

Cisco ASR-920-12SZ-IM and ASR-920-U-12SZ-IM Aggregation Services Router Hardware Installation Guide

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CONTENTS

CHAPTER 1

Overview 1

- Cisco ASR 920 Router Features 1
- Interface Modules 2
  - 8-Port 1 Gigabit Ethernet RJ45 Interface Module (A900-IMA8T) 2
  - 8-Port 1 Gigabit Ethernet SFP Interface Module (A900-IMA8S) 3
  - 8-port T1/E1 Interface Module (A900-IMA8D) 4
  - 16-Port T1/E1 Interface Module (A900-IMA16D) 4
  - 32-Port T1/E1 Interface Module (A900-IMA32D) 5
  - 1-Port 10 Gigabit Ethernet XFP Interface Module (A900-IMA1X) 5
  - 2-Port 10 Gigabit Ethernet SFP+ Interface Module (A900-IMA2Z) 6
  - 8-Port 1 Gigabit Ethernet + 1-Port 10 Gigabit Ethernet SFP+ Combination Interface Module (A900-IMA8T1Z) 6
  - 8-Port 1 Gigabit Ethernet SFP with 1-Port 10 Gigabit Ethernet Combination Interface Module (A900-IMA8S1Z) 7
  - 8-Port 1 Gigabit Ethernet SFP with 1-Port 10 Gigabit Ethernet Combination Interface Module (A900-IMA8S1Z) 8
- 4-Port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module (A900-IMA4OS) 8
- GigabitEthernet Copper Ports 9
- GE SFP Ports 9
- SFP+ Ports 10
- External Interfaces 14
  - Network Interfaces 14
  - Network Timing Interfaces 14
  - External Alarm Inputs 15
  - Management Interfaces 15
    - Management ENET Port 15
    - RS232 Console Port 15

USB Console 15
USB Mass Storage 16
Zero Touch Provisioning Button 16
RS232 Auxiliary Console Port 16
Power Supply 16
Redundancy 18
LED Indicators 18
PWR and STAT LEDs 18
CPU Management Port LEDs 19
SFP LEDs 20
SFP+ LEDs 20
RJ-45 LEDs 21
G.703/FXS/FXO Interface Module LEDs 21
Power Supply Unit LEDs 22
System–Interface LED Behavior 22
Fan Tray LEDs 23
Online Insertion and Removal 23
Perform safe OIR of interface modules 24
Licensing 24

CHAPTER 2 **Preparing for Installation** 27
Safety Guidelines 27
Safety Warning Statements 28
Safety Guidelines for Personal Safety and Equipment Protection 29
Safety Precautions for Module Installation and Removal 29
Safety with Electricity 29
Power Supply Considerations 30
Preventing ESD Damage 30
Site Planning 31
General Precautions 31
Site Planning Checklist 31
Site Selection Guidelines 32
Environmental Requirements 32
Physical Characteristics 32

Air Flow Guidelines 32
Air Flow Guidelines for ETSI Rack Installation 34
Floor Loading Considerations 34
Site Power Guidelines 34
Electrical Circuit Requirements 35
Site Cabling Guidelines 35
Asynchronous Terminal Connections 36
Interference Considerations 36
Electromagnetic Interference 36
Radio Frequency Interference 36
Lightning and AC Power Fault Interference 37
Rack-Mounting Guidelines 37
Precautions for Rack-Mounting 37
Rack Selection Guidelines 37
Equipment Rack Guidelines 38
Installation Checklist 39
Creating a Site Log 40
Chassis-Lifting Guidelines 40
Tools and Equipment 41
Unpacking and Verifying the Shipped Contents 41

CHAPTER 3 **Installing the Cisco ASR 920 Series Router** 43
Prerequisites 43
Installing the Router in a Rack 44
Attaching Brackets to the Router 44
Attaching Brackets for 19-Inch Racks 45
Attaching Brackets for 23-Inch Racks 47
Attaching Brackets for ETSI Racks 48
Mounting the Router in a Rack 49
Installing the Router Chassis in the Rack 49
Attaching the Cable Guides 50
Wall Mounting the Router 52
Attaching the Brackets to the Router for Wall-Mounting 52
Mounting Router on the Wall 53

Installing and Removing SFP Modules 55
Installing SFP Modules 55
Removing SFP Modules 56
Connecting to the Copper Ports 57
Connecting to SFP Modules 58
Connecting to Fiber-Optic SFP Modules 58
Installing the Chassis Ground Connection 59
Installing and Removing the Fan Tray 61
Installing the Fan Tray 61
Removing the Fan Tray 62
Interface Module Installation 64
Installing an Interface Module 64
Removing an Interface Module 64
Installing Patch Panel 64
Install 3G Patch Panel 74
Install Rack Brackets 74
Set up 3G Patch Panel on Rack 82
Wall Mount 3G Patch Panel 94
Patch Panel Dimensions 96
Patch Panel Pinout 100
Panel and Bracket 101
Installing the Power Supply 101
Power Connection Guidelines 102
Guidelines for DC-Powered Systems 102
Guidelines for AC-Powered Systems 103
Preventing Power Loss 103
Installing the DC Power Supply Module 103
Activate a DC Power Supply Module 104
Install the DC Power Cables 105
Removing the DC Power Supply Module 106
Installing the AC Power Supply Module 108
Install the AC Power Cables 109
Activate an AC Power Supply Module 110
Removing the AC Power Supply Module 111

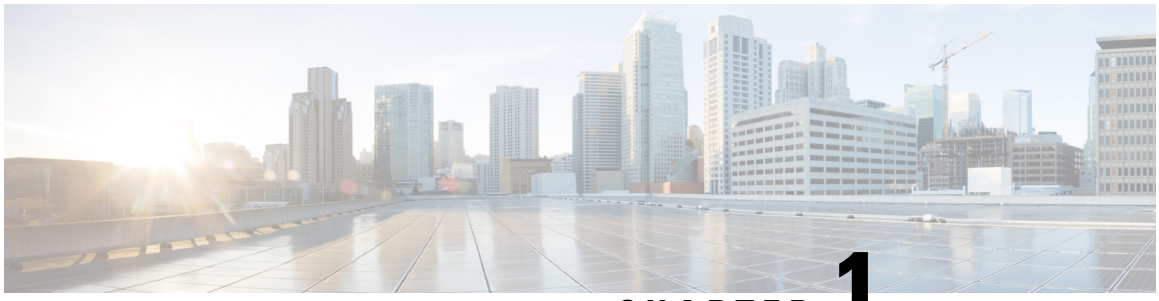
Powering On the Router 112
Connecting the Router to the Network 112
Connecting Console Cables 113
Connecting to the USB Serial Port Using Microsoft Windows 113
Connecting to the Console Port Using Mac OS X 113
Connecting to the Console Port Using Linux 114
Installing the Cisco USB Device Driver 114
Uninstalling the Cisco USB Driver 116
Connecting to the EIA Console Port 117
Connecting a Management Ethernet Cable 118
Installing and Removing SFP and SFP+ Modules 118
Connecting a USB Flash Device 119
Removing a USB Flash Device 119
Connecting Timing Cables 120
Connecting Cables to a GPS Interface 120
Connecting Ethernet Cables 121
Connecting Cables to SFP Modules 122
Connector and Cable Specifications 122

CHAPTER 4 **Initial Configuration** 123
Checking Conditions Prior to System Startup 123
Powering Up the Router 123
Verifying the Front Panel LEDs 124
Verifying the Hardware Configuration 124
Checking Hardware and Software Compatibility 124
Configuring the Router at Startup 125
Accessing the CLI Using the Console 125
Configuring Global Parameters 126
Checking the Running Configuration Settings 126
Saving the Running Configuration to NVRAM 127
Safely Powering Off the Router 127

CHAPTER 5 **Troubleshooting** 129
Pinouts 129

GPS Port Pinouts 129
Time-of-Day Port Pinouts 129
Alarm Port Pinouts 130
Management GigabitEthernet Port Pinouts 131
USB Console Port Pinouts 131
USB Flash or MEM Port Pinouts 132
Optical Fiber Specifications 132
Alarm Conditions 132
G.703/FXS/FXO Interface Module Pinout 133
LED Summary 134
Power Supply LEDs 134
Fan Tray LEDs 134

CHAPTER 6 Site Log 135



CHAPTER 1

Overview

Note The Cisco ASR-920-12SZ-IM and Cisco ASR-920U-12SZ-IM are collectively referred to as the Cisco ASR-920-12SZ-IM Router in this document. Any differences between the routers are specifically called out.

The Cisco ASR 920 Series Aggregation Services Router is a family of fixed configuration routers that provides common network architecture to the Service Providers for macro and small cell networks.

This router acts as an access device for mobile backhaul services—macro Cell Site Router (CSR) and Small Cell Router (SCR). As an access device, it provides capabilities like 1GE/10GE, MPLS, H-QoS, Services, GPS clocking, PoE and fit within ETSI 300 mm depth cabinet. It can easily be integrated into the Unified MPLS for Mobile Transport (UMMT) and Fixed Mobile Convergence (FMC) solution.

- Cisco ASR 920 Router Features, on page 1
- Interface Modules, on page 2
- 4-Port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module (A900-IMA4OS), on page 8
- GigabitEthernet Copper Ports, on page 9
- GE SFP Ports, on page 9
- SFP+ Ports, on page 10
- External Interfaces, on page 14

Cisco ASR 920 Router Features

The router provides 1GE/10GE, MPLS, H-QoS, high availability hardware design, advanced Ethernet Operations, Administration, and Maintenance (OAM), as well as advanced timing support, including satellite timing (GNSS) based clocking, and PoE in one platform.

- ASR-920-12SZ-IM—This router has fixed Ethernet interfaces (8x1G copper + 4x1G SFP + 4x10G/1G (dual rate)
- ASR-920-12SZ-IM-CC—Has the same specifications as the above variant. However, this chassis is coated with an acrylic-based material to help improve the reliability against air-borne contamination.

The following table provides snapshot of the number and type of supported ports:

ASR 920 Sub-family	1 GE Port	Dual Rate 1G/10G Port	Type of 1 GE Port
ASR-920-12SZ-IM, ASR-920-12SZ-IM-CC	12	4[1] Te0/0/12 – Te 0/0/15	8 Cu ports Ge0/0/0 – Ge0/0/7 4 SFP ports Ge0/0/8 – Ge0/0/11

[1] Each port can operate at either 1G or 10G, and operates in a mutually exclusive way. You cannot insert both 1G and 10G together. If you insert IG IMs (A900-IMA8T1Z, A900-IMA8S1Z, A900-IMA8T, A900-IMA8S), the dual rate port would support only 10G.

Interface Modules

The Cisco ASR-920-12SZ-IM and ASR-920-U-12SZ-IM router interface modules are field-replaceable units. In addition to the ports provided on an RSP, the router supports the following interface modules:

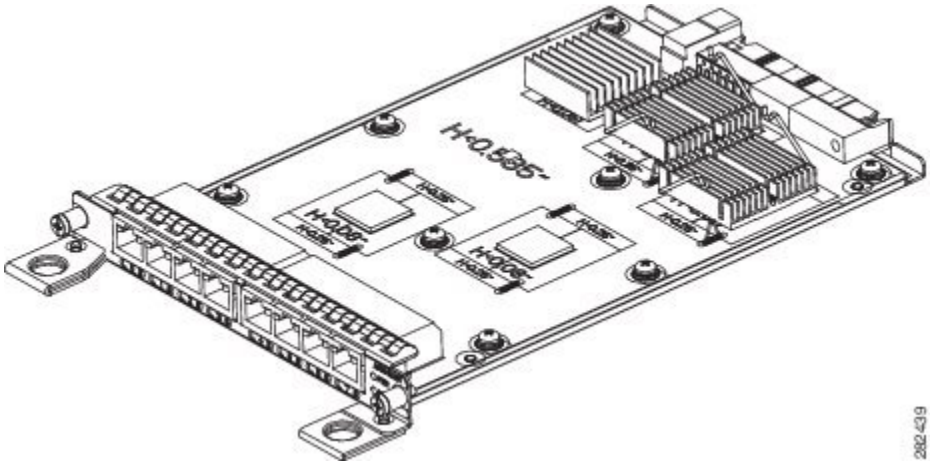
- ASR 900 8 port 10/100/1000 Ethernet Interface Module (A900-IMA8T)
- ASR 900 8 port SFP Gigabit Ethernet Interface Module (A900-IMA8S)
- ASR 900 8 port RJ48C T1/E1 Interface Module (A900-IMA8D)
- ASR 900 16 port T1/E1 Interface Module (requires patch panel) (A900-IMA16D)
- ASR 900 32 port T1/E1 Interface Module (requires patch panel) (A900-IMA32D)
- ASR 900 1 port 10GE XFP Interface Module (A900-IMA1X)
- ASR 900 2 port 10GE SFP+/XFP Interface Module (A900-IMA2Z)
- ASR900 Combo 8 port 10/100/1000 and 1 port 10GE Interface Module (A900-IMA8T1Z)
- ASR900 Combo 8 SFP GE and 1 port 10GE IM (A900-IMA8S1Z)
- ASR 900 4 port OC3/STM1 or 1 port OC12/STM4 Interface Module (A900-IMA4OS)

For more information about supported interface modules, see the Cisco ASR 903 and ASR 903U Aggregation Services Router Hardware Installation Guide and Cisco ASR 920 Series Aggregation Services Routers: High-Port-Density Models Data Sheet.

8-Port 1 Gigabit Ethernet RJ45 Interface Module (A900-IMA8T)

The 8-port 1 Gigabit Ethernet RJ45 interface module provides eight Gigabit Ethernet copper ports. The figure below shows the interface module.

Figure 1: 8-port 1 GE Gigabit Ethernet RJ45 (Copper) Interface Module

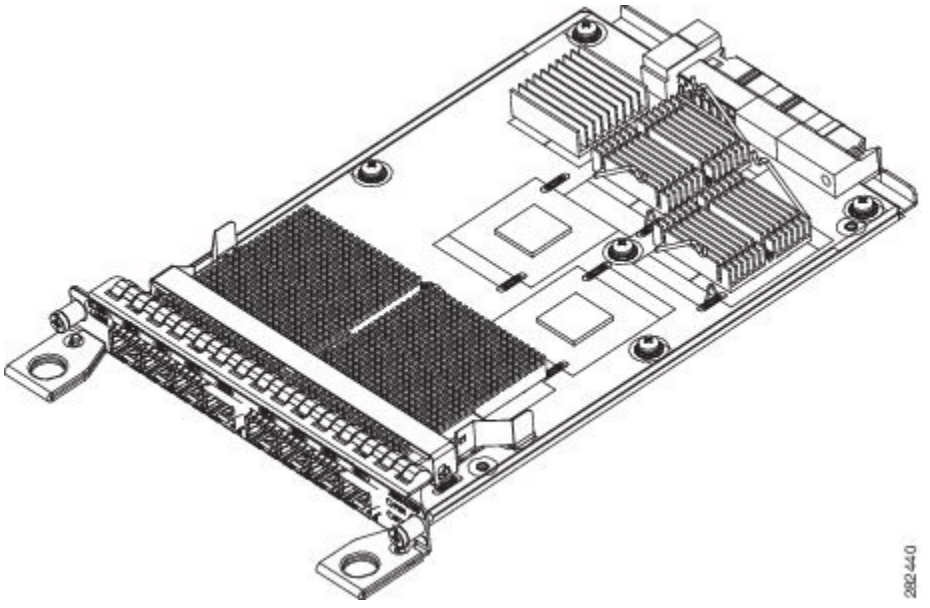


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

8-Port 1 Gigabit Ethernet SFP Interface Module (A900-IMA8S)

The Gigabit Ethernet Small Form-Factor Pluggable (SFP) interface module provides eight Gigabit Ethernet SFP modules. The figure below shows the 8-port 1 GE Gigabit Ethernet SFP interface module.

Figure 2: 8-port 1 GE Gigabit Ethernet SFP Interface Module

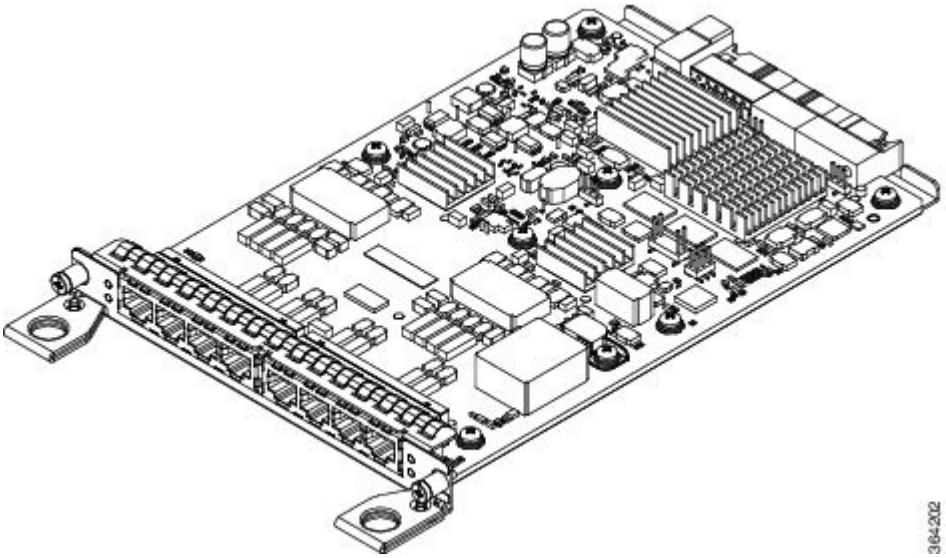


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

8-port T1/E1 Interface Module (A900-IMA8D)

The 8-port T1/E1 interface module provides connectivity for up to 8 T1/E1 ports through RJ48C port connectors on the front panel. The figure below shows the interface module. For information on supported slots, see *Supported RSPs*.

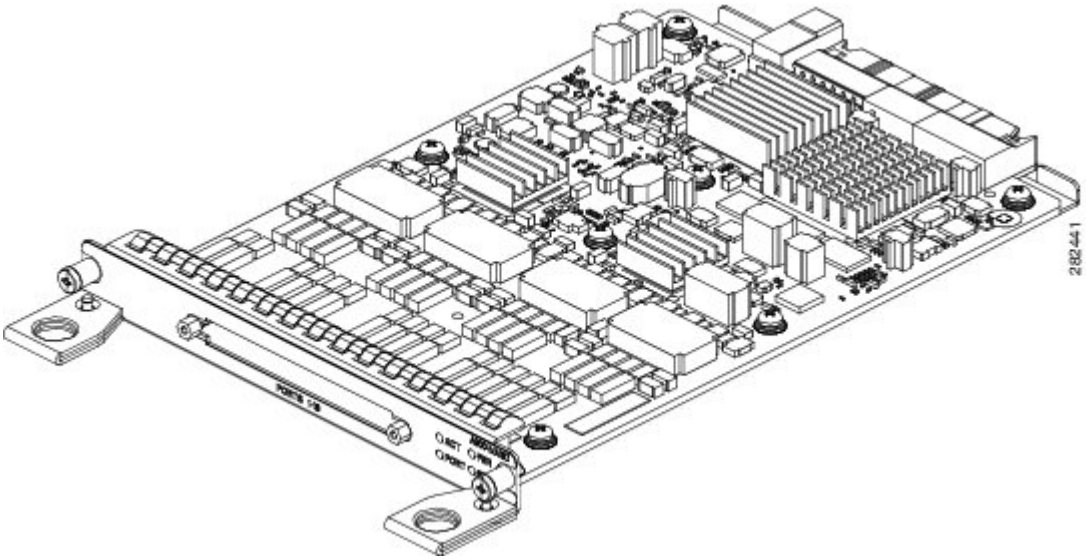
Figure 3: 8-portT1/E1 Interface Module



16-Port T1/E1 Interface Module (A900-IMA16D)

The 16-port T1/E1 interface module provides connectivity for up to 16 T1/E1 ports through a 100-pin Amplimite connector. The 16-port T1/E1 interface module requires the use of a patch panel to provide RJ48 (T1) or BNC (E1) connectors. The figure below shows the interface module.

Figure 4: 16-port T1/E1 Interface Module

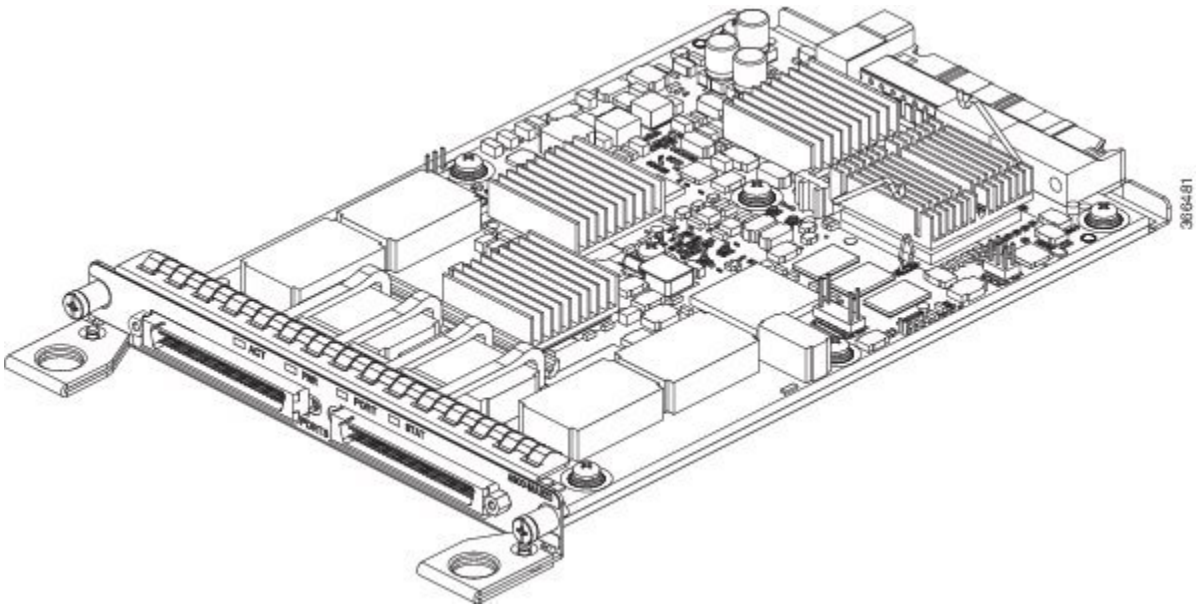


32-Port T1/E1 Interface Module (A900-IMA32D)

The 32-port T1/E1 interface module provides connectivity for up to 32 T1/E1 ports through two 68-pin Tyco connectors. It is supported on the A900-RSP2A-64 module in slots 3, 4 and 5, and on the A900-RSP2A-128 on all slots.

The 32-port T1/E1 interface module requires the use of a patch panel to provide RJ48 or BNC connectors.

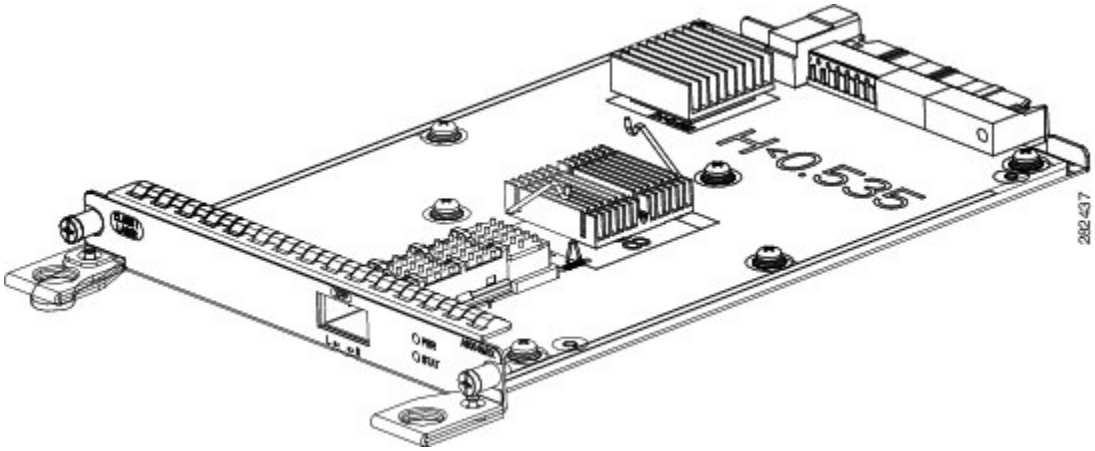
Figure 5: 32-portT1/E1 Interface Module



1-Port 10 Gigabit Ethernet XFP Interface Module (A900-IMA1X)

The 10-Port Gigabit Ethernet XFP interface module provides a single port supporting a 10 Gigabit Ethernet XFP module. The figure below shows the interface module.

Figure 6: 1-port 10 Gigabit Ethernet XFP Interface Module



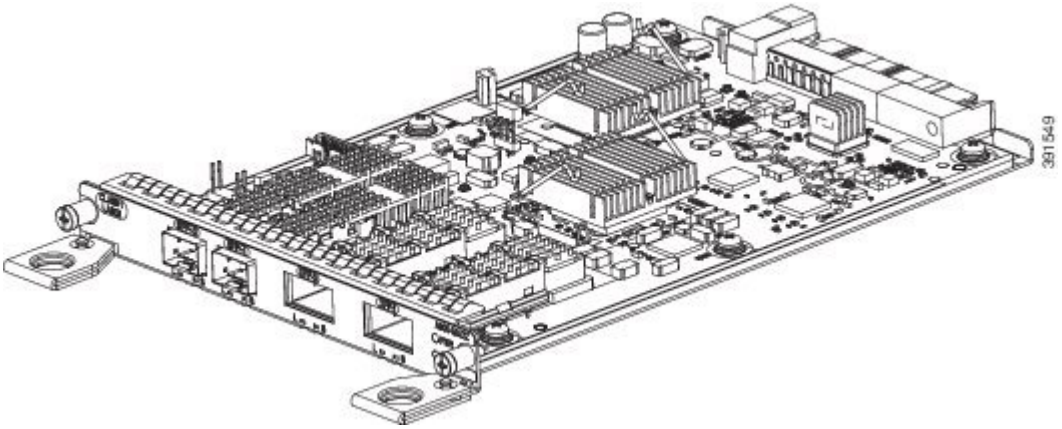
Note 1-port 10 Gigabit Ethernet interface modules are not supported in slots 4 and 5.

For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

2-Port 10 Gigabit Ethernet SFP+ Interface Module (A900-IMA2Z)

The 2-port 10 Gigabit Ethernet interface module provides a dual port supporting a 10 Gigabit Ethernet SFP+ and XFP module.

Figure 7: 2-port10 Gigabit Ethernet Interface Module

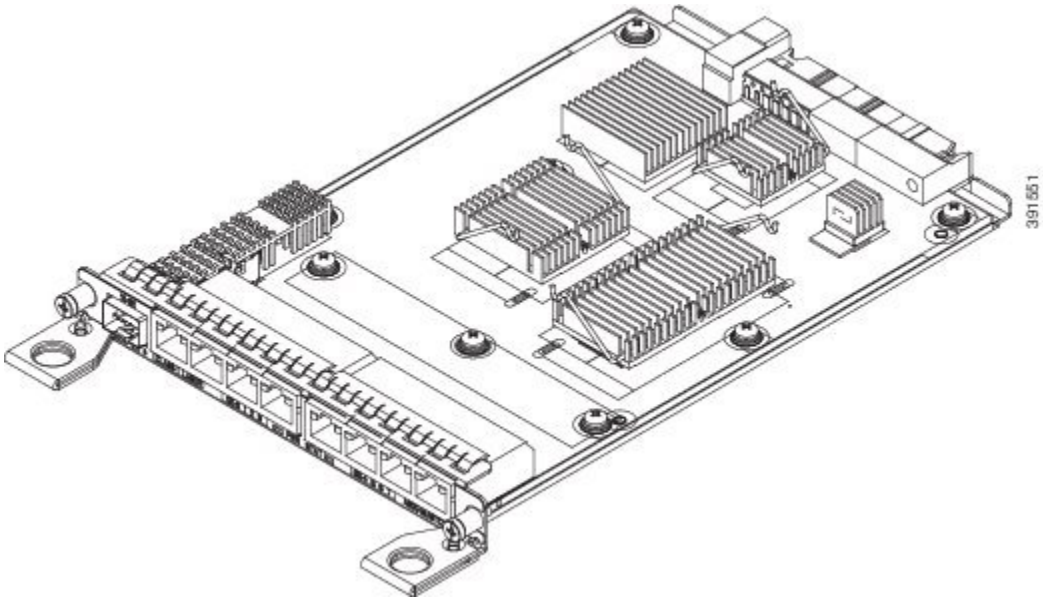


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

8-Port 1 Gigabit Ethernet + 1-Port 10 Gigabit Ethernet SFP+ Combination Interface Module (A900-IMA8T1Z)

This 8-port 1 Gigabit Ethernet (RJ45 Copper) interface module with the 1-port 10 Gigabit Ethernet interface module is a high density combination interface module. This module supports 8 Gigabit Ethernet Copper ports and 1 10 Gigabit Ethernet SFP+ port.

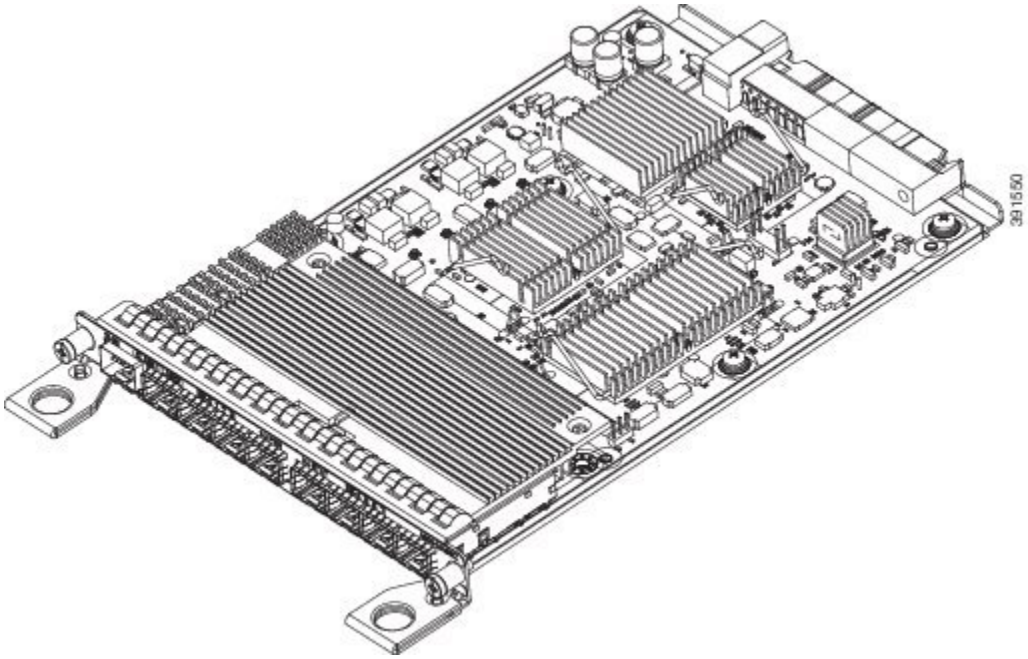
Figure 8: 8-port 1 GE (RJ45) + 1-port 10 GE SFP+ Interface Module



8-Port 1 Gigabit Ethernet SFP with 1-Port 10 Gigabit Ethernet Combination Interface Module (A900-IMA8S1Z)

The 8-port 1 Gigabit Ethernet SFP interface module with the 1-port 10 Gigabit Ethernet interface module is a high density combination interface module. This module supports 8 Gigabit Ethernet SFP ports and 1 10 Gigabit Ethernet SFP+ port.

Figure 9: 8-port 1 GE SFP + 1-port 10 GE SFP+ Interface Module

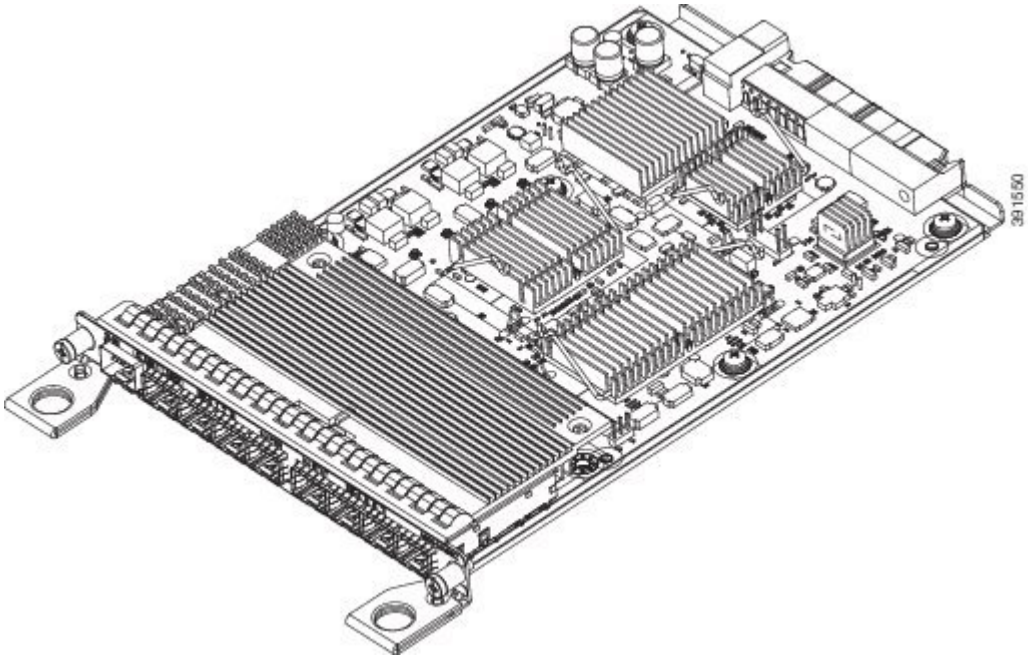


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

8-Port 1 Gigabit Ethernet SFP with 1-Port 10 Gigabit Ethernet Combination Interface Module (A900-IMA8S1Z)

The 8-port 1 Gigabit Ethernet SFP interface module with the 1-port 10 Gigabit Ethernet interface module is a high density combination interface module. This module supports 8 Gigabit Ethernet SFP ports and 1 10 Gigabit Ethernet SFP+ port.

Figure 10: 8-port 1 GE SFP + 1-port 10 GE SFP+ Interface Module



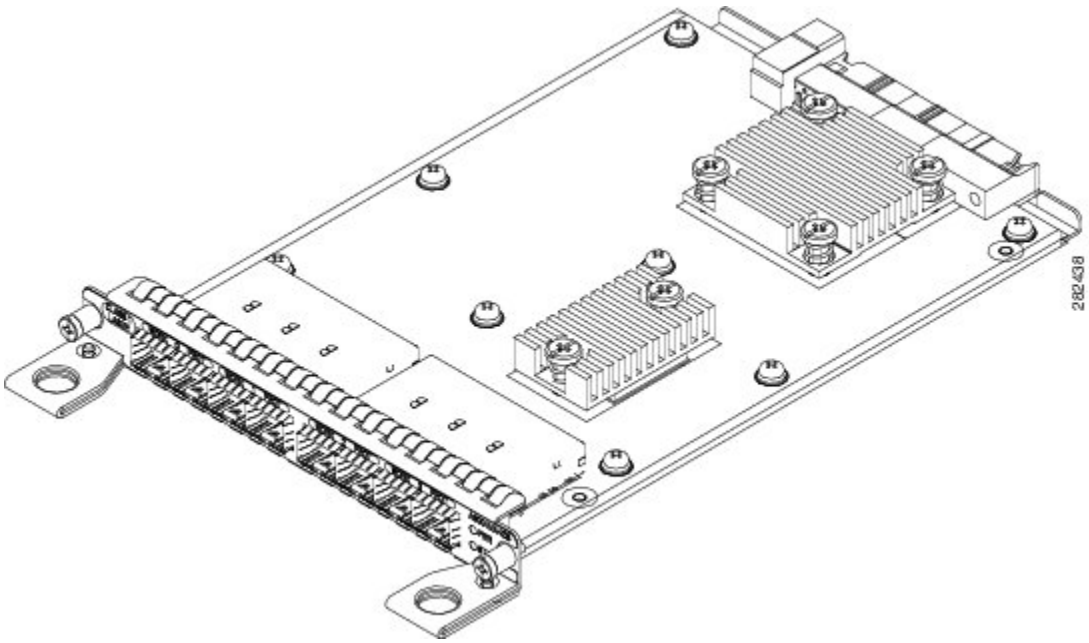
For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

4-Port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module (A900-IMA4OS)

The 4-port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) interface module can operate as up to four STM-1 interfaces. The figure below shows the interface module.

Note The optical interface module is designed for OC-3 and OC-12 traffic.

Figure 11: 4-port OC-3 Interface Module



For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

GigabitEthernet Copper Ports

Fixed copper GigabitEthernet (GE) interfaces are provided through standard RJ-45 connectors. These ports support the following features:

- Standard 100/1000Base-T/TX operation with forced or auto-negotiation for speed and duplex.
- Automatic crossover (auto-MDIX) for straight-through and crossover connections.
- Pause flow control as defined by the 802.3x standard.
- Frame size of 9216 bytes.
- Synchronous ENET operation that provides its recovered receive clock as an input clock source for the SETS as well as uses the system-wide reference clock to derive its transmit clock.

GE SFP Ports

The GE SFP ports support the following features:

- 100Base-FX and 1000Base-X SFP modules.
- Digital optical monitoring as specified by the SFP.
- Any mix of SFPs is supported unless specifically noted.
- Pause flow control as defined by the 802.3x standard.
- Frame size of 9216 bytes.
- Synchronous ENET operation that provides its recovered receive clock as an input clock source for the SETS as well as uses the system-wide reference clock to derive its transmit clock.

Note Copper based SFPs do not support synchronous ENET operations.

SFP+ Ports

The SFP+ ports support the following features:

- Digital optical monitoring as specified by the optical transceiver module.
- Any mix of SFPs is supported unless specifically noted.
- Pause flow control as defined by the 802.3x standard.
- Frame size of 9216 bytes.

The following figures show the port numbering for the Cisco ASR 920 router:

Figure 12: Front Panel of Cisco ASR-920-12SZ-IM Router—With DC Power Supply

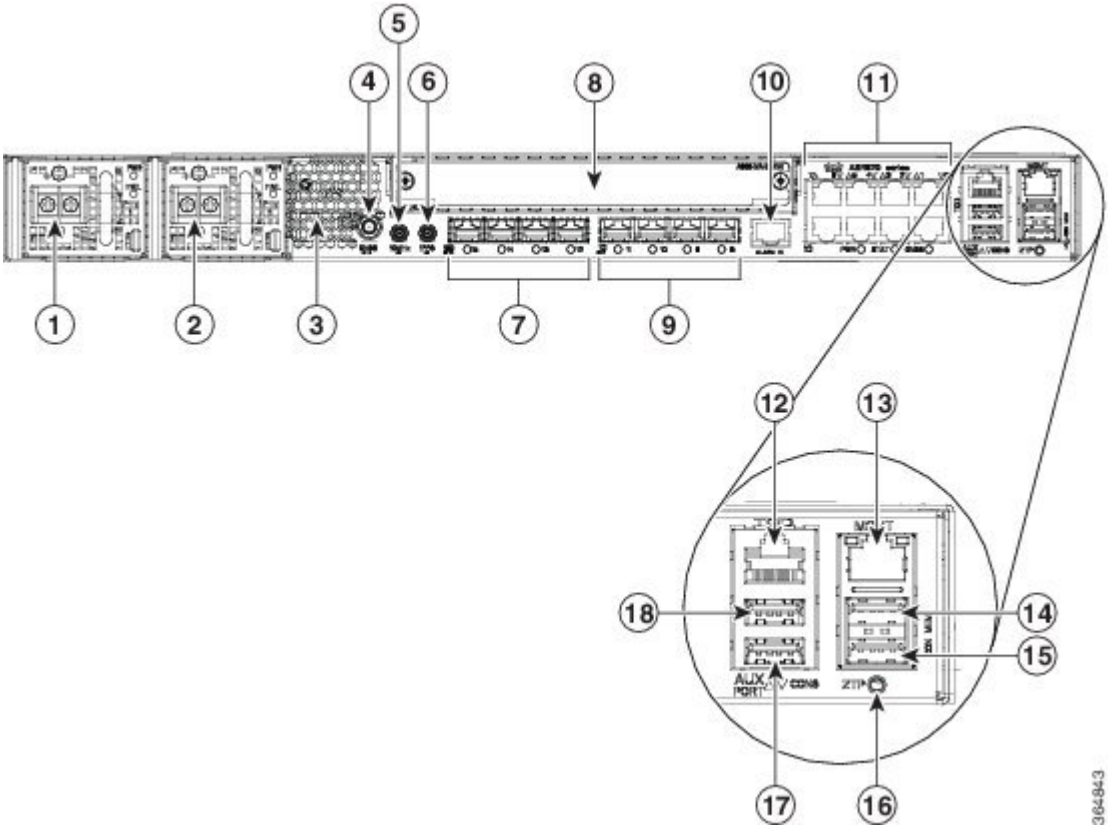
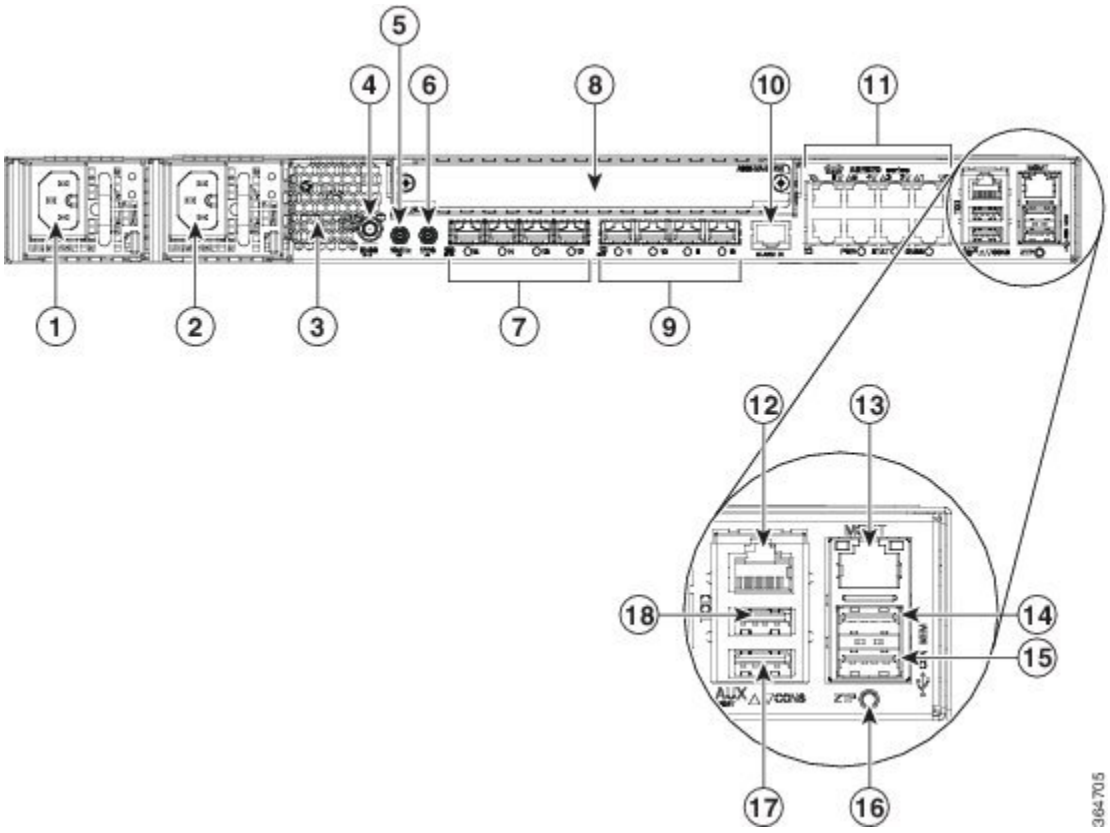


Figure 13: Front Panel of Cisco ASR-920-12SZ-IM Router—With AC Power Supply



1	**Power Supply 0 (AC or DC)**	10	**Alarm port**
2	Power Supply 1 (AC or DC)	11	Eight Copper port (1G PoE) **Note** Port 0 is located at the bottom right, port 1 is located at the top right, and so on.
3	Front Air-Inlet Area	12	ToD port
4	GNSS RF IN (SMA threaded connector)	13	Management Port
5	DIN 1.0/2.3 Snap-in connector (10MHZ)	14	USB Memory port
6	DIN 1.0/2.3 Snap-in connector (1PPS)	15	USB Console port
7	Four 1G/10G SFP+	16	Zero Touch Provisioning button
8	Interface Module	17	RS232 Console port
9	Four 1G SFP	18	RS232 Aux Console port

Figure 14: Rear View of Cisco ASR-920-12SZ-IM Router



1	Fan tray	3	Air vents
2	Grounding lug	—	

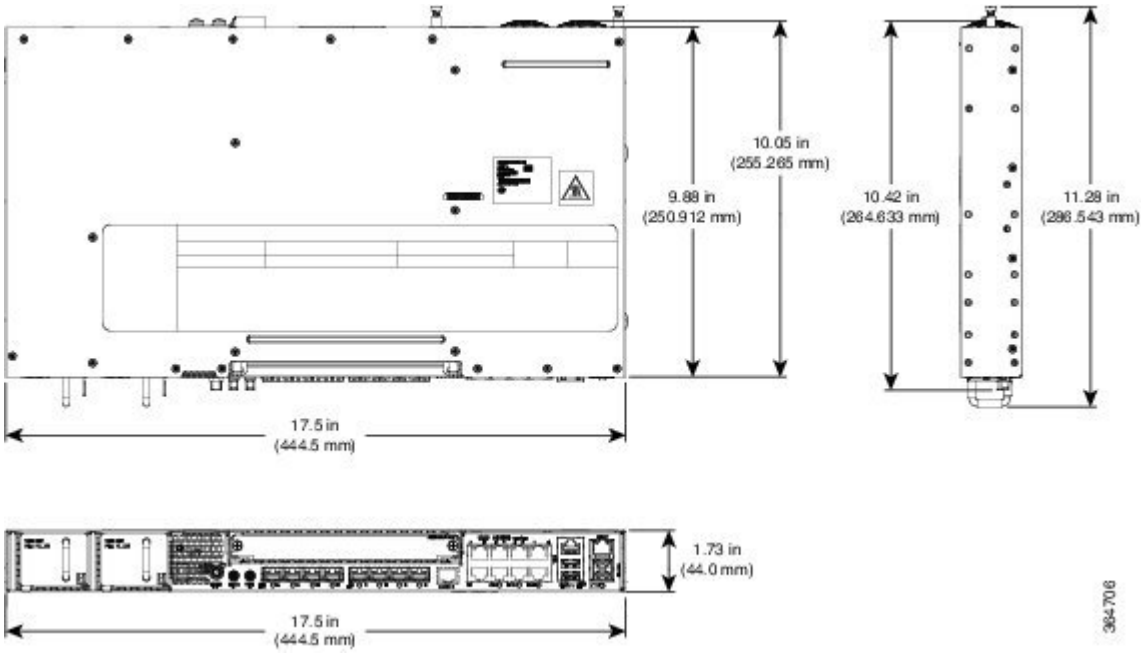
The following table describes the other features of Cisco ASR-920-12SZ-IM (AC and DC) Router.

Table 1: Cisco ASR-920-12SZ-IM Router Specifications

Specification	**ASR-920-12SZ-IM**
DimensionWidth x Depth x Height	17.5 x 9.88 x 1.73 inches
Weight	Total weight: 4.83 kg Weight of PSU: 0.59 kg Weight of Fan: 0.33 kg
Rack Unit	One RU
Airflow	Front to back
Cable access	Front cable access
System throughput	60 Gbps, 95 Mpps
Power Supply	
Redundant	Yes
AC	Yes
Voltage Range	85V AC to 264V AC, nominal 100/240 VAC
Frequency Range	47 Hz to 63 Hz, nominal 50/60 Hz
Maximum Power	360 W
DC	Yes
Voltage Range	-18 VDC to -32 VDC or -40 VDC to -72 VDC
Nominal Voltage Range	-24 VDC/-48 VDC/-60 VDC
Maximum Power	375 W
Operating Temperature	–40º C to 70º C

Specification	ASR-920-12SZ-IM
Alarms	• 4 alarm dry contact inputs (normally open) • LED indicators for critical, major, and minor alarms
Supported Interface Modules	For more information on these IM modules, see the *Cisco ASR 903 Aggregation Series Router Hardware Installation Guide*. For more information on the supported IMs, see the *Cisco ASR920 Data sheet.*
Mounting option	• Front or rear rail 19 or 23 inches • ETSI 300 mm open cabinet • Wall mount
Port Configuration	12x1G and 4x10G/1G ports
Port Numbering	4x10G SFP+ – Port [12:15] 4x1G SFP – Port [8:11] 8x1G PoE RJ45/Cu ports [0:7]
Combo Ports	Ports 12 to 15 are Dual Rate ports
Copper/1G/10G Port LEDs	Link/Activity/Fault
Temperature Sensors	Four temperature sensors
1PPS/ToD	External ports for 1PPS/TOD
PoE	Provides power over Ethernet
GNSS	Connects to the external GPS

Figure 15: Cisco ASR-920-12SZ-IM Router—Dimensions



External Interfaces

The external physical interfaces on the front panel of the router are given below:

Network Interfaces

The network interfaces are provided through fixed ports.

- GE SFP ports—supports 100/1000 modes
- GE Copper RJ-45 ports—supports 10/100/1000 operation. All eight copper RJ-45 ports support PoE/PoE+/UPoE with overall power budget of 180 W.

Note PoE is not supported when the system is powered with 24 V DC.

- 10GE SFP+—supports 10G/1G mode depending on the SFP+/SFP in the network interface slot.

Network Timing Interfaces

- 10Mhz input or output—Miniature coaxial connectors for 10Mhz timing (input or output). You can use this interfaces with an external GPS device to send or receive clocking from the router
- 1PPS input or output and ToD input or output—This interface is used for input or output of time-of-day (ToD) and 1PPS pulses. ToD format includes both NTP and IEEE 1588-2008 time formats.

The same RS422 pins for 1PPS and TOD are shared between input and output directions. The direction for each can be independently configured through software.

- GNSS RF IN—This interface is used to connect the external GPS antenna to the in-built GPS module.

External Alarm Inputs

The router supports four dry contact alarm inputs through an RJ-45 jack on 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.

Management Interfaces

The following management interfaces are supported:

Management ENET Port

A single management copper ENET port supporting 100/1000Base-T operation is provided on the front panel. It uses a standard RJ-45 jack.

RS232 Console Port

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

Note The RS232 console port is enabled only through the Cisco-designed cable adapter USB type A cable to RJ-45 adapter cable. To use this port, disable the flow control on the terminal.

Caution Do not plug the USB-to-RJ45 adapter cable in the USB Memory port.

USB Console

A single USB 2.0 Type-A receptacle on the front panel of the router provides console access to ROMMON, Cisco IOS-XE 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.

USB Mass Storage

A single USB 2.0 Type-A receptacle on the front panel of the router allows external USB mass storage devices, such as standard USB flash drives. This interface is used to load images, load or store configurations, write logs, and so on.

Note More than 8 GB is not supported in ROMMON mode,

Zero Touch Provisioning Button

The Zero Touch Provisioning (ZTP) button on the front panel initiates the ZTP process on a short press of less than eight seconds. Pressing the ZTP button for more than eight seconds causes a board reset.

RS232 Auxiliary Console Port

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

Note The RS232 Aux console port is enabled only through the Cisco-designed cable adapter from USB type A cable to RJ-45 adapter cable.

Note This is a debug-only port. it is recommended that this port be used by field service engineers only.

Power Supply

The router supports AC, DC, or a combination of both power supplies in a 1+1 redundant configuration. For information on installing the power supplies, see the *Installing the Power Supply* section.

Note If only one PSU is present, a successful firmware upgrade to either primary or secondary microcontroller unit (MCU) triggers a reload of device and is reloaded before any warning messages are displayed.

Table 2: Power Supply Specification

Specification	AC (A920-PWR400-A)	DC (A920-PWR400-D)
Input Voltage	85–264, nominal 100VAC, 240VAC 47–63 Hz, nominal 50/60 Hz	18–32 VD or -40 to -72 VDC Nominal - 24V VDC, or -48VDC, or -60VDC
Maximum Input Power	375W (with PoE power of 180W) 150W Max (No PoE)	375W (with PoE power of 180W) 150W Max (No PoE
Redundant	Yes	Yes

Specification	AC (A920-PWR400-A)	DC (A920-PWR400-D)
How Swap	Yes	Yes
Current sharing	Yes	Yes
Input Connector	IEC60320, C15 style receptacle	Two-position terminal block

Note This product requires surge protection as part of the building installation. To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, an external surge protective device (SPD) is required at the AC power service equipment.

Note For DC systems, if a surge of more than 500 V is expected, add an appropriate external surge protective device.

Note The routers support AC and DC power supplies in a 1+1 redundant configuration.

One AC and one DC power supply in the same router is also a supported configuration.

The router has a single fan-tray with four fans. The system is designed to operate at its maximum operating temperature of 70º C, in case of failure of a single fan operating temperature of 65º C. The fan tray is field-replaceable.

Table 3: Feature History

Feature Name	Release Information	Description
Switching Fan Speed	Cisco IOS XE Cupertino 17.8.1	This feature enables the Cisco ASR-920-12SZ-IM and Cisco ASR-920-12SZ-IM-CC to switch from default dynamic fan speed to static fan speed in the presence of A900-IMA3G-IMSG interface module. This prevents the interface module from shutting down due to the increase in router's temperature. Also, the switch from dynamic to static fan speed enables the smart SFPs to function efficiently.

The dynamic fan-speed algorithm sets the fan speed based on the ASIC temperature.

Prior to Cisco IOS XE Cupertino Release 17.8.1, by deafult dynamic fan-speed algorithm for Cisco ASR-920-12SZ-IM and Cisco ASR-920-12SZ-IM-CC was enabled. But, in presence of A900-IMA3G-IMSG interface module, the interface module would shut down due to the increased temperature as the dynamic fan

speed was not sufficient. Also, when the smart SFP was inserted in the node, it would not function with the static fan-speed algorithm mode. This was resulting in the increase of the router's temperature.

Starting with Cisco IOS XE Cupertino Release 17.8.1, in the presence of A900-IMA3G-IMSG interface module, the fan-speed algorithm switches from dynamic to static fan-speed algorithm.

Also, when the smart SFP is inserted, the switch from default dynamic fan-speed algorithm to static fan-speed algorithm helps the smart SFP to function efficiently.

Use the **show platform fan-algorithm** command to verify the fan-speed algorithm configuration for the router:

```
Router#show platform fan-algorithm

Fan Algorithm : Static

Router#
```

Redundancy

The router includes a slot for a redundant power supply. The redundant power supply option provides a second power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails. Redundancy is supported either with identical power supplies or a combination of AC and DC power supply.

A redundant power supply on the router is recommended. Each power supply should be connected to separate independent power sources to ensure that the router maintains power in the event of a power interruption caused by an electrical failure, a wiring fault, or a tripped circuit breaker.



Note To comply with IEC 61850-3 (voltage interruptions), redundant power supplies with separately derived power feeds are required.

LED Indicators

This section describes the different types of LEDs and their behavior.

PWR and STAT LEDs

The PWR LEDs are available on the front panel. These LEDs provide power on the board (PWR) status. During power up state, these LEDs provide booting status and report errors.



Note The digital code signing functionality validates the integrity and authenticity of the ROMMON image before booting it.

Table 4: PWR and STAT LED Indications

PWR LED State	STAT LED state	Indication	Comment
Amber	Off	Power in the system is all right and FPGA configuration is taking place.	Permanent Amber/Off indicates FPGA configuration failure.
Amber	Red	FPGA Image Validation Error.	System is in unresponsive state.
Flashing Amber and Green alternatively	Amber	Upgrade FPGA image error, continuing with Golden FPGA image.	—
Flashing Amber and Green alternatively	Off	FPGA configuration successful and Digital code signing successfully validated FPGA image. Digital code signing passed the control to Microloader to boot ROMMON.	—
Flashing Amber and Green alternatively	Red	Digital code signing reported failure in ROMMON image validation.	—
Flashing Amber	Flashing Amber	ZTP process has begun. **Note** A short press of the ZTP button triggers the provisioning. A longer press of more than eight seconds, resets the board.	Both LEDs turn Green once provisioning is complete.
Green	Off	IOS-XE image is booting.	
Green	Green	Successfully booted and system is operating normally.	—
Green	Amber	A minor alarm or synchronization is in Holdover or free-running mode	—
Green	Red	A major or critical alarm (high temperature reported for any sensor) or multiple fan failure.	—

CPU Management Port LEDs

The LED for the 100/1000 Management port is integrated on the connector itself. There are two LEDs in the connector to indicate the Link or Activity status.

Table 5: CPU Management Port LED Indication

LED	LED State	Indication
Left	Green	Link up in 1000 Mbps
	Blinking Green	Activity in 1000 Mbps
	Amber	Link up in 100 Mbps
	Blinking Amber	Activity in 100 Mbps
	Off	Link down
Right	Green	Link up in full duplex with 1000 Mbps speed
	Green	Link up in full duplex with 100 Mbps speed
	Off	Link up in half duplex with 100 Mbps speed

SFP LEDs

Each SFP port has an LED indicator.

Table 6: SFP Port LED Indication

LED	LED State	Indication
Labeled same as the SFP port number	Green	Link up in 1000Base-X/100Base-FX
	Blinking Green	Activity in 1000 Base-X/100Base-FX
	Amber	Fault/Error/Link down
	Off	Administratively down

SFP+ LEDs

Each SFP+ port has an LED indicator.

Table 7: SFP+ Port LED Indication

LED	LED State	Indication
Labeled same as the SFP port number	Green	Link up in 10G/1G
	Blinking Green[2]	Activity in 10G/1G
	Amber	Fault/Error/Link down
	Off	Administratively down

[2] For A900-IMA8T1Z, A900-IMA8S1Z, and A900-IMA2Z LED, status would be Green for Activity in 10G/1G.

RJ-45 LEDs

There is only one LED on each RJ45 port on the fixed slot (slot 0/0) and this indicates only the link or speed status. There is no LED to show the Duplex state. However, there are two LEDs for IM RJ45 ports and they indicate the Link and Duplex state.

Table 8: RJ-45 LED Indication

LED State	Indication
Green	Link up in 10/100/1000Base-T
Blinking Green	Activity in 10/100/1000Base-T
Amber	Fault/Error/Link down
Off	Administratively down

G.703/FXS/FXO Interface Module LEDs

The following table summarizes the LEDs for the G.703/FXS/FXO interface module.

Table 9: Cisco ASR 903 Router G.703/FXS/FXO IM LEDs

LED Label	Color or State	Description
Power (PWR)	Green	All power rails are within spec.
	Red	Disabled
	Off	No Power

LED Label	Color or State	Description
Operating Status (STAT)	Red	Failure
	Yellow	Booting
	Green	Operational
	Off	No Power
Port Bi-color LEDs	Green	IM-FPGA Link/In-Frame, working properly
	Solid Yellow	Fault or Loop condition
	Off	Out of Service or not configured (default state)

Power Supply Unit LEDs

Each power supply unit has a corresponding LED on the front panel.

Table 10: PSU LED Indication

Power LED	FAIL LED	Power Supply Condition
Green	Off	Power Supply ON; valid input/output
Yellow 1Hz blinking	Red 1Hz blinking	PSU Warning due to OCP, OTP, UV, OV, OP, abnormal fan operation PSU continues to operate
Off	On	PSU failure due to OCP, OTP, UV, OV, OP, abnormal fan operation. No valid output.
Green 1Hz blinking	Off	Valid power present, shutdown by system.
Yellow	Off	Input voltage low
Off	Off	No valid power input.

System–Interface LED Behavior

Table 11: 1G Copper and 1G SFP LED Indication

Event	1G Copper Port LEDs (Link)	1G SFP Port LEDs
ROMMON	Off	Off
IOS Shut	Off	Off
IOS No shut (cable disconnect)	Amber	Amber
IOS No shut (Link Up)	Green	Green

Table 12: Dual Rate Port LED Indication

Event	Dual Rate (1G/10G) Port LEDs
ROMMON	Off
IOS Shut	Off
IOS No shut (cable disconnect)	Amber
IOS No shut (Link Up)	Green

Table 13: Management Port LED Indication

Event	Management Port LEDs (Link/Duplex)
ROMMON	Green/Off
IOS Shut	Off/Off
IOS No shut (cable disconnect)	Amber/Off
IOS No shut (cable connect)	Green/Green in 1G mode Amber/Green in 100M mode

Fan Tray LEDs

Table 14: Fan Tray LEDs

Color/ State	Description
Off	System is not powered on
Green	All fans are working normally
Amber	Single or multiple fan failures and critical error
Red	ROMMON

Online Insertion and Removal

This router supports the following 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 upon the current configuration. If the inserted SFP is incompatible with the current configuration for that port, the port does not become operational until the configuration is updated.
- Both power supplies are installed and active and the load may be shared between them or a single PSU could support 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.

- When a fan tray is removed or replaced, there is no need to power down the router. However, when the fan tray is removed from the router, the router shuts down automatically after some time, depending on the ambient temperature. The time duration before the router shuts down is shown in the table below:

Perform safe OIR of interface modules

OIR allows you to remove and replace IMs without powering down the router. However, IM 0/1 does not support OIR. To replace or remove IM 0/1, you must perform a graceful shutdown of the IM before removal; otherwise, a SIGBUS error may occur, resulting in an unexpected restart of the IM.

Before you begin

Follow these steps to perform a graceful shutdown of IM 0/1.

Procedure

Step 1 Enter global configuration mode.

Example:

```
Router#configure terminal
```

Step 2 Gracefully shut down and power off the IM.

Example:

```
Router(config)#hw-mod sub 0/1 shut unpowered
```

Step 3 Physically remove the IM.

Step 4 Insert the new or replacement IM.

Step 5 Re-enable and power on the IM.

Example:

```
Router(config)@no hw-mod sub 0/1 shut unpowered
```

The replacement IM is safely installed and operational. The system continues normal operation and avoids unexpected errors or restarts.

Licensing

The router supports the following types of licenses:

- Port Licensing—Port Upgrade license is available as a "Pay as you Grow" model.
  - 6 ports 1GE upgrade license
  - 2 ports 10G upgrade license
  - Bulk License to enable 12x1port 1GE and 4x10GE ports
- Advanced Metro IP Access
- Metro IP Access
- Metro Access (default)
- Feature licensing

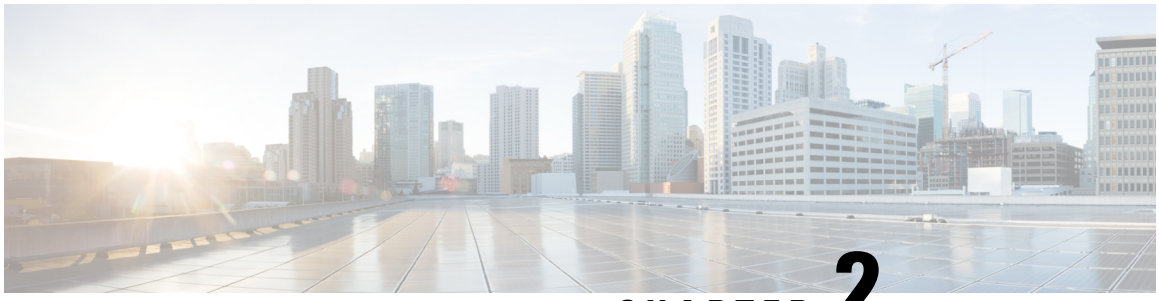
The following methods are used to activate the above licenses:

- Cisco Software Licensing—The Cisco Software License Activation feature is a set of processes and components to activate Cisco software feature sets by obtaining and validating fee-based Cisco software licenses.



Note Licenses generated by the Cisco Software Licensing are tied to the UDI of the chassis and a corresponding watchtower device certificate (WDC) is stored in the system.

- Cisco Smart Licensing—Smart Licensing is usage-based licensing where devices register with the Cisco Secure server.



CHAPTER 2

Preparing for Installation

This chapter describe how to prepare for the installation of the router at your site.

Note These routers are designed to boot up in less than 30 minutes, provided the neighboring devices are in full operational state.

- Safety Guidelines, on page 27
- Safety Warning Statements, on page 28
- Safety Guidelines for Personal Safety and Equipment Protection, on page 29
- Safety Precautions for Module Installation and Removal, on page 29
- Safety with Electricity, on page 29
- Power Supply Considerations, on page 30
- Preventing ESD Damage, on page 30
- Site Planning, on page 31
- Air Flow Guidelines, on page 32
- Floor Loading Considerations, on page 34
- Site Power Guidelines, on page 34
- Electrical Circuit Requirements, on page 35
- Site Cabling Guidelines, on page 35
- Asynchronous Terminal Connections, on page 36
- Interference Considerations, on page 36
- Installation Checklist, on page 39
- Creating a Site Log, on page 40
- Chassis-Lifting Guidelines, on page 40
- Tools and Equipment, on page 41
- Unpacking and Verifying the Shipped Contents, on page 41

Safety Guidelines

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

In addition, before replacing, configuring, or maintaining the router, review the safety warnings listed in the Regulatory Compliance and Safety Information document.

Safety Warning Statements



Warning Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. Statement 1



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



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



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



Warning This equipment is suitable for installations utilizing the insert CBN. Equipment Bonding Networks CBN—Statement 7013



Warning This equipment is suitable for installation in network telecommunications facilities. Installation Location Network Telecommunications Facilities — Statement 8015



Warning This equipment is suitable for installation in locations where the NEC applies. Installation Location Where the National Electric Code (NEC) Applies—Statement 8016

Caution To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Management Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be 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.

For other standard warning messages and their translations, see the *Regulatory Compliance and Safety Information for the Cisco ASR 920 Series Aggregation Services Router* document.

Safety Guidelines for Personal Safety and Equipment Protection

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

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

Safety Precautions for Module Installation and Removal

To see the safety precautions for module installation and removal, see the *Regulatory Compliance and Safety Information for the Cisco ASR 920 Series Aggregation Services Router* document.

Safety with Electricity

To see the safety with electricity, see the *Regulatory Compliance and Safety Information for the Cisco ASR 920 Series Aggregation Services Router* document.

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

- Locate the room's emergency power-off switch. If an electrical accident occurs, you will be able to quickly turn off the power.
- Before starting work on the system, turn off the DC main circuit breaker and disconnect the power terminal block cable.
- Before doing the following, disconnect all power:
  - Working on or near power supplies
  - Installing or removing a router chassis or network processor module

    - Performing most hardware upgrades

- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit; always check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.
- If an electrical accident occurs, proceed as follows:
    - Use caution, and do not become a victim yourself.
    - Turn off power to the router.
    - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim, and then call for help.
    - Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

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

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

Power Supply Considerations

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

Preventing ESD Damage



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

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

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To channel unwanted ESD voltages safely to ground, connect the clip to an unpainted surface of the chassis frame. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.

- When removing a component, use available ejector levers or captive installation screws, if any, to release the bus connectors from the backplane or midplane.
- Handle components by their handles or edges only; do not touch the printed circuit boards or connectors.
- Place a removed component board side up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.



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

Site Planning

The sections describe how to plan for the installation of the Cisco ASR 920 Series Router.

General Precautions

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

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

Site Planning Checklist

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

- The site meets the environmental requirements.
- The site’s air conditioning system can compensate for the heat dissipation.
- The floor space that the router occupies can support the weight of the system.
- Electrical service to the site complies with the requirements.
- The electrical circuit servicing the router complies with the requirements.
- Consideration has been given to the console port wiring and limitations of the cabling involved, according to TIA/EIA-232F.
- The router's Ethernet cabling distances are within the prescribed limitations.

- The equipment rack in which you plan to install the router complies with prescribed requirements.
- When selecting the location of the rack, careful consideration must be given to safety, ease of maintenance, and proper airflow.

Site Selection Guidelines

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

The routers are designed to meet the industry EMC, safety, and environmental standards described in the *Regulatory Compliance and Safety Information for the Cisco ASR 920 Series Router* document.

Environmental Requirements

Environmental monitoring of the Cisco ASR 920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M Router protects the system and components from damage caused by excessive voltage and temperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan and prepare your site configuration before installation. After installation, make sure that the site maintains the environmental characteristics described in *Cisco ASR-920-12SZ-IM Router Specifications* table.

For an outside plant installation (cell site cabinet, hut etc.), it is required that the router be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air or other reactive elements present in the outside air. To achieve this level of protection, we recommend that the unit be installed in a fully sealed enclosure or cabinet. Examples of such cabinets include IP65 cabinets with heat exchanger complying with Telecordia GR487. Temperature must be maintained within –40º C to 70º C.

The equipment shall be placed inside a space protected from direct outside weather and environmental stresses by an enclosure, and where the operating climate, as defined by Class 2 of GR-3108-CORE, is between

- -40°C (-40°F) and 70°C (158°F)
- 5 and 90% RH

Physical Characteristics

Be familiar with the physical characteristics of the router to assist you in placing the system in the proper location. For more information, see *Cisco ASR-920-12SZ-IM Router Specifications* table.

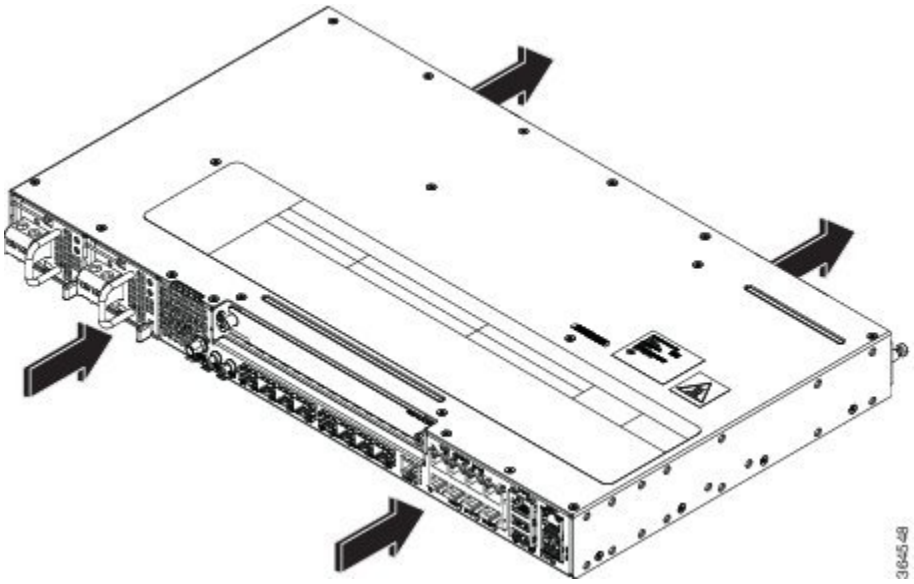
Air Flow Guidelines

Cool air is circulated through the router by fans located along the back 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 chassis.

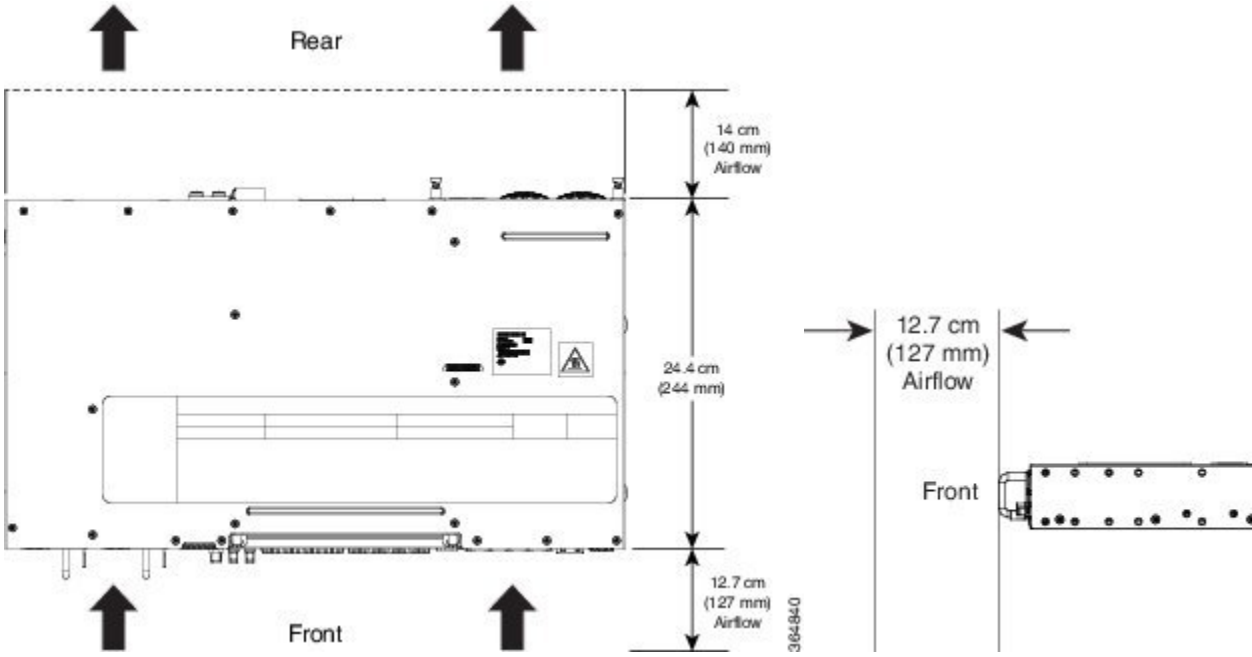
The direction of air flow is from front-to-back.

Figure 16: Air Flow in the Cisco ASR 920 Series Routers



To ensure adequate air flow through the equipment rack, it is recommended that you maintain a minimum clearance distance as mentioned below, at all times.

- front clearance—12.7 cm
- rear clearance—14 cm



Note the following points:

- When installing the routerouter in a back-to-back position with another device, ensure that there is a minimum of 10 cm air flow 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 should also be as dust-free as possible. Dust tends to clog the router fans, reducing the flow of cooling air through the equipment rack and the routers that occupy it, thus increasing the risk of an overtemperature condition.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat that is generated by the equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the 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 chassis 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 chassis.

Air Flow Guidelines for ETSI Rack Installation

To install a Cisco ASR 920 Series Router in a 2-post or 4-post rack, the front and rear doors of the cabinet must be removed. It is recommended that you maintain a minimum clearance distance as mentioned below, at all times.

- front clearance—12.7 cm
- rear clearance—14 cm

If you are mounting the chassis in a 4-post enclosed cabinet, ensure that you have a minimum of 14 cm of clearance on each side of the chassis.

Floor Loading Considerations

Ensure that the floor under the rack supporting the Cisco ASR 920 Series Routers is capable of supporting the combined weight of the rack and all the other installed equipment.

To assess the weight of a fully configured Cisco ASR 920 Series Router, see the *Cisco ASR-920-12SZ-IM Router Specifications* table.

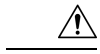
For additional information about floor loading requirements, see the GR-63-CORE, Network Equipment Building System (NEBS) Requirements: Physical Protection document.

Site Power Guidelines

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

- The redundant power option provides a second, identical power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.

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



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



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

For information on power specifications, see *Power Supply Specification* table.

Electrical Circuit Requirements

Each router requires a dedicated electrical circuit. If you equip the router with dual-power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

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

Site Cabling Guidelines

This section contains 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. Consider the distance limitations for signaling, electromagnetic interference (EMI), and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

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

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

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

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline 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.

Asynchronous Terminal Connections

The router provides a console port to connect a terminal or computer for local console access. The port has an RJ-45 connector and supports RS-232 asynchronous data with distance recommendations specified in the IEEE RS-232 standard.

Interference Considerations

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

The sections describe the sources of interference and how to minimize their effects on the router.

Electromagnetic Interference

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

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

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

For information about the electrode magnetic compliance standards supported on the Cisco ASR 920 Series Router, see the Regulatory Compliance and Safety Information for the Cisco ASR 920 Series Aggregation Services Router document.

Radio Frequency Interference

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

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

Lightning and AC Power Fault Interference

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

The electromagnetic pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors to damage or destroy electronic equipment. If you have previously experienced such problems, you should consult with RFI and EMI experts to ensure that you have adequate electrical surge suppression and shielding of signal cables in your Cisco ASR 920 Series Router operating environment.

Rack-Mounting Guidelines

The sections provide guidelines for rack-mounting.

Precautions for Rack-Mounting

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

- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to the components in the rack.
- Do not step on or stand on any component or system when servicing other systems or components in a rack.
- When mounting the router in a partially filled rack, load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Rack Selection Guidelines

The router can be mounted in most two-post or four-post, 19-inch equipment racks that comply with the Electronic Industries Association (EIA) standard for equipment racks (EIA-310-D 19-inch). The rack must have at least two posts with mounting flanges to mount the chassis.



Caution When mounting a chassis in any type of rack equipment, ensure that the inlet air to the chassis does not exceed 70° C.

The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 inch ± 0.06 inch (46.50 cm ± 0.15 cm). The rack-mounting hardware included with the chassis is suitable for most 19-inch equipment racks.

Consider installing the router in a rack with the following features:

- NEBS-compliant, 19-inch wide (48.3-cm) rack.

- EIA or European Telecommunications Standards Institute (ETSI) hole patterns in the mounting rails. The required mounting hardware is shipped with the router. If the rack that you plan to install the system in has metric-threaded rails, you must provide your own metric-mounting hardware.
- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.

Caution The router is not recommended to be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. If you use an enclosed rack, ensure that the air flow requirements are maintained as discussed in *Air Flow Guidelines*.

Equipment Rack Guidelines

The placement of a rack can affect personnel safety, system maintenance, and the system's ability to operate within the environmental characteristics. Choose a proper location for the router by following the guidelines described here.

Locating for Safety

If the Cisco ASR 920 Series Router is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack's center of gravity is as low as possible.

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

Locating for Easy Maintenance

It is recommended that you maintain a minimum clearance distance as mentioned below, at all times.

- front clearance—12.7 cm
- rear clearance—10 cm

This space ensures that you can remove the router components and perform routine maintenance and upgrades easily.

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

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

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

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

Locating for Proper Airflow

Ensure that the router location has enough airflow to keep the system operating within the environmental characteristics and the air temperature is sufficient to compensate for the heat dissipated by the system. For more information, see the *Air Flow Guidelines* section.

Installation Checklist

To assist you with your installation and to provide a record of what was done by whom and when, photocopy the Cisco ASR 920 Series Router Installation Checklist shown in the table below. Use this to record the completion and verification of each procedure. After the checklist is completed, place it in your Site Log along with the other records pertaining to your new Cisco router.

Table 15: Installation Checklist

Task	Verified By	Date
Date on which chassis received		
Chassis and all accessories unpacked		
Types and numbers of interfaces verified		
Safety recommendations and guidelines reviewed		
Installation Checklist copied		
Site Log established and background information entered		
Site power voltages verified		
Site environmental specifications verified		
Required passwords, IP addresses, device names, and so on, available		
Required tools available		
Network connection equipment available		
Cable-management brackets installed (optional, but recommended)		
AC power cables connected to AC sources and router		

Task	Verified By	Date
DC power cables connected to DC sources and router		
Network interface cables and devices connected		
System power turned on		
System boot complete (STATUS LED is on)		
Correct software configuration displayed after system banner appears		

Creating a Site Log

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

Create the Site Log prior to the installation. (See “Site Log” for more information about the Site Log as well as a sample Site Log that can be used to make copies.)

Chassis-Lifting Guidelines

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

Each time you lift the chassis or any heavy object, follow these guidelines:

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



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

Tools and Equipment

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

- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- #12-24 pan-head screws to secure the router to the equipment rack
- Cables for connecting to the network ports (depending on the configuration)

Note For more information about cable specifications, see the *Troubleshooting* section.

- Ethernet hub, switch, or PC with a network interface card for connecting to the Ethernet ports
- Console terminal (an ASCII terminal or a PC running terminal emulation software) that is configured for 9600 baud, 8 data bits, no parity, no flow control, and 1stop bit
- 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 (in-lb) or 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-AWG and 12-AWG wires
- Tape measure and level

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

Unpacking and Verifying the Shipped Contents

When you receive your chassis, perform the following steps:

Procedure

Step 1 Inspect the box for any shipping damage. If there is obvious physical damage, contact your Cisco service representative.

Step 2 Unpack the Cisco ASR 920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M Router.

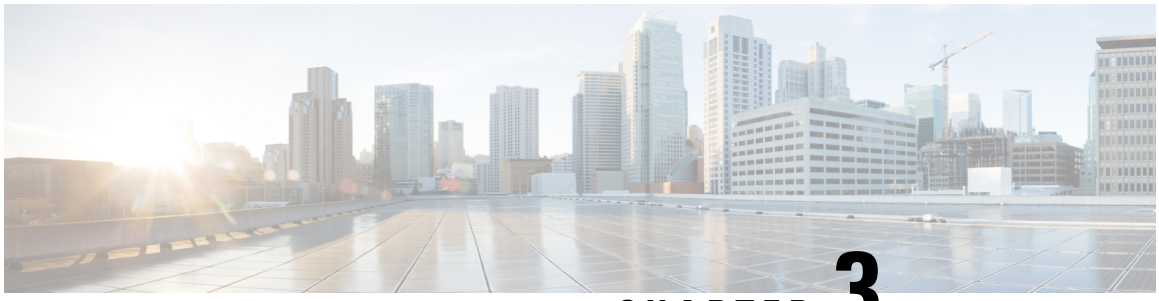
Step 3 Perform a visual inspection of the chassis.

Step 4 Use the table below to check the contents of the Cisco ASR 920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M Router shipping container. Do not discard the shipping container. You will need the container if you move or ship the Cisco ASR 920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M Router in the future.

Table 16: Cisco ASR 920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M Router Default Shipping Container Contents

Component	Description
Chassis (PID: ASR-920-12SZ-IM)	Cisco ASR 920 Series Router chassis Fan tray (PID: ASR-920-FAN-TRAY). By default, the fan tray is installed in the chassis.
Accessories kit	Chassis rack-mount brackets (19-inch EIA) with eight screws
	Two cable guides with two screws
	One earth lug with two 10-32 screws
	USB Type-A to USB Type-A Male cable
	PSU dummy cover (ASR920-PWR-BLANK)
	IM dummy cover (ASR900-IMA-BLANK)
ESD, wrist strap (disposable)	One disposable wrist strap (optional)
Documentation	Cisco ASR 920 Series Router Pointer Card
Optional equipment	Check the container for the following optional equipment: • AC and DC power supplies **Note** The AC and DC power supplies are provided as ordered. • Power cord if an AC power supply was shipped. There are no cords for the DC power supply units. **Note** If you do not specify the type of power cable, US power cable for the AC router variant is supplied.

Note
Most Cisco documentation is available online. The Cisco ASR 920 Series Aggregation Services Router Pointer Card that is shipped with your Cisco ASR 920 Series Router contains links and information about the various documents that are available online.



CHAPTER 3

Installing the Cisco ASR 920 Series Router

This chapter describes how to install the router and includes the following sections:

- Prerequisites, on page 43
- Installing the Router in a Rack, on page 44
- Mounting the Router in a Rack, on page 49
- Installing the Router Chassis in the Rack, on page 49
- Attaching the Cable Guides, on page 50
- Wall Mounting the Router, on page 52
- Installing and Removing SFP Modules, on page 55
- Connecting to the Copper Ports, on page 57
- Installing the Chassis Ground Connection, on page 59
- Installing and Removing the Fan Tray, on page 61
- Interface Module Installation, on page 64
- Installing Patch Panel, on page 64
- Install 3G Patch Panel, on page 74
- Patch Panel Dimensions, on page 96
- Patch Panel Pinout, on page 100
- Panel and Bracket, on page 101
- Installing the Power Supply, on page 101
- Connecting the Router to the Network, on page 112

Prerequisites

Before installing the router, it is important to prepare for the installation by:

- Preparing the site (site planning) and reviewing the installation plans or method of procedures (MOP). See *Site Planning* section.
- Unpacking and inspecting the router. See *Chassis-Lifting Guidelines* section.
- Gathering the tools and test equipment required to properly install the router. See *Tools and Equipment* section.

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

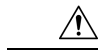
Installing the Router in a Rack

Each Cisco ASR 920 Series Aggregation Services Router router includes rack-mounting brackets. Using the rack-mounting brackets, you can mount the router in a 19-inch, 23-inch, or an ETSI rack that conforms to the EIA-310-D specification.

Using the two rack-mounting brackets for mounting, you can recess the router in the equipment rack. This arrangement provides extra space in front of the router for the cables and allows you to close the doors of racks equipped with front-close doors.

To attach or replace the rack-mounting brackets, see the *Attaching Brackets to the Router* section.

The rack-mounting brackets are slotted to allow the router to be mounted in racks with EIA 1.25-inch (3.175-cm) or WECO 1.0-inch (2.54-cm) hole spacing. When installed in the rack, the router requires one EIA 1.75-inch (4.4-cm) vertical mounting space (or 1 rack unit [RU]) for mounting (see the *Mounting the Router in a Rack* section).



Caution Allow clearance on either side of the router for cooling air to be drawn in through the right side and circulated through the chassis and out the three-fan exhaust ports mounted on the other side of chassis.

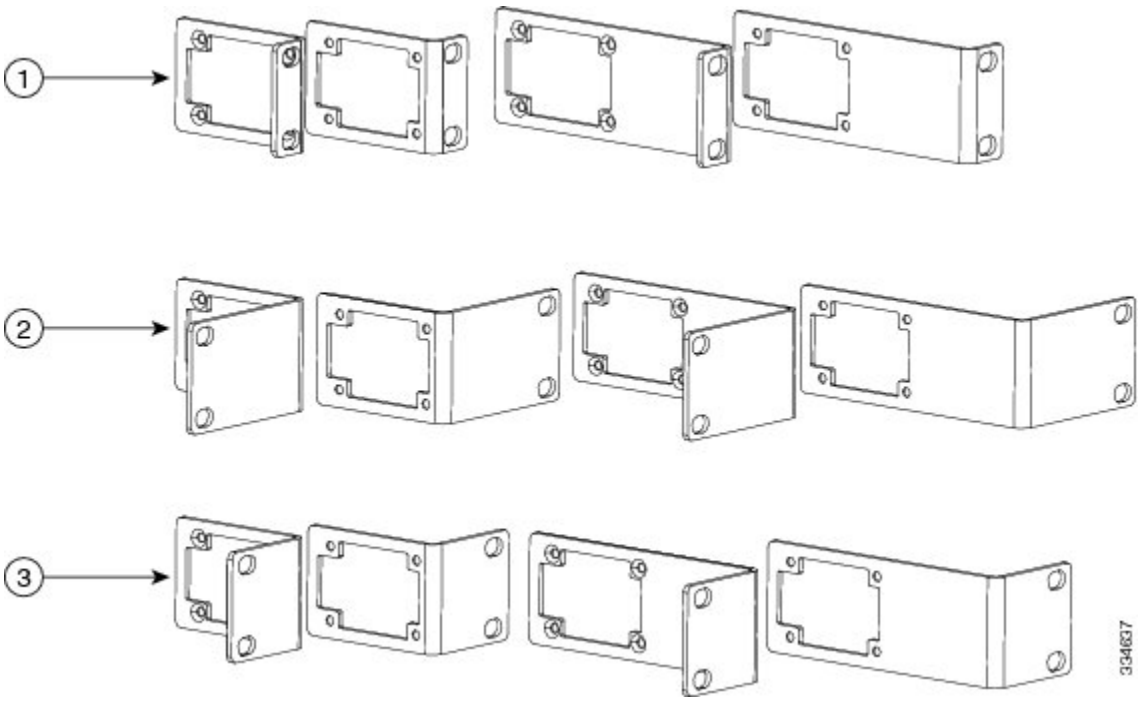
The sections describe how to install the router in a rack. The procedures in this section apply to both horizontal and vertical mounting of the router in a rack:

Attaching Brackets to the Router

Ensure that you use screws that is provided with the rack mount bracket only. Screw should be secured only with the rack mount bracket in place.

The bracket orientation and the brackets that you use depend on whether you are attaching the brackets for a 19-inch, 23-inch, or an ETSI rack. The following figure shows the types of mounting brackets.

Figure 17: Rack-Mounting Brackets



1	19-inch brackets	2	23-inch brackets
3	ETSI-rack brackets	—	—

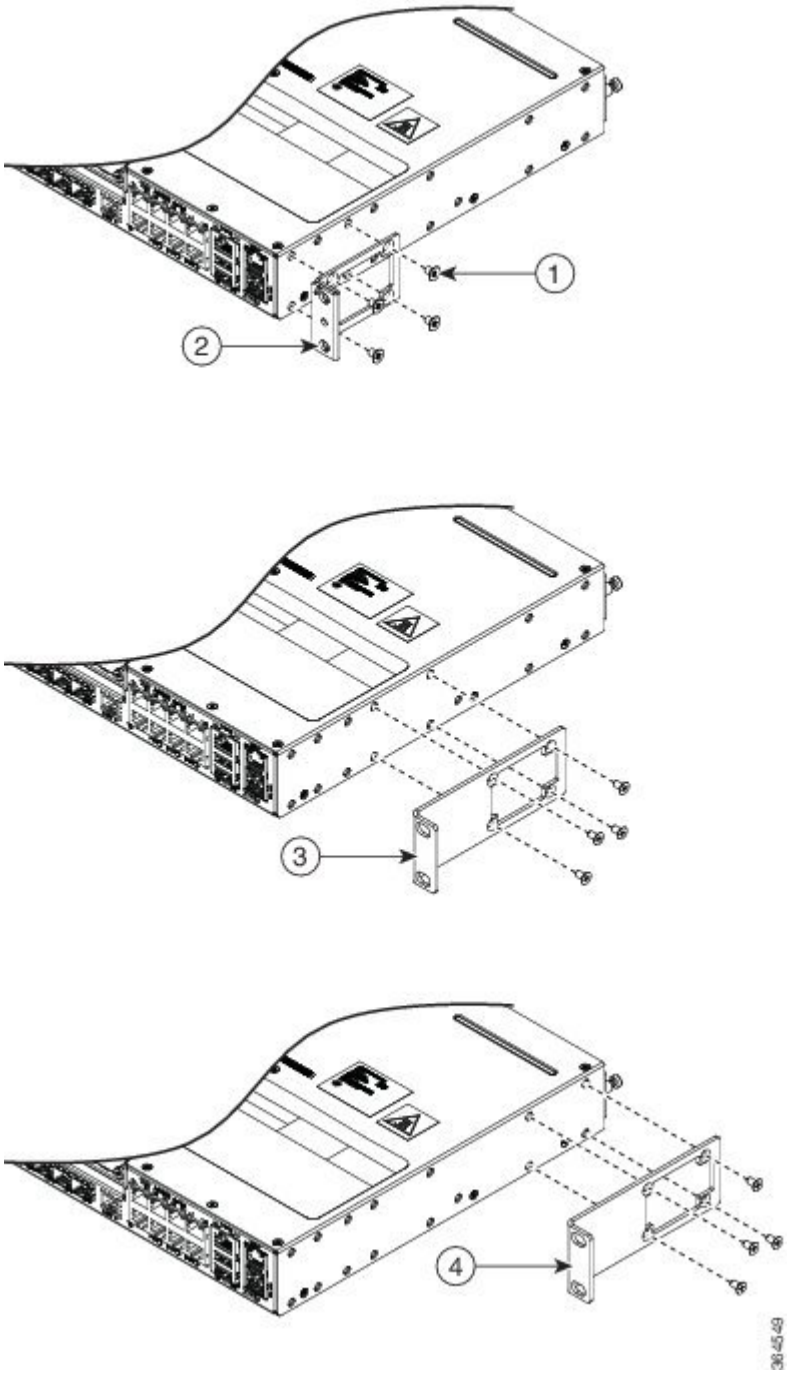
- For 19-inch racks, use part number 700-39959-01 (see *Attaching Brackets for 19-Inch Racks* section).
- For 23-inch racks, use part number 700-40065-01 (see *Attaching Brackets for 23-Inch Racks* section).
- For ETSI racks, use part number 700-40067-01 (see *Attaching Brackets for ETSI Racks* section).

Note The bracket mounting screws are pre-installed on the router. Depending on the bracket mounting position of the chassis, you must remove the appropriate screws, fix the bracket, and install the screws again.

Attaching Brackets for 19-Inch Racks

The following figure shows how to attach brackets for 19-inch racks on the router.

Figure 18: Attaching Brackets for 19-Inch Racks

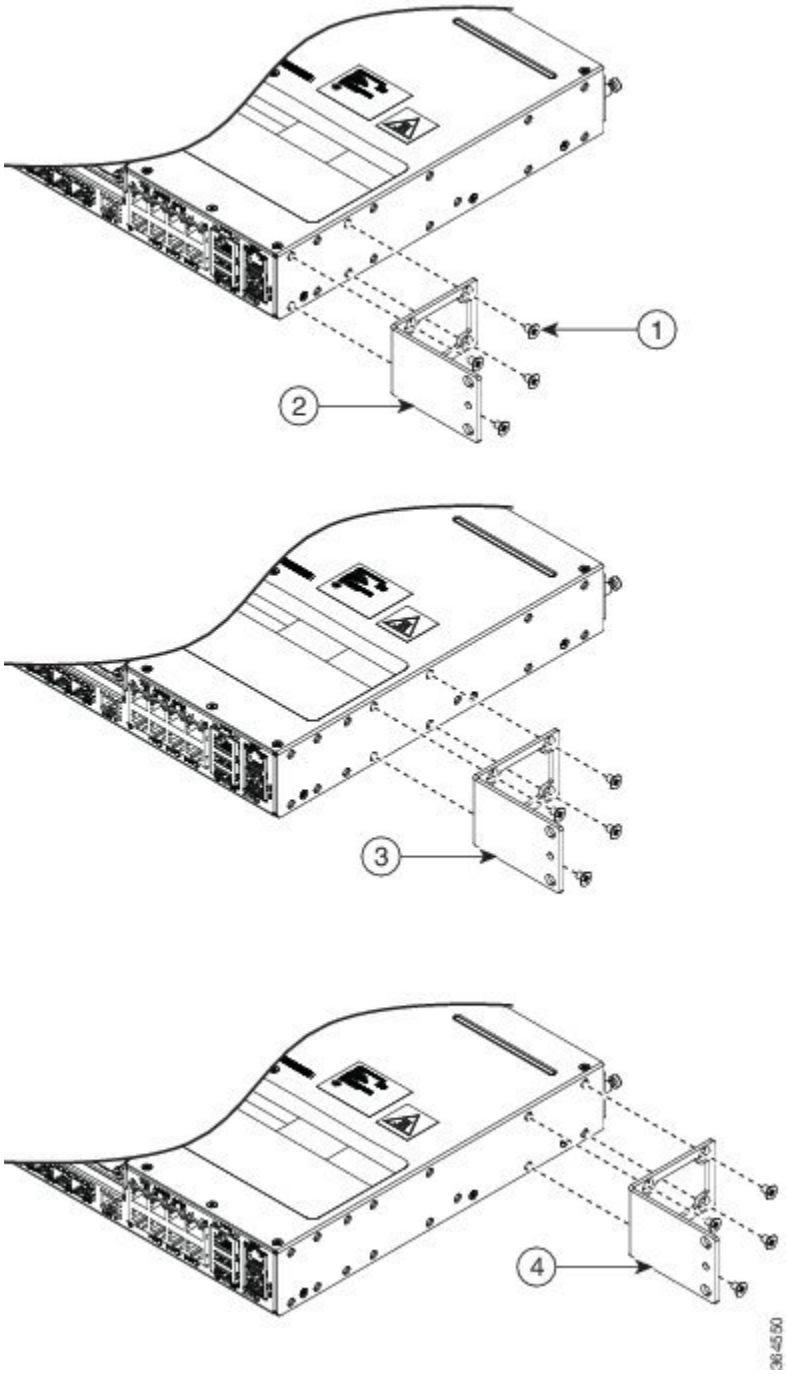


1	Phillips flat-head screws	2	Front-mounting position
3	Mid-mounting position	4	Rear-mounting position

Attaching Brackets for 23-Inch Racks

The following figure shows how to attach brackets for 23-inch racks on the router.

Figure 19: Attaching Brackets for 23-Inch Racks



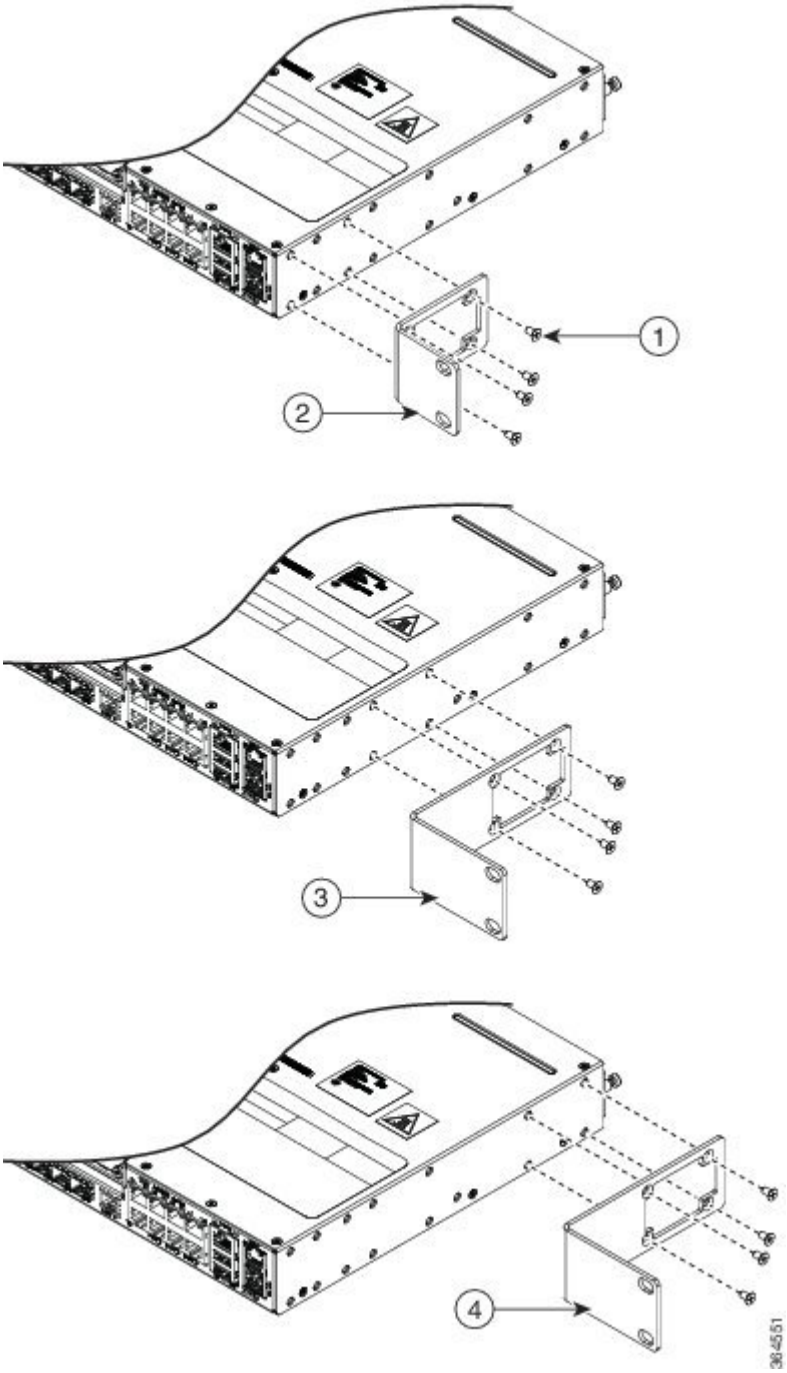
1	Phillips flat-head screws	2	Front-mounting position

3	Mid-mounting position	4	Rear-mounting position

Attaching Brackets for ETSI Racks

The following figure shows how to attach brackets for ETSI racks on the router.

Figure 20: Attaching Brackets for ETSI Racks



1	Phillips flat-head screws	2	Front-mounting position
3	Mid-mounting position	4	Rear-mounting position

Mounting the Router in a Rack

Perform the steps given below to mount the router into the equipment rack.

Note To secure the router to the equipment rack, you must use the two mounting screws (provided) for each side or follow your local practices for installing the router into your equipment rack. Ensure that the rack-mount brackets are securely fastened. For more information, see the *Attaching Brackets to the Router* section.

Procedure

Step 1 Locate the equipment rack position where you plan to install the router.

Step 2 Verify that there are no obstructions and ensure that the equipment rack is stabilized.

Step 3 Determine whether you are mounting the router on a 19-inch, 23-inch, or an ETSI rack. *Rack-Mounting Brackets* figure shows the types of mounting brackets.

Step 4 Determine the mounting position (Front-, Mid-, or Rear-mounting) of the router. (For 19-inch racks, see *Attaching Brackets for 19-Inch Racks* section. For 23-inch racks, see *Attaching Brackets for 23-Inch Racks* section. For ETSI racks, see *Attaching Brackets for ETSI Racks* section.)

Step 5 Locate the mounting holes of the router.

Step 6 Align the rack-mounting bracket with the router and position with the four #6-32 x 0.25-inch screws (provided).

Step 7 Insert the screws (four places) and tighten using a Number 2 Phillips screwdriver (each side).

Step 8 Position the router in the equipment rack lining up the bracket holes on the router with the holes on the rack and secure with four #6-32 x 0.25-inch mounting screws (two on each side).

Step 9 Tighten the screws using a 1/4-inch flat-blade screwdriver (each side). The recommended maximum torque is 10 in.-lb.

Installing the Router Chassis in the Rack

Note Ensure adequate air flow when mounting the router in a rack. For more information, see the *Air Flow Guidelines* section in the *Cisco ASR-920-12SZ-IM and ASR-920U-12SZ-IM Aggregation Services Router Hardware Installation Guide*.

Note Install the cable guides before installing the router in a 19-inch EIA rack. See the *Attaching the Cable Guides* section in the *Cisco ASR-920-12SZ-IM and ASR-920U-12SZ-IM Aggregation Services Router Hardware Installation Guide*.

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

Procedure

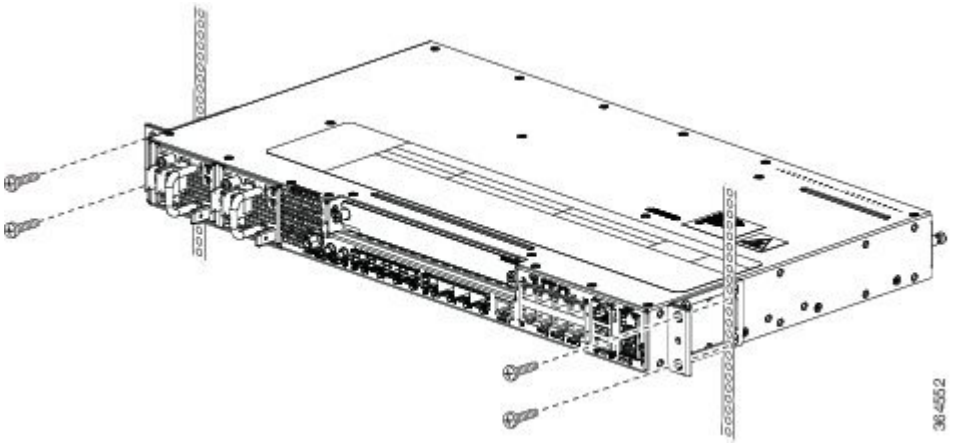
Step 1 Position the chassis in the rack as follows:

- If the front of the chassis (front panel) is at the front of the rack, insert the rear of the chassis between the mounting posts.
- If the rear of the chassis is at the front of the rack, insert the front of the chassis between the mounting posts.

Step 2 Align the mounting holes in the bracket (and optional cable guide) with the mounting holes in the equipment rack.

The following figure shows how to install the router in a 19-inch EIA rack.

Figure 21: Installing the Chassis in a 19-inch EIA Rack



Step 3 Install the four M6x12mm zinc-plated steel screws through the holes in the bracket and into the threaded holes in the equipment rack posts.

Step 4 Use a tape measure and level to verify that the chassis is installed straight and level.

Attaching the Cable Guides

The Cisco ASR 920 Series Router supports the following cable guides:

- A920-CBL-GUIDE (left and right)—help in routing the cables from all components on the front panel thereby enabling a proper cable-bending radius.

Note If the chassis is mounted using 19-inch brackets, you must assemble the cable guides before installing the chassis on the rack.

To install the cable guides, perform these steps:

Procedure

Step 1 Position the cable guide-left and cable guide-right against the front of the chassis and align the four screw holes, as shown in the following figure.

Figure 22: Cable Guide Installation For 19-inch Rack Brackets

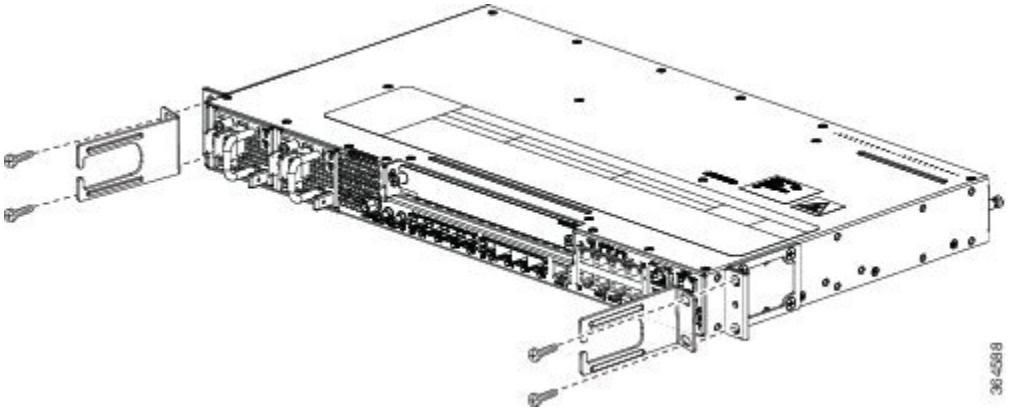
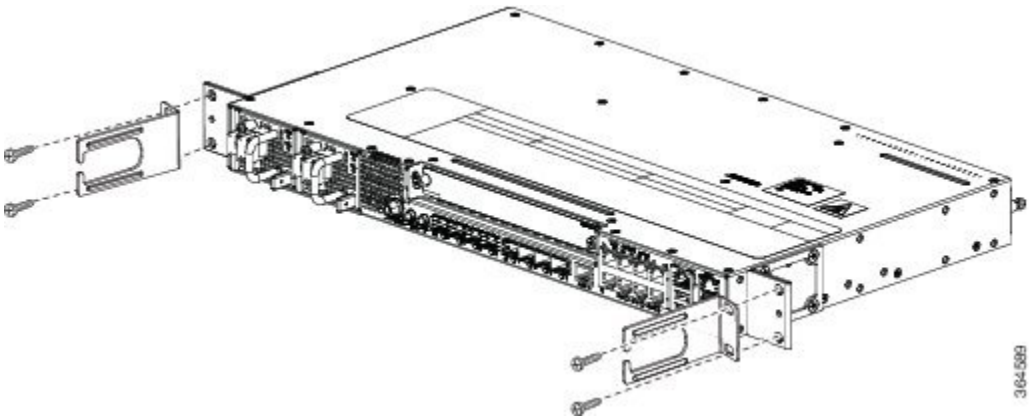
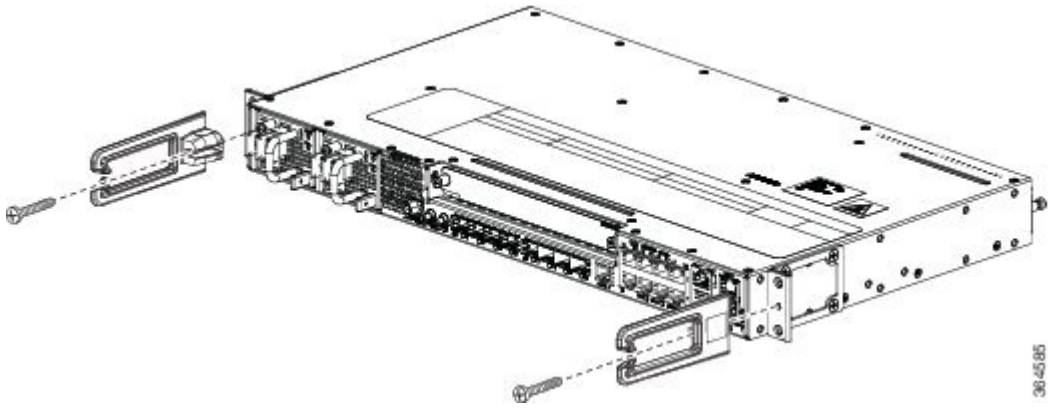


Figure 23: Cable Guide Installation For ETSI Rack Brackets



Step 2 Secure the cable guides with the four M6x12mm screws supplied with the cable kit. The recommended maximum torque is 3N-m.

Figure 24: Installing the Cable Guides (As Per the Standard Kit)



Wall Mounting the Router

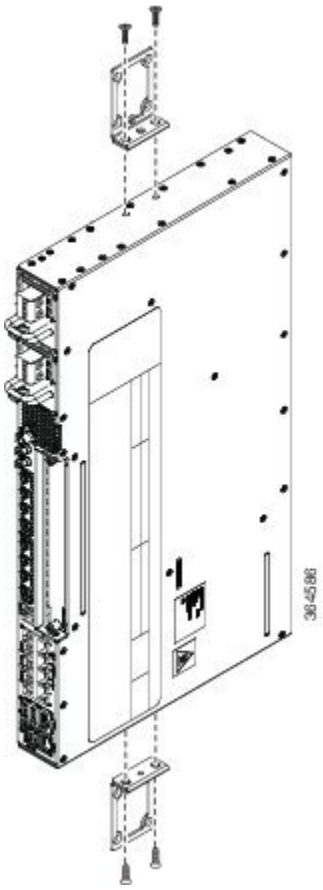
To install the router on a wall, follow the instructions in these procedures:

Attaching the Brackets to the Router for Wall-Mounting

Note While wall mounting the router, always ensure that the power supplies are at the top position.

The following figure shows how to attach a 19-inch bracket to one side of the router. Follow the same steps to attach the second bracket to the opposite side.

Figure 25: Attaching 19-inch Brackets for Wall Mounting



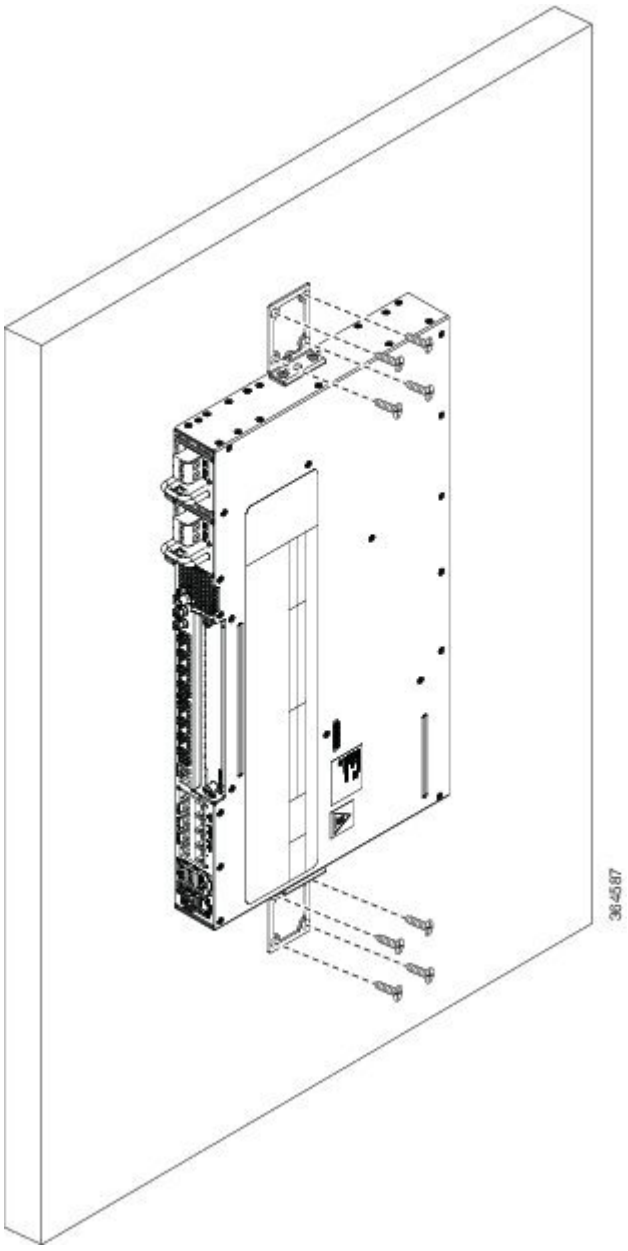
Mounting Router on the Wall

For the best support of the router and cables, ensure the router is attached securely to wall studs or to a firmly attached plywood mounting backboard.

Warning Suitable for mounting on and over a concrete or other non-combustible surface only. Statement 345

Mount the router with the front panel as shown in the following figure.

Figure 26: Mounting the Router on the Wall



Caution When mounting the router vertically, ensure that the power supplies are at the top.

Installing and Removing SFP Modules

These sections describe how to install and remove SFP modules. The modules are inserted into the SFP module slots as depicted in *Installing an SFP Module into an SFP Module Slot* figure. These field-replaceable modules provide interfaces.

Each port must match the wavelength specifications on the other end of the cable. For reliable communications, the cable must not exceed the stipulated cable length.

Use only Cisco SFP modules on the Cisco router. Each SFP module has an internal serial EEPROM that is encoded with security information. This encoding provides a way for Cisco to identify and validate that the SFP module meets the requirements for the router.

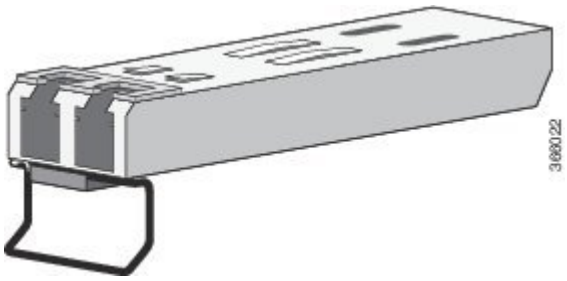
For detailed instructions on installing, removing, and cabling the SFP module, see the SFP module documentation.

Installing SFP Modules

The following figure shows an SFP module that has a bale-clasp latch.

Caution We strongly recommend that you do not install or remove fiber-optic SFP modules with cables attached because of the potential damage to the cables, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP module.Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules more often than is absolutely necessary.

Figure 27: SFP Module with a Bale-Clasp Latch



To insert an SFP module into the module slot, follow these steps:

Procedure

Step 1 Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.

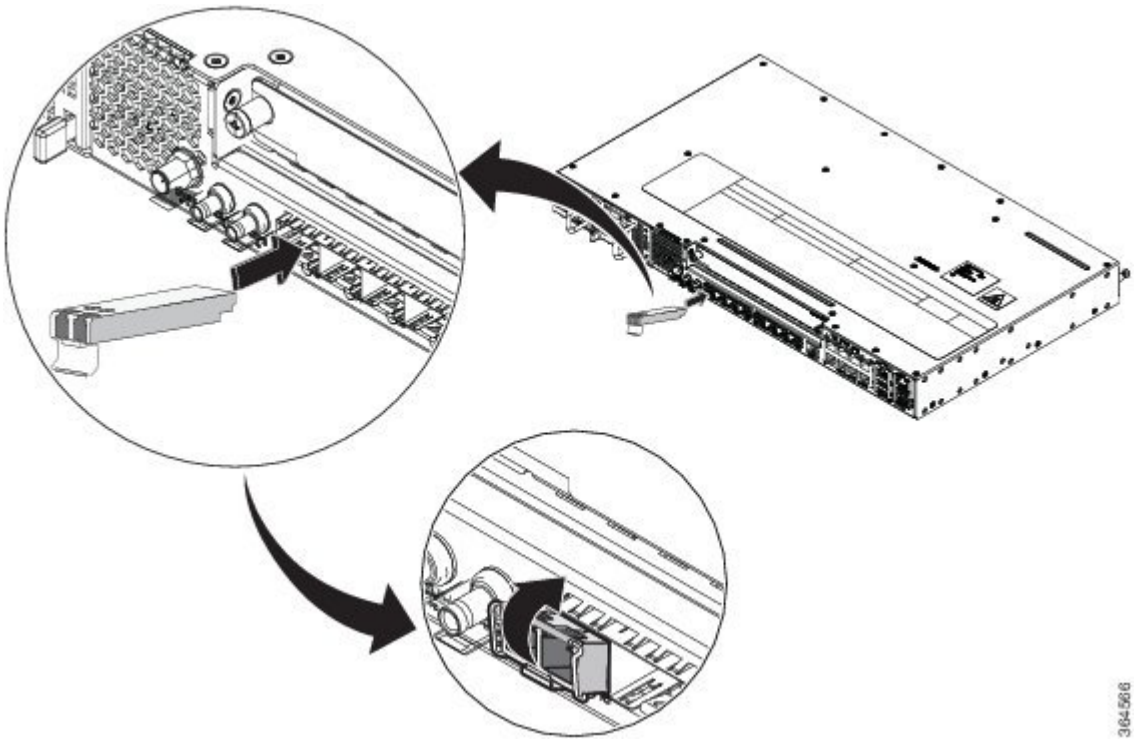
Some SFP modules identify the top side of the module with send (TX) and receive (RX) markings or arrows that show the direction of the connection.

Step 2 If the SFP module that you are using has the markings, use them to identify the top side of the module.

Step 3 Align the SFP module in front of the slot opening.

Step 4 Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the slot.

Figure 28: Installing an SFP Module into an SFP Module Slot



Caution
Do not remove the dust plugs from the fiber-optic SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light. Store the dust plugs for later use.

Step 5 Insert the cable connector into the SFP module:

- For fiber-optic SFP modules, insert the LC cable into the SFP module.
- For copper 1000BASE-T SFP modules, insert the RJ-45 cable connector into the SFP module.

Removing SFP Modules

To remove an SFP module from a module receptacle, follow these steps:

Procedure

Step 1 Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.

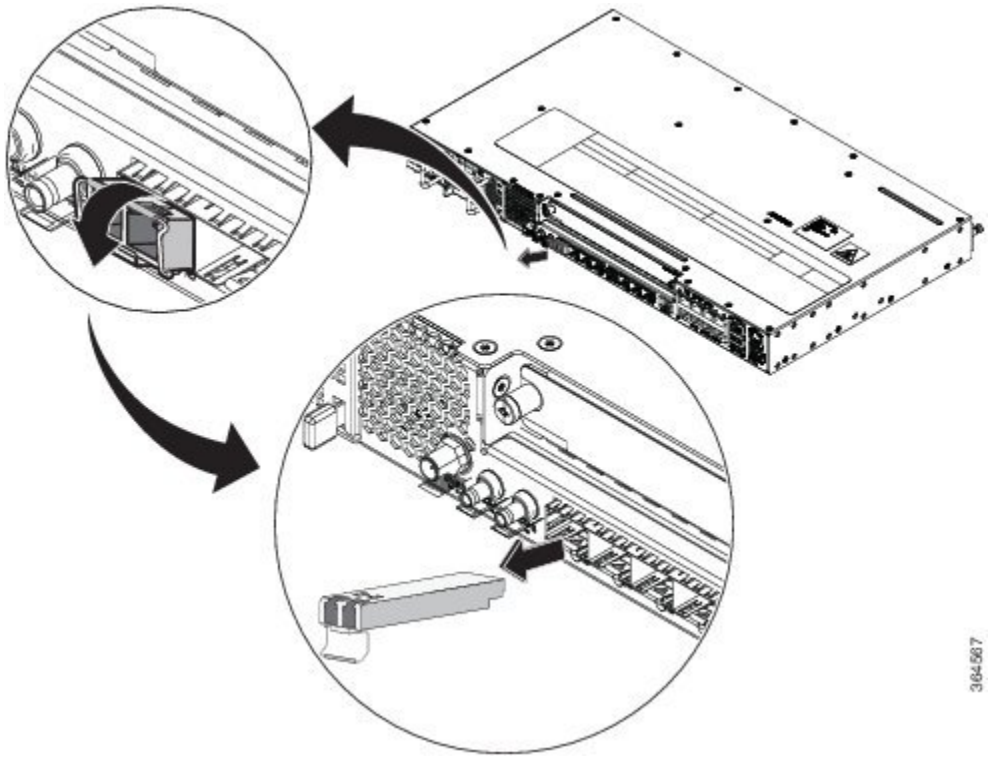
Step 2 Disconnect the cable from the SFP module, and insert a dust plug into the cable end.

Tip
For reattachment, note which cable connector plug is send (TX) and which is receive (RX).

Step 3 Unlock and remove the SFP module, as shown in the following figure.

If the module has a bale-clasp latch, pull the bale out and down to eject the module. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.

Figure 29: Removing a Bale-Clasp Latch SFP Module



Step 4 Grasp the SFP module between your thumb and index finger, and carefully remove it from the module slot.

Step 5 For fiber-optic SFP modules, insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.

Step 6 Place the removed SFP module in an antistatic bag or other protective environment.

Connecting to the Copper Ports

Copper ports [0:7] are capable of working 10/100/1000 Mbps.

Note The router copper ports configure themselves to operate at the speed of attached devices. If the attached ports do not support autonegotiation, you can explicitly set the speed and duplex parameters. Connecting devices that do not autonegotiate or that have their speed and duplex parameters manually set can reduce performance or result in no linkage.

To maximize performance, choose one of these methods for configuring the Ethernet ports:

- Let the ports autonegotiate both speed and duplex.
- Set the port speed and duplex parameters on both ends of the connection.

Procedure

Step 1 When connecting to workstations, servers, and routers, connect a straight-through cable to an RJ-45 connector on the front panel.When connecting to routers or repeaters, use a crossover cable.

Note
You can use the **mdix auto** interface configuration command in the CLI to enable the automatic medium-dependent interface crossover (auto-MDIX) feature. When the auto-MDIX feature is enabled, the router detects the required cable type for copper Ethernet connections and configures the interfaces accordingly. Therefore, you can use either a crossover or a straight-through cable for connections to a copper 100/1000, or an SFP module port on the router, regardless of the type of device on the other end of the connection.

Step 2 Connect the other end of the cable to an RJ-45 connector on the other device. The port LED turns on when both the router and the connected device have established link.

If the port LED does not turn on, the device at the other end might not be turned on, or there might be a cable problem or a problem with the adapter installed in the attached device.

Note
On user network interface (UNI) ports, the port LED is green after the link is established.

Step 3 Reconfigure and reboot the connected device, if necessary.

Step 4 Repeat Steps 1 through 3 to connect each device.

Connecting to SFP Modules

This section describes how to connect to SFP modules. For instructions on how to connect to fiber-optic SFP modules, see the *Connecting to Fiber-Optic SFP Modules* section.

For instructions about how to install or remove an SFP module, see the *Installing and Removing SFP Modules* section.

Connecting to Fiber-Optic SFP Modules

Follow these steps to connect a fiber-optic cable to an SFP module:

Danger Class 1 laser product. Statement 1008

Caution Do not remove the rubber plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

Procedure

Step 1 Remove the rubber plugs from the module port and fiber-optic cable, and store them for future use.

Step 2 Insert one end of the fiber-optic cable into the SFP module port.

Step 3 Insert the other cable end into a fiber-optic connector on a target device.

Step 4 Observe the port status LED.

The LED turns green when the router and the target device have an established link.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be problem with the adapter installed in the target device.

Step 5 If necessary, reconfigure and restart the router or target device.

Installing the Chassis Ground Connection

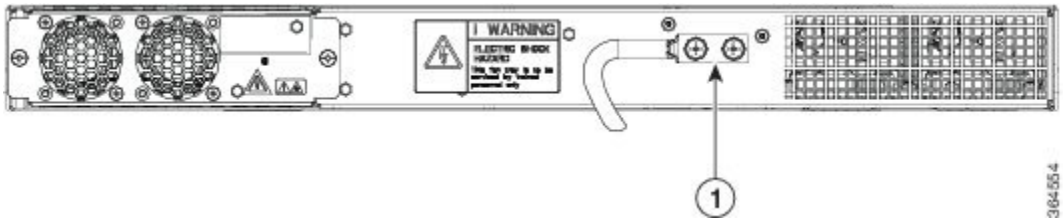
Before you connect the power or turn on the power to the router, you must provide an adequate chassis ground (earth) connection to your router.

Ensure that you secure the lugs only with the Cisco-provided screw. Secure the screws only while assembling the lugs.

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

Tip Ensure that the grounding lug wire does not cover the fan opening.

Figure 30: Attaching a Grounding Lug to the Rear of the Router



1	Grounding-lug

To ensure that the chassis ground connection that you provide is adequate, you need the following parts and tools:

- Ratcheting torque screwdriver with Phillips head that exerts up to 15 in.-lb (1.69 N-m) of torque for attaching the ground wire to the router
- Crimping tool as specified by the ground lug manufacturer
- 6-AWG or larger copper wire for the ground wire
- Wire-stripping tools appropriate to the wire you are using

Caution Before making connections to the router, ensure that you disconnect the power at the circuit breaker. Otherwise, severe injury to you or damage to the router may occur.

Caution Electric Shock Hazard: This fan tray has to be serviced by trained personnel only.

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

Warning Use copper conductors only. Statement 1025

Warning When installing the unit, the ground connection must always be made first and disconnected last. Statement 42

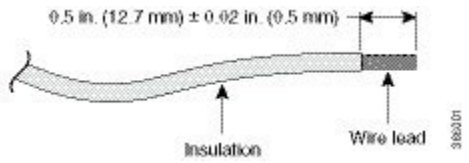
This unit is to be installed in a restrictive access location and must be permanently grounded to a minimum 6-AWG copper ground wire.

Perform the following procedure to ground the router using a 2-hole lug and the corresponding mounting point. Most carriers require a minimum 6-AWG ground connection. Verify your carrier's requirements for the ground connection.

Procedure

Step 1 If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch ± 0.02 inch (12.7 mm ±0.5 mm).

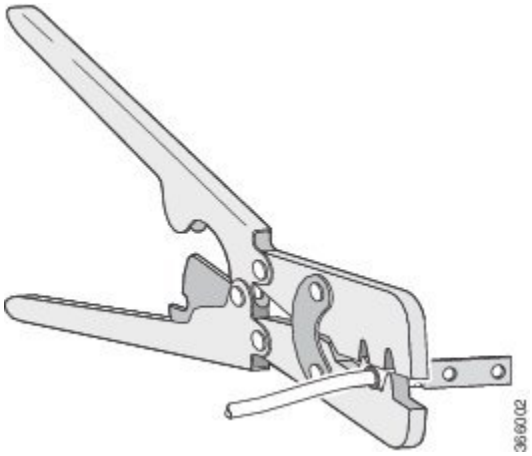
Figure 31: Stripping a Ground Wire



Step 2 Slide the open end of your 2-hole ground lug over the exposed area of the ground wire.

Step 3 Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire as shown in the following figure.

Figure 32: Crimping a Ground Lug on to the Ground Wire



Step 4 Use a Phillips head screwdriver to attach the 2-hole ground lug and wire assembly to the router with the 2 pan-head Phillips head screws.

Step 5 Connect the other end of the ground wire to a suitable grounding point at your site.

Installing and Removing the Fan Tray

This section describes how to install and remove fan trays.

Installing the Fan Tray

Follow these steps to install the fan tray in the chassis:

Caution Electric Shock Hazard: This fan tray has to be serviced by trained personnel only.

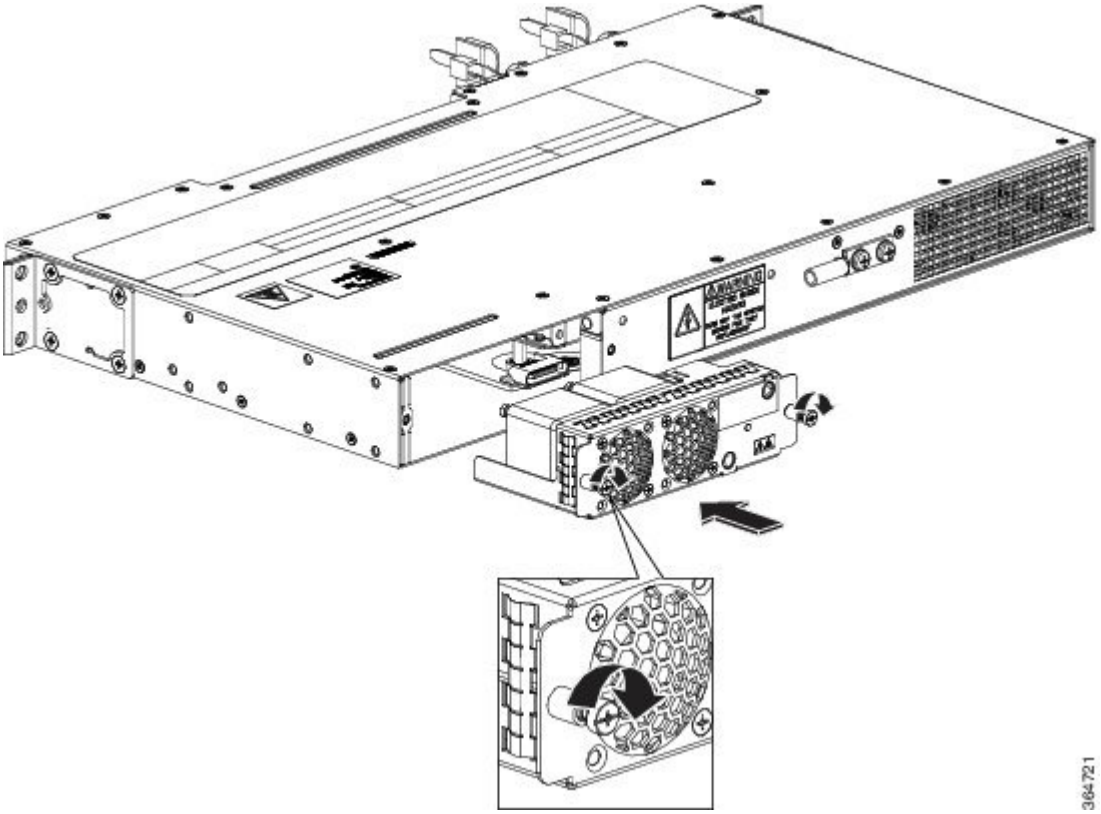
Caution Always wear the ESD wrist strap when installing or uninstalling the fan tray.

Caution Unplug all power sources before performing this procedure.

Procedure

Step 1 Orient the fan tray so that the captive screws are aligned to the chassis cavity on the back panel. See the following figure.

Figure 33: Installing the Fan Tray in the Chassis



Step 2 Push the fan assembly into the chassis until the power connector seats in the backplane and the captive installation screws make contact with the chassis.

Step 3 Tighten the captive installation screws, using a flat-blade or number 2 Phillips-head screwdriver.

Removing the Fan Tray

To remove the existing fan assembly, follow these steps:

Caution When removing the fan tray, keep your hands and fingers away from the spinning fan blades. Let the fan blades stop completely before you remove the fan tray.

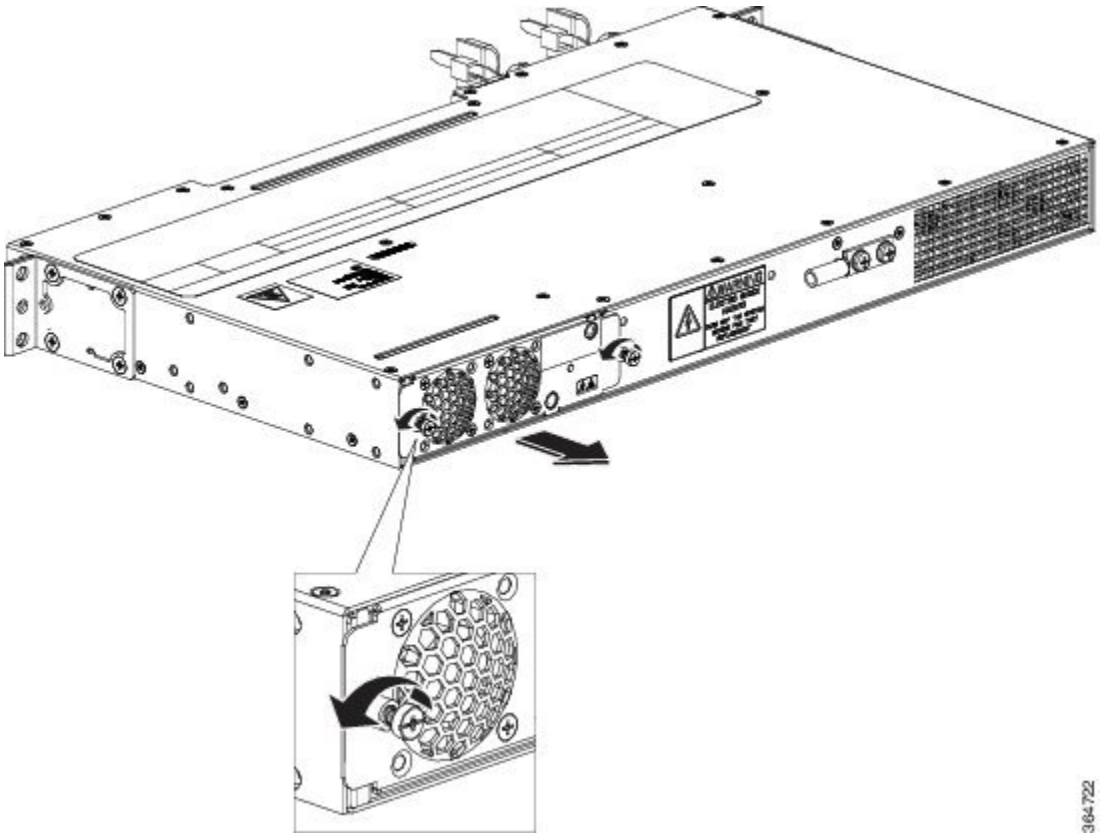
Caution Unplug all power sources before performing this procedure.

Caution Always wear the ESD wrist strap when installing or uninstalling the fan tray.

Procedure

Step 1 Locate the fan assembly in the chassis. The fan tray is located to the left of the chassis on the rear side. See the following figure.

Figure 34: Uninstalling the Fan Tray from the Chassis



Step 2 Loosen the two fan tray captive installation screws by turning them counterclockwise, using a flat-blade or number 2 Phillips-head screwdriver.

Step 3 Grasp the fan assembly with both hands, and pull it outward; rock it gently, if necessary, to unseat the fan assembly power connector from the backplane.

Step 4 Pull the fan assembly clear of the chassis, and set it aside.

Interface Module Installation

The following sections describe the various tasks of associated with interface module installation:

Installing an Interface Module

⚠

Caution Before inserting an interface module, make sure that the chassis is grounded.

Procedure

Step 1 To insert the interface module, carefully align the edges of the interface module between the upper and lower edges of the router slot.

Step 2 Carefully slide the interface module into the router slot until the interface module makes contact with the backplane.

Step 3 Tighten the locking thumbscrews on both sides of the interface module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

Step 4 Connect all the cables to each interface module.

Removing an Interface Module

Procedure

Step 1 To remove an interface module, disconnect all the cables from the interface module.

Step 2 Loosen the locking thumbscrews on both sides of the interface module.

Step 3 Slide the interface module out of the router slot by pulling on the handles. If you are removing a blank filler plate, pull the blank filler plate completely out of the router slot using the captive screws.

Installing Patch Panel

To install the brackets on the rear of the patch panel, perform these steps:

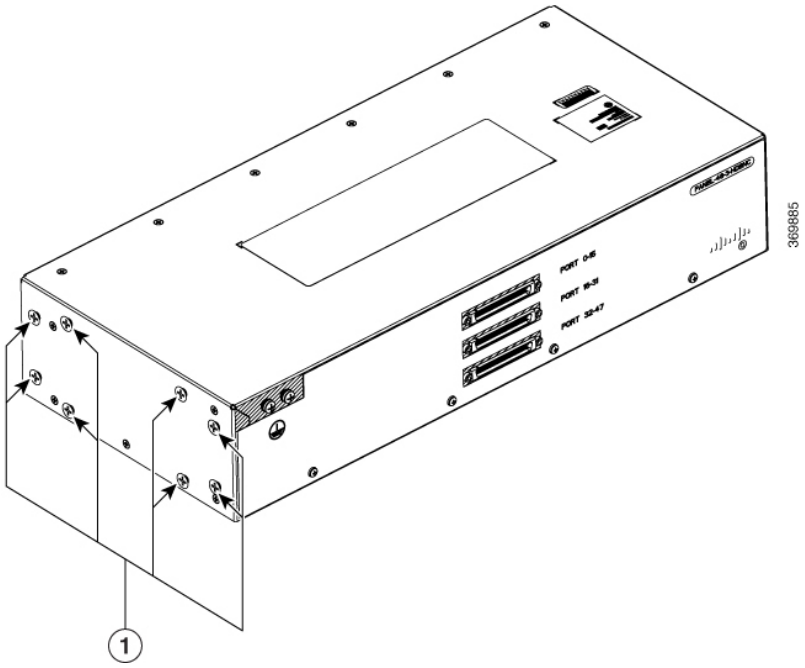
Procedure

Step 1 Remove the larger (M4) rack mount screws (as indicated in the *Rack Mount Screws* figure below) from both sides. To secure the brackets, follow the instructions in Step-3.

Step 2 Remove the patch panel rack-mount brackets from the accessory kit and position them beside the patch panel.

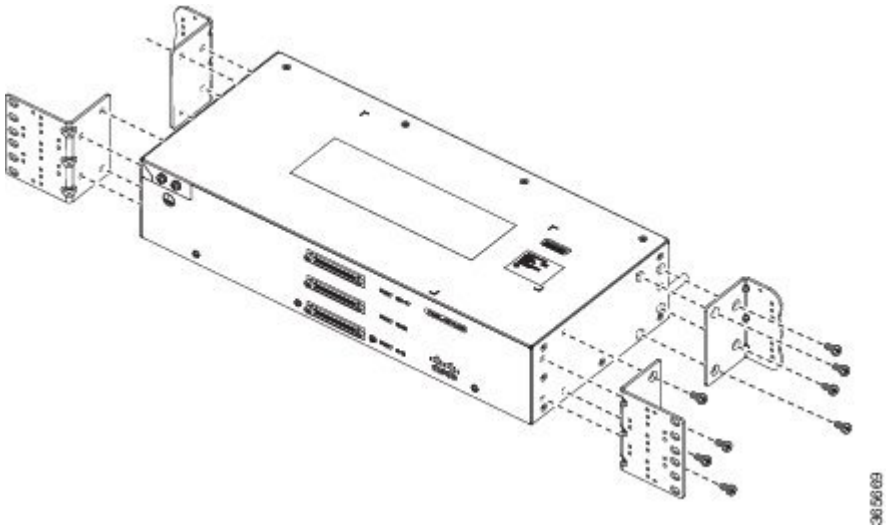
Step 3 Position the brackets against the patch panel sides, and align with the screw holes. Secure the rack mount bracket to patch panel using a torque of 13.2 in.-lb (1.5 N-m) see the figure below.

Figure 35: Rack Mount Screws



(1) Rack mount screws to secure rack mount brackets on both the sides.

Figure 36: Patch Panel Front View with Brackets



Step 4 Position the cable management guides against the mounting brackets on the patch panel, see the figure below.

Figure 37: Patch Panel Front View with Brackets and Guides

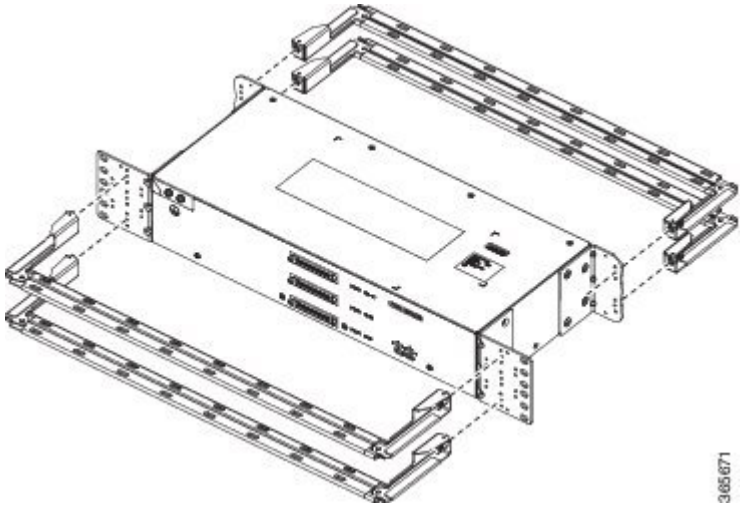
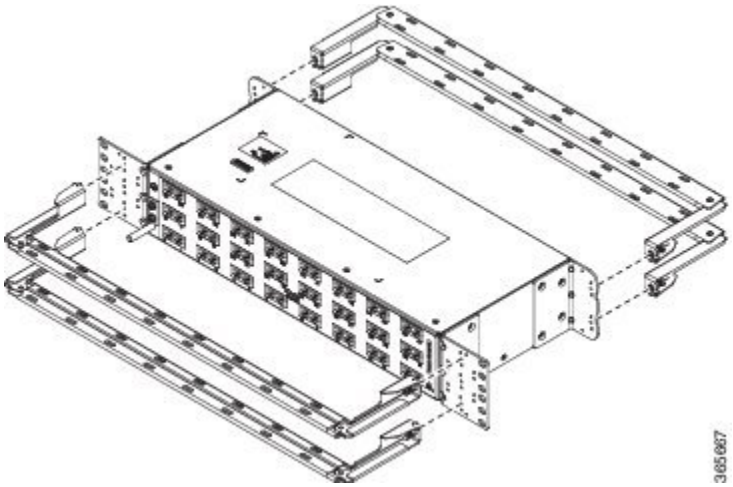


Figure 38: Patch Panel Rear View with Brackets and Guides



Step 5 Secure the guides to the brackets with the screws. The recommended maximum torque is 28 in.-lb (3.16 N-m).

Step 6 **Note**
Cable brackets should be assembled according to the PID used as different PIDs have different set and quantity of brackets. Refer figures 110 to 115 for PID and cable bracket details.

Position the patch panel with brackets and guide onto the rack and secure with screws provided. The recommended maximum torque is 28 in.-lb (3.16 N-m), see the figure below.

Figure 39: Patch Panel Front View with Brackets and Guides Installed on Rack

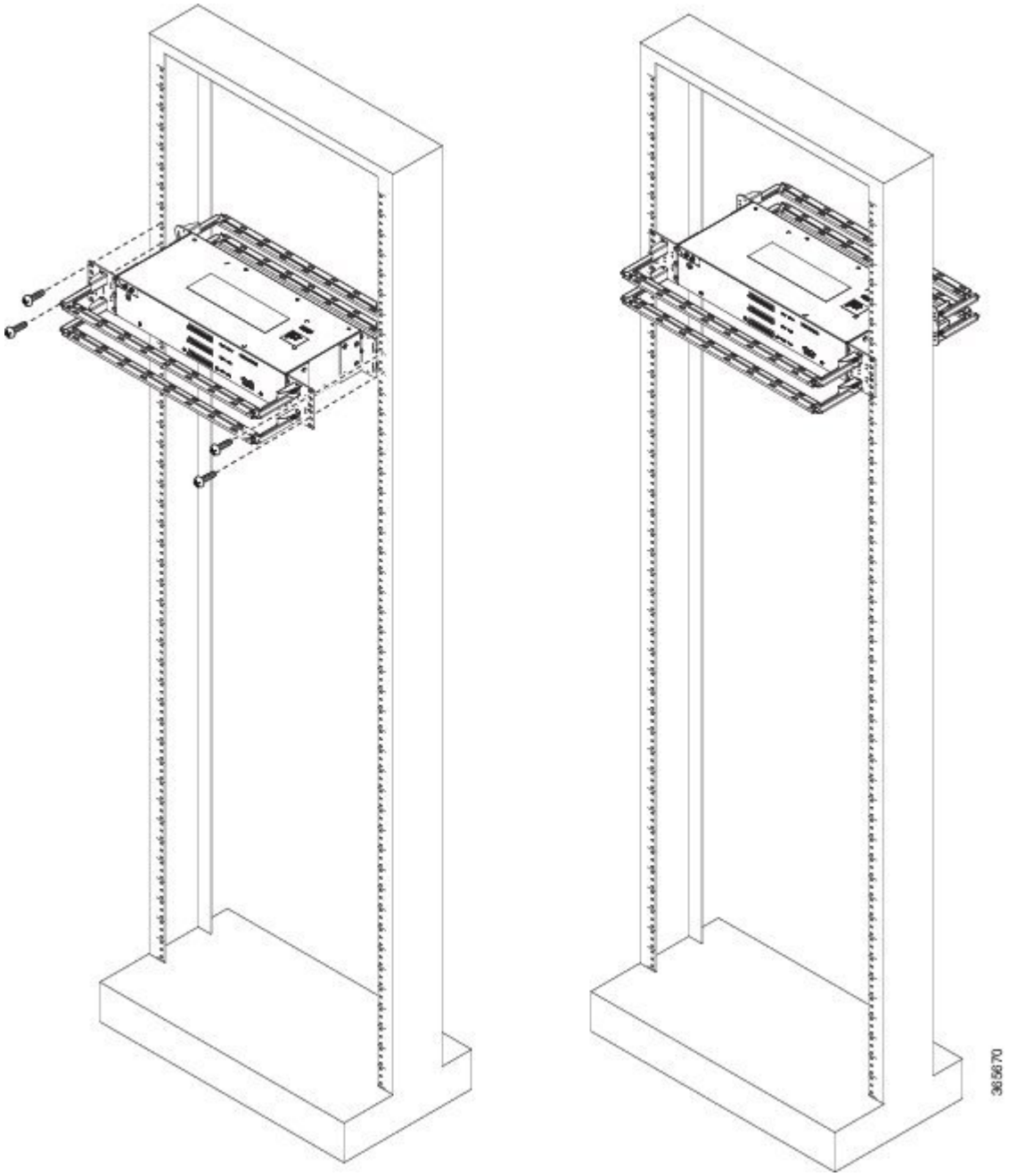


Figure 40: Patch Panel Rear View with Brackets and Guides Installed on Rack

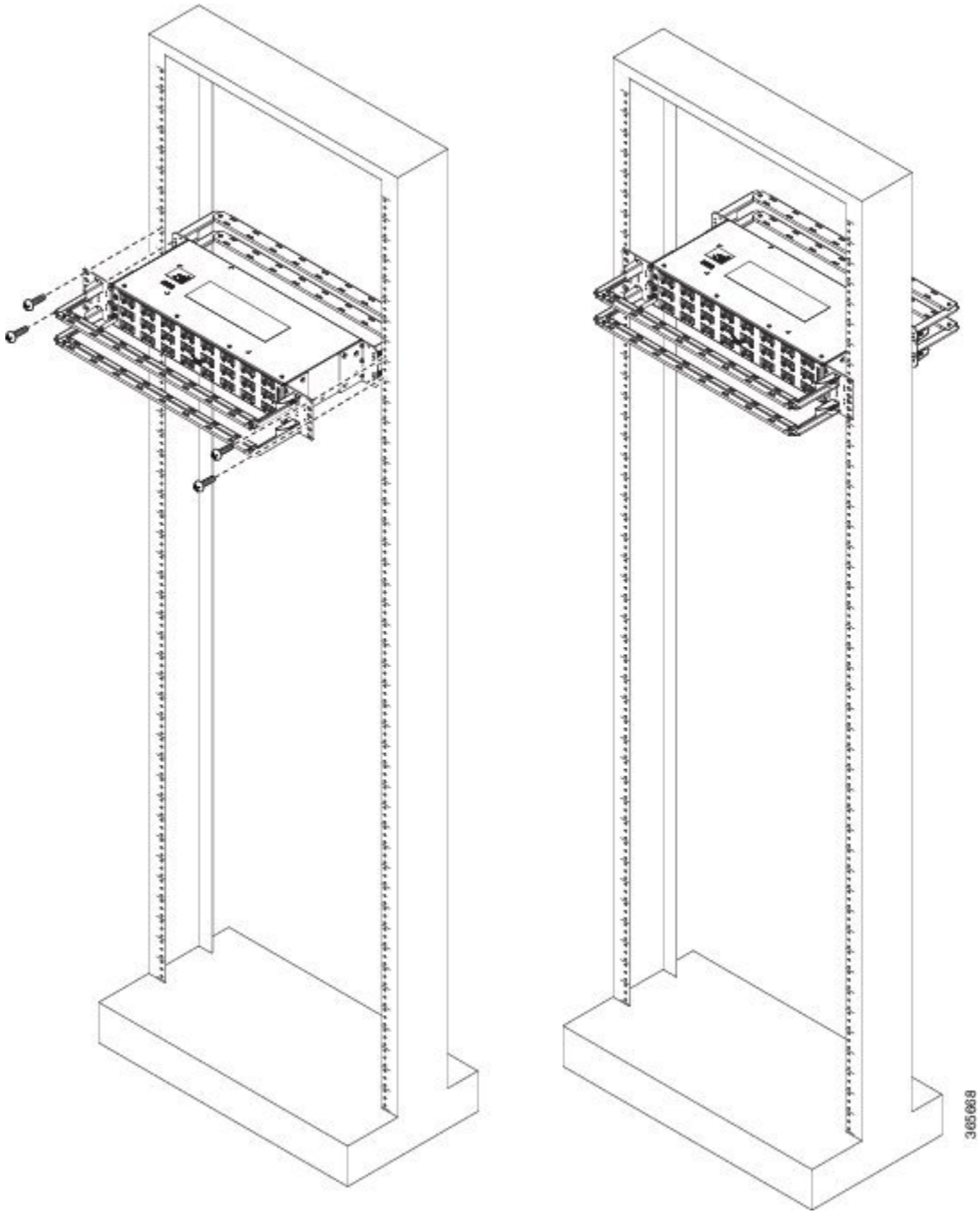


Figure 41: PANEL-16-DIN Patch Panel Mounting Installed on Rack

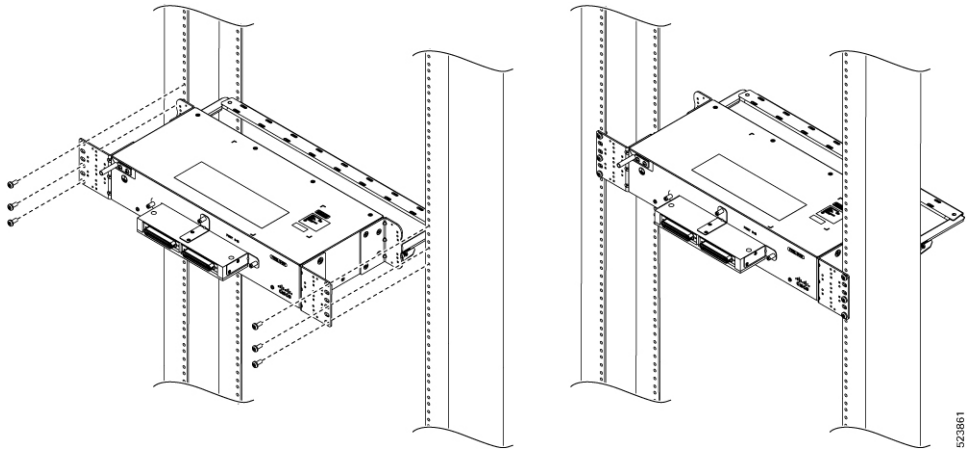


Figure 42: PANEL-48-1-AMP64

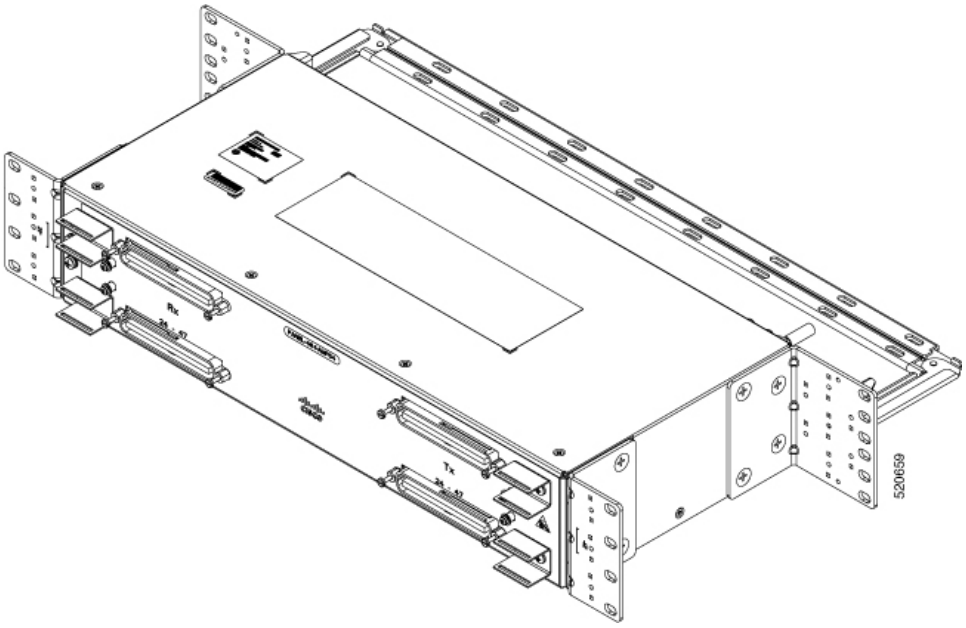


Figure 43: PANEL-48-1-DIN

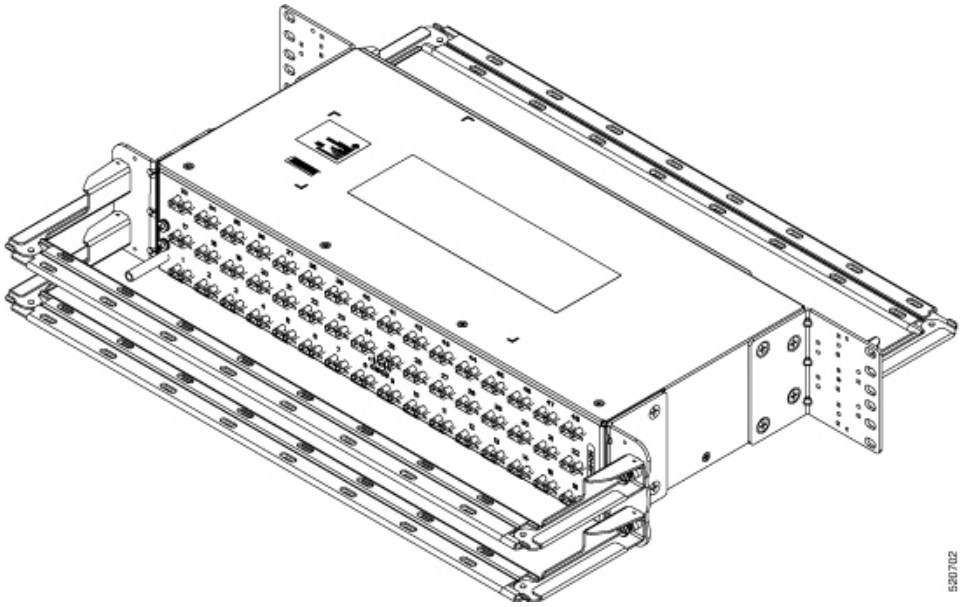


Figure 44: PANEL-48-1-RJ48

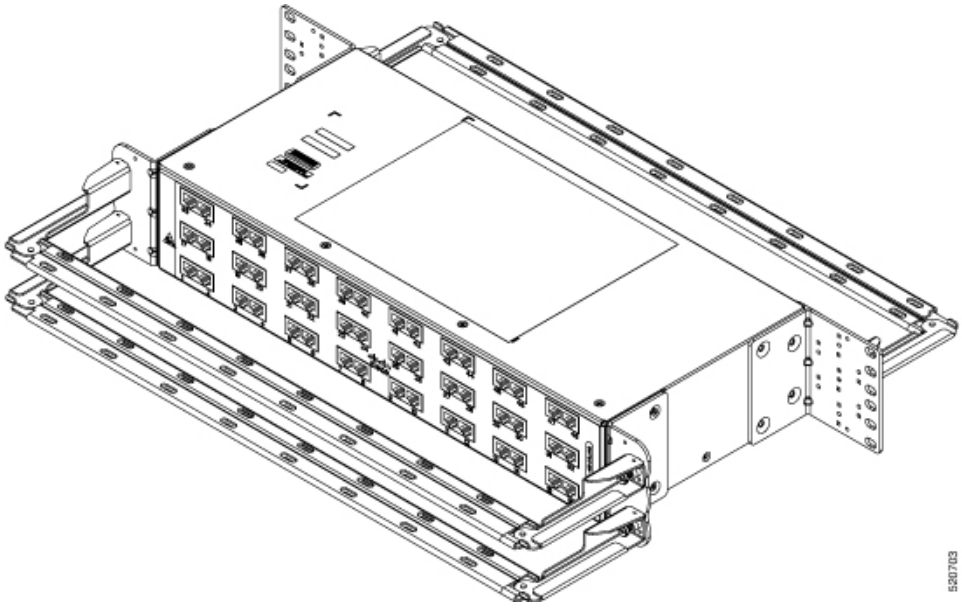
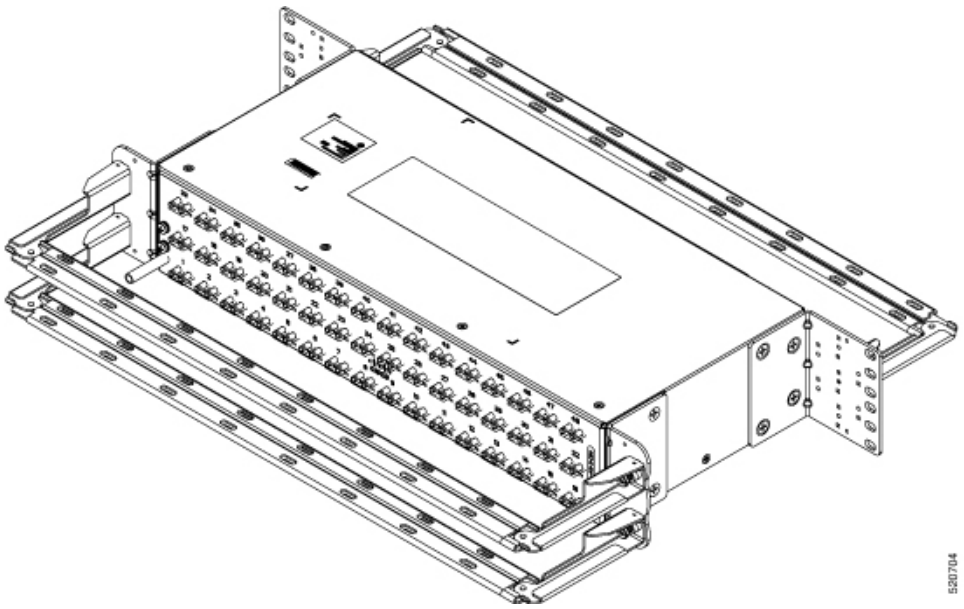


Figure 45: PANEL-48-3-DIN



Note
The installation of PANEL-48-1-AMP64, PANEL-48-1-DIN, PANEL-48-1-RJ48, and PANEL-48-3-DIN is similar to the installation steps mentioned above.

Figure 46: PANEL-48-3-HDBNC

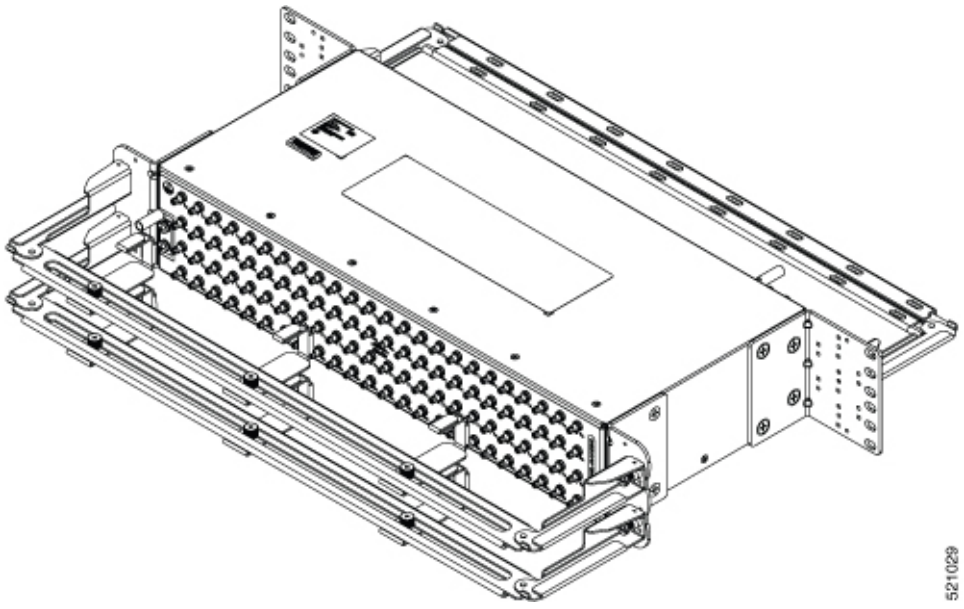


Figure 47: PANEL-144-1-AMP64

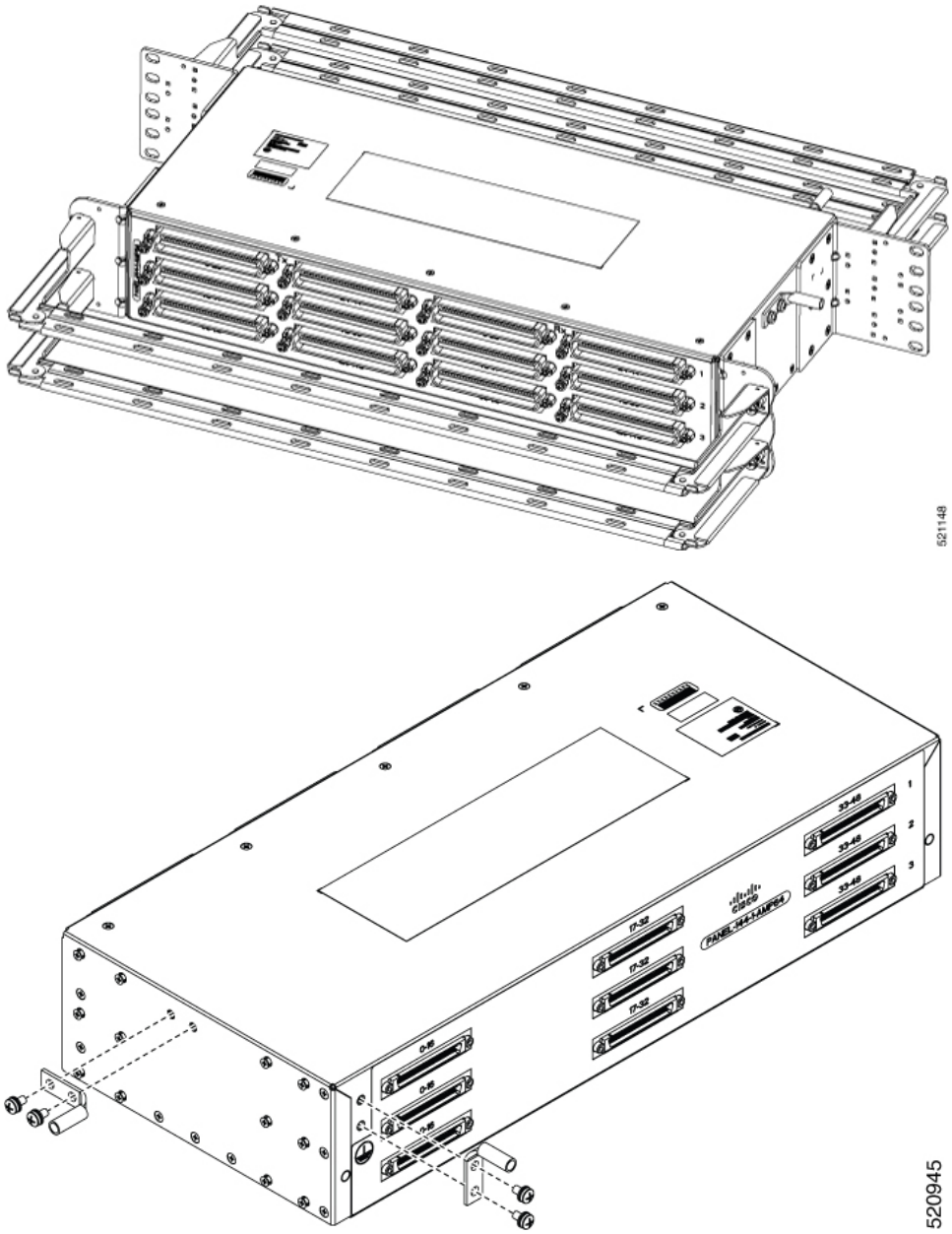
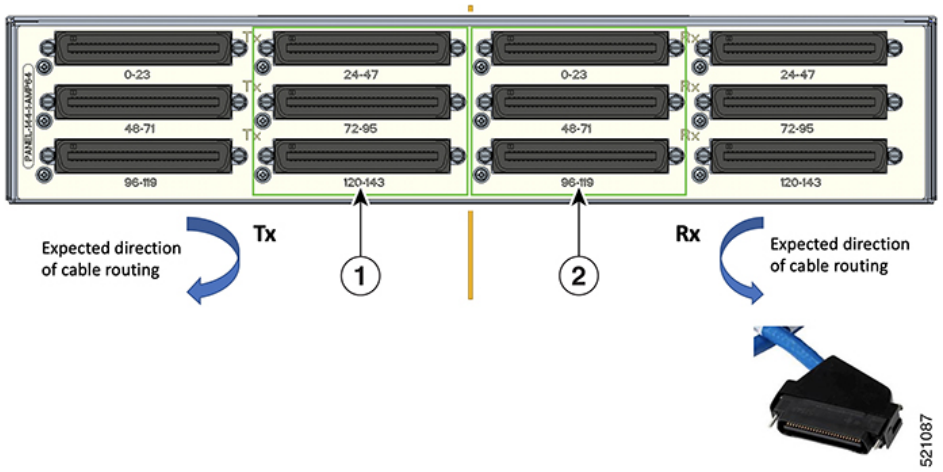


Figure 48: Example of 120° Exit Cable Hood



The following table shows details of the 120° exit cable hood:

Table 17: Cable Routing Recommendation for Panel-144-1-AMP64

1	120° exit cable hood with left routing should be used for centre ports on the Tx side.
2	120° exit cable hood with right routing should be used for centre ports on the Rx side.

Install 3G Patch Panel

You can choose to either set up the Cisco ASR 903 3G patch panel on a rack or wall mount it.

Install Rack Brackets

Procedure

Step 1 Connect the grounding lugs using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire.

Step 2 Use a 6 AWG ground wire to connect the other end to a suitable grounding point at your site.

Figure 49: Patch Panel Grounding - Single

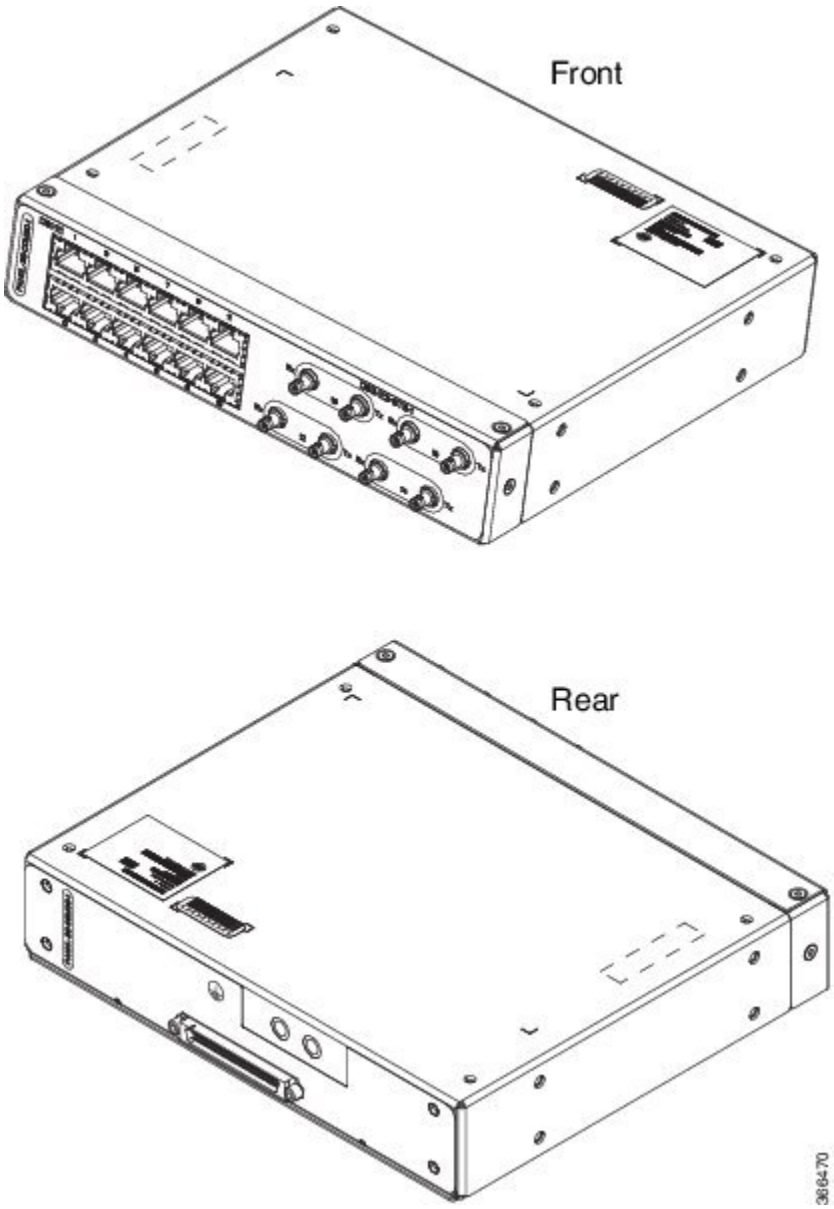
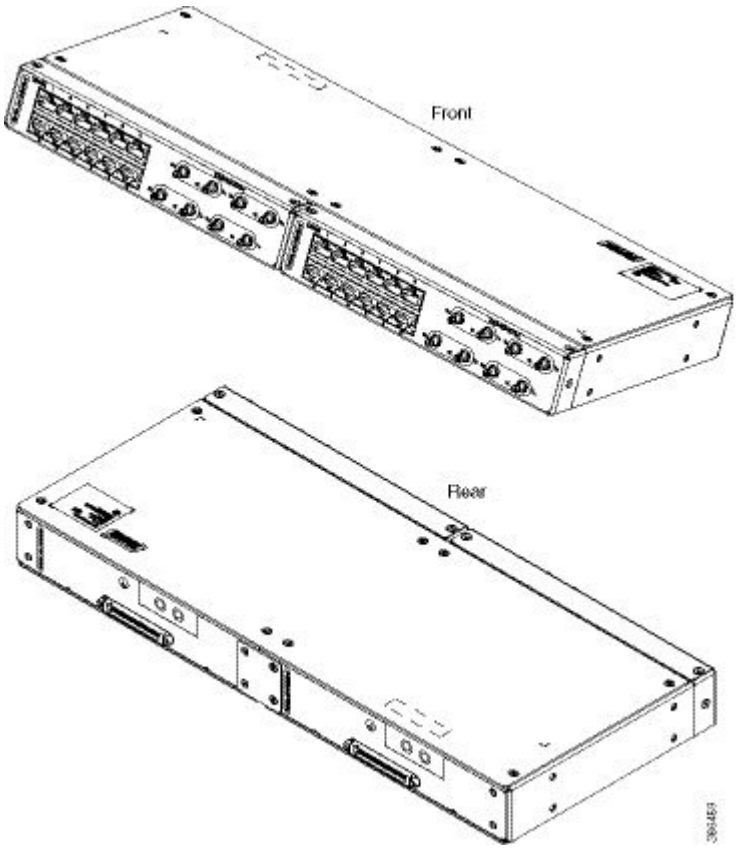


Figure 50: Patch Panel Grounding - Dual



Step 3 Position the patch panel in the rack as follows:

- If the front of the patch panel is at the front of the rack, insert the rear of the chassis between the mounting posts.
- If the rear of the patch panel is at the front of the rack, insert the front of the chassis between the mounting posts.

Step 4 Align the mounting holes in the bracket with the mounting holes in the equipment rack.

Figure 51: Installing the Patch Panel - Single in a 19-inch Rack

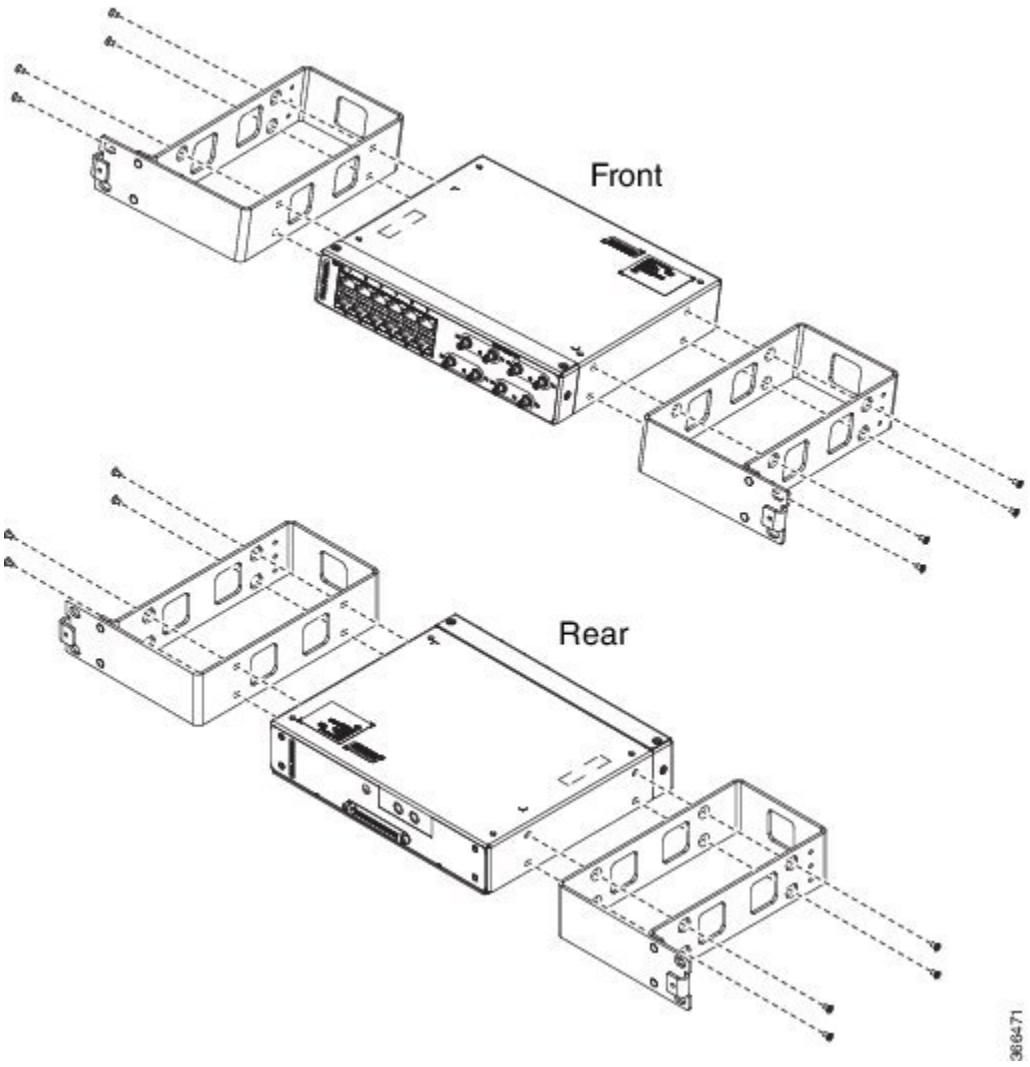


Figure 52: Installing the Patch Panel - Dual in a 19-inch Rack

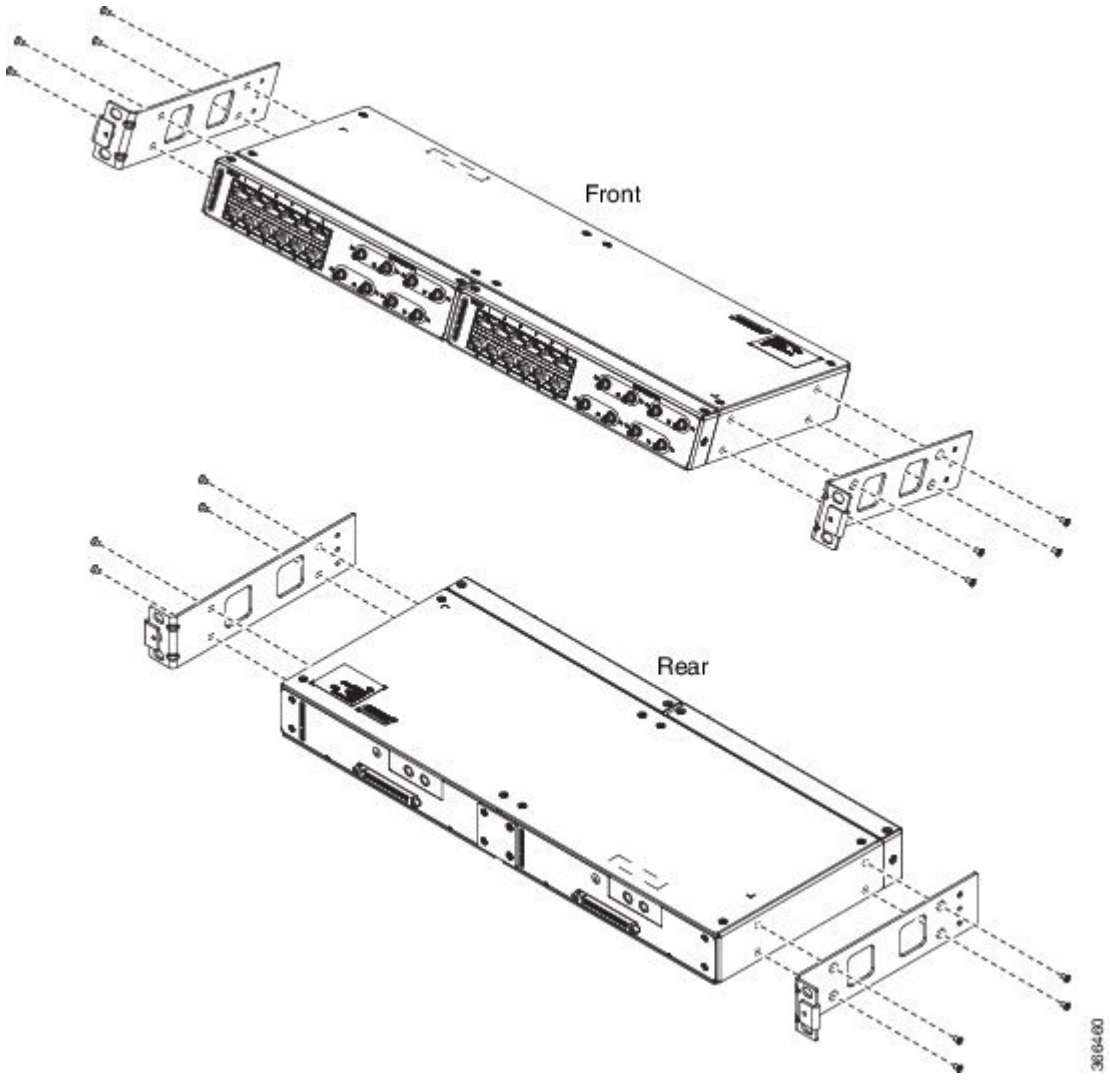


Figure 53: Installing the Patch Panel - Single in a 21-inch Rack

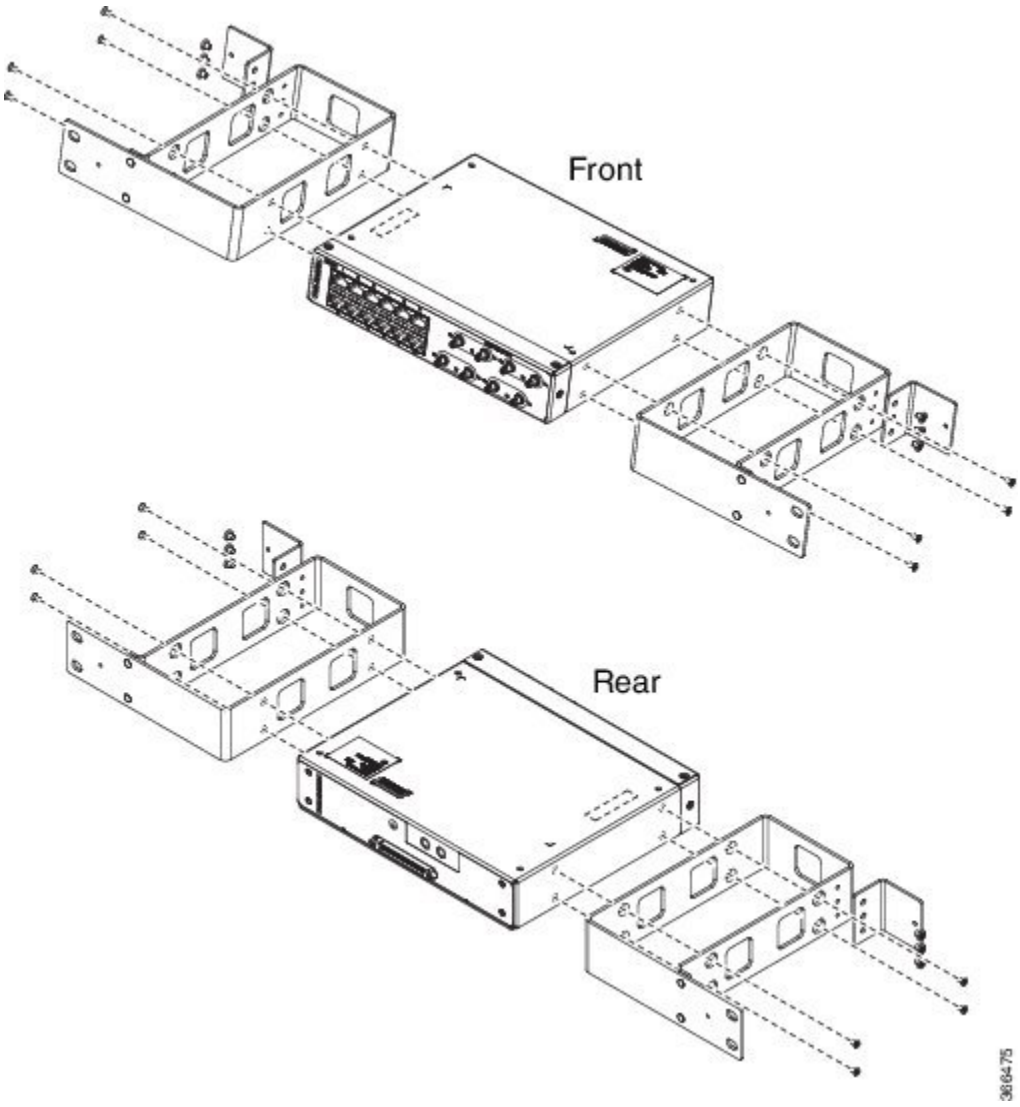


Figure 54: Installing the Patch Panel - Dual in a 21-inch Rack

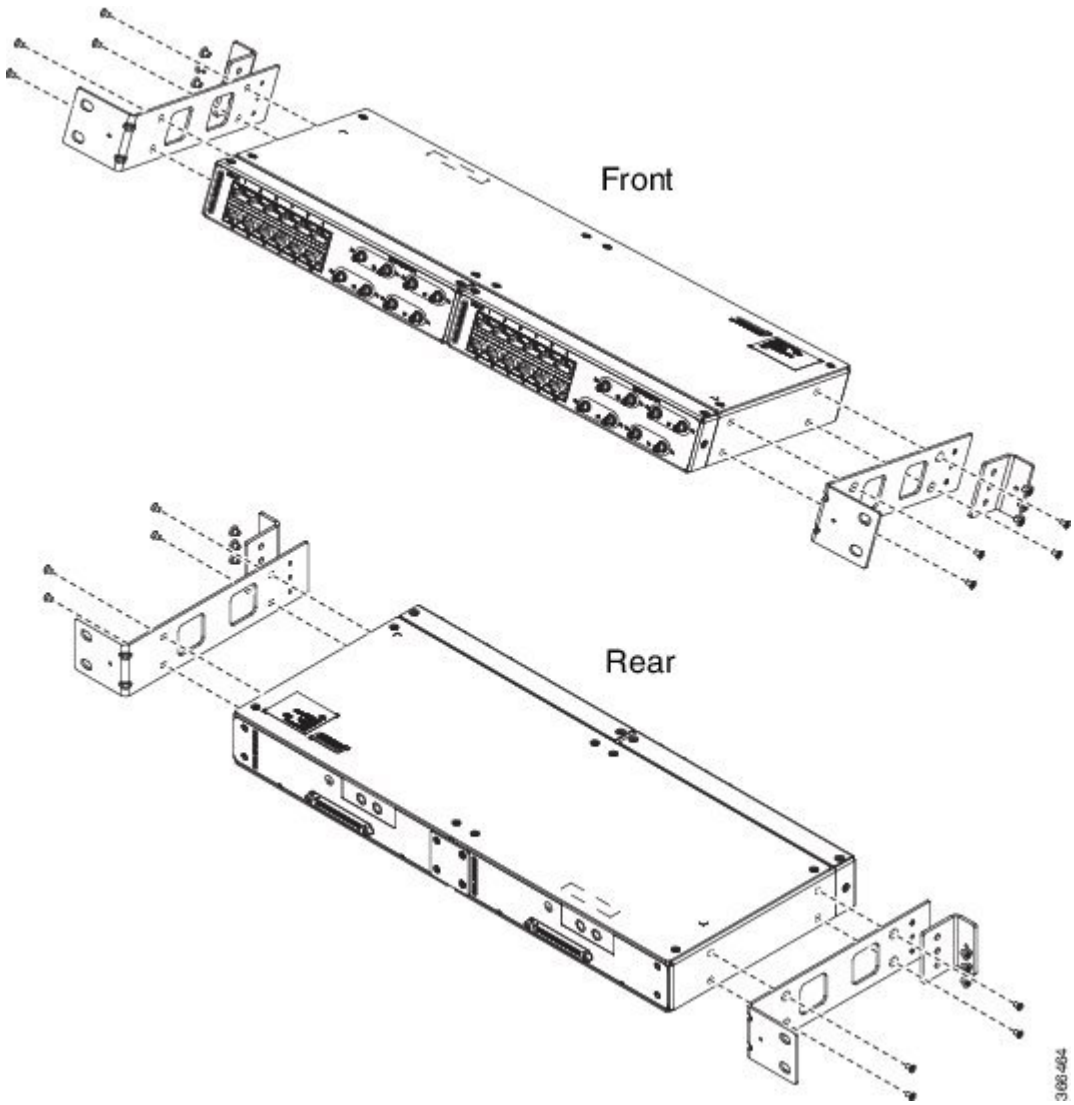


Figure 55: Installing the Patch Panel - Single in a 23-inch Rack

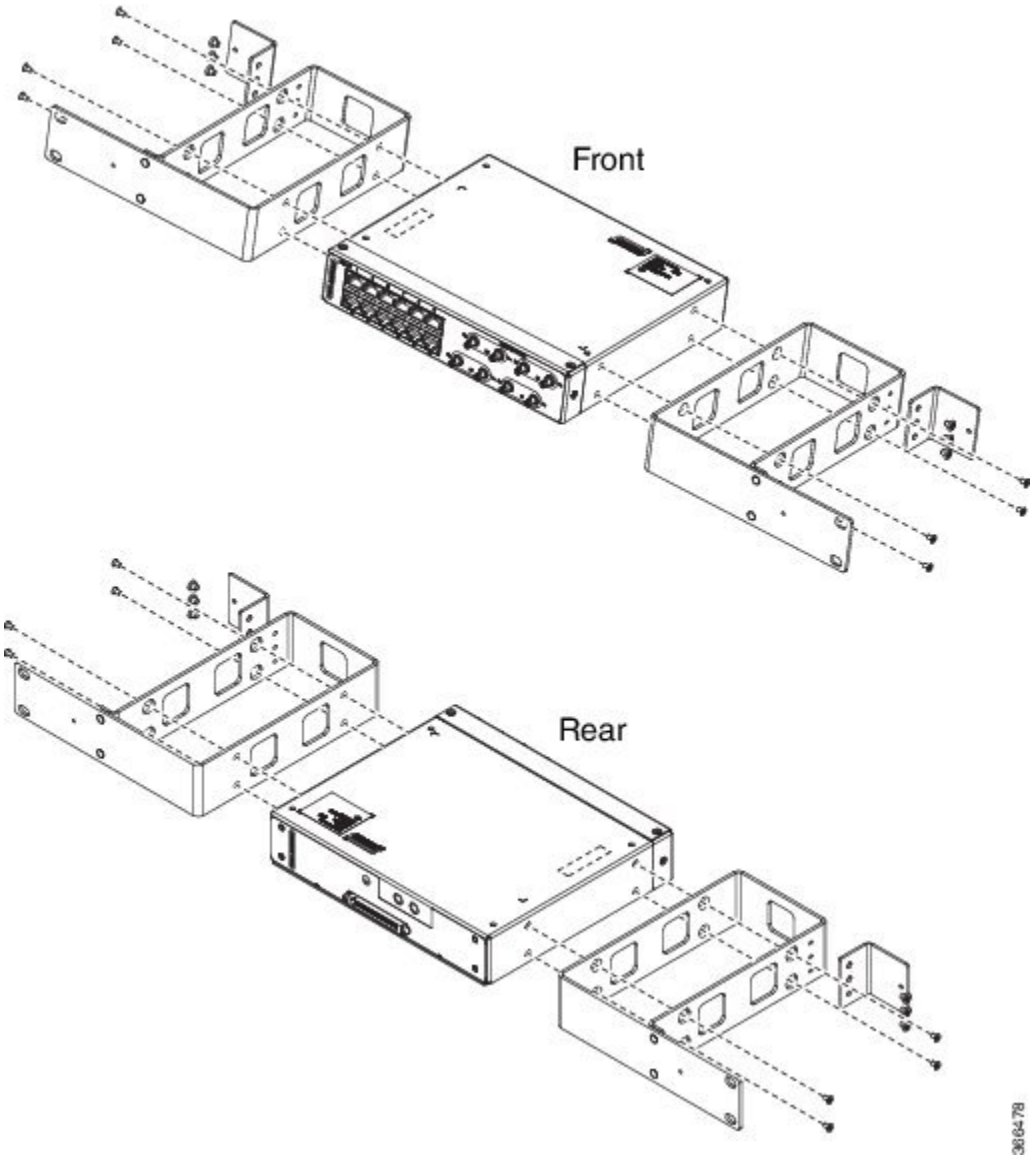
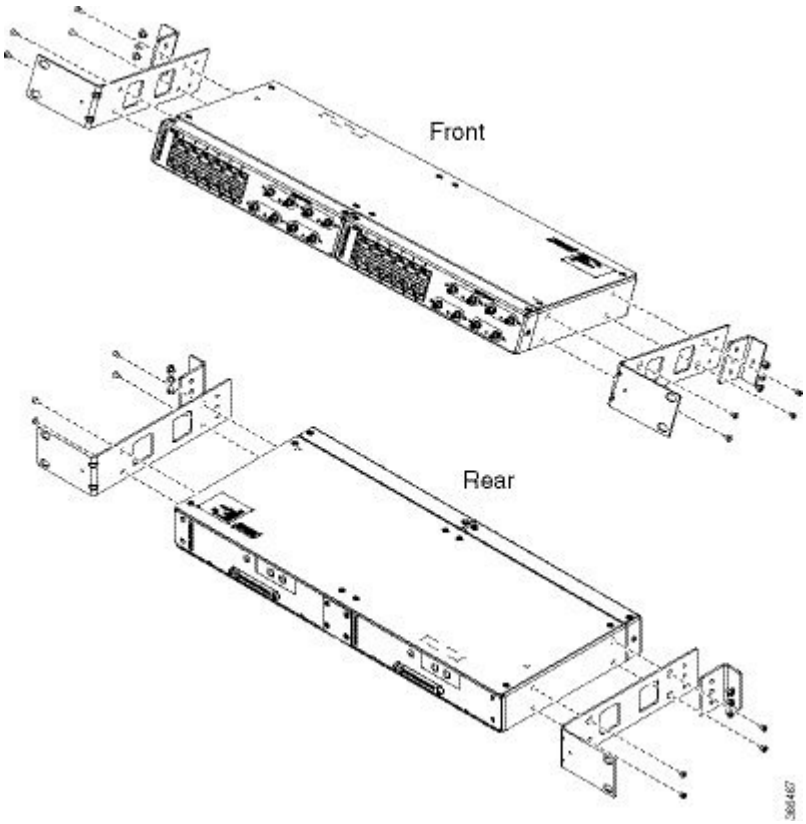


Figure 56: Installing the Patch Panel - Dual in a 23-inch Rack



Step 5 Secure the brackets to the chassis with the screws. The recommended maximum torque is 28 in.-lb (3.16 N-m).

- EIA 19 and 23 inches mounting brackets for both single and double 3G interface module patch panels.
- ETSI 21 inches mounting brackets for both single and double 3G interface module patch panels.

Set up 3G Patch Panel on Rack

To install the optional cable management brackets, perform these steps:

Procedure

Step 1 Position the cable management brackets against the front of the chassis and align the screw holes, as shown in the figure.

Step 2 Secure the cable management brackets with the screws. The recommended maximum torque is 10 in.-lb (1.12 N-m).

Figure 57: Attaching 19-inch Brackets to Patch Panel - Single

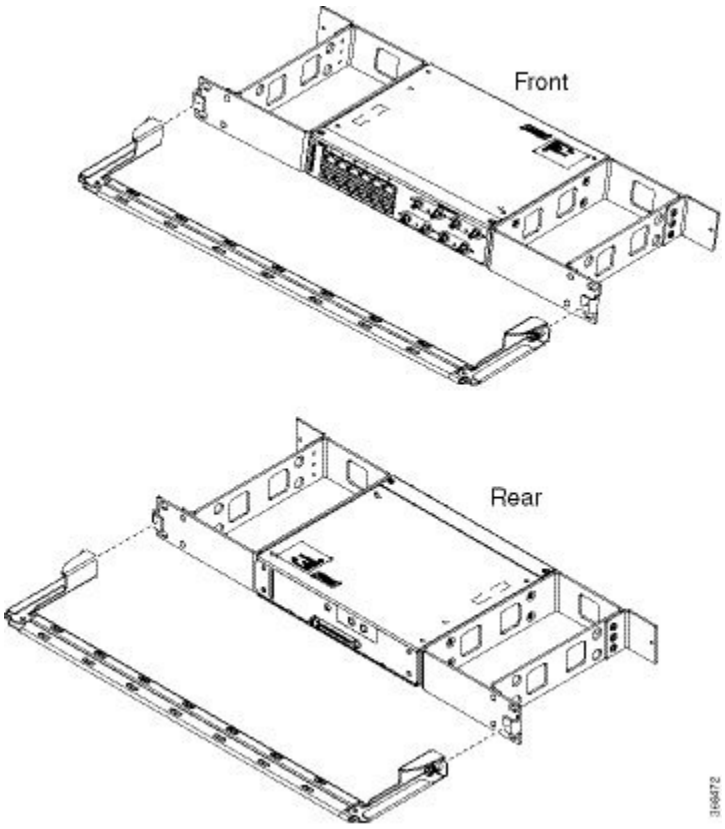


Figure 58: Installing 19-inch Brackets on to Rack - Single

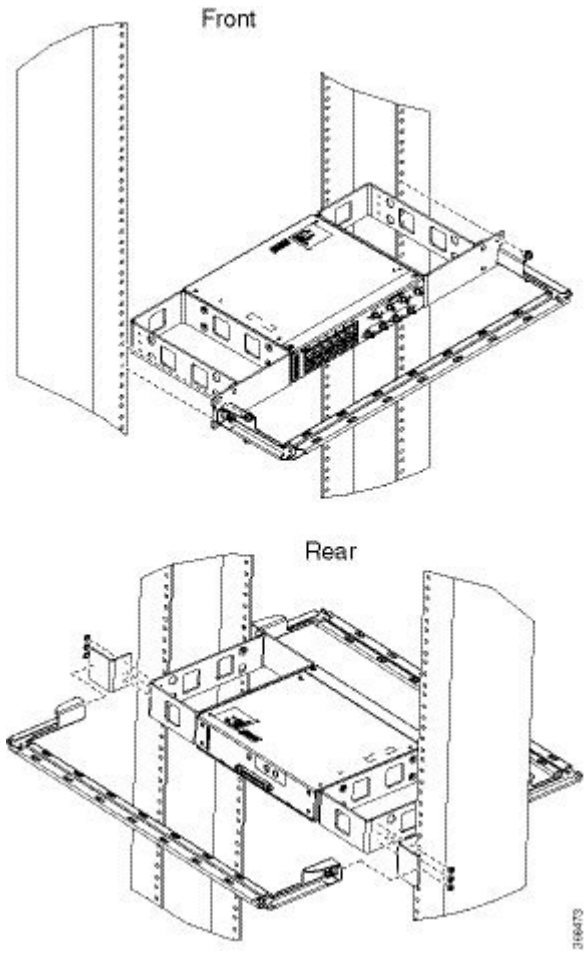


Figure 59: Attaching 19-inch Brackets to Patch Panel - Dual

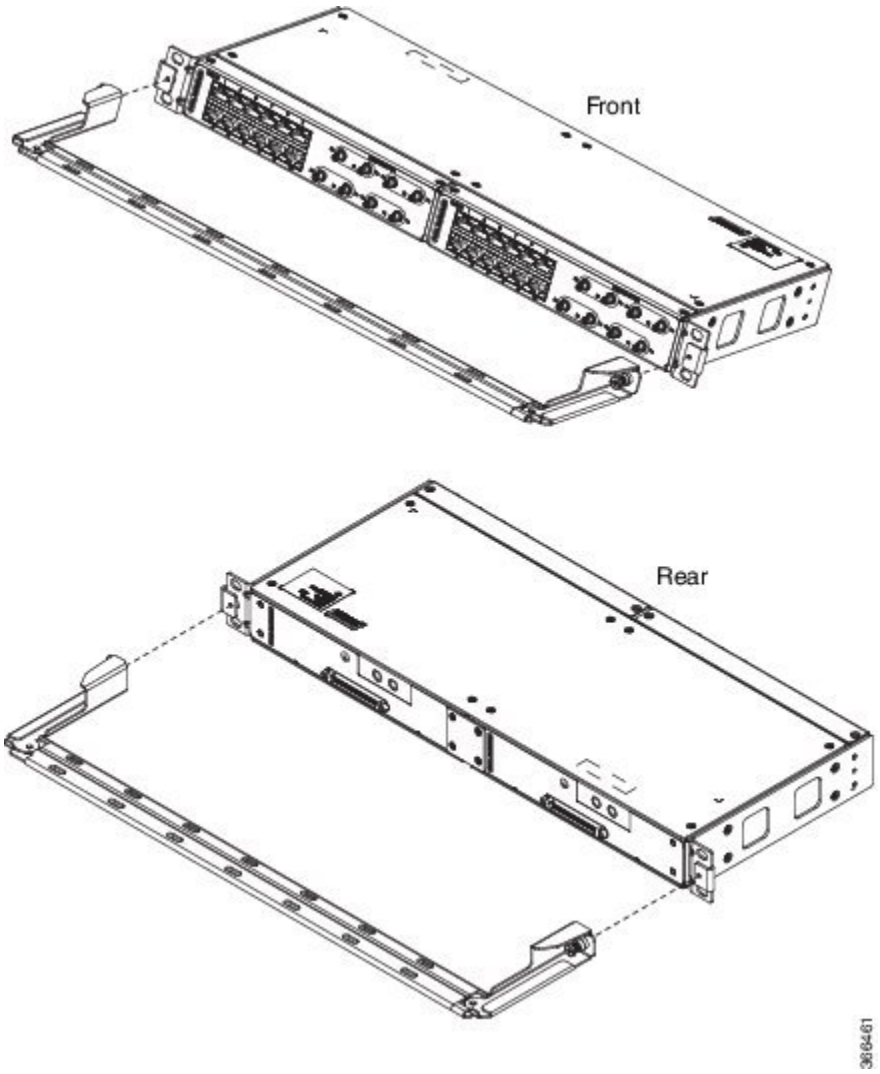


Figure 60: Installing 19-inch Brackets on to Rack - Dual

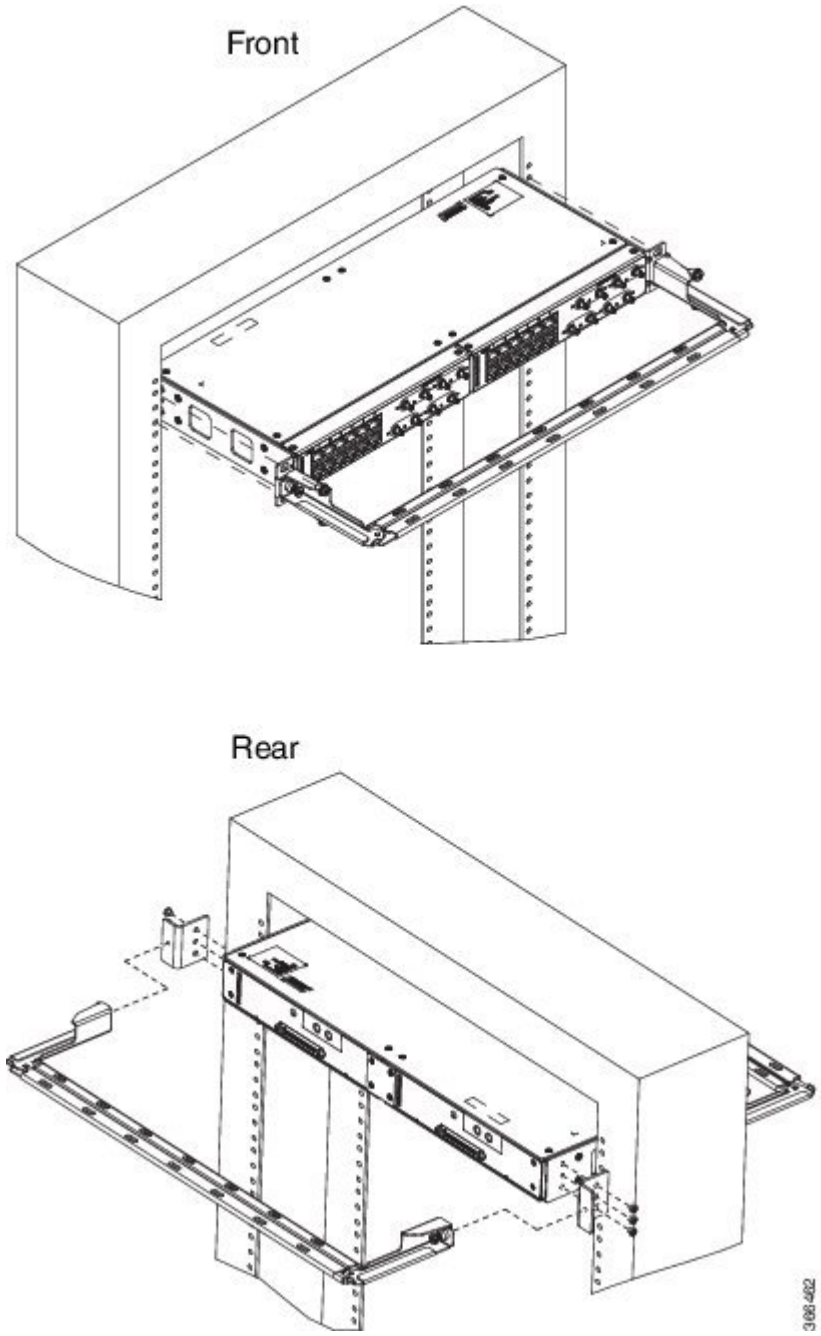


Figure 61: Attaching 21-inch Brackets to Patch Panel - Single

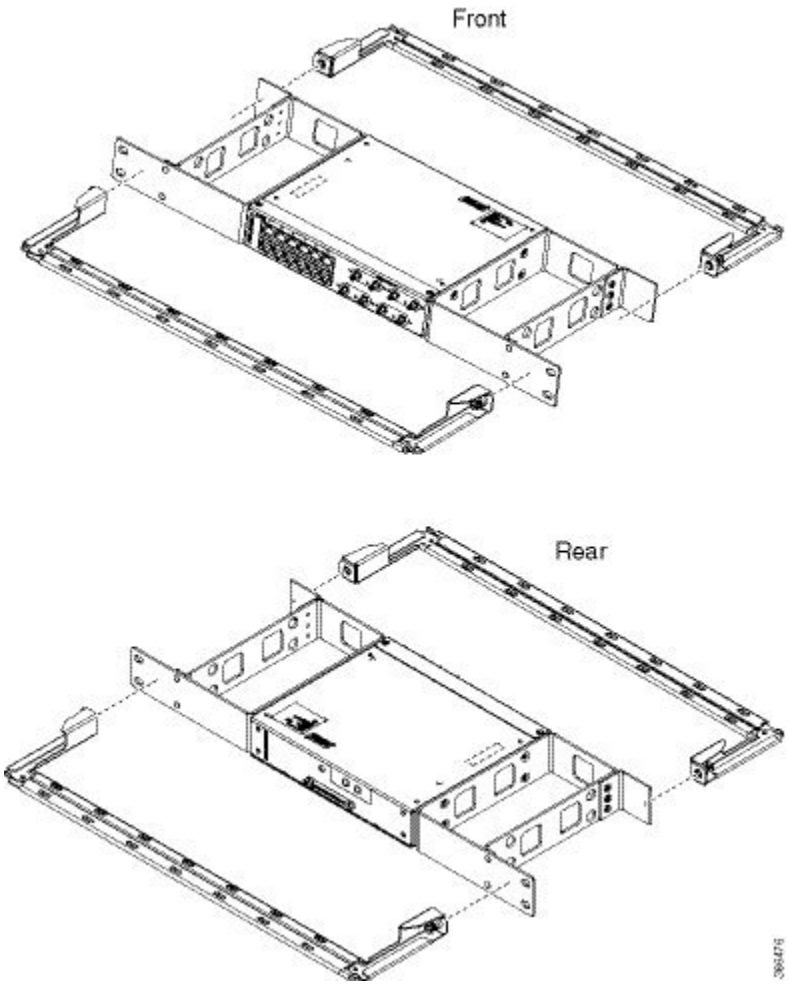


Figure 62: Installing 21-inch Brackets on to Rack - Single

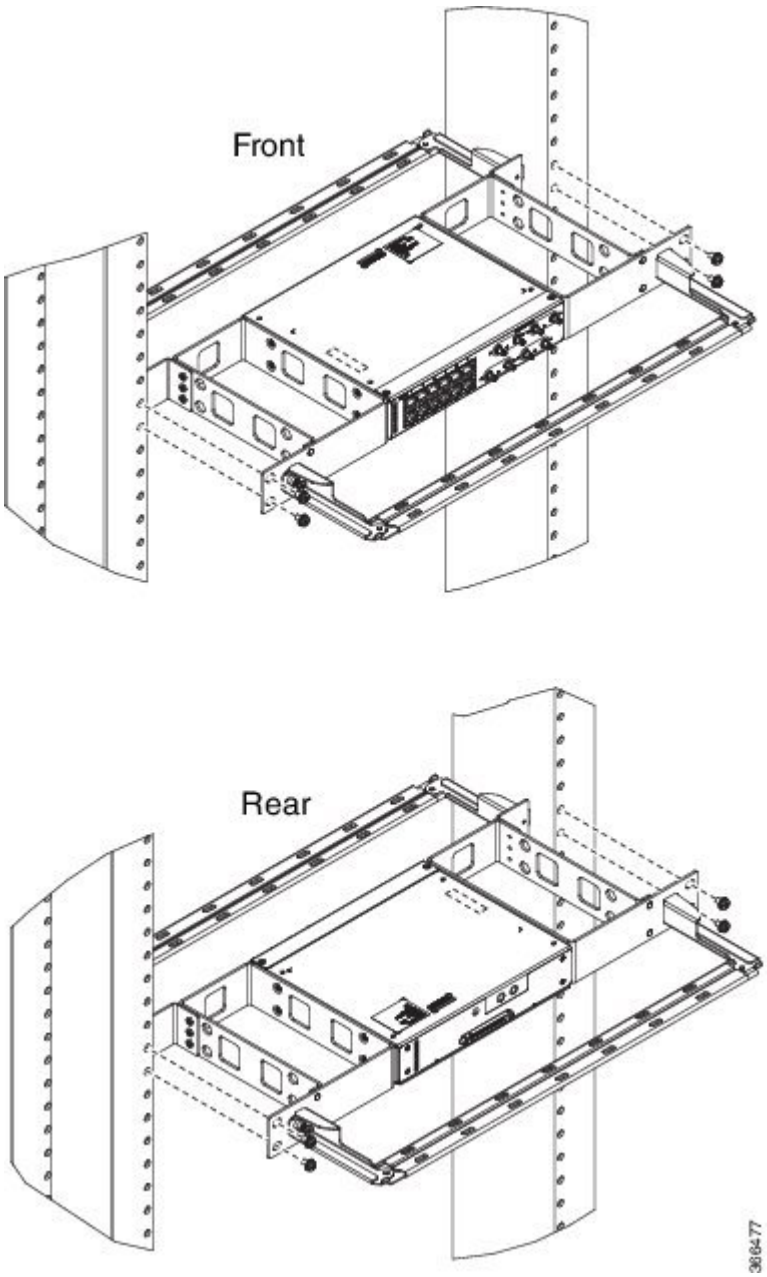


Figure 63: Attaching 21-inch Brackets to Patch Panel - Dual

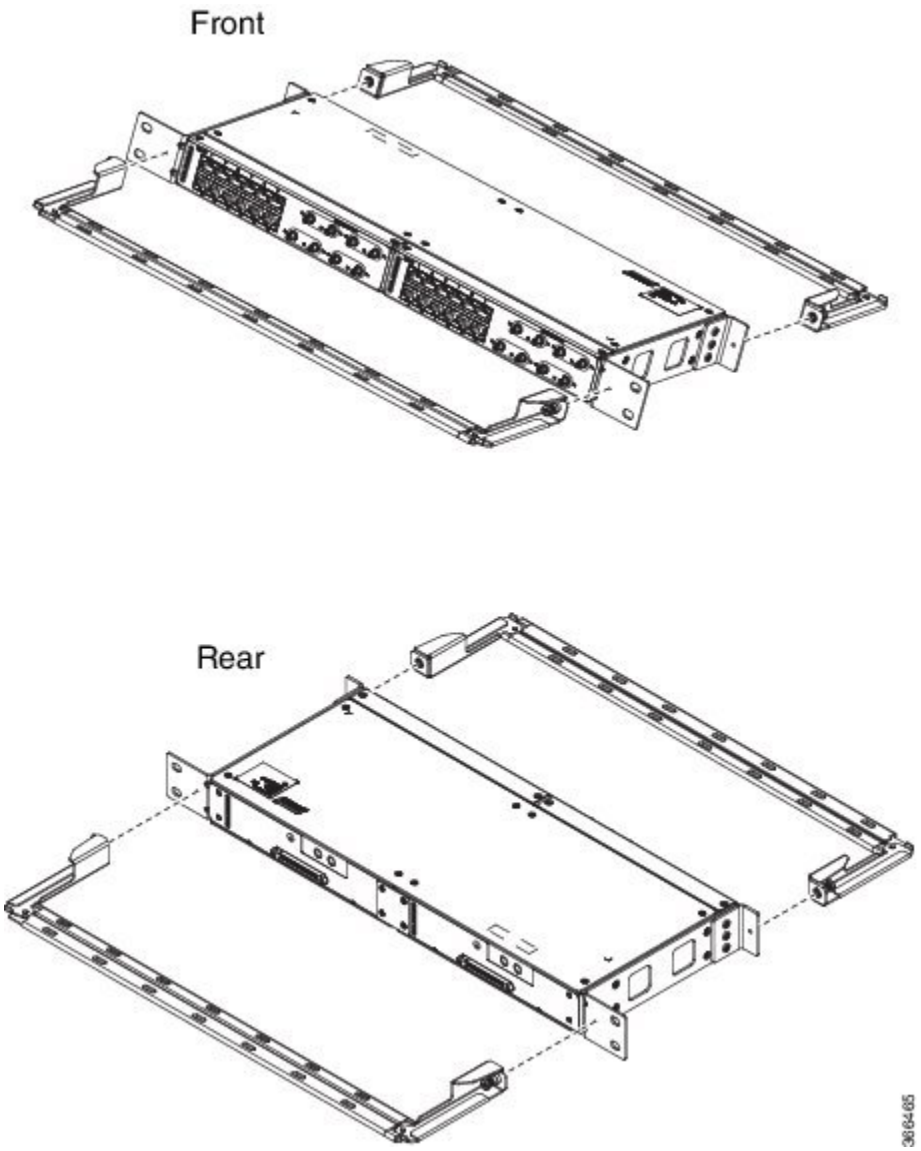


Figure 64: Installing 21-inch Brackets on to Rack - Dual

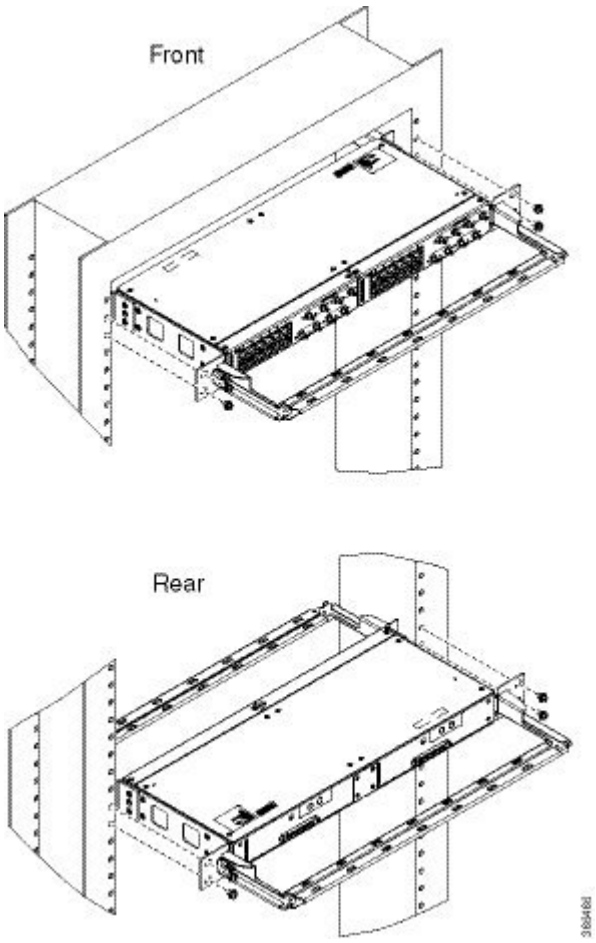


Figure 65: Attaching 23-inch Brackets to Patch Panel - Single

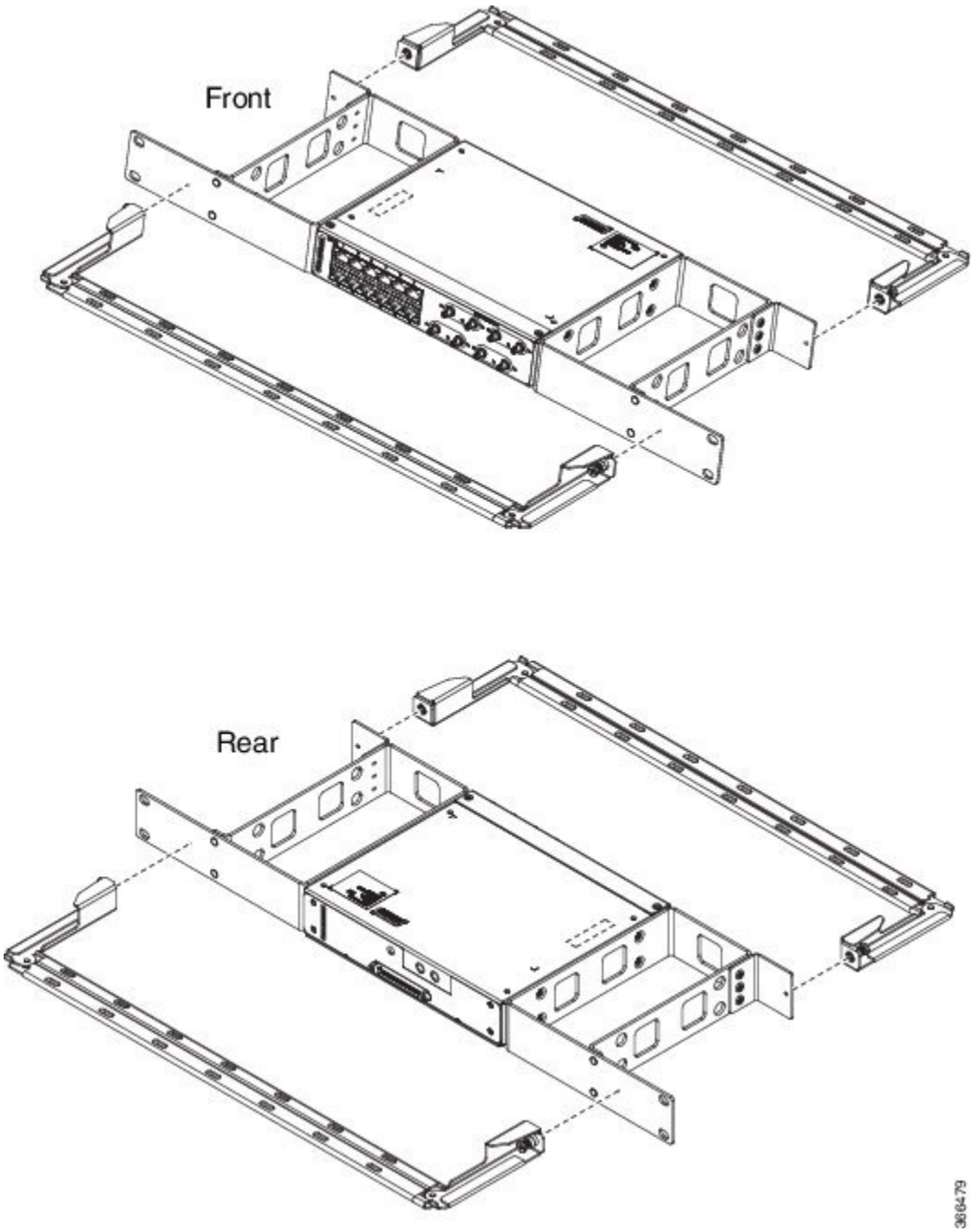


Figure 66: Installing 23-inch Brackets on to Rack - Single

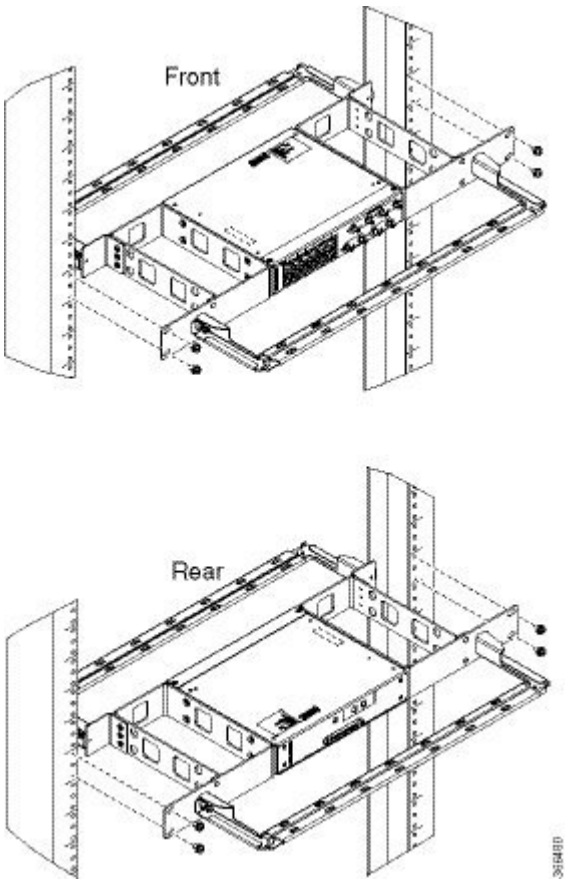


Figure 67: Attaching 23-inch Brackets to Patch Panel - Dual

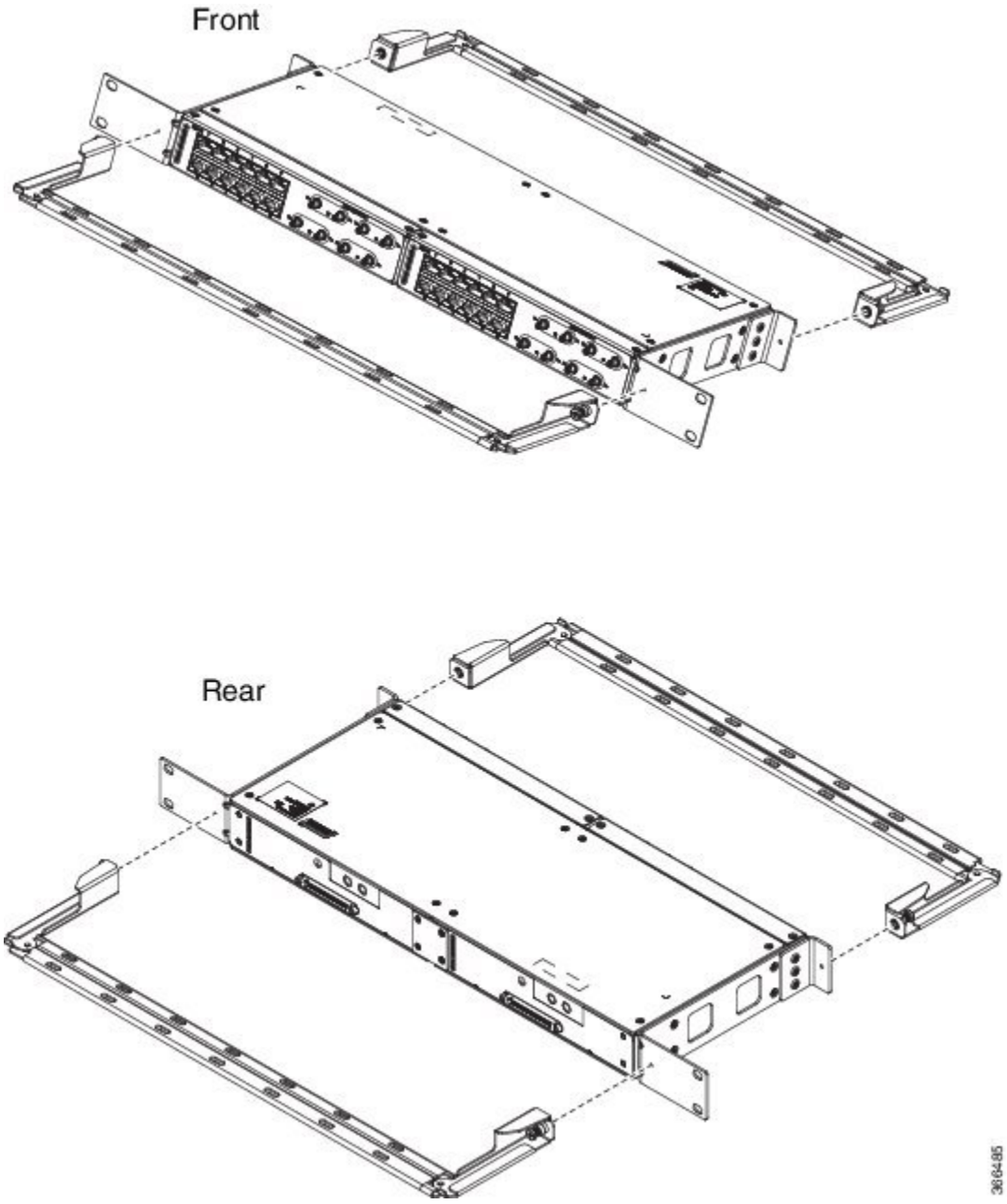
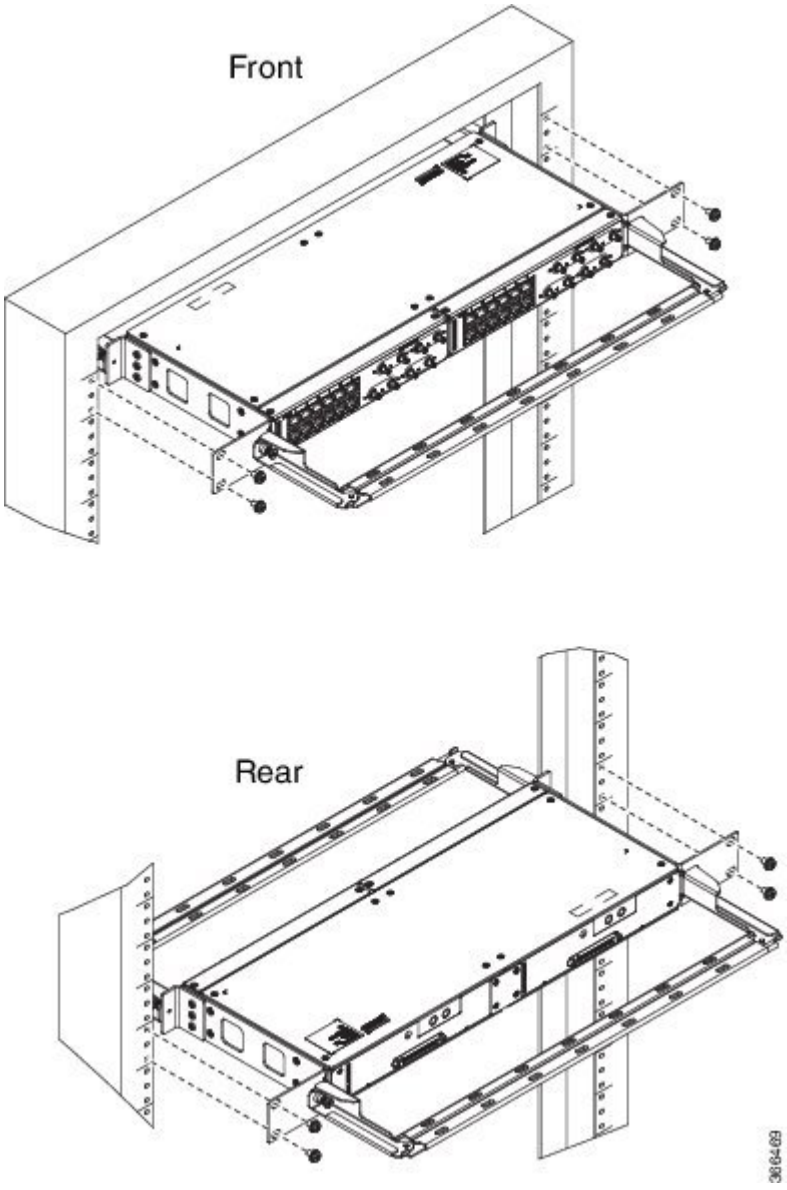


Figure 68: Installing 23-inch Brackets on to Rack - Dual



Wall Mount 3G Patch Panel

Before you begin

You must first install the mounting brackets and cable guides on to the patch panel before you mount it on the wall. You can use the same rack mount brackets (700-113653-01) for wall mount.

Procedure

Step 1 Remove the mounting brackets from the accessory kit and position them beside the device.

Note
You can install the brackets as shown in the figure.

Figure 69: Wall Mount - Single

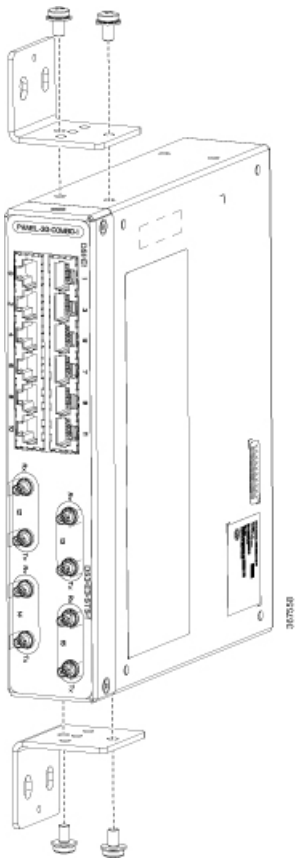
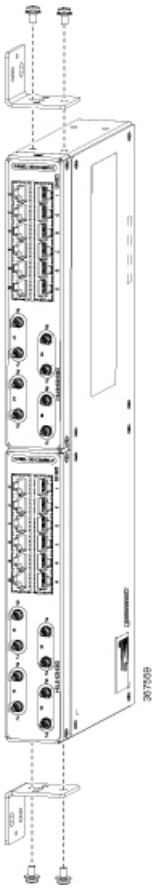


Figure 70: Wall Mount - Dual



Step 2 Secure the bracket to the device with the recommended maximum torque of 10 inch-pounds (1.1 newton meters).

Step 3 Position the device vertically on the wall.

Caution
Before mounting the device, ensure that all unused holes at the sides of the device are protected with screws.

Step 4 Use a tape measure and level to verify that the device is installed straight and on level.

Patch Panel Dimensions

Following are the various patch panel dimensions.

Figure 71: Patch Panel Without Brackets

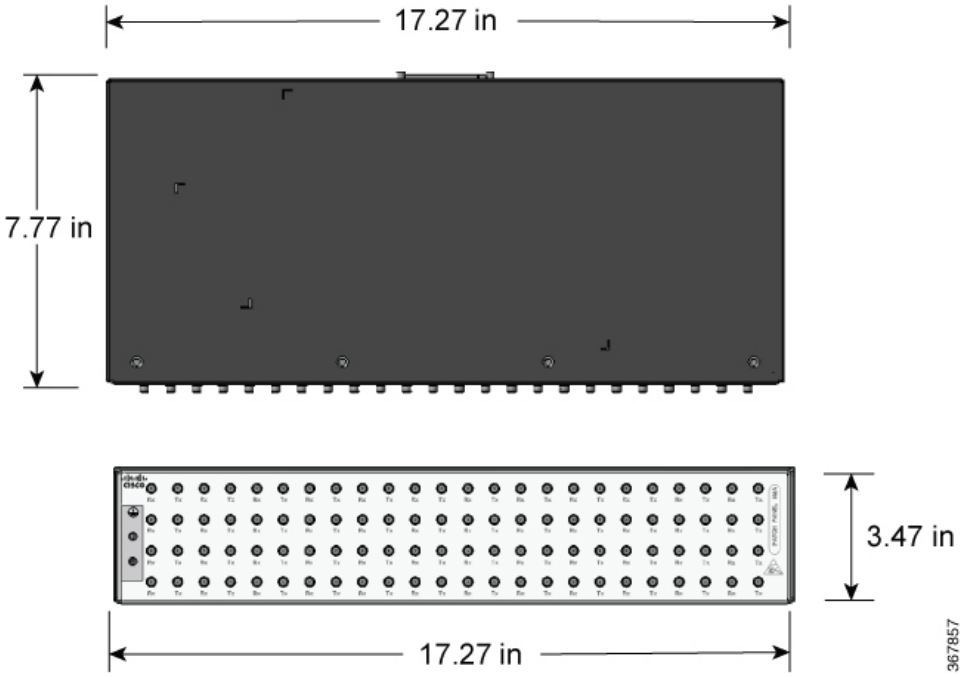


Figure 72: Patch Panel With Brackets

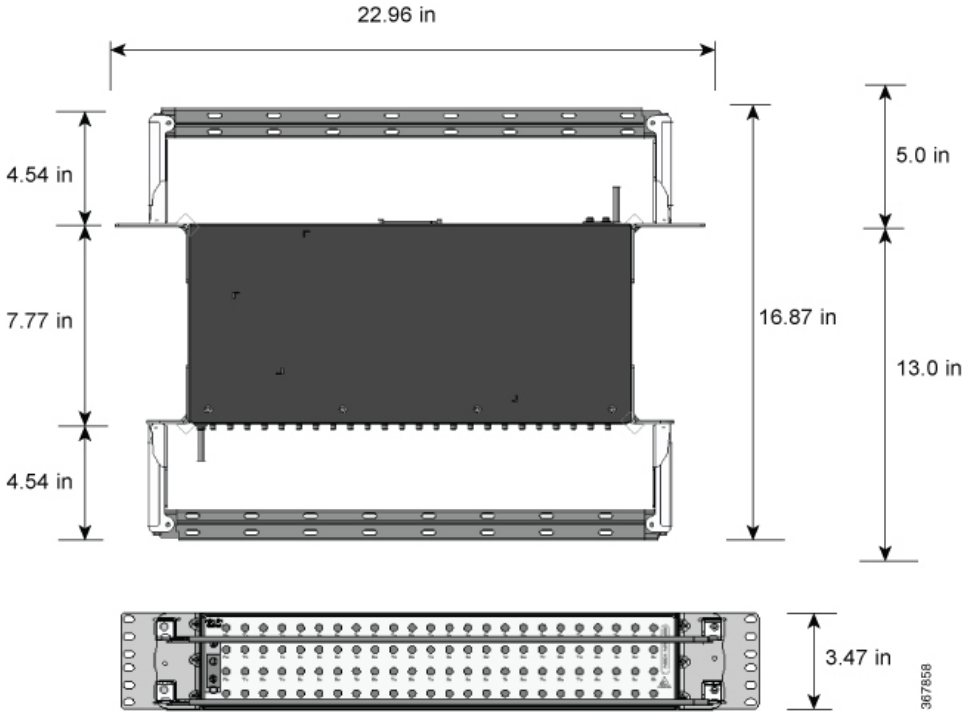


Figure 73: AMP64 Patch Panel With Brackets

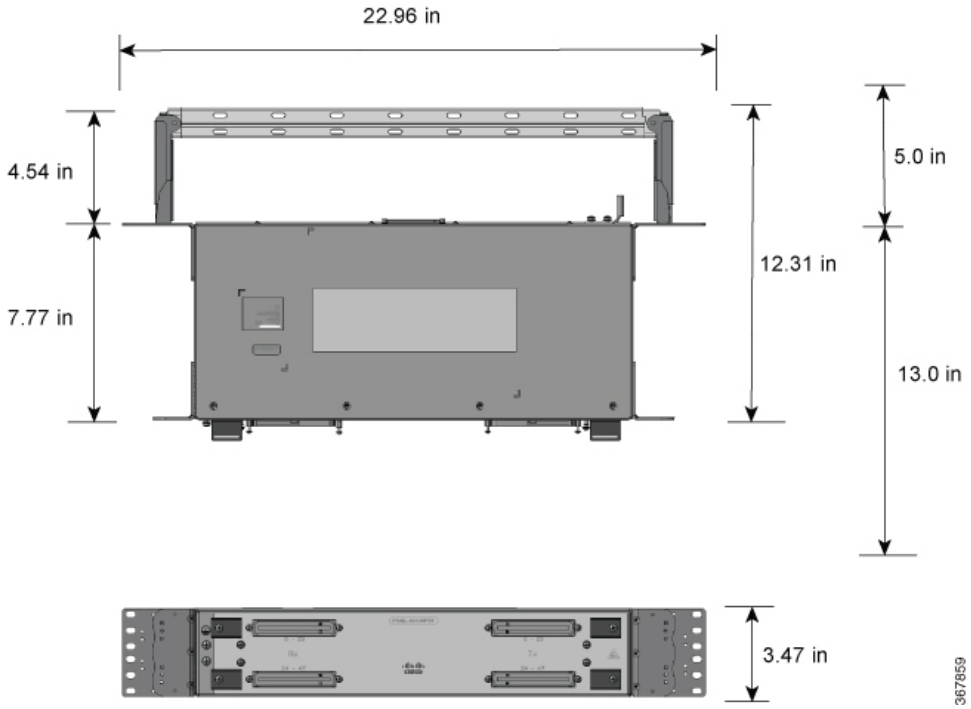


Figure 74: 3G Patch Panel Without Brackets - Single

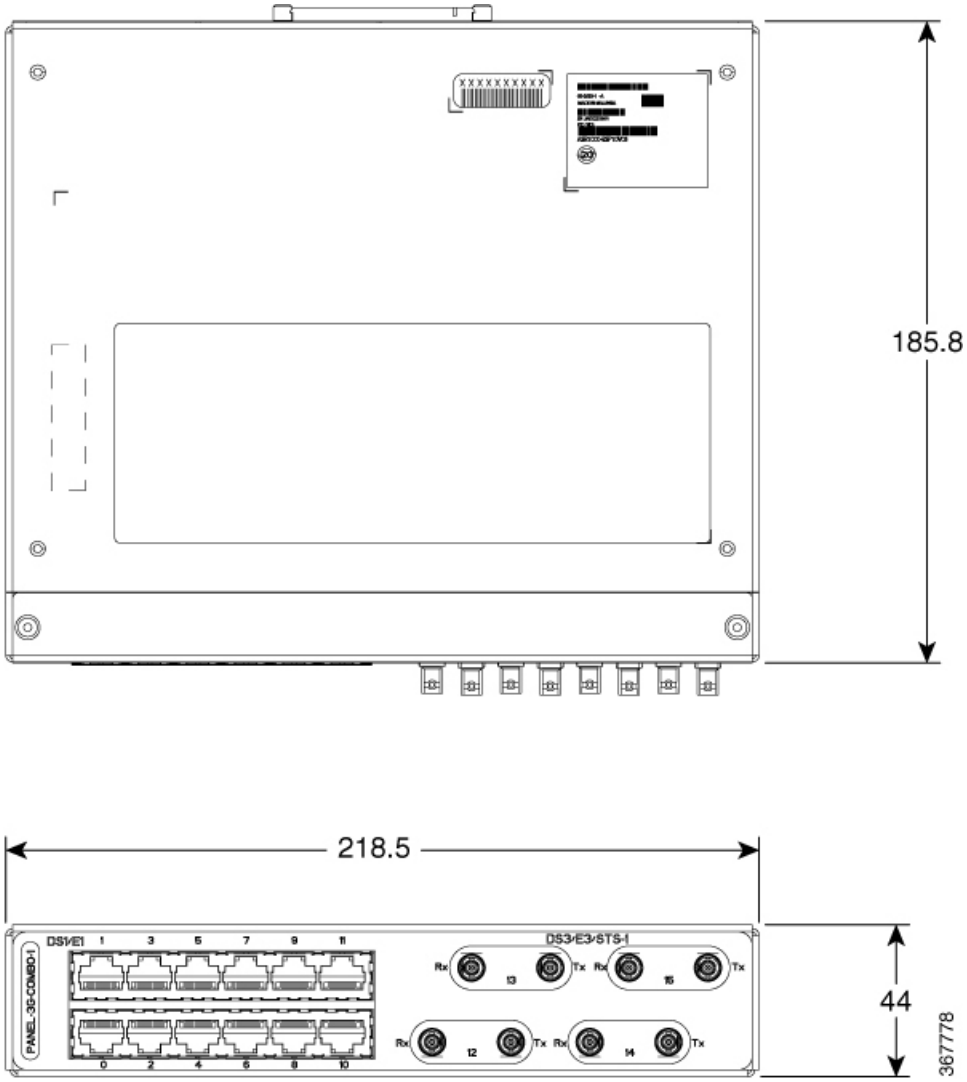
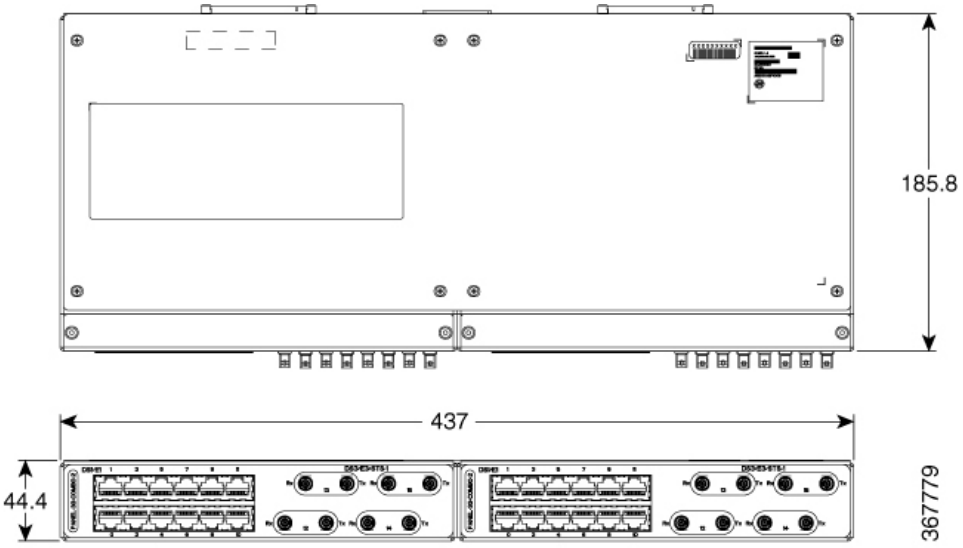


Figure 75: 3G Patch Panel Without Brackets - Dual



Patch Panel Pinout

Given below are the pinout information for the regular crossover and the straight-through cable patch panel.

Table 18: Pinout Details

Pin #	Crossover	Straight-through
1	Receive Tip	Transmit Tip
2	Receive Ring	Transmit Ring
3	—	—
4	Transmit Tip	Receive Tip
5	Transmit Ring	Receive Ring
6	—	—
7	—	—
8	—	—

Panel and Bracket

Table 19: Panel and Bracket Details

Panel	Bracket Description
PANEL-3G-COMBO-1	Single 12E1 + 4xDS3 patch panel for 3G CEM/IMSG IM (requires crossover cable)
PANEL-3G-COMBO-2	Double 12E1 + 4xDS3 patch panel for 3G CEM/IMSG IM (requires crossover cable)
PANEL-3G-COMBO-1S	Single 12E1 + 4xDS3 patch panel for 3G CEM/IMSG (requires a straight-through cable)
PANEL-3G-COMBO-2S	Double 12E1 + 4xDS3 patch panel for 3G CEM/IMSG IM (requires a straight-through cable)
P3G1-RCKMNT-19IN	EIA 19 inches mounting brackets for single 3G CEM/IMSG IM patch panel
P3G1-RCKMNT-ETSI	ETSI 21 inches mounting brackets for single 3G CEM/IMSG IM patch panel
P3G1-RCKMNT-23IN	EIA 23 inches mounting brackets for single 3G CEM/IMSG IM patch panel
P3G2-RCKMNT-19IN	EIA 19 inches mounting brackets for double 3G CEM/IMSG IM patch panel
P3G2-RCKMNT-ETSI	ETSI 21 inches mounting brackets for double 3G CEM/IMSG IM patch panel
P3G2-RCKMNT-23IN	EIA 23 inches mounting brackets for double 3G CEM/IMSG IM patch panel

Installing the Power Supply

The router provides the choice of two different power supplies:

- DC power—The DC power supply uses 2-position terminal block-style connector with positive latching/securing and labeled connections for +24/48V, GRD, -24/48V. The terminal block connector is of suitable size to carry the appropriate AWG wire size to handle the input current of the power supply. No ON/OFF switch is provided.
- AC power—The AC power supply has an IEC 320-type power receptacle and a 15 Amp service connector. You can use standard right angle power cords with the AC power supply. The power supply includes a power cord retainer. No ON/OFF switch is provided.

You can install dual power supplies for redundancy.

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

Note Products that have an AC power connection are required to have an external surge protective device (SPD) provided as part of the building installation to comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety.

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

Power Connection Guidelines

This section provides guidelines for connecting the router's power supplies to the site power source.

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

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

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

Guidelines for DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

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

- If the chassis is powered with -48V grounding of the positive, the it should be done at the power source side and chassis should protected by a dedicated two-pole circuit breaker.

Guidelines for AC-Powered Systems

Basic guidelines for AC-powered systems include the following:

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

Preventing Power Loss

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

- To prevent loss of input power, ensure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- In some systems, you can use an UPS to protect against power failures at your site. Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems such as the Cisco ASR 920 Series Router, which can have substantial current-draw fluctuations due to bursty data traffic patterns.

Use the information in the *Cisco ASR-920-12SZ-IM Router Specifications* table to estimate the power requirements and heat dissipation of the router based on a given configuration of the router. Determining power requirements is useful for planning the power distribution system needed to support the router.

Installing the DC Power Supply Module

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

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

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

Perform the following procedure to install the power supply module:

Procedure

Step 1 Ensure that the system (earth) ground connection has been made. See the following figure.

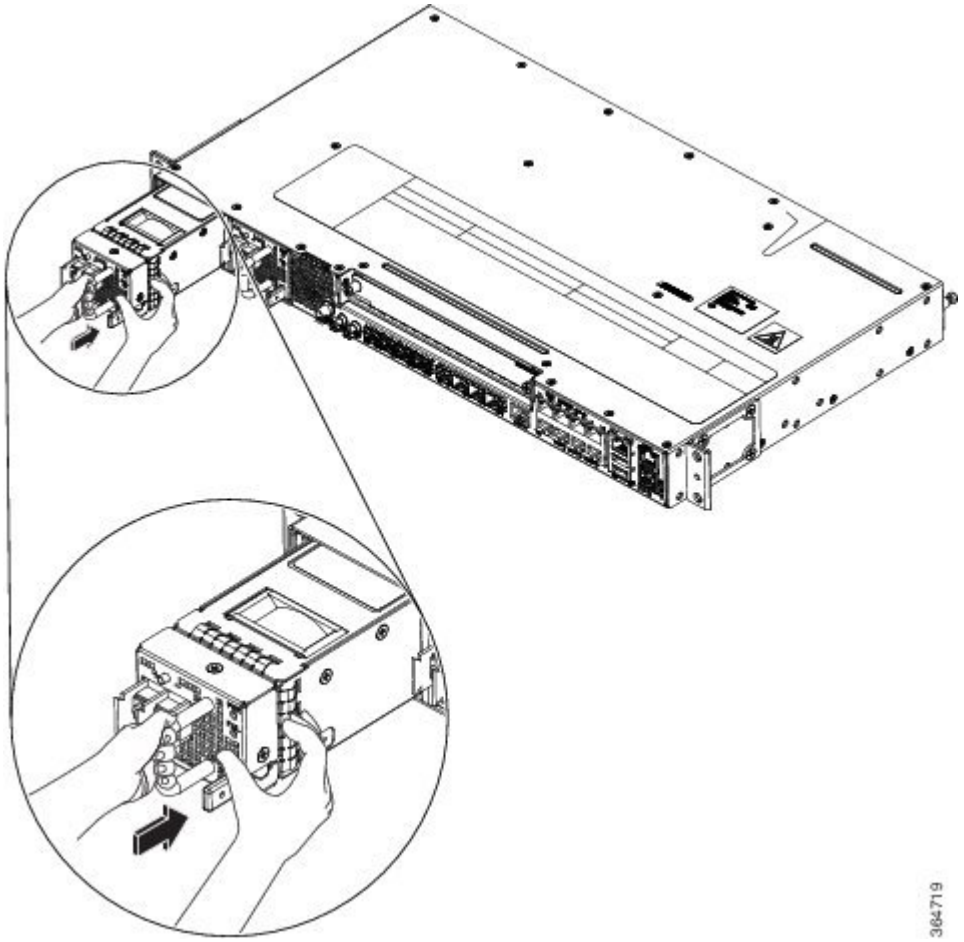
Step 2 If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.

Step 3 Verify that power to the DC circuit connected to the power supply you are installing is off. To ensure that power has been removed from the DC circuits, locate the circuit breakers for the DC circuits, switch the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.

Step 4 Grasp the power supply handle with one hand. Place your other hand underneath the power supply. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Step 5 Tighten the captive installation screws of the power supply. The recommended maximum torque is 5.5 in.-lb (0.62 N-m).

Figure 76: Installing the DC Power Supply Module



Activate a DC Power Supply Module

Perform the following procedure to activate a DC power supply:

Procedure

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

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

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

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

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

Install the DC Power Cables

Note When installing DC power supply, use 12AWG, 90°C temperature rated cable. The recommended cable length is 3 meters maximum from source. Up to 5 meters use 10AWG, and up to 3 meters use 12AWG, 90°C temperature rated cable and for other length contact Cisco.

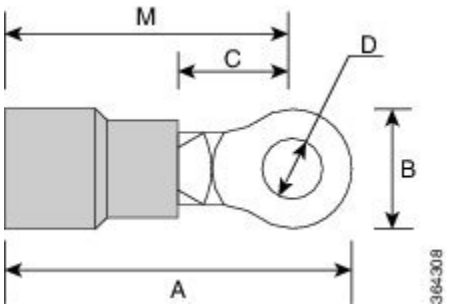
Note For N540X-16Z4G8Q2C-A/D and N540X-16Z8Q2C-D, when installing DC power supply, use 14-16AWG, 90°C temperature rated cable. The recommended cable length is 3 meters maximum from source. Up to 5 meters use 14AWG, and up to 3 meters use 16AWG, 90°C temperature rated cable and for other length contact Cisco.

Note

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

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

Figure 77: DC Connector with In built Screw



A	0.74 in. (1.88 cm)	C	0.18 in. (0.46 cm)

B	0.25 in. (0.64 cm)	D	0.14 in. (0.36 cm)
M	0.62 in. (1.58 cm)		

To attach the DC power supplies:

Procedure

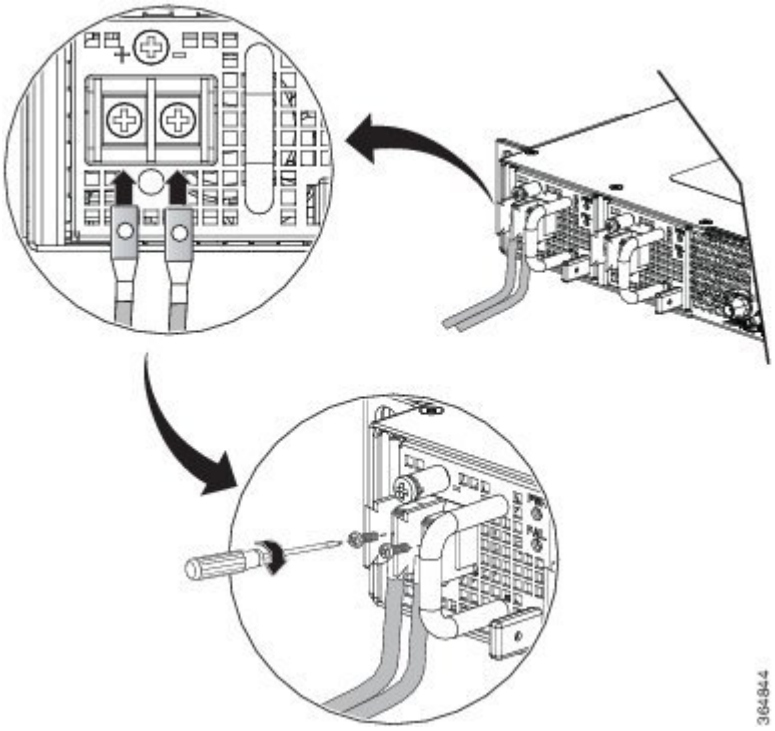
Step 1 Locate the terminal block plug.

Step 2 Insert the DC-input power source wires into the terminal block plug.

Step 3 Attach the DC supply wires using the designated screws.

Step 4 Use a ratcheting torque screwdriver to torque the terminal block plug captive screw. See the following figure.

Figure 78: Attach the DC Power Supply Wires



Note
These images are for only representation purposes. Certain variants of Cisco NCS 540 may vary.

Removing the DC Power Supply Module

This section provides information about removing and replacing the DC power supply.

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

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

Follow these steps to remove and replace the DC power supply:

Procedure

Step 1 Before servicing the power supply, switch off the circuit breaker in your equipment area. As an additional precaution, tape the circuit-breaker switch in the Off position.

Step 2 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

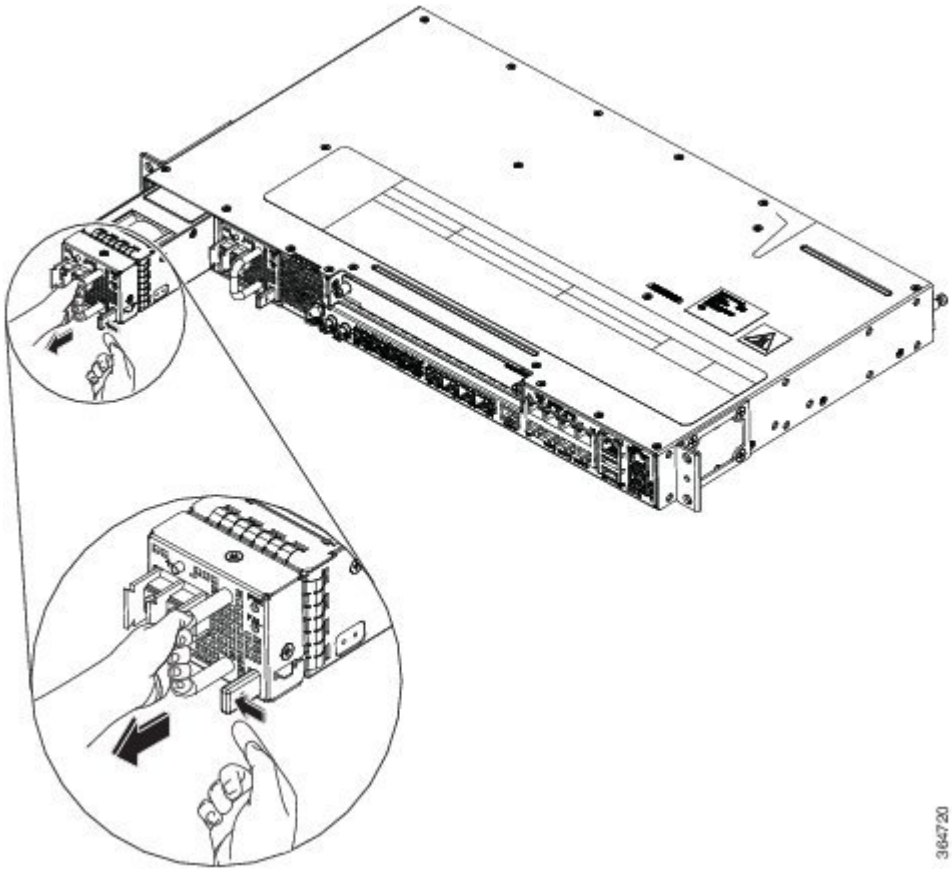
Step 3 Switch the power supply circuit-breaker switch to the Off (O) position.

Step 4 Pull the terminal block plug connector out of the terminal block head in the power supply. See the following figure.

Step 5 Loosen the captive screws on the DC power supply.

Step 6 Grasp the power supply handle. Simultaneously press the power supply lock towards the left and pull the power supply out from the chassis while supporting it with the other hand.

Figure 79: Removing the DC Power Supply Module



Installing the AC Power Supply Module

Follow these steps to install the AC power supply module:

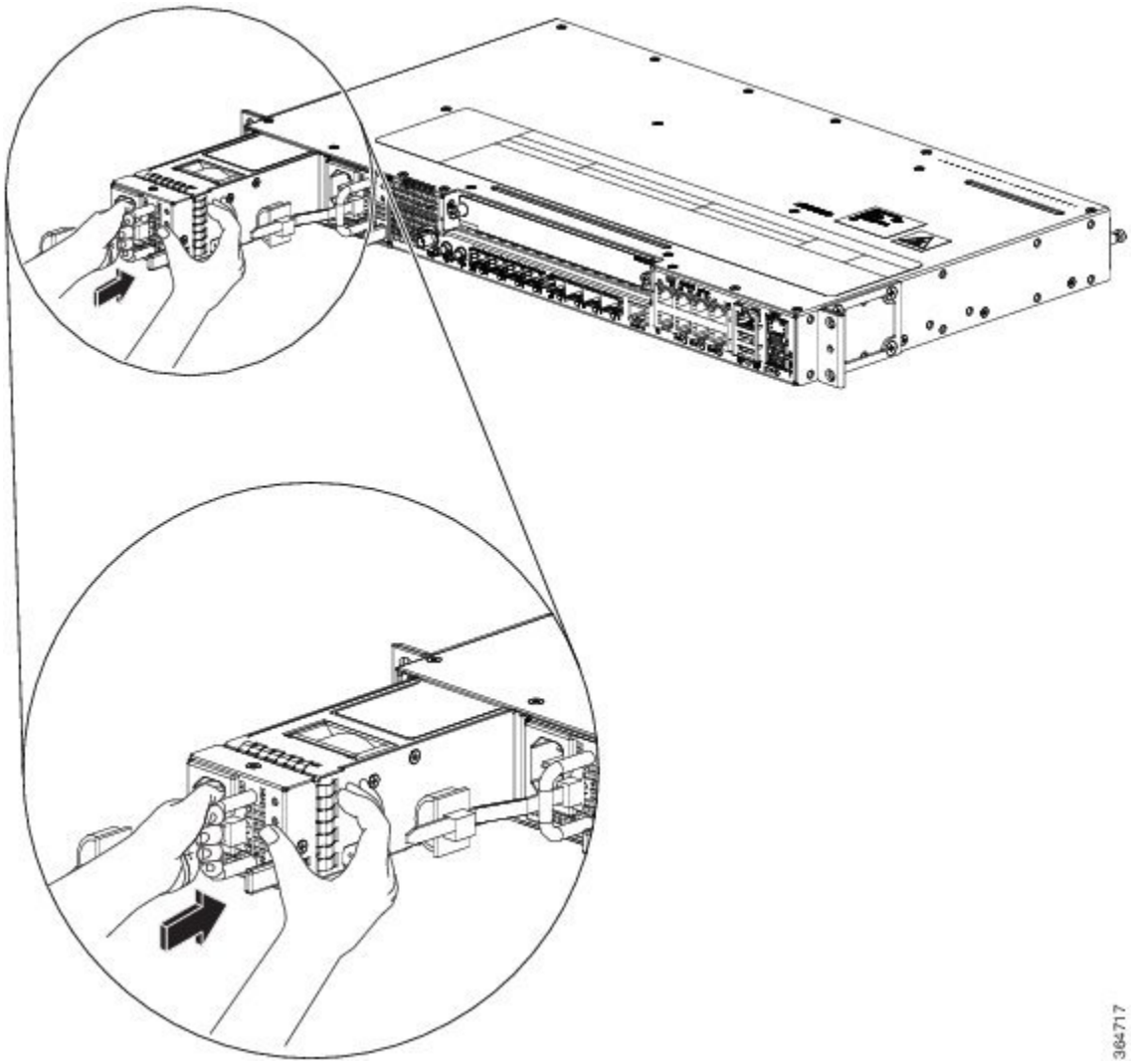
Procedure

Step 1 Ensure that the system (earth) ground connection has been made.

Step 2 If necessary, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.

Step 3 Grasp the power supply handle with one hand. Place your other hand underneath the power supply. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay. See the following figure.

Figure 80: Installing the AC Power Supply Module



Step 4 Slide the AC power supply cord inside the tie of the tie-and-holder and tighten the tie around the power supply cord.

Step 5 Plug the power supply cord into the AC power supply.

Install the AC Power Cables

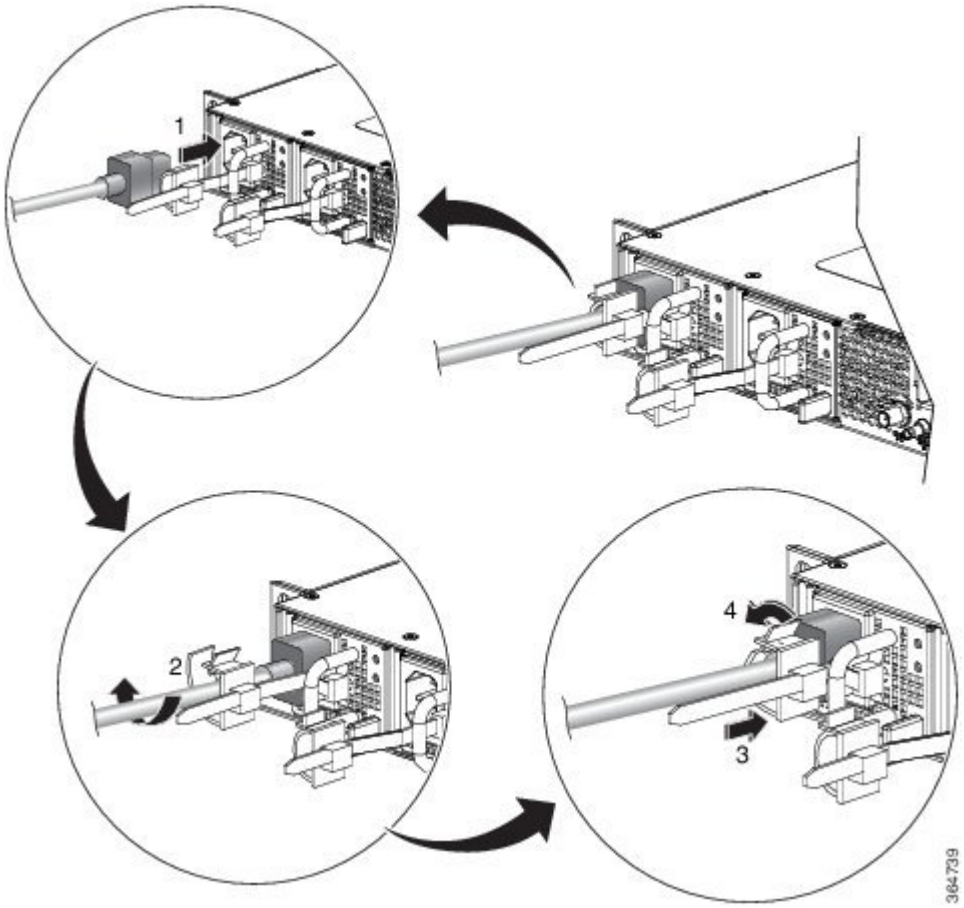
To install the AC power cables in the power supply slots:

Procedure

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

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

Figure 81: Attach the AC Power Tie-and-Clip Cord



Note
These images are for only representation purposes. Certain variants of Cisco NCS 540 do not include a tie for the power supply cord.

Activate an AC Power Supply Module

Perform the following procedure to activate an AC power supply:

Procedure

Step 1 Plug the power cord into the power supply.

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

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

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

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

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

Removing the AC Power Supply Module

This section describes how to remove and replace the AC power supply.



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



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



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

Follow these steps to remove and replace the AC power supply:

Procedure

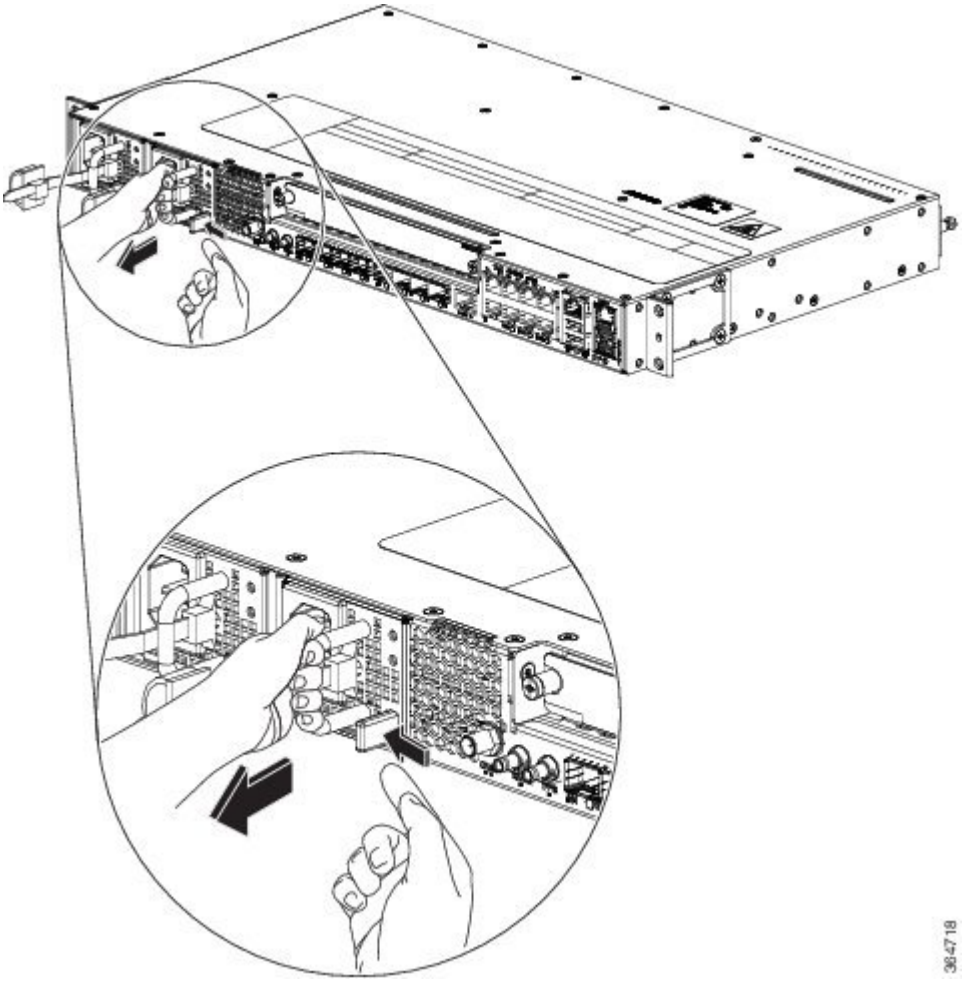
Step 1 Disconnect the power cord from the power source. Do not touch any metal on the power cord when it is still connected to the power supply.

Step 2 Loosen the tie and remove the power cord from the tie-and holder.

Step 3 Remove the power cord from the power connection on the power supply. Do not touch the metal prongs embedded in the power supply.

Step 4 Grasp the power supply handle. Simultaneously press the power supply lock towards the left and pull the power supply out from the chassis while supporting it with the other hand.

Figure 82: Removing the AC Power Supply Module



Powering On the Router

After the router is either rack mounted or mounted on the wall, perform these tasks to complete the installation:

- Power on the router.
- Connect the front-panel ports. See the *Connecting to SFP Modules* section to complete the installation.

Connecting the Router to the Network

The sections describe how to connect a router to the network:

Note Connect only SELV services to all the ports.

Connecting Console Cables

The sections describe how to connect to the router using console cables:

Connecting to the USB Serial Port Using Microsoft Windows

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

Note Install the USB device driver before establishing a physical connection between the router and the PC, by using the USB console cable plugged into the USB serial port. Otherwise, the connection will fail. For more information, see the *Installing the Cisco USB Device Driver* section in the *Cisco ASR-920-12SZ-IM and ASR-920U-12SZ-IM Aggregation Services Router Hardware Installation Guide*.

Procedure

Step 1 Connect a USB Type A-to-Type A cable to the USB console port. If you are using the USB serial port for the first time on a Windows-based PC, install the USB driver now according to the instructions in the following sections:

Note
You cannot use the USB port and the EIA port concurrently. When the USB port is used, it takes priority over the EIA port.

Step 2 Connect the USB Type A cable to the PC.

Step 3 To communicate with the router, start a terminal emulator application, such as Microsoft Windows HyperTerminal. This software should be configured with the following parameters:

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

Connecting to the Console Port Using Mac OS X

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

Procedure

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

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

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

Example:

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

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

Example:

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

To disconnect the OS X USB console from the terminal window, enter Ctrl-a followed by Ctrl-\

Connecting to the Console Port Using Linux

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

Procedure

Step 1 Open the Linux terminal window.

Step 2 Connect the Linux USB port to the router.

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

Example:

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

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

Example:

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

To disconnect the Linux USB console from the terminal window, enter Ctrl-a followed by : then quit

Installing the Cisco USB Device Driver

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

This procedure describes how to install the Microsoft Windows USB device driver in Microsoft Windows XP, Windows Vista, Windows 2000, Windows 7, and Windows 8. Download the driver for your router model from the Tools and Resources Download Software site, USB Console Software category.

Note To download the driver, you must have a valid service contract associated to your Cisco.com profile.

Procedure

Step 1 Unzip the file asr-9xx_usbconsole_drivers.zip.

Step 2 Double-click xrusbser_ver2100_installer.exe in the XR21x141x-Win-DriversOnly-Vers2.1.0.0/EXE folder.

Installation Wizard GUI is displayed.

Step 3 Click Next. The InstallShield Wizard Completed window is displayed.

Step 4 Click Finish.

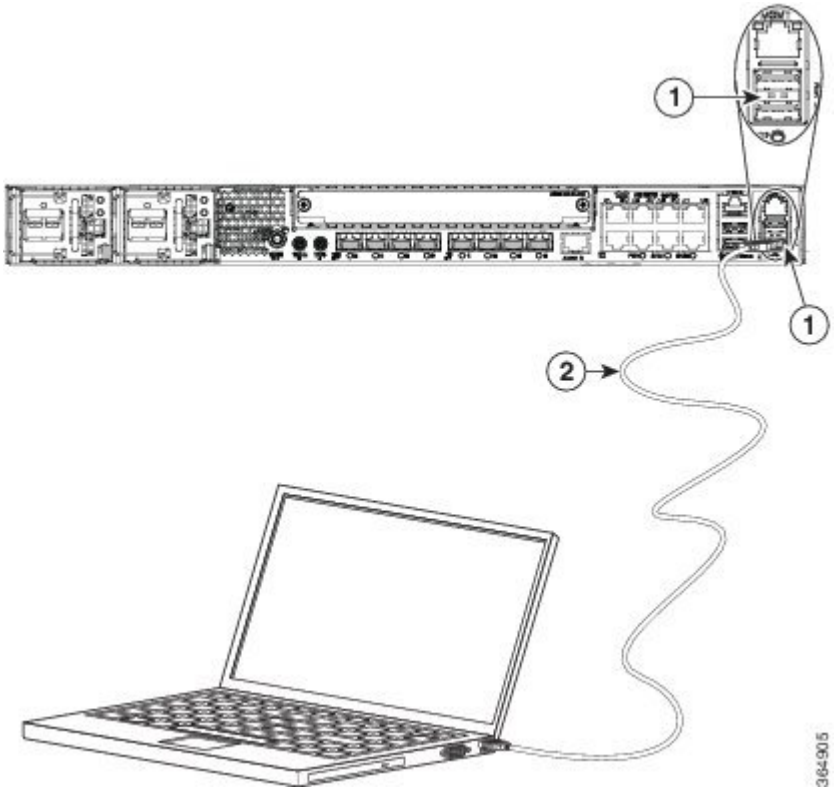
Step 5 Connect the USB cable to the PC and router USB console ports. Follow the on-screen instructions to complete the installation of the driver.

Step 6 XR21V1401 USB UART Device driver successfully installed message is displayed.

The USB console is ready for use.

Uninstalling the Cisco USB Driver

Figure 83: Connecting the USB Console Cable to the Cisco ASR 920 Series Router



1	USB Type-A console port	2	USB Type-A to USB Type-A console cable

This procedure describes how to uninstall the Microsoft Windows USB device driver in Microsoft Windows XP, Windows Vista, Windows 2000, Windows 7, and Windows 8.

Note Disconnect the router console terminal before uninstalling the driver.

Procedure

Step 1 Choose **Start** > **Control Panel** > **Add or Remove Programs** .

Step 2 Scroll to **Windows Driver Package - Exar corporation (xrusbser) Ports** and click **Remove**. The **Program Maintenance** window is displayed.

Step 3 Click **Yes** to uninstall the driver.

Connecting to the EIA Console Port

Note The US-to-RJ45 adapter cable and the DB9 console cable are not included with the router; they can be ordered separately from Cisco.

Note The serial console cable kit is not included with the router; it is ordered separately.

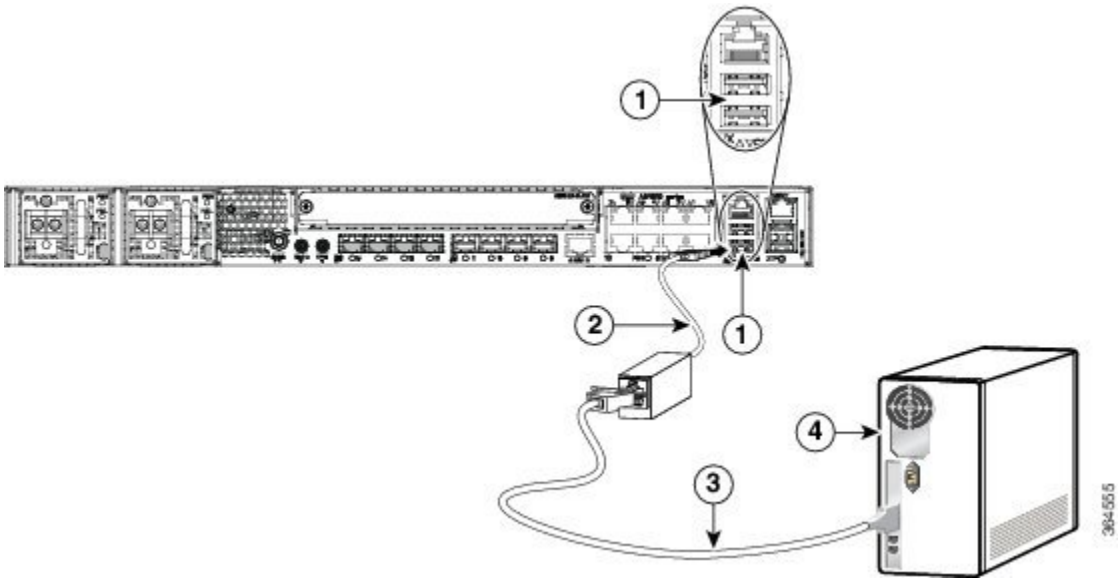
To connect a terminal to the EIA Console port on the router, follow these steps:

Procedure

Step 1 Connect the USB end of the USB-to RJ-45 cable to the EIA Console port.

Step 2 Connect the RJ-45 end of the DB-9 adapter cable to the USB-to RJ-45 cable, as shown in the following figure.

Figure 84: Connecting a Modem to the Cisco ASR 920 Series Router



Label	Component	Label	Component
1	EIA Console port	3	RJ-45 to DB-9 cable
2	USB-to-RJ45 adapter	4	Desktop or system

Step 3 Connect the DB-9 end of the console cable to the DB-9 end of the terminal.

Step 4 To communicate with the router, start a terminal emulator application, such as Microsoft Windows HyperTerminal. This software should be configured with the following parameters:

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

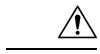
Connecting a Management Ethernet Cable

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

However, when the Ethernet Management port is configured to a fixed speed (10, 100, or 1000 Mbps) through command-line interface (CLI) commands, the port is forced to the MDI mode.

When in a fixed-speed configuration and MDI mode:

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



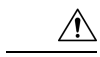
Caution To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Management Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be 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.

Installing and Removing SFP and SFP+ Modules

The Cisco ASR 920 Series Router supports a variety of SFP and SFP+ modules, including optical and Ethernet modules. For information on how to install and remove SFP and SFP+ modules, see the documentation for the SFP or SFP+ module at:

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

For information about inspecting and cleaning fiber-optic connections, see:
http://www.cisco.com/en/US/partner/tech/tk482/tk876/technologies_white_paper09186a0080254eba.shtml



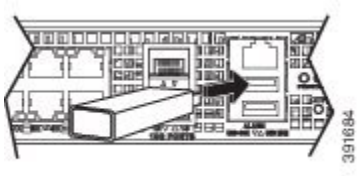
Caution We recommend that you wait for 30 seconds between the removal and insertion of an SFP on an interface module. We recommend this to allow the transceiver software to initialize and synchronize with the Cisco ASR 920 Series Router. Changing an SFP more quickly could result in transceiver initialization issues that disable the SFP.

Connecting a USB Flash Device

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

The following figure shows the USB port connector on the Cisco ASR 920 Series Router.

Figure 85: Flash Token Memory Stick



Removing a USB Flash Device

To remove and replace a USB flash token memory stick from and into a router, follow these steps:

Note If the USB flash device is abruptly removed, the constant sync operations of the file system in progress fail due to the USB device removal. These errors occur with ext2 or ext3 or ext4 file systems and are not seen with fat32 file system. This is a default behavior on any Linux platform.

The following error messages are displayed when you remove the USB device:

```
*Jun 24 10:29:45.766: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:45.878: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:46.012: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:46.013: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
```

Procedure

Step 1 Execute the **eject usb0:** command before removing the USB from the router.

Example:

```
rommon 2 > eject usb0
rommon 2 >
```

If you do not run this command before removing the USB, the following error message is displayed:

```
rommon 2 > dir usb0:
  usb_stor_BBB_comdat:usb_bulk_msg error
  failed to send CBW status 34
  RESET:stall
  usb_stor_BBB_comdat:usb_bulk_msg error
  failed to send CBW status 34
```

```
RESET:stall
usb_stor_BBB_comdat:usb_bulk_msg error
```

Step 2 Pull the memory stick from the USB port.

Step 3 To replace the Cisco USB Flash memory stick, simply insert the module into the USB port labeled USB MEM. The Flash memory module can be inserted only one way, and can be inserted or removed regardless of whether the router is powered up or not.

This completes the USB Flash memory installation procedure.

Connecting Timing Cables

The section describes how to connect timing cables to the Cisco ASR 920 Series Router:

Connecting Cables to a GPS Interface

The sections describe how to connect cables from the Cisco ASR-920-12SZ-IM Router to a GPS unit for input or output timing of frequency:

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

Procedure

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

Step 2 Connect the other end of the shielded mini-coax cable to the 10-Mhz or 1-PPS port on the Cisco ASR 920 Series Router.

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

Procedure

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

Step 2 Connect the other end of the shielded mini-coax cable to the 10-Mhz or 1-PPS port on the Cisco ASR 920 Series Router.

Connecting a Cable to the ToD Interface

Procedure

Step 1 Connect one end of a straight-through Ethernet cable to the GPS unit.

Step 2 Connect the other end of the straight-through Ethernet cable to the ToD or 1-PPS port on the Cisco ASR 920 Series Router.

What to do next

Note For instructions on how to configure clocking, see the *Cisco ASR 920 Series Aggregation Services Routers Configuration Guide* .

Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the ToD ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be 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.

Note For more information about GPS-port pinouts, see *Troubleshooting* section.

Connecting a Cable to the GNSS Antenna Interface

Procedure

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

Step 2 Connect the other end of the shielded coaxial cable to the GNSS antenna after the primary protector.

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

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

Connecting Ethernet Cables

The Cisco ASR 920 Series Router interface modules support RJ-45 and Ethernet SFP ports. For instructions on how to connect cables to Ethernet SFP ports, see the *Connecting Cables to SFP Modules* section.

The RJ-45 port supports standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables. Cisco does not supply Category 5 UTP cables; these cables are available commercially.

Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Gigabit Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be 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.

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

Procedure

Step 1 Confirm that the router is powered off.

Step 2 Connect one end of the cable to the Gigabit Ethernet port on the router.

Step 3 Connect the other end to the BTS patch or demarcation panel at your site.

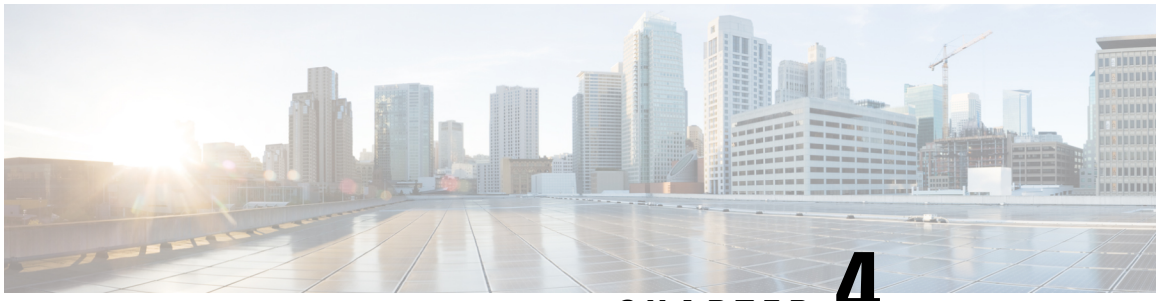
Connecting Cables to SFP Modules

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

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

Connector and Cable Specifications

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



CHAPTER 4

Initial Configuration

This chapter guides you through a basic router configuration, which is sufficient for you to access your network. Complex configuration procedures are beyond the scope of this publication and can be found in the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

To configure a Cisco ASR 920 Series Aggregation Services Router from a console, connect a terminal to the router console port.

- Checking Conditions Prior to System Startup , on page 123
- Powering Up the Router, on page 123
- Configuring the Router at Startup, on page 125
- Safely Powering Off the Router, on page 127

Checking Conditions Prior to System Startup

Ensure that the following conditions are addressed before starting up the router:

- The optional Gigabit Ethernet Management port cable is installed.
- The chassis is securely mounted and grounded.
- The power and interface cables are connected.
- Your PC with terminal emulation program (HyperTerminal or equivalent) is connected to the console port and powered up.
- Your PC terminal emulation program is configured for 9600 baud, 8 data bits, 1 stop-bit, no parity, and no flow control is set to none.
- You have selected passwords for access control.
- Captive installation screws are tight on all the removable components.
- The console terminal is turned on.
- You have determined the IP addresses for the Ethernet and serial interfaces.

Powering Up the Router

After installing your router and connecting cables, start the router and follow these steps:

Procedure

Step 1 Switch on the power supply.

Caution
Do not press any keys on the keyboard until the messages stop and the PWR LED is solid green. Any keys pressed during this time are interpreted as the first command typed when the messages stop, which might cause the router to power off and start over. It takes a few minutes for the messages to stop.

Step 2 Observe the initialization process. When the system boot is complete, the router begins to initialize.

During the boot process, observe the system LEDs. After the router has booted, the green STAT LED comes on and stays on.

Verifying the Front Panel LEDs

The front-panel indicator LEDs provide power, activity, and status information useful during bootup. For more detailed information about the LEDs, see the *LED Indicators* section.

Verifying the Hardware Configuration

To display and verify the hardware features, enter the following commands:

- **show version**—Displays the system hardware version, the installed software version, the names and sources of configuration files, the boot images, and the amount of installed DRAM, NVRAM, and flash memory.
- **show diag slot**—Displays the IDPROM information for the assemblies in the chassis.

Checking Hardware and Software Compatibility

To check the minimum software requirements of Cisco IOS-XE software with the hardware installed on your router, Cisco maintains the **Software Advisor** tool on Cisco.com. The tool provides the minimum Cisco IOS requirements for individual hardware modules and components.

Note To access this tool, you must have a Cisco.com login account.

To access the **Software Advisor** tool:

1. Click Login at Cisco.com. The login page with fields for User Name and Password is displayed.
2. Type your registered User Name and Password and click on the Log in button.
3. Type **Software Advisor** in the search box, and click on the magnifying lens icon next to the search box. .
4. From the displayed search result, click the link for the Software Advisor Tool.

5. Choose a product family or enter a specific product number to search for the minimum supported software needed for your hardware.

Configuring the Router at Startup

This section explains how to create a basic running configuration for your router.



Note You must acquire the correct network addresses from your system administrator or consult your network plan to determine the correct addresses before you can complete the router configuration.

Before continuing the configuration process, check the current state of the router by entering the **show version** command. This command displays the release of Cisco IOS software that is available on the router.

For information on modifying the configuration after you create it, see the Cisco IOS configuration and Cisco IOS Master Command List, All Releases guides.

To configure a Cisco ASR 920 Series Router from the console, you must connect a terminal or terminal server to the console port on the Cisco ASR 920 Series Router. To configure the router using the management Ethernet port, you must have the router's IP address.

Accessing the CLI Using the Console

To access the command line interface using the console, follow these steps:

Procedure

Step 1 When your system is booting, type No at the prompt.

Example:

```
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no
```

Step 2 Press Return to enter the user EXEC mode.

The following prompt is displayed:

Example:

```
Router>
```

Step 3 From the user EXEC mode, enter the enable command, as shown in the following example:

Example:

```
Router> enable
```

Step 4 At the password prompt, enter your system password, as shown in the following example. If an enable password has not been set on your system, you can skip this step.

Example:

```
Password: enablepass
```

When your password is accepted, the privileged EXEC mode prompt is displayed:

Example:

```
Router#
```

You now have access to the CLI in the privileged EXEC mode. You can enter the necessary commands to complete the required tasks.

Step 5 To exit the console session, enter the quit command, as shown in the following example:

Example:

```
Router# quit
```

Configuring Global Parameters

When you first start the setup program, configure the global parameters. These parameters are used for controlling system-wide settings. Perform the following steps to enter the global parameters:

Procedure

Step 1 Connect a console terminal to the console port, and then boot the router. For more information on connecting a console terminal, see *Connecting Console Cables* section.

Step 2 The first sections of the configuration script appear only at an initial system startup. On subsequent uses of the setup facility, the script begins with a System Configuration Dialog as shown below: When you are prompted about whether you want to enter the initial configuration dialog, enter yes.

Example:

```
Would you like to enter the initial configuration dialog? [yes/no] yes
At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
Basic management setup configures only enough connectivity for management of the system,
extended setup will ask you to configure each interface on the system.
```

Basic management setup configures enough connectivity for managing the system; extended setup will ask you to configure each interface on the system.

Checking the Running Configuration Settings

To check the value of the settings you have entered, enter the show running-config command at the Router# prompt:

```
Router# show running-config
```

To review the changes you have made to the configuration use the **show startup-config** command in the user EXEC mode to see the changes and copy run-start stored in the NVRAM.

Saving the Running Configuration to NVRAM

To store the configuration or changes to your startup configuration in NVRAM, enter the copy running-config startup-config command at the prompt:

Router# copy running-config startup-config

Using this command saves the configuration settings that you created in the router using the configuration mode and the setup facility. If you fail to do this, your configuration will be lost, and will not be available when you reload the router next.

Safely Powering Off the Router

This section explains how to shut down the router. We recommend that before turning off all power to the chassis, you issue the **reload** command. This ensures that the operating system cleans up all the file systems. After the reload operation is complete, the router can be powered off safely.

To power off the router safely,:

Procedure

Step 1 Slip on the ESD-preventive wrist strap included in the accessory kit.

Step 2 Enter the **reload** command.

Step 3 Confirm the reload command.

Example:

```
Rmcp-6ru-1#reload
Proceed with reload? [confirm]
Aug 17 00:06:47.051 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: prs exit with
reload chassis code
```

Step 4 After confirming the reload command, wait until the system bootstrap message is displayed before powering off the system:

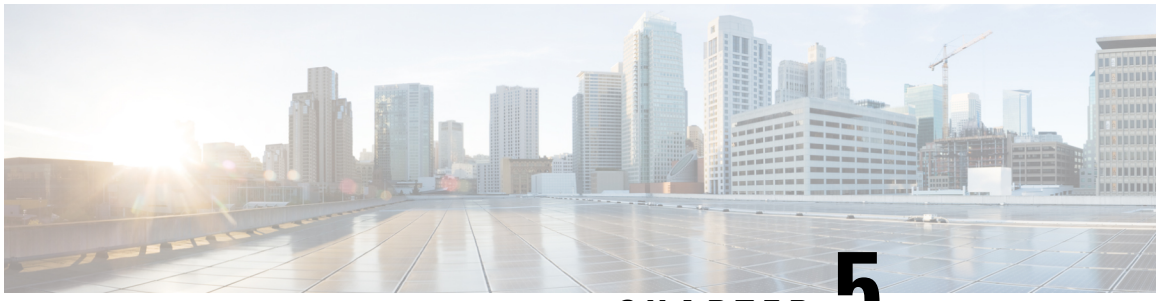
Example:

```
System Bootstrap, Version 15.4(3)S1, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 2012 by cisco Systems, Inc.
Current image running: Boot ROM0
Last reset cause: RSP-Board
UEA platform with 2097152 Kbytes of main memory
```

Step 5 Remove power cables, if any, from the Cisco ASR 920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M Router:

- For power supplies with a circuit breaker switch, position the switch to the Off (O) position.
- For power supplies with a standby switch, place the standby switch in the Standby position.

Note
After powering off the router, wait for a minimum of 30 seconds before powering it on again.



CHAPTER 5

Troubleshooting

This chapter provides information about troubleshooting issues, if any, on the Cisco ASR 920 Series Aggregation Services Router.

- Pinouts, on page 129
- LED Summary, on page 134

Pinouts

The sections describe the pinouts for the Cisco ASR 920 Series Router interfaces:

GPS Port Pinouts

The table below summarizes the GPS port pinouts.

Table 20: GPS Port Pinouts

	10Mhz (input and output)	**1PPS (input and output)**
Waveform	Input—Sine wave Output—Square wave	Input—Pulse Output—Pulse
Amplitude	Input—1.7 volt p-p (+8 to +10 dBm) Output—2.4 volts TTL compatible	Input—2.4 volts TTL compatible Output—2.4 volts TTL compatible
Impedance	50 ohms	50 ohms
Pulse Width	50 percent duty cycle	26 microseconds
Rise Time	Input—AC coupled Output—5 nanoseconds	40 nanoseconds

Time-of-Day Port Pinouts

The table below summarizes the ToD/1-PPS port pinouts.

Table 21: RJ-45 1PPS/ToD Port Pinouts

Pin	Signal Name	Direction	Description
1	V.11 Loopback	Output or Input	V.11 Loopback interface pins (Optional)
2	V.11 Loopback	Output or Input	V.11 Loopback interface pins (Optional)
3	1PPS_N	Output or Input	1PPS RS422 signal
4	GND	—	—
5	GND	—	—
6	1PPS_P	Input	1PPS RS422 signal
7	TOD_N	Output or Input	Time-of-Day character
8	TOD_P	Output or Input	Time-of-Day character

Use a 4-port EIA-232 DCE, 10 feet, Female DB-25, and CAB-HD4-232FC. Pinout of the DB25 connector to be connected to the RS232-to-RS422 converter.

Table 22: RS422 Pinout

Pin	Signal Name	Description
4	TXD+	RTS pin for RS232
20	TXD-	DTR pin for RS232
5	RXD+	CTS pin for RS232
6	RXD-	DSR pin for RS232

Alarm Port Pinouts

The table below summarizes the external alarm input pinouts.

Table 23: External Alarm Input Pinouts

Pin	Signal Name	Description
1	ALARM0_IN	Alarm input 0
2	ALARM1_IN	Alarm input 1
3	—	No connect

Pin	Signal Name	Description
4	ALARM2_IN	Alarm input 2
5	ALARM3_IN	Alarm input 3
6	—	No connect
7	—	No connect
8	COMMON	Alarm common

Management GigabitEthernet Port Pinouts

The table below summarizes the Management GigabitEthernet port pinouts.

Table 24: Management Port Pinout

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

USB Console Port Pinouts

The table below summarizes the USB console port pinouts.

Table 25: Single USB Console Port Pinouts

Pin	Signal Name	Description
1	Vcc	+5VDC
2	D-	Data -
3	D+	Data +

Pin	Signal Name	Description
4	Gnd	Ground

Note The USB console port +5VDC is input, and operates as an USB peripheral device.

USB Flash or MEM Port Pinouts

The table below summarizes the USB flash or MEM port pinouts.

Table 26: Single USB Flash or MEM Port Pinouts

Pin	Signal Name	Description
1	Vcc	+5VDC
2	D-	Data -
3	D+	Data +
4	Gnd	Ground

Note USB TYPE-A receptacle is used.

Note The USB flash or MEM port +5VDC is output. This router provides power for USB flash or MEM port. This port operates as a USB host.

Optical Fiber Specifications

The specification for optical fiber transmission defines two types of fiber: single mode and multimode. Within the single-mode category, three transmission types are defined: short reach, intermediate reach, and long reach. Within the multimode category, only short reach is available. For information about optical SFP modules, see the documentation for the SFP module at: http://www.cisco.com/en/US/partner/products/hw/modules/ps5455/prod_installation_guides_list.html .

Alarm Conditions

The table below summarizes the meaning of the alarm conditions on the Cisco ASR 920 Series Router.

Table 27: Alarm Condition Summary

Alarm Type	Alarm Meaning
Critical	Port in down state. Environmental sensor threshold exceeded critical level (voltage, temperature)
Major	Environmental sensor threshold exceeded major level (voltage, temperature)
Info	Port administratively shut down.

G.703/FXS/FXO Interface Module Pinout

Table 28: FXO RJ11 Pinout

Pin	Signal Name	Direction	Description
1	NC	-	-
2	Ring	Analog	Ring audio
3	Tip	Analog	Tip audio
4	NC	-	-

Table 29: FXS RJ45 Pinout

Pin	Signal Name	Direction	Description
1, 2, 3	NC	-	-
4	Ring	Analog	Ring audio
5	Tip	Analog	Tip audio
6, 7, 8	NC	-	-

Table 30: G.703 RJ48C Pinout

Pin	Signal Name	Direction	Description
1	Rx_Tip	Input	G.703 64 Kbps Co-Directional receive tip signal
2	Rx_Ring	Input	G.703 64 Kbps Co-Directional receive ring signal
3	NC	-	-
4	Tx_Tip	Output	G.703 64 Kbps Co-Directional transmit tip signal

Pin	Signal Name	Direction	Description
5	Tx_Ring	Output	G.703 64 Kbps Co-Directional transmit ring signal
6, 7, 8	NC	-	-

LED Summary

The sections describe the meanings of the LEDs.

Power Supply LEDs

The table below summarizes the power supply LEDs for both the AC and DC power supplies.

Table 31: PSU LED Indication

Power LED	FAIL LED	Power Supply Condition
Green	Off	Power Supply ON; valid input/output
Yellow 1Hz blinking	Red 1Hz blinking	PSU Warning due to OCP, OTP, UV, OV, OP, abnormal fan operation PSU continues to operate
Off	On	PSU failure due to OCP, OTP, UV, OV, OP, abnormal fan operation. No valid output.
Green 1Hz blinking	Off	Valid power present, shutdown by system.
Yellow	Off	Input voltage low
Off	Off	No valid power input.

Fan Tray LEDs

The table below summarizes the Fan Tray LEDs.

Table 32: Fan Tray LEDs

Color/State	Description
Off	System is not powered on
Green	All the fans are working normally
Red	Single or multiple fan failures and critical error



CHAPTER 6

Site Log

Use the Site Log to provide a record of actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that those who perform tasks have access to it. Use the Installation Checklist (see the *Site Planning* section) to verify the steps in the installation and maintenance of your router. Site Log entries can include the following:

- Installation progress—Make a copy of the Cisco ASR 920 Series Aggregation Services Router Installation Checklist, and insert it into the Site Log. Make entries as you complete each task.
- Upgrade, removal, and maintenance procedures—Use the Site Log as a record of ongoing router maintenance and expansion history. Each time a task is performed on the Cisco ASR 920 Series Router, update the Site Log to reflect the following:
  - Removal or replacement of interface modules
  - Configuration changes
  - Maintenance schedules and requirements
  - Maintenance procedures performed
  - Intermittent problems
  - Comments and notes

The table below shows a sample site log. Make copies of the sample, or design your own site log to meet the requirements of your site and equipment.

Table 33: Site Log

Date	Description of Action Performed or Symptom Observed	Initials