# Preparing for Installation

The following sections describe how to prepare for the installation of the router at your site:


- Safety Guidelines, on page 1
- Site Planning, on page 8
- Site Power Guidelines, on page 13
- Site Cabling Guidelines, on page 14
- Rack-Mounting Guidelines, on page 16
- Rack Compatibility, on page 19
- Installation Checklist, on page 21
- Creating a Site Log, on page 22
- Receiving the Cisco NCS 560-4 Router, on page 22
- Chassis-Lifting Guidelines, on page 24
- Tools and Equipment, on page 24
- Unpack and Verify Shipped Contents, on page 25


# Safety Guidelines

Before you begin the installation of the router, review the safety guidelines in this chapter to avoid injuring yourself or damaging the equipment.

In addition, before replacing, configuring, or maintaining the router, review the safety warnings listed in *Regulatory Compliance and Safety Information for the Cisco NCS 500 Series Routers*.

## Standard Warning Statements

To see translations of the warnings that appear in this publication, refer to the Regulatory Compliance and Safety Information document that accompanied this device.

**Warning** 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. Statement 1006

**Warning** Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

**Warning** To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 149°F (65°C). Statement 1047

**Warning** The chassis should be mounted on a rack that is permanently affixed to the building. Statement 1049

**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

**Warning** Class 1M laser radiation when open. Do not view directly with optical instruments. Statement 1053

**Warning** Class I (CDRH) and Class 1M (IEC) laser products. Statement 1055

**Warning** IMPORTANT SAFETY INSTRUCTIONS: This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

**Warning** This is a Class A Device and is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this type was sold or purchased by mistake, it should be replaced with a residential-use type. Statement 294

**Warning** This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. Statement 340

**Warning** This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

# Safety Guidelines for Personal Safety and Equipment Protection

The following guidelines help ensure your safety and protect the equipment. This list does not include all the potentially hazardous situations. Therefore, you should be on alert.

- Before moving the system, always disconnect all the power cords and interface cables.
- Never assume that power is disconnected from a circuit; always check.
- Before and after installation, keep the chassis area clear and dust-free.
- Keep tools and assembly components away from walk areas where you or others could trip over them.
- Do not work alone if potentially hazardous conditions exist.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Do not wear loose clothing that may get caught in the chassis.
- When working under conditions that may be hazardous to your eyes, wear safety glasses.

# Safety With Electricity

**Warning** Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12

**Warning** Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43

**Warning** Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001

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

**Warning** Read the installation instructions before connecting the system to the power source. Statement 1004

**Warning** This product relies on the building's installation for short-circuit (overcurrent) protection. For -48/-60 VDC installation, the wire shall be 8 AWG minimum with a 40 A circuit breaker. Statement 1005

**Warning** This product relies on the building's installation for short-circuit (overcurrent) protection. For an AC installation, ensure that the branch circuit breaker is rated a maximum 20A.

**Warning** When you connect or disconnect the power and relay connector with power applied, an electrical arc can occur. This could cause an explosion in hazardous area installations. Be sure that power is removed from the switch and alarm circuit. Be sure that power cannot be accidentally turned on or verify that the area is nonhazardous before proceeding. Failure to securely tighten the power and relay connector captive screws can result in an electrical arc if the connector is accidentally removed. Statement 1058

**Warning** Take care when connecting units to the supply circuit so that wiring is not overloaded. Statement 1018

**Warning** The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019

**Warning** To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ45 connectors. Use caution when connecting cables. Statement 1021

**Warning** A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022

**Warning** To reduce the risk of fire, use only 26 AWG or larger telecommunication line cord. Statement 1023

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

**Warning** Use copper conductors only. Statement 1025

**Warning** This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

**Warning** To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Statement 1032

**Warning** Do not use this product near water; for example, near a bath tub, wash bowl, kitchen sink or laundry tub, in a wet basement, or near a swimming pool. Statement 1035

**Warning** Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Statement 1036

**Warning** Before opening the unit, disconnect the telephone-network cables to avoid contact with telephone-network voltages. Statement 1041

**Warning** This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general-purpose outlet could be hazardous. The telecommunications lines must be disconnected 1) before unplugging the main power connector or 2) while the housing is open, or both. Statement 1043

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

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

**Warning** Never install an AC power module and a DC power module in the same chassis. Statement 1050

**Warning** Failure to securely tighten the power and relay connector captive screws can result in an electrical arc if the connector is accidentally removed. Statement 1058

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

**Warning** If you connect or disconnect the console cable with power applied to the switch or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding. To verify switch operation, perform POST on the switch in a nonhazardous location before installation. Statement 1065

**Warning** Installation of the equipment must comply with local and national electrical codes. Statement 1074

**Warning** Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1075

When working on equipment powered by electricity, follow these guidelines:

- Locate the room's emergency power-off switch. If an electrical accident occurs, you will be able to quickly turn off the power.
- Before working on the system, turn off the DC main circuit breaker and disconnect the power terminal block cable.
- Before doing the following, disconnect all power:
  - Working on or near power supplies
  - Installing or removing a router chassis or network processor module
  - Performing most hardware upgrades
- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit; always check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.
- If an electrical accident occurs, proceed as follows:
  - Use caution, and do not become a victim yourself.
  - Turn off power to the router.
  - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim, and then call for help.
  - Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the following guidelines when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for it.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- When installing or modifying telephone lines, use caution.

# Power Supply Considerations

Check the power at your site to ensure that you are receiving clean power (free of spikes and noise). Install a power conditioner if necessary.

# Preventing ESD Damage

**Warning** This equipment needs to be grounded. Use a green and yellow 6 AWG ground wire to connect the host to earth ground during normal use. Statement 383

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD can occur when electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. When removing and replacing modules, always follow ESD prevention procedures:

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To channel unwanted ESD voltages safely to ground, connect the clip to an unpainted surface of the chassis frame. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use available ejector levers or captive installation screws, if any, to release the bus connectors from the backplane or midplane.
- Handle components by their handles or edges only; do not touch the printed circuit boards or connectors.
- Place a removed component board side up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

**Note** For the safety of your equipment, periodically check the resistance value of the antistatic wrist strap. It should be between 1 and 10 Mohm.

# Site Planning

The following sections describe how to plan for the installation of the router.

## General Precautions

Observe the following general precautions when using and working with your router:

- Keep your system components away from radiators and heat sources and do not block cooling vents.

- Do not spill food or liquids on your system components and never operate the product in a wet environment.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Position system cables and power supply cables carefully. Route system cables and the power supply cable and plug so that they cannot be stepped on or tripped over. Be sure that nothing else rests on your system component cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.
- If you turn off your system, wait at least 30 seconds before turning it on again to avoid system component damage.

# Site Planning Checklist

Use the following checklist to perform and account for all the site planning tasks described in this chapter:

- The site meets the environmental requirements.
- The site's air conditioning system can compensate for the heat dissipation of the router.
- The floor space that the router occupies can support the weight of the system.
- Electrical service to the site complies with the requirements.
- The electrical circuit servicing the router complies with the requirements.
- Consideration has been given to the console port wiring and limitations of the cabling involved, according to TIA/EIA-232F.
- The router Ethernet cabling distances are within limitations.
- The equipment rack in which you plan to install the router complies with requirements.
- In selecting the location of the rack, careful consideration has been given to safety, ease of maintenance, and proper airflow.

# Site Selection Guidelines

The router requires specific environmental operating conditions. Temperature, humidity, altitude, and vibration can affect the performance and reliability of the router. The following sections provide specific information to help you plan for the proper operating environment.

The router is designed to meet the industry EMC, safety, and environmental standards described in the *Regulatory, Safety, and Compliance Information for the Cisco NCS 500 Series Routers*.

## Environmental Requirements

The Cisco NCS 560 Router is Telcordia GR-3108 (Class-1 for non-coated PIDs and Class-2 for conformal coated PIDs) or GR-63-Core Indoor compliant.

Environmental monitoring in the router protects the system and components from damage caused by excessive voltage and temperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan and prepare your site configuration *before* installation. After installation, make sure that the site maintains the environmental characteristics described in the *Cisco NCS 560 Series Routers Datasheet*.

For an outside plant installation (cell site cabinet, hut, and so on), it is required that the router be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air, or other reactive elements present in the outside air. To achieve this level of protection, we recommend that the unit be installed in a fully sealed enclosure or cabinet. Examples of such cabinets include IP65 cabinets with heat exchanger complying with Telcordia GR487. Temperature must be maintained within –40ºC to 65ºC. When you use the reverse air flow fan modules, N560-4-PWR-FAN-R, and N560-4-FAN-H-R, the ambient temperature must be maintained within 0ºC to 40ºC.

## Physical Characteristics

Be familiar with the physical characteristics of the Cisco NCS 560 Router to assist you in placing the system in the proper location. For more information, see the *System Specifications* section.

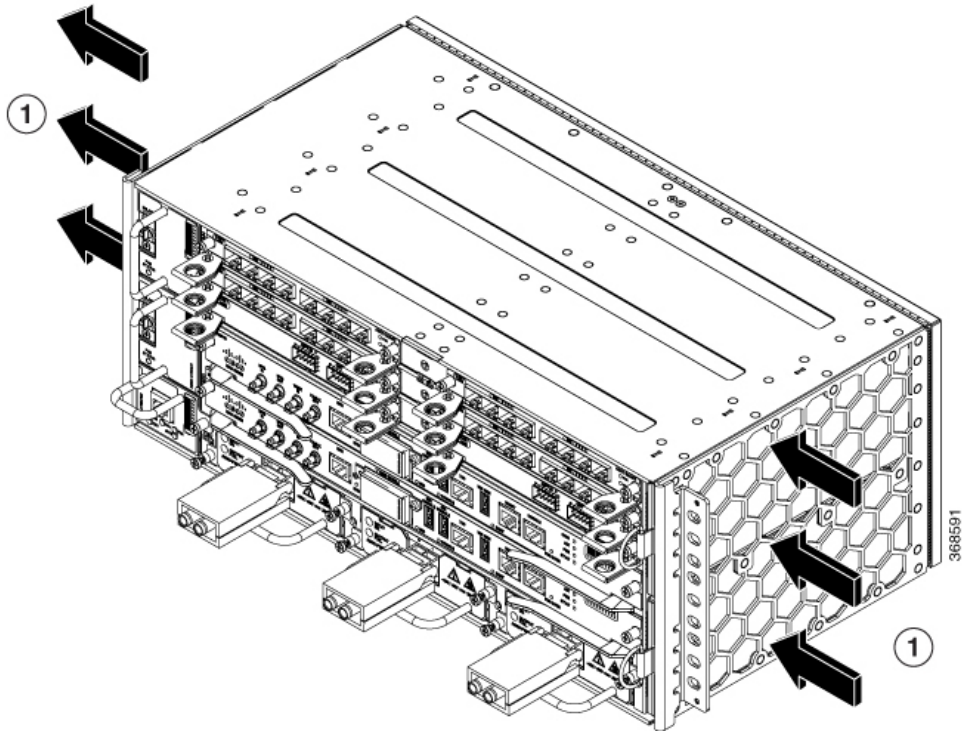
## Assembly Guidelines

First, assemble the route switch processor (RSP). Then, IMs must be installed from the lower slot to the upper slot in the following order—slot 0, slot 1 and so on.

# Air Flow Guidelines

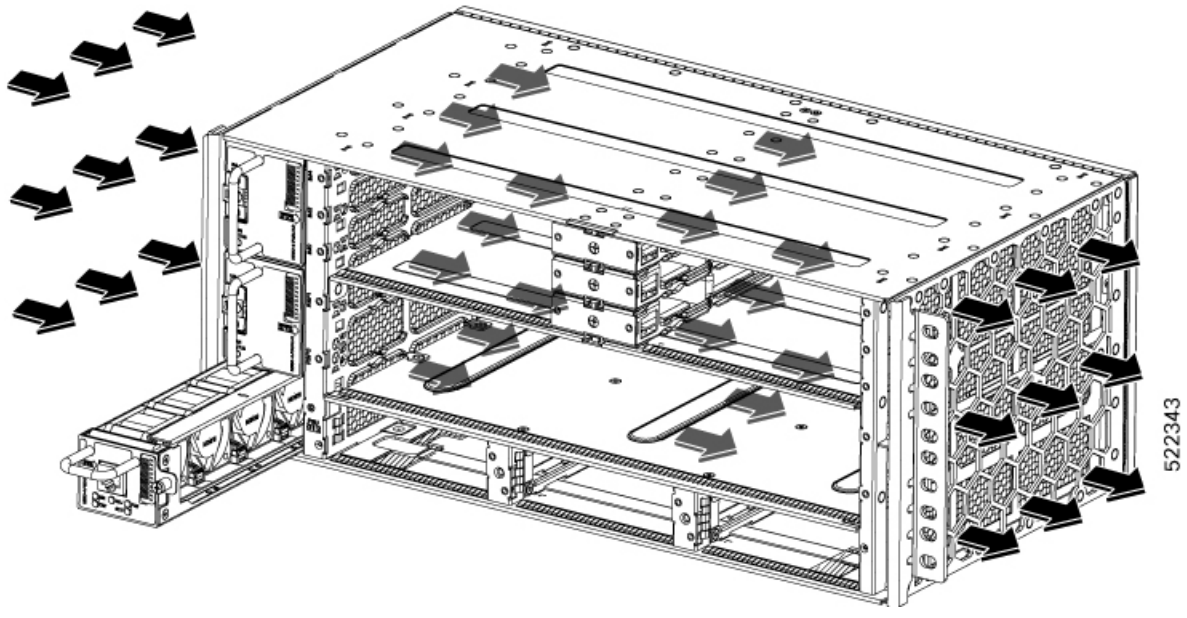
Cool air is circulated through the Cisco NCS 560-4 Router by three fan trays located along the left side of the router. Air flow is side-to-side, right to left, as shown in the figure below.

*Figure 1: Cisco NCS 560-4 Router Chassis Air Flow*




| | |
|---|---|
| 1 | Direction of air flow — from the right side of the router to the left side |

*Figure 2: Cisco NCS 560-4 Router Chassis Air Flow With N560-4-PWR-FAN-R and N560-4-FAN-H-R*




N560-4-PWR-FAN-R and N560-4-FAN-H-R fan modules allow the air to flow from the left side of the router to the right side.

The fan trays maintain acceptable operating temperatures for the internal components by drawing in cool air through the vents, and circulating the air through the chassis.

The following guidelines will help you plan your equipment rack configuration:

- To ensure adequate air flow through the equipment rack, we recommend that you maintain a clearance of at least 80 mm (3.15 inches) on each side of the rack at all times.
- If airflow through the equipment rack and the routers that occupy it is blocked or restricted, or if the ambient air being drawn into the rack is too warm, an overtemperature condition can occur within the rack and the routers that occupy it.
- The site should also be as dust-free as possible. Dust tends to clog the router fans, reducing the flow of cooling air through the equipment rack and the routers that occupy it, thus increasing the risk of an overtemperature condition.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat that is generated by the equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the side intakes and the exhaust fans.
- When rack-installed equipment fails, especially equipment in an enclosed rack, try operating the equipment by itself, if possible. Power off all other equipment in the rack (and in adjacent racks) to give the router maximum cooling air and clean power.
- Avoid setting up the router in a location in which the router air intake vents may draw in the exhaust air from adjacent equipment. Consider how the air flows through the router; the airflow direction is side to side, with ambient air drawn in from the vents located on the front right of the router.

## Air Flow Guidelines for Enclosed Rack Installation

To install a Cisco NCS 560-4 Router in a 4-post enclosed cabinet, the front and rear doors of the cabinet must be removed or be perforated with a minimum of 65% open area (70% for 800mm racks).

If you are mounting the chassis in a 4-post enclosed cabinet, ensure that you have a minimum of 6 inches (15.24 cm) of clearance on each side of the chassis.

# Floor Loading Considerations

Ensure that the floor under the rack supporting the Cisco NCS 560-4 Routers are capable of supporting the combined weight of the rack and all the other installed equipment.

To assess the weight of a fully-configured router, refer to System Specifications or the *Product Specifications* section in the Cisco Network Convergence System 560-4 Router Data Sheet.

For additional information about floor loading requirements, consult *GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection*.

# Site Power Guidelines

The Cisco NCS 560-4 Router has specific power and electrical wiring requirements. Adhering to these requirements ensures reliable operation of the system. Follow these precautions and recommendations when planning your site power for the Cisco NCS 560-4 Router:

- The redundant power option provides a second, identical power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.
- In systems configured with the redundant power option, connect each of the two power supplies to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.
- To prevent a loss of input power, be sure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and the breakers.
- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.
- Provide proper grounding to avoid personal injury and damage to the equipment due to lightning striking power lines or due to power surges. The chassis ground must be attached to a central office or other interior ground system.

**Caution** 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.

**Note** The Cisco NCS 560-4 Router installation must comply with all the applicable codes and is approved for use with copper conductors only. The ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system must be made with a 6 AWG gauge wire, copper ground conductor at a minimum.

The maximum power draw of the Cisco NCS 560-4 Router chassis and its configurable hardware components are listed in the following table. The maximum power draw values are not affected by whether the router chassis contains 1 or 2 power supplies AC or DC.

| Hardware Component(s) | Maximum Power Draw Value |
|---|---|
| Router chassis with 2 power supplies, 3 fan trays, and 1 RSP4 | (approx.) 500 W |
| N560-4-PWR-FAN | 54 W |
| N560-4-FAN-H | 80 W |
| N560-4-RSP4 and N560-4-RSP4E (active) | 164 W |
| N560-4-RSP4 and N560-4-RSP4E (standby) | 164 W |

| Hardware Component(s) | Maximum Power Draw Value |
|---|---|
| N560-4-RSP4-CC and N560-4-RSP4E-CC (active) | 164 W |
| N560-4-RSP4-CC and N560-4-RSP4E-CC (standby) | 164 W |
| N560-IMA-2C-DD (2-port 100 GigabitEthernet lite interface module) | 75 W |
| A900-IMA8Z (NCS4200-8T-PS) (8-port 10 Gigabit Ethernet Interface Module) | 55 W |
| A900-IMA8CS1Z-M (NCS4200-1T16G-PS) (8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module) | 55 W |
| A900-IMA2C (2-port 100 Gigabit Ethernet Interface Module) | 75 W |
| A900-IMA8Z-L (8-port 10 GigabitEthernet lite SFP+ Interface Module) | 24 W |
| A900-IMA2C-CC (2-port 100 Gigabit Ethernet Interface Module) | 75 W |
| N560-IMA-8Q/4L (8-port 10 Gigabit Ethernet / 25 Gigabit Ethernet / 50 Gigabit Ethernet Interface Module) | 50 W |

## Electrical Circuit Requirements

Each Cisco NCS 560-4 Router requires a dedicated electrical circuit. If you equip it with dual power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

The Cisco NCS 560-4 Routers can be powered by a DC source or an AC source. Ensure that equipment grounding is present and observe the power strip ratings. Make sure that the total ampere rating of all products plugged into the power strip does not exceed 80% of the rating.

For more information about the Cisco NCS 560-4 Router power supply, see the Power Supply section.

# Site Cabling Guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the Cisco NCS 560-4 Router, consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, electromagnetic interference (EMI), and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

Also consider any additional interface equipment you need, such as transceivers, hubs, switches, modems, channel service units (CSU), or data service units (DSU).

Before you begin, read these important notes about cabling:

- Shielded cables must be used to connect to the RJ-45 alarm connector on the fan tray in order to comply with FCC/EN55022/CISPR22 Class A emissions requirements.

Before you install the Cisco NCS 560-4 Router, have all the additional external equipment and cables on hand. For information about ordering, contact a Cisco customer service representative.

The extent of your network and the distances between the network interface connections depend in part on the following factors:

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline in planning your network connections prior to installing the Cisco NCS 560-4 Router.

If wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.

# Asynchronous Terminal Connections

The RSP4 provides a console port to connect a terminal or computer for local console access. The port has an RJ45 connector and supports RS-232 asynchronous data with distance recommendations specified in the IEEE RS-232 standard.

# Interference Considerations

When wires are run for any significant distance, there is a risk that stray signals will be induced on the wires as interference. If interference signals are strong, they can cause data errors or damage to the equipment.

The following sections describe sources of interference and how to minimize its effects on the Cisco NCS 560-4 Router system.

**Electromagnetic Interference**

All equipment powered by AC current can propagate electrical energy that can cause EMI and possibly affect the operation of other equipment. The typical sources of EMI are equipment power cords and power service cables from electric utility companies.

Strong EMI can destroy the signal drivers and receivers in the Cisco NCS 560-4 Router and even create an electrical hazard by causing power surges through the power lines into installed equipment. These problems are rare but could be catastrophic.

To resolve these problems, you need specialized knowledge and equipment that could consume substantial time and money. However, you can ensure that you have a properly grounded and shielded electrical environment, paying special attention to the need for electrical surge suppression.

For information about the electrode magnetic compliance standards supported on the Cisco NCS 560-4 Router, see *Regulatory Compliance and Safety Information for the Cisco NCS 500 Series Routers*.

**Radio Frequency Interference**

When electromagnetic fields act over a long distance, radio frequency interference (RFI) may be propagated. Building wiring can often act as an antenna, receiving the RFI signals and creating more EMI on the wiring.

If you use twisted-pair cable in your plant wiring with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal.

**Lightning and AC Power Fault Interference**

If signal wires exceed the recommended cabling distances, or if signal wires pass between buildings, you should consider the effect that a lightning strike in your vicinity might have on the Cisco NCS 560-4 Router.

The electromagnetic pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors to damage or destroy electronic equipment. If you have previously experienced such problems, you should consult with RFI and EMI experts to ensure that you have adequate electrical surge suppression and shielding of signal cables in your Cisco NCS 560-4 Router operating environment.

# Rack-Mounting Guidelines

The following sections provide guidelines for rack-mounting the Cisco NCS 560-4 Router:

## Precautions for Rack-Mounting

The following rack-mount guidelines are provided to ensure your safety:

- Do not move large racks by yourself. Due to the height and weight of a rack, a minimum of two people are required to accomplish this task.
- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to the components in the rack.
- Do not step on or stand on any component or system when servicing other systems or components in a rack.
- When mounting the Cisco NCS 560-4 Router 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.

## Rack Selection Guidelines

The Cisco NCS 560-4 Router can be mounted in most two-post or four-post, EIA 19-inch, EIA 23-inch and ETSI equipment racks that comply with the Electronic Industries Association (EIA) standard for equipment racks. The rack must have at least two posts with mounting flanges to mount the chassis.

**Caution** When mounting a chassis in any type of rack equipment, ensure that the inlet air to the chassis does not exceed 65 degrees C.

The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 inches

± 0.06 inch (46.50 cm ± 0.15 cm). The rack-mounting hardware included with the chassis is suitable for most 19-inch equipment racks.

Consider installing the Cisco NCS 560-4 Router in a rack with the following features:

- Network Equipment Building System (NEBS) compliant, 19-inch (48.3 cm) wide rack.
- EIA or European Telecommunications Standards Institute (ETSI) hole patterns in the mounting rails. The required mounting hardware is shipped with the Cisco NCS 560-4 Router. If the rack that you plan to install the system in has metric-threaded rails, you must provide your own metric-mounting hardware.
- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.

**Note** The Cisco NCS 560-4 Router should not be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. Installing the router in any type of enclosed rack—*even with the side doors removed*—could disrupt the air flow, trap heat next to the chassis, and cause an overtemperature condition inside the router. If you use an enclosed rack, ensure that there are air vents on all sides of the rack and there is proper ventilation.

# Cabinet Selection Guidelines

Equipment that is intended for installation in controlled environmental space has average yearly levels of contamination. Ventilated cabinets or racks can be used if pollutant levels are maintained within allowable limits.

Equipment intended for installation in outside plant (OSP) areas must have sealed cabinets with heat exchanger that meet the IP66 or IP65 protection and low average yearly levels of concentration of contaminants inside the cabinet.

**Note** Ventilated cabinets and racks are not recommended for OSP applications.

***Table 1: Cabinet Type for Indoor and Outdoor Installation***

| Cabinet Type | Suitable for Indoor Installation? | Suitable for Outdoor Installation? |
|---|---|---|
| Open rack with no front and rear doors | Yes | No |
| Ventilated cabinets with normal air filter at intake and fans | Yes | No |
| Sealed cabinets with heat exchanger that meet NEMA -4 or protection | Yes | Yes |

| Cabinet Type | Suitable for Indoor Installation? | Suitable for Outdoor Installation? |
|---|---|---|
| Sealed cabinets with air-conditioners that meet NEMA -4 or IP65 protection | Yes | Yes |

**Allowable limits for Environmental Pollutants**

Concentration of pollutant levels in outdoor and indoor environment must be less than pollutant levels mentioned in Table 2.3 and Table 2.4 of *NEBS GR-63-CORE Issue 5 Dec 2017*, respectively. High concentrations of pollutants have a negative impact on the equipment life time.

**Allowable Temperature and Humidity**

Maximum allowable temperature and humidity levels must be within the values that are mentioned in the data sheets. Do not install in places where condensation may occur, or where equipment is exposed to high humidity for long time, such as near the sea, rivers, and large water bodies.

**Installations in Highly-corrosive Environment**

Installation in highly corrosive area is not recommended. Examples of highly corrosive areas are seashore, less than 10 meters from high traffics roadway, and areas having high industrial pollutants.

**Periodic Measurement of Environmental Pollutants**

We recommend that you check concentration of pollutants periodically. Necessary protection should be provided to ensure the equipment is not exposed to high concentration level of pollutants.

# Equipment Rack Guidelines

The placement of the rack can affect personnel safety, system maintenance, and the system's ability to operate within the environmental characteristics described in the *Cisco NCS 560-4 Routers Datasheet*. Choose a proper location for the Cisco NCS 560-4 Router by following the guidelines listed below.

**Locating for Safety**

If the Cisco NCS 560-4 Router is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack's center of gravity is as low as possible.

For additional information about the proper placement of electronic equipment, consult the document GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection.

**Locating for Easy Maintenance**

Keep at least three feet (36 inches) of clear space at the front and two feet (24 inches) at the back of the rack. This space ensures that you can remove the Cisco NCS 560-4 Router components and perform routine maintenance and upgrades easily.

Avoid installing the Cisco NCS 560-4 Router in a congested rack and consider how routing of cables from other pieces of equipment in the same rack could affect access to the router cards.

The sides of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis.

Allow the following clearances for normal system maintenance:

- At the top of the chassis—At least 3 inches (7.6 cm)
- Sides of the chassis—3 to 4 ft (91.44 cm to 121.92 cm)

**Note** If you are installing the chassis in a plenum, the air flow direction changes from right-to-left of router to front-to-back of the router. In this case, the side space is not required.

To avoid problems during installation and ongoing operations, follow these general precautions when you plan equipment locations and connections:

- Use the **show environment all** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings about high temperature and creates reports on other potentially dangerous occurrences. If warning messages are displayed, take immediate action to identify the cause, and correct the problem.
- Keep the Cisco NCS 560-4 Router off the floor and out of areas that collect dust.
- Follow ESD-prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

### Locating for Proper Airflow

Ensure that the Cisco NCS 560-4 Router location has enough airflow to keep the system operating within the environmental characteristics and the air temperature is sufficient to compensate for the heat dissipated by the system.

# Rack Compatibility

We recommend that you follow these rack specifications.

## Rack Types

***Figure 3: Rack specification EIA (19 inches and 23 inches)***

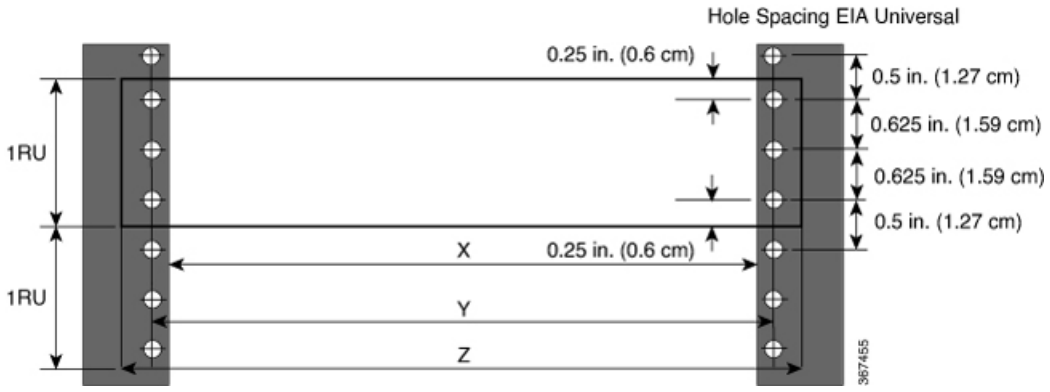


*Table 2: Rack specification EIA (19 inches and 23 inches) for the Cisco NCS 560-4 Router*

| 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) | 450.8mm (17.75”) | 465mm (18.312”) | 482.6mm (19”) |
| 2 Post | | | | |
| 4 Post | 23 inches (58.4 centimeters) | 552.45mm (21.75”) | 566.7mm (22.312”) | 584.2mm (23”) |
| 2 Post | | | | |

*Figure 4: Four Post Rack Type*

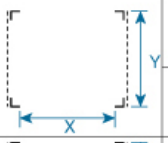
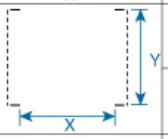
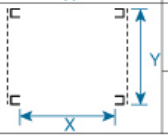
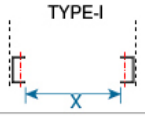
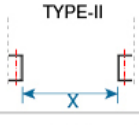
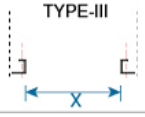
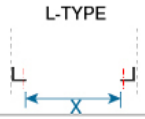
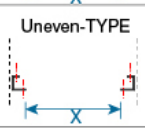
| 4 – Post Type (Hole EIA Universal) | Width Available (X) | Compatibility with Chassis | Compatibility with Plenum |
|---|---|---|---|
| All 23” Type rack | 21.75” (552.45mm) | Yes | Yes |
| All ETSI rack (21” rack) | 19.68” (500.0mm) | Yes | Yes |
| 19” Type rack<br>L-Type Post  | 17.75” (450.8mm)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

*Figure 5: Two Post Rack Type*

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

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# Installation Checklist

Use the Installation Checklist that is shown in the following table to provide a record of what was done by whom and when. Use this list to record the completion and verification of each procedure. After the checklist is completed, place it in your Site Log along with the other records pertaining to your new Cisco router.

*Table 3: Installation Checklist*

| Task | Verified By | Date |
|---|---|---|
| Date on which chassis received | | |
| Chassis and all accessories unpacked | | |
| Types and numbers of interfaces verified | | |
| Safety recommendations and guidelines reviewed | | |
| Installation Checklist that is copied. | | |
| Site Log established and background information entered | | |
| Site power voltages verified | | |
| Site environmental specifications verified | | |
| Required passwords, IP addresses, device names, and so on, available | | |

| Task | Verified By | Date |
|---|---|---|
| Required tools available | | |
| Network connection equipment available | | |
| Cable-management brackets that are installed (optional, but recommended). | | |
| AC power cables that are connected to AC sources and router. | | |
| DC power cables that are connected to DC sources and router. | | |
| Network interface cables and devices connected | | |
| System power that is turned on. | | |
| System boot completes (STATUS LED is on). | | |
| Correct software configuration that is displayed after system banner appears | | |

# Creating a Site Log

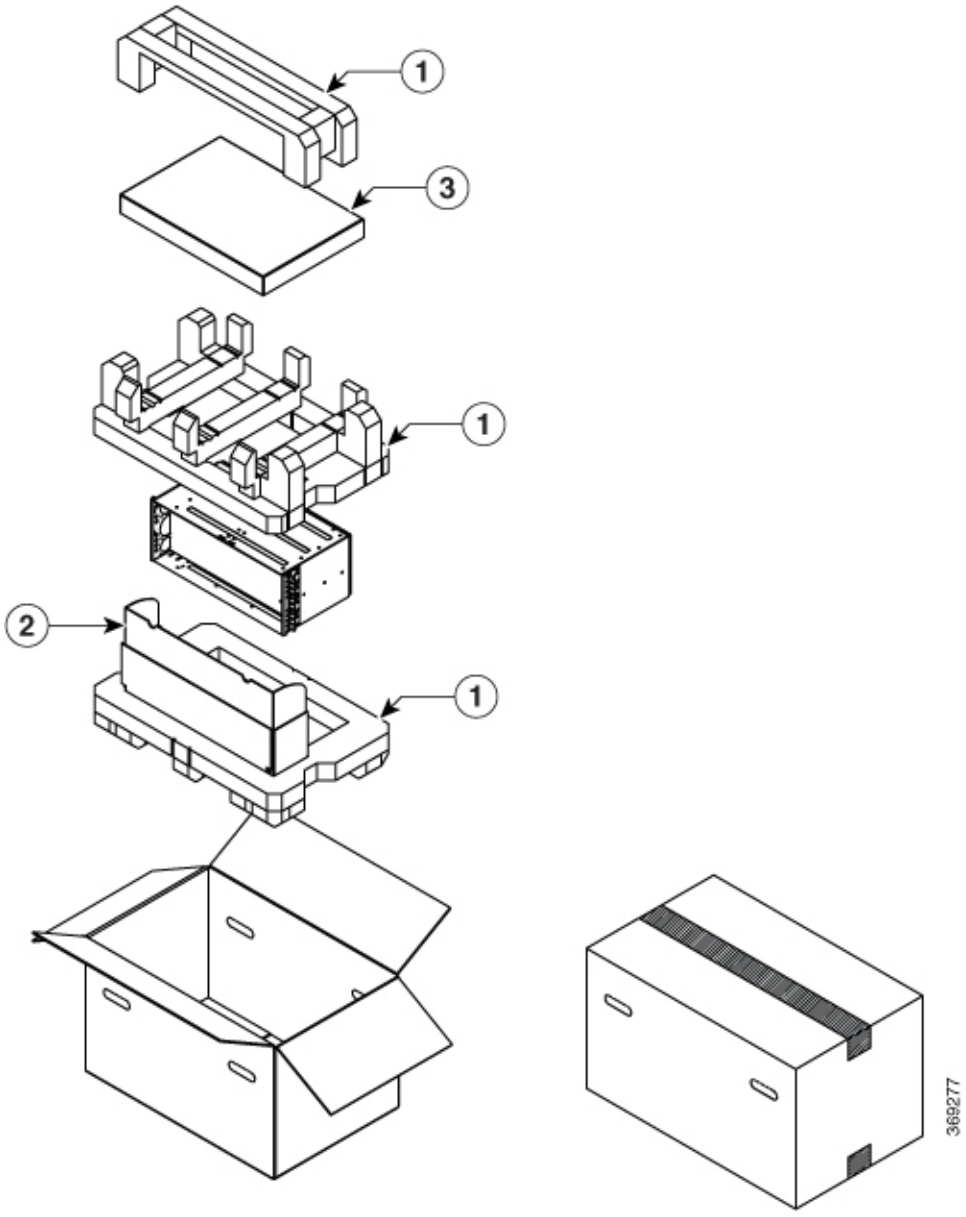
The Site Log provides a record of all the actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that anyone who performs tasks has access to it.

Create the Site Log prior to the installation. See the *Site Log and Manufactures* section for more information on the Site Log as well as a sample Site Log that can be used to make copies.

# Receiving the Cisco NCS 560-4 Router

Each Cisco NCS 560-4 Router chassis is shipped in a container.

*Figure 6: Cisco NCS 560-4 Router Packaged for Shipping*




| | | | |
|---|---|---|---|
| 1 | Bottom and Top foam | 2 | Tray |
| 3 | Roll End Lock Front (RELF) | — | — |

# Chassis-Lifting Guidelines

The chassis is not intended to be moved frequently. Before you install the system, ensure that your site is properly prepared so that you can avoid having to move the chassis later to accommodate power sources and network connections.

Each time you lift the chassis, follow these guidelines:

- Ensure that your footing is solid, and balance the weight of the chassis between your feet.
- Lift the chassis slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. If you must bend down to lift the chassis, bend at the knees, not at the waist, to reduce the strain on your back muscles.
- Do not remove installed components from the chassis.
- Always disconnect all external cables before lifting or moving the chassis.

**Warning** To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Lift the unit only by using handles that are an integral part of the chassis, or by grasping the chassis underneath its lower edge. Statement 163

# Tools and Equipment

You need the following tools and equipment to install and upgrade the router and its components:

- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- Flat-blade screwdrivers: Small 3/16-inch (0.476 cm) and medium 1/4-inch (0.625 cm):
  - To install or remove modules
  - To remove the cover if you are upgrading the memory or other components
- #12-24 pan-head screws to secure the router to the equipment rack
- Cables for connecting to the WAN and LAN ports (depending on the configuration)
- Ethernet hub or switch or PC with a network interface card for connecting to the Ethernet ports
- Console terminal (an ASCII terminal or a PC running terminal emulation software) that is configured for 115200 baud, 8 data bits, no parity, and two stop bits
- Console cable for connecting to the console port

- (Optional) Modem for connecting to the auxiliary port for remote administrative access
- Auxiliary cable for connecting to the auxiliary port (you can supply this cable or order one)
- Ratcheting torque screwdriver with a Phillips head that exerts up to 30 pound-force per square inch (in-lb) of pressure
- Crimping tool as specified by the ground lug manufacturer
- 8 AWG copper wire for the power cord
- Wire-stripping tools for stripping both 6 AWG and 8 AWG wire
- Tape measure and level

**Warning** Only trained and qualified personnel should be allowed to install or replace this equipment. Statement 49

# Unpack and Verify Shipped Contents

### Procedure

**Step 1** Inspect the shipping container for any shipping damage. If there is obvious physical damage, contact your Cisco service representative, else continue with the remaining steps.

**Step 2** Unpack the router.

**Step 3** Inspect the router.

**Step 4** Use the following table to verify the contents of the container. Do not discard the shipping container. You will need the container in the future if you move or ship the router.

### What to do next

***Table 4: Cisco NCS 560-4 Router Shipping Container Contents***

| Component | Description |
|---|---|
| Chassis | Cisco NCS560-4 Router |
| | Fan Trays |
| | Power Supplies |
| | RSP |
| | Interface Modules |
| | 19-inch rack mount brackets |

| Component | Description |
|---|---|
| Accessories kit | Rack mount adapter screws (for 23-inch and ETSI adaptors)<br>4 cable management brackets |
| | Four cable-management brackets (one per bracket) |
| | One earth lug with two 10-32 screws. |
| | 1 RJ45 to RJ45 crossover cable<br>1 RJ45 to DB-9 (female) adapter |
| ETSI Bracket (To be used when the router is used as a reverse flow system) | N560-4-O-BRCKT |
| ESD, wrist strap (disposable) | One disposable wrist strap (optional) |
| Documentation | *Regulatory Compliance and Safety Information for the Cisco NCS 500 Router* |

**Note** Most Cisco documentation is available online. The chassis Pointer Card that is shipped with your Cisco NCS 560-4 Router contains links and information to other online documentation.

**Note** If the product is not in use, store the device in the initial packaged condition or in an ESD PE sealed bag with silica gel.