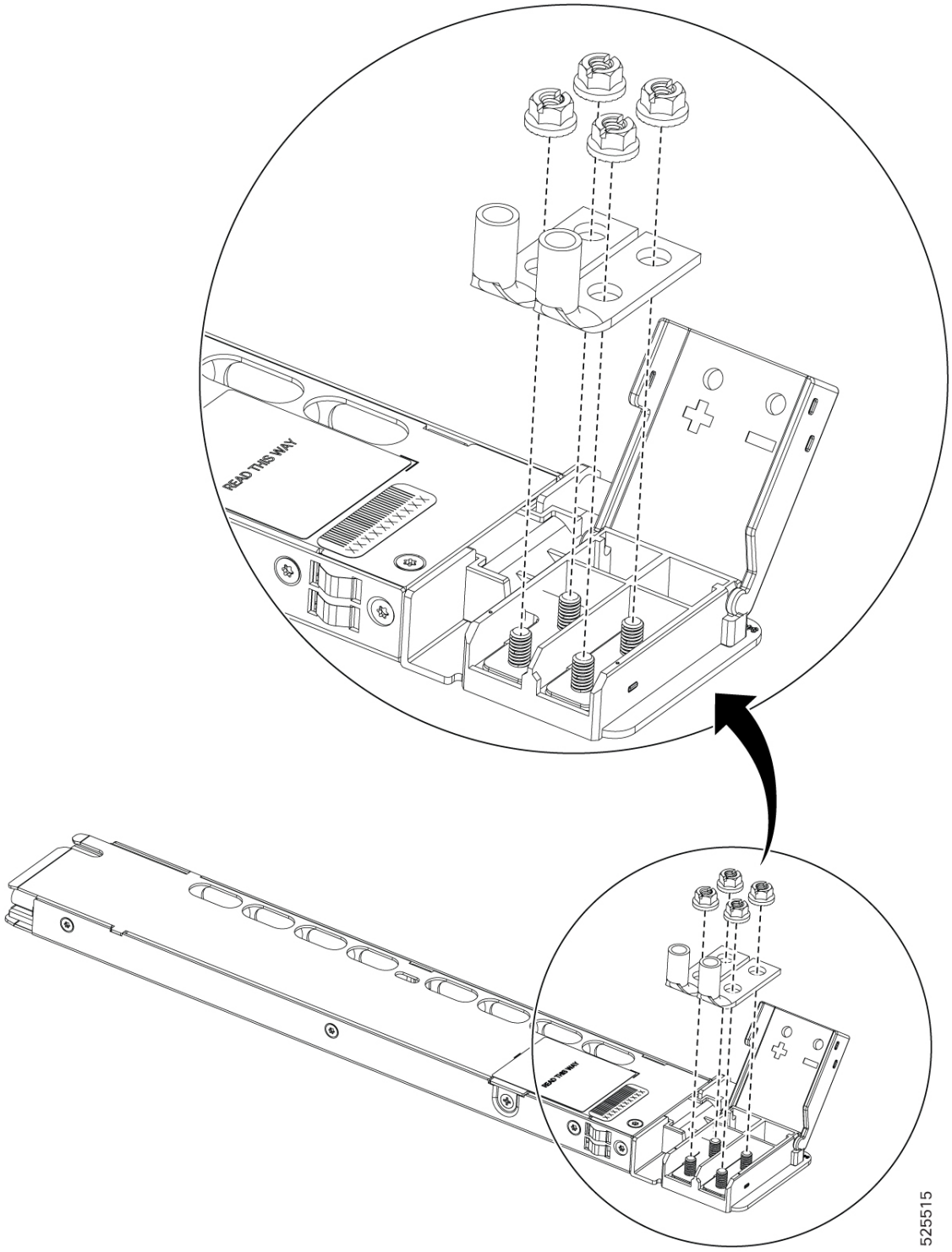
Figure 12: DC PEM

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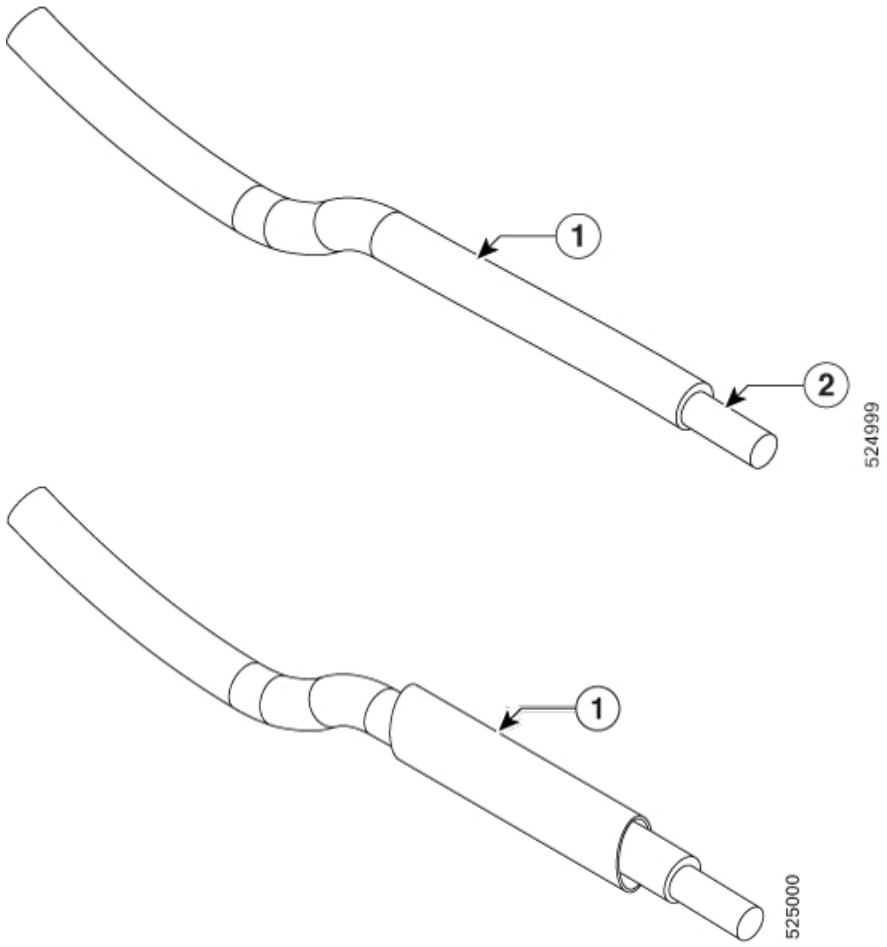
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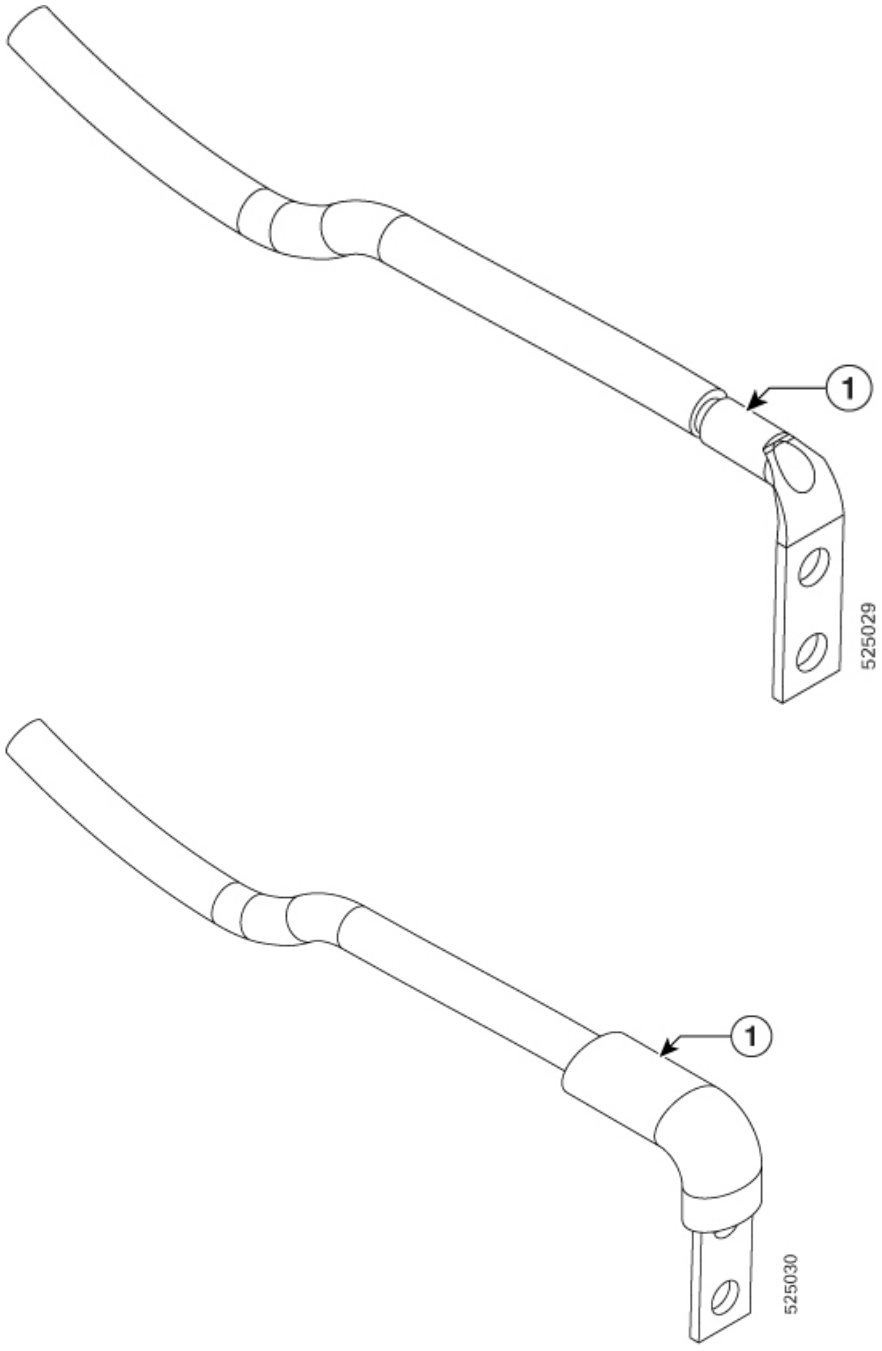


Turn On a DC PEM

Perform the following procedure to activate a DC PEM:

1. Verify the PEM operation by checking whether the respective PEM front panel LED (PS0 or PS1) is green.
2. If the LEDs indicate any issues with power problem, see *LEDs*.
3. If you are also connecting a redundant DC PEM, repeat these steps for the second power source.

Note If you are connecting a redundant DC PEM, ensure that each PEM is connected to a separate power source in order to prevent power loss in the event of a power failure.

The operating voltage range is -40V to 72VDC, 45A maximum.

Install an RSP module

To install an RSP module in the router chassis, perform the following steps:

Procedure

Step 1 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

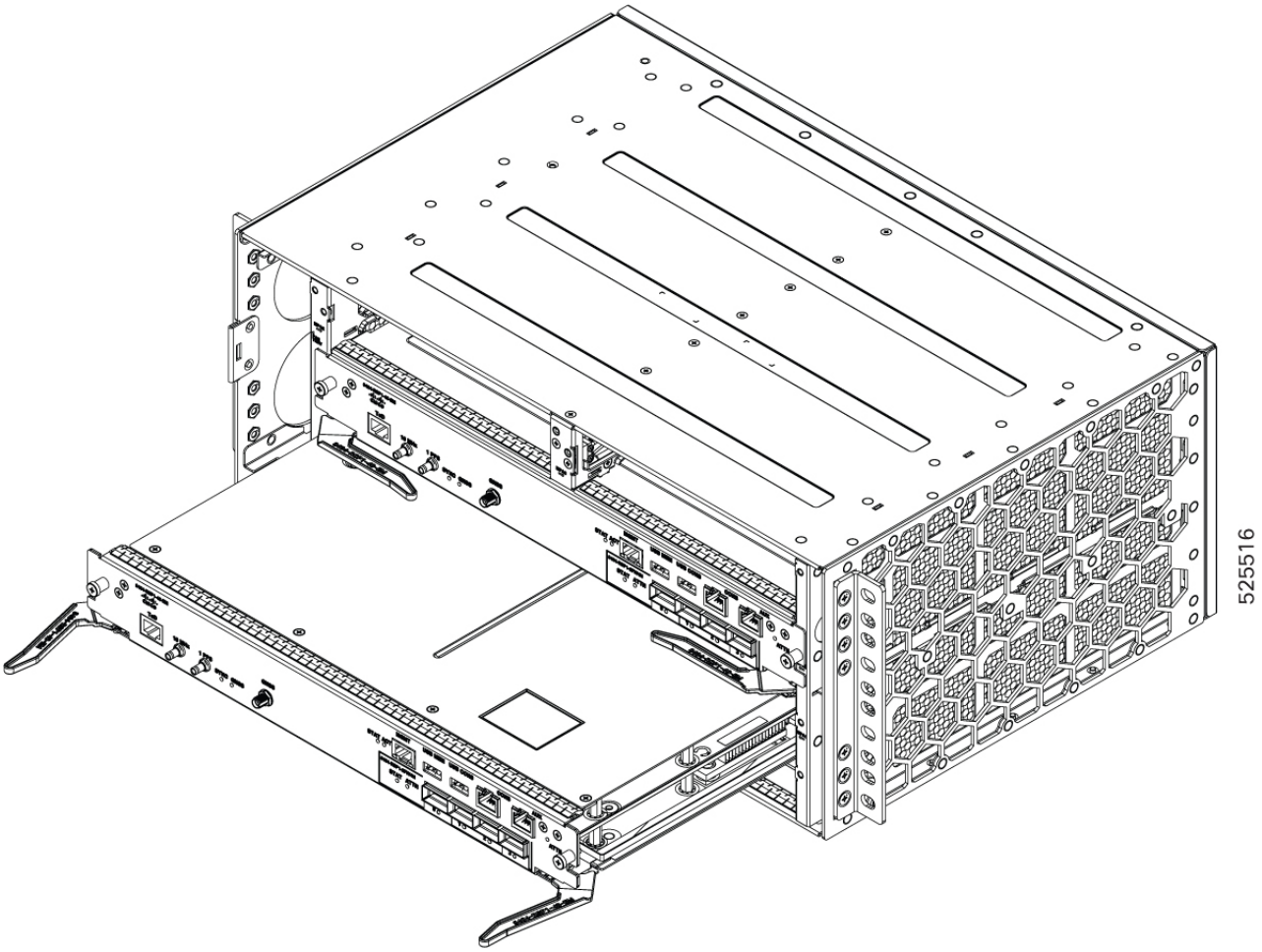
Step 2 Choose a slot for the module. Make sure that there is enough clearance to accommodate any equipment that will be connected to the ports on the module. If a blank module filler plate is installed in the slot in which you plan to install the module, remove the plate by removing its 2 Phillips pan-head screws.

Step 3 Fully open both the ejector levers on the new module.

Caution
To prevent ESD damage, handle modules by carrier edges only.

Step 4 Position the module in the slot. Make sure that you align the sides of the module with the guides on each side of the slot, as shown in the figure below.

Figure 13: RSP Installation



Step 5 Carefully slide the module into the slot until the EMI gasket on the module makes contact with the module in the adjacent slot and both the ejector levers have closed to approximately 45 degrees with respect to the module faceplate.

Caution
If the top slot already has an RSP module installed, and you install a second RSP module in the slot below it, be careful not to damage the EMI gasket of the bottom RSP module against the ejector levers of the top RSP during insertion.

Step 6 While pressing down, simultaneously close both the ejector levers to fully seat the module in the backplane connector. The ejector levers are fully closed when they are flush with the module faceplate.

Step 7 Tighten the two captive installation screws on the module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

Note
Make sure that the ejector levers are fully closed before tightening the captive installation screws.

Note
- After inserting the card completely, ensure that the captive screw is tightened within 3 minutes.
- If the screw is not tightened within the specified time, the card will transition to a *shutdown* state.

- To recover the card and bring it back to operational mode, you will need to manually execute the **reload location** command with the force option.

```
RP/0/RP0/CPU0:ios#reload location 0/RP0-1/<slot #> force
```

Step 8 Tighten the captive screw within three minutes after the full insertion of the card. After three 3 minutes, the card will be shown as *shutdown*. Reload the chassis with the force option using the **reload location** command to bring the card to the operational mode.

```
RP/0/RP0/CPU0:ios##reload location 0/<slot #> force
```

Step 9 Verify that the captive installation screws are tightened on all of the modules installed in the chassis. This step ensures that the EMI gaskets on all the modules are fully compressed in order to maximize the opening space for the new or replacement module.

Note
If the captive installation screws are loose, the EMI gaskets on the installed modules will push adjacent modules toward the open slot, which reduces the size of the opening and makes it difficult to install the new module.

Note
When installing the cabling to an RSP, we recommend that you leave a service loop of extra cabling sufficient to allow for fan tray removal.

Note
Close all unused optics ports on the MPA module using the appropriate dust caps to prevent dust from accumulating inside the cage. For information on dust caps, see the *Installing dust caps*.

Install the fan trays

The fan trays are modular units that provides cooling to the Cisco 8404-SYS-D Router.

Note Do not introduce body parts or objects in the fan tray slot when installing or removing the fan tray module. Exposed circuitry is an energy hazard.

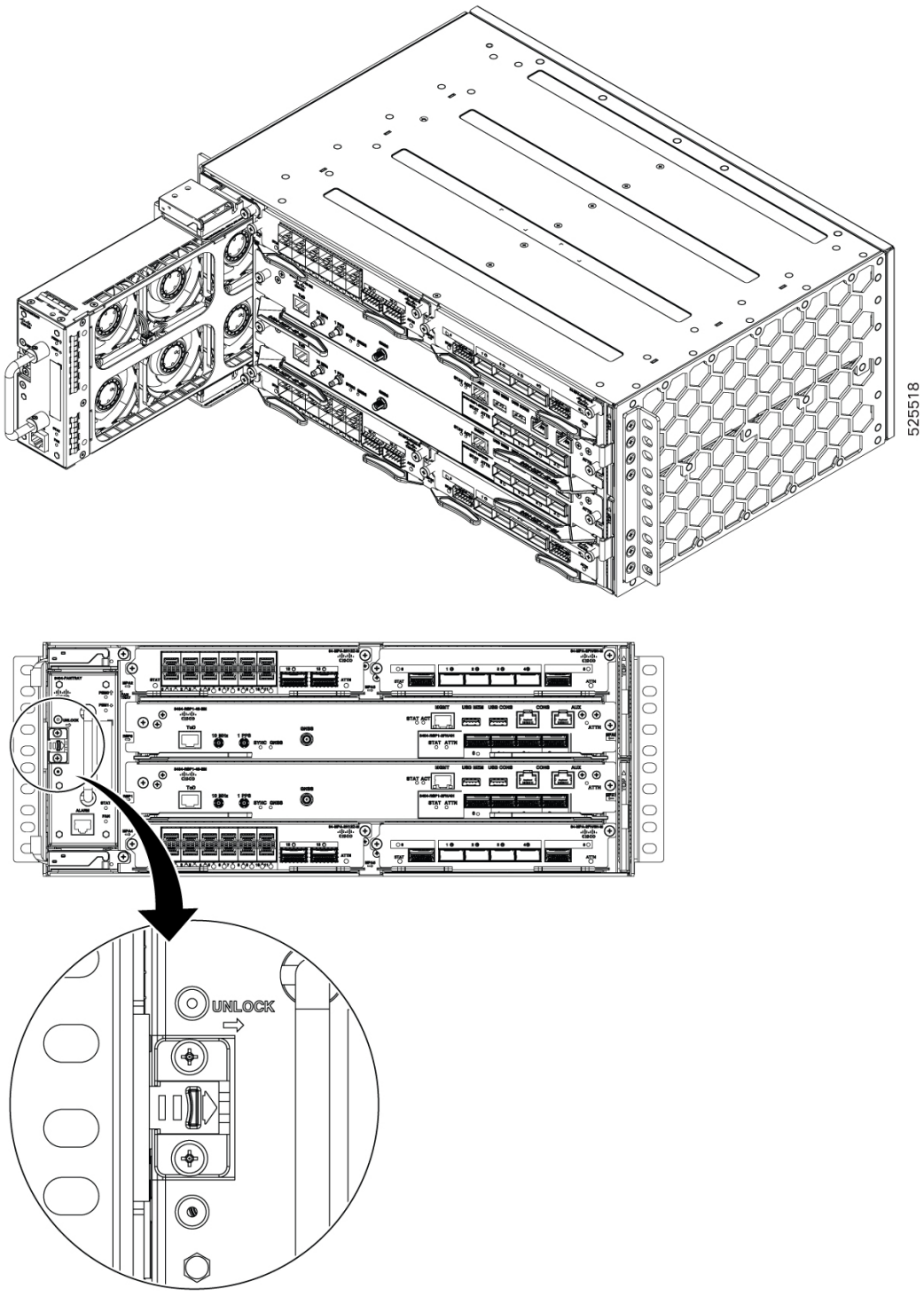
Follow these steps to install the primary fan tray in the chassis:

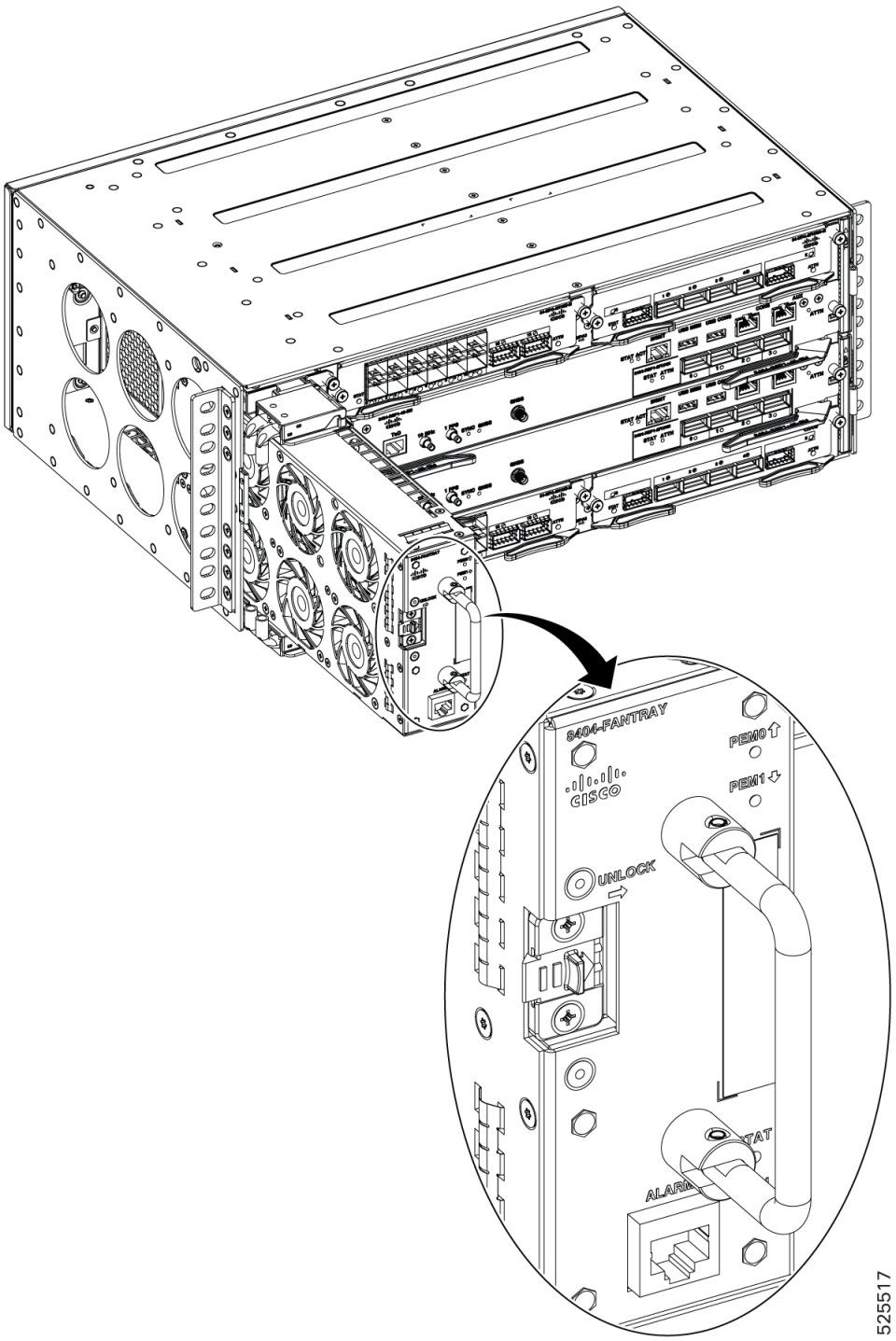
Procedure

Step 1 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

Step 2 Orient the fan tray so that the latch is on the left side of the fan tray's front panel. The figure below shows how to orient the fan tray.

Figure 14: Install the Fan Tray





Step 3 Guide the fan tray into the chassis using the front handle and thumb finger to move the latch position to the right.

Caution
The fans are exposed on the right side of the fan tray. Keep your fingers, clothing, and jewellery away from the fans. Always handle the fan tray by the handle.

Step 4 After the fan tray is fully seated in the chassis, release the latch carefully to ensure that the latch is fully locked.

Air filter maintenance

A periodic health check of the filter, every 3 months based on the level of air in the environment, helps in avoiding over clogging of the filters and provides a better life. This product's filter is used as a single-use component. If the product is installed in a controlled environment, check and replace the filter every three months, otherwise replace the filter every month with PID (Cisco 8404-FILTER) or equivalent.

Install dust caps

The following list provides the product IDs (PIDs) for the dust caps that are available for each port type:

- A900-DCAP-RJ45
- A900-DCAP-SFP
- A900-DCAP-USB
- 8000-QSFP-DCAP
- RJ-45—A900-DCAP-RJ45-S= (24 dust caps per package) or A900-DCAP-RJ45-L= (240 caps per package)
- SFP—A900-DCAP-SFP-S= (24 caps per package) or A900-DCAP-SFP-L= (240 caps per package)
- USB—A900-DCAP-USB-S= (12 dust caps per package) or A900-DCAP-USB-L= (120 dust caps per package)

To install the dust cap:

1. Hold the dust cap by its handle.
2. Insert the dust cap in to the appropriate unused ports (RJ-45, SFP, USB, or QSFP) on the chassis front panel.

Install and remove SFP modules

The Cisco 8404-SYS-D router supports a variety of SFP modules, including optical and Ethernet modules. For information on how to install and remove SFP modules, see the documentation for the SFP module at

http://www.cisco.com/en/US/partner/products/hw/modules/ps5455/prod_installation_guides_list.html

For information about inspecting and cleaning fiber-optic connections, see
http://www.cisco.com/en/US/partner/tech/tk482/tk876/technologies_white_paper09186a0080254eba.shtml

Caution We recommend that you wait 30 seconds between removal and insertion of an MPA and RSP on an interface module. This time is recommended to allow the transceiver software to initialize and synchronize with the standby RSP. Changing an SFP more quickly could result in transceiver initialization issues that disable the SFP.

Warning Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Warning There are no serviceable parts inside. To avoid risk of electric shock, do not open. Statement 1073

Warning An instructed person is someone who has been instructed and trained by a skilled person and takes the necessary precautions when working with equipment.

A skilled person or qualified personnel is someone who has training or experience in the equipment technology and understands potential hazards when working with equipment. Statement 1089

Warning Only a skilled person should be allowed to install, replace, or service this equipment. Refer to statement 1089 for the definition of a skilled person. Statement 1090

Warning Only an instructed person or skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of an instructed or skilled person. Statement 1091

Warning Hot surface. Use care when handling. Statement 1092

Wait time for re-inserting 1G and 10G optics in Cisco 8404-SYS-D with 84-MPA-2H12Z-M MPA

When using the Cisco 8404-SYS-D chassis equipped with the 84-MPA-2H12Z-M Modular Port Adapter (MPA), special considerations are required when removing and re-inserting certain 1G and 10G optics. Proper wait times help prevent network disruptions and maintain stable operation, especially when dealing with specific SFP types and third-party optics.

Key Recommendation

- After removing any of the following optics from the 84-MPA-2H12Z-M MPA module, you must wait at least 15 minutes before re-inserting the same optic into any SFP port:

- Cisco 1G Bidirectional (BiDi) SFP
- Cisco 1G Coarse Wavelength Division Multiplexing (CWDM) SFP
- Cisco 10G BiDi SFP
- All third-party 1G and 10G SFP optics (as their behaviour is unverified by Cisco)

Note No 15-minute wait is required when installing new (unused) optics.

Impact when you insert SFP optic within 15 minutes

If you re-insert the same SFP optic within 15 minutes on the 8404-SYS-D with the 84-MPA-2H12Z-M MPA:

- **Same groups:** There may be a brief link disruption (link flap) on the other ports within the same group as the port where the optic is inserted.
- **Other groups and MPAs:** Ports in other groups on the same MPA, or on other MPAs in the same chassis, will not experience any link disruption.

Port Grouping

- The 84-MPA-2H12Z-M MPA has a total of 14 ports (12 SFP + 2 QSFP), divided into two groups:
  - **Group 1:** Ports 0–7
  - **Group 2:** Ports 8–13
- **QSFP28 Ports:** Inserting optics into QSFP28 ports does not cause link disruptions on any ports

Applicable Optics

Cisco 1G BiDi Optics

- GLC-BX40-DA-I
- GLC-BX40-D-I
- GLC-BX40-U-I
- GLC-BX80-D-I
- GLC-BX80-U-I

Cisco 1G CWDM Optics

- 1G CWDM-SFP-XXXX (various wavelengths)

Cisco 10G BiDi Optics

- SFP-10G-BXD-I
- SFP-10G-BXU-I
- SFP-10G-BX40U-I

- SFP-10G-BX40D-I

Third-party 1G and 10G SFP Optics

All brands and models not officially verified by Cisco

Port Connection Guidelines

Depending on the chassis, you can use Quad Small Form-Factor Pluggable Plus (QSFP+), QFSP-DD, QSFP28, SFP, SFP+, and RJ45 connectors to connect the ports on the line cards to other network devices.

To prevent damage to the fiber-optic cables, we recommend that you keep the transceivers disconnected from their fiber-optic cables when installing the transceiver in the line card. Before removing a transceiver from the router, remove the cable from the transceiver.

To maximize the effectiveness and life of your transceivers and optical cables, do the following:

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers. The router is typically grounded during installation and provides an ESD port to which you can connect your wrist strap.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.
- Keep the transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and to prevent damage to the connectors. Attenuation (loss of light) is increased by contamination and should be kept below 0.35 dB.
    - Clean these parts before installation to prevent dust from scratching the fiber-optic cable ends.
    - Clean the connectors regularly; the required frequency for cleaning depends upon the environment. In addition, clean connectors when they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.
    - Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends under a microscope to determine if damage has occurred.

Connect to the Console Port

- The router must be fully installed in its rack, connected to a power source, and grounded.
- The necessary cabling for the console, management, and network connections must be available.
    - An RJ45 rollover cable and DB9F/RJ45 adapter are provided in the router accessory kit.
    - Network cabling should already be routed to the location of the installed router.

Before you create a network management connection for the router or connect the router to the network, you must create a local management connection through a console terminal and configure an IP address for the

router. You also can use the console to perform the following functions (each of which can be performed through the management interface after you make that connection):

- Configure the router using the command-line interface (CLI).
- Monitor network statistics and errors.
- Configure Simple Network Management Protocol (SNMP) agent parameters.
- Download software updates.

The system console port is an RJ45 receptacle for connecting a data terminal to perform the initial configuration of the router. The console cable is shipped with the hardware.

Note Only RJ45 to DB-9 adapter cable is provided in the package.

Figure 15: Connecting the USB Type-A Console Cable to the Chassis

1	USB Type-A console port	2	USB Type-A to USB Type-A cable

Follow this procedure to connect a data terminal to the console port:

1. Set your terminal to these operational values: 115200 bps, 8 data bits, no parity, and two stop bits.
2. Attach the terminal end of the cable to the interface port on the data terminal.
3. Attach the other end of the cable to the console port.

Connect to the Management Ethernet Port

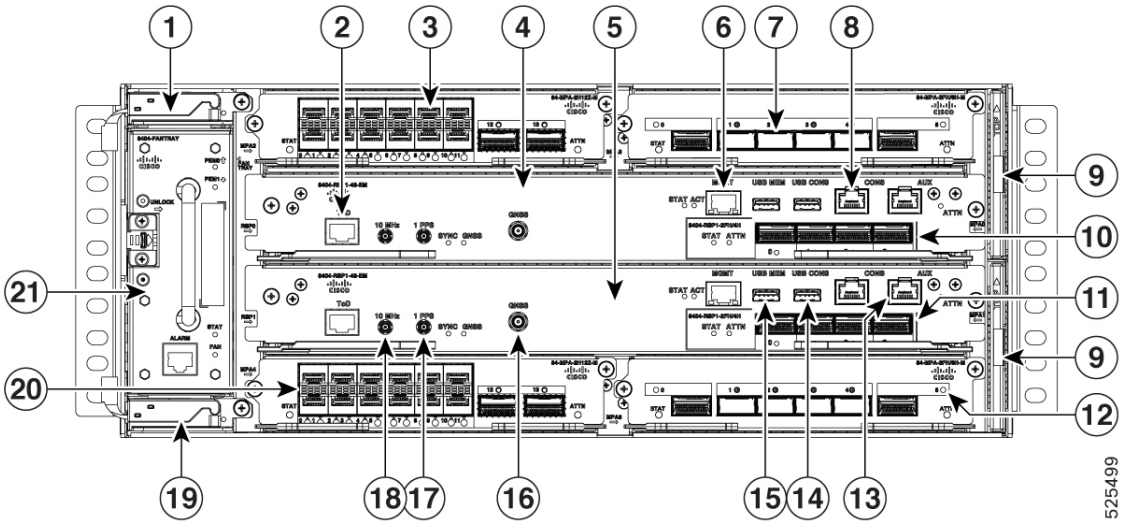
You must complete the initial router configuration.

The management Ethernet port provides out-of-band management, which enables you to use the Command Line Interface (CLI) to manage the router by its IP address. This port uses a 100/1000 Ethernet connection with an RJ45 interface.

Note To prevent an IP address conflict, do not connect the management Ethernet port until the initial configuration is complete.

To connect cables to the system management port, attach Category 5 cables directly to the RJ45 receptacle on the management Ethernet port.

Figure 16: Connect to the Management Ethernet Port



6	Management (MGMT) port

Note To comply with GR-1089-CORE, the intra-building port(s) of the equipment must use shielded intra-building cabling or wiring that is grounded at both ends.

1. Plug the cable directly into the RJ45 receptacle.
2. Connect the network end of your RJ45 cable to a switch, hub, repeater, or other external equipment.

Connecting Timing Cables

The following sections describe how to connect timing cables.

Connecting Cables to Timing Interfaces Card

Perform the following steps on how to connect cables from the router to a Timing Interfaces Card unit for input 10Mhz or 1PPS interface.

1. Connect one end of a mini-coax cable to the Timing Interfaces Card unit.
2. Connect the other end of the mini-coax cable to the 10MHz or 1PPS port on the router.

Install and Remove Transceiver Module

This section shows how to install and remove transceiver module.

Safety precautions for module installation and removal

Be sure to observe the following safety precautions when you work on the chassis.

Install and Remove SFP Modules

Before you remove or install an SFP or SFP+ module, read the installation information in this section.

Caution Protect all the unused ports by inserting clean dust covers or dust caps into them.

Caution Protect the line card by inserting a clean SFP/SFP+ module cage cover (shown in the following figure) into the optical module cage when there is no SFP or SFP+ module installed. The SFP/SFP+ module cage cover is not a standard part of the accessories kit.

Figure 17: SFP/SFP+ Module Cage Cover

Caution Protect the SFP or SFP+ modules by inserting clean dust covers into them after the cables are removed. Be sure to clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another module. Avoid getting dust and other contaminants into the optical ports of your SFP or SFP+ modules, because the optics do not work correctly when obstructed by dust.

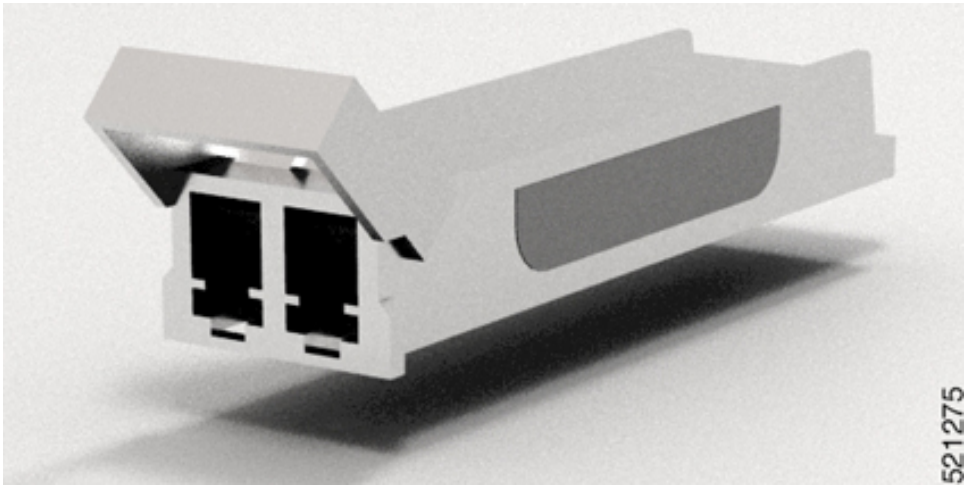
Caution We strongly recommend that you do not install or remove the SFP or SFP+ module with fiber-optic cables attached to it because of the potential of damaging the cable, the cable connector, or the optical interfaces in the module. Disconnect all cables before removing or installing an SFP or SFP+ module. Removing and inserting a module can shorten its useful life; so you should not remove and insert modules more than it is absolutely necessary.

Note When installing an SFP or SFP+ module, you would hear a click as the triangular pin on the bottom of the module snaps into position into the hole in the receptacle. The click indicates that the module is correctly seated and secured in the receptacle. Verify that the modules are completely seated and secured in their assigned receptacles on the line card by firmly pushing on each SFP or SFP+ module.

Bale Clasp SFP or SFP+ Module

The bale clasp SFP or SFP+ module has a clasp that you use to remove or install the module. (See the figure below.)

Figure 18: Bale Clasp SFP or SFP+ Module

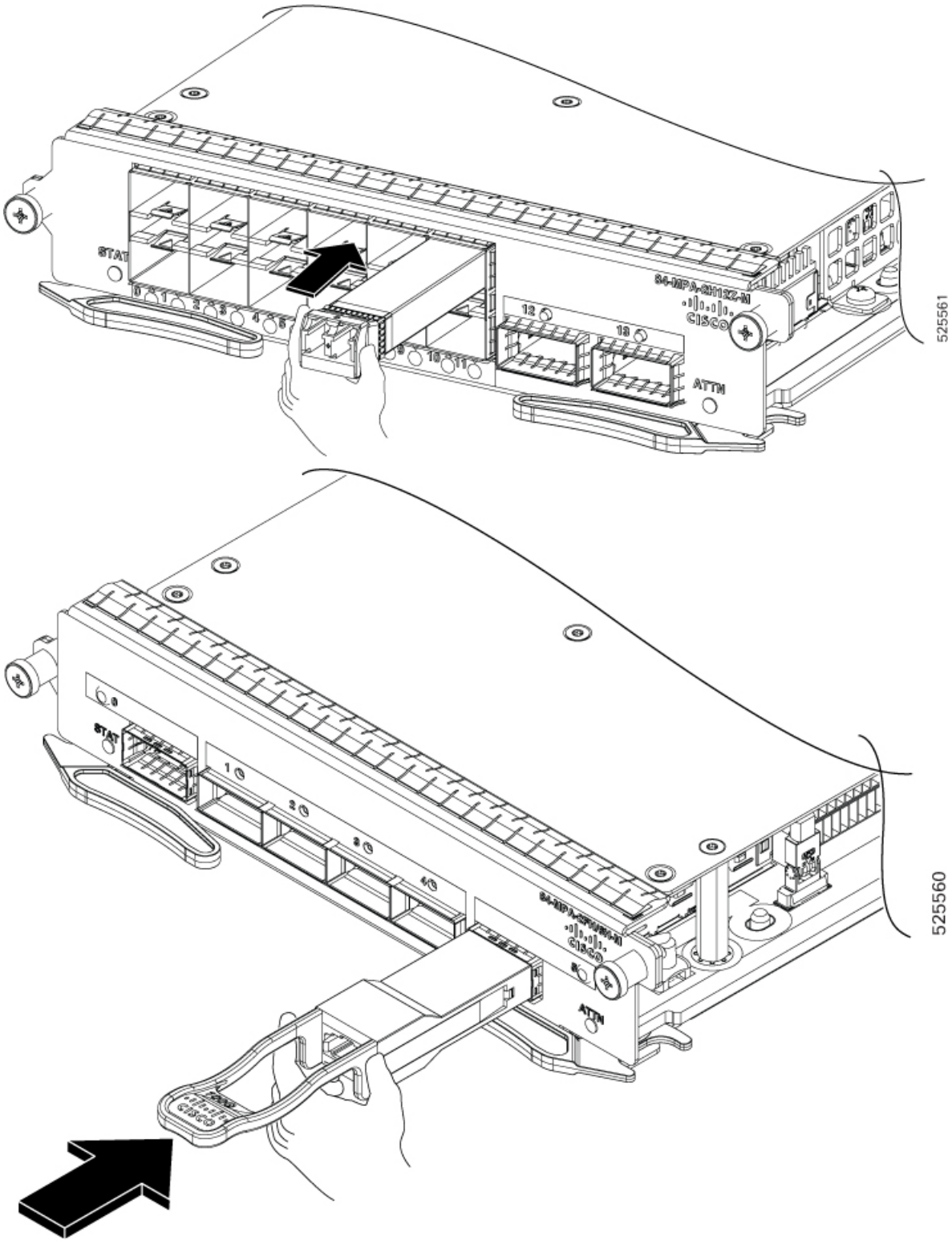


Install a Bale Clasp SFP or SFP+ Module

To install this type of SFP or SFP+ module:

1. Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
2. Close the bale clasp before inserting the SFP module.
3. Line up the SFP module with the port and slide it into the port. (See the figure below.)

Figure 19: Installing a Bale Clasp SFP Module into a Port



Note When installing an SFP or SFP+ module, you should hear a click as the triangular pin on the bottom of the SFP module snaps into the hole in the receptacle. This click indicates that the module is correctly seated and secured in the receptacle. Verify that the SFP modules are completely seated and secured in their assigned receptacles on the line card by firmly pushing on each SFP module.

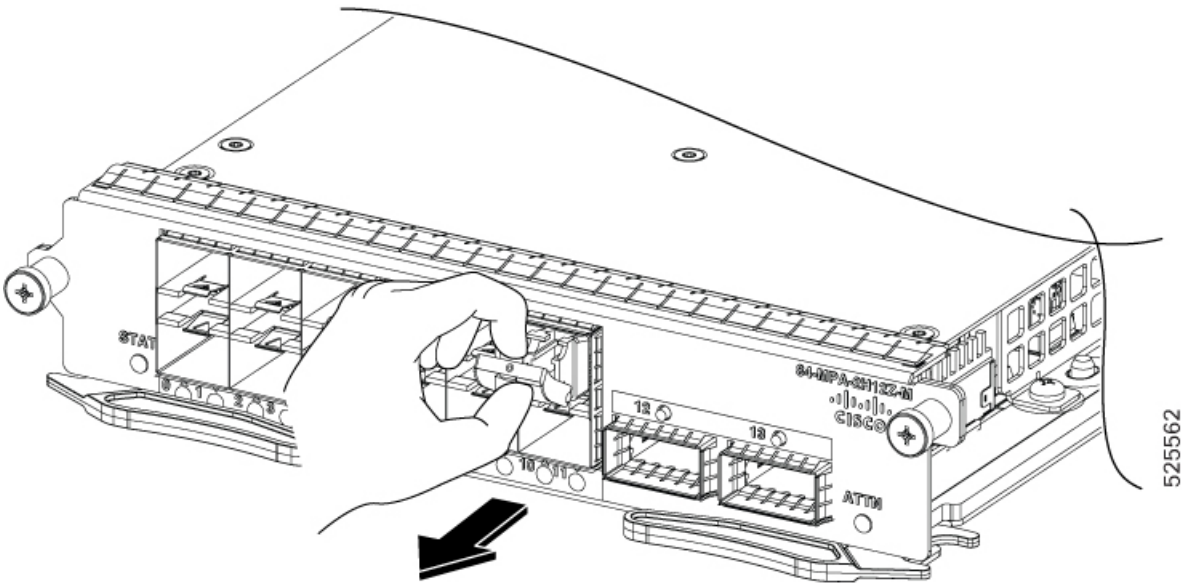
Remove a Bale Clasp SFP or SFP+ Module

To remove this type of SFP or SFP+ module:

1. Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
2. Disconnect and remove all interface cables from the ports; note the current connections of the cables to the ports on the line card.
3. Open the bale clasp on the SFP module with your index finger, as shown in the figure below. If the bale clasp is obstructed and if you cannot open it, use your index finger, use a small flat-blade screwdriver or other long, narrow instrument to open the bale clasp.
4. Grasp the SFP module between your thumb and index finger and carefully remove it from the port, as shown in the figure below.

Note This action must be performed during your first instance. After all ports are populated, this may not be possible.

Figure 20: Removing a Bale Clasp SFP or SFP+ Module



5. Place the SFP module that you removed on an antistatic mat, or immediately place it in a static shielding bag if you plan to return it to the factory.

6. Protect your line card by inserting a clean SFP module cage covers into the optical module cage when there is no SFP module installed.

Connect Interface Ports

You can connect optical interface ports on line cards with other devices for network connectivity.

Connect a Fiber-Optic Port to the Network

Depending on the line card model that you are using, you can use either QSFP+ or QSFP28 transceivers. Some transceivers work with fiber-optic cables that you attach to the transceivers and other transceivers work with pre-attached copper cables. When installing fiber-optic cables for a port, you must install SFP transceivers for 1-Gigabit optical ports or install SFP+ transceivers for 10-Gigabit optical ports or QSFP+ transceivers for 100-Gigabit ports before installing the fiber-optic cable in the transceivers.

Caution Removing and installing a transceiver can shorten its useful life. Do not remove and insert transceivers more than it is absolutely necessary. We recommended that you disconnect cables before installing or removing transceivers to prevent damage to the cable or transceiver.

Disconnect Optical Ports from the Network

When you need to remove fiber-optic transceivers, you must first remove the fiber-optic cables from the transceiver before you remove the transceiver from the port.

Maintain Transceivers and Optical Cables

To maintain high signal accuracy and to prevent damage to the connectors, transceivers and fiber-optic cables must be kept clean and free of dust. Attenuation (loss of light) is increased by contamination and should be below 0.35 dB.

Refer to Inspection and Cleaning Procedures for Fiber-Optic Connections document for inspection and cleaning processes for fiber optic connections.

Consider the following maintenance guidelines:

- Transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventative wrist strap that is connected to the grounded chassis.
- Do not remove and insert a transceiver more than it is necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. Clean them before use to prevent dust from scratching the fiber-optic cable ends.
- Do not touch the ends of connectors. Touching the ends would leave fingerprints and cause other contamination.
- Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or have been accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.

- Inspect routinely for dust and damage. Clean and then inspect fiber ends under a microscope to determine whether any damage has occurred.

Install and Remove QSFP Transceiver Modules

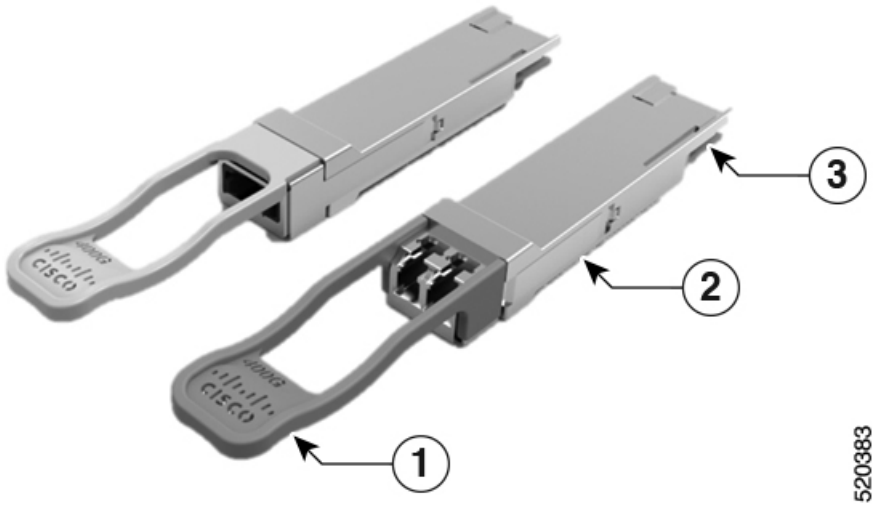
This section provides the installation, cabling, and removal instructions for the Quad Small Form-Factor Pluggable transceiver modules. Refer to the *Cisco Optical Transceiver Handling Guide* for additional details on optical transceivers.

Caution When inserting optical transceiver modules into host ports, handle them carefully. Ensure that the applied force does not exceed 20 lbs (9.1kg).

Note The router diagrams are provided for reference purposes only and may not represent the actual product.

The following figure shows a 400-Gigabit QSFP-DD optical transceiver.

Figure 21: 400-Gigabit QSFP-DD Transceiver Module



1	Pull-tab	2	QSFP-DD transceiver body
3	Electrical connection to the module circuitry		

Installing the Transceiver Module

Warning This icon is a hot surface warning. To avoid personal injury, do not touch without proper protection.

Caution The transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling transceiver modules or coming into contact with system modules.

Caution Protect the transceiver ports by inserting clean dust caps (8000-QSFP-DCAP) into any ports not in use and do not have optical modules plugged in. If optical modules are plugged in but not in use, the dust caps that were supplied with the optical modules, should be used to protect the TX and RX surfaces of the optical module.

Be sure to clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another module.

The router ships with dust caps plugged in. We highly recommend you to keep the dust caps plugged in until you are ready to plug an optic.

The dust caps protect the ports from possible EMI interference and also avoid contamination due to dust collection. To meet the EMI interference requirements, you must use the metal dust caps when the ports are not in use by optical modules.

The following table provides the supported port details and operating temperature of the QDD-400G-ZR-S and QDD-400G-ZRP-S optical modules when port side exhaust or port side intake fans and power supplies are used.

The QSFP transceiver module has a pull-tab latch. To install a transceiver module, follow these steps:

Procedure

Step 1 Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack.

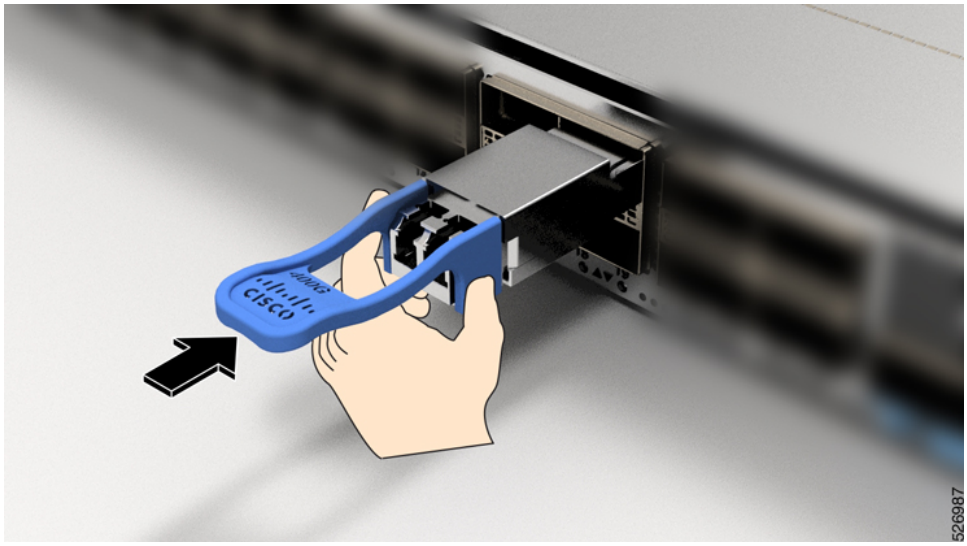
Step 2 Remove the transceiver module from its protective packaging.

Step 3 Check the label on the transceiver module body to verify that you have the correct model for your network. Do not remove the dust plug until you're ready to attach the network interface cable. Dust plug is not shown in the images.

Step 4 Hold the transceiver by the pull-tab so that the identifier label is on the top.

Step 5 Align the transceiver module in front of the module's transceiver socket opening and carefully slide the transceiver into the socket until the transceiver contact with the socket electrical connector.

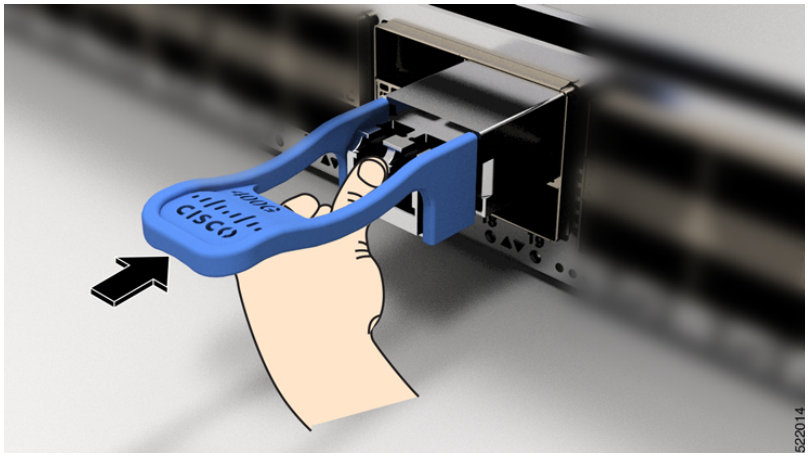
Figure 22: Installing the QSFP Transceiver Module



Step 6 Press firmly on the front of the transceiver module with your thumb to fully seat the transceiver in the module's transceiver socket (see the below figure).

Caution
If the latch isn't fully engaged, you might accidentally disconnect the transceiver module.

Figure 23: Seating the QSFP Transceiver Module



Attach the Optical Network Cable

Before you begin

Before you remove the dust plugs and make any optical connections, follow these guidelines:

- Keep the protective dust plugs installed in the unplugged fiber-optic cable connectors and in the transceiver optical bores until you are ready to make a connection.

- Inspect and clean the optical connector end faces just before you make any connections.
- Grasp the optical connector only by the housing to plug or unplug a fiber-optic cable.

Note The transceiver modules and fiber connectors are keyed to prevent incorrect insertion.

Note The multiple-fiber push-on (MPO) connectors on the optical transceivers support network interface cables with either physical contact (PC) or ultra-physical contact (UPC) flat polished face types. The MPO connectors on the optical transceivers do not support network interface cables with an angle-polished contact (APC) face type.

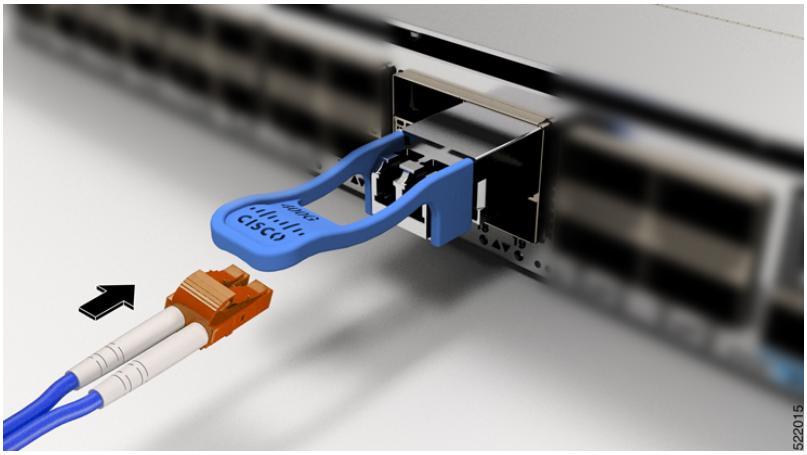
Note Inspect the MPO connector for the correct cable type, cleanliness, and any damage. For complete information on inspecting and cleaning fiber-optic connections, see the *Inspection and Cleaning Procedures for Fiber-Optic Connections* document.

Procedure

Step 1 Remove the dust plugs from the optical network interface cable MPO connectors and from the transceiver module optical bores. Save the dust plugs for future use.

Step 2 Attach the network interface cable MPO connectors immediately to the transceiver module.

Figure 24: Cabling a Transceiver Module



Removing the Transceiver Module

Caution The transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling transceiver modules or coming into contact with modules.

To remove a transceiver module, follow these steps:

Procedure

Step 1 Disconnect the network interface cable from the transceiver connector.

Step 2 Install the dust plug immediately into the transceiver's optical bore.

Step 3 Grasp the pull-tab and gently pull to release the transceiver from the socket.

Figure 25: Removing the QSFP Transceiver Module

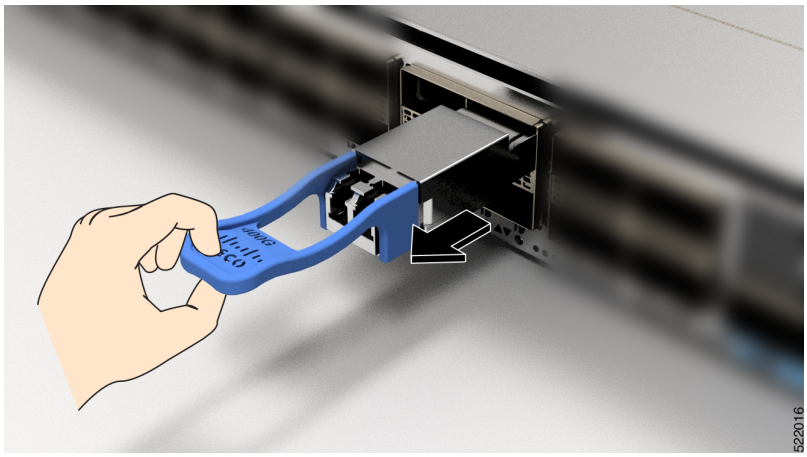
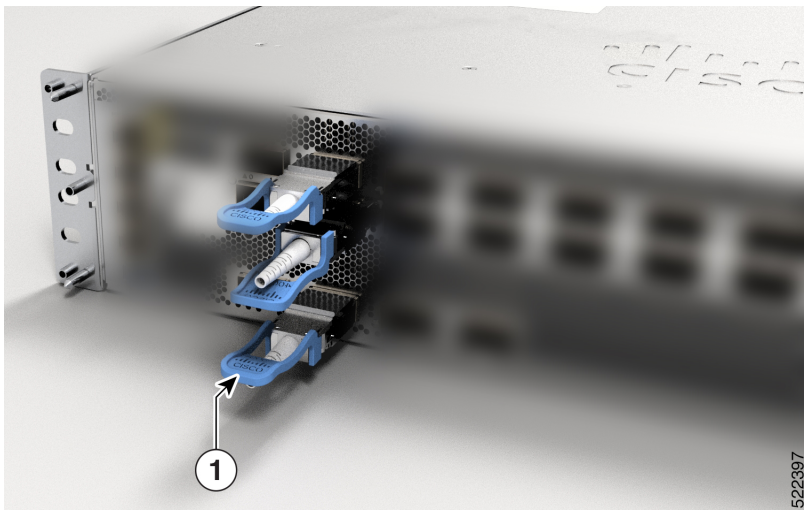


Figure 26: Removing the QSFP Transceiver Module from router



1	Grasp the pull-tab and gently pull to release the transceiver from the socket.

Step 4 Slide the transceiver out of the socket.

Step 5 Place the transceiver module into an antistatic bag.