Prepare for Installation

Note The images in this chapter are only for representation purposes, unless specified otherwise. The chassis' actual appearance and size may vary.

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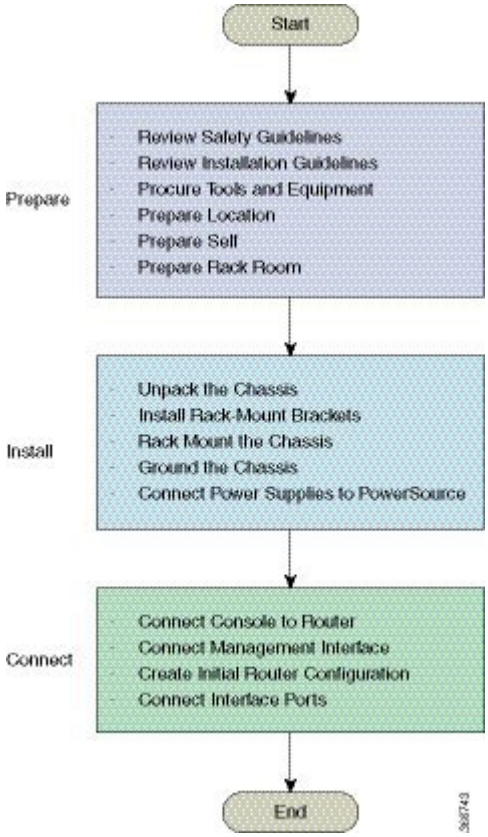
Review Installation Roadmap

The figure, Installation Workflow, lists the steps to install Cisco NCS 5500 Series fixed-port chassis and its components and prepare the system for operation. Use this workflow as a reference to ensure that all components are properly installed in the correct order. For information about a step, see the respective section of this installation guide.

Figure 1: Installation Workflow



Review Safety Guidelines

Before you perform any procedure in this document, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment. The following guidelines are for your safety and to protect equipment. Because the guidelines do not include all hazards, be constantly alert.

- Keep the work area clear, smoke and dust-free during and after installation. Do not allow dirt or debris to enter into any laser-based components.
- Do not wear loose clothing, jewelry, or other items that could get caught in the router or other associated components.
- Cisco equipment operates safely when used in accordance with its specifications and product-usage instructions.
- Be sure to power down a fixed configuration PDU or modular configuration power shelf before removing it from the chassis.
- If potentially hazardous conditions exist, do not work alone.
- Take care when connecting multiple units to the supply circuit so that wiring is not overloaded.

- 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 about whether suitable grounding is available.
- 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.
- Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.
- When installing or replacing the unit, the ground connection must always be made first and disconnected last.
- The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack may cause the rack to tip over.

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

Cautions and Regulatory Compliance Statements for NEBS

The following are NEBS GR-1089-CORE cautions, regulatory compliance statements, and requirements:

- The intra-building port(s) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.

Caution The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces which 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 metallically to OSP wiring.

- Products that have AC power ports that are intended for deployments where an external Surge Protective Device (SPD) is utilized at the AC power service equipment (see definition in National Electric Code).
- This product is designed for a Common Bonding Network (CBN) installation.
- This product can be installed in network telecommunication facilities or locations where the National Electric Code applies.
- An electrical conducting path shall exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. Electrical continuity shall be provided by using thread-forming type mounting screws that remove any paint or nonconductive coatings and establish a metal-to-metal contact. Any paint or other nonconductive coatings shall be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.

- The DC return connection to this system should remain isolated from the system frame and chassis (DC-I).
- The nominal DC operating voltage -48 VDC.

Review Site Selection Guidelines

This equipment requires specific environmental operating conditions such as temperature, humidity, altitude, and vibration for better performance and reliability. The following sections provide guidelines for installation of the equipment to ensure operating conditions are within specified limits mentioned in the *Cisco Network Convergence System 5500 Series: 55A2 Chassis Data Sheet*. There are two categories of installation sites: Central Office and Outside Plant.

Central Offices (COs) and Similar Facilities

- Equipment qualified for GR-63-CORE is intended for installation in Central Offices (COs) and similar facilities.
- Temperature and humidity levels of central offices shall be as per GR-63-CORE - Issue 5, Table 4-4 and Figure 4-1. Maximum allowable temperature and humidity levels must be within the values mentioned in the data sheets. Always maintain absolute humidity levels less than 0.024 Kg of water vapor/Kg of dry air. We do not recommend installations where condensation may occur or where equipment is exposed to high humidity for long duration.
- Environmental pollutant limits of central offices shall be as per GR-63-CORE Table 2-4.

Outside Plant Installation (OSP)

- Equipment qualified for GR-3108-CORE is intended for installation in outside plant applications (OSP).
- Temperature and humidity levels of OSP installation sites shall be as per GR-3108-CORE Table 1-1. Maximum allowable inlet air temperature and humidity levels must be within the values mentioned in the data sheets. Environments with relative humidity above 85% or where condensation may occur is not acceptable for equipment qualified for GR-3108-CORE Class 1 and 2.
- Environmental pollutant limits of OSP sites shall be as per GR-63-CORE Table 2-3.
- See the Review Outside Plant (OSP) Guidelines, on page 5 for additional information.

Note We recommended that you check the concentration of pollutants periodically at CO and OSP sites. Equipment should be provided with necessary protection to ensure it is not exposed to high concentration level of pollutants.

Caution Installation in highly corrosive areas is not recommended. Examples of highly corrosive areas include: near the sea, rivers, and large bodies of water where high humidity persist for long peroids of time; highly polluted areas such as sites less than 10 meters from high traffic roadways; areas with high industrial pollutants.

Caution Equipment should be provided with necessary protection against insects, pests, etc.

Review Outside Plant (OSP) Guidelines

The following sections provide guidelines for the NCS 55A2 temperature-hardened, conformal coated chassis (NCS-55A2-MOD-HX-S, NC55A2-MOD-SE-H-S) for outside plant installation (OSP).

Cabinet Selection Guidelines

For an outside plant installation, it is required that the equipment be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air, or other reactive elements present in the outside air. The table below provides guidelines for cabinet selection.

	Central Office (CO)	Outside Plant (OSP)
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, meeting NEMA-4/IP66 or IP65 protection	Yes	Yes
Sealed cabinets with air-conditioners, meeting NEMA-4/IP66 or IP65 protection	Yes	Yes

Equipment (PID) Selection Guidelines

Data sheet provides details of PID, respective maximum operating conditions and standards that equipment comply with. This section provides guidelines of selection of PID based on environmental conditions. Below table shows PIDs and environmental conditions in which it can be installed.

PID	Central Office (CO)	Outside Plant (OSP)
NCS-55A2-MOD-S	Yes	No
NCS-55A2-MOD-SE-S	Yes	No
NCS-55A2-MOD-HD-S	Yes	No
NCS-55A2-MOD-HX-S	Yes	Yes
NC55A2-MOD-SE-H-S	Yes	Yes

Selection of Air Filter Box

Some sites may have high suspended dust concentration. Suspended dust flows into the air breathing equipment along with cooling and caus earlier failures. Air filters can be considered to minimize the course particles

intrusion into the equipment and mitigate early failures. Table below show guidelines for selection of air filters.

	Central Office (CO)		Outside Plant (OSP)
Dust concentration levels	< 20µg/m3	>/= 20µg/m3	< 90µg/m3
NCS-55A2-FLTR-FW	Optional	Recommended	Recommended
Note µg/m3: Micrograms per cubic meter			

Air Filter Maintenance

A periodic health check of the filter, every three months based on the level of dust in the environment, helps in avoiding over clogging of the filters and provide a better life. This product's filter is used as a single-use component. If the product is installed in a controlled environment, check and replace the filter every three months, otherwise replace the filter every month with PID (NCS-55A2-FLTR-FW=).

Review Installation Guidelines

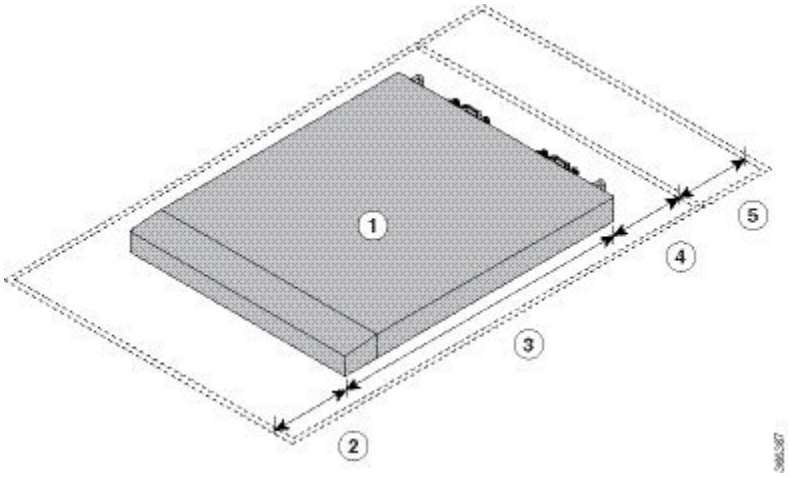
Before installing the chassis, verify that these guidelines are met:

- Site is properly prepared so that there is sufficient room for installation and maintenance. For specifications on the clearances required for chassis installation, see Clearance Requirements in a Solid Door Cabinet, on page 6.
- Operating environment is within the ranges listed in Environmental and Physical Specifications
- Chassis is mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the chassis 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 chassis in the rack.
- Airflow around the chassis and through the vents is unrestricted.
- Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures. Make sure that the cabling is safely away from other devices that might damage the cables.
- For cable requirements for optical module connections, see the Transceivers, Connectors, and Cables section. Each port must match the wave-length specifications on the other end of the cable, and the cable must not exceed the maximum cable length.

Clearance Requirements in a Solid Door Cabinet

The fixed-port chassis requires front-to-back airflow. Leave at least 6.0 in. (15.24 cm) front and rear clearance for air intake/exhaust at room temperature up to 55C, and leave at least 4.0 in. (10.16 cm) front and rear clearance for air intake/exhaust at room temperature up to 40C. Leave an additional 6.0 in. (15.24 cm)/4.0 in. (10.16 cm) rear clearance for removal and installation of power supplies and fan modules.

Figure 2: Clearances Required Around the Chassis



1	Chassis	4	• 6.0 in. (15.24 cm) front clearance for air intake/exhaust at room temperature up to 55C • 4.0 in. (10.16 cm) front clearance for air intake/exhaust at room temperature up to 40C
2	• 6.0 in. (15.24 cm) front clearance for air intake/exhaust at room temperature up to 55C • 4.0 in. (10.16 cm) front clearance for air intake/exhaust at room temperature up to 40C	5	Additional 6.0 in. (15.24 cm)/4.0 in. (10.16 cm) rea clearance for removal and installation of power supplies and fan modules.
3	Chassis depth		

Note Clearance for air intake and exhaust is not required if the fixed-port chassis is placed inside perforated door cabinet or an open cabinet.

Clearance Requirements for Outside Plant Enclosure (OSP)

NCS-55A2-MOD-HX-S and NC55A2-MOD-SE-H-S are temperature-hardened, conformal coated chassis that can be installed in OPT enclosures. Observe the following clearance requirements when installing these chassis in OSP enclosures:

Installation and Options	Front Clearance	Rear Clearance
Chassis with slider and air filter box, with 1RU space between chassis	2 in. (50.8 mm) @ 158°F (70°C)	2 in. (50.8 mm) @ 158°F (70°C)
Chassis with bracket and air filter box, with 1RU space between chassis		
Chassis with bracket, with 1RU space between chassis		
Chassis with slider and air filter box, with no space between chassis	6 in. (152.4 mm) @ 158°F (70°C) 4 in. (101.6 mm) @ 131°F (55°C) 2 in. (50.8 mm) @ 104°F (40°C)	2 in. (50.8 mm) @ all temperatures
Chassis with bracket and air filter box, with no space between chassis		
Chassis with bracket, with no space between chassis		

Note
- The temperatures are measured at the air inlet to the equipment.
- The temperatures are valid at sea level. The maximum allowable temperatures are reduced at higher altitudes. Altitude derating 1°C for every 300m.
- The above mentioned maximum allowable temperatures assume that all optics are I-Temp (industrial grade) optics with allowable optics case temperature up to 85°C.
- In case of a single fan failure, the maximum allowable temperature will be less than specified.
- In case the air filter is clogged, the temperature alarm may be raised at temperatures below the listed temperatures.

Airflow Direction

The airflow through the fan trays and power supplies on the Cisco NCS 5500 series router is either from the port side exhaust or the port side intake, depending on how the modules were ordered. To ensure proper airflow, you must make sure that when you install the router its air intake is positioned in a cold aisle and the air exhaust is positioned in a hot aisle.

Procure Tools and Equipment

Obtain these necessary tools and equipment for installing the chassis:

- Number 1 and number 2 Phillips screwdrivers with torque capability to rack-mount the chassis
- 3/16-inch flat-blade screwdriver
- Tape measure and level

- ESD wrist strap or other grounding device
- Antistatic mat or antistatic foam
- A Torx T15 screwdriver, or the Torx T15 key to install adapters
- Grounding cable (6 AWG recommended), sized according to local and national installation requirements; the required length depends on the proximity of the switch to proper grounding facilities
- Ground lug (1)
- Crimping tool large enough to accommodate the girth of the lug
- Wire-stripping tool
- (ANSI) Pair of 19-inch mounting brackets
- M4 screws to fix brackets (16)
- M4 screws to fix ground lug (2)

Accessory Kits for Fixed Port Routers

The following table contains the accessory kit PIDs and the items present in the accessory kits of the fixed port routers. The rack mount kit present in the accessory kit contains the screws and brackets required for installation.

Table 1: Accessory Kits Information

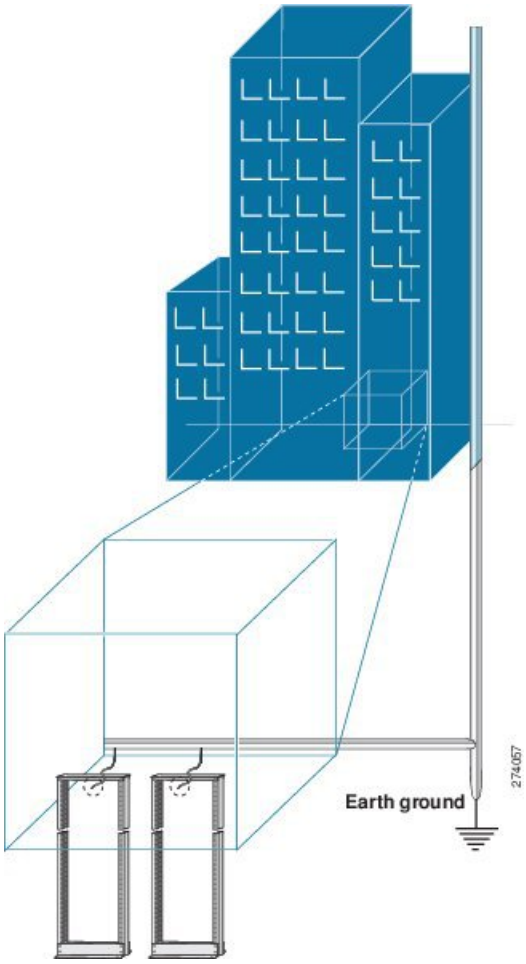
Router	Accessory Kit-1	Items in Accessory Kit -1	Accessory Kit – 2 (NEBS)	Items in Accessory Kit-2
Cisco NCS-55A1-24H	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	NC55-24H-NEBS-KIT	Rack mount kit, ground lug kit, and air baffle for NEBS
Cisco NCS 5501	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	NCS-1RU-NEBS-KIT	Rack mount kit, ground lug kit, and air baffle for NEBS
Cisco NCS 5501-SE	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	NCS-1RU-NEBS-KIT	Rack mount kit, ground lug kit, ground bracket, and air baffle for NEBS
Cisco NCS-55A1-48Q6H	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS-55A1-24Q6H-S	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS-55A1-24Q6H-SS	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	-	-

Router	Accessory Kit-1	Items in Accessory Kit -1	Accessory Kit – 2 (NEBS)	Items in Accessory Kit-2
Cisco NCS 55A1-36H-S	NC55-A1-ACC-KIT	Rack mount kit and ground lug kit	NC55-A1-NEBS-KIT	Rack mount kit, ground lug kit, ground bracket, and air baffle for NEBS
Cisco NCS 55A1-36H-SE-S	NC55-A1-ACC-KIT	Rack mount kit and ground lug kit	NC55-A1-NEBS-KIT	Rack mount kit, ground lug kit, ground bracket, and air baffle for NEBS
Cisco NCS 5502	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS 5502-SE	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS 55A2-MOD-S	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco 55A2-MOD-HD-S	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS 55A2-MOD-SE-S	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS-55A2-MOD-HX-S	NC55-2RU-ACCX-KIT	Conformal Coated Rack mount kit and ground lug kit	-	-
Cisco NC55A2-MOD-SE-H-S	NC55-2RU-ACCX-KIT	Conformal Coated Rack mount kit and ground lug kit	-	-
NCS-57B1-6D24-SYS				
NCS-57B1-5DSE-SYS				

Prepare Your Location

This section illustrates how the building that houses the chassis must be properly grounded to the earth ground.

Figure 3: Building with Rack Room Connected to Earth Ground



Prepare Yourself

This section illustrates how to prepare yourself before removing the chassis from the sealed antistatic bag. The figures show how to cuff the ESD strap around the wrist and the ground cord that connects the cuff to the ground. ESD wrist straps are the primary means of controlling static charge on personnel.

Figure 4: Wearing the ESD Strap

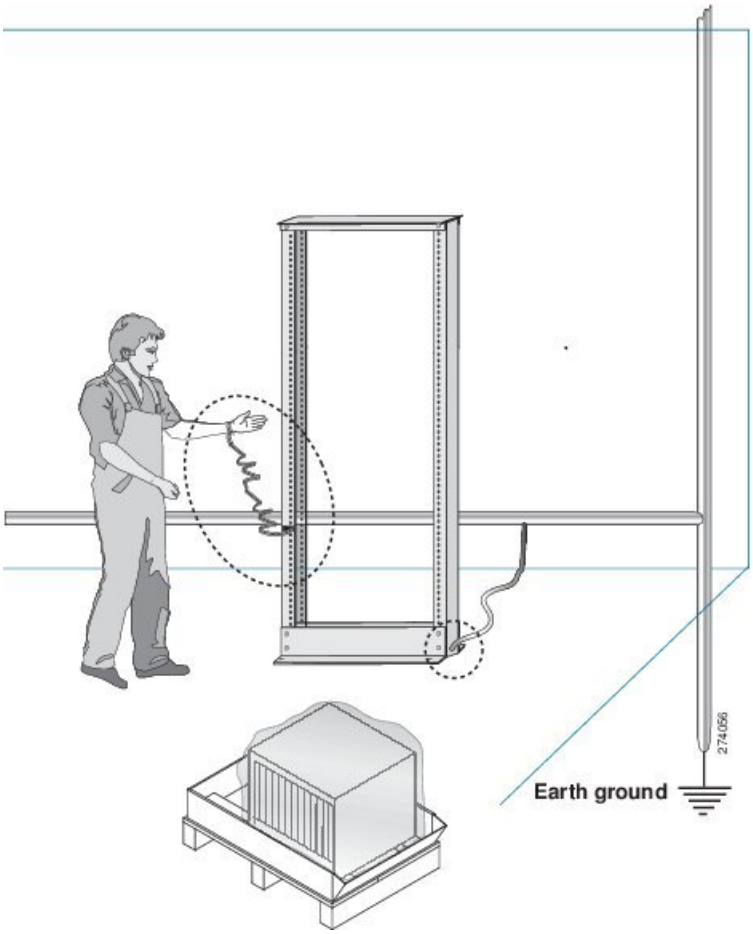
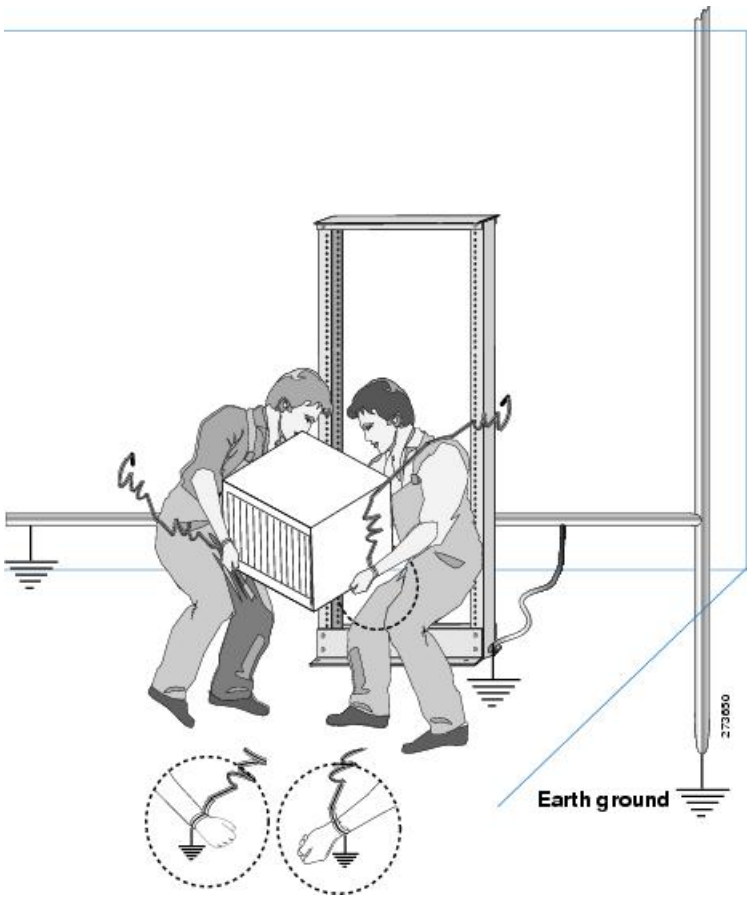


Figure 5: Handling the Chassis



Prepare Rack for Chassis Installation

Install the NCS 5500 Series chassis into a standard 19-inch, four-post Electronic Industries Alliance (EIA) cabinet or rack with mounting rails that conform to English universal hole spacing per section 1 of the ANSI/EIA-310-D-1992 standard.

The spacing between the posts of the rack must be wide enough to accommodate the width of the chassis.

Figure 6: Rack Specification EIA (19 inches and 23 inches)

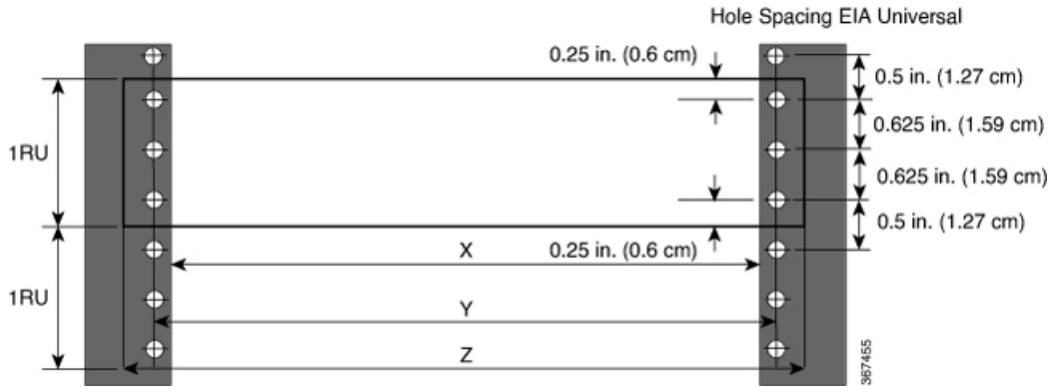


Table 2: Rack specification EIA (19 inches and 23 inches)

Post Type	Rack Type	Rack Front Opening (X)	Rack Mounting Hole Center-Center (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				

Before you move the chassis or mount the chassis into the rack, we recommend that you do the following:

Step 1 Place the rack where you plan to install the chassis. Ensure that the rack that the chassis is being installed is grounded to earth ground as instructed in Prepare Your Location , on page 10.

Step 2 Secure the rack to the floor.

To bolt the rack to the floor, a floor bolt kit (also called an anchor embedment kit) is required. For information on bolting the rack to the floor, consult a company that specializes in floor mounting kits (such as Hilti; see Hilti.com for details). Make sure that floor mounting bolts are accessible, especially if annual retorquing of bolts is required.