

Cisco Network Convergence System 540 Small Density Routers Hardware Installation Guide

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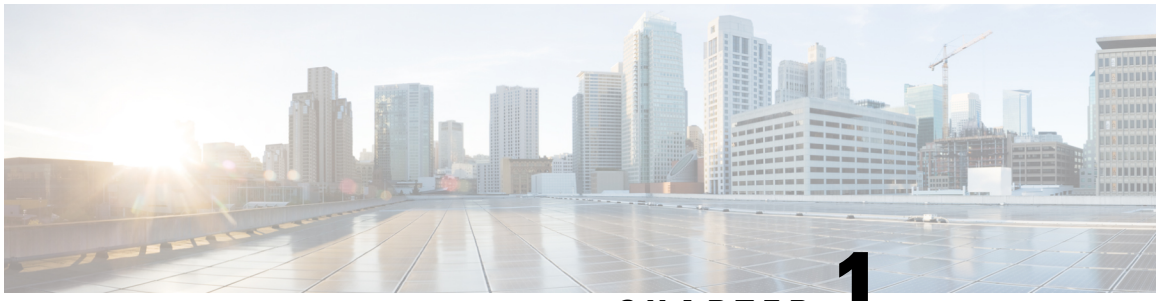
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CHAPTER 1

Safety Warnings

This handout lists the safety warnings necessary for handling this chassis. Before you install or service the chassis, review these safety warnings to avoid injuring yourself or damaging the equipment.

For a complete list of translated safety warnings, see the Regulatory Compliance and Safety Information — Cisco NCS 500 Series Routers document.

The safety warnings are grouped under the following sections:

- Standard Warning Statements, on page 1
- Safety guidelines for personal safety and equipment protection, on page 3
- Safety Precautions for Module Installation and Removal, on page 3
- Safety with electricity, on page 4
- Cautions and Regulatory Compliance Statements for NEBS, on page 6
- Power supply considerations, on page 7
- Preventing ESD damage, on page 9

Standard Warning Statements

Warning

Statement 1071—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Read the installation instructions before using, installing, or connecting the system to the power source. Use the statement number at the beginning of each warning statement to locate its translation in the translated safety warnings for this device.

SAVE THESE INSTRUCTIONS





Note **Statement 407**—Japanese Safety Instruction

You are strongly advised to read the safety instruction before using the product.

https://www.cisco.com/web/JP/techdoc/pldoc/pldoc.html

When installing the product, use the provided or designated connection cables/power cables/AC adapters.

〈製品使用における安全上の注意〉

www.cisco.com/web/JP/techdoc/index.html

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Warning **Statement 1101**—Connected To Grounded Outlet

In the Scandinavian countries (Denmark, Finland, Iceland, Norway, and Sweden) the appliance must be connected to a grounded outlet.



Warning **Statement 1015**—Battery Handling

To reduce risk of fire, explosion, or leakage of flammable liquid or gas:

- Replace the battery only with the same or equivalent type recommended by the manufacturer.
- Do not dismantle, crush, puncture, use a sharp tool to remove, short the external contacts, or dispose of the battery in fire.
- Do not use if battery is warped or swollen.



Warning **Statement 1017**—Restricted Area

This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.



Warning **Statement 9001**—Product Disposal

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



Warning **Statement 1047—**Overheating Prevention

To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: –40 to 149°F (–40 to 65°C) or 0 to 50°C for N540-6Z18G-SYS-A/D.



Warning **Statement 1049—**Rack Installation

To reduce the risk of bodily injury, mount the chassis on a rack that is permanently affixed to the building.



Warning **Statement 2014—**Class A Warning for Korea

This is a Class A device and is registered for electromagnetic compatibility (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.

Safety guidelines for personal safety and equipment protection

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

- Before moving the system, always disconnect all power cords and interface cables.
- Never assume that power is disconnected from a circuit; always check.
- Before and after installation, keep the chassis area clean and dust free.
- Keep tools and assembly components away from walk areas where you or others can 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 Precautions for Module Installation and Removal

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

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

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

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

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

This product is a Class 1 laser product.

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

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

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

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

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

Safety with electricity

Warning **Statement 1003—**DC Power Disconnection

To reduce risk of electric shock or personal injury, disconnect DC power before removing or replacing components or performing upgrades.

Warning **Statement 1022—**Disconnect Device

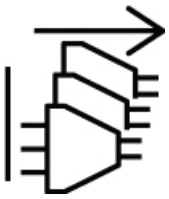
To reduce the risk of electric shock and fire, a readily accessible disconnect device must be incorporated in the fixed wiring.

Warning **Statement 1024—**Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, 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.

Warning **Statement 1028—**More Than One Power Supply

This unit might have more than one power supply connection. To reduce risk of electric shock, remove all connections to de-energize the unit.



Warning **Statement 1046—**Installing or Replacing the Unit

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.

Warning **Statement 2004—**Grounded Equipment

This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use.

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

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

Warning **Statement 1074—**Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

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

- Locate the room's emergency power-off switch. If an electrical accident occurs, you know where to quickly turn off the power.

- Before starting work on the system, turn off the DC main circuit breaker and disconnect the power terminal block cable.
- Disconnect all power when:
  - Working on or near power supplies
  - Installing or removing a device 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 and you are uninjured:
  - Use caution to avoid injuring yourself.
  - Turn off power to the device.
  - Seek medical attention, if necessary.

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

- When installing or modifying telephone lines, use caution.
- Never install telephone jacks in wet locations unless the jack is designed to handle such locations.
- Never install telephone wiring during a lightning storm.

Cautions and Regulatory Compliance Statements for NEBS

The NEBS-GR-1089-CORE regulatory compliance statements and requirements are discussed in this section.



Warning **Statement 7003—**Shielded Cable Requirements for Intrabuilding Lightning Surge

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

The following port(s) are considered intrabuilding ports on these N540X-8Z16G-SYS-A/D, and N540X-4Z14G2Q-A/D router variants:

- Copper Gigabit Ethernet ports

Warning **Statement 7005—**Intrabuilding Lightning Surge and AC Power Fault

The intrabuilding port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring for more than 6 meters (approximately 20 feet). These interfaces are designed for use as intrabuilding interfaces only (Type 2, 4, or 4a ports as described in GR-1089) 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 an OSP wiring system.

Warning **Statement 7012—**Equipment Interfacing with AC Power Ports

Connect this equipment to AC mains that are provided with a surge protective device (SPD) at the service equipment that complies with NFPA 70, the National Electrical Code (NEC).

Note **Statement 7013—**Equipment Grounding Systems—Common Bonding Network (CBN)

This equipment is suitable for installations using the CBN.

Warning **Statement 7016—**Battery Return Conductor

Treat the battery return conductor of this equipment as DC Isolated (DC-I).

Note **Statement 8015—**Installation Location Network Telecommunications Facilities

This equipment is suitable for installation in network telecommunications facilities.

Note **Statement 8016—**Installation Location Where the National Electric Code (NEC) Applies

This equipment is suitable for installation in locations where the NEC applies.

Note This equipment is designed to boot up in less than 30 minutes, depending on its neighboring devices that must be fully up and running.

Power supply considerations

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

Power Connection Guidelines

This section provides guidelines for connecting the device power supplies to the site power source.

Warning **Statement 1024—**Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, 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.

Guidelines for DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

- Each chassis power supply has its own dedicated input power source. The source must comply with the safety extra-low voltage (SELV) requirements in the UL 60950-1, UL 62368-1, CSA 60950-1, CSA 62368-1, EN 60950-1, EN 62368-1, IEC 60950-1, and IEC 62368-1 standards.
- Protect the circuit by a dedicated two-pole DC circuit breaker. Ensure that the circuit breaker is sized according to the power supply input rating and local or national code requirements.
- The circuit breaker is considered as the disconnect device and is easily accessible.
- The system ground is the power supply and chassis ground.
- Use the grounding lug to attach a wrist strap for ESD protection during servicing.
- Do not connect the DC return wire to the system frame or to the system-grounding equipment.
- Ensure that the DC return is grounded at the source side.
- Ensure that each power feed of the equipment is connected to different power sources.

Guidelines for AC-Powered Systems

Basic guidelines for AC-powered systems include the following:

- Each chassis power supply has its own dedicated branch circuit.
- Ensure that the circuit breaker is sized according to the power supply input rating and local or national code requirements.
- The AC power receptacles that are used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles must connect to protective earth ground at the service equipment.

Prevent Power Loss

Use the following guidelines to prevent power loss to the device:

- To prevent input power loss, ensure that the maximum load on each circuit supplying the power 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 such as the device, which can have substantial current-draw fluctuations due to bursty data traffic patterns.

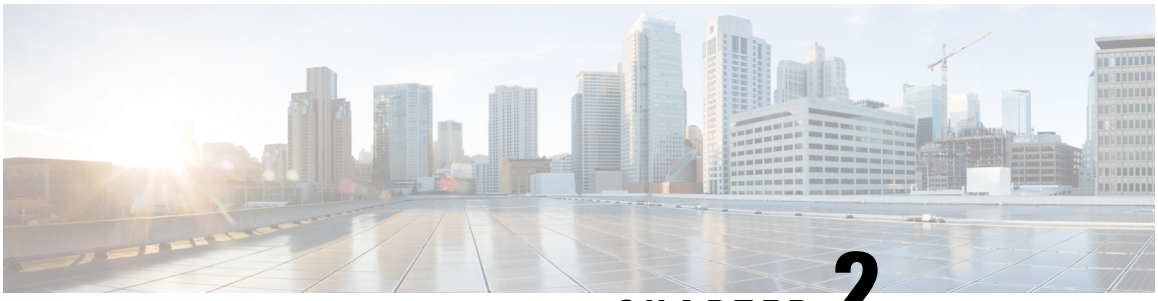
Determining power requirements is useful for planning the power distribution system to support the device.

Preventing ESD damage

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

- Ensure that the device 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 only their handles or edges; 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.

For the safety of your equipment, periodically check the resistance value of the antistatic wrist strap. Maintain the value between 1 and 10 MOhm.



CHAPTER 2

Cisco NCS 540 Small Density Routers Overview

The Cisco NCS 540 Small Density Routers are temperature-hardened, fixed port, one rack unit form-factor router. An IOS XR-based cell site router, the router extends Cisco's 5G Converged SDN Transport to edge of the networks as a cell site (CSR)/Network Interface Device (NID)/Customer Premises Equipment (CPE), with the smallest footprint, ever.

This document includes the following small density router variants:

- N540X-6Z18G-SYS-A/D
- N540X-8Z16G-SYS-A/D
- N540X-4Z14G2Q-A/D
- N540X-6Z18G-SYS-A/D
- N540X-6Z6G-SYS

For more information about the router features and benefits, see the Cisco Network Convergence System 540 Small Density Router Data Sheet.

The Cisco N540X-6Z18G-SYS-A/D, N540X-8Z16G-SYS-A/D, N540X-4Z14G2Q-A/D, and N540X-6Z6G-SYS router variants include the following components:

- The PSU is conformal coated. The PSU is fixed and non-removable. The dual power supplies (AC and DC) are installed inside the router.
- The mother board has no conformal coating.

Note The Cisco N540X-6Z18G-SYS-A/D router has no conformal coating.

The Cisco N540X-6Z6G-SYS small density hardened router has field replaceable PSU supporting 1+1 redundancy and replaceable fan tray supporting 1+n fan redundancy. The Cisco N540X-6Z6G-SYS contains six 1G SFP ports that supports 1 Gpbs data rate and six dual rate SFP+ ports that supports 1 or 10 Gpbs data rate.

PSU Redundancy Lost Alarm:

PSU redundancy lost alarms are generated when there's no proper input feed applied on any one of Power Modules (PMs) (PM0 or PM1). The alarms are also generated when the output for PM0 or PM1 isn't proper.

This is applicable to Cisco N540X-6Z18G-SYS-A/D, N540X-8Z16G-SYS-A/D, and N540X-4Z14G2Q-A/D routers with fixed PSUs.

The following alarms are raised for PSU redundancy lost event with a faulty PM0:

- Power Module Generic Fault
- Power Module Error
- Power Group Redundancy Lost

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Network Interfaces

The Cisco N540X-6Z18G-SYS-A/D and N540X-6Z18G-SYS-A/D routers have the following network interfaces:

- 18 x 1G SFP+ ports
- 6 x 1G/10G SFP+ ports

The Cisco N540X-8Z16G-SYS-A/D router has the following network interfaces:

- 8 CSFP ports
- 4 SFP ports
- 4 Copper ports
- 8 x 1/10GSFP+ ports

The Cisco N540X-4Z14G2Q-A/D router has the following network interfaces:

- 4 x 1G/10G SFP+ ports
- 2 x 25G SFP28 ports
- 4 Copper ports/SFP ports
- 10 x 1G SFP ports

The Cisco N540X-6Z6G-SYS-A/D router has the following network interfaces:

- 6 x 1G SFP ports
- 6 x 1G/10G SFP+ ports

Figure 1: Cisco N540X-6Z18G-SYS-A Router

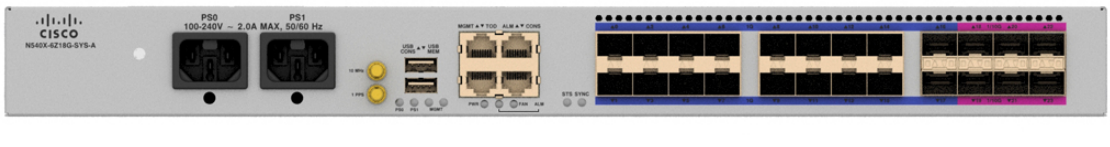


Figure 2: Cisco N540X-6Z18G-SYS-D Router

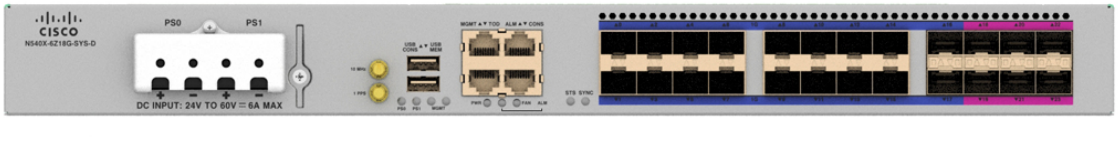


Figure 3: Cisco N540X-8Z16G-SYS - A Router

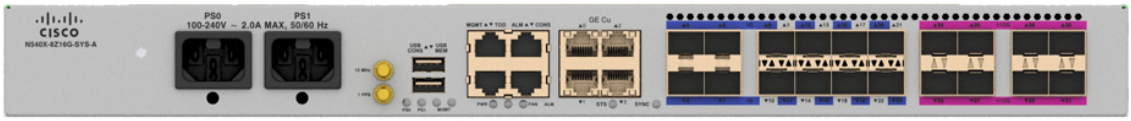


Figure 4: Cisco N540X-8Z16G-SYS - D Router

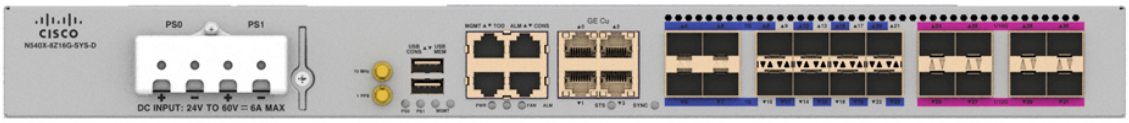


Figure 5: Cisco N540X-4Z14G2Q-A Router

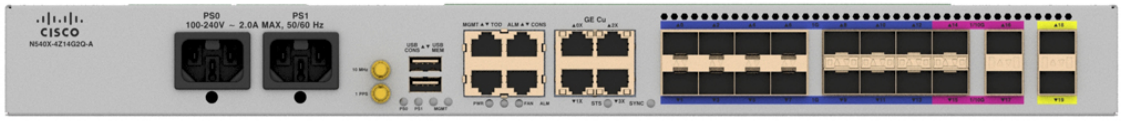


Figure 6: Cisco N540X-4Z14G2Q-D Router

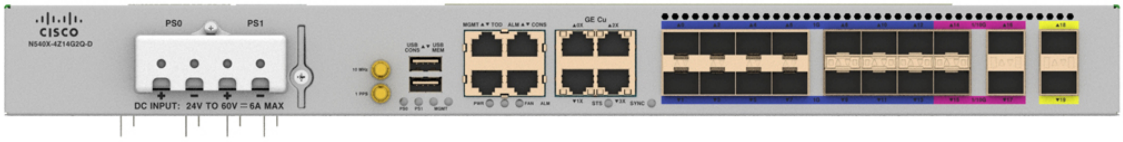


Figure 7: Cisco N540X-6Z18G-SYS-A Router

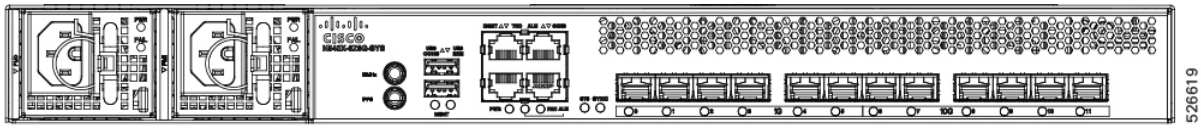


Figure 8: Cisco N540X-6Z18G-SYS-D Router



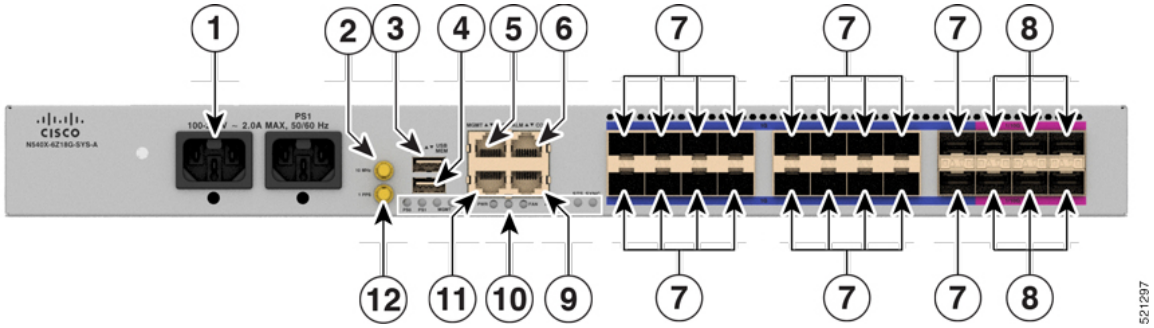
Note All ports are color coded in the chassis for ease of identification; for example, the 10G SFP+ ports are in pink, the 1G SFP ports are in blue, and 25G ports are in yellow.

Figure 9: Cisco N540X-6Z6G-SYS Router



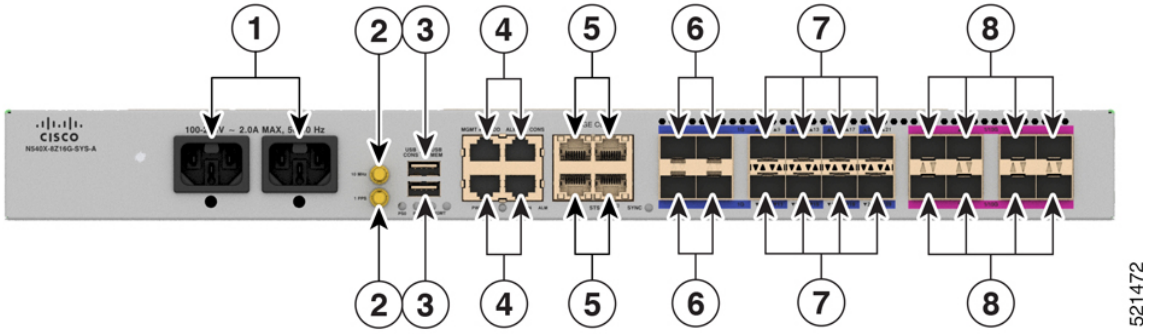
Cisco NCS 540 Small Density Router Features

Figure 10: Cisco N540X-6Z18G-SYS-A/D Router Components on Front View



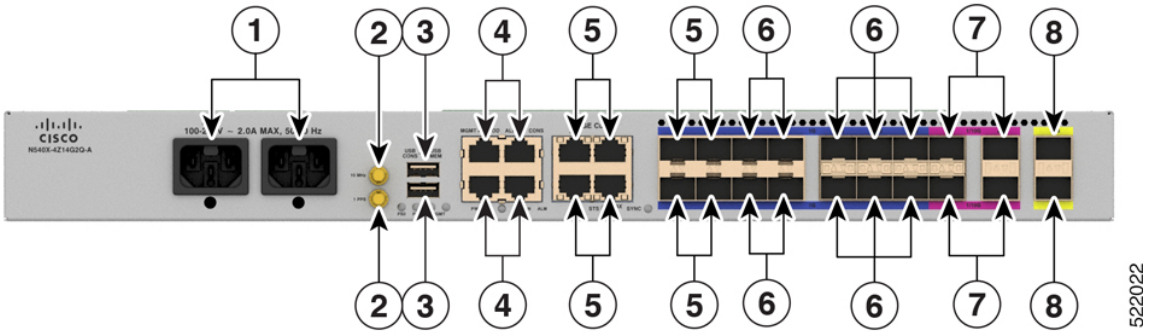
1	AC Power Input	2	10 MHz Input or Output
3	USB Console	4	USB 2.0 MEM port
5	Management Port	6	Alarm Port
7	1G ports (port 0 to 17)	8	10G SFP ports (port 18 to 23)
9	Console Port	10	Status LEDs
11	Time of Day (TOD) Port	12	1 PPS Input or Output Port

Figure 11: N540X-8Z16G-SYS-A/D Router Port and LED details on Front View



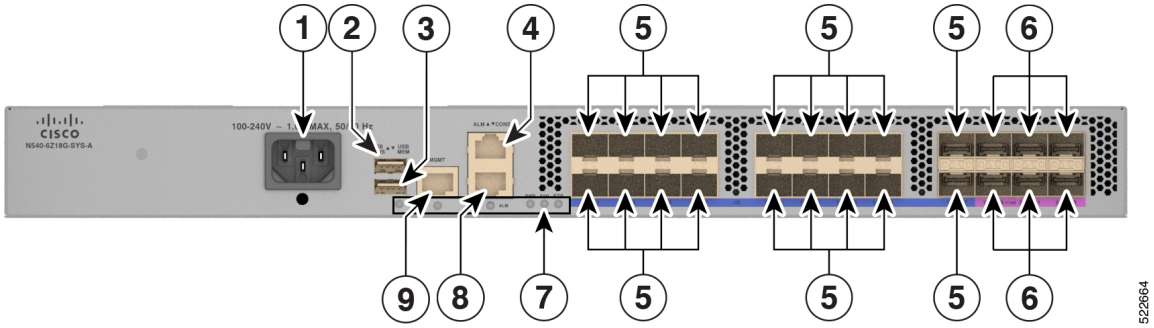
1	AC Power Input	2	10 MHz Input or Output 1 PPS Input or Output Port
3	USB Console USB 2.0 MEM port	4	Management Port Alarm Port
5	4 - Cu ports (ports 0 to 3)	6	4 - 1G SFP ports (ports 4 to 7)
7	8 - 1G SFP ports (ports 8 to 23) For these cages, each cage opening has two port names, hence total number of ports 8X2 =16 (port 8 to 23). You can also use CSFP optical modules in these cages.	8	8 - 1/10G SFP+ ports (ports 24 to 31)

Figure 12: N540X-4Z14G2Q-A/D Router Port and LED details on Front View



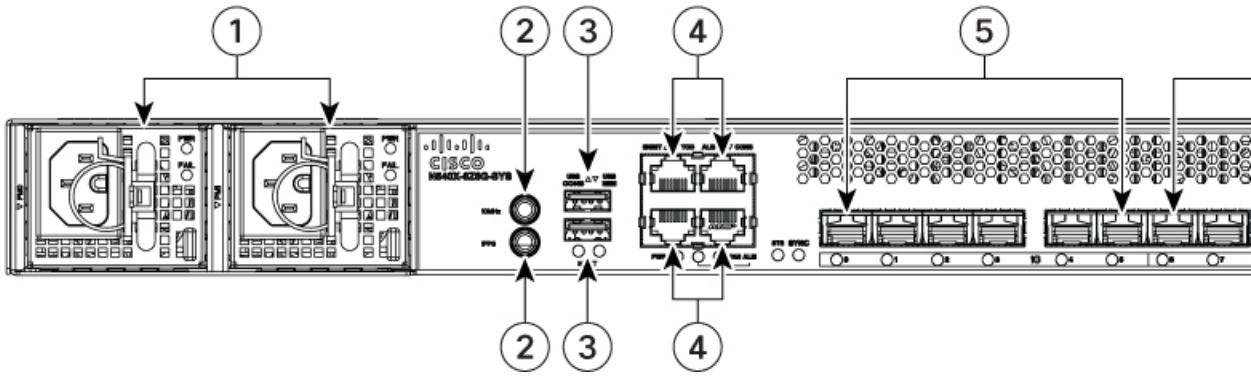
1	AC Power Input	2	10 MHz Input or Output Port 1 MHz Input or Output Port
3	USB Console USB 2.0 MEM port	4	Management Port Alarm Port TOD Port CONS Port
5	1G copper/SFP combo (ports 0 to 3)	6	10X 1G SFP ports (4 to 13)
7	4X 1G/10G SFP+ ports (14 to 17)	8	2X 25G SFP28 ports (18 to 19)

Figure 13: Cisco N540X-6Z18G-SYS-A/D Router Port and LED details on Front View



1	AC Power Input	2	USB Console
3	USB 2.0 MEM port	4	Alarm Port
5	1G ports (port 0 to 17)	6	10G SFP ports (port 18 to 23)
7	Status LEDs	8	Console Port
9	Management Port	-	-

Figure 14: Cisco N540X-6Z6G-SYS Router Port and LED details on Front View



1	Modular or Redundant (concurrent AC + DC) Power Input	2	10 MHz Input or Output Port 1 PPS Input or Output Port
3	USB Console USB 2.0 MEM port	4	Management Port Alarm Port Power Port Fan Alarm Port
5	1G SFP Ports (port 0 to 5)	6	10G SFP+ Ports (port 6 to 11)

Specification

For information on physical specification, temperature, and other details for the router, see *Cisco NCS 540 chassis specification* in the Cisco Network Convergence System 540 Small Density Router Data Sheet.

Interface Naming

The following table shows the interface naming of the Cisco N540X-8Z16G-SYS-A/D, N540X-4Z14G2Q-A/D, and N540X-6Z18G-SYS-A/D routers:

Table 1: Port Numbering

1G ports (SFP)	1G/10G Dual rate ports (SFP+)
0/0 to 0/17	0/18 to 0/23

The *interface-path-id* is *rack* / *slot* / *module* / *port*. The slashes between values are required as part of the notation.

- **GigE** — 0/0/0/0 - 0/0/0/17
- **TenGigE** — 0/0/0/18 - 0/0/0/23

Note Dual-Rate functionality is supported only with the supported SFP.

Table 2: Maximum Number of Ports

Category	Maximum Number of Ports	Port Number
1GE	24	0/0 - 23
10GE	6	0/18 - 23

The following table shows the interface naming of the N540X-8Z16G-SYS-A/D router:

Table 3: Port Numbering

1G Copper ports	1G SFP ports	1G SFP ports (Including CSFP)	1G/10G Dual rate SFP+ ports
0/0 to 0/3	0/4 to 0/7	0/8 to 0/23*	0/24 to 0/31

* ports 9, 10, 13, 14, 17, 18, 21, and 22 are enabled only with CSFP optical modules.

The *interface-path-id* is *rack/slot/module/port*. The slash between values is required as part of the notation.

- **GigE** — 0/0/0/0 to 0/0/0/23 (ports 9, 10, 13, 14, 17, 18, 21, and 22 are enabled only with CSFP optics)
- **TenGigE** — 0/0/0/24- 0/0/0/31

Table 4: Maximum Number of Ports

Category	Maximum Number of Ports	Port Number
1GE copper	4	0/0 to 0/3
1GE SFP	20 (including CSFP ports)	0/4 to 0/23
10GE	8	0/24 to 0/31

The following table shows the interface naming of the N540X-4Z14G2Q-A/D router:

Table 5: Port Numbering

1G Copper/SFP combo Ports	1G SFP Ports	10G SFP+ Ports	25G SFP28 Ports
0/0 to 0/3	0/4 to 0/13	0/14 to 0/17	0/18 and 0/19

- 1GE Combo – 0/0/0/0-0/0/0/3
- 1GE SFP – 0/0/0/4-0/0/0/13
- 10GE – 0/0/0/14-0/0/0/17
- 25GE- 0/0/0/18-0/0/0/19

Table 6: Maximum Number of Ports

Category	Maximum Number of Ports	Port Number
1GE	14	0/0 to 0/13
10GE	4	0/14 to 0/17
25GE	2	0/18 and 0/19

N540X-6Z6G-SYS

The following table shows the interface naming of the Cisco N540X-6Z6G-SYS routers:

Table 7: Port Numbering

1G ports (SFP)	1G/10G Dual rate ports (SFP+)
0/0 to 0/5	0/6 to 0/11

The *interface-path-id* is *rack* / *slot* / *module* / *port*. The slashes between values are required as part of the notation.

- **GigE** — 0/0/0/0 - 0/0/0/5
- **GigE/TenGigE** — 0/0/0/6 - 0/0/0/11

Note Dual-Rate functionality is supported only with the supported SFP.

Table 8: Maximum Number of Ports

Category	Maximum Number of Ports	Port Number
1GE	12	0/0 - 11
10GE	6	0/6 - 11

External Alarm Inputs

The router supports four dry contact alarm inputs through an RJ-45 jack at the front panel.

- Normally Open—indicates that no current flows through the alarm circuit and the alarm is generated when the current is flowing.

Each alarm input can be provisioned as critical, major, or minor.

Air Plenum

Air plenum or air baffle assembly is used to change the air flow pattern of the unit. When the router is installed with the plenum, the air flow pattern is changed from, from front-to-side to front-to-back. The air flow front-to-back pattern provides a rack installation bay with a cool front zone and hot rear zone. For installing the plenum, see *Installing the Chassis in the Air Plenum*.



Note The system operating temperature is limited to 50 degrees Celsius. The air plenum changes the direction from front-to-side to front-to-back.

The air plenum is only available for Cisco N540-6Z18G-SYS-A/D router variant.

Console

The RS232 console port provides transmission (Tx), reception (Rx), and ground (Gnd).

USB Console

A single USB 2.0 Type-A receptacle on the front panel of the router provides console access to uboot, Cisco IOS-XR and diagnostics. While it uses the Type-A connector, it operates as a USB peripheral only for connection to an external host computer. This interface requires the use of a Type-A to Type-A connector instead of a standard USB cable.

Note Use of the USB console is mutually exclusive of the RS232 console port. This interface requires the use of a Type-A to Type-A USB cable. If you insert the USB cable and connect to the host computer, then you can only enter the commands using the USB.

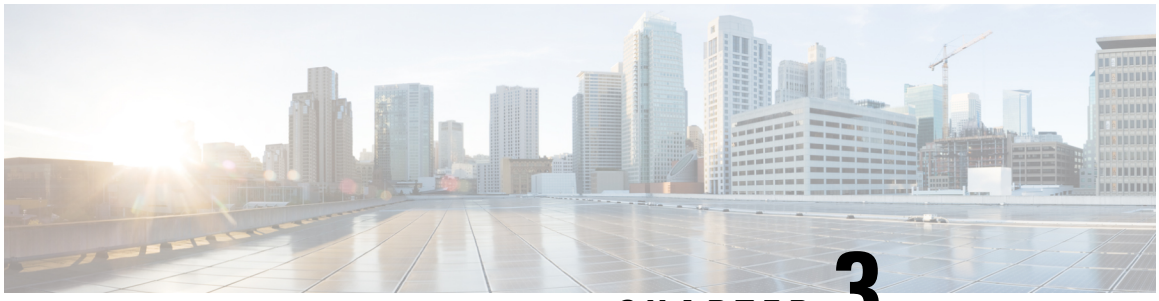
Online Insertion and Removal

The router supports the following Online Insertion and Removal (OIR) operations:

- When an SFP is removed, there is no effect on traffic flowing on other ports.
- When an SFP is installed, the system initializes that port for operation based on the current configuration. If the inserted SFP is incompatible with the current configuration of that port, the port does not become operational until the configuration is updated.
- When both power supplies are installed and active, the load may be shared between them or a single PSU supports the whole load. When a power supply is not working or the input cable is removed, the remaining power supply takes the entire load without disruption.
- The power supply modules are fixed and cannot be removed.

Supported Transceiver Modules

For more information on the supported transceiver modules, see Transceiver Module Group (TMG) Compatibility Matrix. In the **Begin your Search** search box, enter the keyword and click **Enter**.



CHAPTER 3

Prepare for Installation

Before you install the Cisco NCS 540, you must prepare your site for the installation.

Preparing your site involves these tasks:

- General Precautions, on page 23
- Site Planning Checklist, on page 24
- Environmental Requirements, on page 24
- Airflow Guidelines, on page 24
- Site Power Guidelines, on page 29
- Site Cabling Guidelines, on page 29
- Tools and Equipment, on page 30
- Prepare Your Location , on page 31
- Prepare Yourself , on page 33
- Prepare Rack for Router Installation, on page 33
- Cabinet Selection Guidelines, on page 34
- Unpack the Cisco NCS 540 Small Density Router, on page 35

General Precautions

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

- 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 cable carefully. Route system cables and the power supply cable and plug so that they are not stepped on or tripped over. Ensure that nothing is 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 to avoid damage to the system components, wait at least 30 seconds before turning it on again.

Site Planning Checklist

Use the following checklist to carry out all site planning tasks:

- The site meets environmental requirements.
- The site's air conditioning system can compensate for the heat dissipation of the chassis.
- The floor space that the chassis occupies can support the weight of the system.
- Electrical service to the site complies with the safety with electricity requirements.
- The electrical circuit servicing the chassis complies with the power supply requirements.
- Console port wiring and cabling limitations have been considered in accordance to TIA/EIA-232F.
- The chassis Ethernet cabling distances are within prescribed limits.
- The equipment rack where the chassis is to be installed complies with prescribed requirements.
- The following factors have been carefully considered when selecting rack: location, safety, ease of maintenance, and proper airflow.

Environmental Requirements

Environmental monitoring of the chassis protects the system and components from damage due to excessive voltage and temperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan and prepare your site configuration *before* installation. After installation, ensure that the environmental characteristics continue to be met.

For an outside plant installation (cell site cabinet, hut, and so on), you're required to protect the chassis against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air, or other reactive elements. We recommend that you install the unit 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. This is applicable to Cisco N540X-6Z18G-SYS-A/D, N540X-8Z16G-SYS-A/D, N540X-4Z14G2Q-A/D, and N540X-6Z6G-SYS router variants.

Cisco N540-6Z18G-SYS-A/D router supports operational temperature of 0 to 50ºC.

Place the device inside a space that is protected from direct weather and environmental stresses by an enclosure.

Airflow Guidelines

Cool air is circulated through the router by fans that are located along the left side of the router. The internal fans maintain acceptable operating temperatures for the internal components by drawing in cool air through the vents, and circulating the air through the router.

To ensure adequate airflow, we recommend that you always maintain this minimum clearance distance as mentioned in the following figure.

- Front clearance—5 inches (12.7 centimeters)
- Rear clearance—0.5 inches (1.27 centimeters)

- Side clearance—3 inches (7.62 centimeters)

Figure 15: Airflow Top View Clearance

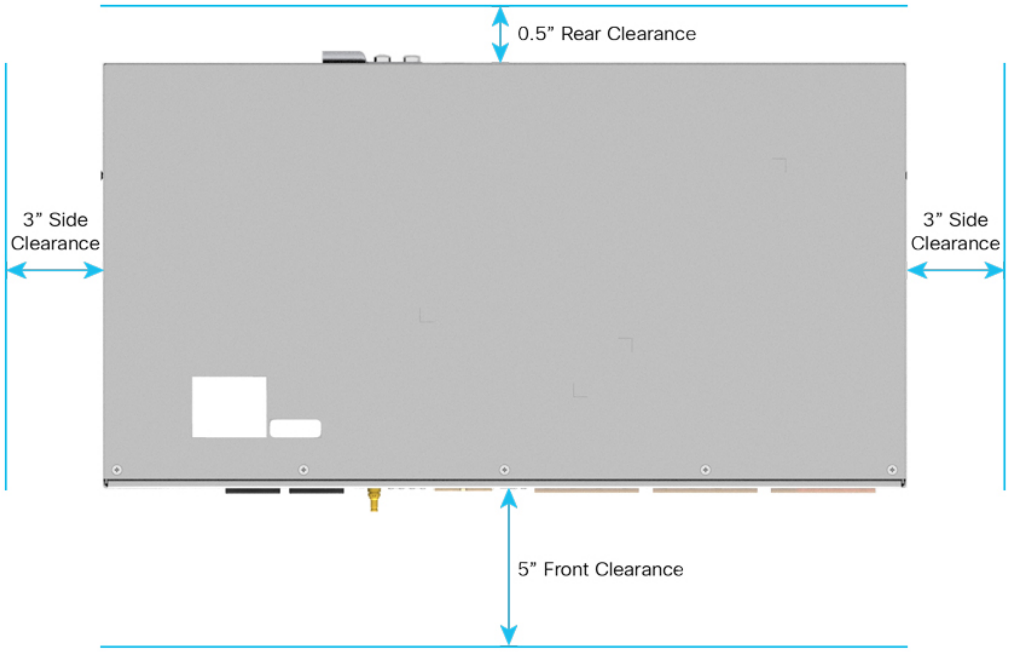


Figure 16: Airflow Side View Clearance

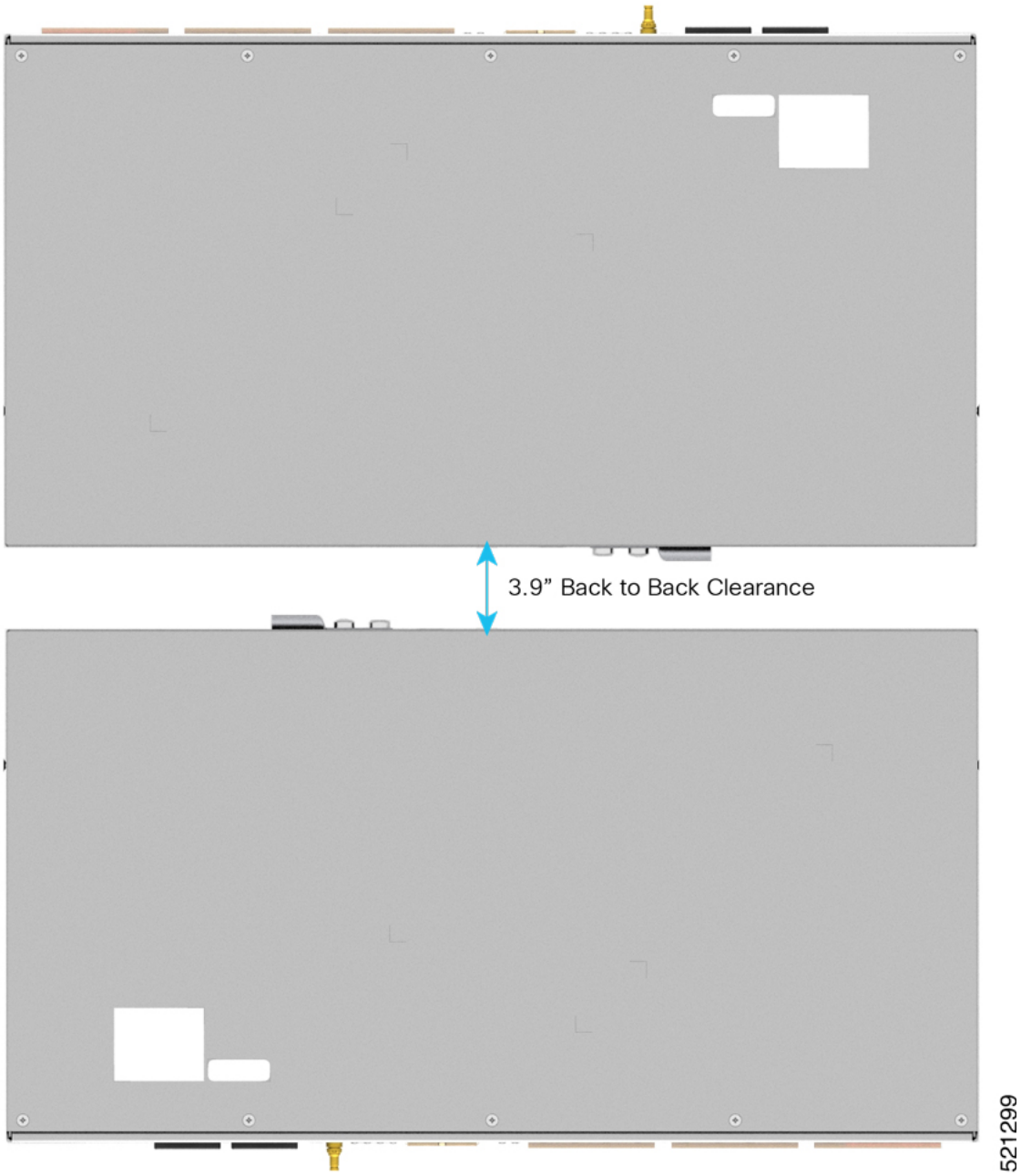
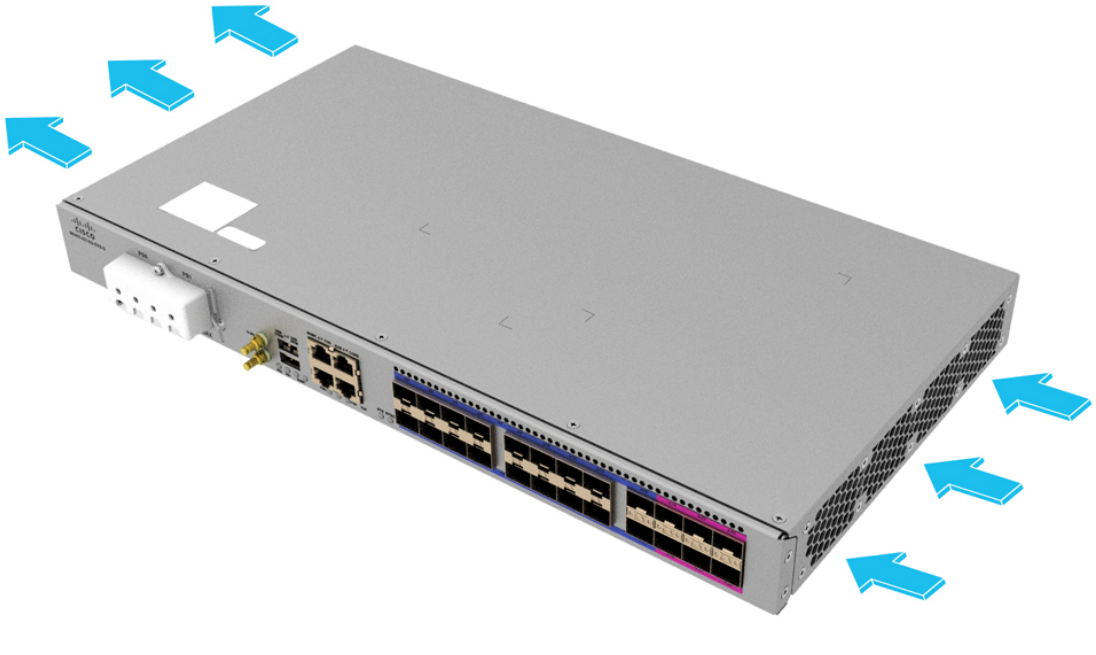
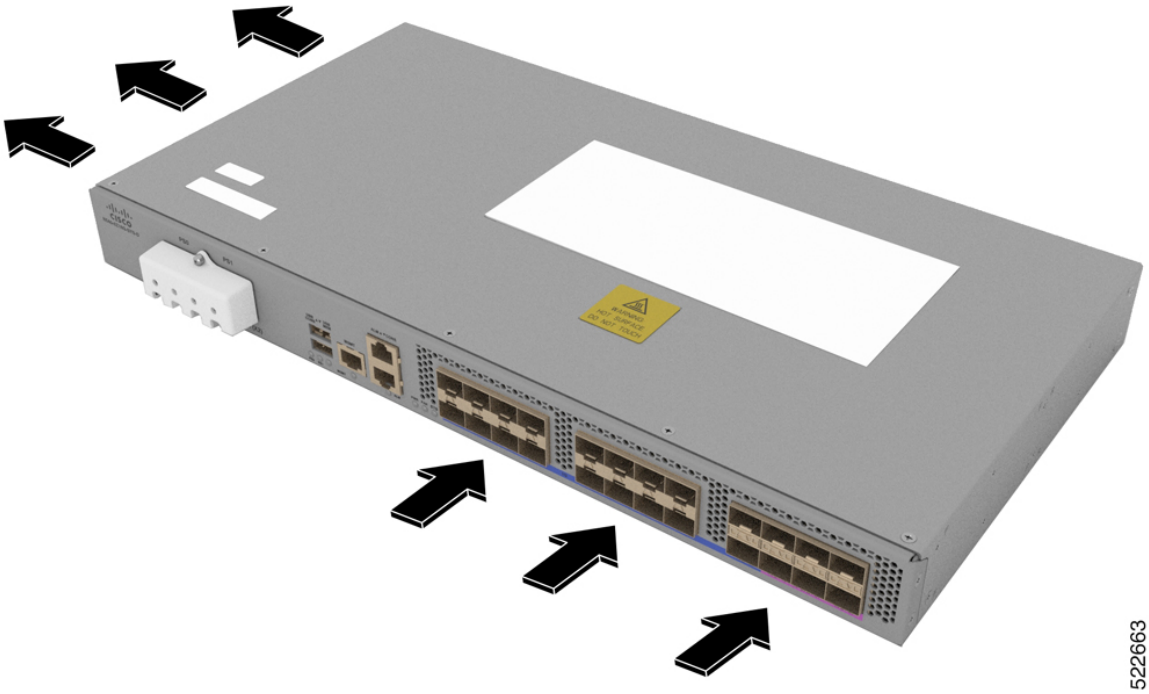


Figure 17: Airflow Side View from Right to Left



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Figure 18: Airflow Side View of Cisco N540-6Z18G-SYS-A/D Router from Front to Left



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Table 9: Airflow Guidelines

Router	Flow Direction	Air Clearance
N540X-6Z18G-SYS-A N540X-6Z18G-SYS-D	Right to Left	At least 3 inches (76.2 millimeters) required on both inlet and exit directions.
N540X-8Z16G-SYS-A N540X-8Z16G-SYS-D	Right to Left	At least 3 inches (76.2 millimeters) required on both inlet and exit directions.
N540X-4Z14G2Q-A N540X-4Z14G2Q-D	Right to Left	At least 3 inches (76.2 millimeters) required on both inlet and exit directions.
N540-6Z18G-SYS-A N540-6Z18G-SYS-D	Front to Left	At least 3 inches (76.2 millimeters) required on both inlet and exit directions.
N540X-6Z6G-SYS	Front to back	At least 3 inches (76.2 millimeters) required on both inlet and exit directions.

Note the following points:

- When installing the router in a back-to-back position with another device, ensure that there is a minimum of 3.9 inches (10 centimeters) airflow clearance between the two devices.
- 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 may occur within the rack and the routers that occupy it.
- The site must 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, thereby 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 must have louvered sides and a fan to provide cooling air. The equipment generates heat near the bottom of the rack, which can be drawn upward into the intake ports of the equipment above.
- When mounting a router in an open rack, ensure that the rack frame does not block 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 the other equipment in the rack (and in adjacent racks) to give the router maximum cooling air and clean power.
- Avoid installing 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 front to back, with ambient air drawn in from the vents located on the sides of the router.

Site Power Guidelines

The chassis has specific power and electrical wiring requirements. Adhering to these requirements ensures the reliable operation of the system. Follow these precautions and recommendations when planning your site power for the chassis:

- The redundant power option provides a second, identical power supply to ensure uninterrupted power supply.
- Connect each power supply to a separate input power source. Otherwise, it results in a total power failure to the system due to a fault in the external wiring or a tripped circuit breaker.
- To prevent loss of input power, ensure that the maximum load on each circuit 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. If necessary, install a power conditioner.
- Provide proper grounding to avoid personal injury and damage to the equipment due to power surges or lightning striking power lines. The chassis ground must be attached to a central office or other interior ground system.

Note Cisco N540-6Z18G-SYS-A/D router has single power supply unit.

Caution The router requires external surge protection devices for installations where electrical surges higher than 4KV common mode and 2KV differential mode are expected. Failure to do so can result in permanent damage to the router. For Cisco N540-6Z18G-SYS-A/D router, 2KV common mode and 1KV differential modes are supported.

Note The chassis installation must comply with all the applicable codes, and is approved for use with only copper conductors. The ground bond-fastening hardware must be compatible 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.

Site Cabling Guidelines

These are the guidelines for wiring and cabling at your site:

- When preparing your site for network connections to the router, consider:
  - the type of cable required for each component, and the cable limitations.

    Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

  - the distance limitations for signaling, ElectroMagnetic Interference (EMI), and connector compatibility.
  - any additional interface equipment you need, such as transceivers, hubs, switches, modems, Channel Service Units (CSU), or Data Service Units (DSU).

- Before you install the router, keep all the additional external equipments and cables handy. For information about ordering these equipments and cables, 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 when planning your network connections *prior to* installing the 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.

Tools and Equipment

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

- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- #12-24 pan-head screws to secure the device to the equipment rack
- Cables for connecting to network ports (based on the configuration)
- Ethernet hub, switch, or PC with a network interface card for connecting to the Ethernet ports
- Console terminal that is configured for 115200 baud, 8 data bits, no parity, no flow control, and 2 stop bits
- Console cable for connecting to the console port
- Ratcheting torque screwdriver with a Phillips head that exerts up to 30-pound force per square inch (0.02-kilograms force per square millimeter (kgf/mm2)) of pressure
- Crimping tool as specified by the ground lug manufacturer
- Wire-stripping tools for stripping both 6 and 14-AWG wires

- Tape measure and level
- Ratcheting torque screwdriver with a Phillips head that exerts up to 15 inch-pounds (1.69 newton meters) of torque for attaching the ground wire to the device

Prepare Your Location

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

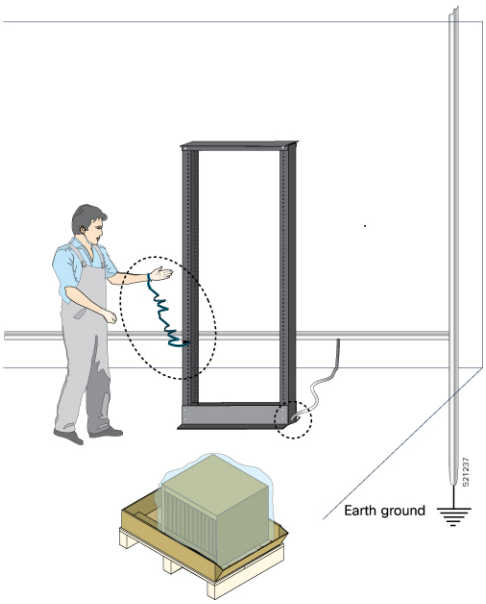
Figure 19: Building with Rack Room Connected to Earth Ground

Prepare Yourself

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

Note: These images are for only representation purposes. The chassis' actual appearance and size would vary.

Figure 20: Wearing the ESD Strap



Prepare Rack for Router Installation

Install the chassis into a two-post standard rack with standard horizontal mounting rails. Before you mount the chassis into the rack, we recommend that you do the following:

Procedure

Step 1 Place the rack where you plan to install the chassis. Ensure that the rack is grounded to earth.

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 an annual retorquing of bolts is required.

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 10: 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
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.

Unpack the Cisco NCS 540 Small Density Router

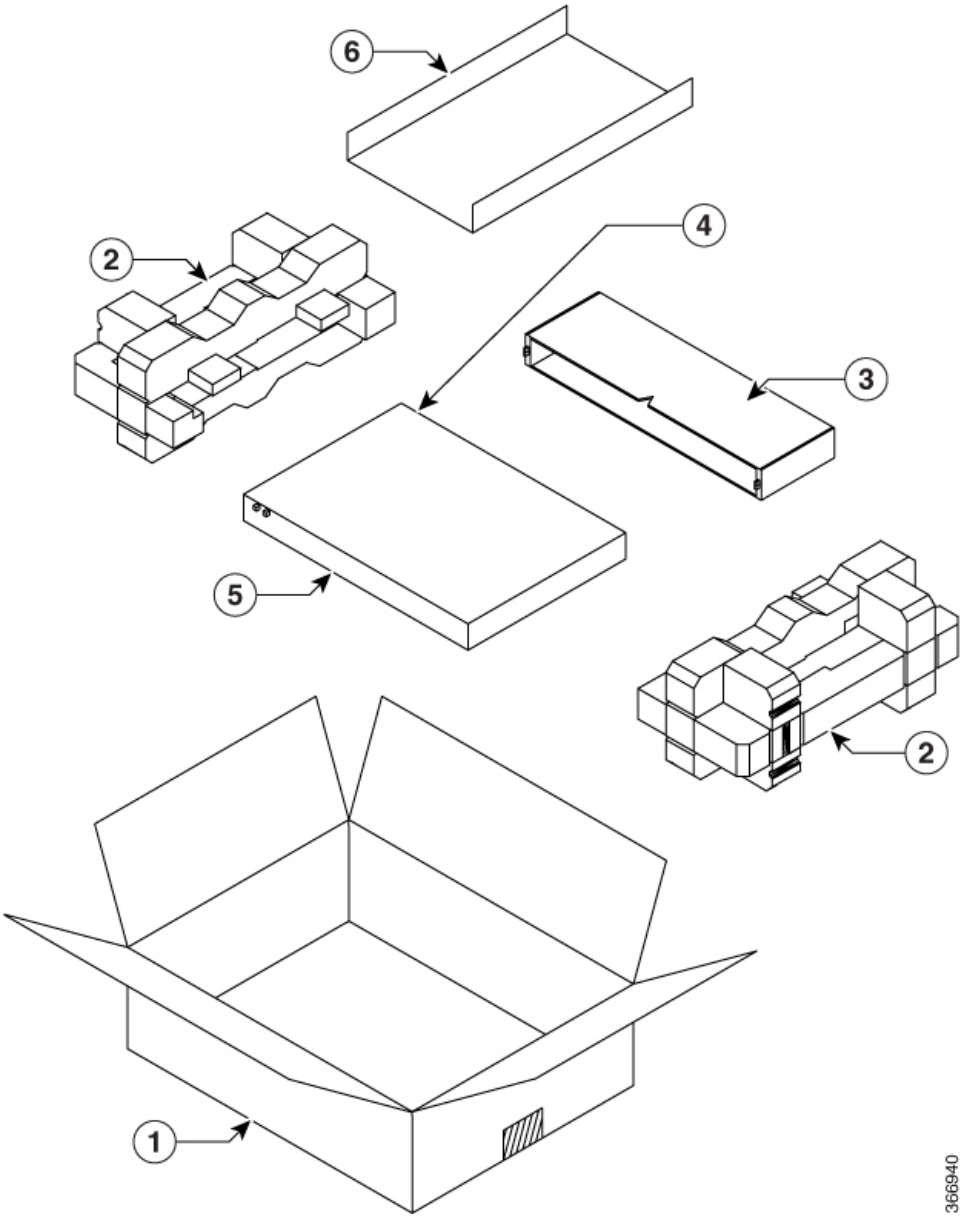
Ensure that there is sufficient room around the chassis pallet for unpacking.

1. Remove the accessory tray and the packing material.
2. Carefully set the packing material aside.

Tip Be sure to save the packaging in case you need to return any of the components products.

Note These images are for only representation purposes. The chassis' actual appearance and size would vary.

Figure 21: Unpacking the Device



1	Regular Slotted Container (shipping box)	2	Foam end caps
3	Front corrugated cap	4	Front end of the product
5	Back end of the product	6	Accessory tray

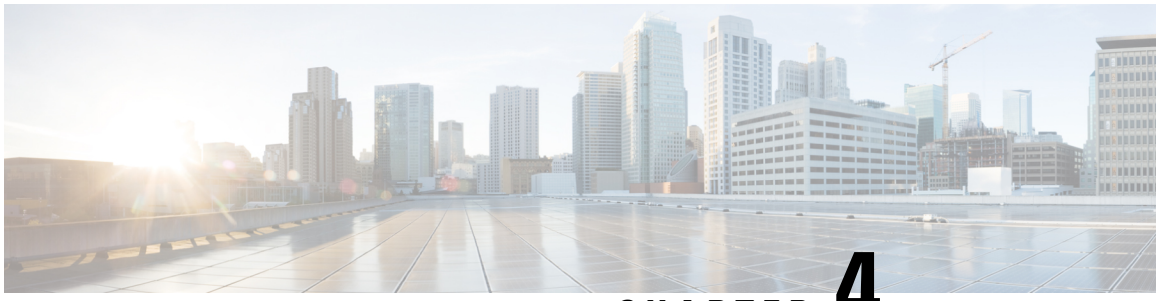
The Cisco N540X-6Z18G-SYS-A/D, N540X-8Z16G-SYS-A/D, N540X-4Z14G2Q-A/D, and N540-6Z18G-SYS-A/D router variants include the following accessories kit.

Table 11: Accessories Kit

Category	Accessories Kit
19-inch rack mount brackets	N540-RCKMT-19-ACA N540-RCKMT-19-ACD
23-inch rack mount brackets	N540-RCKMT-23-ACA N540-RCKMT-23-ACD
ETSI rack mount brackets	N540-RKMT-ETSI-ACA N540-RKMT-ETSI-ACD
Cable management brackets	N540-CBL-BRKT-AC
(Only applicable to Cisco N540-6Z18G-SYS-A/D router) Plenum and ETSI rack mount brackets	N540-6Z18G-PL-E N540-6Z18G-PL-E=
(Only applicable to Cisco N540-6Z18G-SYS-A/D router) Plenum and 23-inch rack mount brackets	N540-6Z18G-PL-23 N540-6Z18G-PL-23=
(Only applicable to Cisco N540-6Z18G-SYS-A/D router) Cable bracket	N540-CBL-BRKT-FN
(Only applicable to Cisco N540-6Z6G-SYS router) Cable bracket 19-inch rack mount brackets	N540-RCKMT-PLA

Note Most Cisco documentation is available online. The chassis Pointer Card that is shipped with your Cisco NCS 500 Series Services Routers 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.



CHAPTER 4

Install the Device

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

Installing the Cisco NCS 540 Small Density routers involves these tasks:

Note All the installation instructions for N540X-6Z18G-SYS-A/D, N540X-8Z16G-SYS-A/D, N540X-4Z14G2Q-A/D, and N540X-6Z6G-SYS variants remain similar and any differences between the routers are specifically called out.

The illustrations are for reference purpose only and may vary based on your Cisco NCS 540 variant.

- Rack Compatibility, on page 39
- Set up Device on Rack or Wall, on page 41

Rack Compatibility

We recommend that you follow these rack specifications.

Rack Types

Figure 22: Rack specification EIA (19 inches and 23 inches)

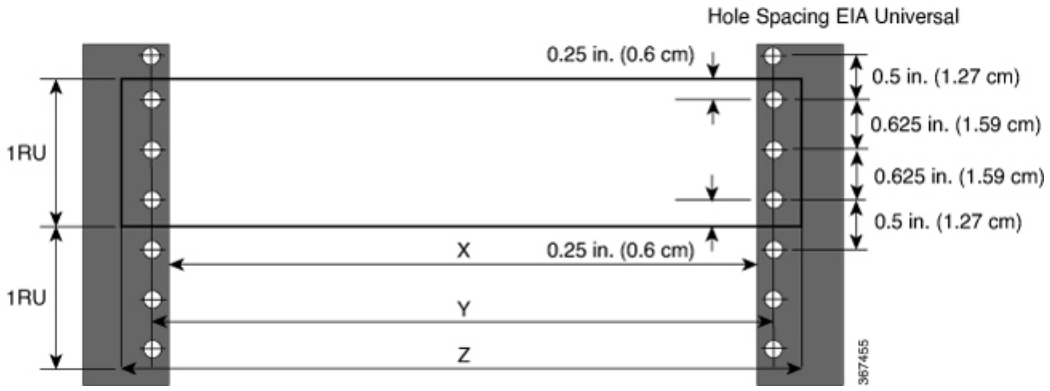
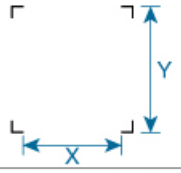
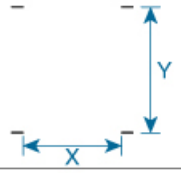
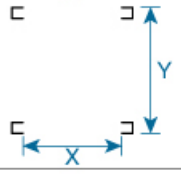


Table 12: Rack specification EIA (19 inches and 23 inches)

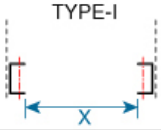
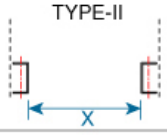
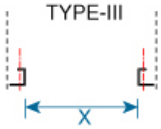
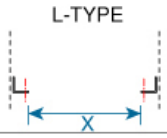
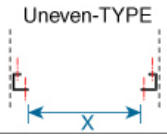
Post Type	Rack Type	Rack Front Opening (X)	Rack Mounting Hole Centre-Centre (Y)	Mounting Flange Dimension (Z)
4 Post	19 inches (48.3 centimeters)	17.75 inches (45 centimeters)	18.31 inches (46.5 centimeters)	19 inches (48.2 centimeters)
2 Post				
4 Post	23 inches (58.4 centimeters)	21.75 inches (55.24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

Figure 23: Four Post Rack Type

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

367456

Figure 24: Two Post Rack Type

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

367457

Set up Device on Rack or Wall

You can choose to either set up the Cisco NCS 540 on a rack or wall mount it.

Rack Mount

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

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

Table 13: Cisco NCS 540 Small Density Router Rack-Mount Kit

Quantity	Part Description
2	Rack-mount brackets
8 (48-101850-01)	M3 x 0.5 x 6-mm Phillips flat-head screws
2 (48-101620-01)	SCR, M, PAN, PH, SEX, 10-32 x 0.365"L, CSwZN, nickel alloy

Quantity	Part Description
1 (32-0619-01)	LUG, FAST, UNIN, #6AWG, #10, 2 HOLES
4 (48-101690-01)	SCR, M, PAN, PH, 12-24 x 0.49"L, CSwZN, nickel alloy
1 (32-0670-01)	LUG, FAST, UNIN, #6AWG, 2 HOLES, 90'

To mount the rack on the router:

1. Attach the rack-mount brackets and the cable guides to the router as follows:
   a. The router has port-side intake modules, position the router so that its ports are facing the cold aisle.
   b. Position the bracket ears facing front or middle rack-mount, on the side of the chassis so that the holes are aligned.
   c. Use four M3 screws to attach the brackets to the chassis.
   d. Repeat Steps 1b and 1c with the other rack-mount bracket on the other side of the router.
   e. Use four No. 12-24 screws and mount the router to the rack.

Figure 25: Installing 19 inch Rack-Mount Brackets in the Front

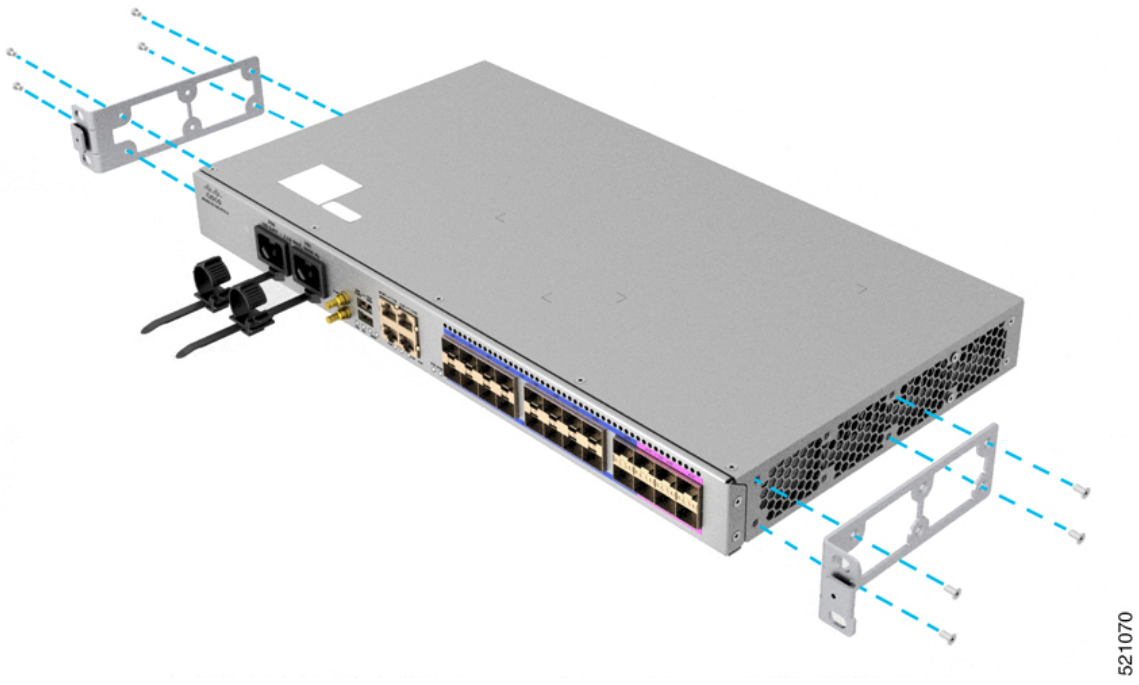
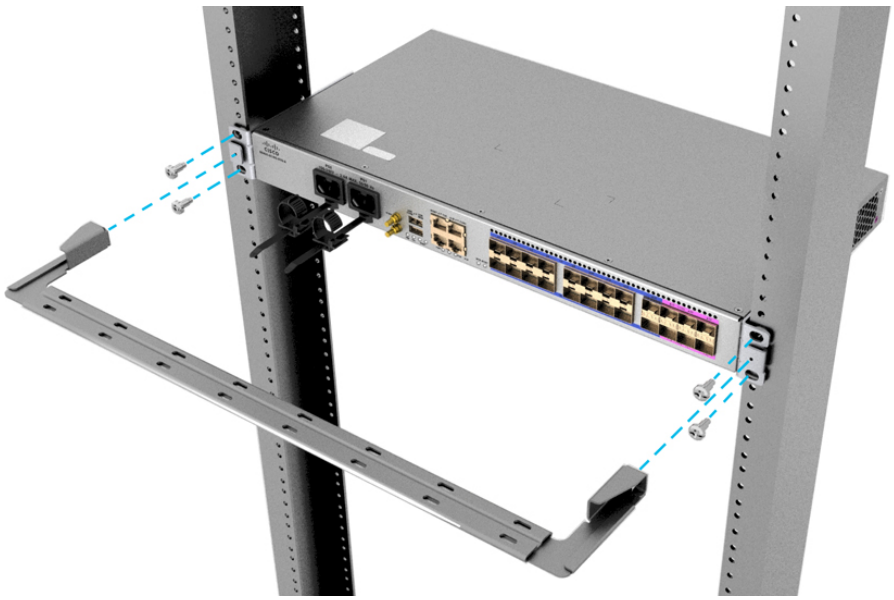
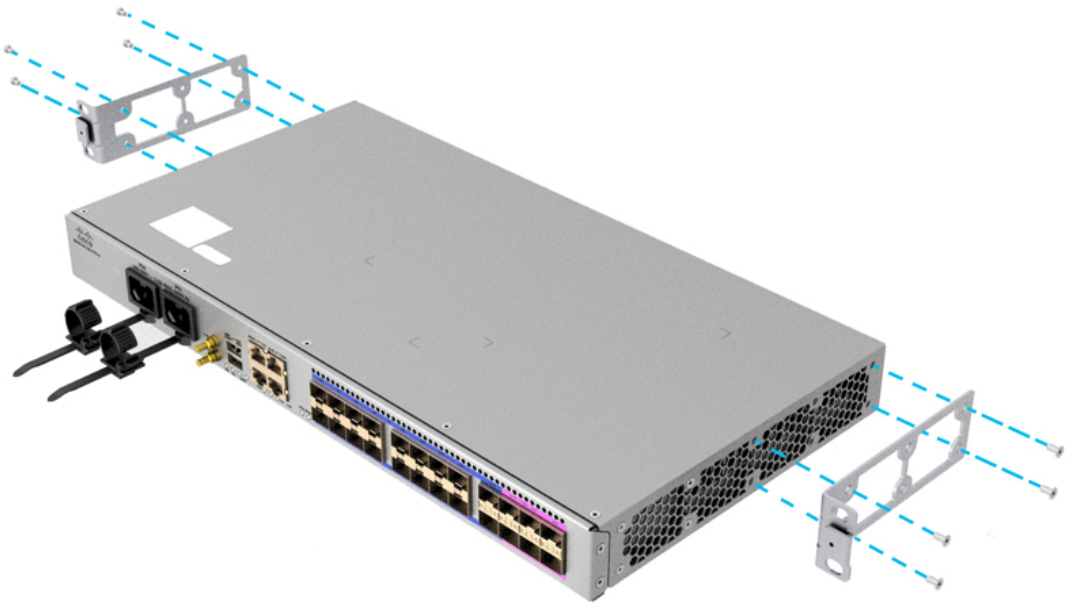


Figure 26: Installing Cable Management and 19 inch Rack-Mount Brackets in the Front



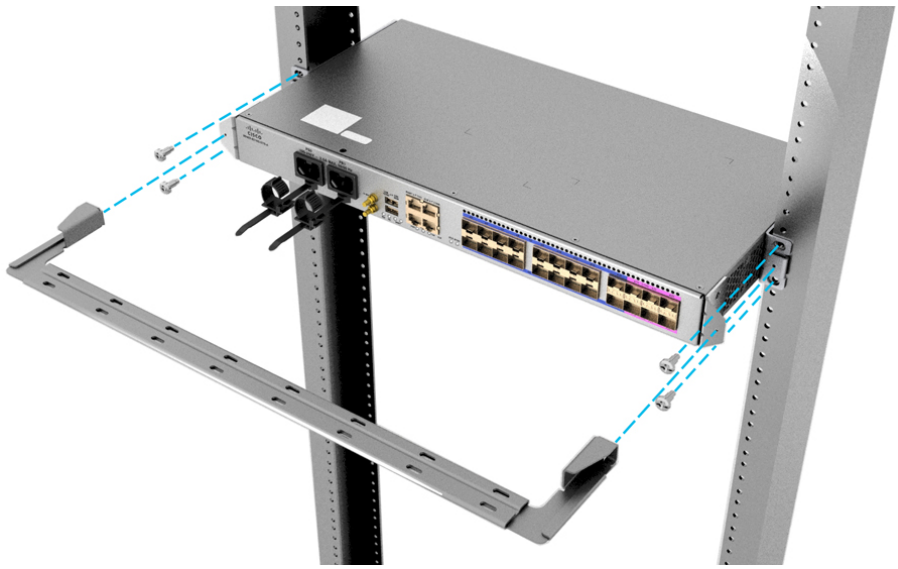
521071

Figure 27: Installing 19 inch Rack-Mount Brackets in the Middle



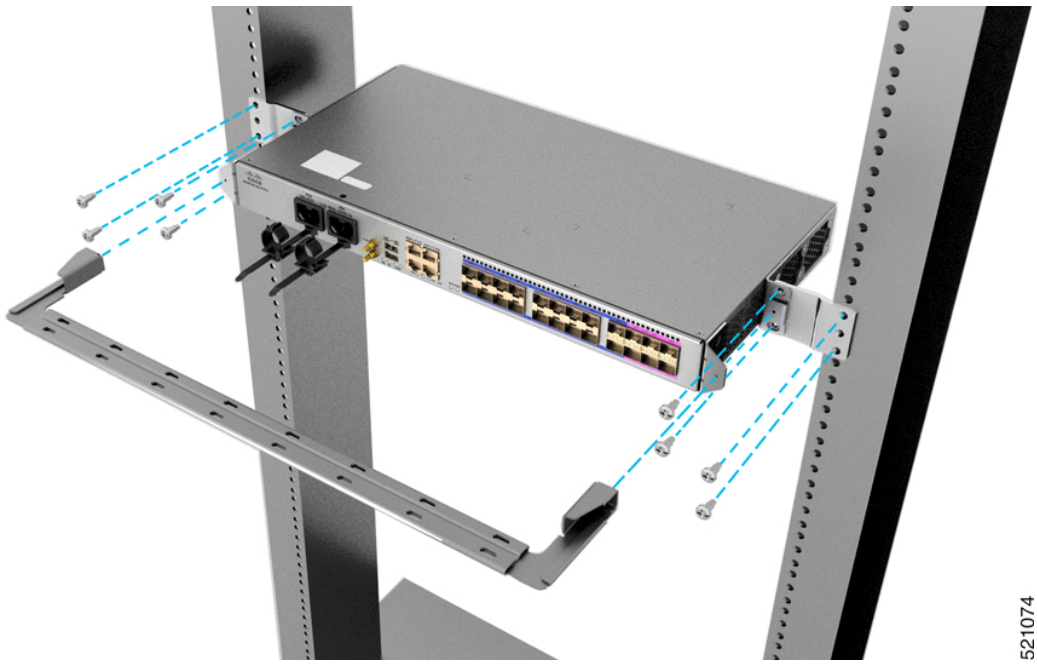
521072

Figure 28: Installing Cable Management and 19 inch Rack-Mount Brackets in the Middle



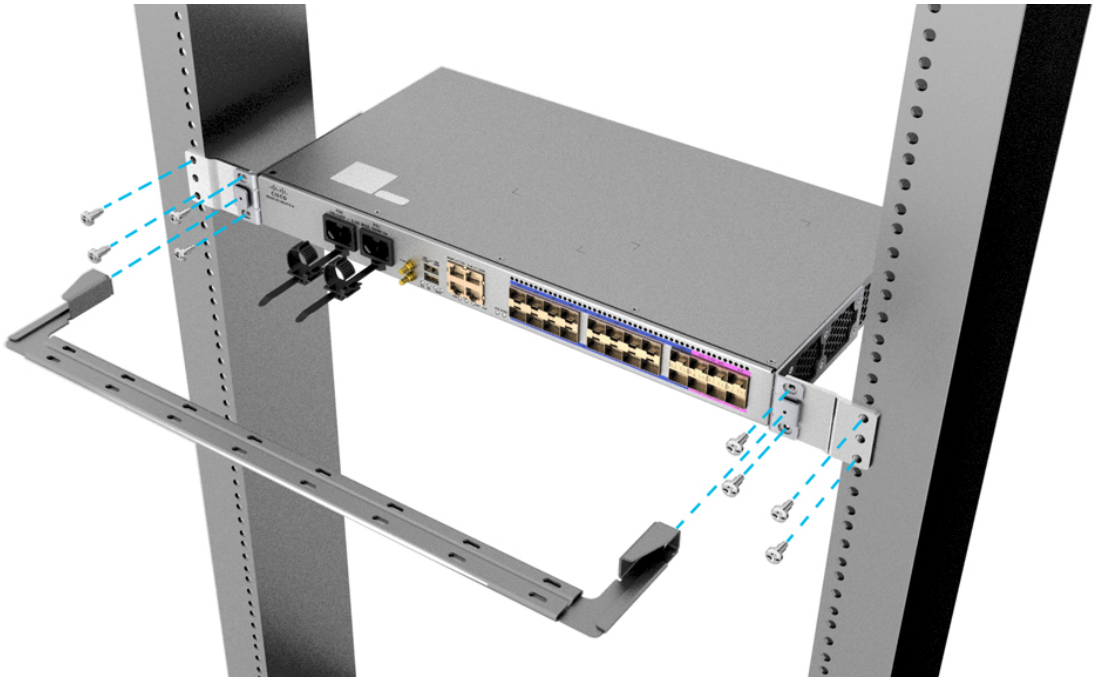
521073

Figure 29: Installing Cable Management and 23 inch Rack-Mount Brackets in the Middle



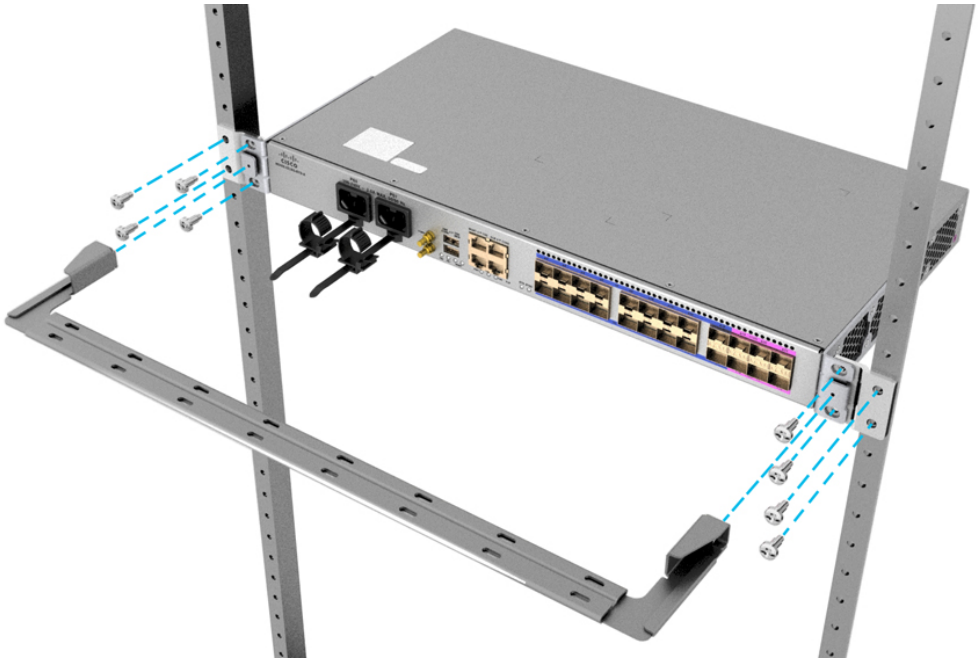
521074

Figure 30: Installing Cable Management and 23 inch Rack-Mount Brackets in the Front



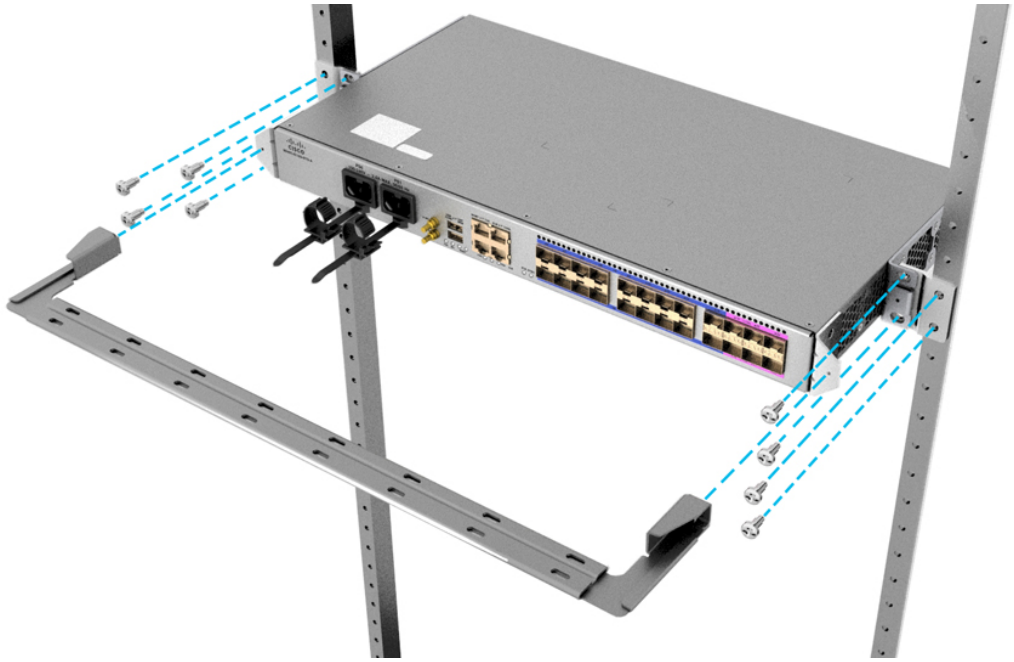
521075

Figure 31: Installing Cable Management and ETSI Rack-Mount Brackets in the Front



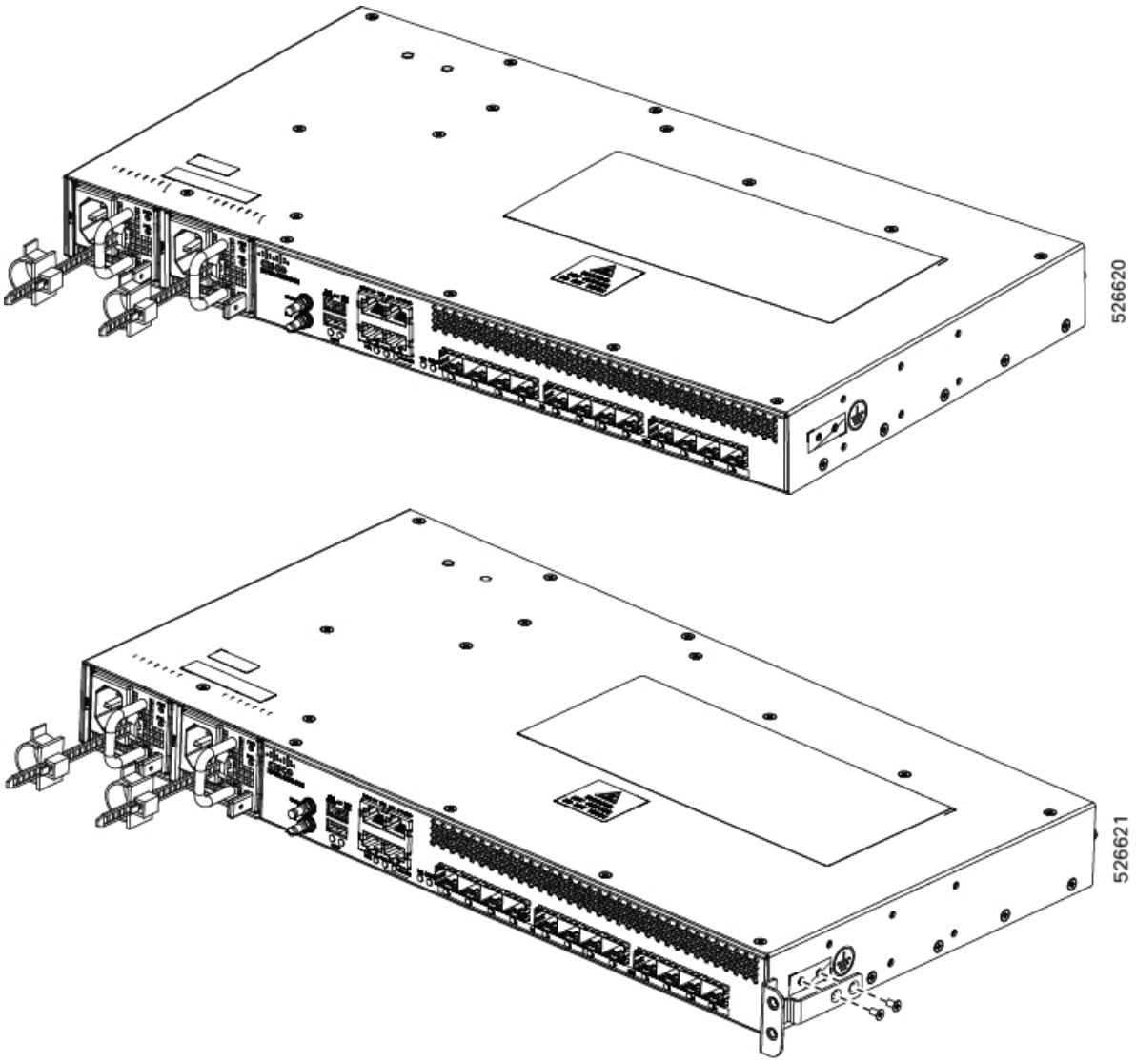
521076

Figure 32: Installing Cable Management and ETSI Rack-Mount Brackets in the Middle



521077

Figure 33: Installing Mounting Bracket on N540X-6Z6G-SYS



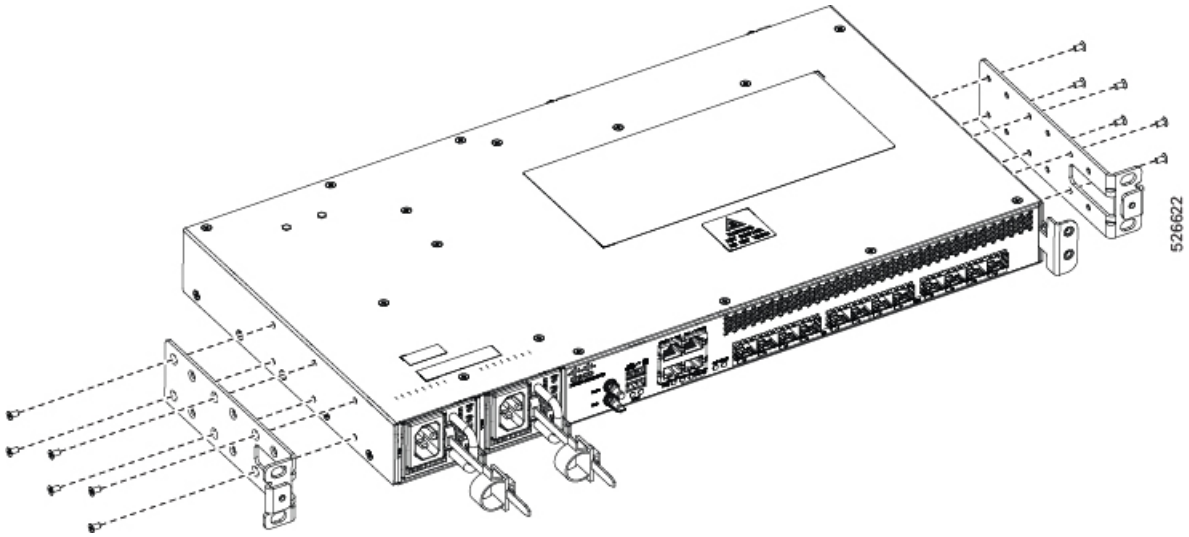


Figure 34: Fixing N540X-6Z6G-SYS on rack

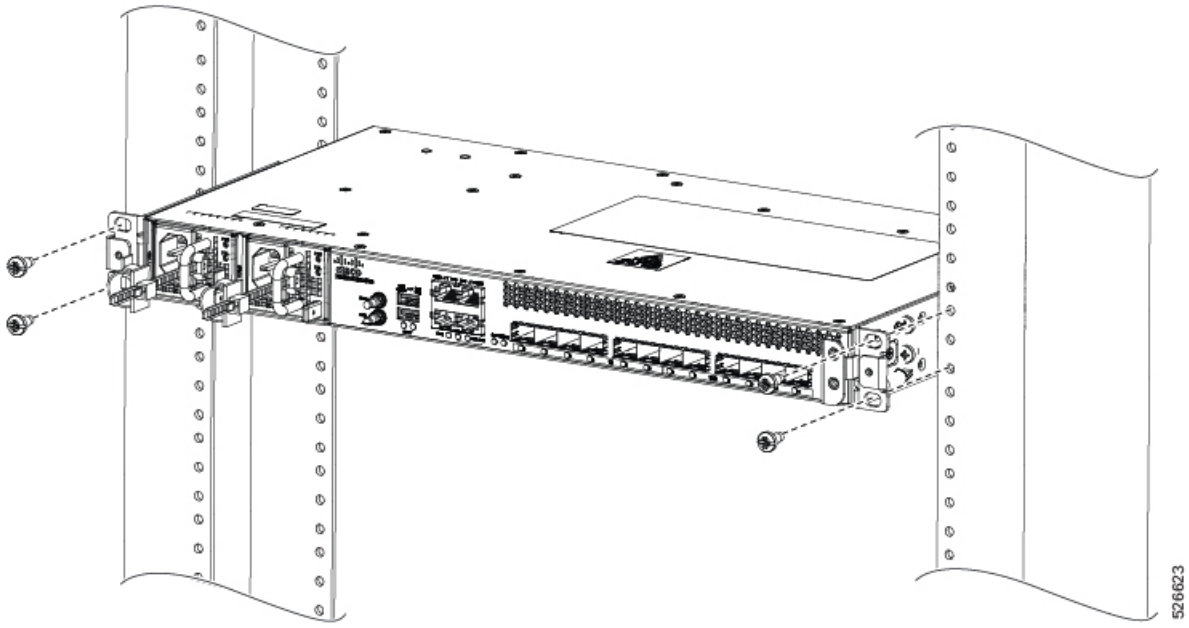


Figure 35: Fixing the N540X-6Z6G-SYS Grounding Lug on Extension Bracket

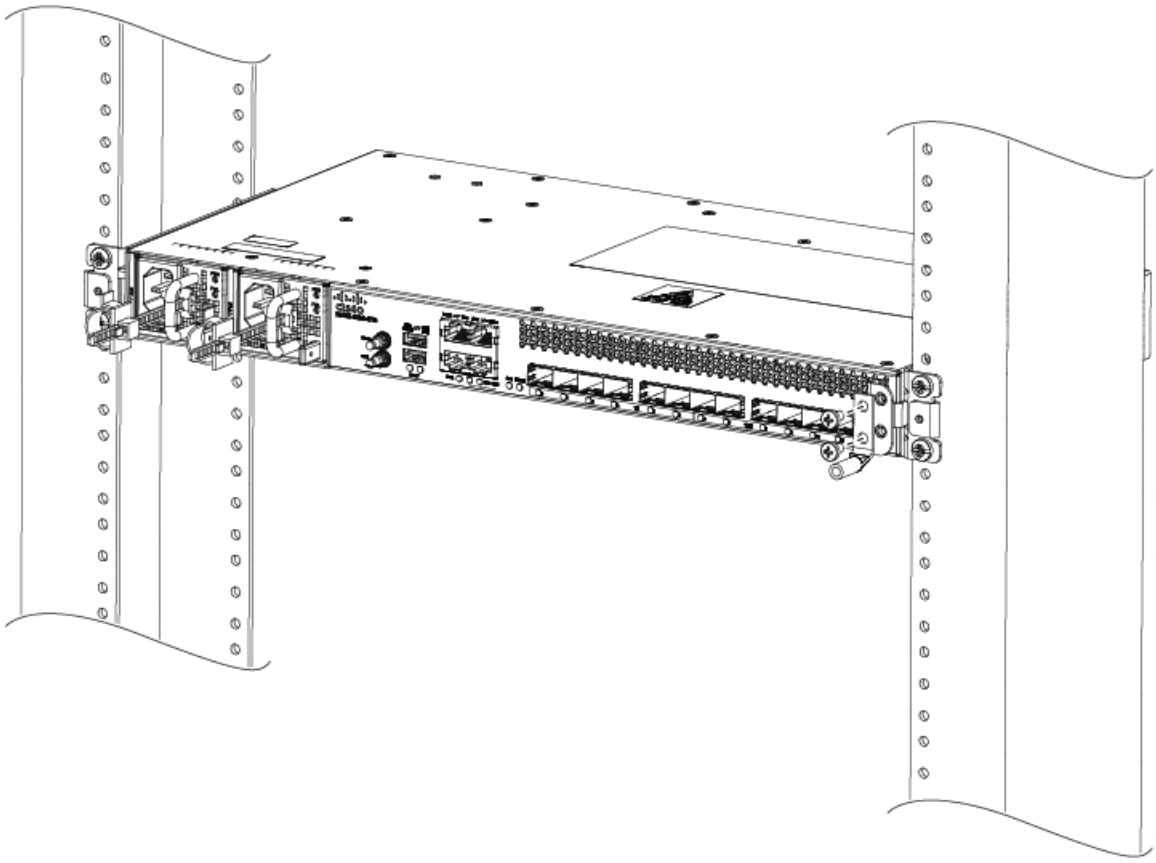
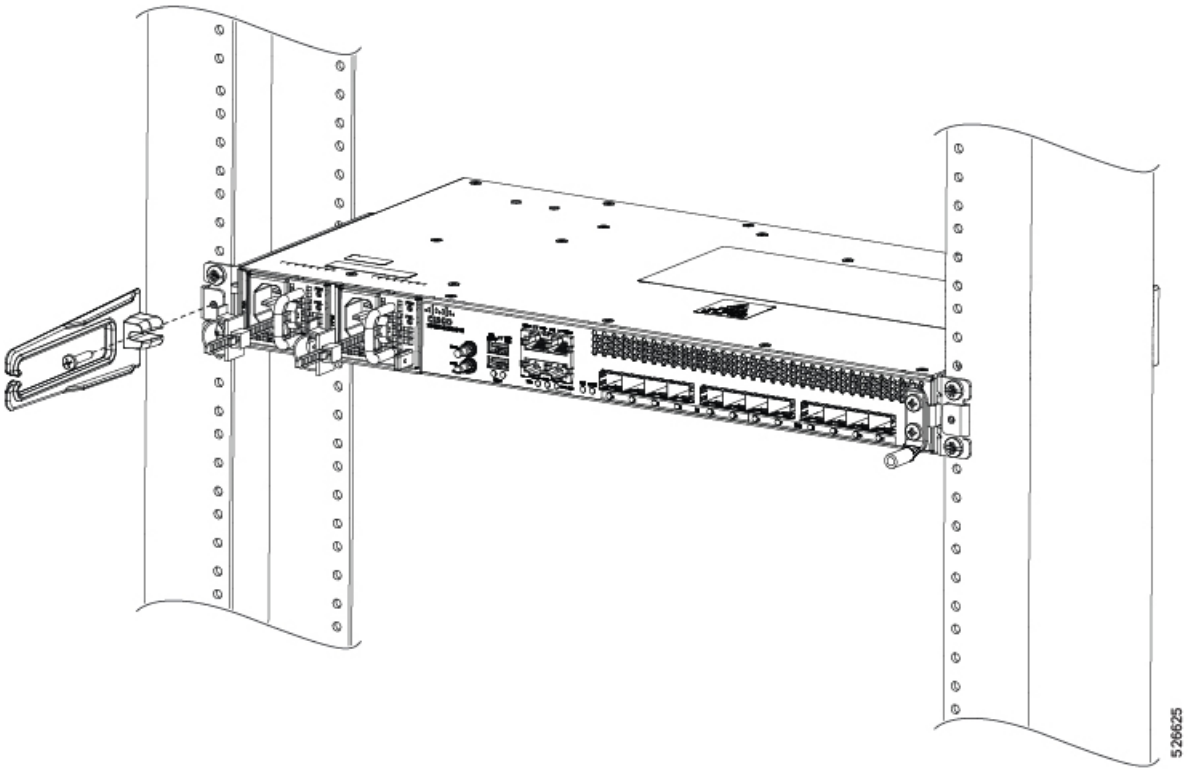


Figure 36: Fixing the N540X-6Z6G-SYS Cable Management on Extension Bracket



2. Install the router onto the 2-post rack as follows:
   a. Lift and position the router into position between the two rack posts.
   b. Move the router until the rack-mount brackets come in contact with the two rack posts.
   c. Hold the chassis at level and have another while the second person inserts two screws 12-24 in each of the two rack-mount brackets (using a total of four screws) and into the cage nuts or threaded holes in the vertical rack-mounting rails.
   d. Tighten the 12-24 screws to 30 in-lb (3.39 N.m).

Install the N540-6Z18G-SYS-A/D router with Air Plenum

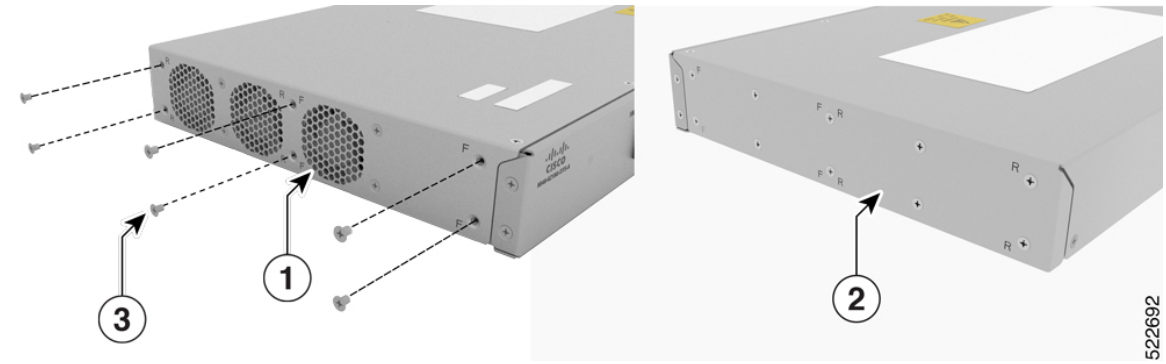
Note Air plenum is only applicable for Cisco N540-6Z18G-SYS-A/D router.

Plenum Assembly on ETSI Rack

1. Remove the screws on the sides of the chassis, according to your mounting option:
   - To front mount the chassis, remove four screws on the right side of the chassis. The "F" highlighted screws.

- To mid mount the chassis, remove six screws on the left side of the chassis. The "F" and "R" highlighted screws.

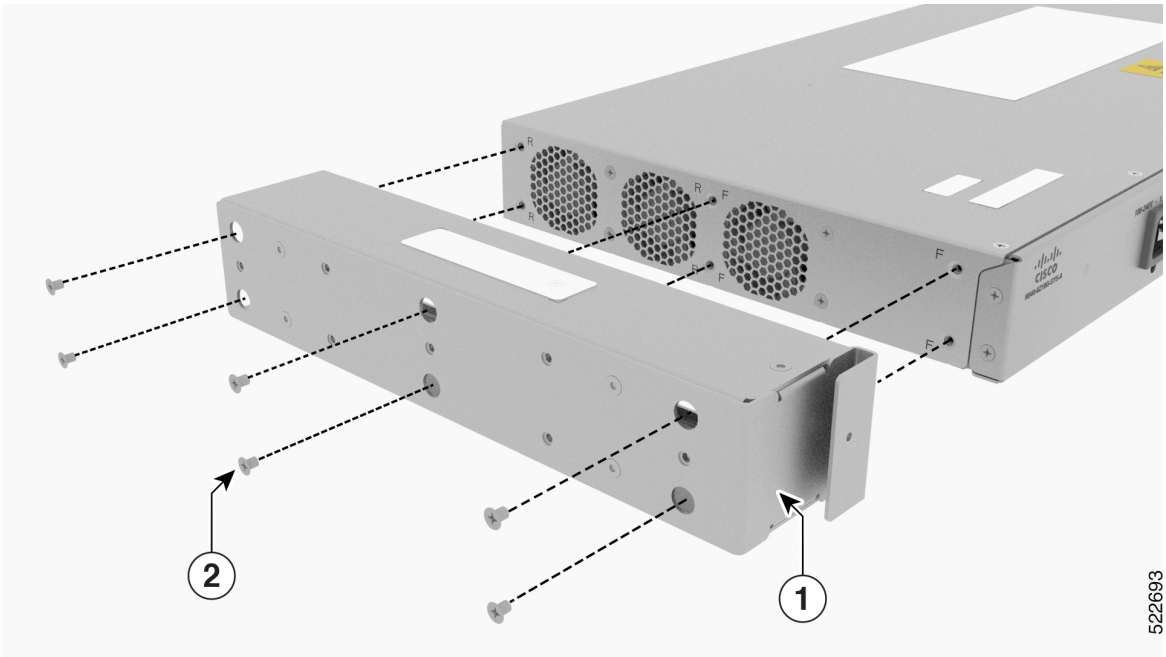
Figure 37: Remove Screws from the Sides of the Chassis



1	Left side of the chassis
2	Right side of the chassis
3	Screw

2. Fix the plenum (800-110707-01) with help of six screws (48-101850-01).

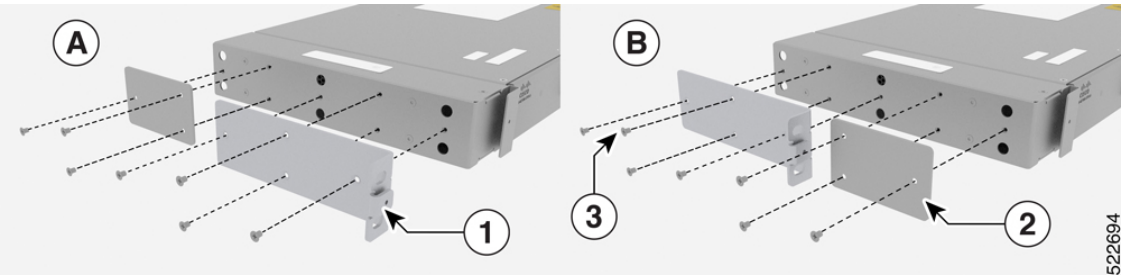
Figure 38: Fix the Plenum with Screws



1	Air Plenum
2	Screw

3. Fix the mounting bracket (700-131329-01) with the help of four screws (48-101850-01), according to your mounting option.
   - For front mount (refer image A), fix the mounting bracket in the front and the dummy cover at the rear.
   - For mid mount (refer image B), fix the mounting bracket in the mid and the dummy cover at the front.
4. Fix the dummy cover (700-131330-01) with help of three screws (48-101850-01).

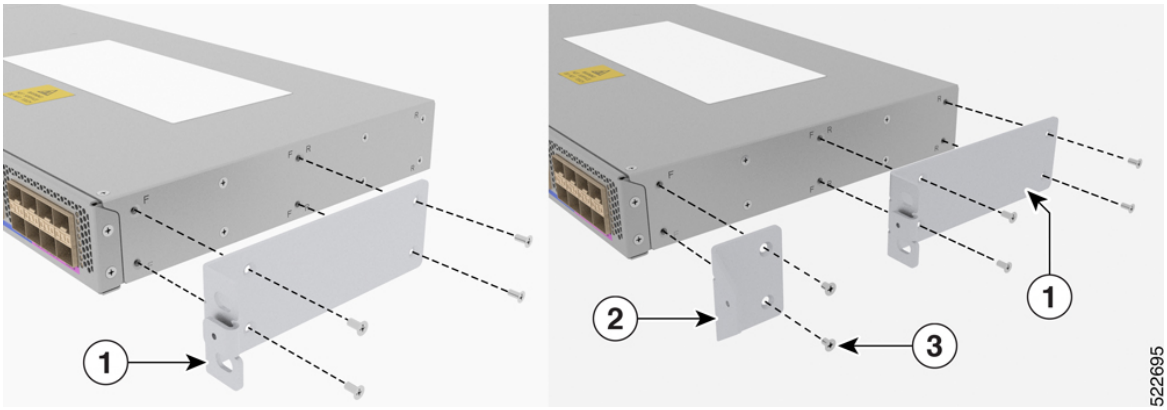
Figure 39: Fix Mounting Bracket and Dummy Cover



1	Mounting Bracket
2	Dummy Cover
3	Screw

5. Fix the mounting bracket (700-131271-01) with help of four screws (48-101850-01).
6. For mid mount, fix the cable bracket (700-130022-01) with help of two screws (48-101850-01). The cable bracket is applicable only in case of mid mount.

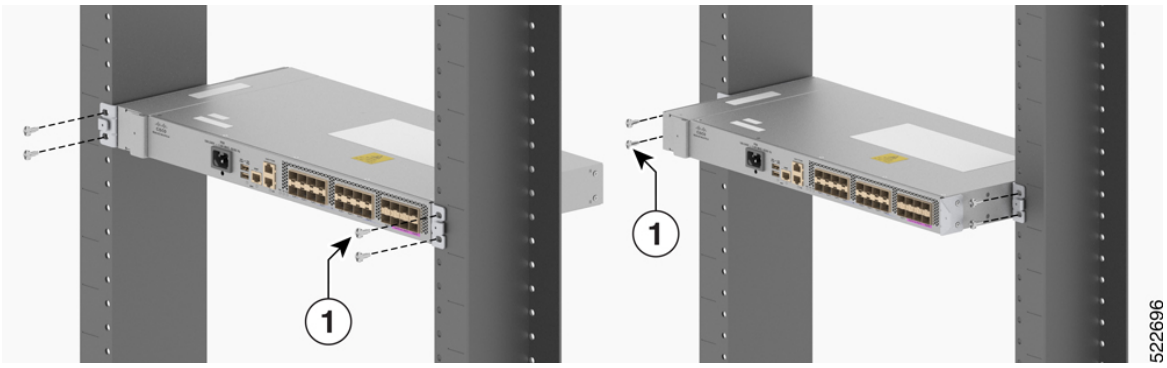
Figure 40: Fix Mounting Bracket and Cable Bracket



1	Mounting Bracket
2	Cable Bracket
3	Screw

7. Fix the assembly to rack either in the front or in the mid, with help of four screws (48-101690-01).

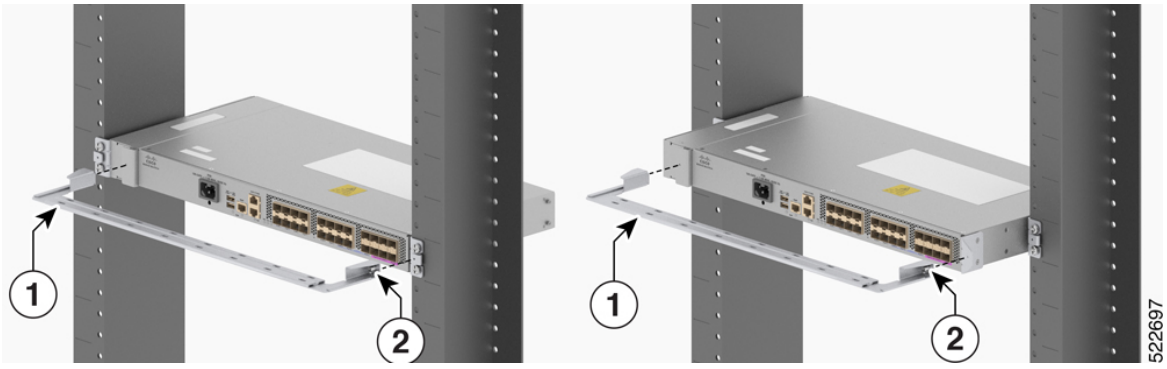
Figure 41: Fix Assembly to Rack



1	Screw

8. Fix the cable bracket (700-114387-01) to the assembly with the help captive screws in the cable bracket.

Figure 42: Fix Cable Bracket to the Assembly



1	Cable Bracket
2	Captive Screw

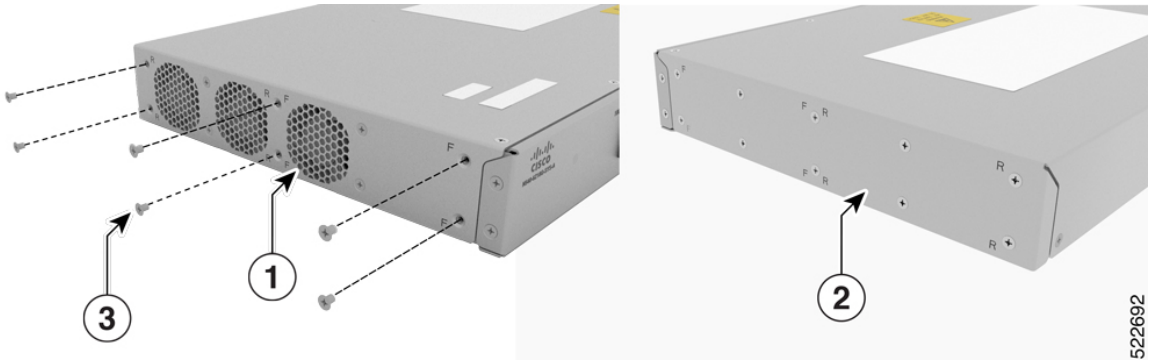
Figure 43: ETSI and Air Plenum Assembly



Plenum Assembly on 23-Inches Rack

1. Remove the screws on the sides of the chassis, according to your mounting option:
   - To front mount the chassis, remove four screws on the right side of the chassis. The “F” highlighted screws.
   - To mid mount the chassis, remove six screws (48-101690-01) on the left side of the chassis. The "F" and "R" highlighted screws.

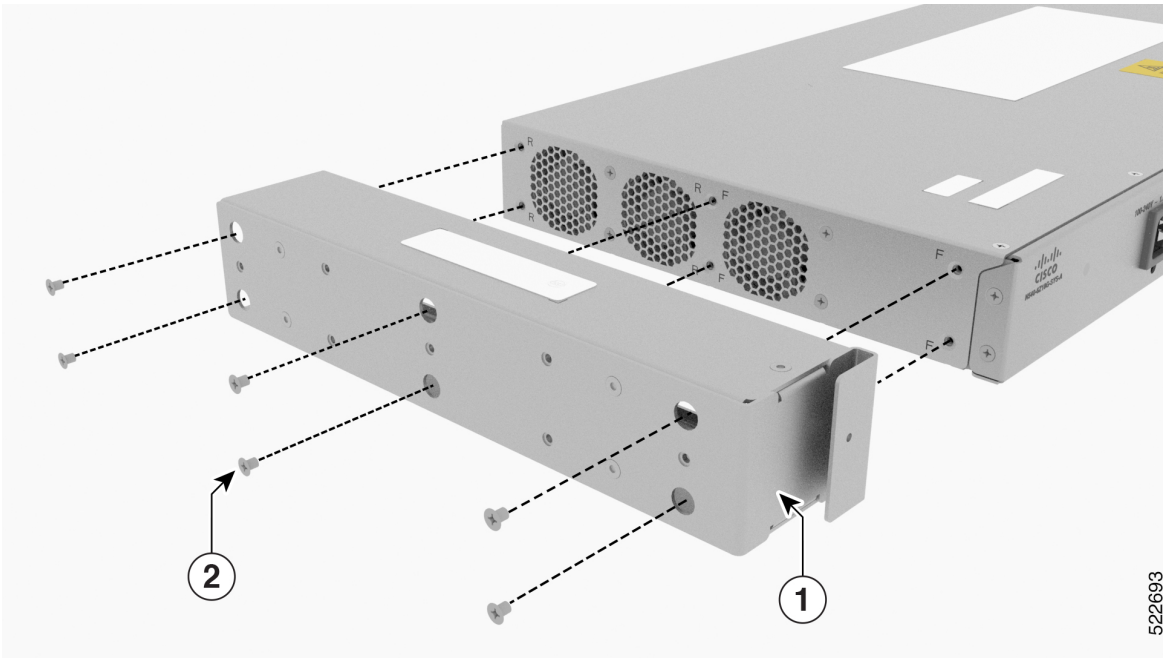
Figure 44: Remove Screws from the Sides of the Chassis



1	Left side of the chassis
2	Right side of the chassis
3	Screw

2. Fix the plenum (800-110707-01) with help of six screws (48-101850-01).

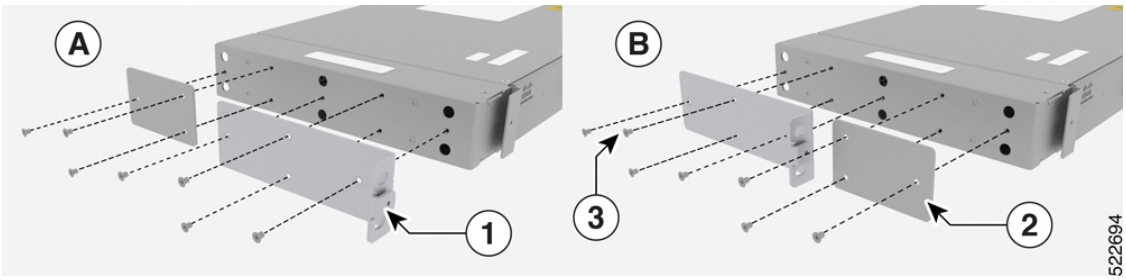
Figure 45: Fix the Plenum with Screws



1	Air Plenum
2	Screw

3. Fix the mounting bracket (700-129948-01) with the help of four screws (48-101850-01), according to your mounting option.
   - For front mount (refer image A), fix the mounting bracket in the front and the dummy cover at the rear.
   - For mid mount (refer image B), fix the mounting bracket in the mid and the dummy cover at the front.
4. Fix the dummy cover (700-131330-01) with help of three screws (48-101850-01).

Figure 46: Fix Mounting Bracket and Dummy Cover

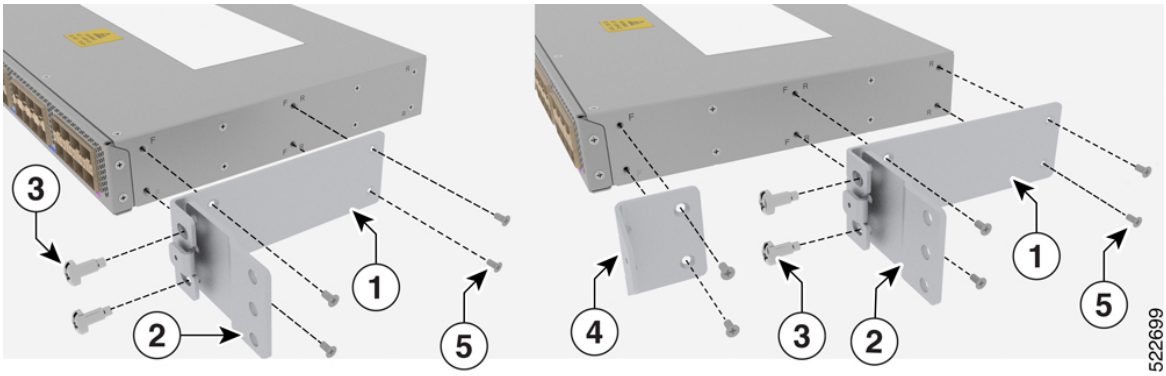


1	Mounting Bracket
2	Dummy Cover

3	Screw

5. Fix the mounting bracket (700-119499-01) with the help of four screws (48-101850-01).
6. Fix the bracket (700-112688-01) with the help of two screws (48-101690-01).
7. Fix the cable bracket (700-130022-01) with the help of two screws (48-101850-01).

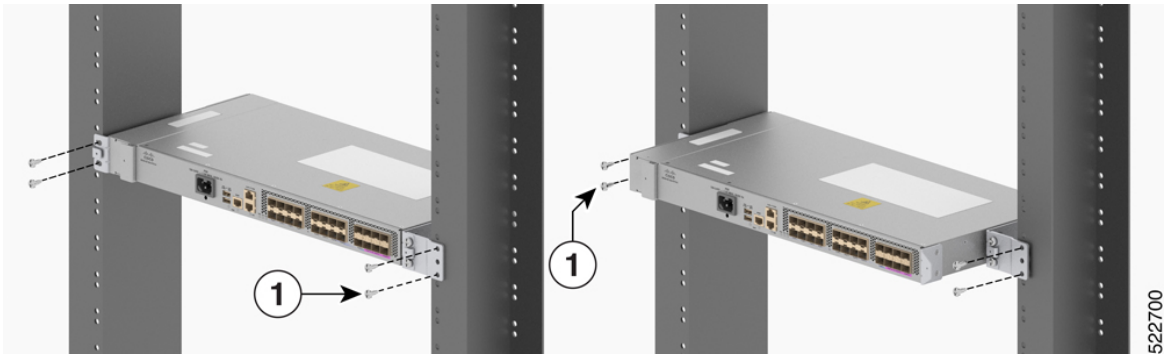
Figure 47: Fix Mounting Bracket and Cable Bracket



1	Mounting Bracket
2	Bracket
3	Bracket Screw
4	Cable Bracket
5	Mounting Bracket Screw

8. Fix the assembly to rack with the help of four screws (48-101690-01).

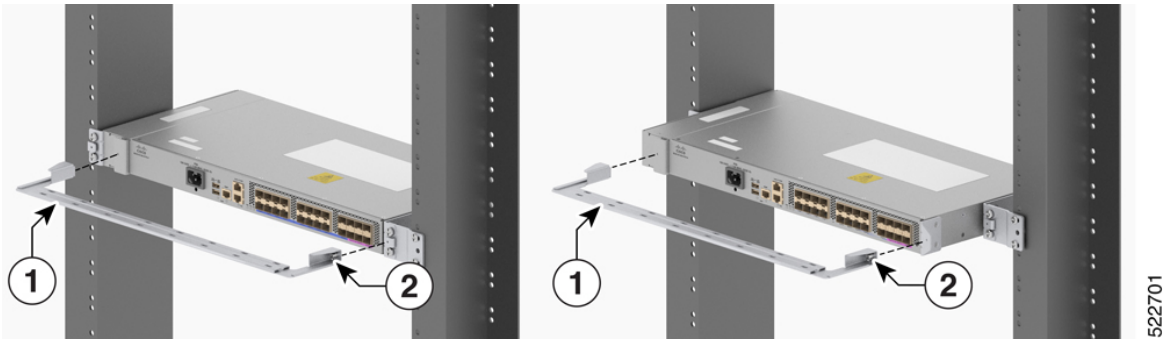
Figure 48: Fix the Assembly to Rack



1	Screw

9. Fix the cable bracket (700-114387-01) to the assembly with the help of captive screws in the cable bracket.

Figure 49: Fix Cable Bracket to the Assembly



1	Cable Bracket
2	Captive Screw

Wall Mount

Install the wall mounting brackets and cable guides on to the chassis before you mount the chassis on the wall.

Note Wall mount is currently not available on NCS 540 Small Density Routers. Contact your Cisco representative if you need a wall mount.

Installing the Air Filter (N540X-SMALL-SF)

This section describes installing the air filter, N540X-SMALL-SF, on the following NCS 540 router variants:

- N540X-6Z18G-SYS-D
- N540X-6Z18G-SYS-A

Note The maximum operating temperature is 60°C when air filters and dust covers are installed on the system.

The maximum operating temperature increases to 70°C when air filters and dust covers are removed from the system.

Note Air filters are consumable items and must be ordered separately by customers. Customers may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

Before you begin

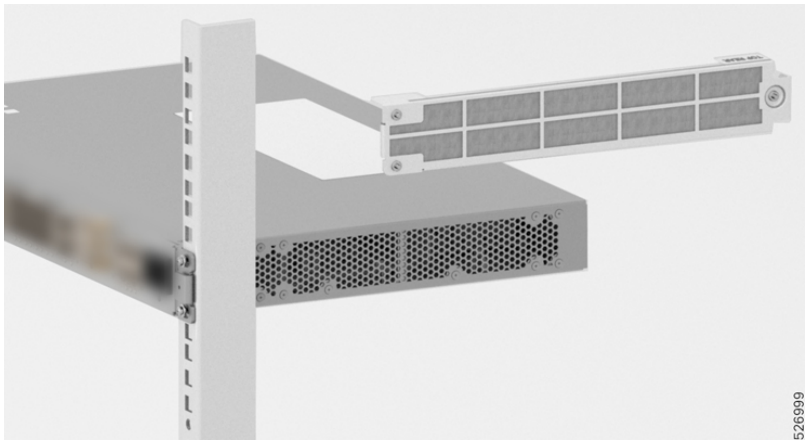
- Complete the "Rack Mount, on page 41" procedure.

- Since the air filter is installed from the top, make sure that there is approximately 2 rack units of space above the router.

Procedure

Step 1 Position the air filter on top of the air inlet side of the chassis as shown in the figure.

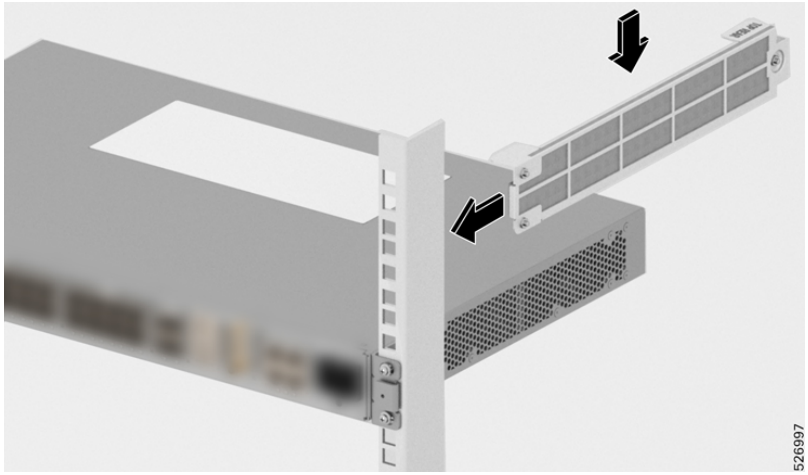
Figure 50: Position the air filter



Note
Locate the label "TOP REAR" on the air filter's top bracket. The label serves as an installation guide indicating that this side of the air filter should be positioned at the top of the router chassis.

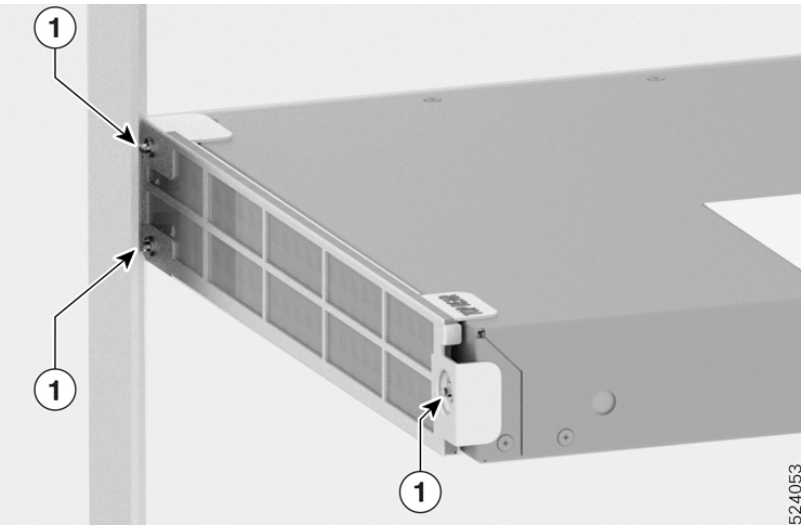
Step 2 From the top, slide the air filter to cover the air vents as shown in the figure.

Figure 51: Slide the air filter



Note
There are three magnetic points on the air filter as shown in the figure. The magnetic points keep the air filter secured to the router chassis.

Figure 52: Magnetic points



Install the air filter (N540X-SMALL-AF) (front and side views)

This section describes installing the air filter, N540X-SMALL-AF, on the following NCS 540 router variants:

- N540X-6Z18G-SYS-D
- N540X-6Z18G-SYS-A

Note Air filters are consumable items and must be ordered separately by customers. Customers may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

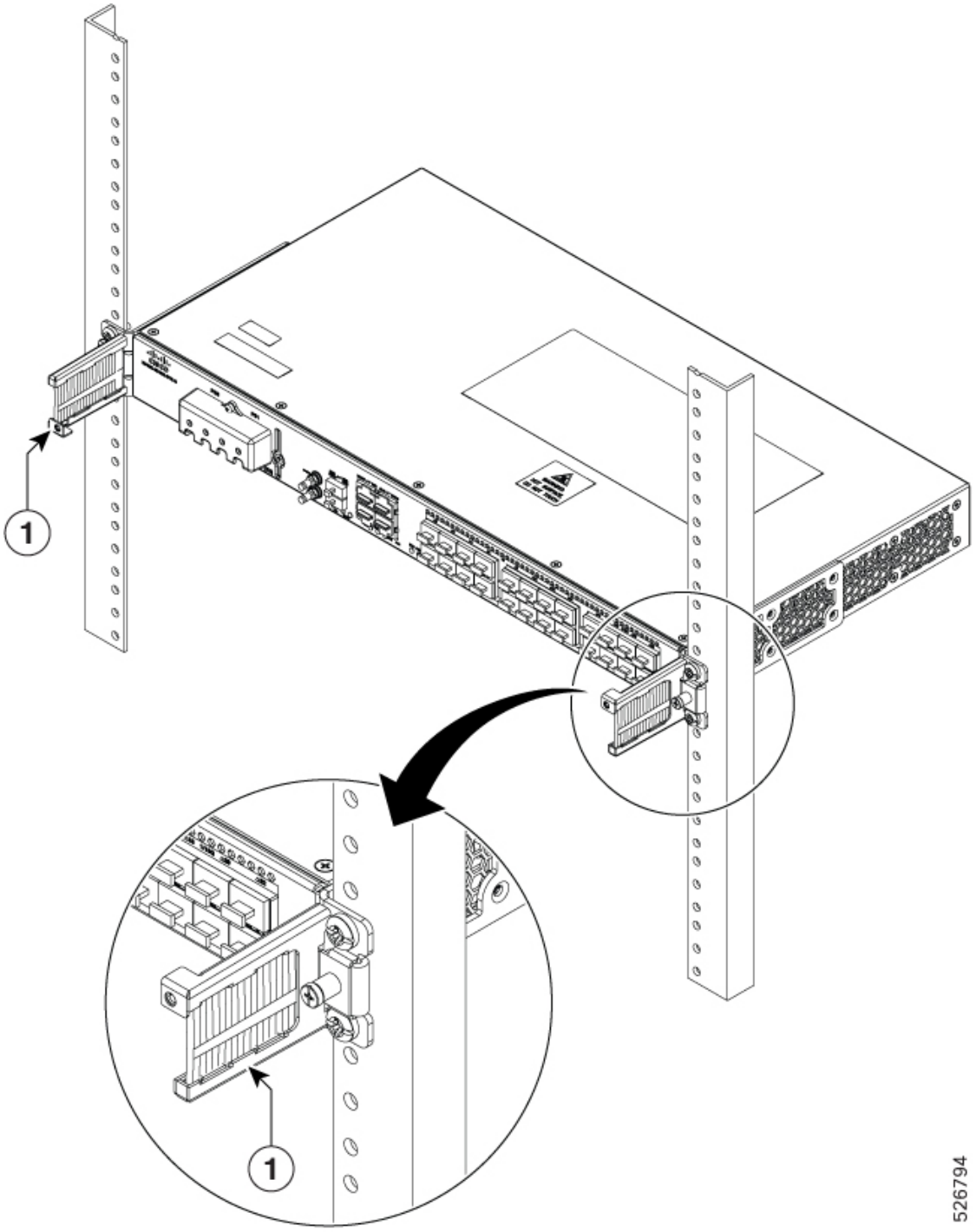
Before you begin

- Complete the "Rack Mount, on page 41" procedure.
- Since the air filter is installed from the top, make sure that there is approximately 2 rack units of space above the router.

Procedure

Step 1 Mount the cable management onto the mounting ears on both sides.

Figure 53: Mount the cable management

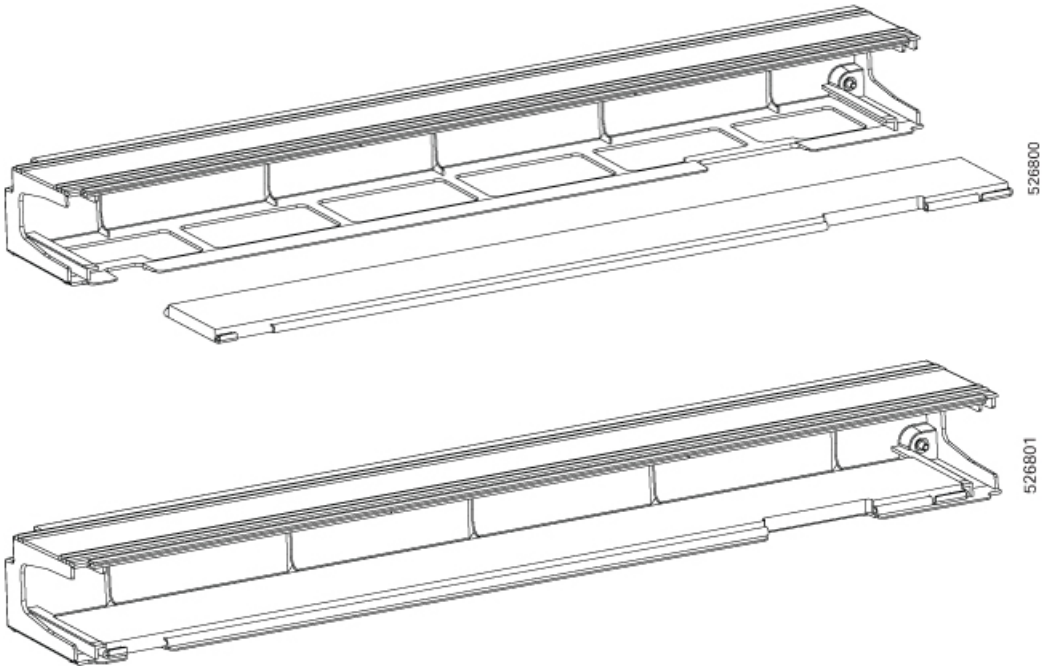


Part	Part Number	Quantity
1 - Cable management	800-52079-01	2

Note
Use thumb screw to fix cable management with rack mount bracket.

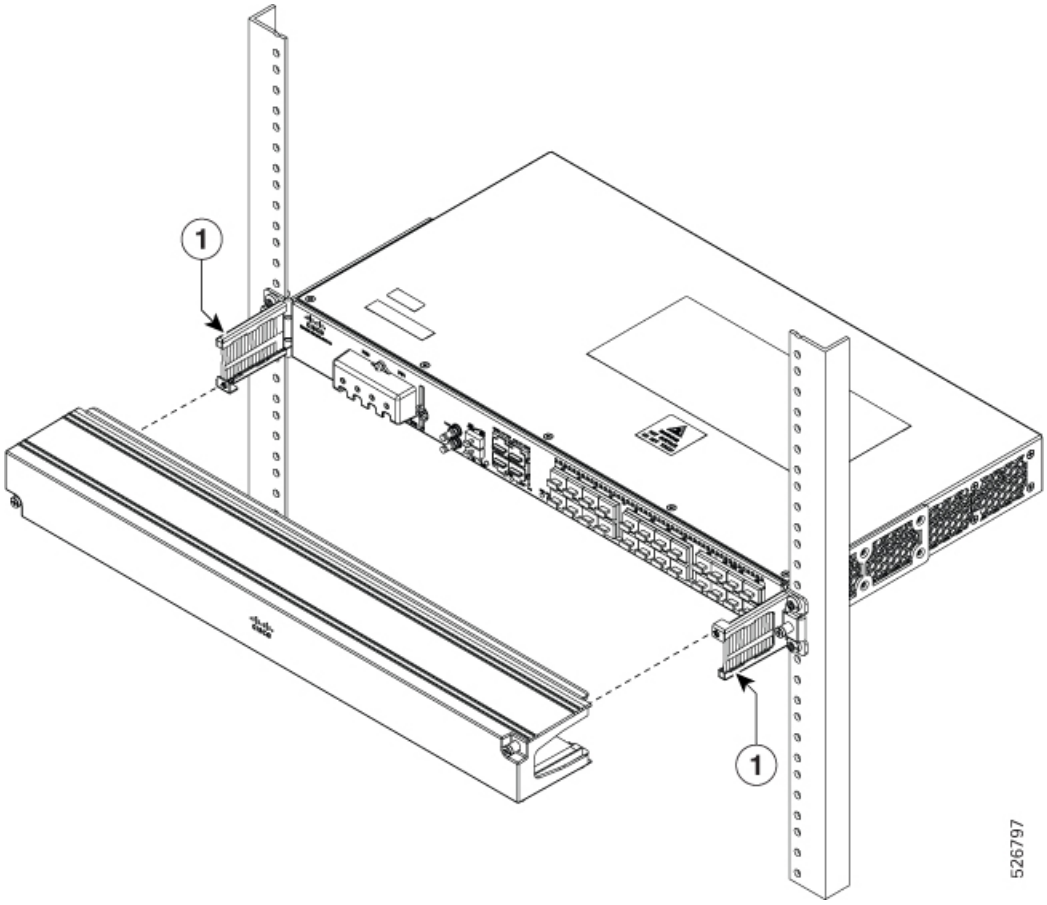
Step 2 Install the air filter (800-52115-01) inside the front air filter cover (700-137145-01).

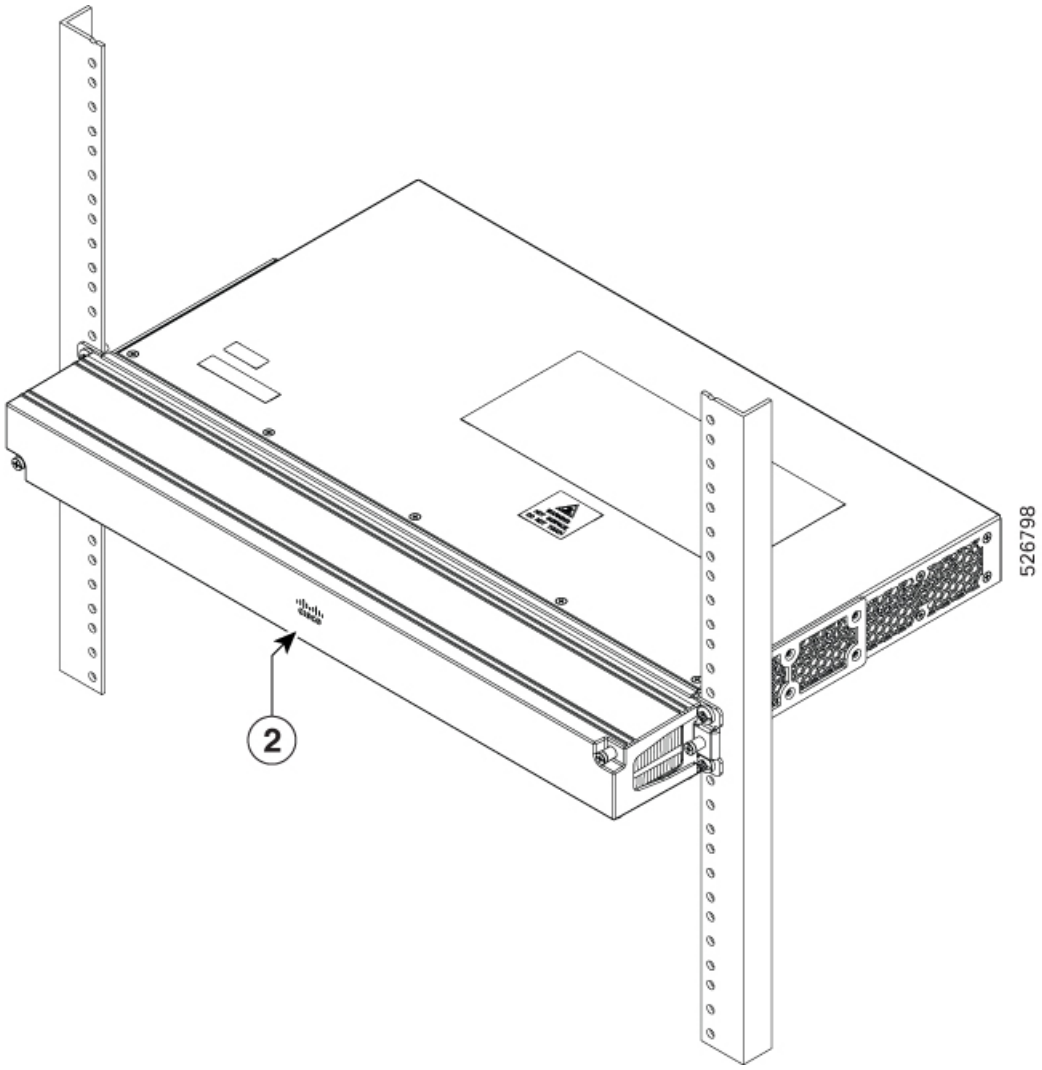
Figure 54: Air filter with filter cover



Step 3 Assemble the front air filter cover.

Figure 55: Front air filter

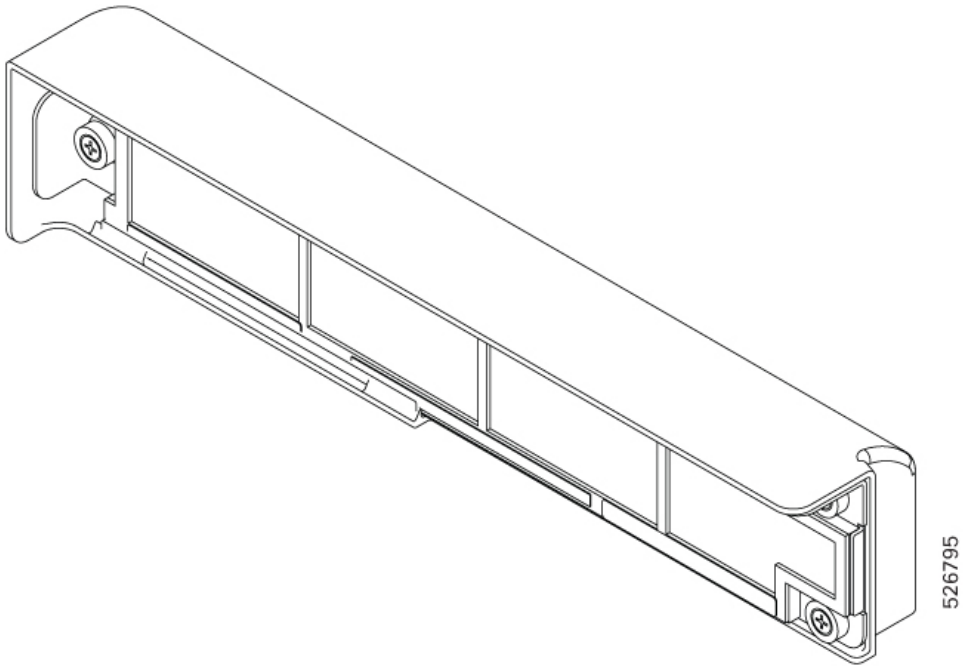




Part	Part Number	Quantity
1 - Cable management	800-52079-01	2
2 - Air filter front cover	700-137145-01	1

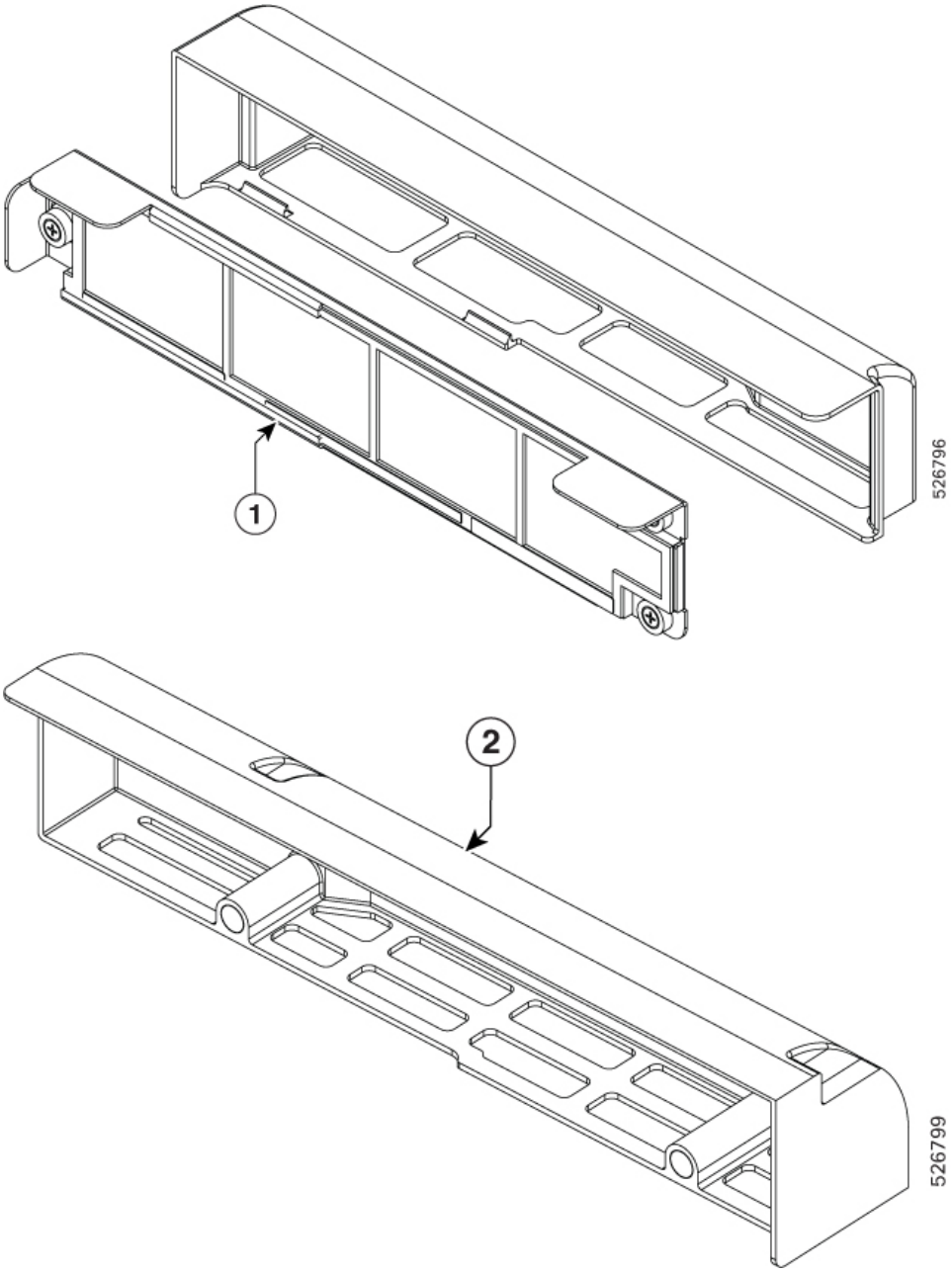
Step 4 Fix the side-mounted air filter onto the air baffle (RH).

Figure 56: Side-mounted air filter



Part	Part Number	Quantity
1 - Air filter	800-52029-01	1
2 - Air baffle	700-137564-01	1

Figure 57: Air filter

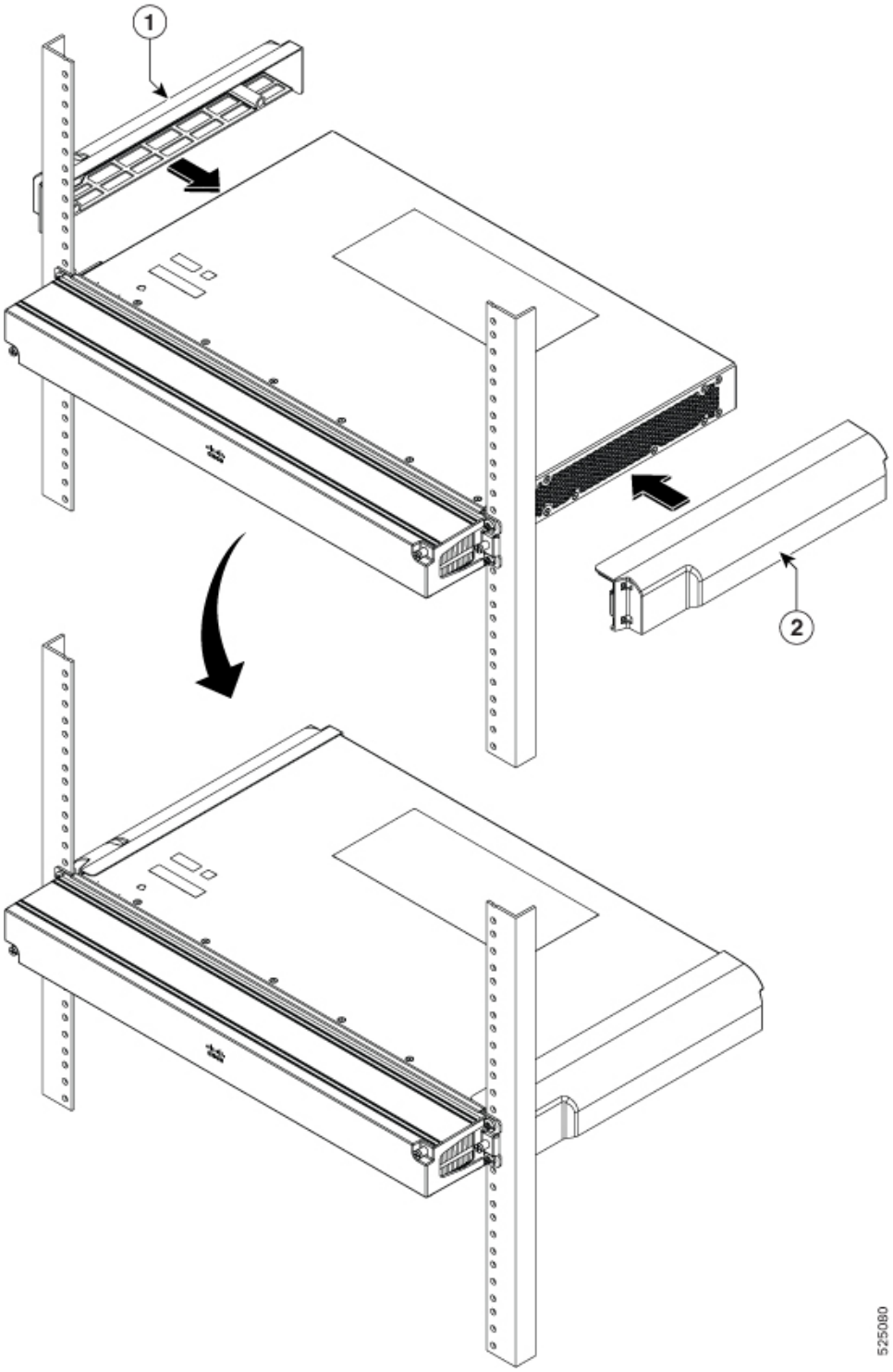


Part	Part Number	Quantity
1 - Air baffle - Right side with air filter	700-137564-01 800-52029-01	1
2 - Air baffle left side	700-137569-01	1

Note
Air filter baffle with air filter should be assembled in right side of the chassis air inlet.

Step 5 Mount both the right and left air baffles on the chassis.

Figure 58: Mounting air filters on both sides of chassis



Part	Part Number	Quantity
1 - Exhaust Baffle	700-137569-01	1
2 - Right side air baffle with filter	700-137564-01 800-52029-01	1

Warning
We recommend that you use only the screws with part number 48-101690-01 to mount the chassis on rack. Other screws are not recommended for the side filter assembly.

Warning
The ports without optics should be closed with dust caps.

Ground the Device

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

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

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

To ground the device:

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

Figure 59: Ground Lug

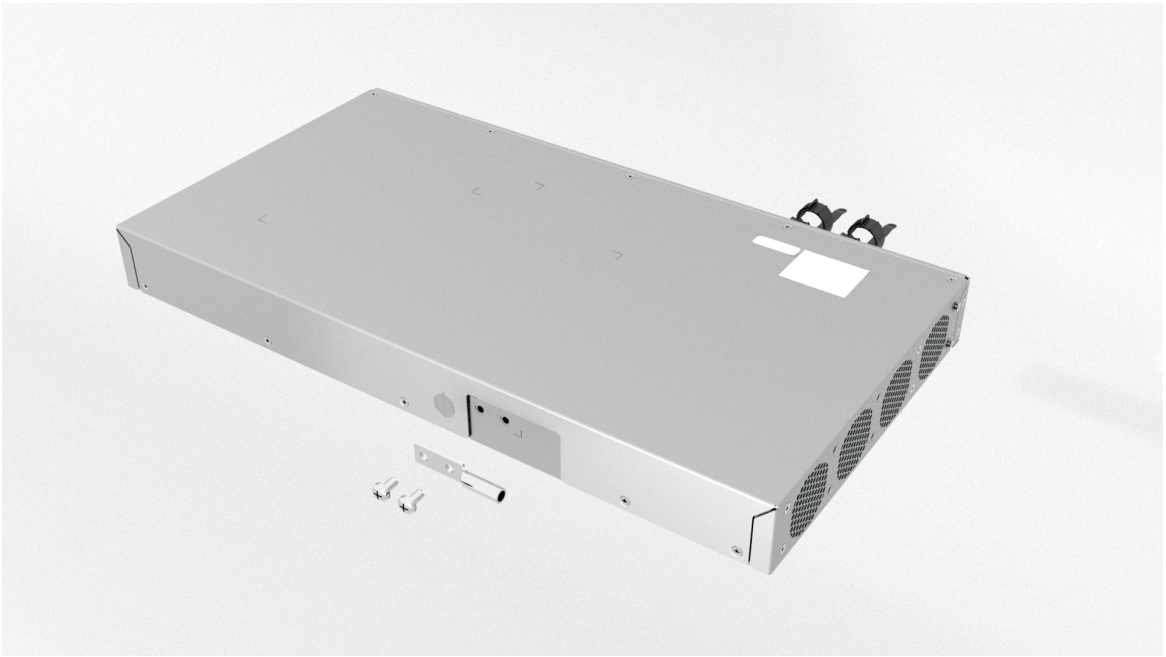
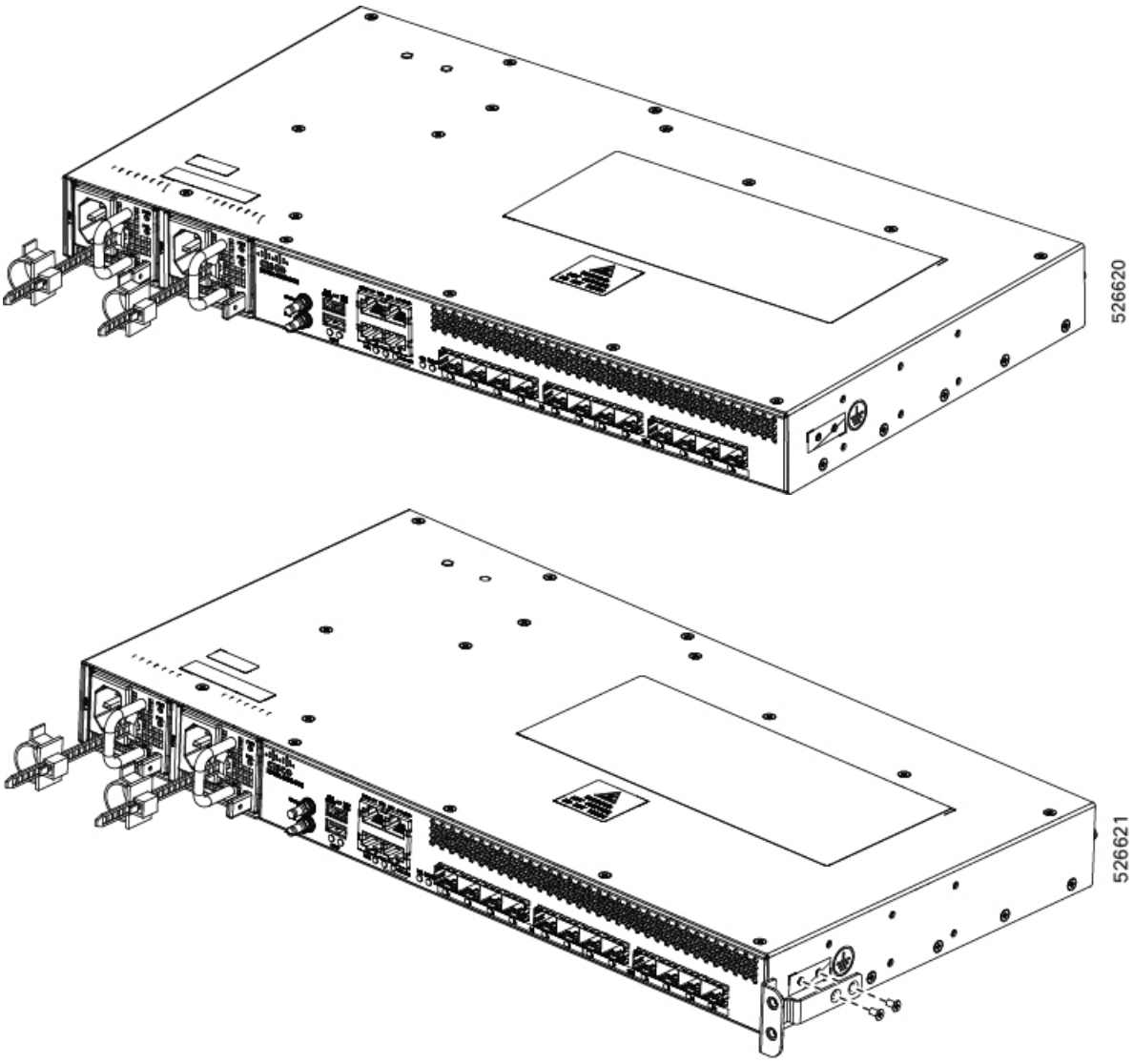
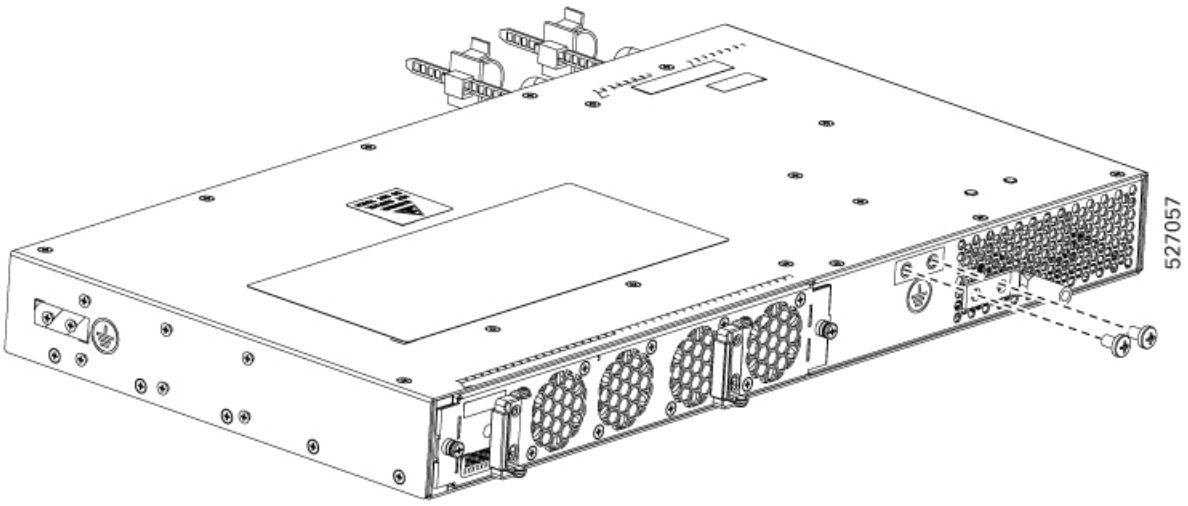


Figure 60: Installing Ground Lug on N540X-6Z6G-SYS



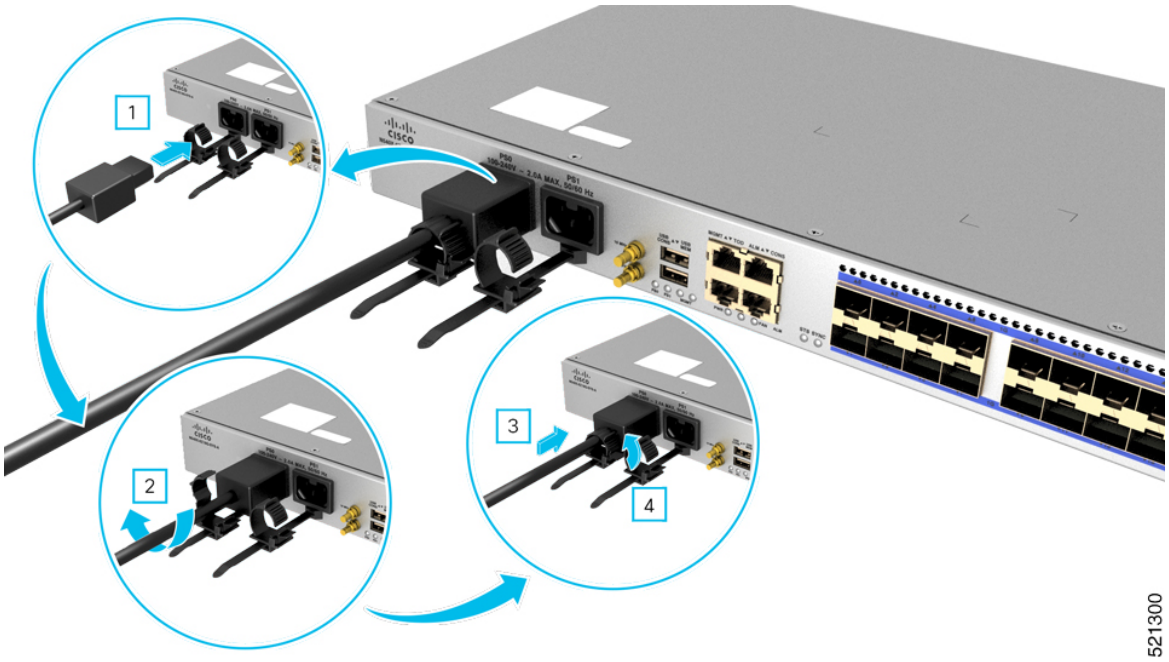


2. Attach one end of the shelf ground cable (No. 6 AWG cable) to the ground point on the rear of the router using the specified dual-hole lug connector.
   a. Use a wire-stripping tool to remove approximately 0.75 inches (19 mm) of the covering from the end of the grounding cable.
   b. Insert the stripped end of the grounding cable into the open end of the grounding lug.
   c. Use the crimping tool to secure the grounding cable in the grounding lug.
   d. Remove the adhesive label from the grounding pad on the chassis.
   e. Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two #10-32 pan head Phillips screws with washers through the holes in the grounding lug and into the grounding pad.
   f. Ensure that the lug and cable do not interfere with other equipment.
   g. Prepare the other end of the grounding cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.

Install the AC Power Cables

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

1. Plug the power supply cord in to the power supply module.
2. Wrap the tie around the power supply cord.
3. Ensure that the power supply cord is secured to the power supply module.
4. Tighten the tie around the power supply cord as shown.



Note These images are for only representation purposes. Certain variants of Cisco NCS 540 routers don't include a tie for the power supply cord.

Activate an AC Power Supply Module

Perform the following procedure to activate an AC power supply:

1. Plug the power cord into the power supply.
2. Connect the other end of the power cord to an AC-input power source.
3. Verify power supply operation by checking if the respective power supply front panel LED (PS0 or PS1) is green.
4. If the LEDs indicate a power problem, see *Troubleshooting* for troubleshooting information.
5. If you are also connecting a redundant AC power supply, repeat these steps for the second power source.

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

The operating voltage range is 90V-265VAC, 50/60Hz.

Install the DC Power Cables

Note When installing DC power supply, use 14AWG for longer cables and 14-16AWG for shorter cables, 90°C temperature rated cable. The recommended cable length is three meters maximum from source.

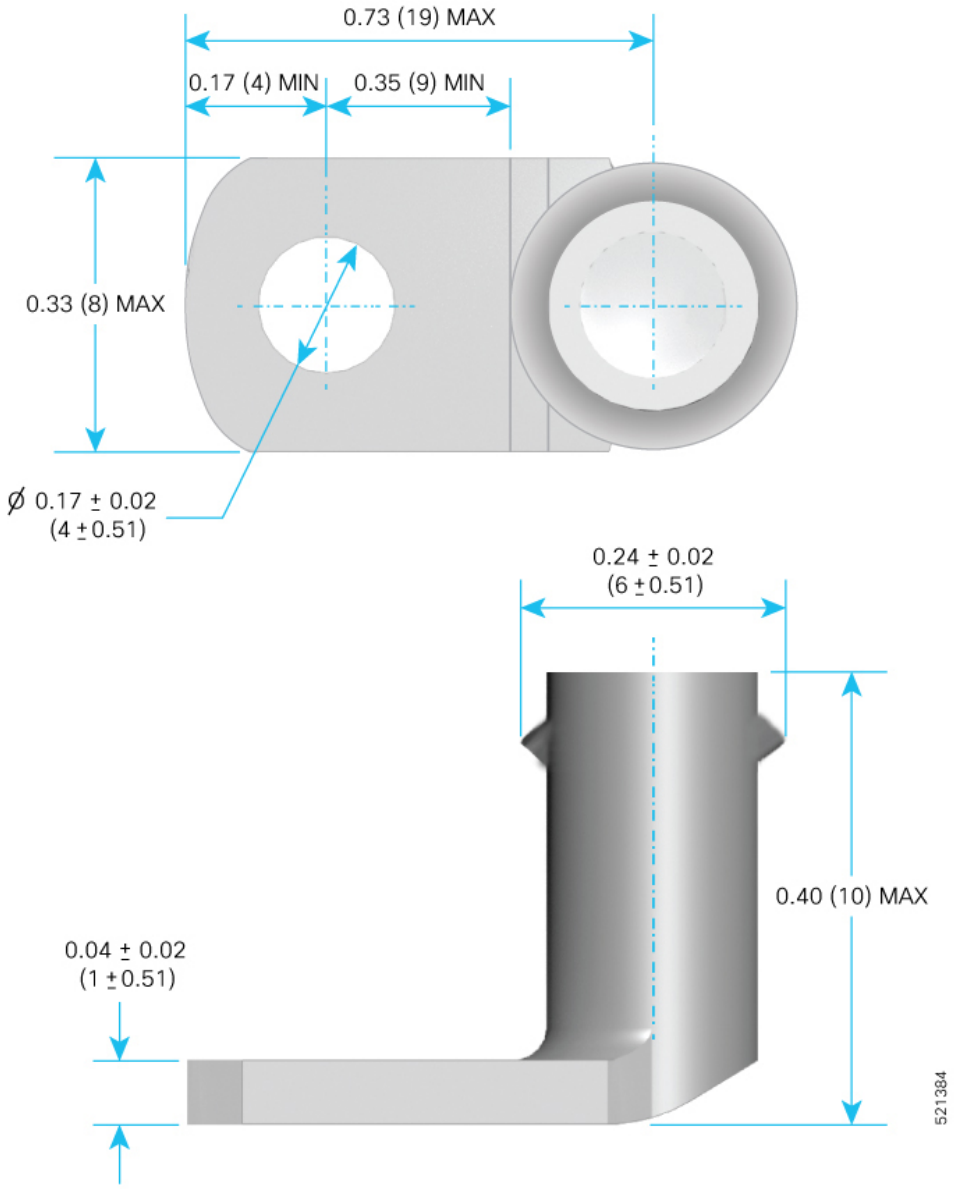
Note

- Always ensure that the building's installation for short-circuit (overcurrent) protection does not exceed 15A.
- We recommend you to use a circuit breaker or a fast acting fuse with a maximum DC rating, based on the router variants for over current protection.

Table 14: Main Circuit Breaker Power Ratings

Router	DC Power Rating
• N540X-6Z18G-SYS-D • N540X-8Z16G-SYS-D • N540X-4Z14G2Q-D	10A
• N540-6Z18G-SYS-D • N540X-6Z6G-SYS	6A

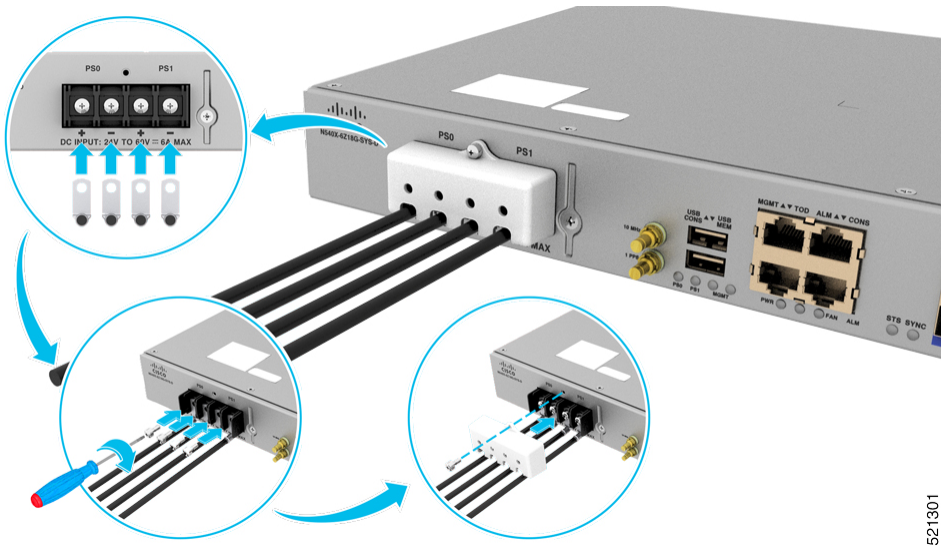
Figure 61: DC Connector with In built Screw



To attach the DC power supplies:

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

Figure 62: Attach the DC Power Supply Wires



Activate a DC Power Supply Module

Perform the following procedure to activate a DC power supply:

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

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

The operating voltage range is -20V to -72VDC.

Port Connection Guidelines

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

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

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers. The router is typically grounded during installation and provides an ESD port to which you can connect your wrist strap.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.

- Keep the transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and to prevent damage to the connectors. Attenuation (loss of light) is increased by contamination and should be kept below 0.35 dB.
  - Clean these parts before installation to prevent dust from scratching the fiber-optic cable ends.
  - Clean the connectors regularly; the required frequency for cleaning depends upon the environment. In addition, clean connectors when they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.
  - Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends under a microscope to determine if damage has occurred.



Note Keep unused ports covered with dust caps in order to protect them from dust and insects.

Connect to the Console Port

Before you begin:

- The router must be fully installed in its rack, connected to a power source, and grounded.
- The necessary cabling for the console, management, and network connections must be available.
  - An RJ-45 rollover cable and DB9F/RJ-45 adapter.
  - Network cabling should already be routed to the location of the installed router.

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

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

The system console port is an RJ-45 receptacle for connecting a data terminal to perform the initial configuration of Cisco NCS 540 fixed-port chassis.

You can connect the router to the computer USB port using the following options:

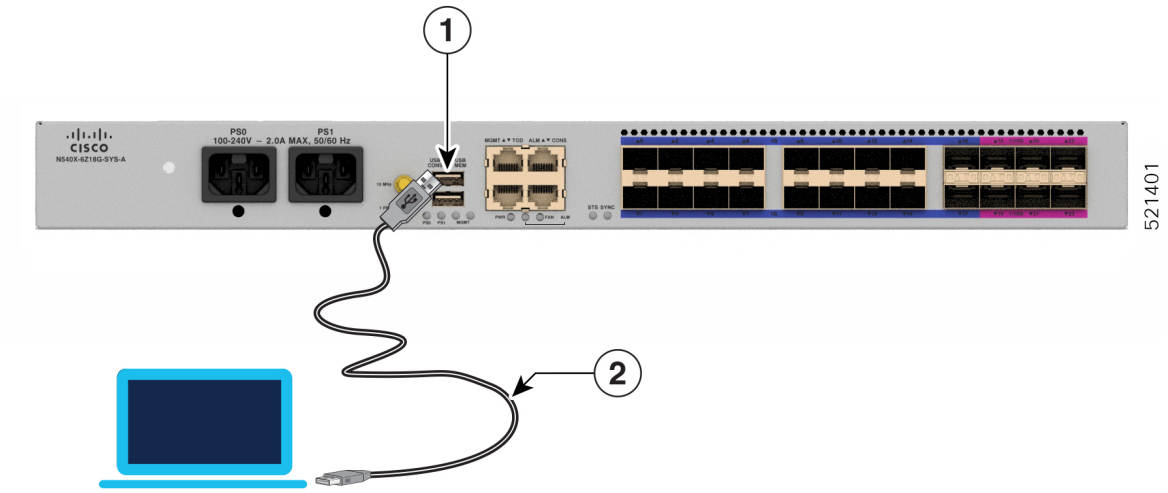
- **Connect Using USBA-A Cable**
  1. Use USBA-A cable to connect from the USB console port (USB CONS) on the router to the USB port of the computer.

2. The settings are the following:
    - Baud rate: 115200
    - Data: 8
    - Parity: none
    - Stop bit:1

Install the required driver from the following link:

https://www.maxlinear.com/product/interface/uarts/usb-uarts/xr21v1410

Figure 63: Connect Using USBA-A Cable



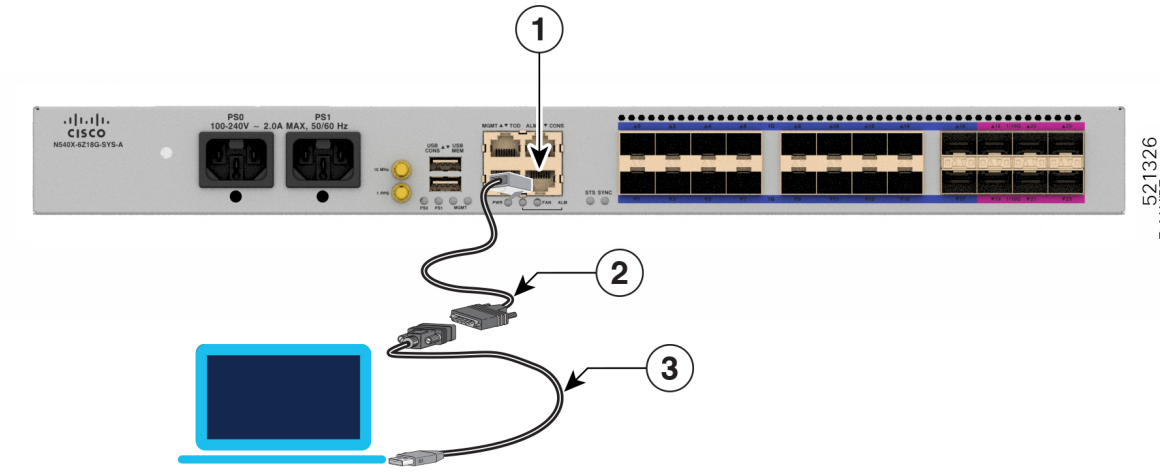
1	Console Port
2	USB Type-A console cable

- **Connect Using Console Port (CONS)**

  Use the console port (CONS) and the converter cable to connect the router to the computer. Use the converter cable in the following way:

  1. RJ-45 to DB-9 Female Connection - Connect the RJ-45 end of the cable to the router.
  2. DB-9 Male to USB - Connect the USB end to the computer.

- *Figure 64: Connecting the USB Console Cable to the Chassis*



1	RJ45 Port
2	Serial to RJ45 Console Adapter Cable
3	USB to Serial Interface Cable

Following table represents the RJ-45 cable pin-out information.

Table 15: RJ-45 Straight-through Cable Pin-outs

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

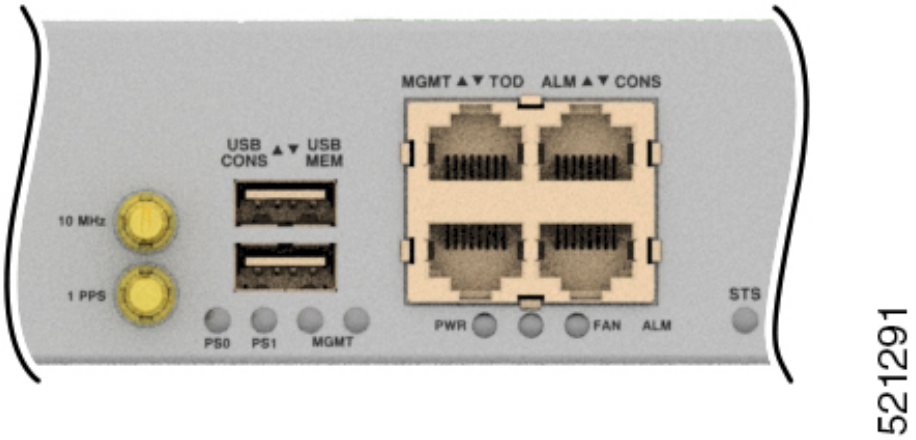
Connect to the Management Ethernet Port

You must complete the initial router configuration.

The management Ethernet port provides out-of-band management, which enables you to use the command-line interface (CLI) to manage the router by its IP address. This port uses a 10/100/1000 Ethernet connection with an RJ-45 interface.

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

To connect cables to the system management port, attach Category 5 cables directly to the RJ-45 receptacle on the management Ethernet port.



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

- Plug the cable directly into the RJ-45 receptacle.
- Connect the network end of your RJ-45 cable to a switch, hub, repeater, or other external equipment.

Connecting Timing Cables

The sections below describe how to connect timing cables to the Cisco NCS 540 Small Density Router.

Note The timing features are not applicable to Cisco N540-6Z18G-SYS-A/D router.

Connecting Cables to a GPS Interface

The following sections describe how to connect cables from the Cisco NCS 540 Small Density router to a GPS unit for input or output timing:

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

1. Connect one end of the mini-coax cable to the external GPS unit or any other equipment that is provided with stable 1PPS/10M reference input.

2. Connect the other end of the mini-coax cable to the 10-MHz or 1-PPS port on the front panel of the Cisco NCS 540 Small Density router.

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

1. Connect one end of the mini-coax cable to the external unit. The external unit can be measuring unit or any other unit that requires 1PPS/10M refernce.
2. Connect the other end of the mini-coax cable to the 10-MHz or 1-PPS port on the front panel of the Cisco NCS 540 Small Density router, which is configured as 1588 secondary mode or boundary clock mode.

Connecting a Cable to the ToD Interface

1. Connect one end of a straight-through Ethernet cable to the GPS unit.
2. Connect the other end of the straight-through Ethernet cable to the ToD or 1-PPS port on the router of the Cisco NCS 540 Small Density router.

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 metallically 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 metallically to OSP wiring.

Replace a fan tray from the N540X-6Z6G-SYS router

This section describes removing and replacing the fan tray on the N540X-6Z6G-SYS chassis.

The fan tray is positioned at the rear side of the chassis.

Note Ensure that you prepare the required items and then replace the fan tray within five minutes.

Caution When the router is operated without the fan tray for more than five minutes, then the chassis goes to shutdown. The complete power cycle is required to bring up the router again.

Before you begin

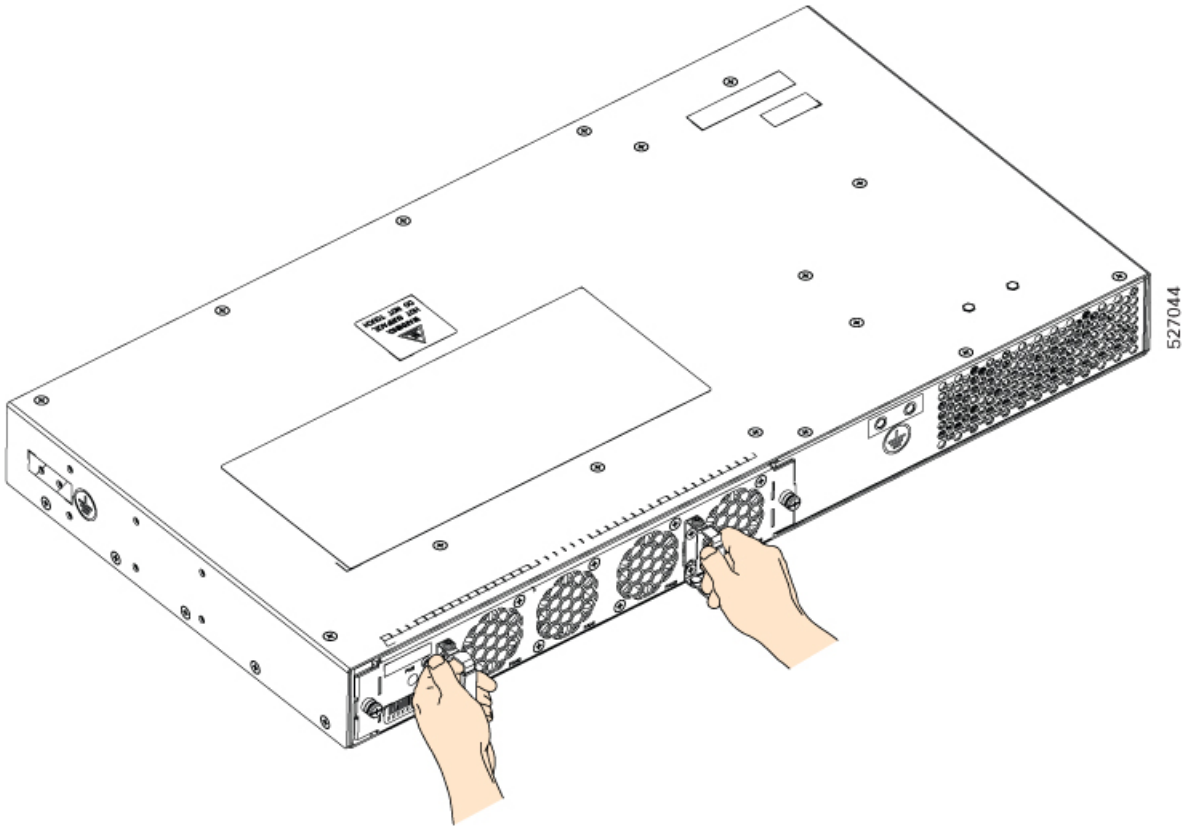
Ensure that there is a sufficient space available at the rear side of the router. Ensure that the operator should remove or replace the fan tray only from the rear side of the router to ensure proper alignment and safe insertion or removal of the fan tray.

Procedure

Step 1 Unfold the fan tray handle.

Step 2 Unscrew the captive thumbscrew at the front of the fan tray.

Figure 65: Fan tray installed in N540X-6Z6G-SYS chassis

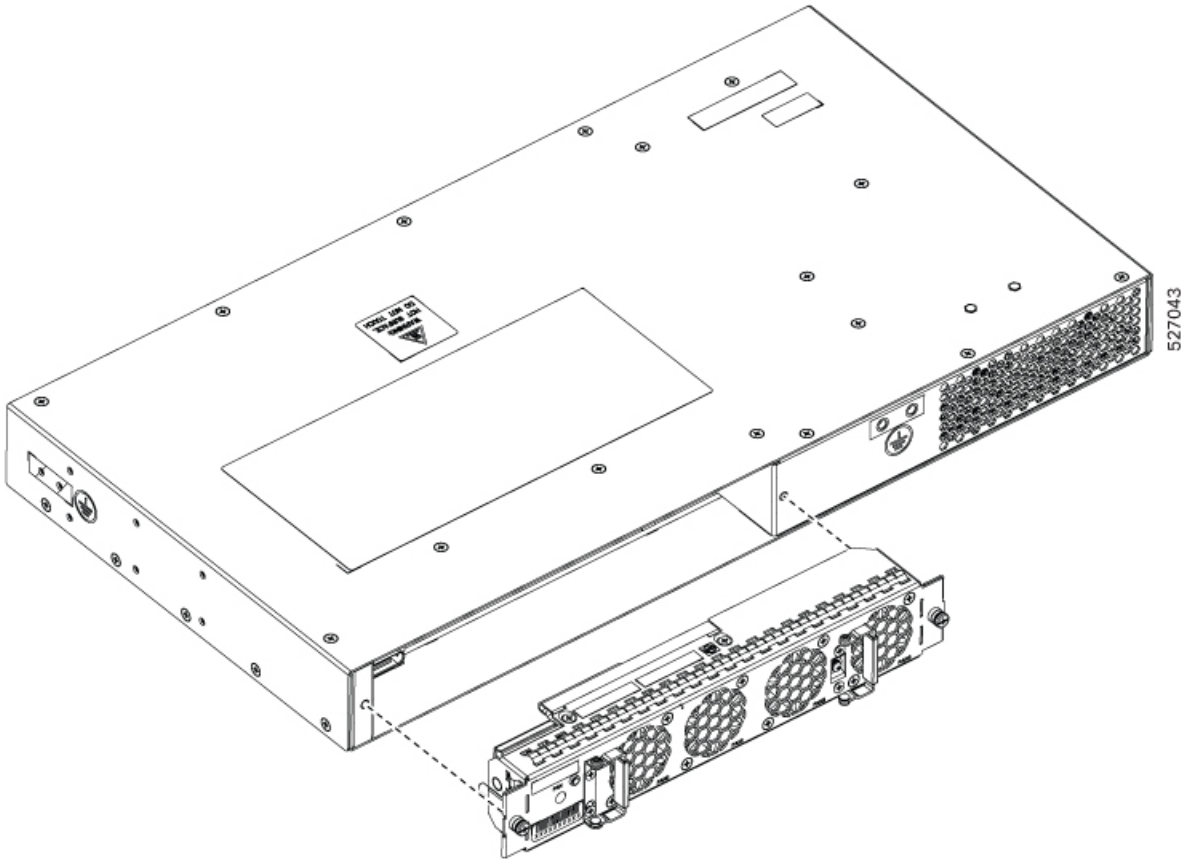


Step 3 Pull the fan tray module with equal proposition on both sides.

Caution
While removing, ensure that you do not touch fans as the blades will be rotating for some time. This ensures that the fan tray is removed completely from the chassis.

Step 4 To insert the fan try module into the slot, hold the fan module with the LED and PID label at the top.

Figure 66: Insert fan tray from the N540X-6Z6G-SYS chassis



Step 5 Align the fan module to the open fan tray slot in the chassis and insert the module gently all the way into the slot of the chassis.

Step 6 If the chassis is powered on, observe the LED in the fan tray is glowing in amber. If the LED is not glowing, then recheck the fan tray installation.

Step 7 Tighten the captive thumbscrew of the fan tray module into chassis.

Step 8 Verify that the fan tray module LED is green after fan speed stabilizes. If the LED is not green, one or more fans are faulty.

Install and Remove Transceiver Modules

Install and Remove SFP Modules

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

Warning **Statement 1051—**Laser Radiation

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

Caution Protect the router by inserting a clean SFP/SFP+ module cage cover, shown in the figure below, into the optical module cage when there is no SFP or SFP+ module installed.

Figure 67: SFP/SFP+ Module Cage Cover



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

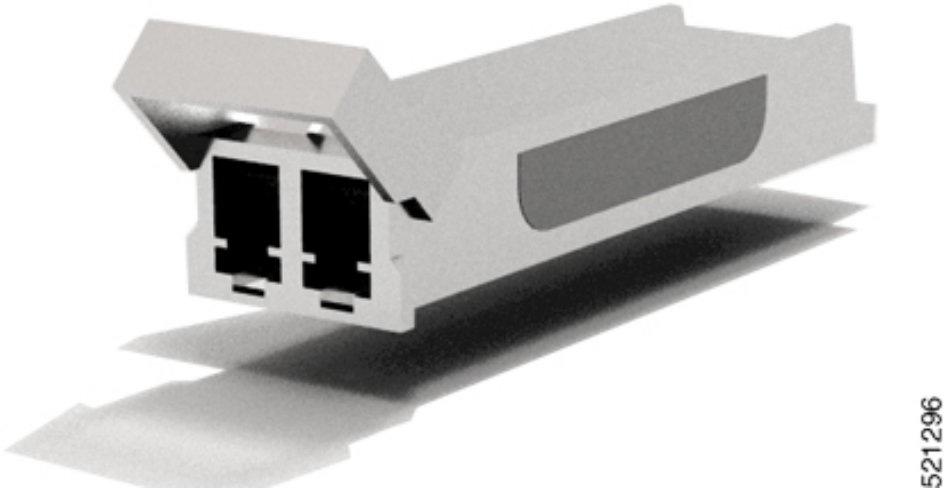
Caution We strongly recommended that you do not install or remove the SFP or SFP+ module with fiber-optic cables attached to it because of the potential of damaging the cable, the cable connector, or the optical interfaces in the module. Disconnect all cables before removing or installing an SFP or SFP+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

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

Bale Clasp SFP or SFP+ Module

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

Figure 68: Bale Clasp SFP or SFP+ Module

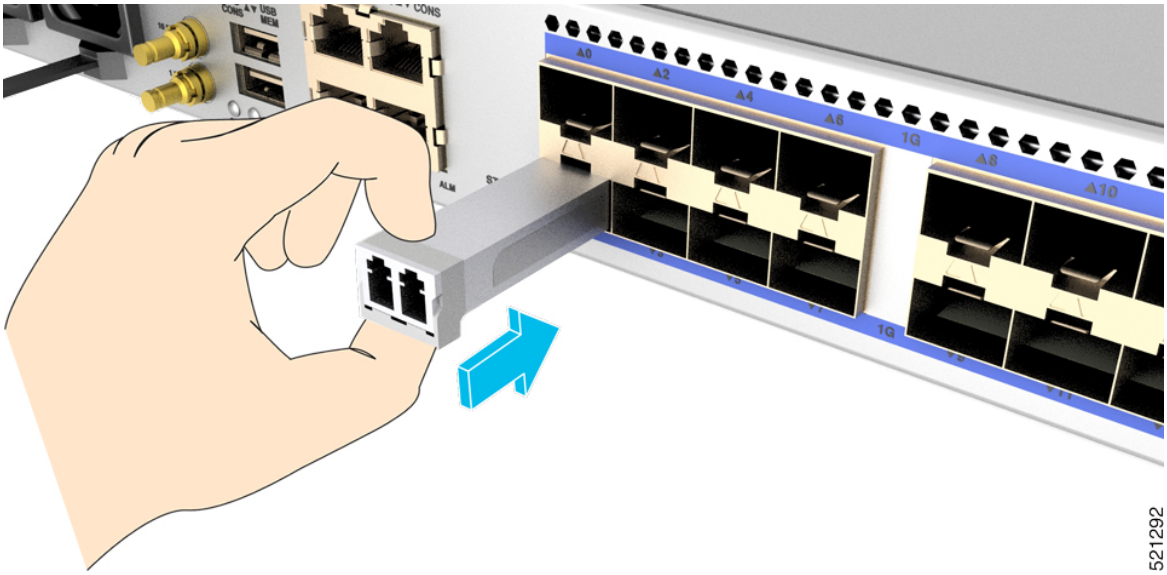


Install a Bale Clasp SFP or SFP+ Module

To install this type of SFP or SFP+ module, follow these steps:

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

Figure 69: Installing a Bale Clasp SFP Module into a Port



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

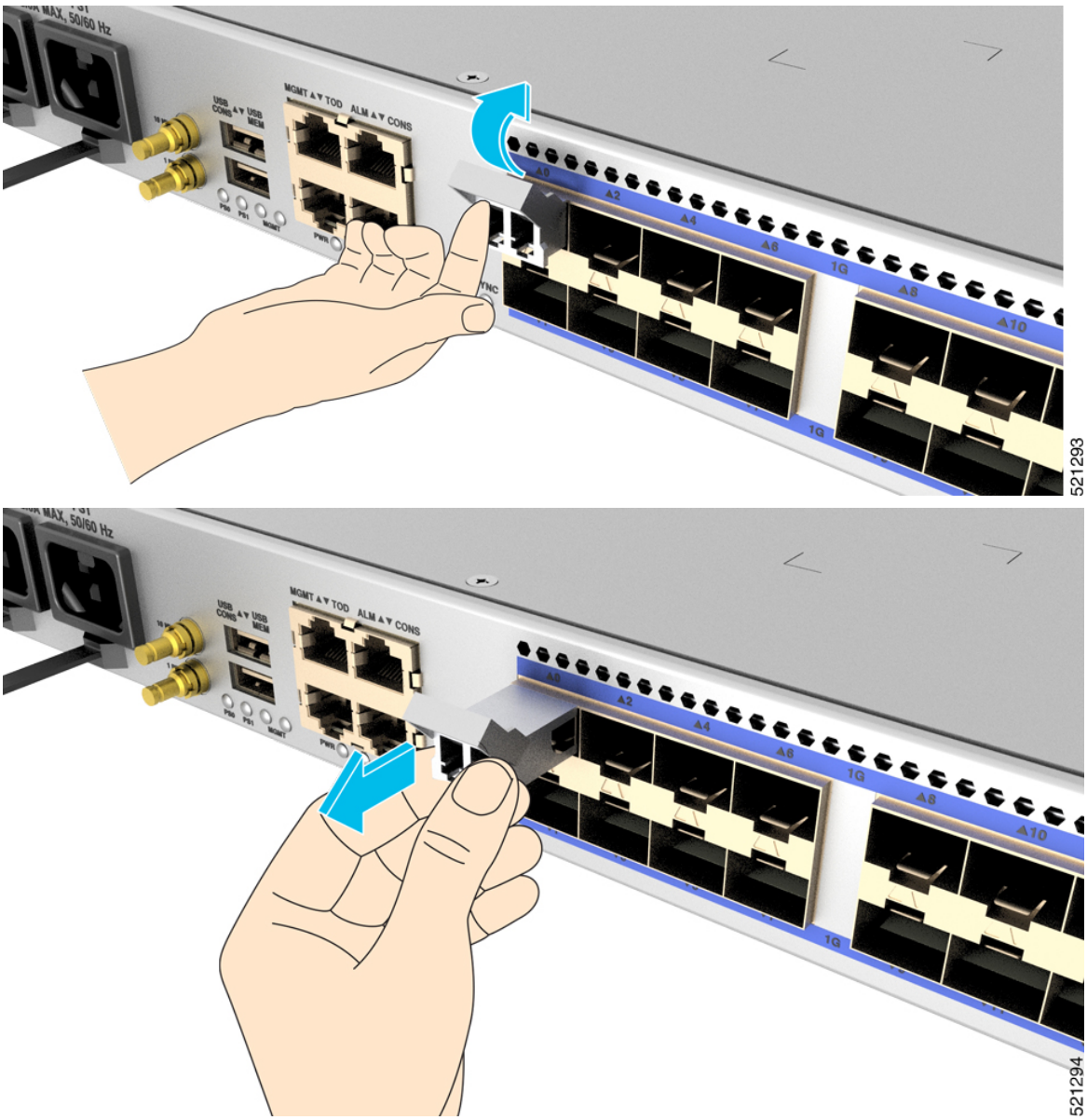
Remove a Bale Clasp SFP or SFP+ Module

To remove this type of SFP or SFP+ module, follow these steps:

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

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

Figure 70: Removing a Bale Clasp SFP or SFP+ Module



5. Place the SFP module that you removed on an antistatic mat, or immediately place it in a static shielding bag if you plan to return it to the factory.
6. Protect your router by inserting a clean SFP module cage covers into the optical module cage when there is no SFP module installed.

Connect Interface Ports

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

Connect a Fiber-Optic Port to the Network

Some transceivers work with fiber-optic cables that you attach to the transceivers and other transceivers work with pre-attached copper cables. When installing fiber-optic cables for a port, you must install SFP transceivers for 1-Gigabit optical ports or install SFP+ transceivers for 10-Gigabit optical ports before installing the fiber-optic cable in the transceivers.



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

Disconnect Optical Ports from the Network

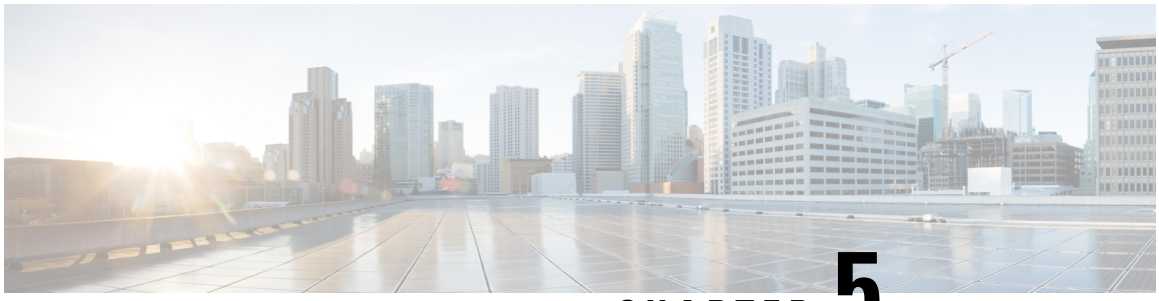
When you need to remove fiber-optic transceivers, you must first remove the fiber-optic cables from the transceiver before you remove the transceiver from the port.

Maintain Transceivers and Optical Cables

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

Consider the following maintenance guidelines:

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



CHAPTER 5

Appendix

Certain troubleshooting aids of the Cisco NCS 540 enable you to perform these tasks that assist the troubleshooting process:

- LEDs, on page 87
- System Specifications, on page 90

LEDs

Note The Cisco NCS 540 Router LEDs are similar for most of the variants, and any differences between the routers are specifically called out.

Router LEDs

All the data port LEDs in the Cisco NCS 540 Router are at the front panel. There are five LEDs that reflect the different statuses of the system.

Table 16: Router LED Descriptions

LED Label	Color	Status
PS0 and PS1	Off	This indicates that there is no AC or DC input.
	Red	This indicates 12V output failure. If one of the input feeds is switched off when both the feeds are connected, then that particular feed shows as red.
	Green	This indicates 12V output is active.

LED Label	Color	Status
STS	Off	the system is placed in shutdown mode; only standby power mode is available.
	Flashing Amber (Slow)	The module is booting up.
	Flashing Amber (Fast)	The module is booting up, shutting down, or is being reloaded.
	Amber	Host kernel is booted and is ready to start SysAdmin VM.
	Green	The module is operational and has no active major or critical alarms.
	Flashing Red	The router has active major or critical alarms.
ALM	Off	No alarm
	Red	Critical alarm - system scope, critical temperature
	Flashing Red	Critical alarm - Relating to voltage rail failures
	Amber	Major alarm - system-scope
	Flashing Amber	Minor alarm - system-scope
SYNC	Off	Time core clock synchronization is disabled or in free-running state.
	Green	Time core is synchronized to an external source including IEEE1588.
	Flashing Green	System is in Synchronous Ethernet mode.
	Amber	Acquiring state or Holdover: Time core is in acquiring state or holdover mode.

Fan Assembly LEDs

Table 17: Fan Assembly LEDs

LED Label	Color	Status
FAN	Off	Sytem is powered off.
	Green	Fans are operating normally.
	Amber	Single fan failure
	Red	More than one fan failure

Power Status LEDs

Table 18: Power Status LEDs

LED Label	Color	Status
PWR	Off	Sytem is powered off
	Green	All the power supplies are on and operating normally.
	Amber	Standby FPGA upgrade is in progress (this is expected to take about three to five minutes).
	Red	Power redundancy is lost due to a power feed failure or an internal power supply failure.

Combination of LEDs

Table 19: Fan and Power Status LED Combination

FAN	PWR	Status
For all the conditions below, the system will not boot.		
Flashing Red	Flashing Red	Thermal shutdown at Power Up
Flashing Red	Flashing Amber	MSS Ready Failure
Flashing Amber	Flashing Green	TAM Init Failure
Flashing Amber	Flashing Red	TAM Ready Failure
Flashing Amber	Flashing Amber	Secure JTAG Failure

SFP and SFP+ Port LED

Table 20: SFP and SFP+ Port LEDs

LED Label	Color	Status
STATUS	Off	Admin is down
	Green	Link is up in 1G/10G ports.
	Yellow	Fault or Error or Link Down

Management Port LEDs

Table 21: Management Port LEDs

LED Label	Color	Status
Left LED	Green	Link is up in 1000 Mbps
	Blinking Green	Activity in 1000 Mbps
	Amber or Orange	Link is up in 100/10Mbps
	Blinking Amber or Orange	Activity in 100/10Mbps
	Off	Link is down
Right LED	Off	Unused

System Specifications

Certain troubleshooting aids of the Cisco NCS 540 enable you to perform these tasks that assist the troubleshooting process:

Weight and Power Consumption

For information on physical specifications and power consumption, see table *Cisco NCS 540 chassis specification* on the Cisco Network Convergence System 540 Small Density Router Data Sheet.

Environmental Specifications

For information on environmental specifications, see table *Environmental properties for NCS 540 fixed systems* on the Cisco Network Convergence System 540 Small Density Router Data Sheet.

Thermal limitations

This table describes the maximum operating temperature range supported for the NCS 540 chassis when using specific optics modules, identified by their product IDs (PIDs). It details:

- Optics module: The model of the optics module.
- Chassis PID: The specific chassis or system product IDs that support these optics modules.
- System maximum and minimum operating temperature supported at MSL: Maximum operating temperature supported by the NCS 540 system at Mean Sea Level (MSL).
- Ports supported: The specific ports on the chassis where the optics modules can be installed.

Table 22: Thermal limitations

Optics module	Chassis PID	Maxiimum operating temperature at MSL	Ports supported
S10G-LR-PM-D-I	• N540X-8Z16G-SYS-A/D • N540-6Z18G-SYS-A/D • N540X-6Z18G-SYS-A/D	• +55C	• P24 to P31 • P18 to P23 • P18 to P23
S10G-SR-PM-D-I	• N540X-8Z16G-SYS-A/D • N540-6Z18G-SYS-A/D • N540X-6Z18G-SYS-A/D	• +55C	• P24 to P31 • P18 to P23 • P18 to P23
S10G-ER-PM-D-I	• N540X-8Z16G-SYS-A/D • N540-6Z18G-SYS-A/D • N540X-6Z18G-SYS-A/D	• +45C	• P24 to P31 • P18 to P23 • P18 to P23

EMC compliance

This table describes the maximum number of ports supported on various NCS 540 small density router models when using specific optics modules. It details:

- Optics module: The model of the optics module.
- Chassis PID: The specific chassis or system product IDs that support these optics modules.
- Maximum number of supported ports: Refers to the highest number of ports on a chassis that can be supported to meet electromagnetic compatibility (EMC) and electromagnetic interference (EMI) compliance.

Table 23: EMC compliance

Optics module	Chassis PID	Maximum number of supported ports
S10G-LR-PM-D-I	• N540X-8Z16G-SYS-A/D • N540-6Z18G-SYS-A/D • N540X-6Z18G-SYS-A/D	6
S10G-SR-PM-D-I	• N540X-8Z16G-SYS-A/D • N540-6Z18G-SYS-A/D • N540X-6Z18G-SYS-A/D	6
S10G-ER-PM-D-I	• N540X-8Z16G-SYS-A/D • N540-6Z18G-SYS-A/D • N540X-6Z18G-SYS-A/D	6

RJ45 Connectors

The RJ45 connector connects Category 3, Category 5, Category 5e, Category 6, or Category 6A foil twisted-pair or unshielded twisted-pair cable from the external network to the following module interface connectors:

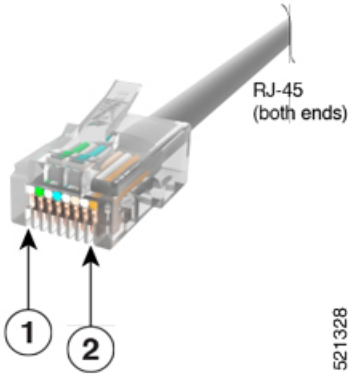
- Router chassis
  - CONSOLE port
  - MGMT ETH port



Caution To comply with GR-1089 intrabuilding, lightning immunity requirements, you must use a foil twisted-pair (FTP) cable that is properly grounded at both ends.

The following figure shows the RJ45 connector.

Figure 71: RJ45 Connector



1	Transmit data (bidirectional)
2	NC (Not Connected)

Transceiver and Cable Specifications

To determine which transceivers and cables are supported by this router, see Cisco Transceiver Modules Compatibility Information.

To see the transceiver specifications and installation information, see Cisco Transceiver Modules Install and Upgrade Guides.

RJ-45 ToD or 1-PPS Port Pinouts

Note This section is not applicable to Cisco N540-6Z18G-SYS-A/D router.

This summarizes the RJ-45 ToD or 1-PPS port pinouts:

Table 24: RJ-45 ToD or 1-PPS Port Pinouts

Pin	Signal Name	Direction	Description
1	NA	NA	NA
2	NA	NA	NA
3	1PPS_N	Output or Input	1PPS RS422 signal
4	GND	NA	NA
5	GND	NA	NA
6	1PPS_P	Output or Input	1PPS RS422 signal
7	TOD_N	Output or Input	Time-of-Day character

Pin	Signal Name	Direction	Description
8	TOD_P	Output or Input	Time-of-Day character

Console Port Pinouts

This summarizes the Console port pinouts:

Table 25: Console Port Pinouts

Pin	Signal Name	Direction	Description
1	ACONS-TX	Output	Aux Consoles transmit output, RS232
2	NC	NA	NA
3	CONS-TX	Output	Console RS232 transmit
4	GND	NA	Ground
5	GND	NA	Ground
6	CONS-RX	Input	Console RS232 receive
7	ACONS-RX	Input	Aux Consoles receive input, RS232
8	NC	NA	NA

Alarm Port Pinouts

This summarizes the alarm port pinouts:

Table 26: Alarm Port Pinouts

Pin	Signal Name	Description
1	ALARM1_IN	Alarm input 1
2	ALARM2_IN	Alarm input 2
3	NC	NA
4	ALARM3_IN	Alarm input 3
5	ALARM4_IN	Alarm input 4
6	NC	NA
7	NC	NA
8	ALARM_I_COMMON	Alarm input COM

To set the description of the alarm:

```
RP/0/RP0/CPU0:ios(config)# environment alarm-contact contact-number description
description
```

To set the severity of the alarm:

```
RP/0/RP0/CPU0:ios(config)# environment alarm-contact contact-number severity
[critical | major | minor] [
```

To set the trigger for the alarm:

```
RP/0/RP0/CPU0:ios(config)# environment alarm-contact contact-number trigger [open
 | closed]
```



Note You can configure up to four external alarms.

The *contact-number* is the pin number of the connected alarm port, that is Alarm input 1 to Alarm input 4.

The **description** string can be up to 80 alphanumeric characters in length and is included in any generated system messages.

For **severity**, enter any one of: **critical**, **major**, or **minor**.

Description and severity are both mandatory values.

Use the **show alarms** command in admin mode to view the alarm details. Use the **show logging** command to view the displays the state of syslog error and event logging.

An SNMP trap is sent for every external alarm that is raised or cleared on the system.

USB Port Console Pinouts

This table summarizes the USB port console pinouts:

Table 27: USB Port Console Pinouts

Pin	Signal Name	Description
A1	VCC	+5 VDC
A2	D–	Data–
A3	D+	Data+
A4	GND	Ground

USB Port Memory Pinouts

This table summarizes the USB port memory pinouts:

Table 28: USB Port Memory Pinouts

Pin	Signal Name	Description
A1	VCC	+5 VDC
A2	D–	Data–
A3	D+	Data+
A4	GND	Ground

Management Ethernet Port Pinouts

This table summarizes the management ethernet port pinouts:

Table 29: Management Ethernet Port Pinouts

Pin	Signal Name
1	TRP0+
2	TRP0–
3	TRP1+
4	TRP2+
5	TRP2–
6	TRP1–
7	TRP3+
8	TRP3–

GPS Port Pinouts

The table below summarizes the GPS port pinouts.



Note This section does not apply to Cisco N540-6Z18G-SYS-A/D router.

Table 30: GPS Port Pinouts

Category	10 MHz (Input and Output)	1PPS (Input and Output)
Waveform	Input—Sine wave Output—Sine wave	Input—Rectangular pulse Output—Rectangular pulse

Category	10 MHz (Input and Output)	1PPS (Input and Output)
Amplitude	Input— > 1.7 volts p-p Output— > 2.2 volts p-p	Input— > 1.2V Output— > 2.5V
Impedance	50 ohms	50 ohms
Pulse Width	50% duty cycle	50% duty cycle
Rise Time	Input—AC coupled	Output—5 nanoseconds

AC Power Cord Specifications

For more information on the supported power cables, see *Ordering information for power cables supported on NCS 540* on the Cisco Network Convergence System 540 Small Density Router Data Sheet.