

Install the Device

Before you begin this task, ensure that you have read and understood the safety warnings in the *Standard Warning Statements* section of the *Safety Warnings* handout.

Note The illustrations are for reference only and may vary based on your Cisco NCS 540 router variant. Any differences between the routers are called out.

Installing the Cisco NCS 540 large density router involves these tasks:

- Rack Compatibility, on page 1
- Set up Device on Rack, on page 4
- Ground the Device, on page 9
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- Install the DC Power Cables, on page 12
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- Maintain Transceivers and Optical Cables, on page 31

Rack Compatibility

We recommend that you follow these rack specifications.

Rack Types

Figure 1: Rack specification EIA (19 inches and 23 inches)

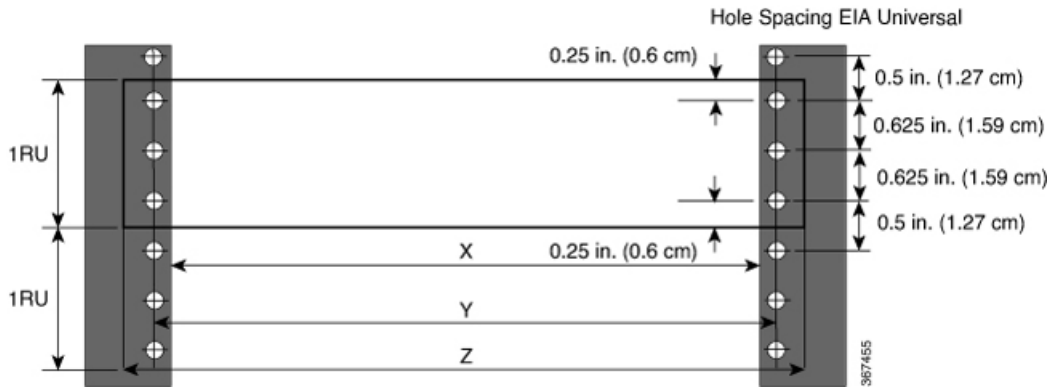
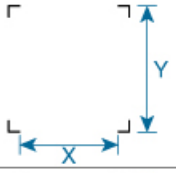
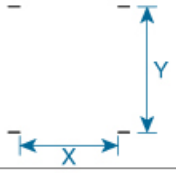
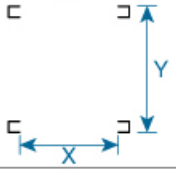


Table 1: Rack specification EIA (19 inches and 23 inches)

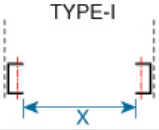
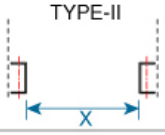
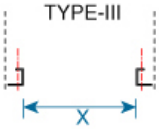
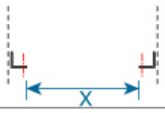
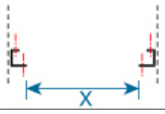
Post Type	Rack Type	Rack Front Opening (X)	Rack Mounting Hole Centre-Centre (Y)	Mounting Flange Dimension (Z)
4 Post	19 inches (48.3 centimeters)	17.75 inches (45 centimeters)	18.31 inches (46.5 centimeters)	19 inches (48.2 centimeters)
2 Post				
4 Post	23 inches (58.4 centimeters)	21.75 inches (55.24 centimeters)	22.31 inches (56.6 centimeters)	23 inches (58.4 centimeters)
2 Post				

Figure 2: Four Post Rack Type

4 – Post Type (Hole EIA Universal)		Width Available (X)	Compatibility
All 23” Type rack		552.45mm (21.75”)	Yes
All ETSI rack (21” rack)		500.0mm (19.68”)	Yes
19” Type rack L-Type Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No
19” Type Racks Flat-Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No
19” Type racks C- Type Post		17.75” (450.8 mm)	Yes
		17.50” (444.5 mm)	No

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Figure 3: Two Post Rack Type

2 – Post Type (Hole EIA Universal)	X – 19" Rack	Compatibility	X-23" Rack	Compatibility
TYPE-I 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
TYPE-II 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
TYPE-III 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
L-TYPE 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes
Uneven-TYPE 	17.75" (450.8 mm)	Yes	21.75" (552.45mm)	Yes
	17.50" (444.5 mm)	No	21.75" (552.45mm)	Yes

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Set up Device on Rack

You can set up the Cisco NCS 540 large density router on a rack.

Rack Mount

The device is shipped with rack mounting brackets that are to be secured on the sides of the device.

Caution If the rack is on wheels, ensure that the brakes are engaged or the rack is otherwise stabilized.

Table 2: Cisco N540-24Q8L2DD-SYS Router Rack-Mount Kit

Quantity	Part Description
2	Rack-mount brackets
8	M4 x 0.7 x 7-mm Phillips flat-head screws
4	12-24 x 0.49 inches L, Philips pan head screws

1. Attach the rack-mount brackets and the cable guides to the router as follows:
   a. The router has port-side intake modules, position the router so that its ports are facing the cold aisle.
   b. Position the bracket ears facing front or middle rack-mount, on the side of the chassis so that the holes are aligned.
   c. Use four M4 screws to attach the brackets to the chassis.
   d. Repeat Steps 1b and 1c with the other rack-mount bracket on the other side of the router.

Figure 4: Installing 19-inch Rack-Mount Brackets (N540DD-RKM-19)

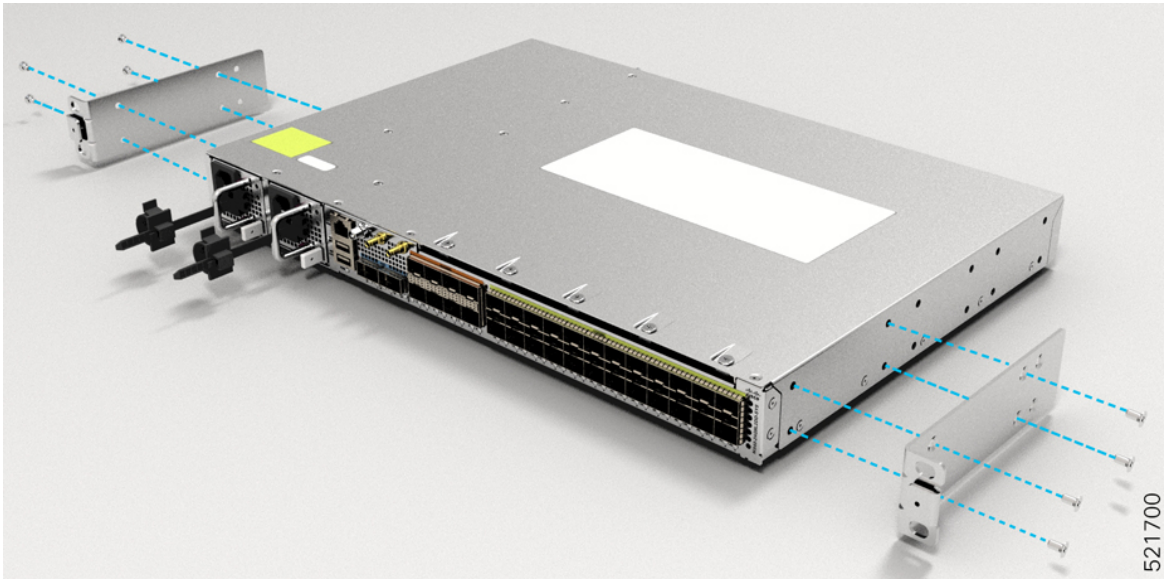


Figure 5: Installing Cable Management (N540-CBL-BRKT-FHC) and 19 inch Rack-Mount Brackets (N540DD-RKM-19) in the Front

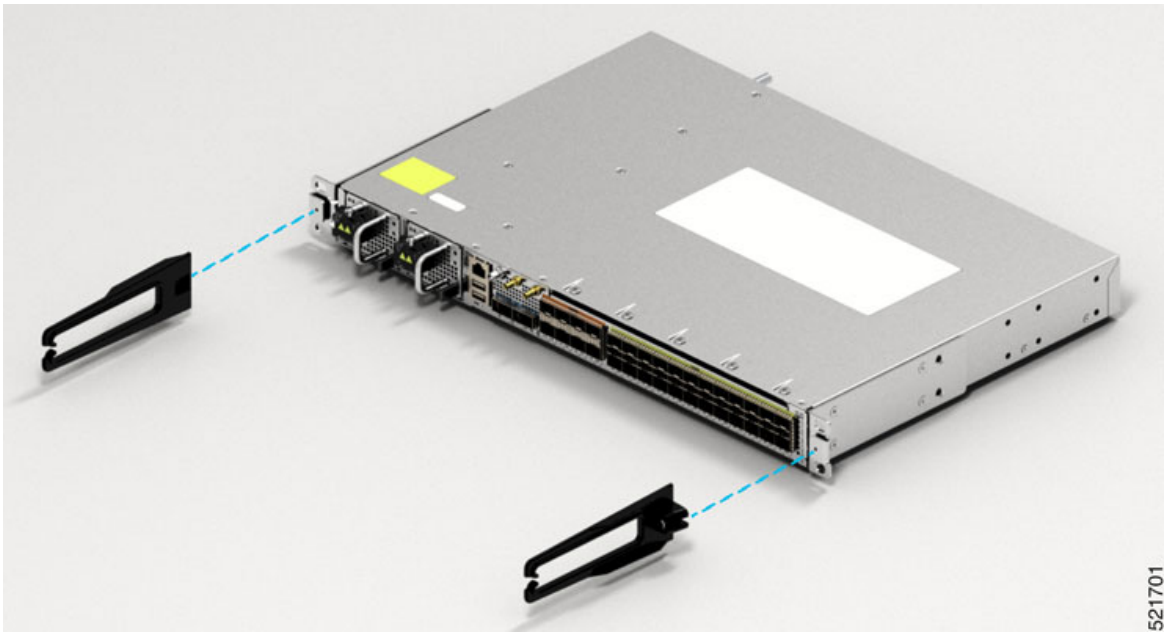


Figure 6: Installing Cable Management (N540-CBL-BRKT-FHC) and 19 inch Rack-Mount Brackets (N540DD-RKM-19) in the Middle

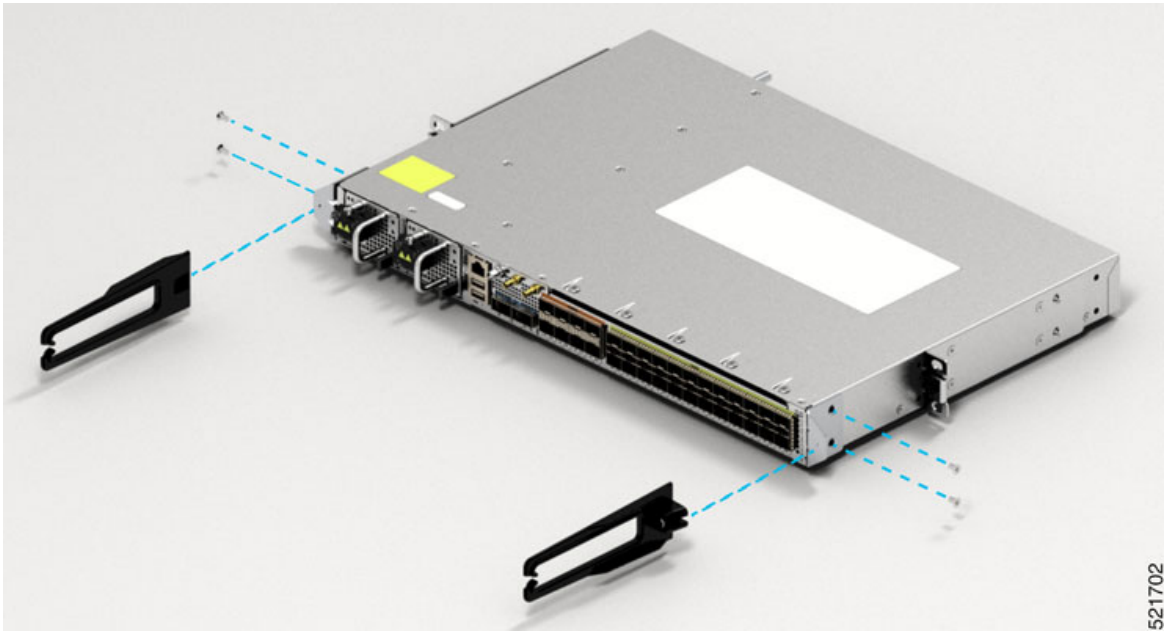


Figure 7: Installing Cable Management (N540-CBL-BRKT-FHC) and 19 inch Rack-Mount Brackets (N540DD-RKM-19) in the Rear

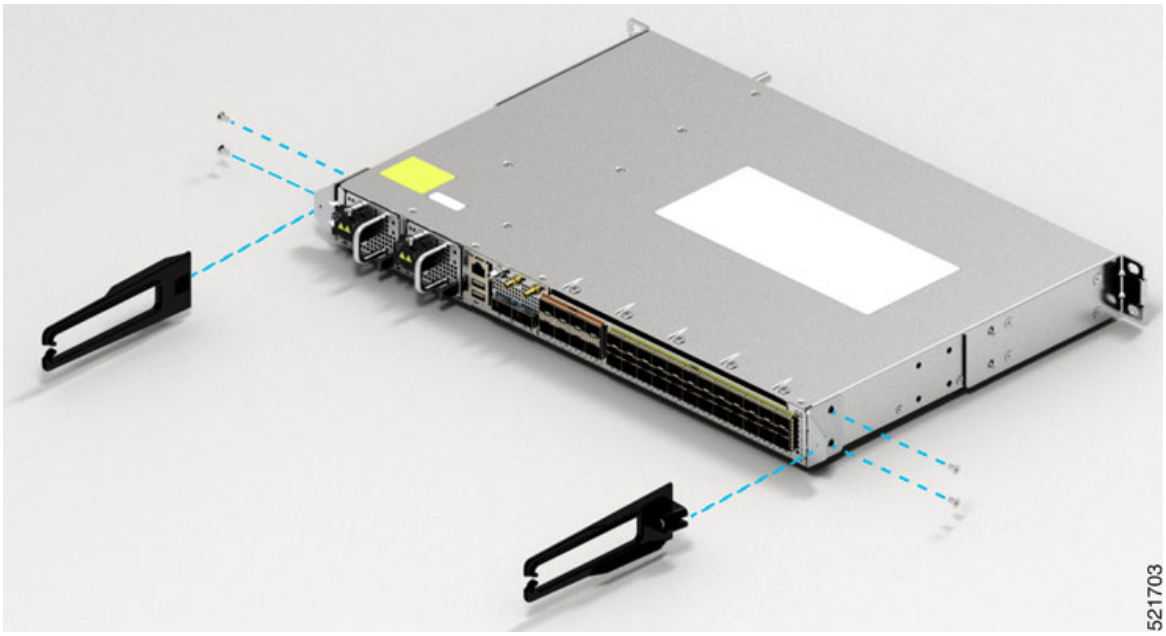


Figure 8: Installing ETSI Rack-Mount Brackets (N540-RKM-ETSI-FHC)

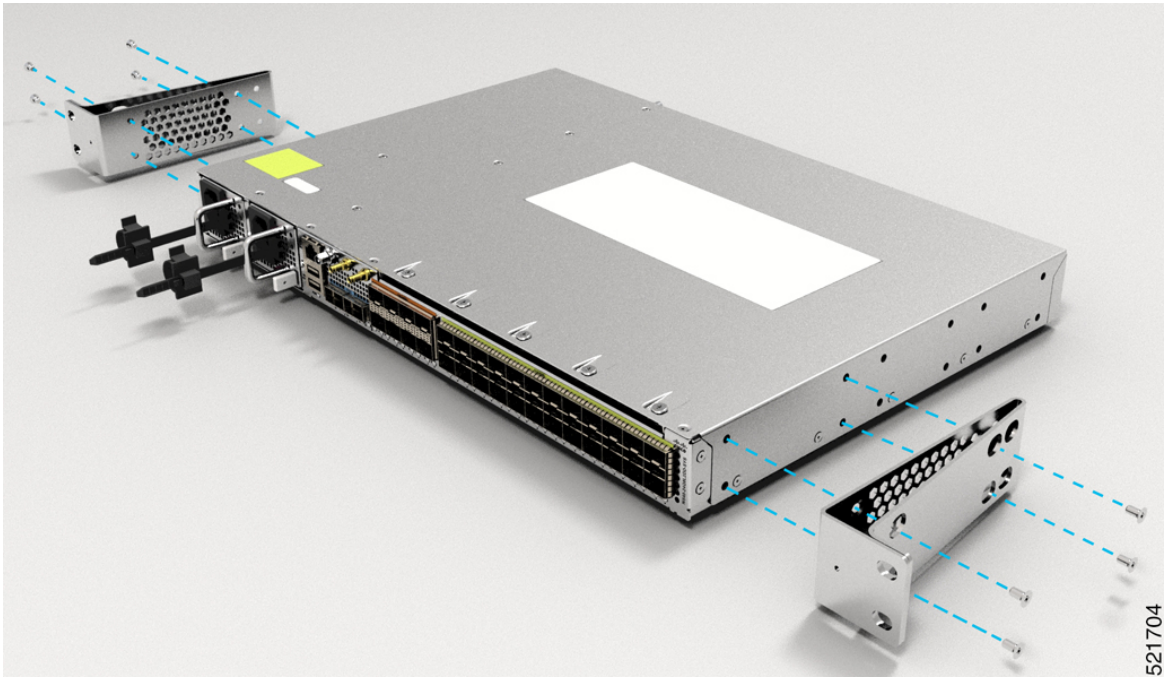


Figure 9: Installing Cable Management (N540-CBL-BRKT-FHC) and ETSI Rack-Mount Brackets (N540-RKM-ETSI-FHC) in the Front

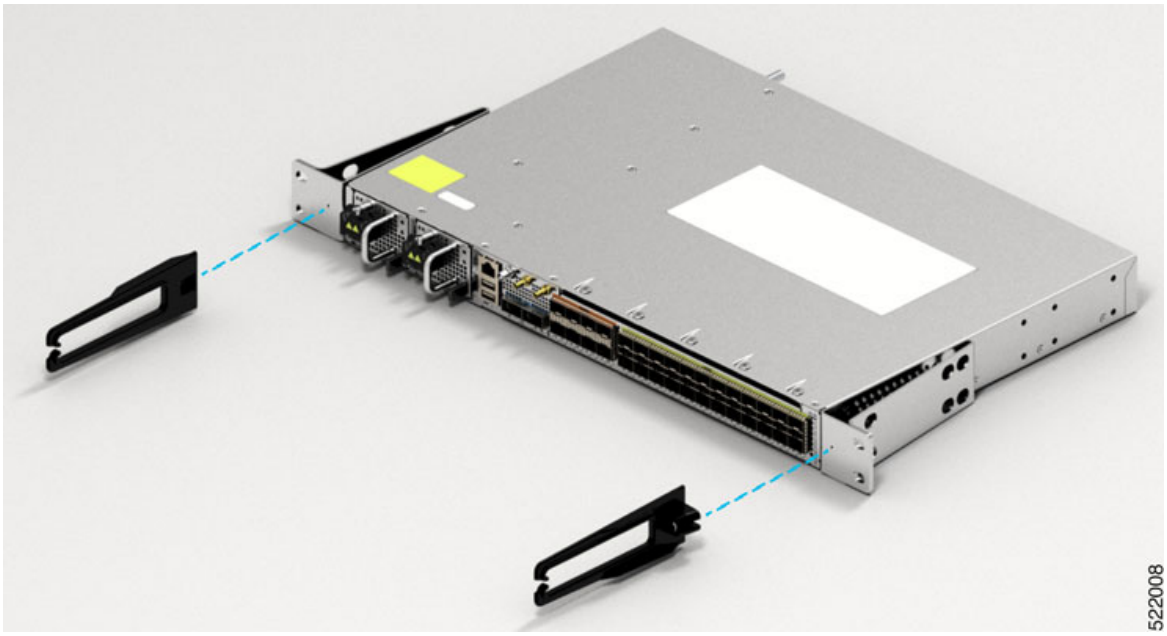
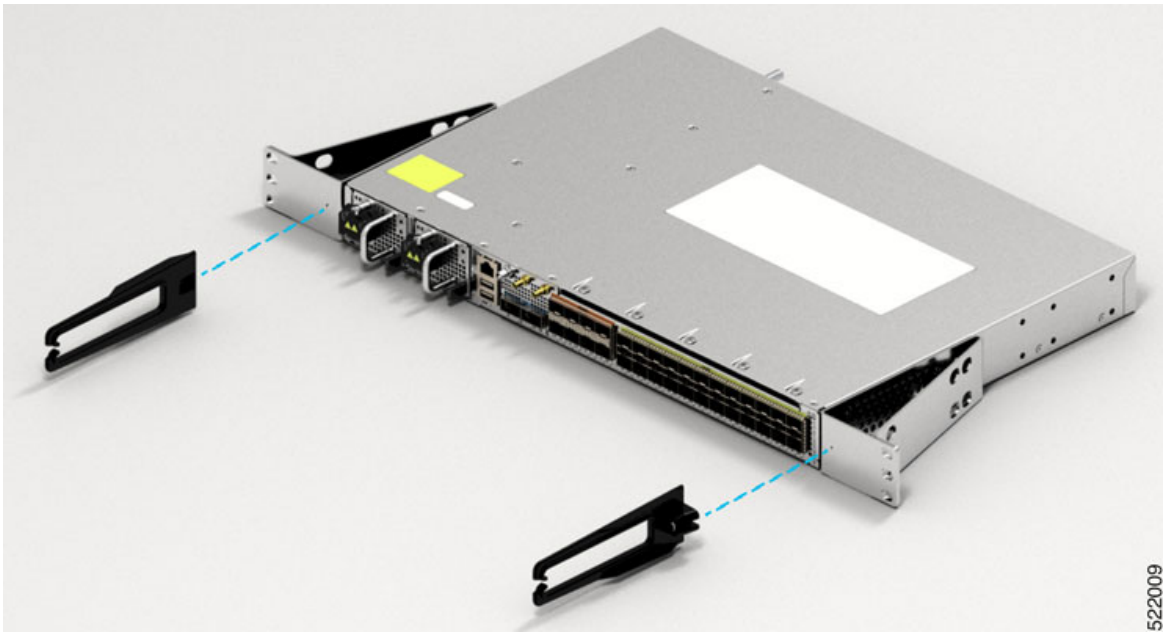


Figure 10: Installing 23-inch Rack-Mount Brackets (N540-RKM-23-FHC)



Figure 11: Installing Cable Management (N540-CBL-BRKT-FHC) and 23-inch Rack-Mount Brackets (N540-RKM-23-FHC) in the Front



Ground the Device

Before you begin this task, ensure that you have read and understood the safety warnings in the Preventing ESD Damage section of the *Safety Warnings* handout.

Before you connect the power or turn on the power to the device, you must provide an adequate device ground (earth) connection to your device.

This section describes how to ground the device. The grounding lug location is on the back panel of the device.

1. Verify that the ground cable is connected to the top of the rack and according to local site practice.

Figure 12: Ground Lug



2. Attach one end of the shelf ground cable (#6 AWG cable) to the ground point on the rear of the chassis using the specified dual-hole lug connector.
   - Use a wire-stripping tool to remove approximately 0.75 inches (19 mm) of the covering from the end of the grounding cable.
   - Insert the stripped end of the grounding cable into the open end of the grounding lug.
   - Use the crimping tool to secure the grounding cable in the grounding lug.
   - Remove the adhesive label from the grounding pad on the chassis.
   - Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two M4 screws with washers through the holes in the grounding lug and into the grounding pad.
   - Ensure that the lug and cable do not interfere with other equipment.
   - Prepare the other end of the grounding cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.

Install the AC Power Cables

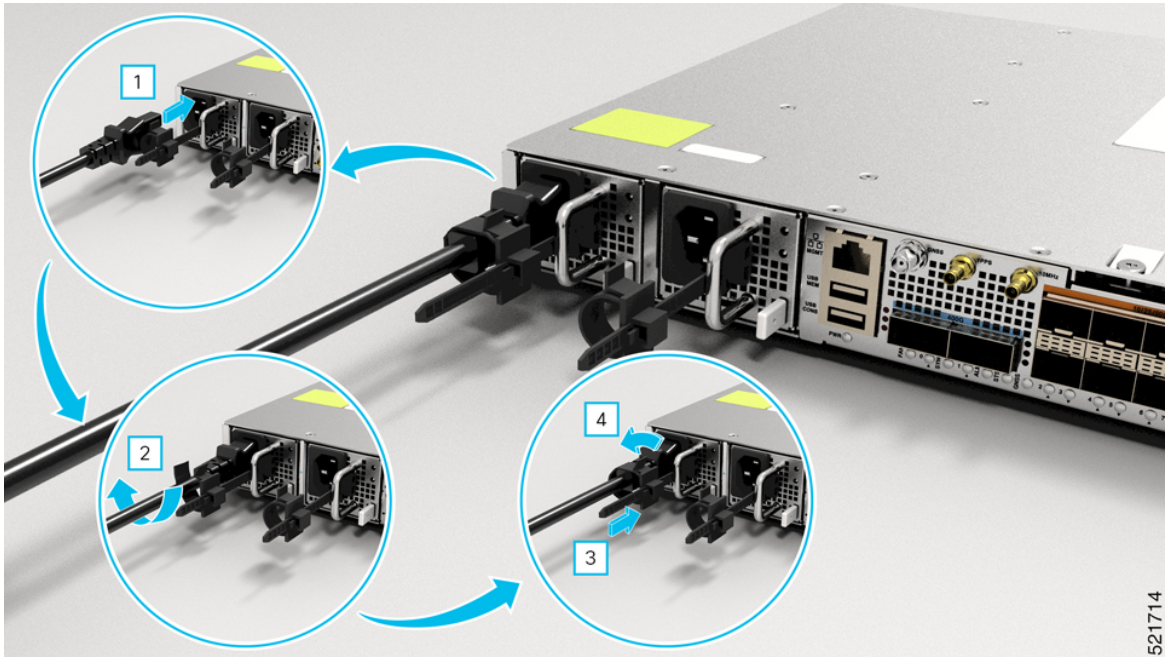
Refer *Chapter 6: Replace Power Supply* for more information about AC power cables installation.

To install the AC power cables in the power supply slots:

1. Plug the power supply cord in the power supply module.

2. Insert the power supply cord into the tie [1, 3] and tighten the tie around the power supply cord as shown in [2, 4] in the figure below.

Figure 13: Attach the AC Power Tie-and-Clip Cord



Note These images are for only representation purposes.

Activate an AC Power Supply Module

Perform the following procedure to activate an AC power supply:

Procedure

Step 1 Plug the power cord into the power supply.

Step 2 Connect the other end of the power cord to an AC-input power source.

Step 3 Verify power supply operation by checking if the respective power supply front panel LED (PM0 or PM1) is green.

Step 4 If the LEDs indicate a power problem, see *Troubleshooting* for troubleshooting information.

Step 5 If you are also connecting a redundant AC power supply, repeat these steps for the second power source.

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

Install the DC Power Cables

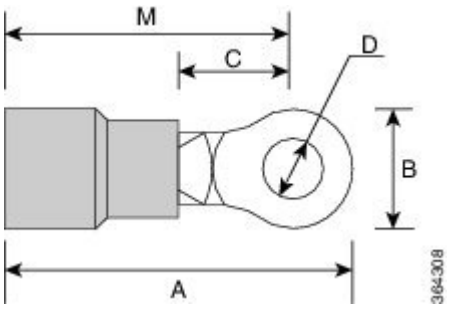
Note When installing DC power supply, use 12AWG, 90°C temperature rated cable. The recommanded cable length is three meters maximum from source. For lengths up to five meters, use 10AWG, and for lengths up to three meters, use 12AWG, 90°C temperature rated cable. For other lengths, contact Cisco.

Note

- Always ensure that the building's installation for short-circuit (overcurrent) protection does not exceed 15A.
- We recommend using a circuit breaker or a fast acting fuse with a maximum DC rating of 10A for over current protection.

Note The DC connector or terminal block has an in-built screw and cage nut to which a torque of 1.3 to 1.8 N-m may be applied.

Figure 14: DC Connector with In built Screw



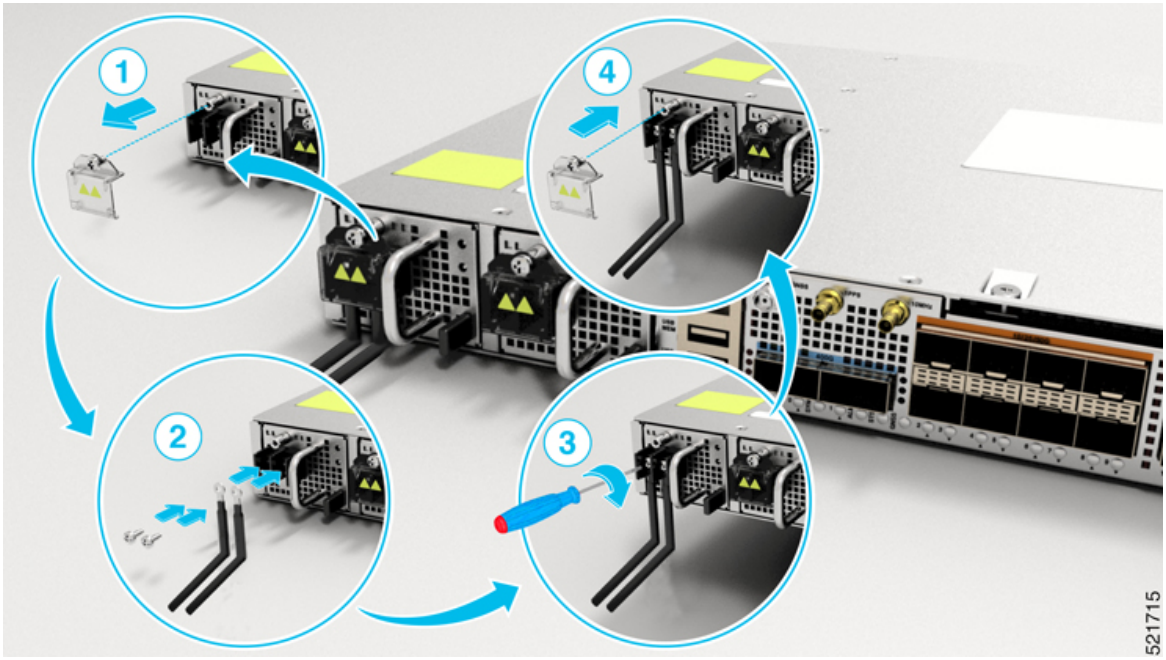
A	0.74 in. (1.88 cm)	C	0.18 in. (0.46 cm)
B	0.25 in. (0.64 cm)	D	0.14 in. (0.36 cm)
M	0.62 in. (1.58 cm)		

To attach the DC power supplies:

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 15: Attach the DC Power Supply Wires



Activate a DC Power Supply Module

Perform the following procedure to activate a DC power supply:

Procedure

Step 1 Remove the tape from the circuit-breaker router handle, and restore power by moving the circuit-breaker router handle to the On (|) position.

Step 2 Verify the power supply operation by checking whether the respective power supply front panel LED (PM0 or PM1) is green.

Step 3 If the LEDs indicate any issues with power problem, see *Troubleshooting*.

Step 4 If you are also connecting a redundant DC power supply, repeat these steps for the second power source.

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

Port Connection Guidelines

Depending on the chassis and installed line cards, you can use pluggables QSFP56-DD, QSFP28-DD, QSFP28, QSFP, SFP56, SFP28, SFP10, SFP, USB console, and RJ-45 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.
    - Network cabling should already be routed to the location of the installed router.

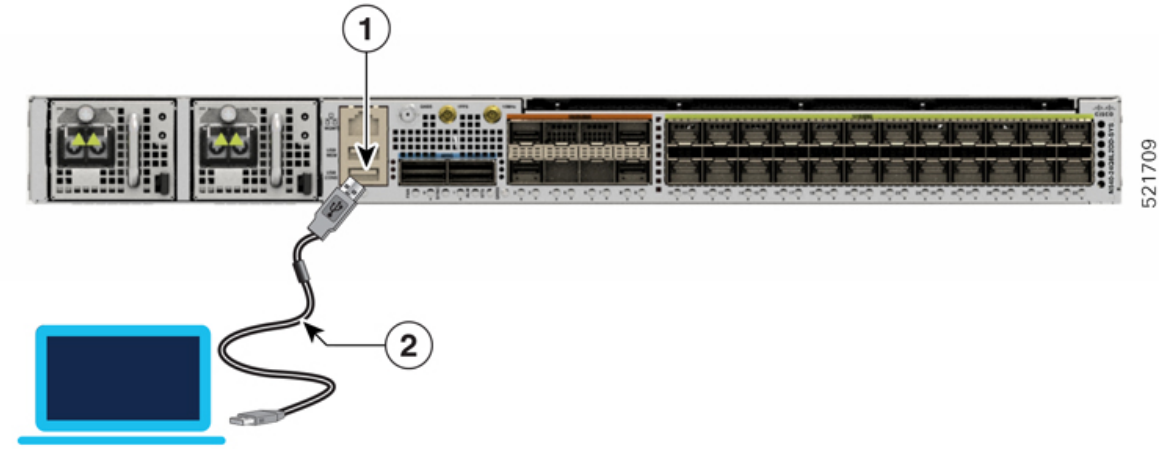
Before you create a network management connection for the router or connect the router to the network, you must create a local management connection through a console terminal and configure an IP address for the router. You also can use the console to perform the following functions (each of which can 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.

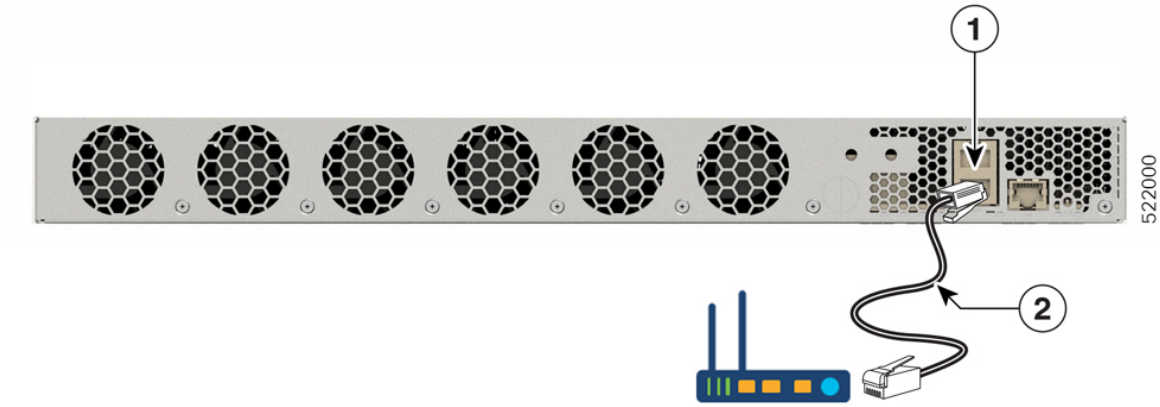
The system console port is an RJ-45 receptacle or USB console for connecting a data terminal to perform the initial configuration of the router.

Figure 16: Connecting the USB Console Cable to the Front of Chassis



1	USB Type-A connector	2	USB cable

Figure 17: Connecting RJ-45 Console Cable to the RJ-45 Console Port at Rear End of the Chassis



1	RJ-45 console port	2	RJ-45 console 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.

Table 3: RJ-45 Straight-through Cable Pin-outs

RJ-45 Pin	Signal
1	—
2	—
3	Tx
4	Ground (GND)
5	GND
6	Rx
7	—
8	—

Connect to the Management Ethernet Port

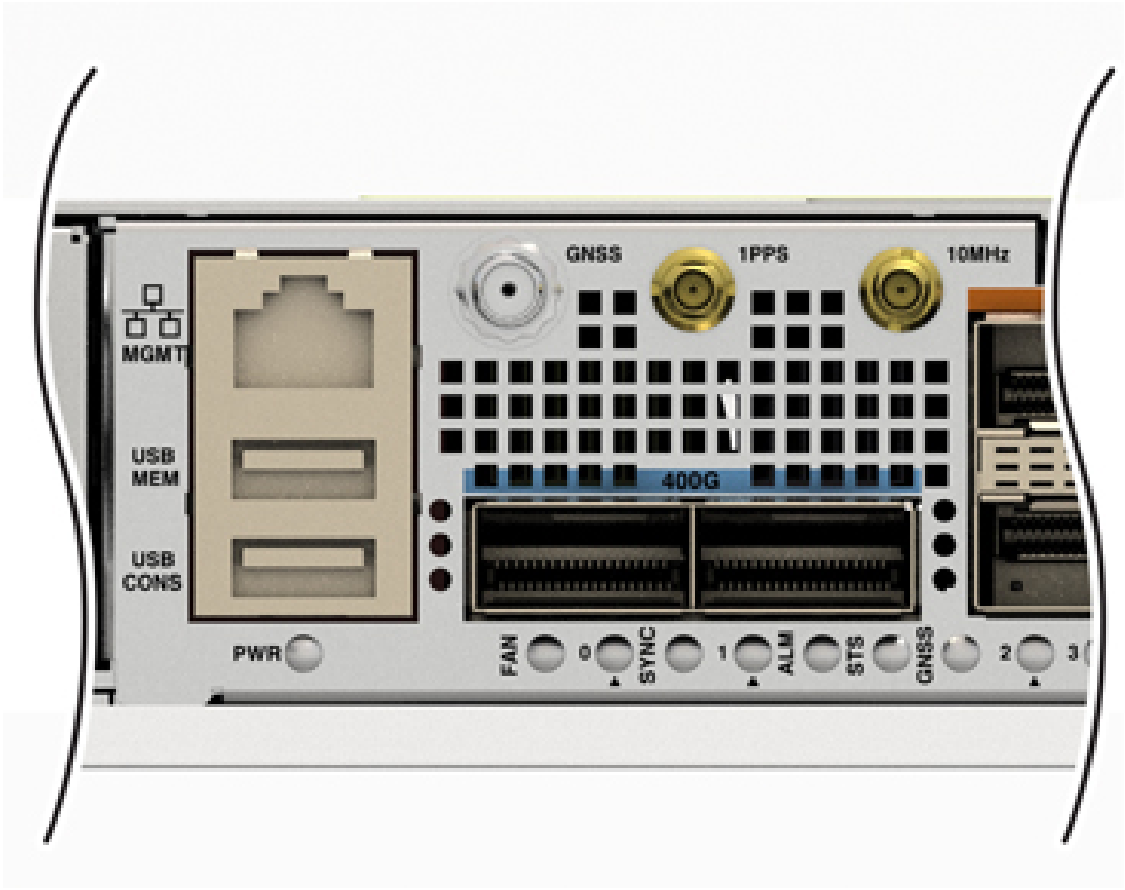
You must complete the initial router configuration.

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 10/100/1000 Ethernet connection with an RJ-45 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 RJ-45 receptacle on the management Ethernet port.

Figure 18: Management Ethernet 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 RJ-45 receptacle.
2. Connect the network end of your RJ-45 cable to a switch, hub, repeater, or other external equipment.

Connecting Timing Cables

The following sections describe how to connect timing cables.

Connecting a Cable to the Input 10MHz or 1PPS Interface

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

Connecting a Cable to the Output 10MHz or 1PPS Interface

Procedure

Step 1 Connect one end of a mini-coax cable to the Slave unit.

Step 2 Connect the other end of the mini-coax cable to the 10MHz or 1PPS port of the router.

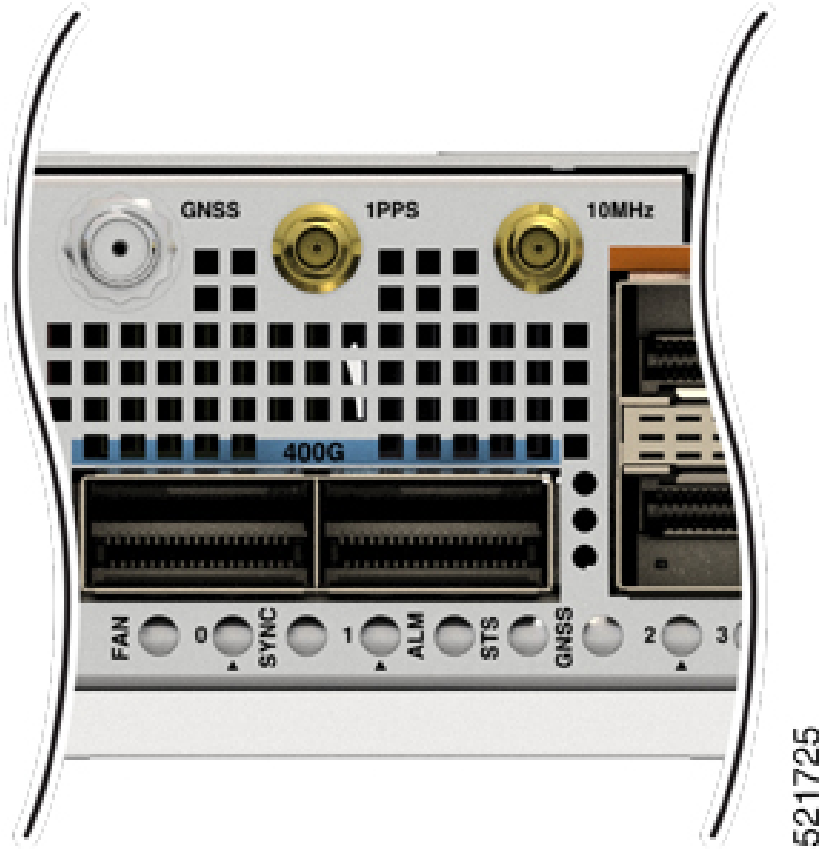
Connecting a Cable to the GNSS Antenna Interface

1. Connect one end of a shielded coaxial cable to the GNSS RF IN port.
2. Connect the other end of the shielded coaxial cable to the GNSS antenna after the primary protector.

Note The GNSS RF In port should have a primary protector installed to meet the Local Safety guidelines.

The GNSS RF In coaxial cable shield must be connected to the Facility Equipment Ground through the chassis. The chassis must have the ground wire connected to the Facility Equipment Ground.

Figure 19: GNSS Receiver



Install and Remove Transceiver Module

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

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.

Warning **Statement 1006—**Chassis Warning for Rack-Mounting and Servicing

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Warning **Statement 1008—**Class 1 Laser Product

This product is a Class 1 laser product.

Warning **Statement 1089—**Instructed and Skilled Person Definitions

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.

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

Warning **Statement 1090—**Installation by Skilled Person

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

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

Install and Remove SFP56, SFP28, SFP10, and SFP Modules

Before you remove or install an SFP56, SFP28, SFP10, and SFP module, read the installation information in this section.

Warning **Statement 1055—**Class 1/1M Laser

Invisible laser radiation is present. Do not expose to users of telescopic optics. This applies to Class 1/1M laser products.



Warning **Statement 1056—**Unterminated Fiber Cable

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments, for example, eye loupes, magnifiers, and microscopes, within a distance of 100 mm, may pose an eye hazard.

Caution Protect the line card by inserting a clean SFP56, SFP28, SFP10, and SFP module cage cover, shown in the figure below, into the optical module cage when there is no SFP56, SFP28, SFP10, and SFP module installed.

Figure 20: SFP56, SFP28, SFP10, and SFP Module Cage Cover



Caution Protect the SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and SFP modules, because the optics do not work correctly when obstructed by dust.

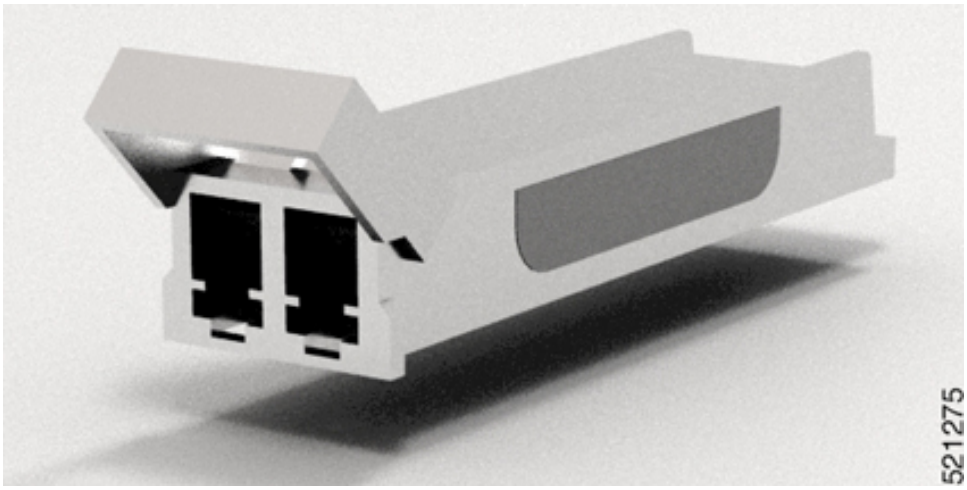
Caution We strongly recommended that you do not install or remove the SFP56, SFP28, SFP10, and SFP module with fiber-optic cables attached to it because of the potential of damaging the cable, the cable connector, or the optical interfaces in the module. Disconnect all cables before removing or installing an SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and SFP module.

Bale Clasp SFP56, SFP28, SFP10, and SFP Module

The bale clasp SFP56, SFP28, SFP10, and SFP module has a clasp that you use to remove or install the module. (See the figure below.)

Figure 21: Bale Clasp SFP56, SFP28, SFP10, and SFP Module

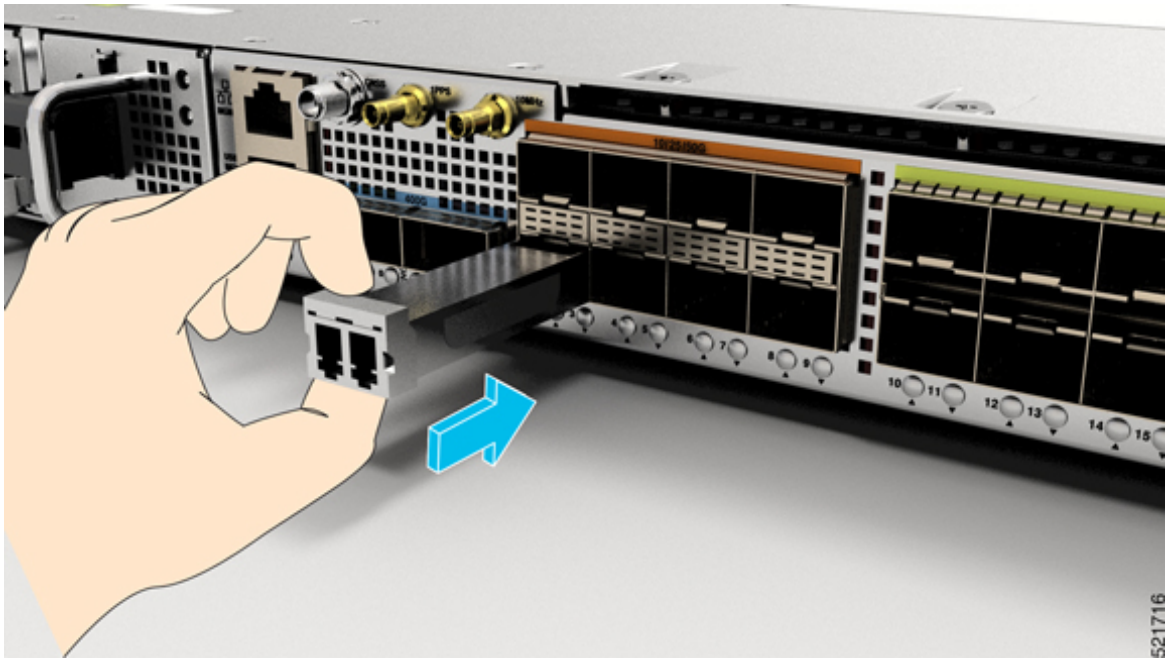


Install a Bale SFP56, SFP28, SFP10, and SFP Module

To install this type of SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and SFP module.
3. Line up the SFP56, SFP28, SFP10, and SFP module with the port and slide it into the port. (See the figure below.)

Figure 22: Installing a Bale Clasp SFP56, SFP28, SFP10, and SFP Module into a Port onthe router



Note When installing an SFP56, SFP28, SFP10, and SFP module, you should hear a click as the triangular pin on the bottom of the SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and SFP modules are completely seated and secured in their assigned receptacles on the line card by firmly pushing on each SFP56, SFP28, SFP10, and SFP module.

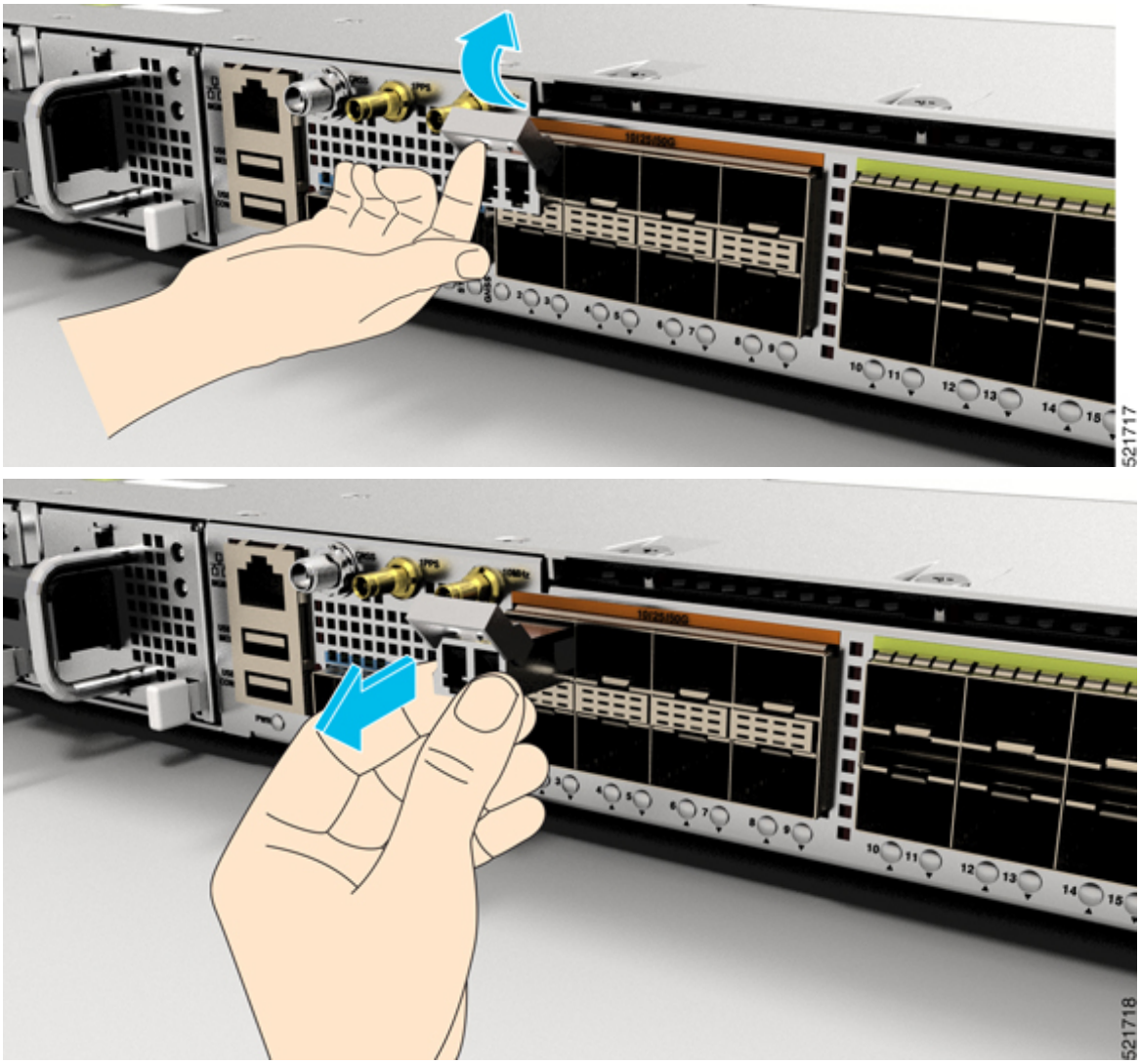
Remove a Bale Clasp SFP56, SFP28, SFP10, and SFP Module

To remove this type of SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and 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 23: Removing a Bale Clasp SFP56, SFP28, SFP10, and SFP Module on the router



5. Place the SFP56, SFP28, SFP10, and 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 SFP56, SFP28, SFP10, and SFP module cage covers into the optical module cage when there is no SFP56, SFP28, SFP10, and SFP module installed.

Install and Remove QSFP+, QSFP28, or QSFP-DD Transceiver Modules

Before you remove or install an QSFP+, QSFP28, or QSFP-DD module, read the installation information in this section.

Warning **Statement 1073—**No User-Serviceable Parts

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

Warning **Statement 1089—**Instructed and Skilled Person Definitions

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.

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

Warning **Statement 1090—**Installation by Skilled Person

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

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

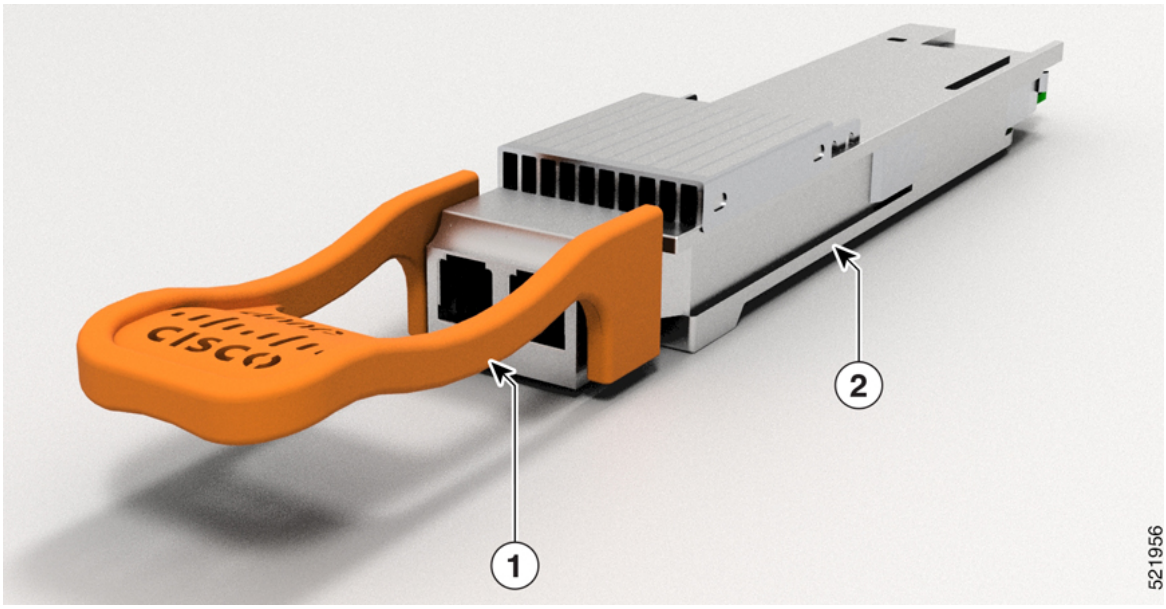
Warning **Statement 1091—**Installation by an Instructed Person

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.

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

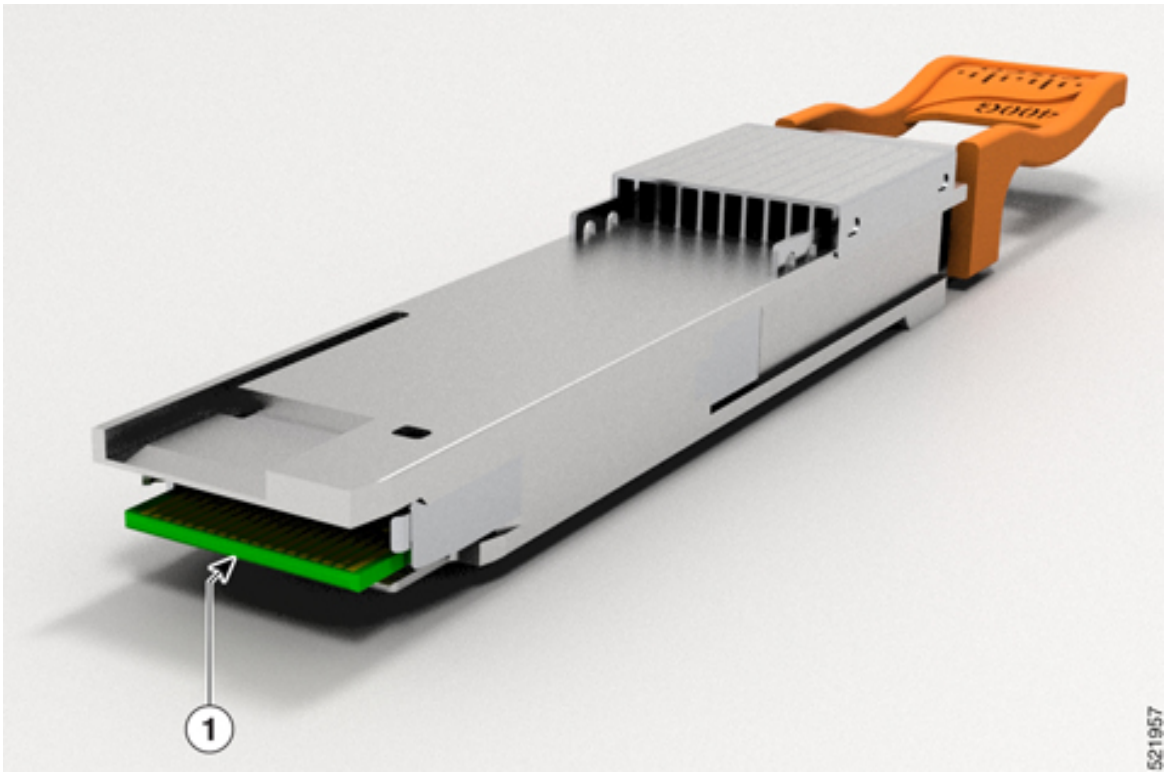
This section provides the installation, cabling, and removal instructions for the 40-Gigabit Quad Small Form-Factor Pluggable Plus (QSFP+), 100 Gigabit (QSFP28), and 200/400-Gigabit QSFP-DD transceiver modules. The modules are hot-swappable input/output (I/O) devices that connect the system's module port electrical circuitry with either a copper or a fiber-optic network. The 100-Gigabit QSFP28 and 40-Gigabit QSFP+ optical transceivers are similar to QSFP-DD optical transceiver shown in the figure below.

Figure 24: QSFP-DD Transceiver Module (Optical)



1	Bale clasp latch
2	QSFP-DD transceiver body

Figure 25: QSFP-DD Transceiver Module (Optical)



1	Electrical connection to the module circuitry

Required Tools and Equipment

You need these tools to install the transceiver modules:

- Wrist strap or other personal grounding device to prevent ESD occurrences.
- Antistatic mat or antistatic foam to set the transceiver on.
- Fiber-optic end-face cleaning tools and inspection equipment.

Install the 40-Gigabit QSFP+, 100-Gigabit QSFP28, or 200/400-Gigabit QSFP-DD Transceiver Module

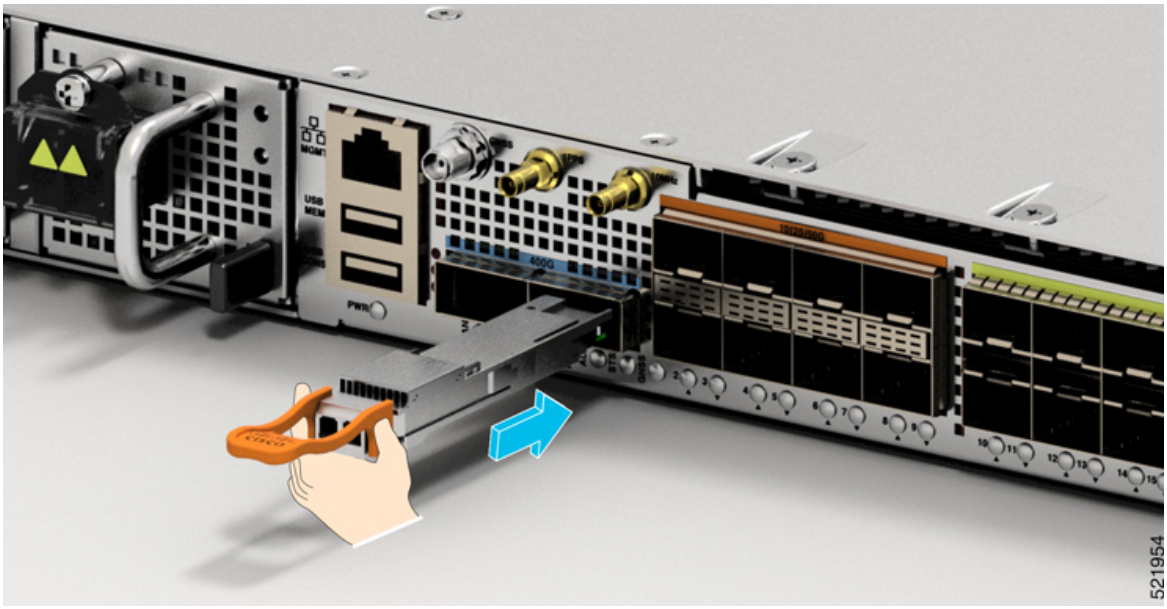
Note The QSFP+, QSFP28, or QSFP-DD transceiver module can have either a bale-clasp latch or a pull-tab latch. Installation procedures for both types of latches are provided.

Caution The QSFP+, QSFP28, or QSFP-DD transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling QSFP+, QSFP28, or QSFP-DD transceiver modules or coming into contact with system modules.

To install an QSFP+, QSFP28, or QSFP-DD transceiver module, follow these steps:

1. Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack.
2. Remove the transceiver module from its protective packaging.
3. Check the label on the transceiver module body to verify that you have the correct model for your network.
4. For transceiver modules, remove the optical bore dust plug and set it aside.
5. For transceiver modules equipped with a pull-tab, hold the transceiver so that the identifier label is on the top.
6. For transceiver modules equipped with a bale clasp latch, keep the bale clasp aligned in a vertical position.
7. Align the transceiver module in front of the module's transceiver socket opening and carefully slide the transceiver into the socket until the transceiver makes contact with the socket electrical connector (see the figure below).

Figure 26: Installing a Bale Clasp QSFP+, QSFP28, or QSFP-DD Transceiver Module on N540-24Q8L2DD-SYS



8. Press firmly on the front of the QSFP+, QSFP28, or QSFP-DD transceiver module with your thumb to fully seat the transceiver in the module's transceiver socket.

Caution If the latch is not fully engaged, you might accidentally disconnect the QSFP+, QSFP28, or QSFP-DD transceiver module.

9. For optical QSFP+, QSFP28, or QSFP-DD transceiver modules, reinstall the dust plug into the transceivers optical bore until you are ready to attach the network interface cable. Do not remove the dust plug until you are ready to attach the network interface cable.

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

Note 40-Gigabit QSFP+, QSFP28, or QSFP-DD transceiver modules are keyed to prevent incorrect insertion.

Note The Multiple-fiber Push-On (MPO) connectors on the optical QSFP+, QSFP28, or QSFP-DD 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 QSFP+, QSFP28, or QSFP-DD transceivers do not support network interface cables with an angle-polished contact (APC) face type.

To attach the optical network cable:

1. Remove the dust plugs from the optical network interface cable MPO connectors. Save the dust plugs for future use.
2. Inspect and clean the MPO connector's fiber-optic end faces.
3. Remove the dust plugs from the transceiver module optical bores.
4. Immediately attach the network interface cable MPO connectors to the transceiver module.

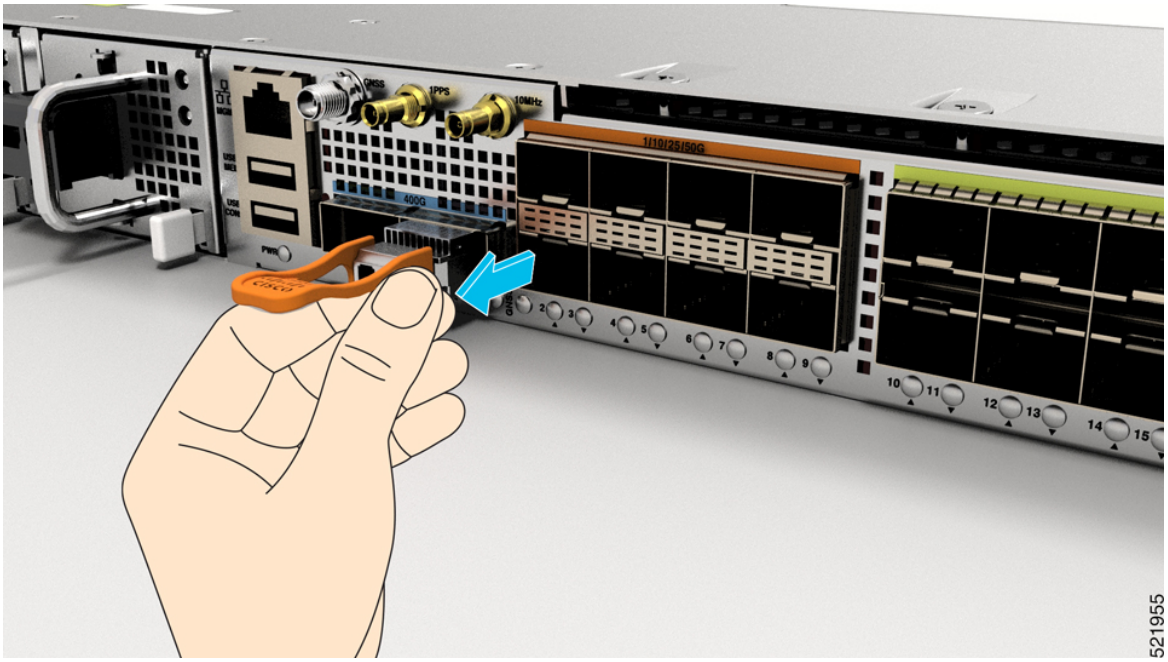
Removing the 40-Gigabit QSFP+, 100-Gigabit QSFP28, or 200/400-Gigabit QSFP-DD Transceiver Module

Caution The QSFP+, QSFP28, or QSFP-DD transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling QSFP+ or QSFP28 transceiver modules or when coming into contact with modules.

To remove a QSFP+, QSFP28, or QSFP-DD transceiver module:

- For transceiver modules, disconnect the network interface cable from the transceiver connector.
- For transceiver modules equipped with a bale clasp latch:
  1. Pivot the bale clasp down to the horizontal position.
  2. Immediately install the dust plug into the transceivers optical bore.
  3. Grasp the sides of the transceiver and slide it out of the module socket.
- For transceivers equipped with a pull tab latch:
  1. Immediately install the dust plug into the transceiver's optical bore.
  2. Grasp the tab and gently pull to release the transceiver from the socket.
  3. Slide the transceiver out of the socket.

Figure 27: Removing a Bale Clasp QSFP+, QSFP28, or QSFP-DD Transceiver Module from N540-24Q8L2DD-SYS



Connect Interface Ports

You can connect optical interface ports on 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-DD 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.

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.

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.