



Installing the Cisco NCS 4216

This chapter describes how to install the Cisco NCS 4216.

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Prerequisites

Before installing the Cisco NCS 4216, it is important to prepare for the installation by:

- Preparing the site (site planning) and reviewing the installation plans or method of procedures (MOP)
- Unpacking and inspecting the Cisco NCS 4216
- Gathering the tools and test equipment required to properly install the Cisco NCS 4216

For more instructions on how to prepare for the installation of the Cisco NCS 4216, see the *Preparing for Installation* section.

Installing the Router in a Rack

The sections describe how to install the Cisco NCS 4216 in a rack.

**Note**

The Cisco NCS 4216 Door is not displayed in the figures below. It is only displayed in the *Installing the Cisco NCS 4216 Door* figure.

Installing the Chassis Brackets

The chassis is shipped with mounting brackets that can be installed on the front or rear of the chassis. To install the brackets on the front of the chassis, perform these steps:

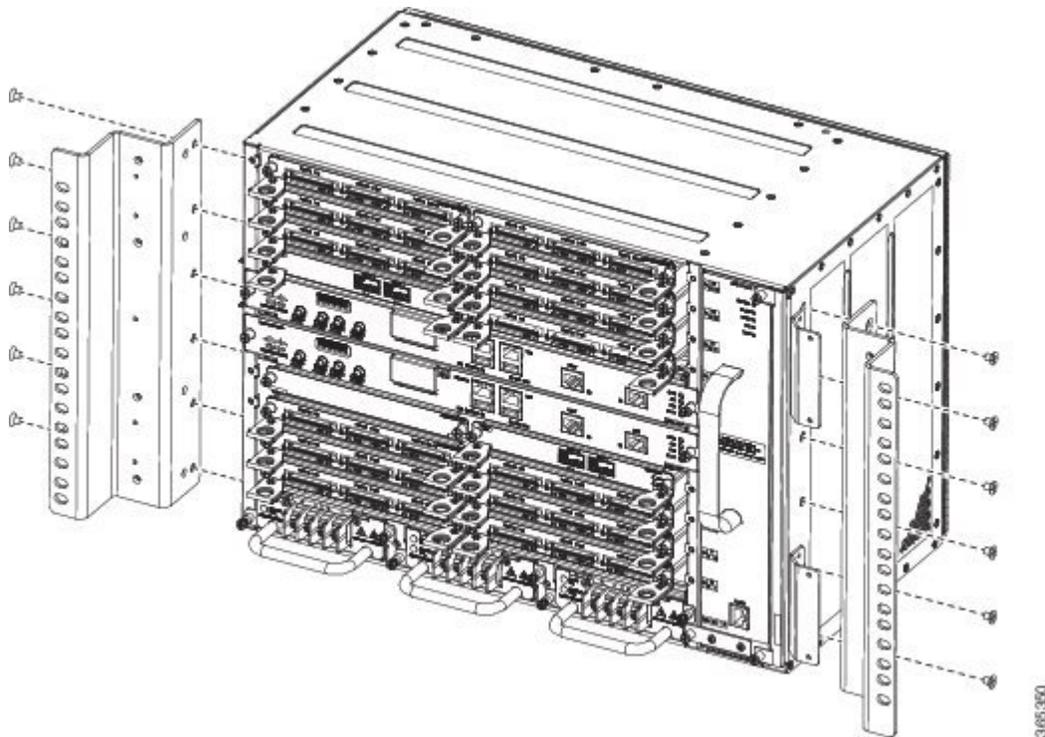
SUMMARY STEPS

1. Remove the rack-mount brackets from the accessory kit and position them beside the router chassis.
2. Position one of the brackets against the chassis side, and align the screw holes.
3. Secure the bracket to the chassis with the screws removed when performing Step 1. The recommended maximum torque is 28 in.-lb (3.16 N-m).

DETAILED STEPS

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

Figure 1: Attaching Mounting Brackets for a 23-inch Rack



- 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 28 in.-lb (3.16 N-m).
The A907-FAN-E fan tray with filter (A907-FAN-F) cannot be mounted using the mounting screws that are supported for fan tray. This is not an issue with the FAN tray filter blank panel (A907-FAN-F-B). We recommend that you use the short screws provided in the following rack mount kits to avoid interference of the air filter during rack mounting and while replacing the fan tray with the fan tray filter (A907-FAN-E):
- 23" rack mount kit (A907-RCKMT-23IN)

What to Do Next

Repeat Step 2 and Step 3 for the other bracket.

Installing the Air Plenum (A907-F2B-AIR) in the Rack

This procedure installs the air plenum to orient the air flow in front-to- back direction in the NCS 4216 router.



Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1074



This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use. Statement 39



For nominal voltage of -60 VDC, the input voltage range is from -40 to -72 VDC.



Use only the fastening hardware provided with the NCS 4216 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.



When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046



The Air Plenum is installed on a rack or a cabinet using thread-forming screws that remove any paint or non-conductive coatings inside the hole threads, and establish a metal-to-metal contact. Also, clean both surfaces outside the screw points that come in contact, so that they are free of paint and other nonconductive coating. Apply an appropriate antioxidant compound to the surfaces.

Installing Air Plenum in NCS 4216 Shelf for ANSI 23-inch Configuration

To install the Air Plenum in NCS 4216 Shelf for ANSI 23-inch configuration, follow the steps below:

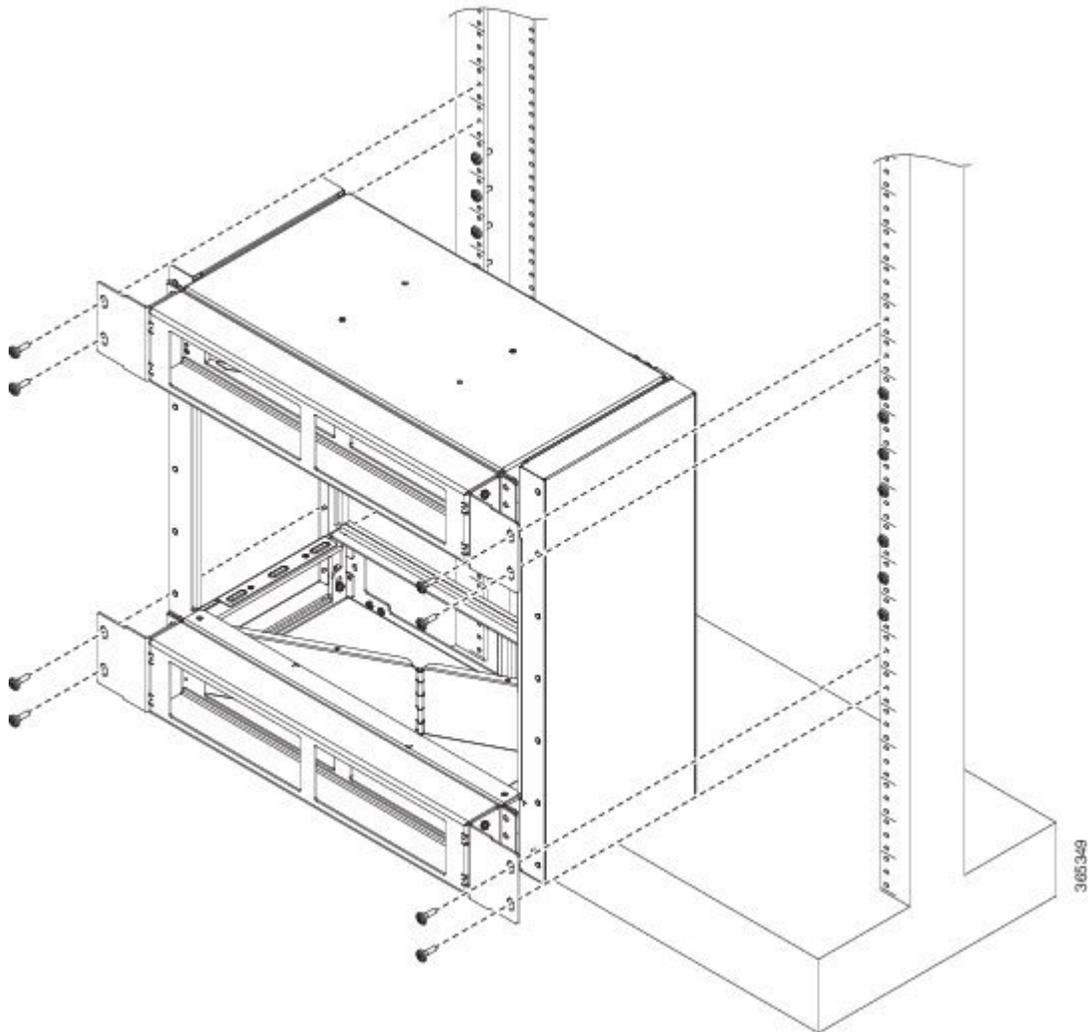
SUMMARY STEPS

1. Install the ANSI 23-inch adapter plates on the horizontal air plenums.
2. Align the screws to fix the adapter plates to the shelf. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).
3. Place a horizontal air plenum as the base.
4. Install the vertical air plenum to the left of the bottom horizontal plenum.
5. Install the wing head screws from the internal side of the horizontal plenum and tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).
6. Install the vertical air plenum to the right of the horizontal air plenum. Follow step 5.
7. Install the horizontal air plenum above the vertical air plenums. Follow step 5.
8. Install the pre-assembled air plenum for ANSI 23-inch configuration.
9. Install the pre-assembled air plenums in the ANSI 23-inch rack or cabinet.
10. Check the length between the top and bottom horizontal air plenums where the chassis will be installed. The length must be not less than 10.5 inches (267 mm). If the length is less, adjust the position of the top horizontal plenum.
11. Install the empty NCS 4216 chassis between the horizontal plenums.

DETAILED STEPS

- Step 1** Install the ANSI 23-inch adapter plates on the horizontal air plenums.

Figure 2: Installing the Air Plenum in the Rack

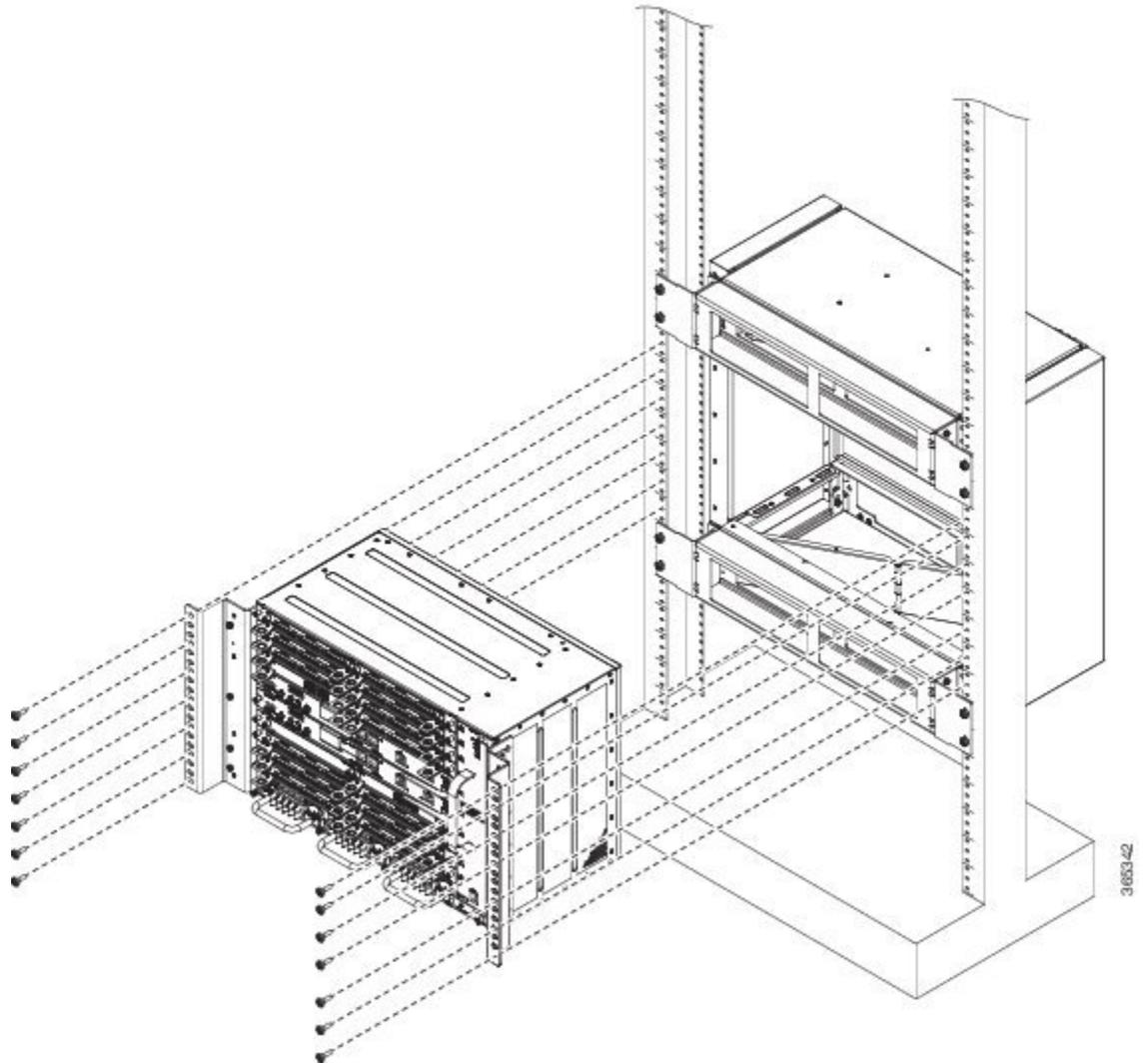


- Step 2** Align the screws to fix the adapter plates to the shelf. Insert the screws and tighten them to a torque value of 11.5 in-lb (1.3 N-m).
- Step 3** Place a horizontal air plenum as the base.
- Step 4** Install the vertical air plenum to the left of the bottom horizontal plenum.
- Step 5** Install the wing head screws from the internal side of the horizontal plenum and tighten the screws to a torque value of 11.5 in-lb (1.3 N-m).
- Step 6** Install the vertical air plenum to the right of the horizontal air plenum. Follow step 5.
- Step 7** Install the horizontal air plenum above the vertical air plenums. Follow step 5.
- Step 8** Install the pre-assembled air plenum for ANSI 23-inch configuration.
- Step 9** Install the pre-assembled air plenums in the ANSI 23-inch rack or cabinet.
- Step 10** Check the length between the top and bottom horizontal air plenums where the chassis will be installed. The length must be not less than 10.5 inches (267 mm). If the length is less, adjust the position of the top horizontal plenum.
- Step 11** Install the empty NCS 4216 chassis between the horizontal plenums.
-

Installing the Router Chassis in the Rack

The procedures in this section apply to both horizontal and vertical mounting of the router in a rack.

Figure 3: Installing the Router Chassis in the Rack



To install the router chassis in the equipment rack, perform these steps:

SUMMARY STEPS

1. Position the chassis in the rack as follows:
2. Align the mounting holes in the bracket (and optional cable guide) with the mounting holes in the equipment rack.
3. Install the 8 or 12 (4 or 6 per side) rack mount screws through the holes in the bracket and into the threaded holes in the equipment rack posts.
4. Use a tape measure and level to verify that the chassis is installed straight and level.

DETAILED STEPS

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- Step 1** 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 2** Align the mounting holes in the bracket (and optional cable guide) with the mounting holes in the equipment rack.
- Caution** Do not use interface module and power supply ejector handles to lift the chassis; using the handles to lift the chassis can deform or damage the handles.
- Step 3** Install the 8 or 12 (4 or 6 per side) rack mount screws through the holes in the bracket and into the threaded holes in the equipment rack posts.
- Step 4** Use a tape measure and level to verify that the chassis is installed straight and level.
-

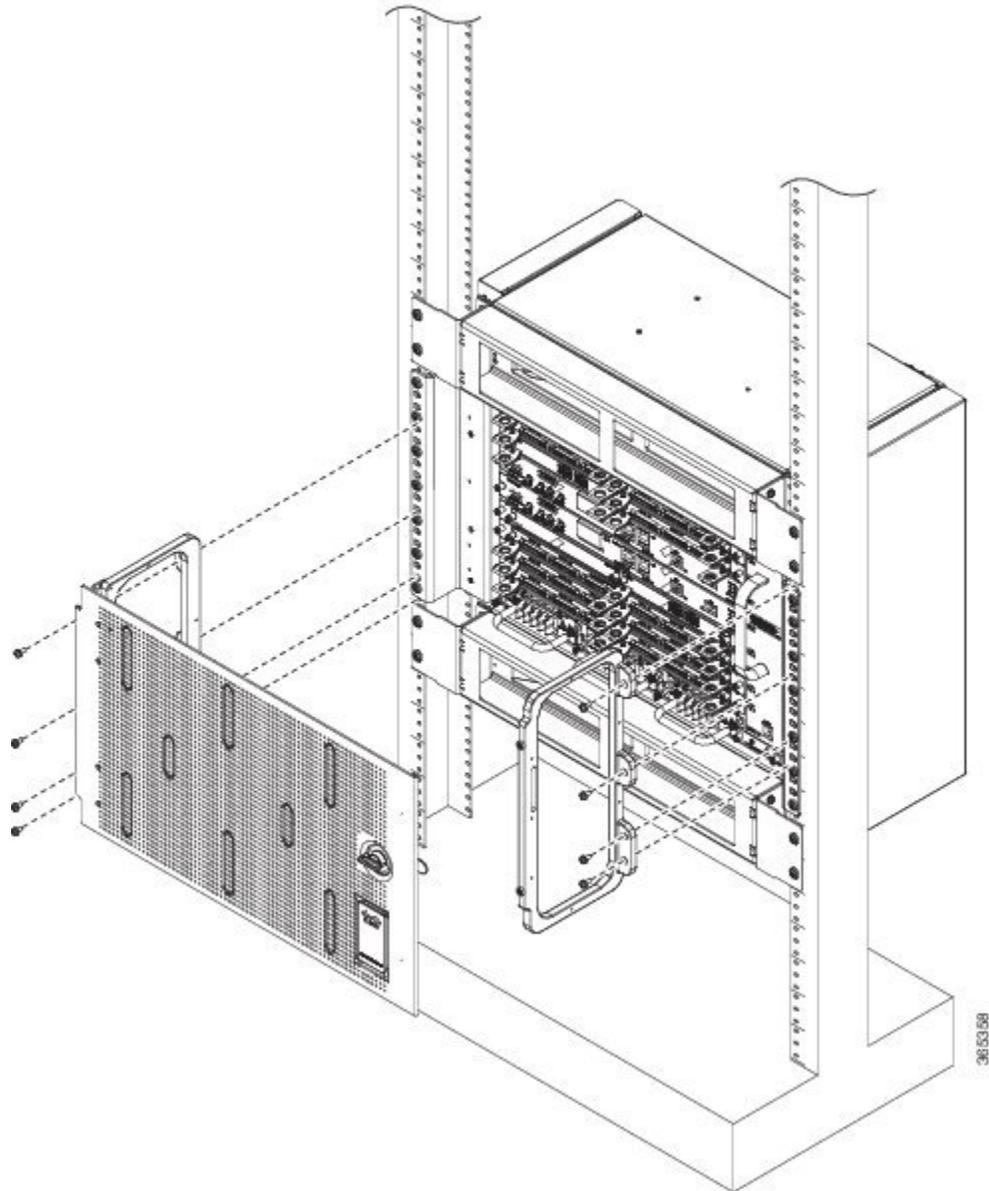
Installing the Cisco NCS 4216 Door

This section describes how to install the NCS 4216 door.



Note You cannot install the 19-inch Rack Door.

Figure 4: Installing the Cisco NCS 4216 Door



To install the door of NCS 4216 shelf, follow the steps below:

SUMMARY STEPS

1. Align the left door bracket screw holes against the shelf screw holes.
2. Insert the fasteners provided along with the packaging (three screws on the side and two screws on the bottom of the door bracket) and tighten them to a torque value of 11.5 in-lb (1.3 N-m).
3. Place a safety washer on the front bottom of the door bracket and fasten it with a fastener.
4. Repeat steps 1 and 2 for the door bracket on the opposite side.
5. Pull the top hinge pin down on the door.
6. Align the door hinges with the bracket hinges.
7. Slide the bottom hinge pin into the bracket hinge and move the top hinge pin in the upward direction.
8. Connect the other end of the ground strap cable to a grounding point on the door bracket using a fastener.

DETAILED STEPS

-
- Step 1** Align the left door bracket screw holes against the shelf screw holes.
- Step 2** Insert the fasteners provided along with the packaging (three screws on the side and two screws on the bottom of the door bracket) and tighten them to a torque value of 11.5 in-lb (1.3 N-m).
- Step 3** Place a safety washer on the front bottom of the door bracket and fasten it with a fastener.
- Step 4** Repeat steps 1 and 2 for the door bracket on the opposite side.
- Step 5** Pull the top hinge pin down on the door.
Note The bottom hinge pin is fixed.
- Step 6** Align the door hinges with the bracket hinges.
- Step 7** Slide the bottom hinge pin into the bracket hinge and move the top hinge pin in the upward direction.
Note The ground strap cable is pre-installed on the door.
- Step 8** Connect the other end of the ground strap cable to a grounding point on the door bracket using a fastener.
-

Opening and Removing the Door of the NCS 4216 Shelf

This procedure opens and removes the door of the NCS 4216 shelf.



Note The NCS 4216 shelf has an ESD plug input and is shipped with an ESD wrist strap. The ESD plug input is located on the outside of the shelf on the right side. It is labeled “ESD” on the top and bottom. Always wear an ESD wrist strap and connect the strap to the ESD plug when working on the NCS shelf.

To open and remove the door of the NCS 4216 router, follow the steps below:

SUMMARY STEPS

1. Turn the knob to unlock the door.
2. Swing the door open.
3. Remove the ground cable from the shelf by removing the screw.
4. Pull the top hinge pin holding the door to the chassis, in the downward direction.
5. Lift the door out of the bottom hinge pin to remove the door from its hinges.

DETAILED STEPS

-
- | | |
|---------------|--|
| Step 1 | Turn the knob to unlock the door. |
| Step 2 | Swing the door open. |
| Step 3 | Remove the ground cable from the shelf by removing the screw. |
| Step 4 | Pull the top hinge pin holding the door to the chassis, in the downward direction. |
| Step 5 | Lift the door out of the bottom hinge pin to remove the door from its hinges. |
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Installing the Patch Panel on the Rack

This procedure installs the Patch Panel on the Rack.

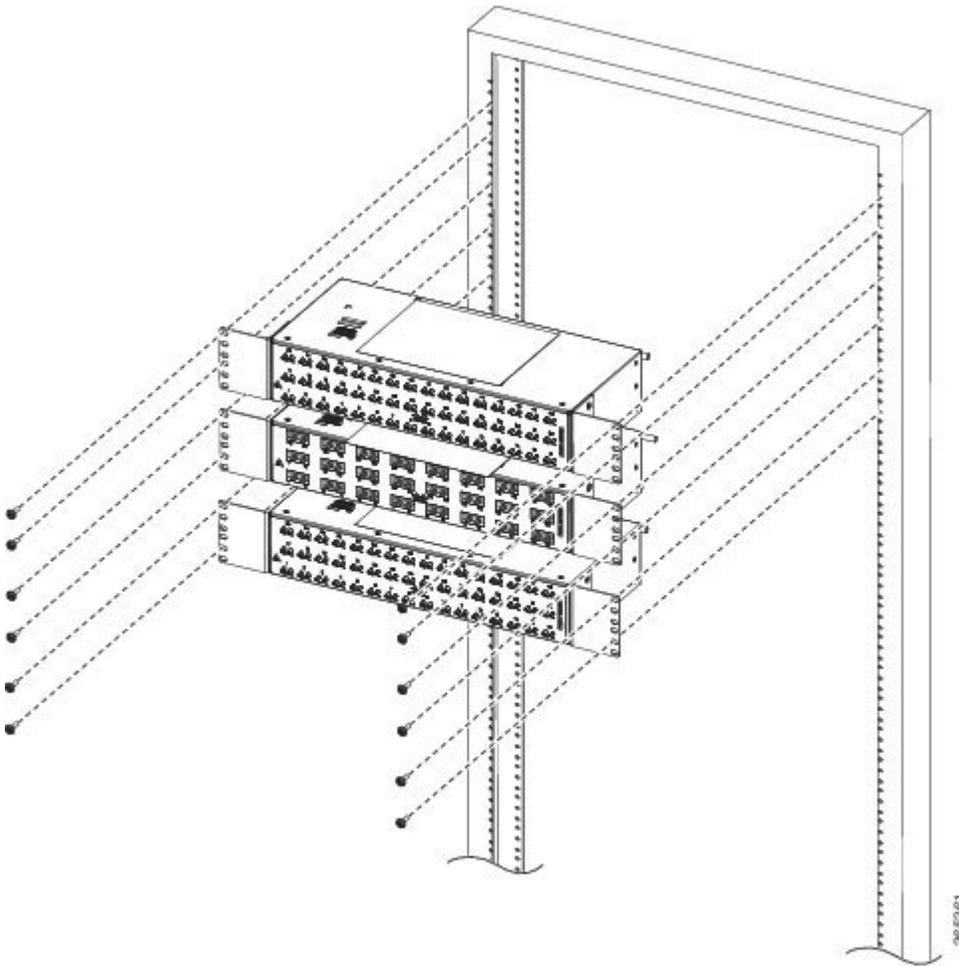
SUMMARY STEPS

1. Assemble the patch panels on the opposite side of the rack to make the cable routing process easy.
2. Fix one patch panel with a minimum of two screws on each side.

DETAILED STEPS

- Step 1** Assemble the patch panels on the opposite side of the rack to make the cable routing process easy.
- Step 2** Fix one patch panel with a minimum of two screws on each side.

Figure 5: Installing the Patch Panel on the Rack

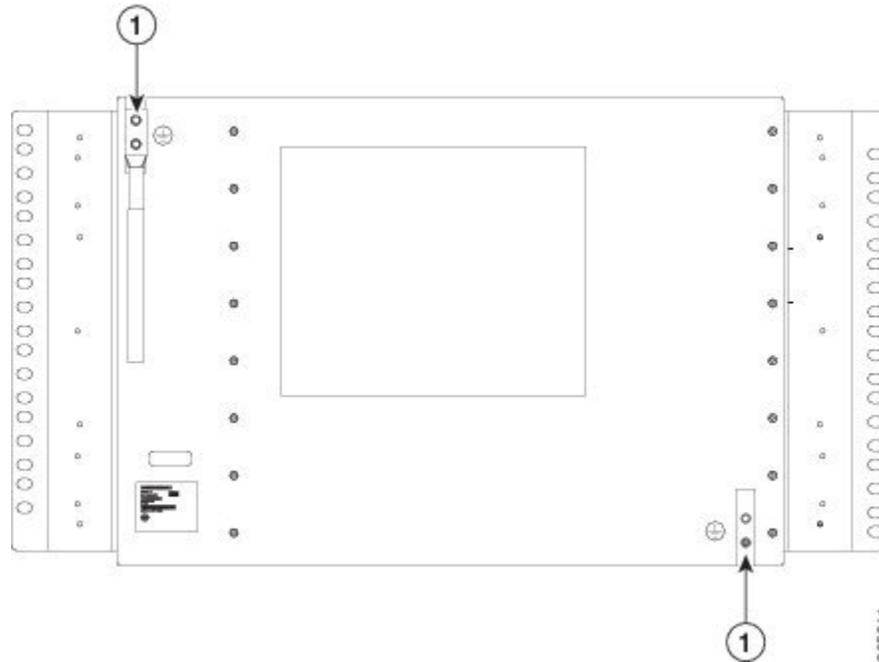


Installing the Chassis Ground Connection

Before you connect the power or turn on the power to the Cisco NCS 4216, you must provide an adequate chassis ground (earth) connection to your router.

This section describes how to ground the Cisco NCS 4216 chassis. 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 6: Attaching a Grounding Lug to the Rear of the Router



1	Grounding lug
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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 15 in.-lb (1.69 N-m) of pressure for attaching the ground wire to the router
- Crimping tool as specified by the ground lug manufacturer
- 6 or 8 AWG copper wire for the power cord
- 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 NCS 4216, ensure that you disconnect the power at the circuit breaker. Otherwise, severe injury to you or damage to the router may occur.

**Danger**

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 local 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 Cisco NCS 4216 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.

SUMMARY STEPS

1. If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch \pm 0.02 inch (12.7 mm \pm 0.5 mm).
2. Slide the open end of your 2-hole ground lug over the exposed area of the ground wire.
3. Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire as shown in the figure below.
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 a 23-inch EIA rack, attach the 2-hole ground lug to the rear of the router.
5. Connect the other end of the ground wire to a suitable grounding point at your site.

DETAILED STEPS

-
- Step 1** If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch \pm 0.02 inch (12.7 mm \pm 0.5 mm).
- 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 the figure below.
- 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 a 23-inch EIA rack, 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.
-

Installing the Fan Tray

The fan tray is a modular unit that provides cooling to the Cisco NCS 4216. Follow these steps to install the fan tray in the chassis:

**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.

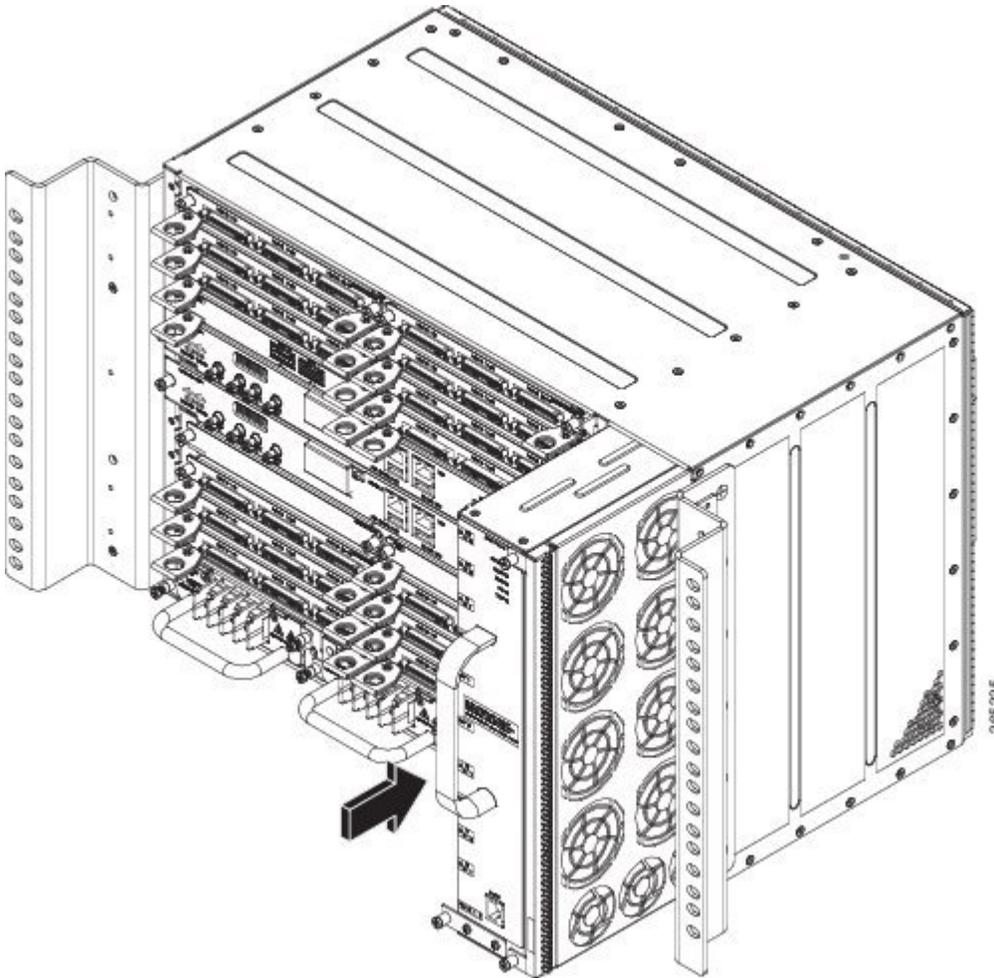
SUMMARY STEPS

1. Orient the fan tray so that the captive screws are on the left side of the fan tray's front panel. The following figure shows how to orient the fan tray.
2. Guide the fan tray into the chassis until it is fully seated.
3. Secure the fan tray to the chassis using the attached captive installation screws. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

DETAILED STEPS

- Step 1** Orient the fan tray so that the captive screws are on the left side of the fan tray's front panel. The following figure shows how to orient the fan tray.

Figure 7: Installing the Fan Tray



- Step 2** Guide the fan tray into the chassis until it is fully seated.
- Caution** The fans are exposed on the left side of the fan tray. Keep your fingers, clothing, and jewelry away from the fans. Always handle the fan tray by the handle.
- Note** When installing the cabling to the RSPs, we recommend that you leave a service loop of extra cabling sufficient to allow for fan tray removal.
- Step 3** Secure the fan tray to the chassis using the attached captive installation screws. The recommended maximum torque is 5.5 in.-lb (.62 N-m).
This completes the procedure for installing or replacing the fan tray in a Cisco NCS 4216.

For information about connecting cables to the fan tray alarm port, see the *Connecting the Fan Tray Alarm Port* section. For a summary of the LEDs on the fan tray, see the *LED Summary* section. For more information about air flow guidelines, see *Air Flow Guidelines* section.

Removing and Replacing the Dust Filter

The chassis is shipped with a blank fan filter cover. To install the dust filter:

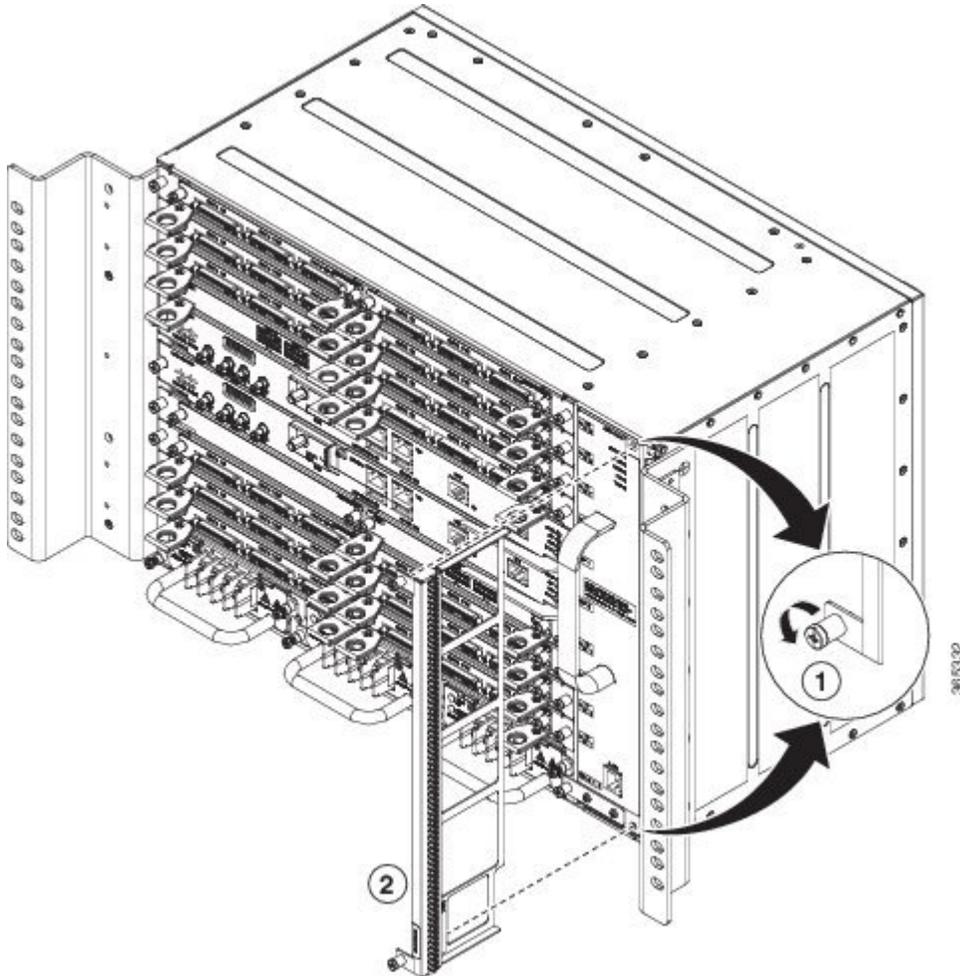
SUMMARY STEPS

1. Remove the blank fan filter cover (A907-FAN-F=) by unscrewing the captive installation screws at the top and bottom of the dust filter frame. See the figure below.
2. Slide the new dust filter (A907-FAN-F) onto the fan tray.
3. Secure the filter with the top and bottom captive screws, in the chassis.

DETAILED STEPS

- Step 1** Remove the blank fan filter cover (A907-FAN-F=) by unscrewing the captive installation screws at the top and bottom of the dust filter frame. See the figure below.

Figure 8: Blank Fan Filter

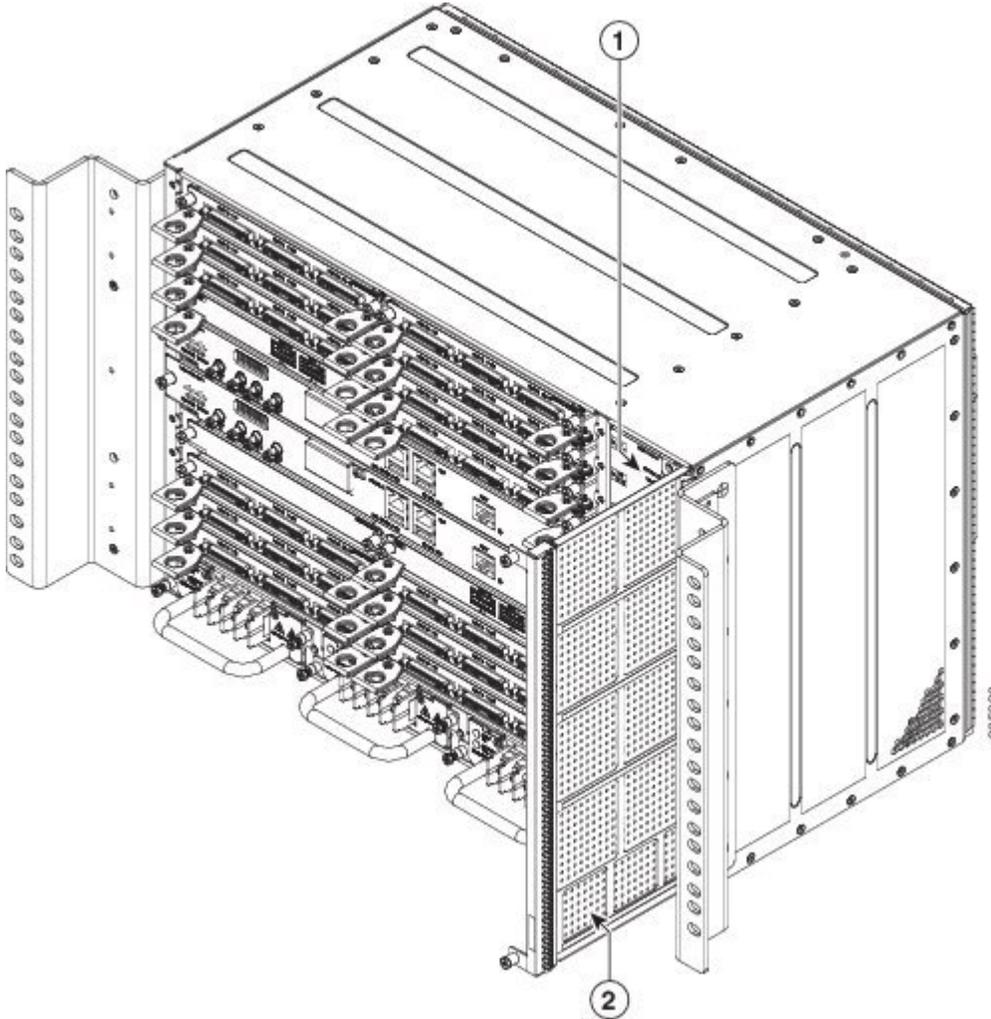


LEDs

Dummy fan filter

- Step 2** Slide the new dust filter (A907-FAN-F) onto the fan tray.
- Step 3** Secure the filter with the top and bottom captive screws, in the chassis.

Figure 9: Fan Filter



Captive screw	Fan filter
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Removing the Dust Filter

1	Captive screw	2	Fan filter
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The dust filter must be removed for cleaning or for a replacement.

Dust Filter Maintenance

A periodic health check of the filter, every 3 months based on the level of dust in the environment helps in avoiding over clogging of the filters and provide better life. The product's filter may be used as a single use or reused depending upon the local deployment needs. If reuse of the filter is prohibited, it may be replaced every six months with PID (A907-FAN-F=) or equivalent.

If reused, this filter media may be cleaned with slightly compressed air, vacuumed, and/or rinsed with clean water. If a degreaser is required, use only a mild detergent, such as, dish washing liquid.



Caution

Avoid using harsh solvents or cleaning agents.

If filters are cleaned with water, the filters should be completely dry before reinstalling. Even though this type of filter may be cleaned, replacement is recommended every two to three years to ensure media durability and eliminate residual dust build-up and subsequent air flow resistance.

Removing and Replacing the Fan Tray

The fan tray supports online insertion and removal (OIR). There is no need to power down the Cisco NCS 4216 to remove or replace the fan tray. However, the router will shut down if the fan tray is removed from the chassis for more than 90 seconds at 25° C due to thermal overload condition. Once the thermal overload condition is absent, the system attempts to power up automatically, if the Fan tray is re-inserted and the system temperature is within limits. Approximately at 25° C the system powers back in 2 minutes.



Note

If the FAN tray is removed and not replaced within the stipulated time then the system will automatically power off. If the system is powered off, then the DC input should be turned off for at least 30 seconds for all the PSU in the system simultaneously, and then turned on for the router to power on.



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.



Caution

The router can stay active for up to 60 seconds if the temperature is below the ambient limit. However, in the event of an overtemperature alarm, the router can shut down in less than 60 seconds. In the event of a critical temperature alarm, the router shuts down immediately.



Caution

To avoid erroneous failure messages, allow at least 2 minutes for the system to reinitialize after the fan tray has been removed or replaced.

Follow these steps to remove and replace the fan tray on the Cisco NCS 4216:

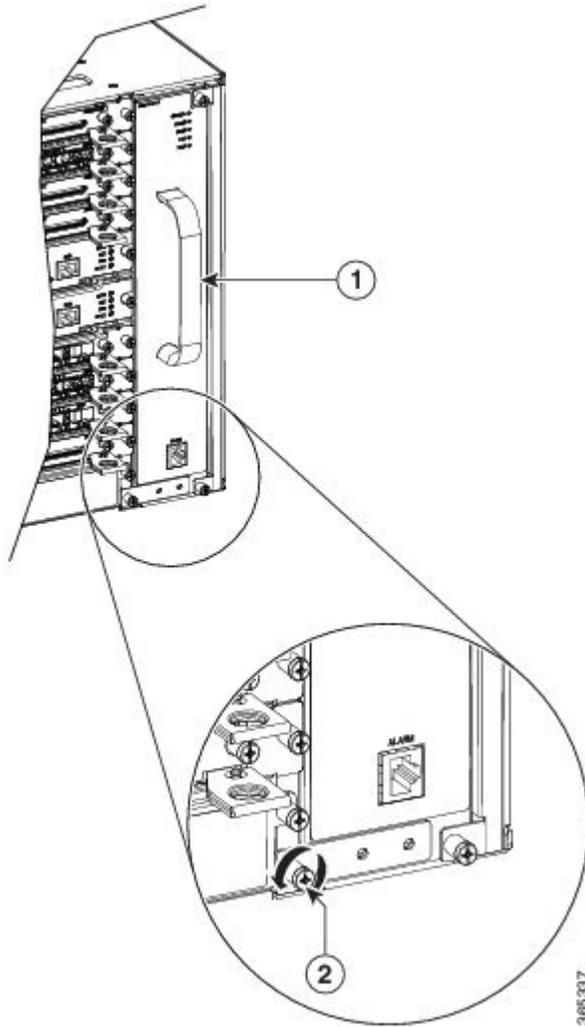
SUMMARY STEPS

1. Using a No. 2 Phillips screwdriver or your fingers, loosen the captive installation screw that secures the fan tray to the chassis. The following figure shows the front of the fan tray, including the captive installation screws.
2. Grasp the fan tray handle with one hand and the outside of the chassis with the other hand. The figure above shows the front of the fan tray, including the handle.
3. Pull the fan tray toward you no more than 1 inch to disengage it from the power receptacle on the midplane, as shown in the following figure.

DETAILED STEPS

- Step 1** Using a No. 2 Phillips screwdriver or your fingers, loosen the captive installation screw that secures the fan tray to the chassis. The following figure shows the front of the fan tray, including the captive installation screws.

Figure 10: Detaching the Fan Tray



1	Fan tray handle	2	Captive screw
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- Step 2** Grasp the fan tray handle with one hand and the outside of the chassis with the other hand. The figure above shows the front of the fan tray, including the handle.

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

Table 1: Fan OIR Timelines

Serial Number	Temperature ° C at 1800 m	OIR Time
	-40° C to 30° C	60 seconds
	31° C to 40° C	30 seconds

RSP Installation

Follow the steps in the sections below on handling an RSP module in the Cisco NCS 4216:

Installing an RSP Module

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

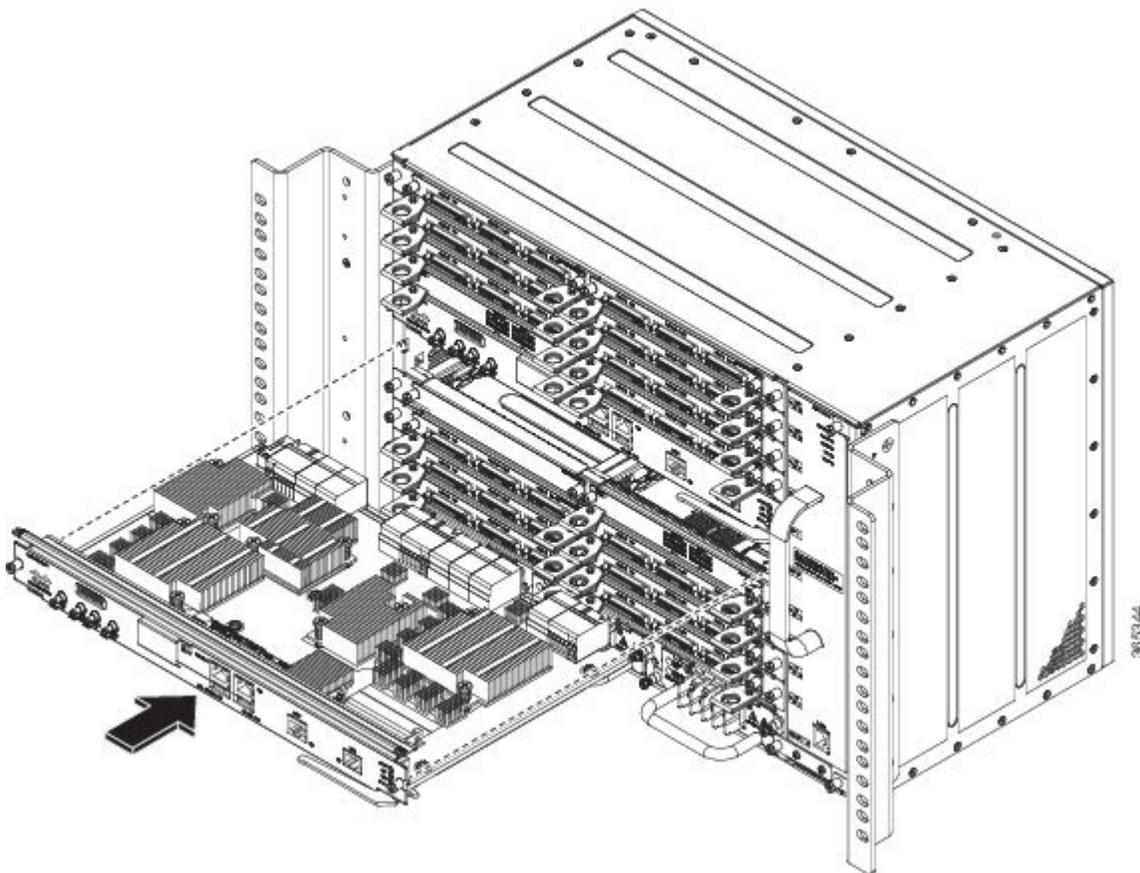
SUMMARY STEPS

1. 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.
2. Fully open both the ejector levers on the new module, as shown in the figure below.
3. 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.
4. 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.
5. 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.
6. Tighten the two captive installation screws on the module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).
7. 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.

DETAILED STEPS

- Step 1** 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 2** Fully open both the ejector levers on the new module, as shown in the figure below.
Caution To prevent ESD damage, handle modules by carrier edges only.
- Step 3** 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 12: Cisco NCS 4216 RSP Installation



- Step 4** 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 5** 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 6** 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 7** 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.
Caution Blank module filler plates (Cisco part number A90X-RSPA-BLANK-W) should be installed in any empty chassis slots to keep dust out of the chassis and to maintain consistent airflow through the chassis.
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.
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Removing an RSP Module

Before you remove an RSP from the router, you should save the current configuration on a TFTP server or an external USB flash drive, using the **copy running-config {ftp | tftp | bootflash:}** command. This saves you time when bringing the module back online.

If the module is running Cisco IOS software, save the current running configuration by entering the **copy running-config startup-config** command.



Warning

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034



Warning

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

To remove an RSP module, perform the following steps:

SUMMARY STEPS

1. Disconnect any cables attached to the ports on the module.
2. Verify that the captive installation screws on all the modules in the chassis are tight. This step ensures that the space created by the removed module is maintained.
3. Loosen the two captive installation screws on the module you plan to remove from the chassis.
4. Place your thumbs on the ejector levers (see *Cisco NCS 4216 RSP Installation* figure) and simultaneously rotate the ejector levers outward to unseat the module from the backplane connector.
5. Grasp the front edge of the module and slide the module straight out of the slot. If the chassis has horizontal slots, place your hand under the module to support its weight as you slide it out from the slot. Do not touch the module circuitry.
6. Place the module on an antistatic mat or antistatic foam, or immediately reinstall the module in another slot.
7. Install blank module filler plates (Cisco part number A90X-RSPA-BLANK-W) in empty slots, if any.

DETAILED STEPS

-
- Step 1** Disconnect any cables attached to the ports on the module.
- Step 2** Verify that the captive installation screws on all the modules in the chassis are tight. This step ensures that the space created by the removed module is maintained.
- Note** If the captive installation screws are loose, the EMI gaskets on the installed modules will push the modules toward the open slot, which in turn reduces the size of the opening and makes it difficult to remove the module.
- Step 3** Loosen the two captive installation screws on the module you plan to remove from the chassis.
- Step 4** Place your thumbs on the ejector levers (see *Cisco NCS 4216 RSP Installation* figure) and simultaneously rotate the ejector levers outward to unseat the module from the backplane connector.
- Step 5** Grasp the front edge of the module and slide the module straight out of the slot. If the chassis has horizontal slots, place your hand under the module to support its weight as you slide it out from the slot. Do not touch the module circuitry.
- Caution** To prevent ESD damage, handle modules by the carrier edges only.
- Step 6** Place the module on an antistatic mat or antistatic foam, or immediately reinstall the module in another slot.
- Step 7** Install blank module filler plates (Cisco part number A90X-RSPA-BLANK-W) in empty slots, if any.
- Warning** Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029
-

Hot-Swapping an RSP Module

The Cisco NCS 4216 provides a feature that allows you to remove and replace a redundant RSP module without powering down the router. This feature, called hot-swapping or OIR, allows you to remove and replace a redundant module without disrupting router operation.

When two redundant modules are installed in the router, only one of the modules is active. The other one runs in standby mode, ready to take over processing if the active module fails.

When you remove or insert a redundant module while the router is powered on and running, the router does the following:

- 1 Determines if there is sufficient power for the module.
- 2 Scans the backplane for configuration changes.
- 3 Initializes the newly inserted module. In addition, the system notes any removed modules and places those modules in the administratively shutdown state.
- 4 Places any previously configured interfaces on the module back to the state they were in when they were removed. Any newly inserted interfaces are put in the administratively shutdown state as if they were present (but unconfigured) at boot time. If you insert the same type of module into a slot, its ports are configured and brought online up to the port count of the original module.

The router runs diagnostic tests on any new interfaces and the test results indicate the following:

- If the tests pass, the router is operating normally.
- If the new module is faulty, the router resumes normal operation but leaves the new interfaces disabled.
- If the diagnostic tests fail, the router stops operating, which usually indicates that the new module has a problem in the bus and should be removed.

Use the following guidelines when performing an OIR on an IM:

- Allow at least 2 minutes for the system to reinitialize before inserting a new IM.
- Avoid inserting a new IM during bootup until the active and standby RSPs have reached an OK state.
- When inserting multiple IMs into the chassis, wait until each IM reaches an OK state before inserting the next IM.

Interface Module Installation

The sections describe the various tasks of associated with interface module installation on the Cisco NCS 4216:

Installing an Interface Module

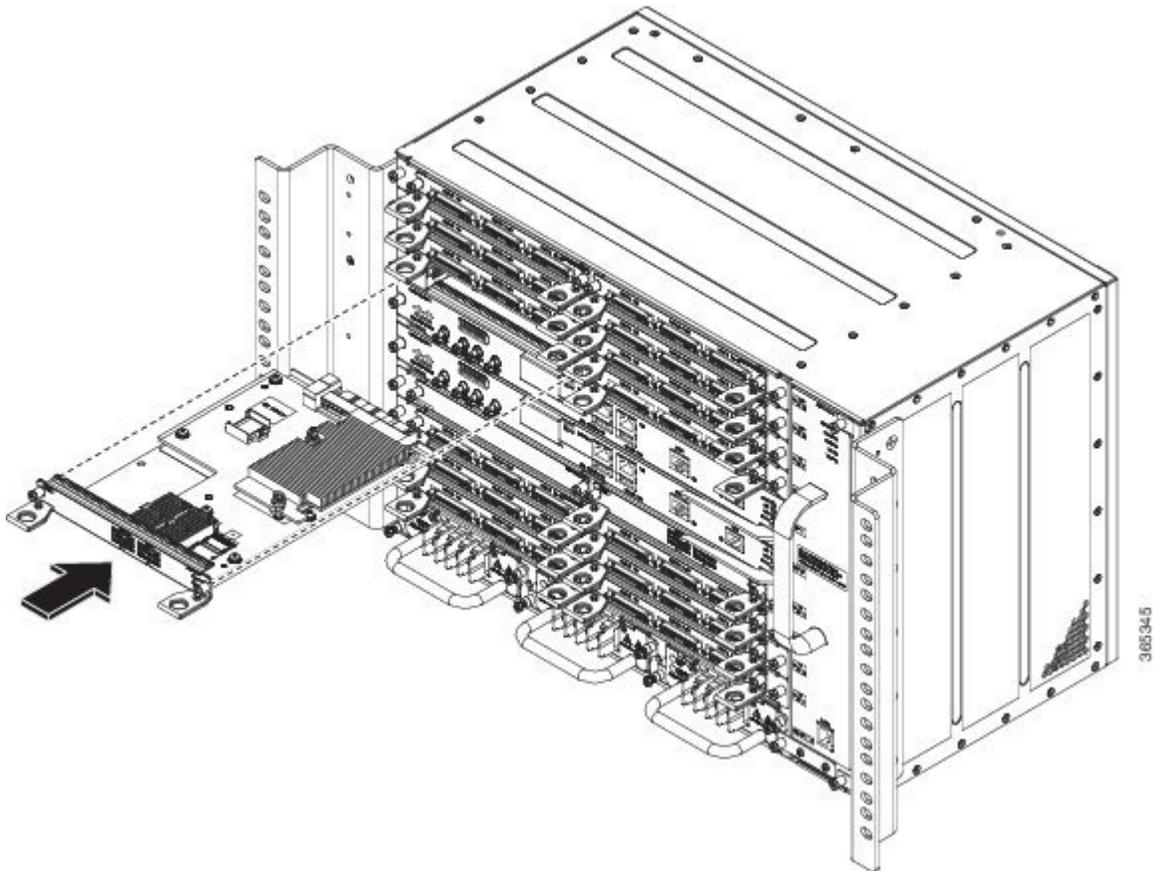
SUMMARY STEPS

1. Before inserting an interface module, make sure that the chassis is grounded.
2. To insert the interface module, carefully align the edges of the interface module between the upper and lower edges of the router slot.
3. Carefully slide the interface module into the router slot until the interface module makes contact with the backplane. The following figure shows how to install the interface module.
4. Tighten the locking thumbscrews on both sides of the interface module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).
5. Connect all the cables to each interface module.

DETAILED STEPS

- Step 1** Before inserting an interface module, make sure that the chassis is grounded.
- Step 2** To insert the interface module, carefully align the edges of the interface module between the upper and lower edges of the router slot.
- Step 3** Carefully slide the interface module into the router slot until the interface module makes contact with the backplane. The following figure shows how to install the interface module.

Figure 13: Inserting an Interface Module



- Step 4** Tighten the locking thumbscrews on both sides of the interface module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).
- Step 5** Connect all the cables to each interface module.

What to Do Next

**Caution**

Do not use interface module and power supply ejector handles to lift the chassis; using the handles to lift the chassis can deform or damage the handles.

Removing an Interface Module

SUMMARY STEPS

1. To remove an interface module, disconnect all the cables from each interface module.
2. Loosen the locking thumbscrews on both sides of the interface module.
3. Slide the interface module out of the router slot by pulling on the handles. If you are removing a blank filler plate, pull the blank filler plate completely out of the router slot using the captive screws.

DETAILED STEPS

-
- | | |
|---------------|--|
| Step 1 | To remove an interface module, disconnect all the cables from each interface module. |
| Step 2 | Loosen the locking thumbscrews on both sides of the interface module. |
| Step 3 | Slide the interface module out of the router slot by pulling on the handles. If you are removing a blank filler plate, pull the blank filler plate completely out of the router slot using the captive screws. |
-

Hot-Swapping an Interface Module

The Cisco NCS 4216 provides a feature that allows you to remove and replace an interface module without powering down the router. This feature, called hot-swapping or OIR, allows you to remove and replace a redundant module without disrupting router operation.

The Cisco NCS 4216 does not support hot-swapping an interface module with another module of a different type. For example, you cannot swap an SFP Gigabit Ethernet module with a copper Gigabit Ethernet module without disrupting router operation.

- If the TDM interface module is swapped with the Gigabit Ethernet module in the same slot or vice-versa, the router must be reloaded.

If you perform OIR on an interface module and move the module to a different slot, the router does not retain the module configuration; you must reconfigure the interface module.

Replacing a configured interface module with a different interface module in the same slot is not supported on the router.

Table 2: Supported Hot Swapping Combinations

Interface Modules	NCS4216-RSP/Cisco IOS Release 3.18.06v.S
SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)	Swapping allowed on all Ethernet interface modules
8-port 10 Gigabit Ethernet Interface Module (8X10GE)	
1-port 100 Gigabit Ethernet Interface Module (1X100GE)	
2-port 40 Gigabit Ethernet QSFP Interface Module (2X40GE)	
OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO)	No support
48 x T1/E1 Interface Module	
48 X T3/E3 Interface Module	

When you remove or insert a redundant module while the router is powered on and running, the router does the following:

- 1 Determines if there is sufficient power for the module.
- 2 Scans the backplane for configuration changes.
- 3 Initializes the newly inserted module. In addition, the system notes any removed modules and places those modules in the administratively shutdown state.
- 4 Places any previously configured interfaces on the module back to the state they were in when they were removed.

The router runs diagnostic tests on any new interfaces and the test results indicate the following:

- If the tests pass, the router is operating normally.
- If the new module is faulty, the router resumes normal operation but leaves the new interfaces disabled.
- If the diagnostic tests fail, the router stops operating, which usually indicates that the new module has a problem in the bus and should be removed.

**Caution**

To avoid erroneous failure messages, note the current configuration of all interfaces before you remove or replace an interface module, and allow at least 2 minutes for the system to reinitialize after a module has been removed or replaced. This time is recommended in order to allow for synchronization between components within the interface module and for synchronization with the standby RSP.

Installing the Power Supply

The Cisco NCS 4216 router provides the choice of the following power supply:

- 900 W DC power: - 40VDC to -72VDC

The DC power supply provides option to connect with two different sources (dual feed); positive (+) and negative (-) are marked on the PSU terminals.

**Caution**

The power supply must be wired before plugging the power supply in the chassis. Ensure the branch circuit breaker is turned off. Only after installing the power supply in the chassis, should the branch circuit breaker be turned on. The branch circuit breaker must be turned off before unplugging the power supply.

Each power supply provides a dual primary input power connection.

**Warning**

Read the installation instructions before connecting the system to the power source. Statement 10

**Caution**

Do not use interface module and power supply ejector handles to lift the chassis; using the handles to lift the chassis can deform or damage the handles.

Preventing Power Loss

Use the following guidelines to prevent power loss to the router.

- To prevent loss of input power, ensure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- In some systems, you can use an UPS to protect against power failures at your site. Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems like the Cisco NCS 4216, which can have substantial current draw fluctuations due to bursty data traffic patterns.

Use the information in the *DC Power Supply Specifications* table to estimate the power requirements and heat dissipation of a Cisco NCS 4216 based on a given configuration of the router. Determining power requirements is useful for planning the power distribution system needed to support the router.

Power Connection Guidelines

This section provides guidelines for connecting the Cisco NCS 4216 power supplies to the site power source.

**Warning**

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate cal inspection authority or an an cian if you are uncertain that suitable grounding is available. Statement 213

**Warning**

This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Guidelines for DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

- Each chassis power supply should have its own dedicated input power source. The source must comply with the safety extra-low voltage (SELV) requirements in the UL 60950, CSA 60950, EN 60950, and IEC 60950 standards.
- The circuit must be protected by a dedicated two-pole circuit breaker. The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The circuit breaker is considered the disconnect device and should be easily accessible.
- The system ground is the power supply and chassis ground.
- Do not connect the DC return wire to the system frame or to the system grounding equipment.
- Use the grounding lug to attach a wrist strap for ESD protection during servicing.

Installing the DC Power Supply

The sections describe how to install a DC power supply in the Cisco NCS 4216:



Note

This equipment is suitable for installation in Network Telecommunications Facilities and locations where the NEC applies.



Note

This equipment is suitable for installations utilizing the Common Bonding Network (CBN).



Note

The grounding architecture of this product is DC-Isolated (DC-I) for DC-powered products. DC-powered products have a nominal operating DC voltage of 48 VDC.

Installing the DC Power Supply Module

Perform the following procedure to install the power supply module:

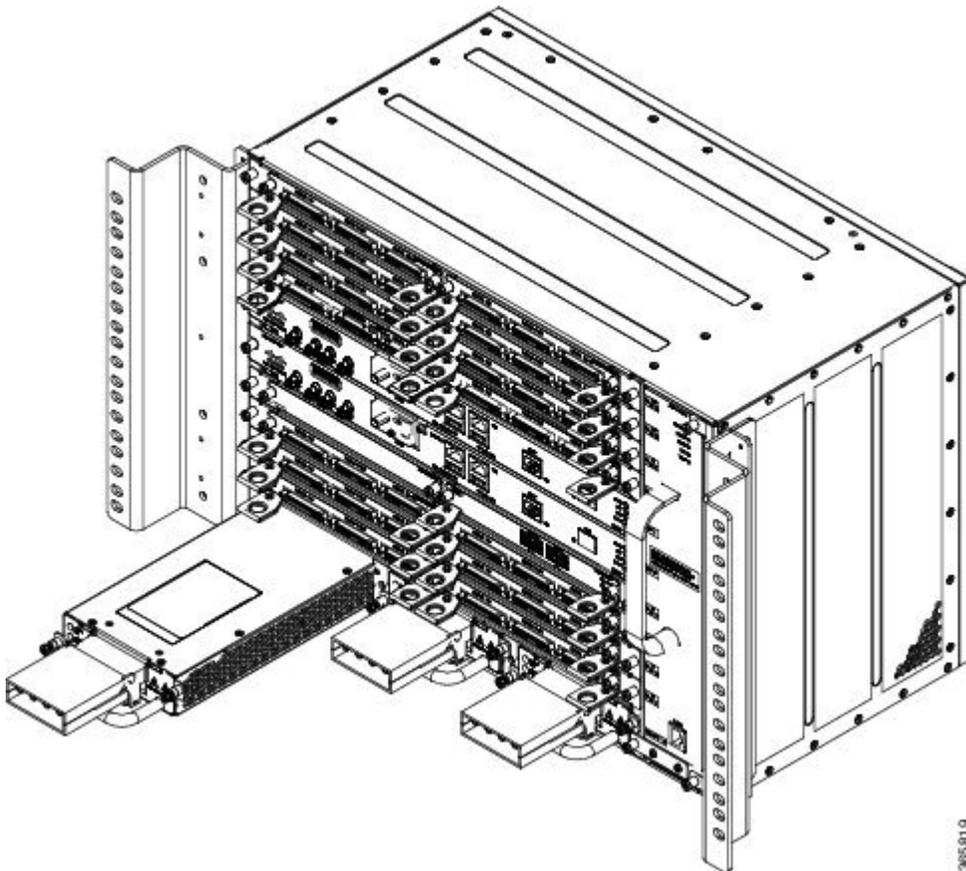
SUMMARY STEPS

1. Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the *Installing the Chassis Ground Connection* section.
2. If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.
3. Verify that power to the DC circuit connected to the power supply you are installing is off. To ensure that power has been removed from the DC circuits, locate the circuit breakers for the DC circuits, switch the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.
4. Grasp the power supply handle with one hand. Place your other hand underneath the power supply, as shown in the figure below. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.
5. Tighten the captive installation screws of the power supply. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

DETAILED STEPS

- Step 1** Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the *Installing the Chassis Ground Connection* section.
- Step 2** If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.
- Step 3** Verify that power to the DC circuit connected to the power supply you are installing is off. To ensure that power has been removed from the DC circuits, locate the circuit breakers for the DC circuits, switch the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.
- Step 4** Grasp the power supply handle with one hand. Place your other hand underneath the power supply, as shown in the figure below. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Figure 14: Installing the DC Power Supply



- Step 5** Tighten the captive installation screws of the power supply. The recommended maximum torque is 5.5 in.-lb (.62 N-m). If you are installing a redundant DC power supply, repeat these steps for the second power source.

Installing Terminal Block on the DC PEM Unit (A900-PWR900-D2)

Perform the following procedure to install the terminal block.

SUMMARY STEPS

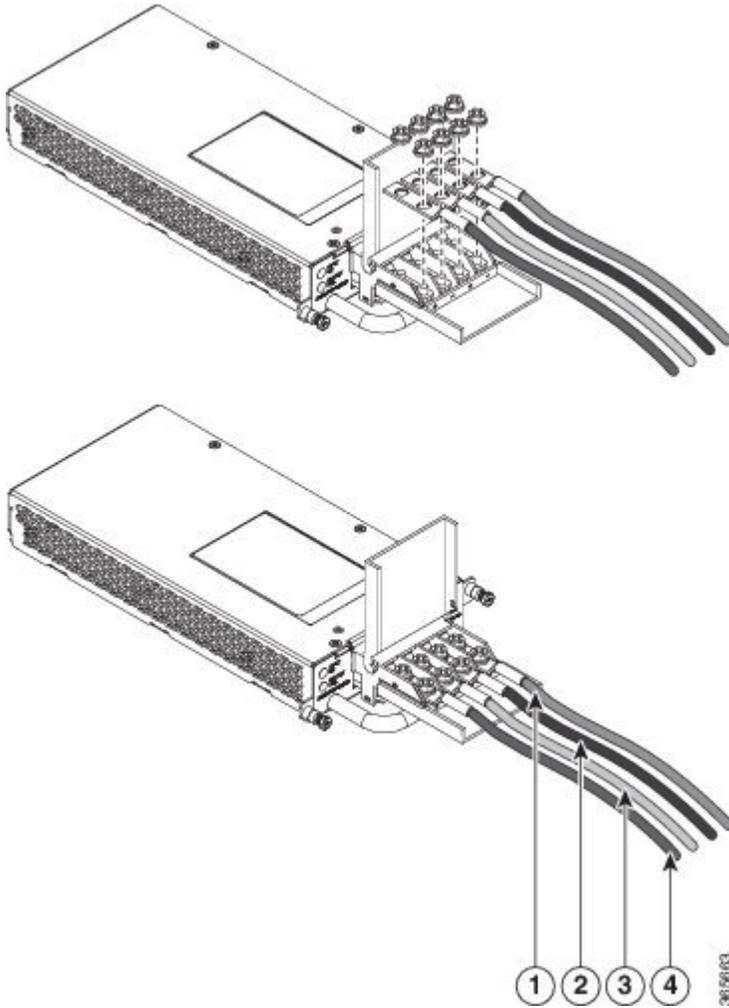
1. Locate the terminal block plug.
2. Use a wire-stripping tool to strip the ends of each of the two wires coming from the DC-input power source to 0.27 inch (6.6 mm) \pm 0.02 inch (0.5 mm) and the wire for grounding. Do not strip more than 0.29 inch (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave behind exposed wire from the terminal block plug after installation.
3. Identify the positive and negative feed positions for the terminal block connection. The recommended wiring sequence is (see the figure below):
4. Insert the exposed wire of one of the three DC-input power source wires into the terminal block plug. Make sure that you cannot see any wire lead. Only wire with insulation should extend from the terminal block.
5. Use a ratcheting torque screwdriver to torque the terminal block plug captive screw (above the installed wire lead) from 4.425 in.-lb (.5 N-m) to 5.310 in.-lb (.6 N-m).
6. Repeat Step 4 through Step 5 for the remaining DC input power source wire and the ground wire.
7. Ensure that the terminal block plug is fully seated in the terminal block header on the DC power supply panel. The plug has a locking feature. You should hear a snap or click when it is installed properly.
8. Use a tie wrap to secure the wires to the rack, so that the wires are not pulled from the terminal block plug by casual contact. Make sure the tie wrap allows for some slack in the ground wire.
9. Use a tie wrap to secure the wires to the handle. Leave a service loop on the ground wire between the handle and the connector such that it is the last to receive strain if the wires are pulled.

DETAILED STEPS

-
- Step 1** Locate the terminal block plug.
- Step 2** Use a wire-stripping tool to strip the ends of each of the two wires coming from the DC-input power source to 0.27 inch (6.6 mm) \pm 0.02 inch (0.5 mm) and the wire for grounding. Do not strip more than 0.29 inch (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave behind exposed wire from the terminal block plug after installation.
- Step 3** Identify the positive and negative feed positions for the terminal block connection. The recommended wiring sequence is (see the figure below):
- Negative (-) lead wire (middle)

- Positive (+) lead wire (right)

Figure 15: DC Power Supply with Lead Wires



1	Positive (+) lead wire	2	Negative (-) lead wire
3	Positive (+) lead wire	4	Negative (-) lead wire

Step 4

Insert the exposed wire of one of the three DC-input power source wires into the terminal block plug. Make sure that you cannot see any wire lead. Only wire with insulation should extend from the terminal block.

Caution Do not overtorque the plug captive screws of the terminal block. The recommended maximum torque is from 4.425 in.-lb (.5 N-m) to 5.310 in.-lb (.6 N-m).

- Step 5** Use a ratcheting torque screwdriver to torque the terminal block plug captive screw (above the installed wire lead) from 4.425 in.-lb (.5 N-m) to 5.310 in.-lb (.6 N-m).
- Step 6** Repeat Step 4 through Step 5 for the remaining DC input power source wire and the ground wire.
Caution Secure the wires coming in from the terminal block plug so that they cannot be disturbed by casual contact.
- Step 7** Ensure that the terminal block plug is fully seated in the terminal block header on the DC power supply panel. The plug has a locking feature. You should hear a snap or click when it is installed properly.
- Step 8** Use a tie wrap to secure the wires to the rack, so that the wires are not pulled from the terminal block plug by casual contact. Make sure the tie wrap allows for some slack in the ground wire.
- Step 9** Use a tie wrap to secure the wires to the handle. Leave a service loop on the ground wire between the handle and the connector such that it is the last to receive strain if the wires are pulled.
-

What to Do Next

This completes the procedure for connecting the DC power supply in the Cisco NCS 4216.

If you are installing a redundant DC power supply, repeat these steps for the second power source.

Activating the DC Power Supply

Perform the following procedure to activate the DC power supply:

SUMMARY STEPS

1. Remove the tape from the circuit-breaker switch handle, and restore power by moving the circuit-breaker switch handle to the On (I) position.
2. Verify power supply operation by checking if the power supply front panel LEDs are in the following states:

DETAILED STEPS

- Step 1** Remove the tape from the circuit-breaker switch handle, and restore power by moving the circuit-breaker switch handle to the On (I) position.
- Step 2** Verify power supply operation by checking if the power supply front panel LEDs are in the following states:
- INPUT OK LED is green
 - OUTPUT FAIL LED is green

If the LEDs indicate a power problem, see the *Troubleshooting* section.

If you are installing 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.

If you are installing a redundant DC power supply, repeat these steps for the second power source.

Removing and Replacing the DC Power Supply

This section provides information about removing and replacing the DC power supply in the Cisco NCS 4216.


Note

The Cisco NCS 4216 power supplies are hot-swappable. If you have installed redundant power supply modules, you can replace a single power supply without interrupting power to the router.


Caution

To avoid erroneous failure messages, allow at least 2 minutes for the system to reinitialize after a power supply has been removed or replaced.


Warning

When you install the unit, the ground connection must always be made first and disconnected last. Statement 1046


Warning

Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003


Warning

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


Warning

Installation of the equipment must comply with local and national cal codes. Statement 1074

Follow these steps to remove and replace the DC power supply on the Cisco NCS 4216:

SUMMARY STEPS

1. Before servicing the power supply, switch off the circuit breaker in your equipment area. As an additional precaution, tape the circuit-breaker switch in the Off position.
2. Slip on the ESD-preventive wrist strap that was included in the accessory kit.
3. Switch the power supply circuit-breaker switch to the Off (O) position.
4. Pull the terminal block plug connector out of the terminal block head in the power supply.
5. Loosen the captive screws on the DC power supply.
6. Grasping the power supply handle with one hand, pull the power supply out from the chassis while supporting it with the other hand.
7. Replace the DC power supply within 5 minutes. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number NCS4216-PWR-BLANK) over the opening, and secure it with the captive installation screws.

DETAILED STEPS

-
- Step 1** Before servicing the power supply, switch off the circuit breaker in your equipment area. As an additional precaution, tape the circuit-breaker switch in the Off position.
 - Step 2** Slip on the ESD-preventive wrist strap that was included in the accessory kit.
 - Step 3** Switch the power supply circuit-breaker switch to the Off (O) position.
 - Step 4** Pull the terminal block plug connector out of the terminal block head in the power supply.
 - Step 5** Loosen the captive screws on the DC power supply.
 - Step 6** Grasping the power supply handle with one hand, pull the power supply out from the chassis while supporting it with the other hand.
 - Step 7** Replace the DC power supply within 5 minutes. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number NCS4216-PWR-BLANK) over the opening, and secure it with the captive installation screws.
-

Connecting the Cisco NCS 4216 Router to the Network

The sections describe how to connect cables on the Cisco NCS 4216.

**Note**

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

Connecting Console Cables

The sections describe how to connect to the Cisco NCS 4216 using console cables.

**Note**

You cannot use the USB and RS232 console ports at the same time; if you insert the USB cable into the router, the RS232 port is disabled.

Connecting to the Serial Port using Microsoft Windows

This procedure shows how to connect to the serial port using Microsoft Windows.

**Note**

Install the USB device driver before establishing a physical connection between the router and the PC, by using the USB Console cable plugged into the USB serial port. Otherwise, the connection will fail. For more information, see the *Installing the Cisco Microsoft Windows USB Device Driver* section.

SUMMARY STEPS

1. Connect the end of the console cable with the RJ45 connector to the light blue console port on the router. or Connect a USB Type A-to-Type A cable to the USB console port as shown in the figure below. If you are using the USB serial port for the first time on a Windows-based PC, install the USB driver now according to the instructions in the following sections.
2. Connect the end of the cable with the DB-9 connector (or USB Type-A) to the terminal or PC. If your terminal or PC has a console port that does not accommodate a DB-9 connector, you must provide an appropriate adapter for that port.
3. To communicate with the router, start a terminal emulator application, such as Microsoft Windows HyperTerminal. This software should be configured with the following parameters:

DETAILED STEPS

Step 1

Connect the end of the console cable with the RJ45 connector to the light blue console port on the router. or Connect a USB Type A-to-Type A cable to the USB console port as shown in the figure below. If you are using the USB serial port for the first time on a Windows-based PC, install the USB driver now according to the instructions in the following sections.

- *Installing the Cisco Microsoft Windows XP USB Driver* section
- *Installing the Cisco Microsoft Windows 2000 USB Driver* section
- *Installing the Cisco Microsoft Windows Vista USB Driver* section

Note You cannot use the USB port and the EIA port concurrently. See the *Connecting to the Auxiliary Port* section.

Note When the USB port is used it takes priority over the RJ45 EIA port.
The USB Type A-to-Type A cable is not included with the Cisco NCS 4216; it is ordered separately.

Step 2

Connect the end of the cable with the DB-9 connector (or USB Type-A) to the terminal or PC. If your terminal or PC has a console port that does not accommodate a DB-9 connector, you must provide an appropriate adapter for that port.

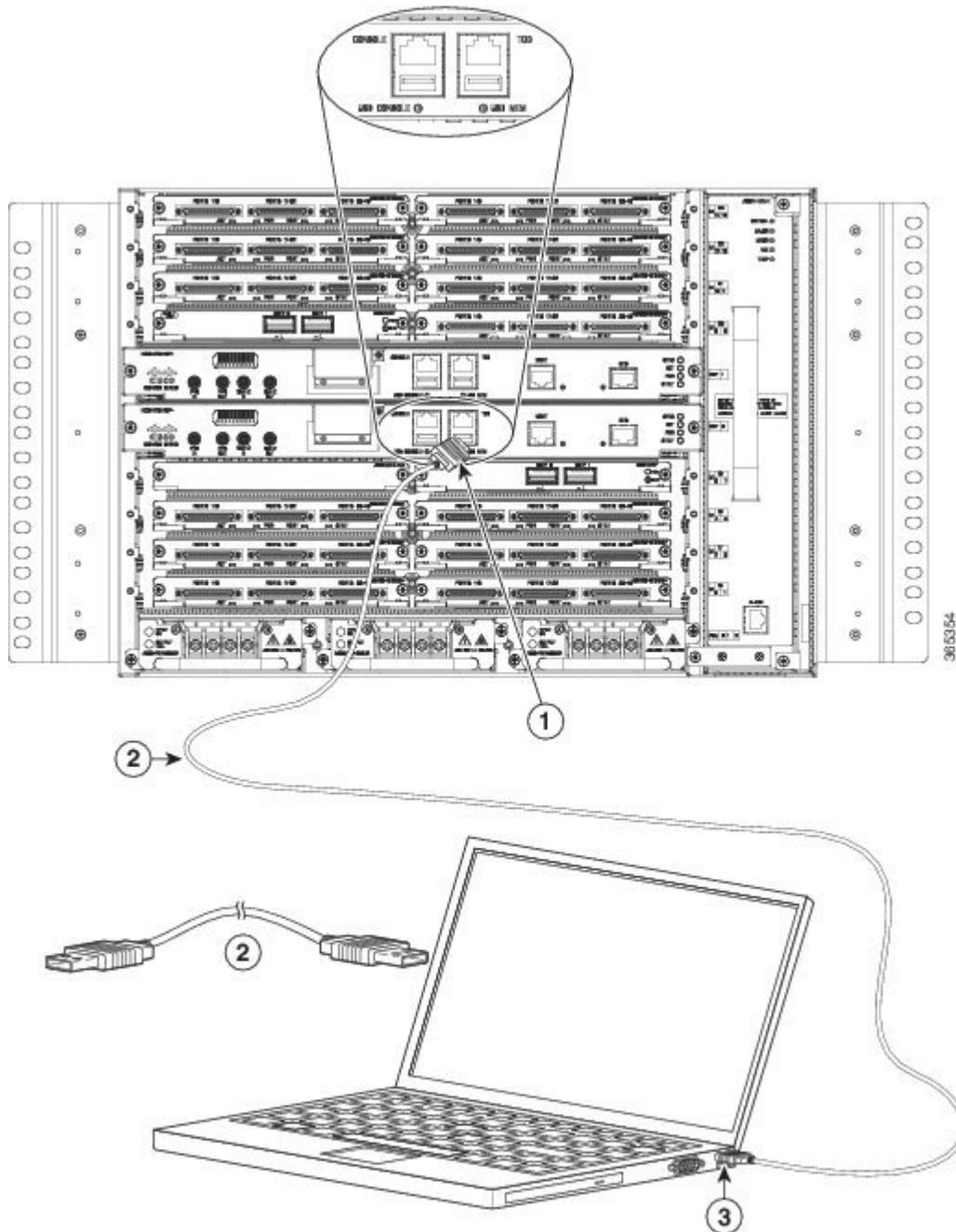
Step 3

To communicate with the router, start a terminal emulator application, such as Microsoft Windows HyperTerminal. This software should be configured with the following parameters:

- 9600 baud
- 8 data bits
- no parity
- 1 stop-bit

- no flow control

Figure 16: Connecting the USB Console Cable to the Cisco NCS 4216



1	USB Type-A console port	2	USB 5-pin mini USB Type-B to USB Type-A console cable
3	USB Type-A	—	—

What to Do Next

Connecting to the Console Port using Mac OS X

This procedure describes how to connect a Mac OS X system USB port to the console using the built in OS X Terminal utility.

SUMMARY STEPS

1. Use the Finder to go to Applications > Utilities > Terminal.
2. Connect the OS X USB port to the router.
3. Enter the following commands to find the OS X USB port number:
4. Connect to the USB port with the following command followed by the router USB port speed

DETAILED STEPS

Step 1 Use the Finder to go to Applications > Utilities > Terminal.

Step 2 Connect the OS X USB port to the router.

Step 3 Enter the following commands to find the OS X USB port number:

Example:

```
macbook:user$ cd /dev
macbook:user$ ls -ltr /dev/*usb*
crw-rw-rw-  1 root  wheel           9,  66 Apr  1 16:46 tty.usbmodem1a21 DT-macbook:dev user$
```

Step 4 Connect to the USB port with the following command followed by the router USB port speed

Example:

```
macbook:user$ screen /dev/tty.usbmodem1a21 9600
```

To disconnect the OS X USB console from the Terminal window

Enter Ctrl-a followed by Ctrl-\

Connecting to the Console Port using Linux

This procedure shows how to connect a Linux system USB port to the console using the built in Linux Terminal utility.

SUMMARY STEPS

1. Open the Linux Terminal window.
2. Connect the Linux USB port to the router.
3. Enter the following commands to find the Linux USB port number
4. Connect to the USB port with the following command followed by the router USB port speed

DETAILED STEPS

-
- Step 1** Open the Linux Terminal window.
- Step 2** Connect the Linux USB port to the router.
- Step 3** Enter the following commands to find the Linux USB port number

Example:

```
root@usb-suse# cd /dev
root@usb-suse /dev# ls -ltr *ACM*
crw-r--r--  1 root   root    188,  0 Jan 14 18:02 ttyACM0
root@usb-suse /dev#
```

- Step 4** Connect to the USB port with the following command followed by the router USB port speed

Example:

```
root@usb-suse /dev# screen /dev/ttyACM0 9600
```

To disconnect the Linux USB console from the Terminal window

Enter Ctrl-a followed by : then quit

Installing the Cisco Microsoft Windows USB Device Driver

A USB device driver must be installed the first time a Microsoft Windows-based PC is connected to the USB serial port on the router.

Installing the Cisco Microsoft Windows XP USB Driver

This procedure shows how to install the Microsoft Windows XP USB driver. Download the driver for your router model from the Tools and Resources Download Software site, USB Console Software category, at the following URL:

<http://tools.cisco.com/support/downloads/go/Redirect.x?mdfid=268437899>

SUMMARY STEPS

1. Unzip the file Cisco_usbconsole_driver_X_X.zip (where X is a revision number).
2. If using 32-bit Windows XP double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows XP double-click the file setup(x64).exe from the Windows_64 folder.
3. The Cisco Virtual Com InstallShield Wizard begins. Click Next.
4. The Ready to Install the Program window appears, Click Install.
5. The InstallShield Wizard Completed window appears. Click Finish.
6. Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments the Found New Hardware Wizard appears. Following the instructions to complete the installation of the driver.
7. The USB console is ready for use.

DETAILED STEPS

-
- | | |
|---------------|---|
| Step 1 | Unzip the file Cisco_usbconsole_driver_X_X.zip (where X is a revision number). |
| Step 2 | If using 32-bit Windows XP double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows XP double-click the file setup(x64).exe from the Windows_64 folder. |
| Step 3 | The Cisco Virtual Com InstallShield Wizard begins. Click Next. |
| Step 4 | The Ready to Install the Program window appears, Click Install. |
| Step 5 | The InstallShield Wizard Completed window appears. Click Finish. |
| Step 6 | Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments the Found New Hardware Wizard appears. Following the instructions to complete the installation of the driver. |
| Step 7 | The USB console is ready for use. |
-

Installing the Cisco Microsoft Windows 2000 USB Driver

This procedure shows how to install the Microsoft Windows 2000 USB driver.

SUMMARY STEPS

1. Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com web site and unzip it.
2. Double-click the file setup.exe.
3. The Cisco Virtual Com InstallShield Wizard begins. Click Next.
4. The Ready to Install the Program window appears, Click Install.
5. The InstallShield Wizard Completed window appears. Click Finish.
6. Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a series of Found New Hardware Wizard windows appear. Following the instructions to complete the installation of the driver.
7. The USB console is ready for use.

DETAILED STEPS

-
- Step 1** Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com web site and unzip it.
- Step 2** Double-click the file setup.exe.
- Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click Next.
- Step 4** The Ready to Install the Program window appears, Click Install.
- Step 5** The InstallShield Wizard Completed window appears. Click Finish.
- Step 6** Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a series of Found New Hardware Wizard windows appear. Following the instructions to complete the installation of the driver.
- Step 7** The USB console is ready for use.
-

Installing the Cisco Microsoft Windows Vista USB Driver

This procedure shows how to install the Microsoft Windows Vista USB driver.

SUMMARY STEPS

1. Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com web site and unzip it.
2. If using 32-bit Windows Vista double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows Vista double-click the file setup(x64).exe from the Windows_64 folder.
3. The Cisco Virtual Com InstallShield Wizard begins. Click Next.
4. The Ready to Install the Program window appears, Click Install.
5. The InstallShield Wizard Completed window appears. Click Finish.
6. Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a pop up window stating "Installing device driver software" appears. Following the instructions to complete the installation of the driver.
7. The USB console is ready for use.

DETAILED STEPS

-
- Step 1** Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com web site and unzip it.
- Step 2** If using 32-bit Windows Vista double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows Vista double-click the file setup(x64).exe from the Windows_64 folder.
- Step 3** The Cisco Virtual Com InstallShield Wizard begins. Click Next.
- Step 4** The Ready to Install the Program window appears, Click Install.
- Note** If a User Account Control warning appears, click "Allow - I trust this program..." to proceed.

- Step 5** The InstallShield Wizard Completed window appears. Click Finish.
- Step 6** Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a pop up window stating “Installing device driver software” appears. Following the instructions to complete the installation of the driver.
- Step 7** The USB console is ready for use.
-

Uninstalling the Cisco Microsoft Windows USB Driver

This section provides instructions for how to uninstall the Cisco Microsoft Windows USB device driver.

Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver

Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver

This procedure shows you how to uninstall both the Microsoft Windows XP and 2000 USB driver. The driver can be removed using the Windows Add Remove Programs utility or the setup.exe program.

Using the Add Remove Programs Utility



Note Disconnect the router console terminal before uninstalling the driver.

SUMMARY STEPS

1. Click Start > Control Panel > Add or Remove Programs.
2. Scroll to Cisco Virtual Com and click Remove.
3. When the Program Maintenance window appears, select the Remove radio button. Click Next.

DETAILED STEPS

-
- Step 1** Click Start > Control Panel > Add or Remove Programs.
- Step 2** Scroll to Cisco Virtual Com and click Remove.
- Step 3** When the Program Maintenance window appears, select the Remove radio button. Click Next.
-

Uninstalling the Cisco Microsoft Windows Vista USB Driver

This procedure shows you how to uninstall the Microsoft Windows Vista USB driver.



Note Disconnect the router console terminal before uninstalling the driver.

SUMMARY STEPS

1. Run the setup.exe for Windows 32-bit or setup(x64).exe for Windows-64bit. Click Next.
2. The InstallShield Wizard for Cisco Virtual Com appears. Click Next.
3. When the Program Maintenance window appears, select the Remove radio button. Click Next.
4. When the Remove the Program window appears, click Remove.
5. When the InstallShield Wizard Completed window appears click Finish.

DETAILED STEPS

-
- Step 1** Run the setup.exe for Windows 32-bit or setup(x64).exe for Windows-64bit. Click Next.
- Step 2** The InstallShield Wizard for Cisco Virtual Com appears. Click Next.
- Step 3** When the Program Maintenance window appears, select the Remove radio button. Click Next.
- Step 4** When the Remove the Program window appears, click Remove.
Note If a User Account Control warning appears, click “Allow - I trust this program...” to proceed.
- Step 5** When the InstallShield Wizard Completed window appears click Finish.
-

What to Do Next

post

**Note****Connecting to the Auxiliary Port**

When a modem is connected to the auxiliary port, a remote user can dial in to the router and configure it. Use a light blue console cable and the DB-9-to-DB-25 connector adapter.

**Note**

The console cable and DB-9-to-DB-25 connector are not included with the Cisco NCS 4216; they are ordered separately.

To connect a modem to the router, follow these steps:

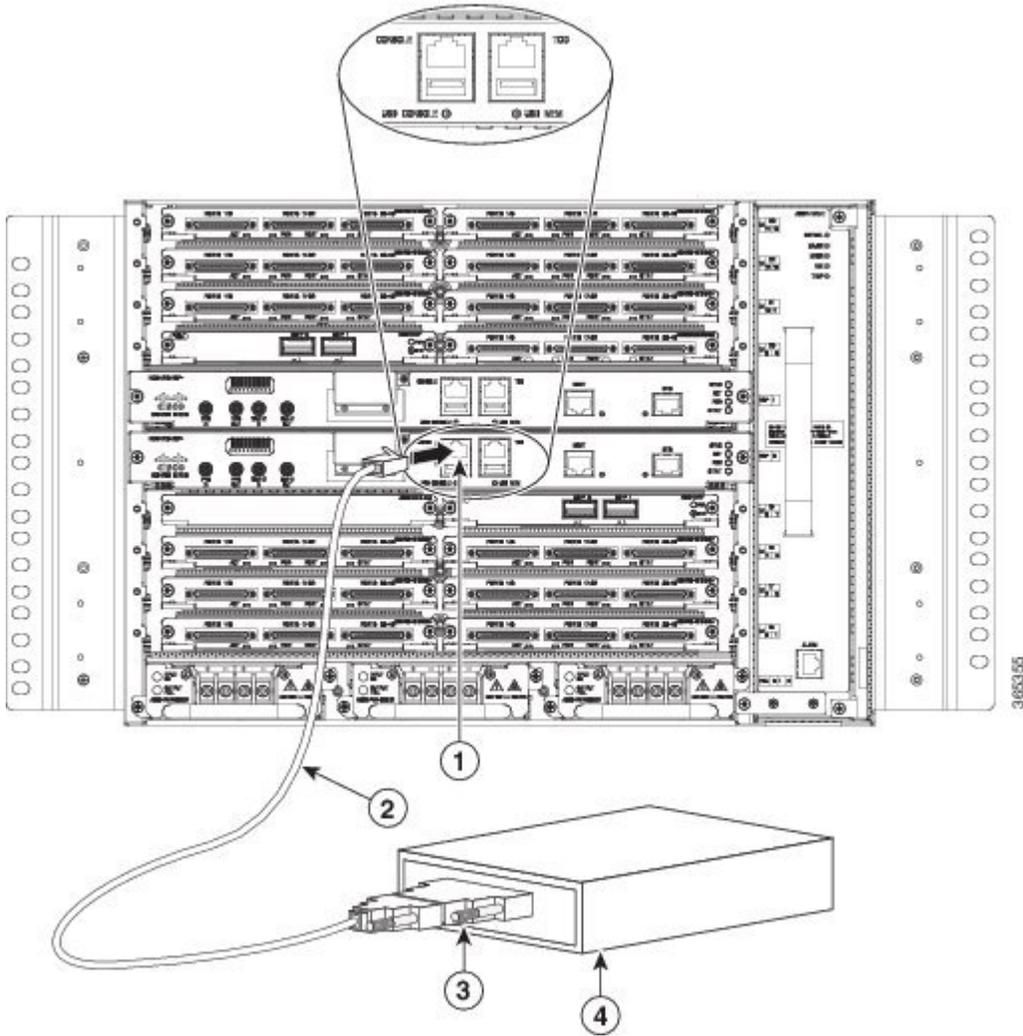
SUMMARY STEPS

1. Connect the RJ45 end of the adapter cable to the black AUX port on the router, as shown in the figure below.
2. Connect the DB-9 end of the console cable to the DB-9 end of the modem adapter.
3. Connect the DB-25 end of the modem adapter to the modem.
4. Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bps is supported) and for mode control with data carrier detect (DCD) and data terminal ready (DTR) operations.

DETAILED STEPS

Step 1 Connect the RJ45 end of the adapter cable to the black AUX port on the router, as shown in the figure below.

Figure 17: Connecting a Modem to the Cisco NCS 4216



1	RJ45 AUX port	3	RJ45 to DB-9
2	DB-9 to DB-25 adapter	4	Modem

- Step 2** Connect the DB-9 end of the console cable to the DB-9 end of the modem adapter.
- Step 3** Connect the DB-25 end of the modem adapter to the modem.
- Step 4** Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bps is supported) and for mode control with data carrier detect (DCD) and data terminal ready (DTR) operations.
-

Connecting a Management Ethernet Cable

When using the Ethernet Management port in the default mode (speed-auto and duplex-auto) the port operates in auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the Auto-MDI/MDI-X feature. The port automatically senses a crossover or straight-through cable and adapts to it.

However, when the Ethernet Management port is configured to a fixed speed (10 or 100 Mbps) through command-line interface (CLI) commands, the port is forced to MDI mode.

When in a fixed-speed configuration and MDI mode:

- Use a crossover cable to connect to an MDI port
- Use a straight-through cable to connect to an MDI-X port



Warning

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Management Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallicly connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicly to OSP wiring.

Installing and Removing SFP

The Cisco NCS 4216 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

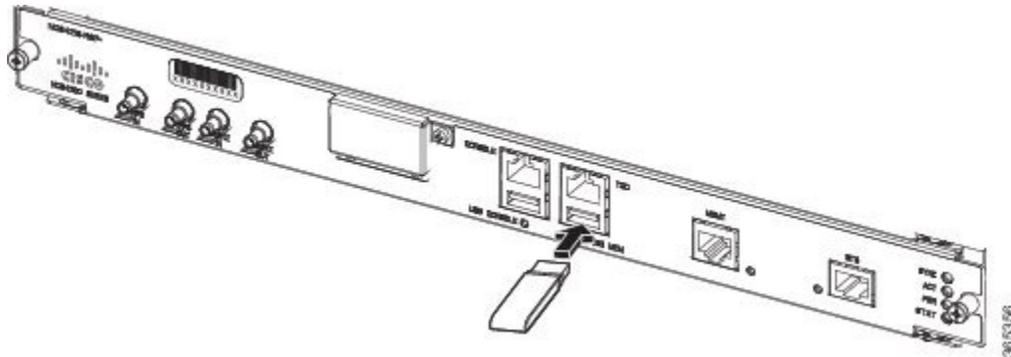
We recommend that you wait 30 seconds between removal and insertion of an SFP on an interface module. This time is recommended to allow the transceiver software to initialize and synchronize with the standby RSP. Changing an SFP more quickly could result in transceiver initialization issues that disable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

Connecting a USB Flash Device

To connect a USB flash device to the Cisco NCS 4216, insert the memory stick in the USB port labeled MEM. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.

The following figure shows the USB port connector on the Cisco NCS 4216.

Figure 18: Cisco NCS 4216 Flash Token Memory Stick



Removing a USB Flash Device

To remove and then replace a USB flash token memory stick from a Cisco NCS 4216, follow these steps:

SUMMARY STEPS

1. Pull the memory stick from the USB port.
2. To replace a Cisco USB Flash memory stick, simply insert the module into the USB port labeled MEM as shown in the *Cisco NCS 4216 Flash Token Memory Stick* figure. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.

DETAILED STEPS

-
- Step 1** Pull the memory stick from the USB port.
- Step 2** To replace a Cisco USB Flash memory stick, simply insert the module into the USB port labeled MEM as shown in the *Cisco NCS 4216 Flash Token Memory Stick* figure. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.
- Note** You can insert or remove the memory stick whether the router is powered on or not.
This completes the USB Flash memory installation procedure.
-

Connecting Timing Cables

The sections describe how to connect timing cables to the Cisco NCS 4216:


Note

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

Connecting Cables to the BITS Interface

The following steps describe how to connect a cable to the router BITS port:

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Connect one end of the cable to the BITS port using a straight-through, shielded RJ48C-to-RJ48C cable.
3. Connect the other end to the BTS patch or demarcation panel at your site.
4. Turn on power to the router.

DETAILED STEPS

-
- Step 1** Confirm that the router is powered off.
- Step 2** Connect one end of the cable to the BITS port using a straight-through, shielded RJ48C-to-RJ48C cable.
- Step 3** Connect the other end to the BTS patch or demarcation panel at your site.
- Step 4** Turn on power to the router.

For information about the BITS port pinouts, see the *Troubleshooting* section.

- Note** Use of two BITS sources or a Y-cable is optional. Each BITS input port is routed to both RSPs, so that SETS device on each RSP has visibility to both BITS inputs.
- Warning** To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the BITS ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallicly connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicly to OSP wiring.
-

Connecting Cables to a GNSS Interface

The sections describe how to connect cables from the Cisco NCS 4216 to a GPS unit for input or output timing of frequency:

**Note**

A Y-cable is required to connect to a primary and backup RSP in order to ensure that the router continues to transmit timing signals in the event of a network failure. For a mini-coax connection, this Y-cable can be part number CAB-BNC-7INY (7 inch BNC Y-cable). For an Ethernet connection, this Y-cable can be a RJ45 Cat5 1-to-2 splitter (3 female port RJ45 connector).

**Note**

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

Connecting Cables to the Input 10Mhz or 1PPS Interface

SUMMARY STEPS

1. Connect one end of a mini-coax Y-cable to the GPS unit.
2. Connect one end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the primary RSP of the Cisco NCS 4216.
3. Connect the other end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the backup RSP of the Cisco NCS 4216.

DETAILED STEPS

-
- Step 1** Connect one end of a mini-coax Y-cable to the GPS unit.
- Step 2** Connect one end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the primary RSP of the Cisco NCS 4216.
- Step 3** Connect the other end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the backup RSP of the Cisco NCS 4216.
-

Connecting Cables to the Output 10Mhz or 1PPS Interface

SUMMARY STEPS

1. Connect one end of a mini-coax Y-cable to the Slave unit.
2. Connect one end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the primary RSP of the Cisco NCS 4216.
3. Connect the other end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the backup RSP of the Cisco NCS 4216.

DETAILED STEPS

-
- Step 1** Connect one end of a mini-coax Y-cable to the Slave unit.
- Step 2** Connect one end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the primary RSP of the Cisco NCS 4216.
- Step 3** Connect the other end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the backup RSP of the Cisco NCS 4216.
-

Connecting Cables to the ToD Interface**SUMMARY STEPS**

1. Connect one end of a straight-through Ethernet cable to the GPS unit.
2. Connect one end of the split-side Y-cable Ethernet to the ToD port on the primary RSP of the Cisco NCS 4216.
3. Connect the other end of the split-side Y-cable Ethernet to the ToD port on the backup RSP of the Cisco NCS 4216.

DETAILED STEPS

-
- Step 1** Connect one end of a straight-through Ethernet cable to the GPS unit.
- Step 2** Connect one end of the split-side Y-cable Ethernet to the ToD port on the primary RSP of the Cisco NCS 4216.
- Step 3** Connect the other end of the split-side Y-cable Ethernet to the ToD port on the backup RSP of the Cisco NCS 4216.
- Note** For instructions on how to configure clocking, see the Cisco NCS 4216 *Software Configuration Guide*
- Warning** To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the ToD ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metalically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.
- Note** For more information about GPS port pinouts, see the *Troubleshooting* section.
-

Connecting a Cable to the GNSS Antenna Interface

Note The GNSS module is not hot swappable.

SUMMARY STEPS

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.

DETAILED STEPS

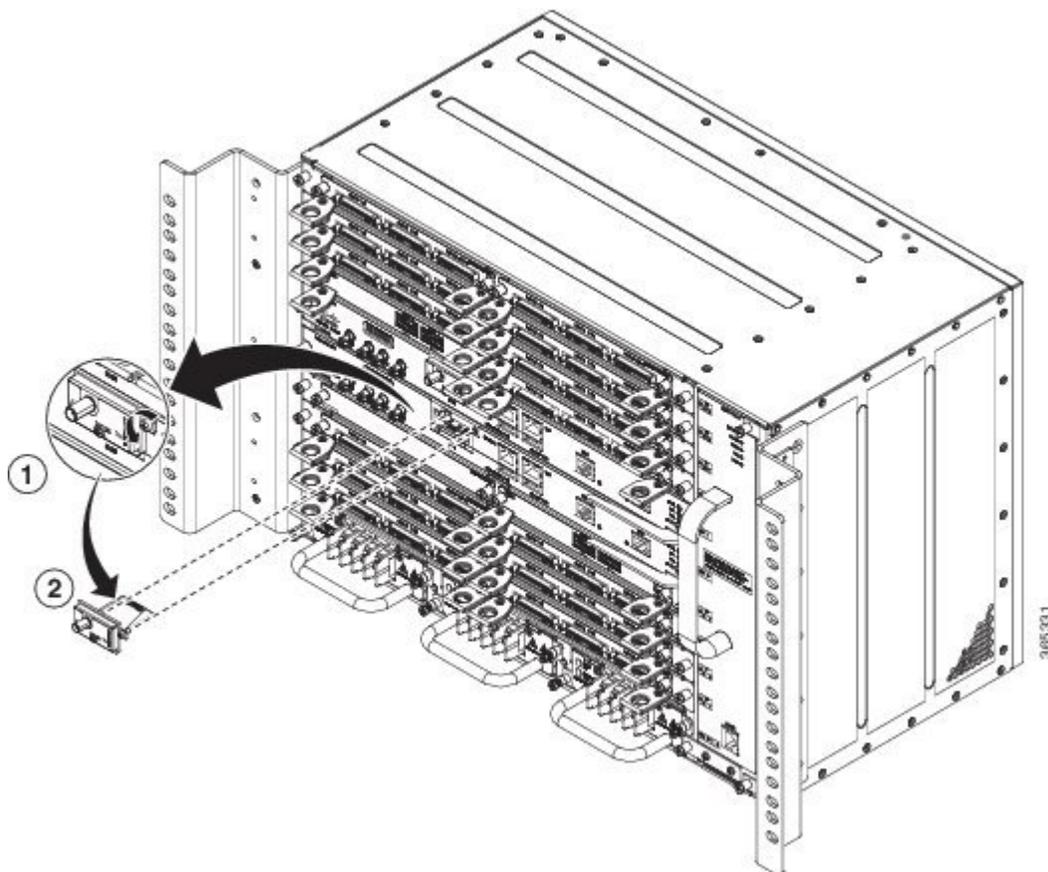
Step 1 Connect one end of a shielded coaxial cable to the GNSS RF IN port.

Step 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: Installing the GNSS Module in the RSP



1	Screw on the GNSS Module	2	Inserting the GNSS Module
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Connecting Ethernet Cables

The Cisco NCS 4216 interface modules support RJ45 or SFP Ethernet ports. For instructions on how to connect cables to Ethernet SFP ports, see the *Connecting Cables to SFP Modules* section.

The RJ45 port supports standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables. Cisco Systems does not supply Category 5 UTP cables; these cables are available commercially.



Warning

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Gigabit Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metalically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metalically to OSP wiring.



Note

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

Follow these steps to connect the cable to a copper Gigabit Ethernet port:

SUMMARY STEPS

1. Confirm that the router is powered off.
2. Connect one end of the cable to the Gigabit Ethernet port on the router.
3. Connect the other end to the BTS patch or demarcation panel at your site.

DETAILED STEPS

- Step 1** Confirm that the router is powered off.
- Step 2** Connect one end of the cable to the Gigabit Ethernet port on the router.
- Step 3** Connect the other end to the BTS patch or demarcation panel at your site.

Connecting Cables to SFP Modules

For information on connecting cables to Cisco optical and Ethernet SFP interfaces, see

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

Connecting T1/E1 cables

The physical layer interface for the Cisco NCS 4216 T1/E1 port is a customer-installed high-density connector. The high-density connector has thumbscrews which should be screwed into the interface when the cable is installed.

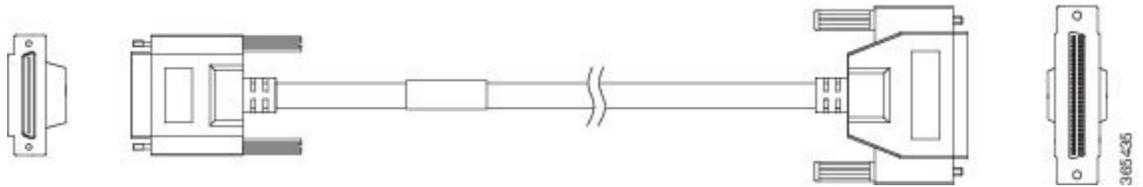


Note Patch panels are required in order to connect the high-density interface connectors to individual T1/E1 lines.

Installing the Cable Connectors

T1/E1 Cable Connectors

Figure 20: T1/E1 Cable Connector



One end of the cable (see the figure above) has a 68-pin connector that plugs into the T1/E1 interface module. Use the thumbscrews on either side of the connector to secure the cable to the interface.

The other end of the cable has two 68-pin connectors that attach to the rear of a 48-port RJ48 or DIN patch panel.

T1/E1 Cable Connectors

One end of the cable (see Figure 3-22) has a 68-pin connector that plugs into the T1/E1 interface module. Use the thumbscrews on either side of the connector to secure the cable to the interface.

The other end of the cable has two 68-pin connectors that attach to the rear of a 48-port RJ48 or DIN patch panel.

T1/E1 Pinouts

For information about the pinout of the cable connecting the T1/E1 interface to the rear of the patch panel, see the *T1/E1 Port Pinouts (RJ-48)* section.

RJ48 Cable Pinouts

T1 lines from individual subscribers are attached to RJ45 connectors on the front of the 24-port patch panel. Each RJ45 port accommodates an individual T1 subscriber line.

For the T1/E1 ports, see the *T1/E1 Port Pinouts (RJ-48)* section.

Patch Panel cables

The patch panel cable connects the interface modules with the patch panel.

Each cable connects one VHDCI connector on the interface module to the connector on the patch panel. A set of three cables is required to connect one interface module to one 48-port patch panel.

The following table shows details of the patch panel cables:

Patch Panel Cable	Description
CABLE-16TDM-C	16-port cable for TDM CEM Interface Module, no redundancy, 10 feet in length

**Note**

CABLE-16TDM-C-R is not supported in Cisco IOS XE Release 3.18.06v.S.

Connecting Cables to the Patch Panel

Figure 21: Interface Module with the Connector

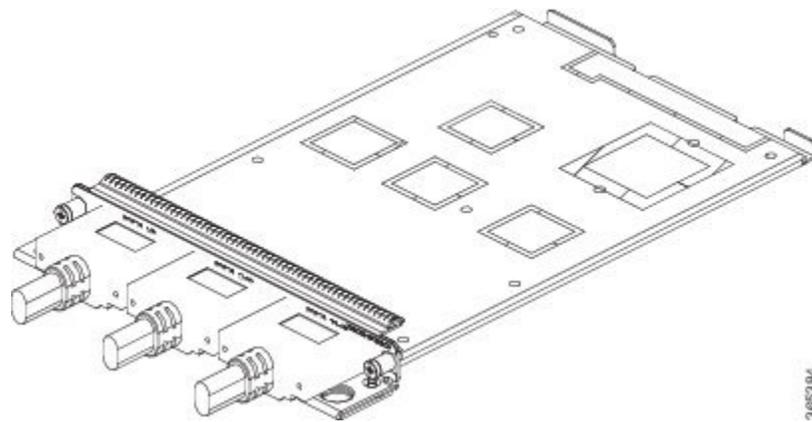
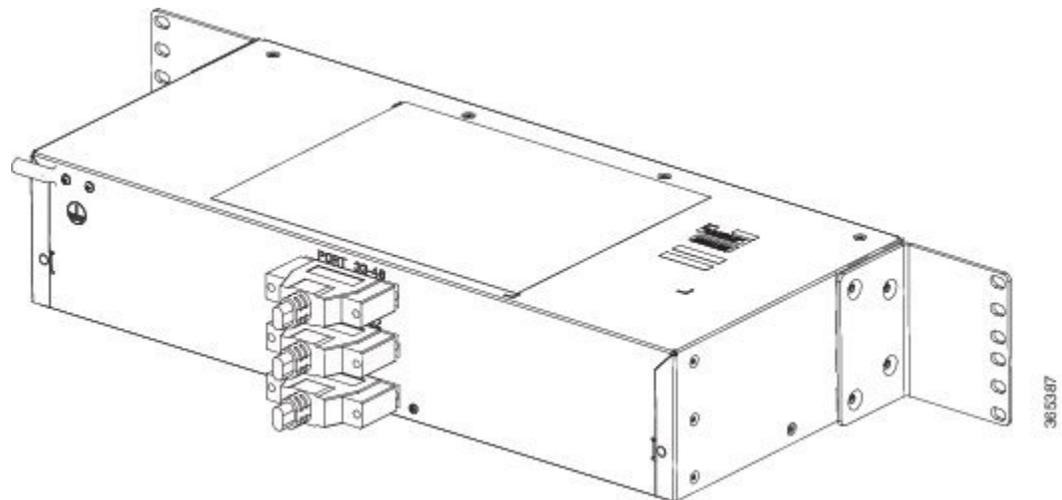


Figure 22: Patch Panel with the Connector



If you are connecting two T1/E1 interfaces to each other, you must cable both interfaces' patch panels together using a T1 straight-through shielded cables. If both T1/E1 interfaces are connected to their patch panels in a different configuration, use a T1 straight-through cable (standard RJ48C patch cable) to connect the patch panels.

**Warning**

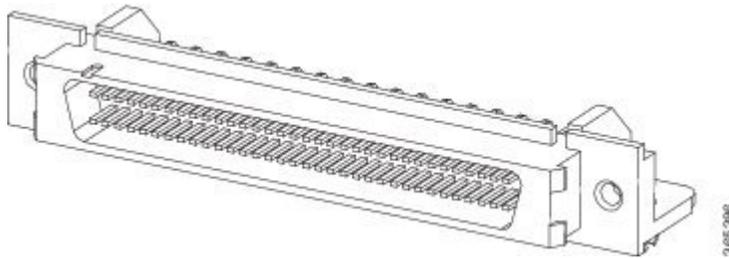
To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the T1/E1 ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallicly connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 1 and Type 3 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicly to OSP wiring.

Patch Panel Connectors

The PANEL-48-1-DIN and PANEL-48-3-DIN provide 48 DIN 1.0/2.3 connectors on the front side of the patch panel. These connectors terminate to 75 ohm coaxial cable through the DIN plug.

The PANEL-48-1-RJ48 provide 48 RJ45 connector on the front side of the patch panel. These connectors terminate to 110 ohm T1/E1 cable through a RJ45 connector.

Figure 23: Patch Panel Connector on the Patch Panel



Connecting the Fan Tray Alarm Port

The fan tray includes an alarm port that maps to 4 dry contact alarm inputs.

The pins on the alarm port are passive signals and can be configured as Normally Open (an alarm generated when current is interrupted) or Normally Closed (an alarm is generated when a circuit is established) alarms. You can configure each alarm input as critical, major, or minor. An alarm triggers alarm LEDs and alarm messages. The relay contacts can be controlled through any appropriate third-party relay controller. The open/close configuration is an option controlled in IOS.

**Warning**

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the alarm ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallicly connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicly to OSP wiring.

Only Pins 1, 2, 4, 6, and 8 are available for customer use. The remaining pins are for Cisco manufacturing test, and should not be connected. Use a shielded cable for connection to this port for EMC protection. *External Alarm Input Pinout* table summarizes the pinouts on the alarm port in the *Troubleshooting* section.

SUMMARY STEPS

1. Attach an RJ45 cable to the alarm port.
2. Attach the other end of the RJ45 cable to the relay controller.

DETAILED STEPS

-
- | | |
|---------------|---|
| Step 1 | Attach an RJ45 cable to the alarm port. |
| Step 2 | Attach the other end of the RJ45 cable to the relay controller. |
-

What to Do Next

For information about how to map alarm inputs to critical, major, and minor alarm conditions, see the Cisco NCS 4216 *Software Configuration Guide* .

Connector and Cable Specifications

For more information on cable specifications and pinouts, see the *Troubleshooting* section.

