

Cisco ASR 903 and ASR 903U Aggregation Services Router Hardware Installation Guide

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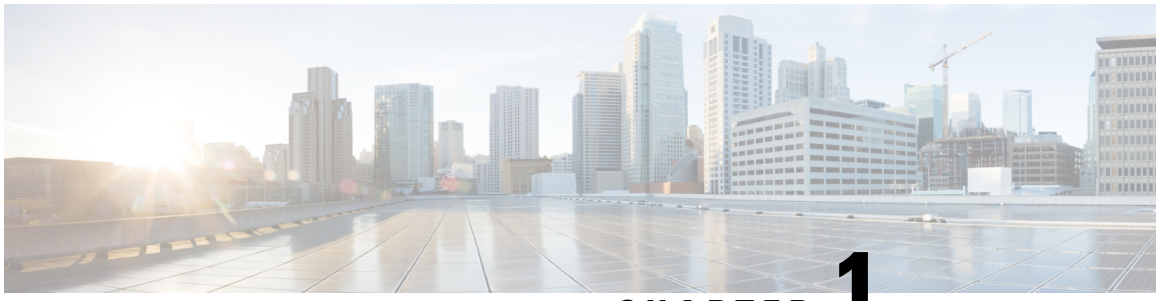
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CHAPTER 1

Overview

Note The Cisco ASR 903 Router and the Cisco ASR 903U Router are collectively referred to as the Cisco ASR 903 Router in this document. Any differences between the routers are specifically called out.

The Cisco ASR 903 Router is a fully-featured aggregation platform designed for the cost-effective delivery of converged mobile and business services. With shallow depth, low power consumption, and an extended temperature range, this compact 3-rack-unit (RU) router provides high service scale, full redundancy, and flexible hardware configuration.

The Cisco ASR 903 Router expands the Cisco service provider product portfolio by providing a rich and scalable feature set of Layer 2 VPN (L2VPN) and Layer 3 VPN (L3VPN) services in a compact package. It also supports a variety of software features, including Carrier Ethernet features, Timing over Packet, and pseudowire.

The Cisco ASR 903 Router is positioned as a pre-aggregation router in IP RAN (GSM, UMTS, iMAX, CDMA, and LTE) networks or an aggregation router in Carrier Ethernet networks.

- Cisco ASR 903 Router Features, on page 1
- Interface Numbering, on page 47
- Regulatory Compliance, on page 48

Cisco ASR 903 Router Features

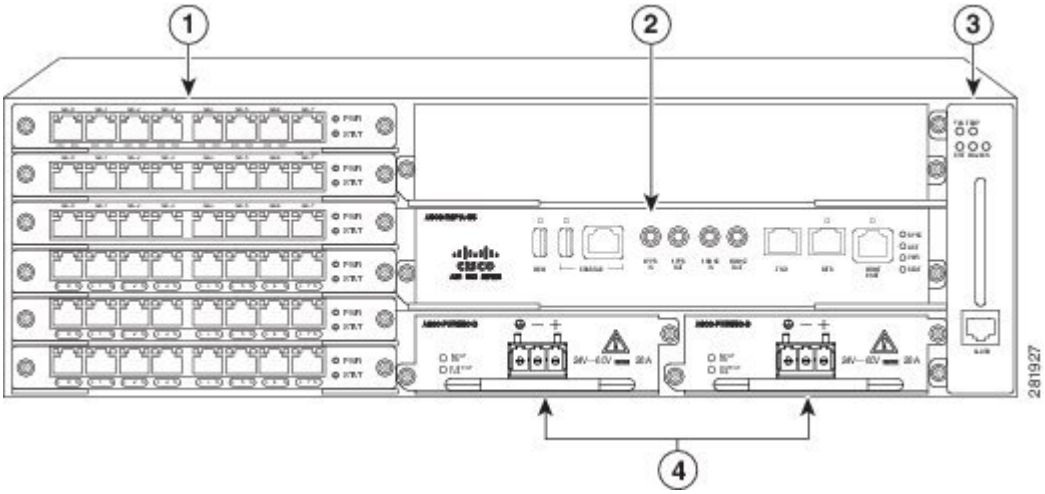
The Cisco ASR 903 Router has the following hardware features:

- 3-RU modular chassis designed for installation in a 300 mm European Telecommunications Standards Institute (ETSI) cabinet
- Dedicated slots in the chassis that support the following:
  - Up to six interface modules
  - Up to two Route Switch Processors (RSP)
  - Up to two AC or DC power supply units
  - One fan tray
- Network frequency, phase, and time inputs and outputs for network interfaces (SyncE and TDM), BITS, 1 PPS or 10 MHz and Timing over Packet (IEEE 1588-2008)
- Adjustable front and rear rail mounting locations

- Front panel access to power supplies, fan tray, RSPs, and interface modules
- Online insertion and removal (OIR) of RSP, interface modules, power supplies, and fan tray
- Discrete status LEDs on power supply, interface module, RSP, and fan tray units
- Four alarm dry contact inputs (either normally open or normally closed)
- Environmental monitoring and reporting functions
- LED indicators for critical, major, and minor alarms
- Side-to-side forced air cooling
- Temperature range, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

The figure below illustrates the Cisco ASR 903 Router chassis design.

Figure 1: Cisco ASR 903 Router Chassis Design



1	Interface modules
2	RSP unit (with active and standby RSP slots)
3	Fan tray
4	Redundant power units (two DC power units are shown)

Power Supply Features

The Cisco ASR 903 Router support AC and DC power supplies. For more information about installing the Cisco ASR 903 Router power supplies, see the Installing the Power Supply.

To estimate the required power supply, use the Cisco Power Calculator.

The power sections provide more information about the power supply:

Redundancy

The Cisco ASR 903 Router chassis includes a slot for an optional 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. The Cisco ASR 903 Router supports current sharing between the power supplies.

A redundant power supply on the Cisco ASR 903 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.

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

Dying Gasp

The Cisco ASR 903 Router DC power supply supports the Dying Gasp feature, which allows the router to provide an input power loss notification to the RSP so that the RSP can send appropriate SNMP traps or OAM messages and update log files on the router. With the DC power supply, the router supports a minimum input power loss detection time of 2 milliseconds (DC) and continued operation of at least 6 milliseconds (DC) after the notification.

Note Continued DC power supply operation may vary for voltages other than +24/-48V.

Note Dying Gasp is not supported on the ASR 900 RSP3 module for 1200W DC power supply.

Table 1: Dying GASP Support on PSU

PSU PID	Dying GASP Support
A900-PWR550-D	Yes
A900-PWR550-D-E	Yes
A900-PWR550-A	Yes
A900-PWR900-D2	No
A900-PWR1200-D	No
A900-PWR1200-A	Yes

Status LEDs

LEDs are also provided on each power supply to indicate the status of the input power and the health of the power supply. For more information about the LEDs on the Cisco ASR 903 Router, see Troubleshooting.

DC Power Specifications

The power supply is field replaceable, hot-swappable, and operates separately from the fan tray. The power supply contains a front panel with mounting screws, a handle for insertion and removal, and two status LEDs. No ON/OFF switch is provided.

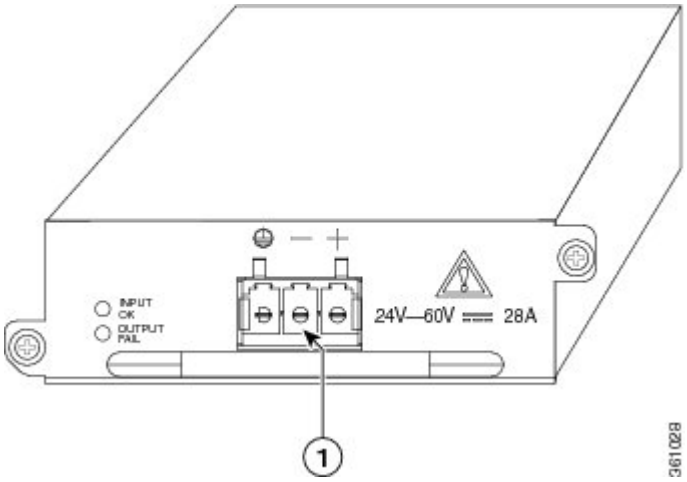
The DC PSU models supported on the router are:

- A900-PWR550-D—Provides 550 W output power for system 12 V power. Uses a euro-style three-position terminal block connector.
- A900-PWR550-D-E—Provides 550 W output power for system 12 V power. Uses a T-shaped connector.

Note The A900-PWR550-D and the A900-PWR550-E power supply can be used with the A900-RSP3C-400-S RSP modules only if the power consumption is within 550 W. However, A900-PWR1200-D is recommended.

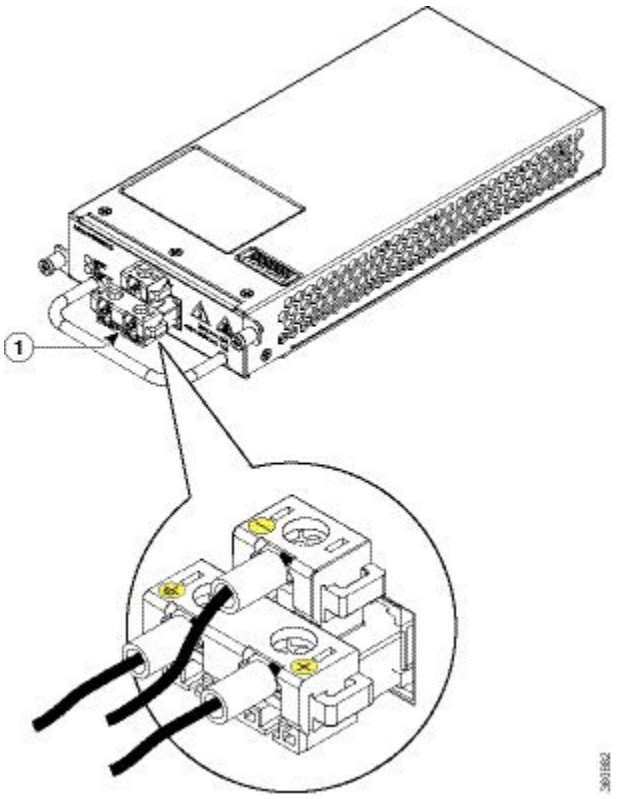
- A900-PWR1200-D—Provides 975 W output power for system 12 V power with the A903-FAN module. As most of the system configurations using A900-RSP3C-400-S RSP modules require power exceeding 550 W, we recommend using the A900-PWR1200-D power supply with A900-RSP3C-400-S RSP modules.

Figure 2: DC PSU Module (A900-PWR550-D) with Euro-style Connector



1	Euro-style connector	—

Figure 3: DC PSU Module (A900-PWR550-D-E) with T-Shaped Connector

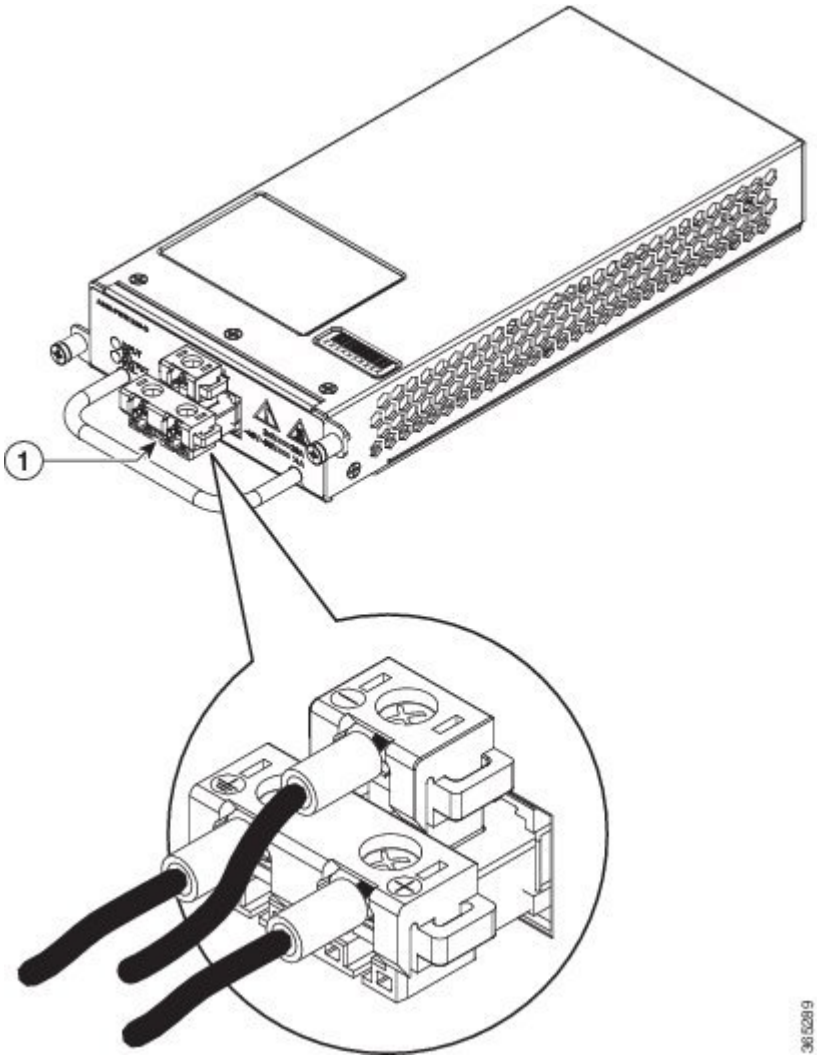


1	T-shaped connector	—

Table 2: DC Power Supply Specifications (550 W)

Part numbers	A900-PWR550-D, A900-PWR550-D-E
Input power specification	+24V/-48V or -60V VDC
Minimum input voltage	19.2 VDC
Maximum input voltage	72 VDC
Output voltage	+12 VDC
Wire gauge for DC input power connections	10 AWG minimum for –48/–60 VDC. 8 AWG minimum for 24 VDC. Connector accepts 8 AWG maximum.
Maximum power output	550 W

Figure 4: DC PSU Module (A900-PWR1200-D)



Label	Component
1	T-shaped connector

Table 3: DC Power Supply Specifications (A900-PWR1200-D)

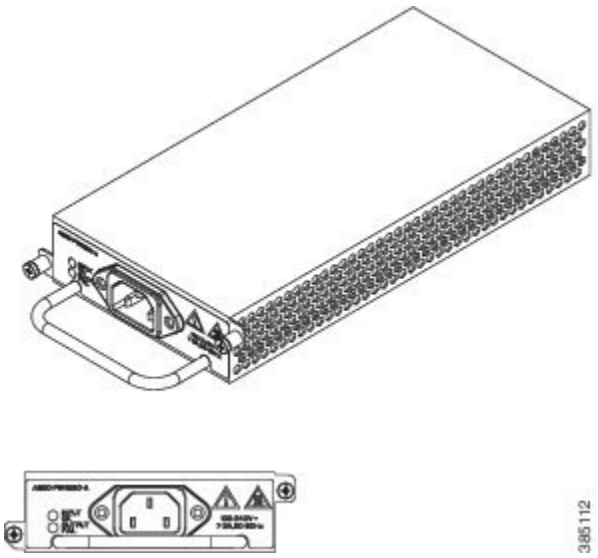
Part numbers	A900-PWR1200-D
Input power specification	48V, GRD, -48V
Minimum input voltage	-40.8 VDC
Maximum input voltage	-72 VDC
Output voltage	+12 VDC

Wire gauge for DC input power connections	8–10 AWG minimum for –48/–60 VDC. Connector accepts 8 AWG maximum.
Maximum power output	1200 W 975W with A903-FAN-E

AC Power Specifications

The AC PSU models supported on the router are:

- A900-PWR550-A—Provides 550 W output power for system 12 V power. Uses an IEC 320 C14 type 15 Amp power receptacle connector.



The A900-PWR550-A power supply can be used with the A900-RSP3C-400-S RSP modules only if the power consumption is within 550 W. However, A900-PWR1200-A is recommended.

Table 4: AC Power Supply Specifications (A900-PWR550-A)

Part number	A900-PWR550-A
Input power specification	115VAC/ 230VAC
Input voltage	85/264 VAC
Minimum input voltage	85 VAC
Maximum input voltage	264 VAC
Minimum output voltage	12V
Maximum output voltage	12.4V
Maximum power output	550 W

- A900-PWR1200-A—Provides 975 W output power for system 12 V power with the A903-FAN module. As most of the system configurations using A900-RSP3C-400-S RSP modules require power exceeding 550 W, we recommend using the A900-PWR1200-A power supply with A900-RSP3C-400-S RSP modules. See the figure below.

Figure 5: AC Power Supply (A900-PWR1200-A)

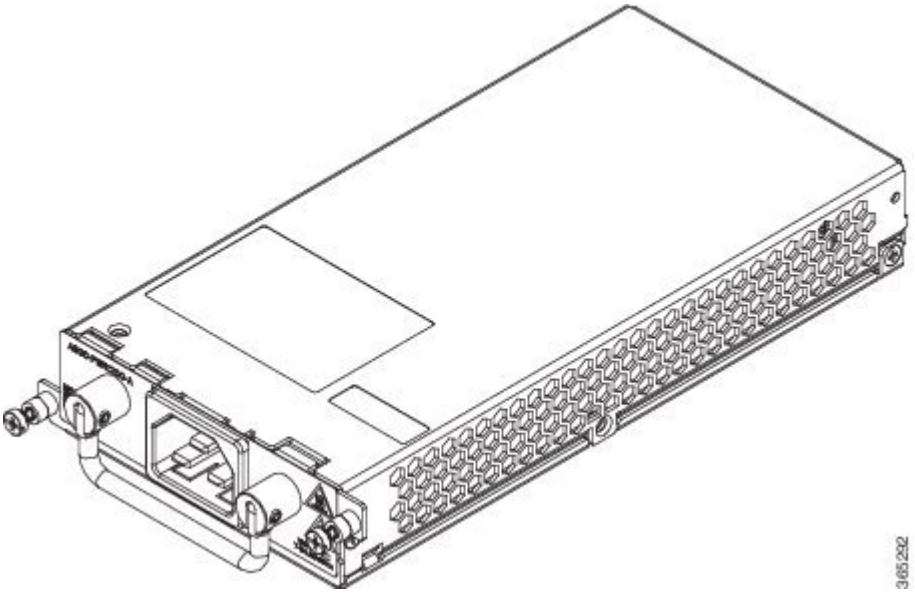


Table 5: AC Power Supply Specifications (A900-PWR1200-A)

Part number	A900-PWR1200-A
Input power specification	115VAC/ 230VAC
Input voltage	85/264 VAC
Minimum input voltage	85 VAC
Maximum input voltage	264 VAC
Minimum output voltage	12V
Maximum output voltage	12.4V
Maximum power output	1200 W

Fan Tray

The fan tray has the following hardware features:

- It provides side-to-side forced air cooling
- It provides redundant fans
- It is field replaceable

- It contains status LEDs
- It contains an alarm port with four external alarm inputs

The fan tray modules that are supported on the router are:

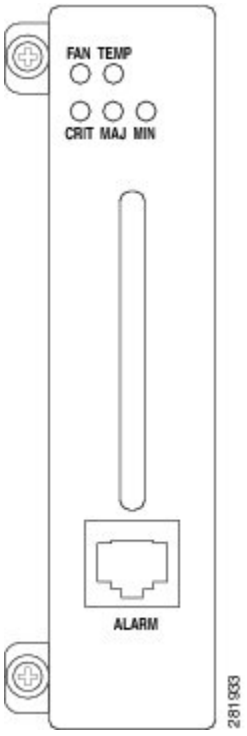
- A903-FAN
- A903-FAN-H
- A903-FAN-E

Attention Always use the correct fan trays or it may result in damaging the interface module due to overheating. For more information on the Interface Module Compatibility Matrix, see Cisco ASR 900 Series Interface Modules Data Sheet.

Fan Tray (A903-FAN)

The Cisco ASR 903 Router uses a modular fan tray that is separate from the power supply. The fan tray contains twelve fans and provides sufficient capacity to maintain operation indefinitely in the event of an individual fan failure.

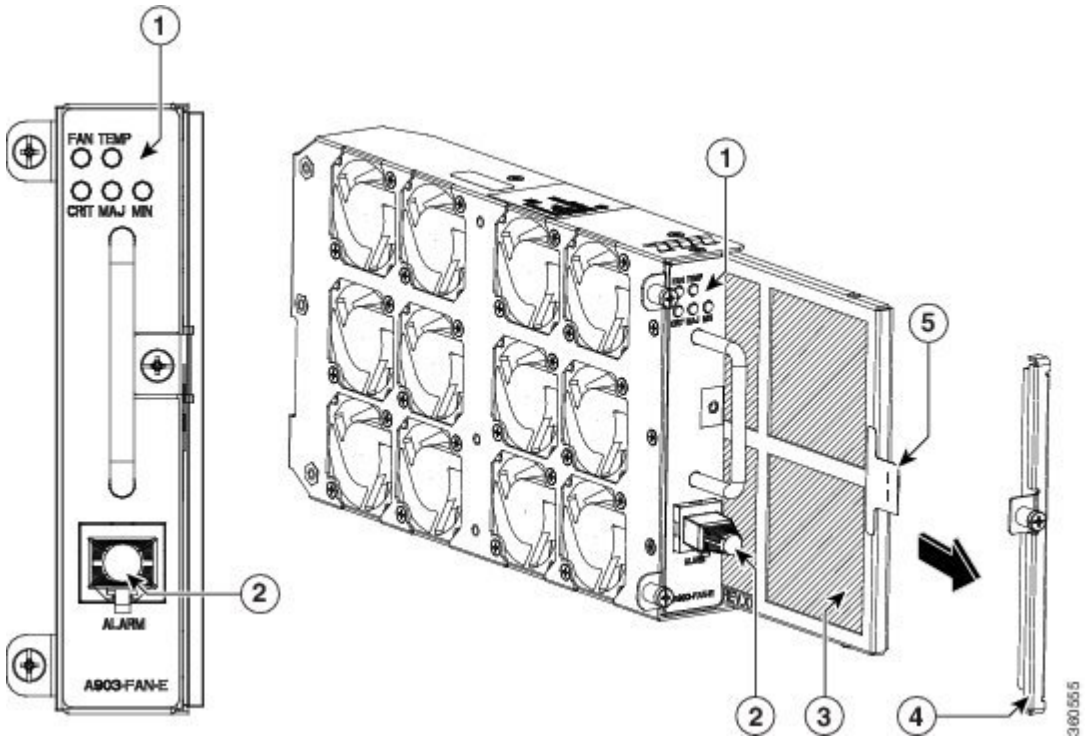
Figure 6: Cisco ASR 903 Router Fan Tray (A903-FAN)



Fan Tray (A903-FAN-E)

The A903-FAN-E is a fan tray containing twelve (40 x 40 x 20 mm) fans and provides sufficient capacity to maintain operation indefinitely in the event of an individual fan failure. It has a 8 mm fan dust filter that prevents dust from entering the unit and avoids possible damage to the components. The fan tray is IEC60950-1 compliant.

Figure 7: Cisco ASR 903 Fan Tray with Dust Filter and Dummy Cover (A903-FAN-E)



1	LEDs	4	Dummy cover
2	Alarm	5	Pull tab
3	Dust filter		—

Dust Filter (A903-FAN-F)

The dust filter on the fan tray is a quadrafoam 45PPI filter which is 85 percent dust resistant. A dummy cover (A903-FAN-F-B) secures the dust filter in the chassis.

Note Use the pull tab provided to easily access the filter.

Air Plenum

Air Plenum or air baffle assembly is used change the air flow pattern of the unit. When the router is installed with the plenum, the air flow pattern is changed from side-side to front-back. The air flow front-back pattern

provides a rack installation bay with a cool front zone and hot rear zone. For installing the plenum, see Installing the Chassis in the Air Plenum.

Note When the air plenum and the fan filter are installed in the chassis, the system operating temperature is limited to 55 degrees Celsius.

The air plenum is available from GAW. To order an air plenum, contact the Sales and Marketing support staff at GAW (see Table A-2).

RSP Modules

The Cisco ASR 903 Router is designed to use up to two RSP modules to handle the data plane, network timing, and control plane functionalities for the router. The RSP configuration allows you to use Cisco IOS software to control chassis management, redundancy, external management, and system status indications on the router.

RSP features include:

- Loading software onto processor-based interface modules
- Redundant RSP management—The RSP manages detection of RSPs, exchange of health and status information, role negotiation, function for detection, health and status exchange, role negotiation
- Packet processing
- Traffic management, including buffering, queuing, and scheduling, Ethernet MAC functions
- Network clocking functions including phase and time-of-day for BITS, 1 PPS, 10 MHz, and 1588 PTP clock references.
- Storage of software images, system configuration, OBFL, SysLog
- PTP packet processing including IEEE 1588-2008 for recovering network timing (frequency, phase, and time) from upstream PTP clocks, for generating PTP frequency and phase references as inputs to the SETS, and for distributing them to downstream PTP clocks
- External management interfaces (RS232 console, management ENET, USB console, USB storage) and system status LED indicators

Supported RSPs

The Cisco ASR 903 Router supports the following RSPs:

- A900-RSP2A-128—Provides 4 GB double data rate type three (DDR3) memory, 128 Gbps aggregate throughput.
- A900-RSP2A-64—Provides 4 GB double data rate type three (DDR3) memory, 64 Gbps aggregate throughput.
- A900-RSP3C-400-S—Provides 8 GB of SDRAM and non-volatile memory, 64MB flash memory, 40 Mb of TCAM memory, 400Gbps throughput.
- A900-RSP3C-200-S—Provides 8 GB of SDRAM and non-volatile memory, 64MB flash memory, 20 Mb of TCAM memory, 200Gbps throughput.

The Cisco ASR 903U Router supports the following RSPs:

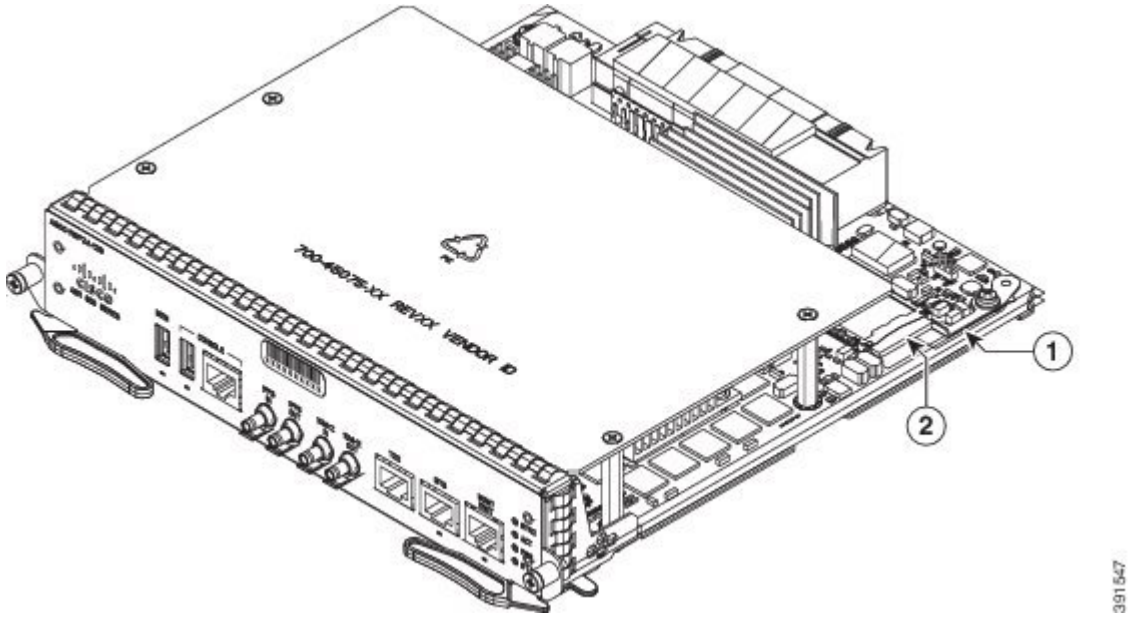
- A900U-RSP2A-128—Provides 4-GB double data rate type three (DDR3) memory and 128-Gbps aggregate throughput.

- A900U-RSP2A-64—Provides 4-GB double data rate type three (DDR3) memory and 64-Gbps aggregate throughput.

Note The supported RSPs have different memory capacities, but they have the same interfaces and functionality.

Caution The SD memory card is not field replaceable. Do not try to remove or replace it.

Figure 8: A900-RSP2A-128 Module



1	SD memory card	2	SD memory card slot

Note Installing a mix of RSP modules in the chassis is *not* supported.

The RSPs do not provide external network interfaces for user traffic. All network interfaces are provided via separate IMs.

Figure 9: A900-RSP3C-400-S RSP Module

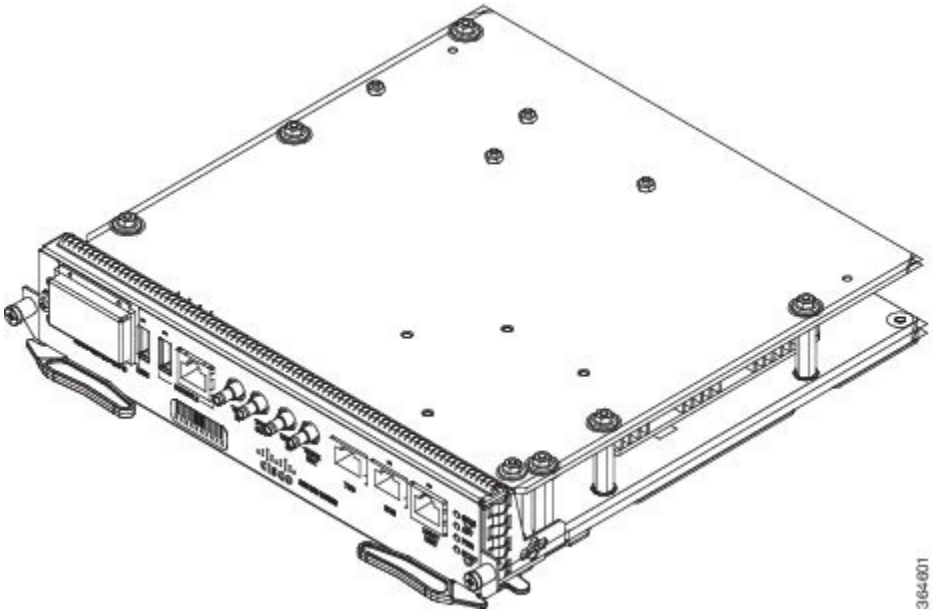
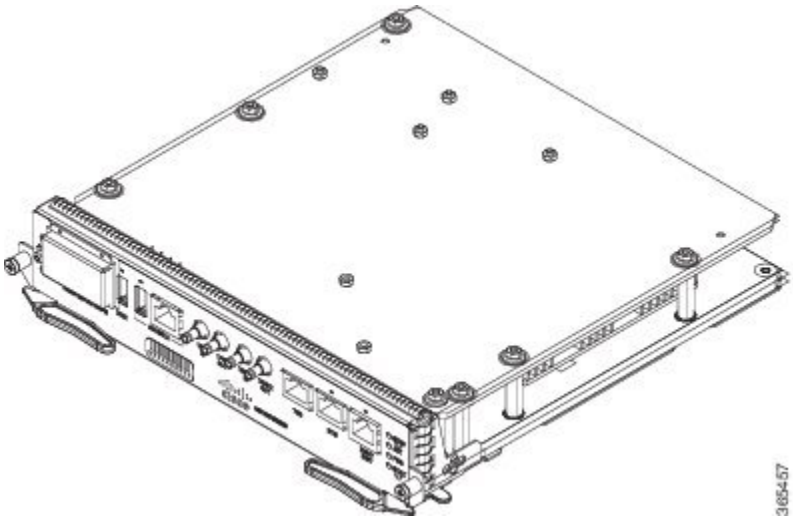


Figure 10: A900-RSP3C-200-S RSP Module



A900-RSP2 Supported Interface Modules

A900-IMA2Z IM supports SFP+ and XFP on ports 0 and 1. Either SFP+ or XFP can be connected on each port. If both are connected on the same port, the port will go down.

The combination IMs (A900-IMA8S1Z, A900-IMA8T1Z) are not supported on the A900-RSP2-64 RSP module on the Cisco ASR 903 Router.

The table below is applicable for A900-RSP2A-128 and A900U-RSP2A-128 RSP modules.

Table 6: A900-RSP2A-128 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
1-port OC48/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-Port T1/E1 + 4-Port T3/E3 CEM Interface Module	A900-IMA3G-IMSG	2,3,4,5
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	
16-port T1/E1 Interface Module	A900-IMA16D	
32-port T1/E1 Interface Module	A900-IMA32D	
8-portT1/E1 Interface Module	A900-IMA8D	
4-port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module	A900-IMA4OS	
SFP Combo IM—8-port SFP Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	
Copper Combo IM—8-port 10/100/1000 Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
6-port E & M Interface Module	A900-IMA6EM	
14-port Serial Interface Module	A900-IMASER14A/S	
4-port C37.94 Interface Module	A900-IMA4C3794	

The table below is applicable for A900-RSP2A-64 and A900U-RSP2A-64 RSP modules.

Table 7: A900-RSP2A-64 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	0-2
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
4-port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module	A900-IMA4OS	

Supported Interface Modules	Part Numbers	Slot
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	3-5
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
16-port T1/E1 Interface Module	A900-IMA16D	
32-port T1/E1 Interface Module	A900-IMA32D	
8-port T1/E1 Interface Module	A900-IMA8D	
6-port E & M Interface Module	A900-IMA6EM	
14-port Serial Interface Module	A900-IMASER14A/S	
4-port C37.94 Interface Module	A900-IMA4C3794	

A900-RSP3C-400-S Supported Interface Modules

The table below is applicable for A900-RSP3C-400-S RSP module.

Note If the **license feature service-offload enable** command is configured, then the following IMs are not supported in the router for RSP3:

- A900-IMA8S
- A900-IMA8T
- A900-IMA8S1Z
- A900-IMA8T1Z

Note There are certain restrictions in using the interface modules on different slots with RSP3 module. Contact Cisco Sales/Support for the valid combinations.

Note If there is any silicon oil leakage from the thermal pad of the RSP card, use a lint-free cloth moistened with IsoPropyl Alcohol (IPA) to thoroughly clean the affected area. Silicon oil leakage is an expected behaviour due to the material's properties. It is non-conductive, non-electrical, and poses no hazard to human health. The presence of silicon oil on the card is harmless and will not impact the card's functionality or system performance.

Table 8: A900-RSP3C-400 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
6-port E & M Interface Module	A900-IMA6EM	All

Supported Interface Modules	Part Numbers	Slot
4-port C37.94 Interface Module	A900-IMA4C3794	All
14-port Serial Interface Module	A900-IMASER14A/S	All
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	All
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	All
SFP Combo IM—8-port SFP Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	All
Copper Combo IM—8-port 10/100/1000 Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	All
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	All
8-port 10 Gigabit Ethernet Interface Module (8x10GE)	A900-IMA8Z	All
1-port 100 Gigabit Ethernet Interface Module (1x100GE)	A900-IMA1C	4 or 5
2-port 100 Gigabit Ethernet (QSFP) Interface Module (2x100GE)	N560-IMA2C/A900-IMA2C	4 and 5[1]
2-port 40 Gigabit Ethernet QSFP Interface Module (2x40GE)	A900-IMA2F	4 or 5
8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module	A900-IMA8CS1Z-M	0,3,4 or 5
48-port T1/E1 Interface module	A900-IMA48D-C	All
48-port T3/E3 Interface module	A900-IMA48T-C	All
1-port OC-192 or 8-Port Low Rate CEM Interface Module	A900-IMA8S1Z-CX	2,3,4,5
4-port OC-48/OC-12/OC-3 + 12-Port A900-IMA3G-IMSG T1/E1 + 4-Port T3/E3 CEM Interface Module	A900-IMA3G-IMSG	2,3,4,5

Supported Interface Modules	Part Numbers	Slot

ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module	A900-IMA1Z8S-CXMS	2, 3, 4, 5[2]
		Note To enable this IM on slot 0 or slot 1, do the following and reload the router:
		`Router# configure t`
		`Router(config)# license feature service-offload enable`

[1] IM supports only one port of 100G with RSP3 as QSFP28 on Port 0 in both slots 4 and 5.
[2] These slots are supported on 10G or 20G mode.

A900-RSP3C-200-S Supported Interface Modules

The table below is applicable for A900-RSP3C-200-S RSP module.

Note If the **license feature service-offload enable** command is configured, then the following IMs are not supported in the router for RSP3:

- A900-IMA8S
- A900-IMA8T
- A900-IMA8S1Z
- A900-IMA8T1Z

Note There are certain restrictions in using the interface modules on different slots with RSP3 module. Contact Cisco Sales/Support for the valid combinations.

Note FAN OIR is applicable every time the IM based fan speed profile is switched to the IMA1C and IMA2F interface modules. Even though the IMs remain in the Out-of-Service state, they are still considered as present in the chassis.

Note If there is any silicon oil leakage from the thermal pad of the RSP card, use a lint-free cloth moistened with IsoPropyl Alcohol (IPA) to thoroughly clean the affected area. Silicon oil leakage is an expected behaviour due to the material's properties. It is non-conductive, non-electrical, and poses no hazard to human health. The presence of silicon oil on the card is harmless and will not impact the card's functionality or system performance.

Table 9: A900-RSP3C-200 Supported Interface Modules and Part Numbers

Supported Interface Modules	Part Numbers	Slot
8-port Gigabit Ethernet SFP Interface Module (8x1GE)	A900-IMA8S	All
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8x1GE)	A900-IMA8T	
1-port 10 Gigabit Ethernet XFP Interface Module (1x10GE)	A900-IMA1X	0, 2 or 4
SFP Combo IM—8-port SFP Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet (1x10GE)	A900-IMA8S1Z	1-5[3]
Copper Combo IM—8-port 10/100/1000 Gigabit Ethernet (8x1GE) + 1-port 10 Gigabit Ethernet Interface Module (1x10GE)	A900-IMA8T1Z	0-4
2-port 10 Gigabit Ethernet Interface Module (2x10GE)	A900-IMA2Z	
8-port 10 Gigabit Ethernet Interface Module (8x10GE)	A900-IMA8Z	4
2-port 40 Gigabit Ethernet QSFP Interface Module (2x40GE)	A900-IMA2F	4
4-port OC-48/OC-12/OC-3 + 12-Port A900-IMA3G-IMSG T1/E1 + 4-Port T3/E3 CEM Interface Module	A900-IMA3G-IMSG	2-5[4]
8-Port 10 Gigabit Ethernet (8x10GE) SFP+ Interface Module with Conformal Coating	[5]ASR900-IMA8Z-CC	0

[3] If you have a 1-port 10G IM in slot 0, then SFP combo may not be supported in slot 5.
[4] If slot 0 has 8X10G IM and you want to insert IMA-3G-IMSG to slot 5, then insert 8X10G IM on slot 6, by using the **hw-module subslot 0/0 A900-IMA8Z mode 6-Port** command.
[5] Supported only from release XE-17.13.1 onwards.

Supported RSP Features

The RSP provides the following features on the Cisco router:

- Centralized data plane, timing, and control plane functions for the system
- High-level control of interface modules
- Management functionalities for the router
- Control plane (host) CPU and associated memory in which IOS-XE and platform control software runs
- Nonvolatile memory for storage of software images, configurations, and system files
- Enabling and monitoring the health and presence of fan trays, interface modules, and power supplies
- Field replacement and hot-swap capabilities

RSP Redundancy

The Cisco ASR 903 Router chassis includes two RSP slots to allow for redundant RSPs. When the router uses redundant RSPs, one RSP operates in the active mode and the other operates in the hot standby mode. Removal or failure of the active RSP results in an automatic switchover to the standby RSP.

Note If you are using redundant RSPs, both the RSPs must be of the same type because a mixed configuration of two different RSP types is not supported.

Network Timing Interfaces

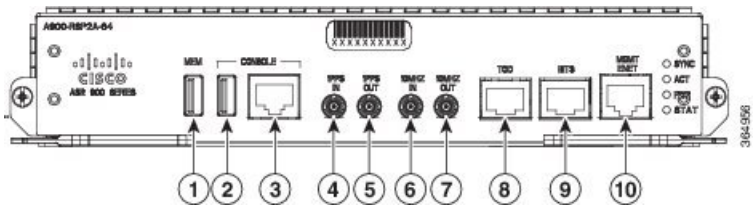
The RSP supports the following network timing interfaces:

- BITS input/output port—RJ48 jack
- 1 PPS input and output—Mini coax connectors
- 2.048 or 10 MHz input and output—Mini coax connectors
- Time of Day (ToD) input/output port and 1 PPS input port—Shielded RJ45 jack

Network timing interfaces support redundancy in a redundant RSP configuration. Network timing interfaces on a redundant RSP remain in operation while the RSP is in hot standby mode.

RSP Interfaces

Figure 11: Cisco A900-RSP2A Interface Summary



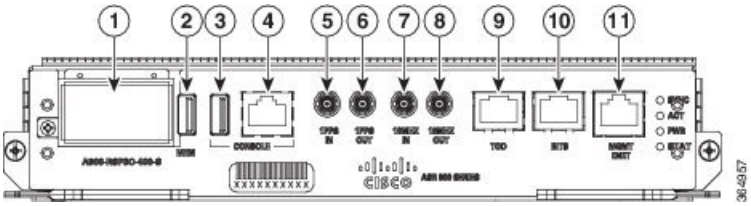
Label	Interface
1	USB memory port

Label	Interface
2	USB console port
3	Console port
4	1 PPS input timing port
5	1 PPS output timing port
6	10 MHz input timing port
7	10 MHz output timing port
8	Time of Day (ToD) timing port
9	BITS timing port
10	Ethernet management port

The Cisco A900-RSP2A module has the following front panel interfaces. For information on cable pinout, see Pinouts.

- 1 USB Type-A Connector for USB-flash (Label = “MEM”)
- 1 USB Type-A Connector for alternate console port (Label = “CONSOLE”)
- RJ45 Connecter for Con/Aux (Label = “CONSOLE”)
- RJ48 Jack for BITS interface. (Label = “BITS”)
- RJ48 Jack for Time-of-Day interface. (Label= “TOD”)
- RJ45 Connecter for Con/Aux (Label = “MGMT ENET”)
- 4 Mini-Coax connectors (Label = “1PPS IN”, “1PPS OUT”, “10MHZ IN”, “10MHZ OUT”)

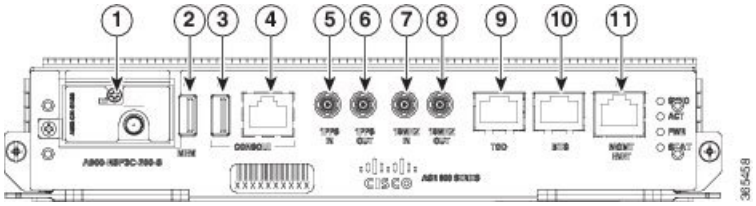
Figure 12: Cisco A900-RSP3C-400-S Interfaces



Label	Interface
1	GNSS module slot (optional)
2	USB memory port
3	USB console port
4	Console port
5	1 PPS input timing port
6	1 PPS output timing port
7	10 MHz input timing port

Label	Interface
8	10 MHz output timing port
9	Time of Day (ToD) timing port
10	BITS timing port
11	Ethernet management port

Figure 13: Cisco A900-RSP3C-200-S Interfaces



Label	Interface
1	GNSS module slot (optional)
2	USB memory port
3	USB console port
4	Console port
5	1 PPS input timing port
6	1 PPS output timing port
7	10 MHz input timing port
8	10 MHz output timing port
9	Time of Day (ToD) timing port
10	BITS timing port
11	Ethernet management port

For more information about installing the RSP, see RSP Installation. For more information about the RSP LEDs, see RSP LEDs.

GNSS Module (A900-CM-GNSS)

The GNSS module is present on the RSP3 modules. It is a pluggable module that allows direct interface with the external antenna.

Note Using a single GPS antenna input for both RSPs requires usage of external splitters.

Warning To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord. Statement 1023

Note The GNSS module is not hot swappable.

GNSS Module RF Input Requirements

- The GNSS module requires an active GPS/GNSS antenna with built-in Low-Noise Amplifier (LNA) for optimal performance. The antenna LNA amplifies the received satellite signals for two purposes:
  - Compensation of losses on the cable
  - Lifting the signal amplitude in the suitable range for the receiver frontend

The Amplification required is 22dB gain + cable/connector loss + Splitter signal loss.

The recommended range of LNA gain (LNA gain minus all cable and connector losses) at the connector of the receiver module is 22dB to 30dB with a minimum of 20dB and a maximum of 35dB.

- GNSS module provides 5V to the active antenna through the same RF input.
- Surge requirement:

GNSS modules have built-in ESD protections on all pins, including the RF-input pin. However, additional surge protection may be required if rooftop antennas are being connected, to meet the regulations and standards for lightning protection in the countries where the end-product is installed.

A lightning protection must be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to PE (Protective Earth).

Surge arrestors should support DC-pass and suitable for the GPS frequency range (1.575GHz) with low attenuation.

- Antenna Sky visibility:

GPS signals can only be received on a direct line of sight between antenna and satellite. The antenna should see as much as possible from the total sky. For proper timing, minimum of four satellites should be locked.

Note The antenna terminal should be earthed at the building entrance in accordance with the ANSI/NFPA 70, the National Electrical Code (NEC), in particular Section 820.93, Grounding of Outer Conductive Shield of a Coaxial Cable.

- Use a passive splitter if more than one GNSS modules are fed from a single antenna.

For information on pinout, see GPS Port Pinout.

Interface Modules

The Cisco ASR 903 Router interface modules are a field-replaceable units. In addition to the ports provided on an RSP, the Cisco ASR 903 Router supports the following interface modules:

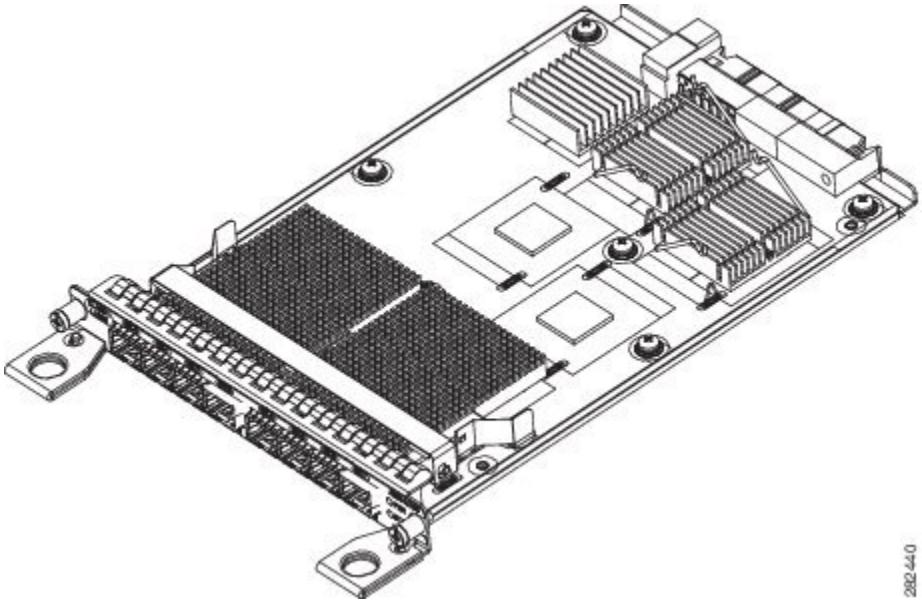
Note For information about supported interface modules, see the *Release Notes for the Cisco ASR 903 Series Aggregation Services Router*.

For more information about installing, see the Interface Module Installation.

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 14: 8-port 1 GE Gigabit Ethernet SFP Interface Module

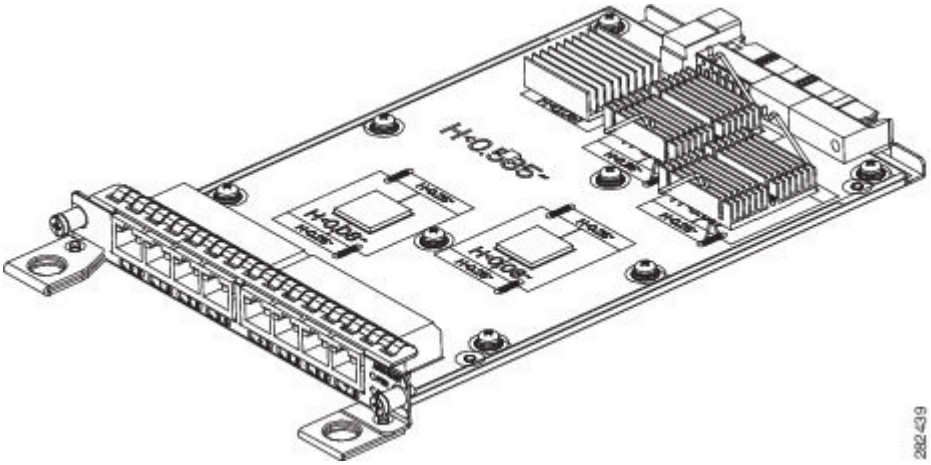


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

8-Port 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 15: 8-port 1 GE Gigabit Ethernet RJ45 (Copper) Interface Module

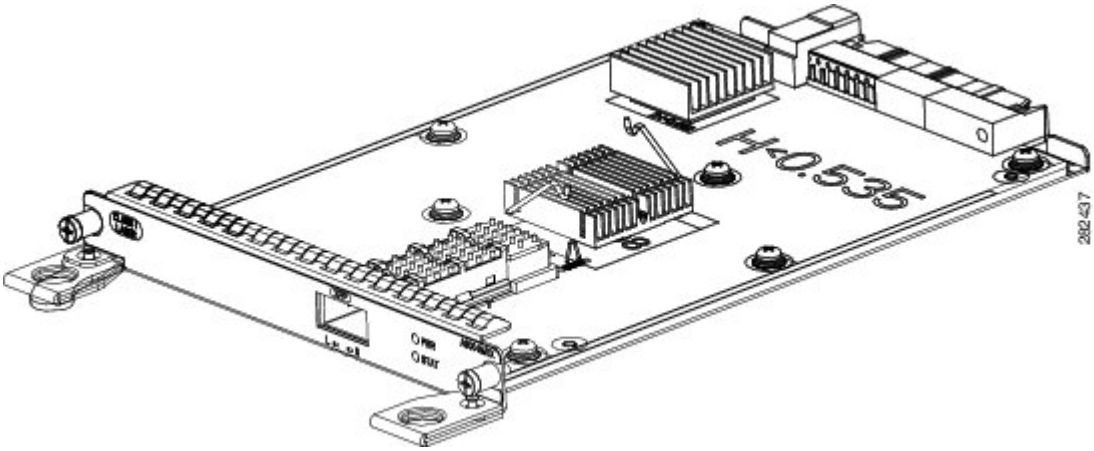


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

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 16: 1-port 10 Gigabit Ethernet XFP Interface Module

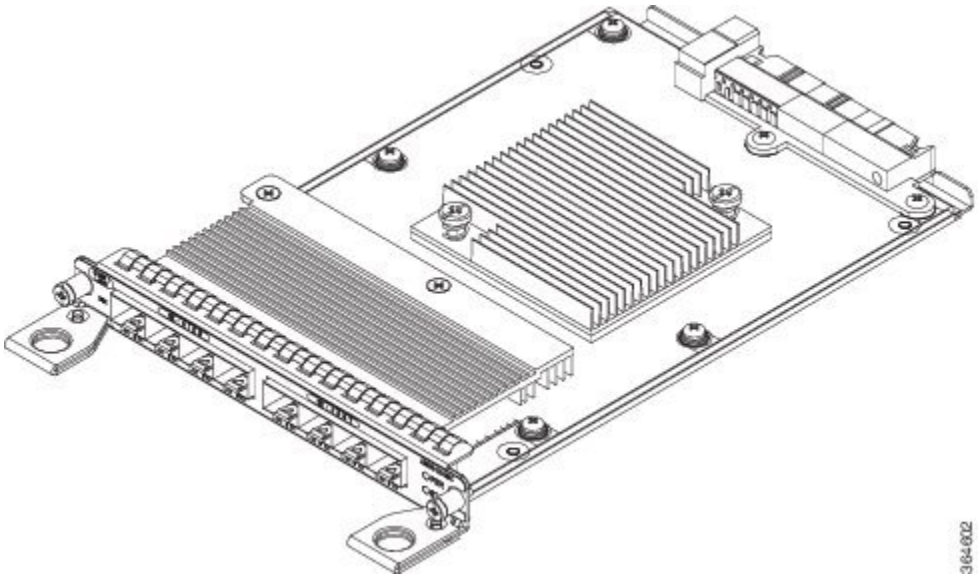


Note 1-port 10 Gigabit Ethernet interface modules are not supported in slots 4 and 5.

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

8-port 10 Gigabit Ethernet Interface Module (8x10GE) (A900-IMA8Z)

Figure 17: 8-port 10 Gigabit Ethernet Interface Module



The high density 8-port 10 Gigabit Ethernet interface module supports eight 10 Gigabit Ethernet ports using SFP+ transceivers cages on the faceplate.

Note It does not support XFP transceivers on the ports.

The 8-port 10 Gigabit Ethernet interface module is supported in slot 0 on the router with the A900-RSP3C-200-S RSP module. Only 6 ports of the 8 are enabled. The ports enabled are 0, 1, 4, 5, 6, and 7.

Use the **hw-module subslot** command to enable the interface module in slot 0 of the router. Save the configuration and reload the router to activate the interface module.

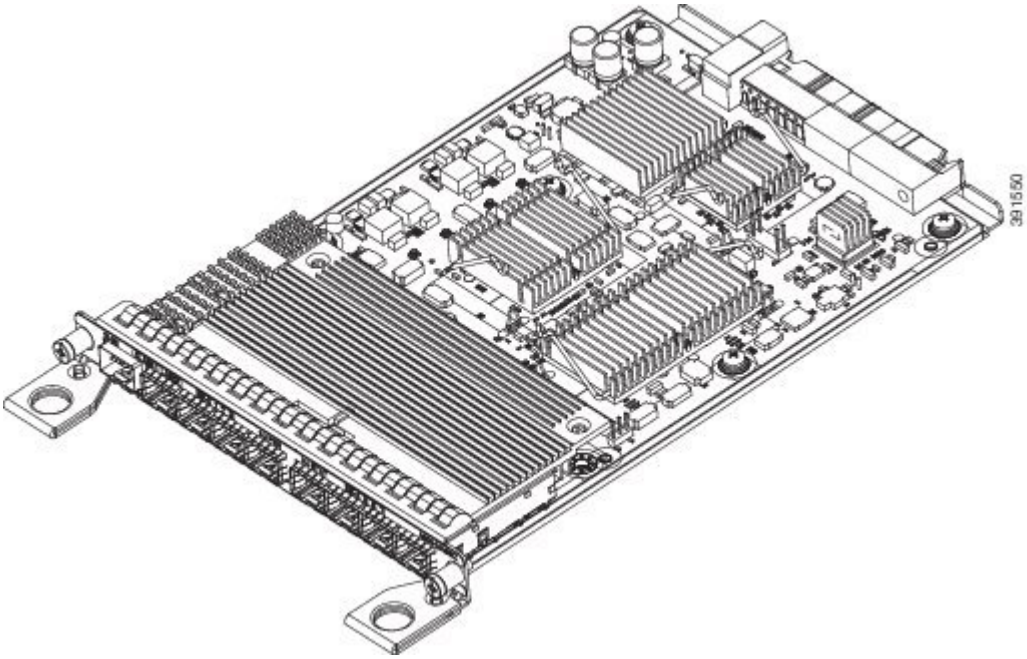
To remove the configuration, use **no hw-module subslot** command.

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 18: 8-port 1 GE SFP + 1-port 10 GE SFP+ Interface Module

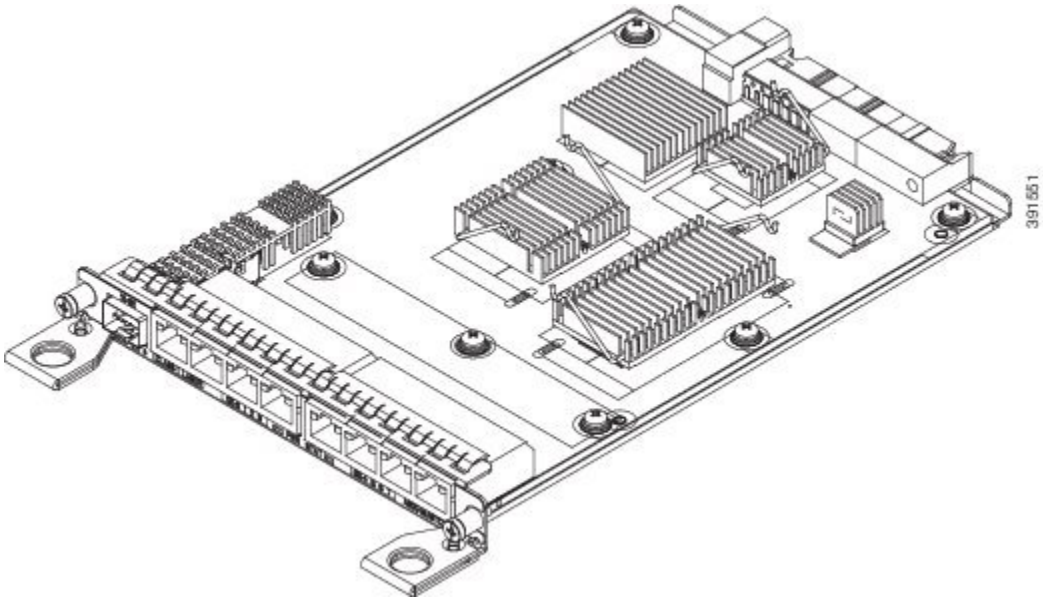


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

8-Port 1 Gigabit Ethernet + 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 19: 8-port 1 GE (RJ45) + 1-port 10 GE SFP+ Interface Module

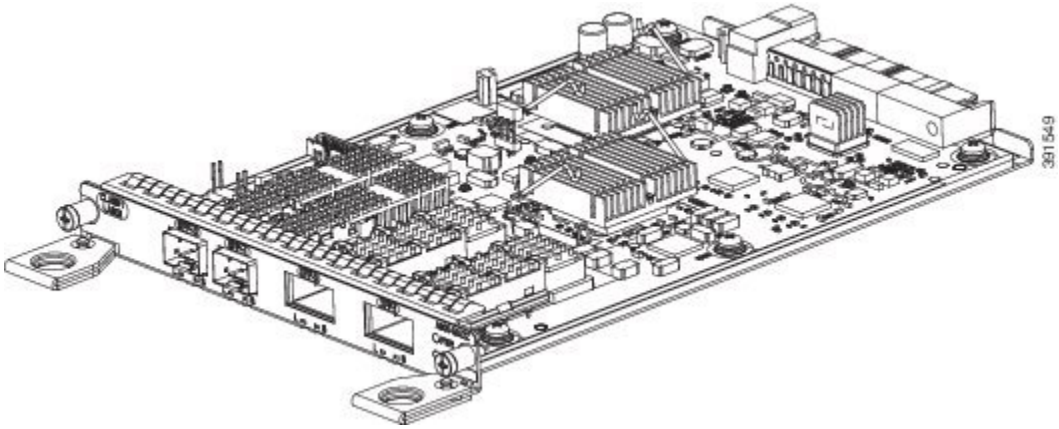


For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

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.

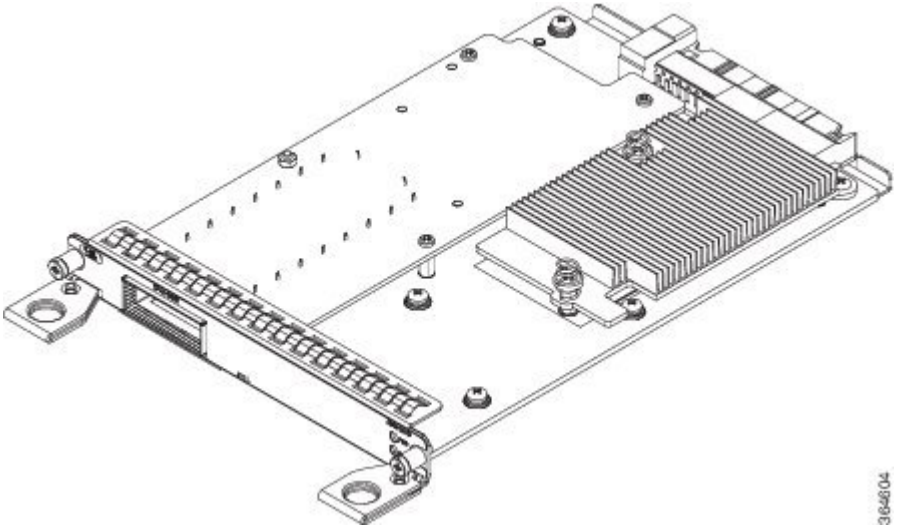
Figure 20: 2-port10 Gigabit Ethernet Interface Module



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

1-Port 100 Gigabit Ethernet Interface Module (1x100GE) (A900-IMA1C)

Figure 21: 1-port 100 Gigabit Ethernet Interface Module



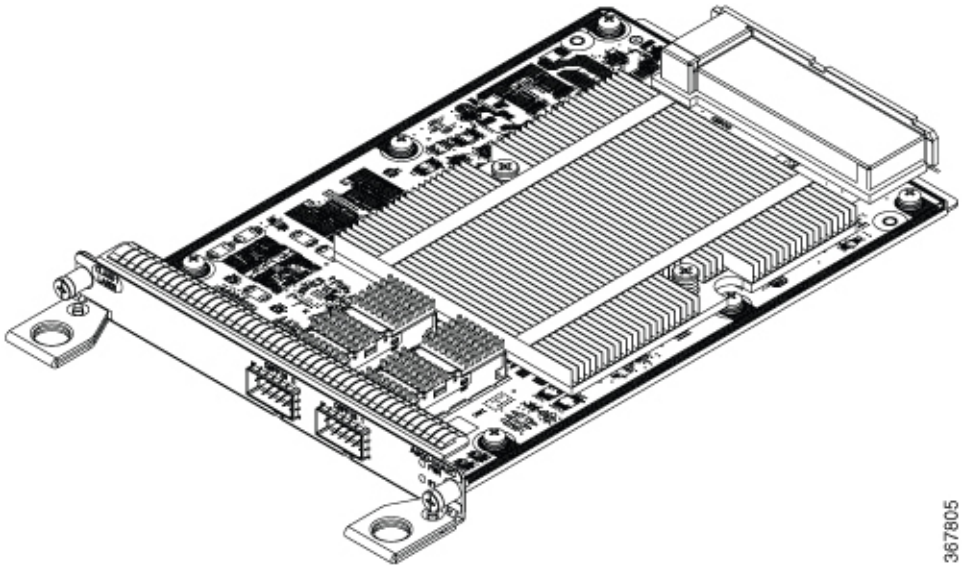
The 1-port 100 Gigabit Ethernet interface module supports one CPAK optics port.

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

2-Port 100 Gigabit Ethernet Interface Module (2X100GE) (N560-IMA2C)

The 2-port 100 Gigabit Ethernet Interface Module (N560-IMA2C) design supports only one 100G QSFP28 optics on Port 0. Port 1 is disabled with RSP3. It currently supports only one mode of operation with 100Gbps of traffic with RSP3.

Figure 22: 2-Port 100 Gigabit Ethernet Interface Module (2X100GE)



For information on supported QSFP modules, see Cisco ASR 900 Series Interface Modules Data Sheet.

Limitations of 2X100 GE IM

After any QSFP28 100G optics is inserted, it takes approximately 10 seconds for the optics to be detected and the link to come up. We recommend this time delay for complete initialization and operation.

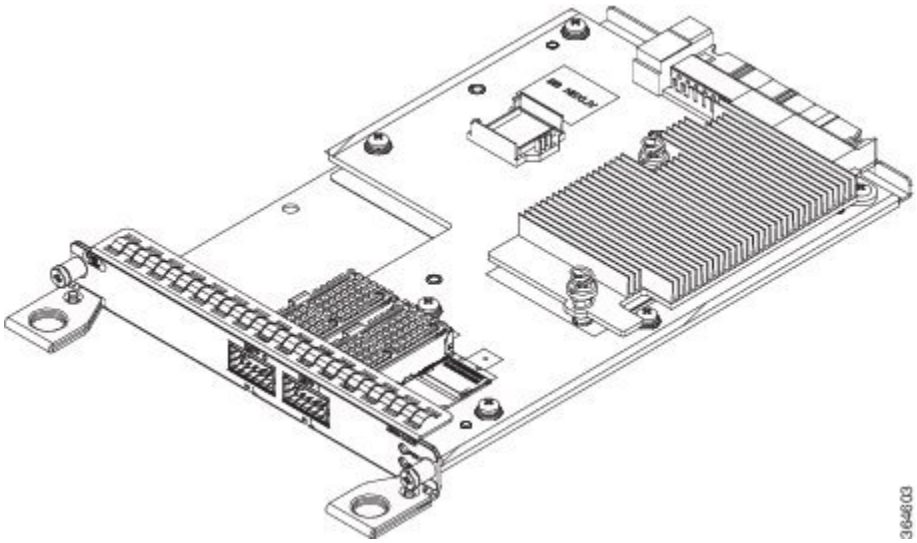
After inserting the cable or after unshutting the 100G interface, the 100G link may take approximately about 2 seconds to come up.

Note QSFP-100G-SR4-S and QSFP-100G-LR4-S are the supported optics for 2X100GE IM for the release 16.11.1.

2-Port 40 Gigabit Ethernet QSFP Interface Module (2x40GE) (A900-IMA2F)

The dual port 40 Gigabit Ethernet interface module supports the 40 Gigabit Ethernet port. The 40GE interface is supported using QSFP+ optics. The figure below shows the interface module.

Figure 23: 2-port 40 Gigabit Ethernet Interface Module



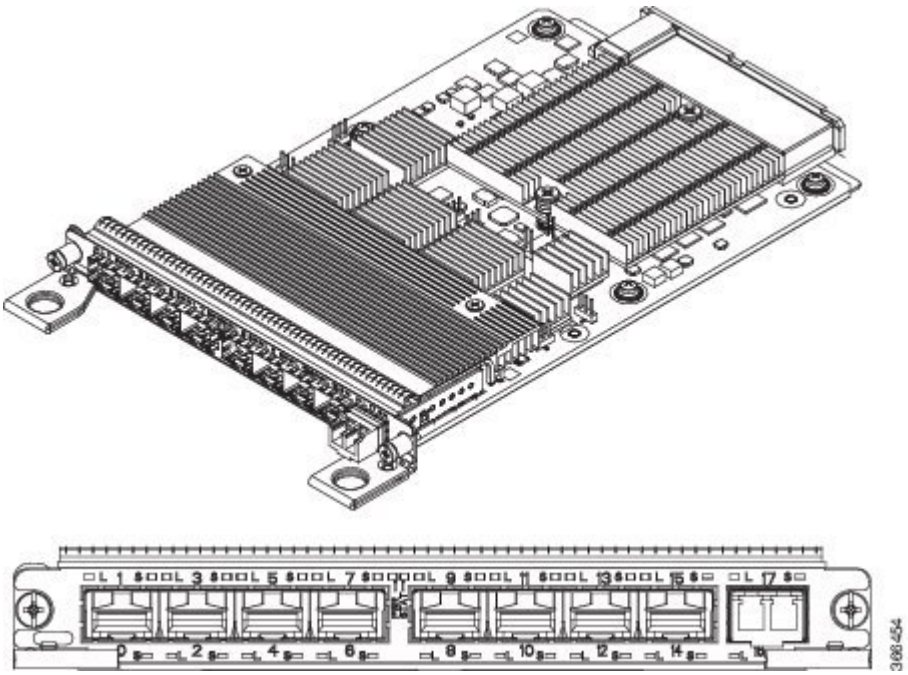
For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

8/16-Port 1 Gigabit Ethernet (SFP / SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module (A900-IMA8CS1Z-M)

The A900-IMA8CS1Z-M interface module has the flexibility to support SFP+/SFP/CSFP on the modules as mentioned below:

- The 8-port 1 Gigabit Ethernet ports can also be used as 16-port 1 Gigabit Ethernet ports Small Form-Factor Pluggable (SFP) .
- The 1-port 10 Gigabit Ethernet port can also be used as 2-port 1 Gigabit Ethernet ports with Small Form-Factor Pluggable (SFP+).

Figure 24: A900-IMA8CS1Z-M Gigabit Ethernet Interface Module



The following modes are supported for the Interface Module, based on slot capacity:

- 8 x 1GigE (SFP) Fully subscribed mode (FS)
- 8 x 1GigE (SFP) + 1 x 10GigE (SFP+) Fully subscribed mode (FS)
- 16 x 1GigE (C-SFP) + 1 x 10GigE (SFP+) Fully subscribed mode (FS)
- 16 or 18 x 1GigE (C-SFP) Oversubscribed mode (OS)
- 16 x 1GigE (C-SFP) + 1 x 10GigE (SFP+) Oversubscribed mode (OS)
- 8 or 9 x 1GigE (SFP) Fully subscribed mode (FS)
- 1 x 10GigE (SFP+) Fully subscribed mode (FS)

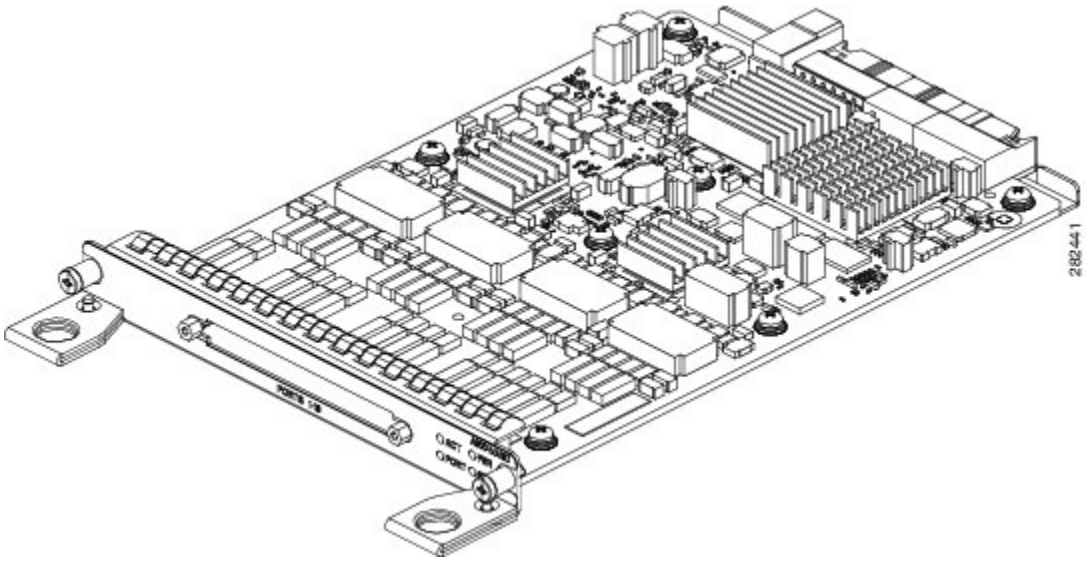
For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

For more information on port numbering, see *Configuring 1-port 10 Gigabit Ethernet (1 X SFP+) / 1-port Gigabit Ethernet (1 X SFP) / 2-port Gigabit Ethernet (1 X CSFP) and 16-port Gigabit Ethernet (8 X CSFP) / 8-port Gigabit Ethernet (8 X SFP) Interface Module* chapter of the *Cisco ASR 900 Router Series Configuration Guide, Cisco IOS XE Everest 16.6.1*.

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 25: 16-port T1/E1 Interface Module

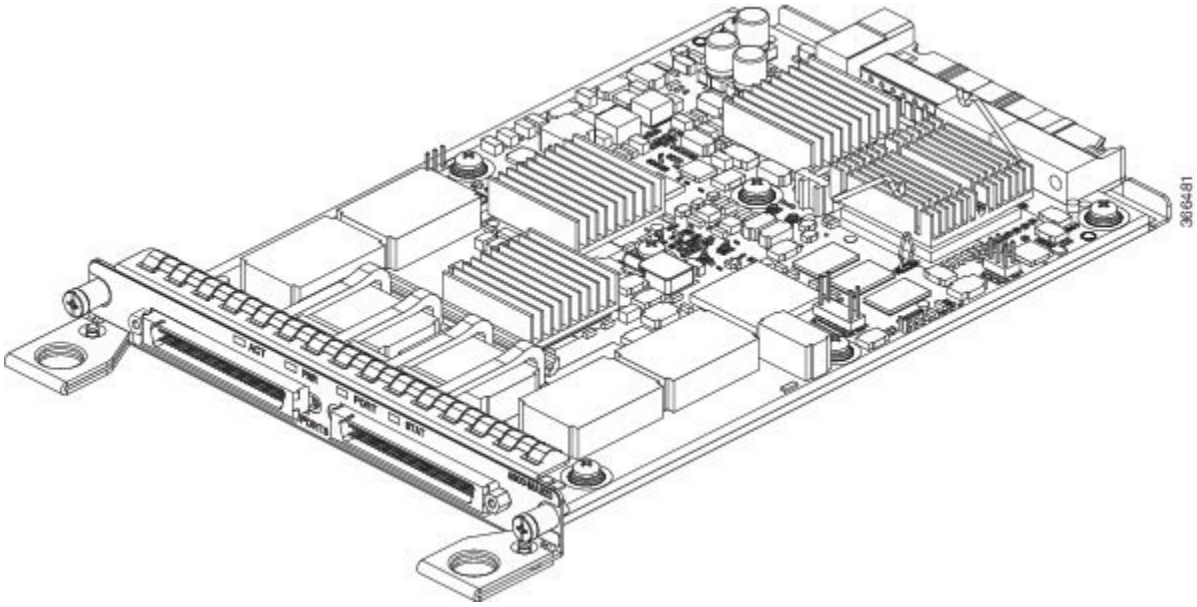


32-Port T1/E1 Interface Module (A900-IMA32D)

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.

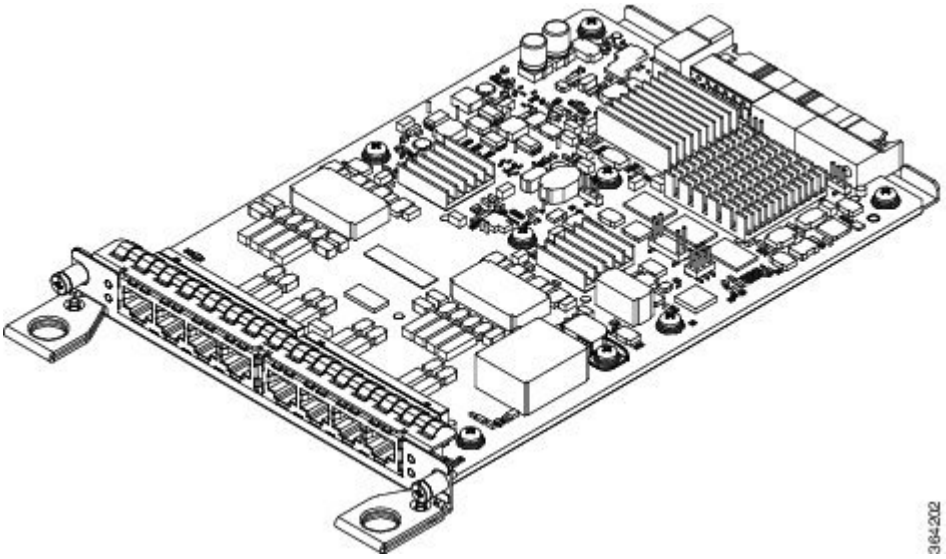
Figure 26: 32-portT1/E1 Interface Module



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 27: 8-portT1/E1 Interface Module



48-Port T1/E1 CEM Interface Module (A900-IMA48D-C)

The 48-port T1/E1 interface module provides connectivity for up to 48 T1/E1 ports through 3 high-density connectors on the front panel (as shown in figure 48-port T1/E1 Faceplate). Each port supports 16 TX and RX ports.

Figure 28: 48-port T1/E1 Interface Module

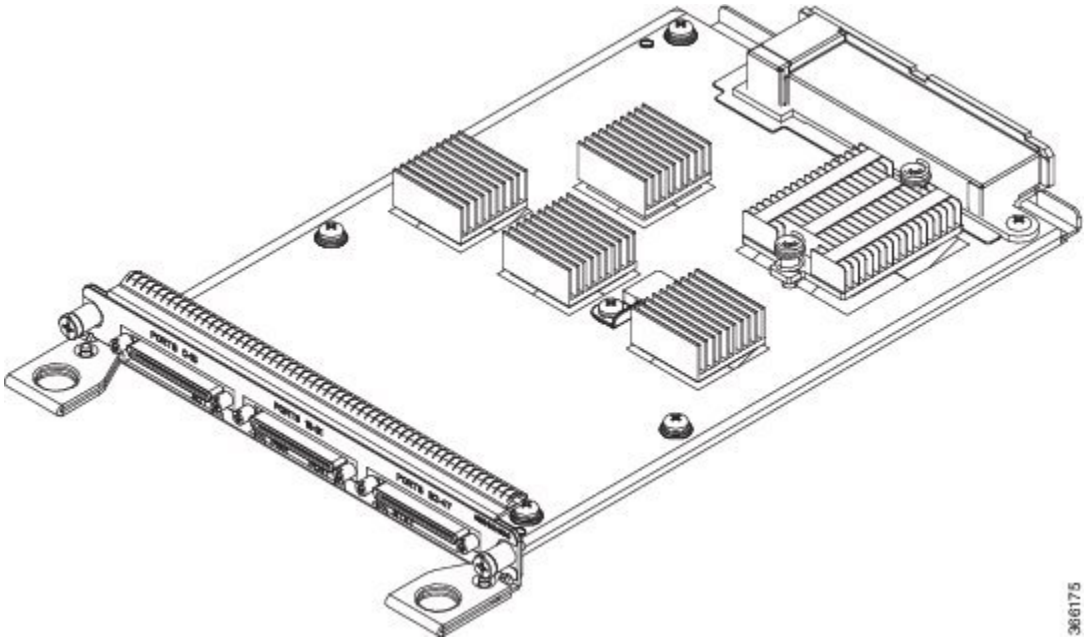
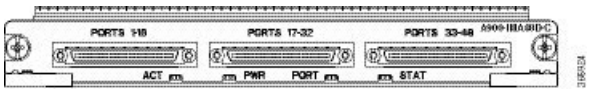


Figure 29: 48-port T1/E1 Faceplate



48-Port T3/E3 CEM Interface Module (A900-IMA48T-C)

The 48-port T3/E3 interface module provides connectivity for up to 48 T3/E3 ports through 3 high-density connectors on the front panel (see the figure below). Each port supports 16 TX and RX ports.

Figure 30: 48 x T3/E3 Interface Module

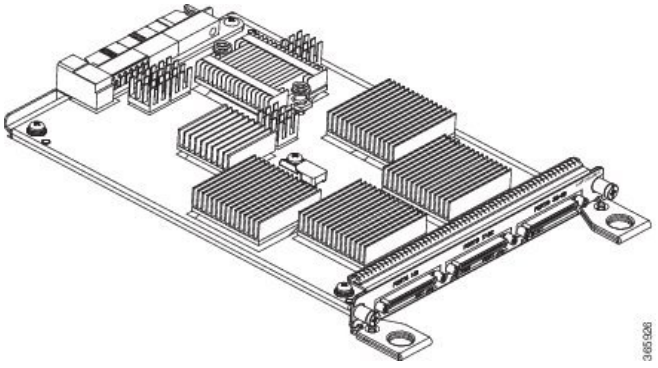
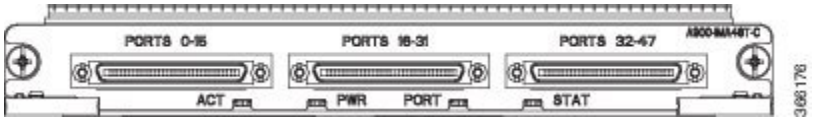


Figure 31: 48-port T3/E3 Faceplate

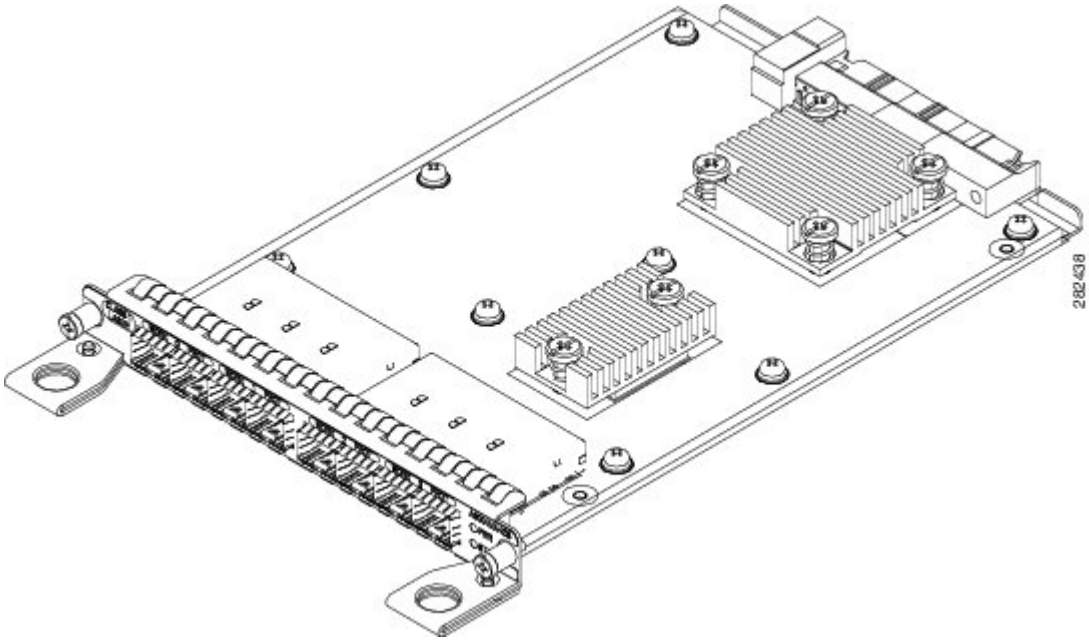


4-Port OC3/STM-1 (OC-3) or 1-port OC12/STM-4 (OC-12) Interface Module (A900-IMA4OS)

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 32: 4-port OC-3 Interface Module



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

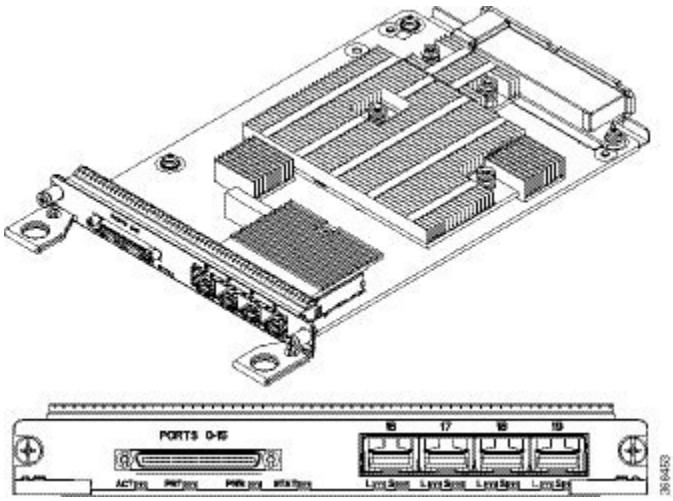
1-port OC-48/STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-Port T1/E1 + 4-Port T3/E3 CEM Interface Module (A900-IMA3G-IMSG)

The A900-IMA3G-IMSG interface module supports:

- 12xDS1/E1 + 4xDS3/E3 interface over the high-density port.
- 1xOC48/12/3 Gigabit interface and 3xOC12/3 Gigabit interface.

Note If OC48 is enabled, then the remaining 3 ports are disabled.

Figure 33: A900-IMA3G-IMSG Gigabit Ethernet Interface Module



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

1-Port OC-192 or 8-Port Low Rate CEM Interface Module (10G HO / 10G LO) (A900-IMA8S1Z-CX)

The 1-port OC-192 interface module with 8-port low rate CEM interface module is a high density combination interface module. This module supports 1 OC-192 port or 8 low rate CEM or 1 Gigabit Ethernet port.

Figure 34: OC-192 Interface Module

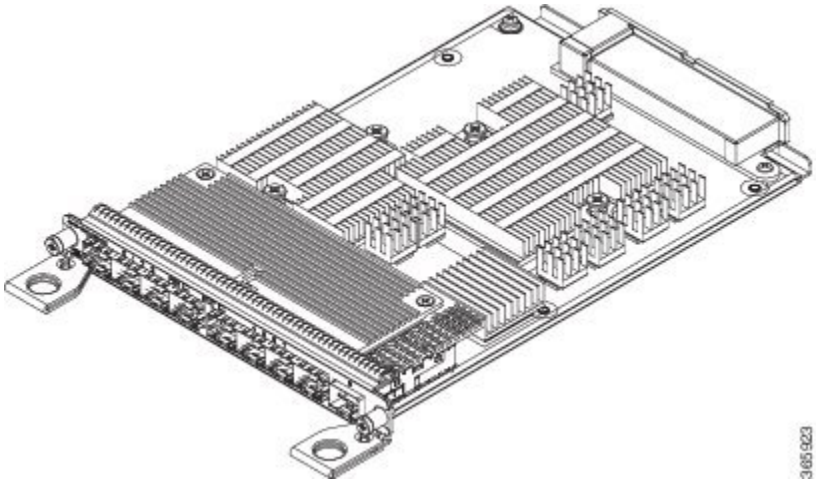
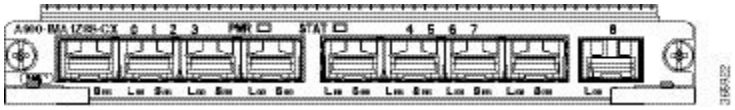


Figure 35: OC-192 Interface Module Faceplate



The OC-192 interface modules are supported on slots 2, 3, 4 and 5 on the chassis.

Ports on the OC-192 are numbered from 1 to 8.

- Ports 0 to 7 are multi-rate ports, that support OC-3, OC-12, OC-48, Fast Ethernet interfaces, and the 1 Gigabit Ethernet interfaces.
- Port 8 is the 10 Gigabit Ethernet port that supports the OC-192 interfaces.

Port Restrictions

- The SFP+ port configuration is supported only on OC-192 interfaces port. If this port is enabled, other SFP ports cannot be used (see the table given in Port Combinations Usage Guidelines section).
- Each SFP port can be configured for SONET or Ethernet.
- SFP ports configuration parameter, (see the table given in Port Combinations Usage Guidelines section):
  - Maximum of 4 x OC-48 interfaces are supported per interface module
  - For each OC-48 port enabled, neighboring SFP ports cannot be configured
  - OC-3 and OC-12 port configuration is supported on all ports simultaneously
  - 1 Gigabit Ethernet port configuration is supported on all ports simultaneously

Note 1 Gigabit Ethernet port configuration is not supported.

- Seamless migration from SONET to 1 Gigabit Ethernet interfaces is supported on all SFP ports

Port Combinations Usage Guidelines

SFP+ Port	SFP+ Port 8	OC-192	Or	SFP+ Port	SFP+ Port 8	—	Or	SFP+ Port	SFP+ Port 8	—	Or	SFP+ Port	SFP+ Port 8	—
SPF Port	7	—		SPF Port	7	OC-48		SPF Port	7	OC-3		SPF Port	7	1 GE
	6	—			6	—			6	OC-12			6	1 GE
	5	—			5	OC-48			5	OC-12			5	1 GE
	4	—			4	—			4	OC-3			4	1 GE
	3	—			3	OC-48			3	OC-3			3	1 GE
	2	—			2	—			2	OC-12			2	1 GE
	1	—			1	OC-48			1	OC-12			1	1 GE
	0	—			0	—			0	OC-3			0	1 GE

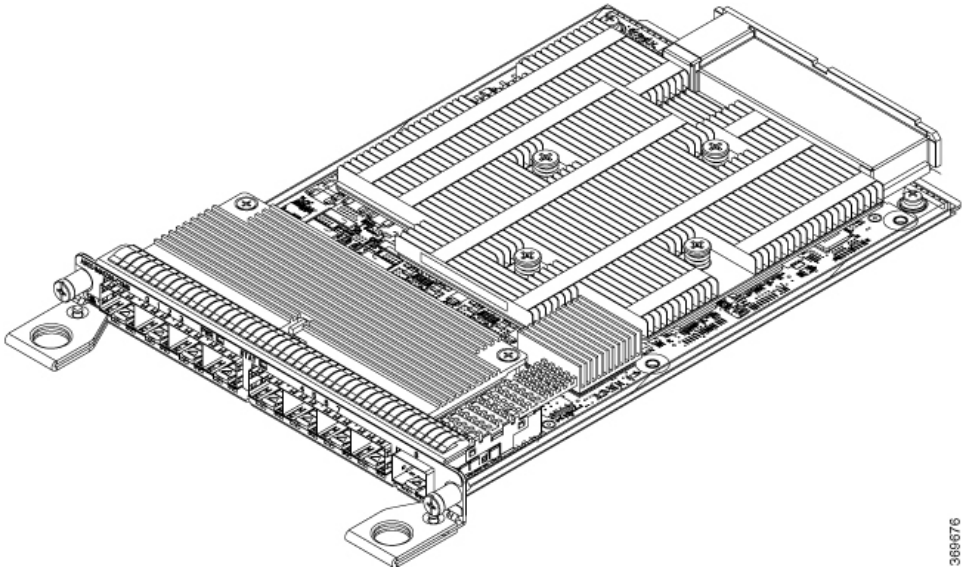
For information on supported SFP modules, see Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module (A900-IMA1Z8S-CXMS)

The ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module is a cost-effective interface module (IM) that supports CEM and Multiservice Gateway features on the OCn interfaces.

Note The Multiservice Gateway features are not supported on this IM on Cisco IOS XE Release 16.12.1.

Figure 36: CEM and iMSG Interface Module



The ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module, 20G IM supports eight SFP optical interfaces supporting at OC-3/OC-12/OC-48/1G rates and a single SFP+ optical interface supporting at OC-192/10G.

This IM operates in two modes:

- 20G mode; uses two XFI lanes towards the system
- 10G mode; uses single XFI lane towards the system

The benefits of this IM are:

- Improves backplane efficiency
- Increases system capacity
- Increases client flexibility

The most important feature of the ASR 900 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module, 20G IM is it provides more flexibility from the interface, which allows you to configure any interface speed on the OCn port irrespective of the IM bandwidth. The bandwidth restriction comes into effect only when the circuit is configured.

For example, you can configure the SFP+ port as an OC-192 and the other eight optical ports as OC-48 to have the total interface speed of 30G. However, if you configure only one STS-1 HO CEP on each port that will take only 9xSTS-1, which is equivalent to 500 Mbps (9 x 52Mbps x1.06) of the backplane traffic.

Restrictions

- On the port capable of OC-192 speed, lower speed such as, OC-3, OC-12, or OC-48 are not supported.

- Separate licenses are required for every OC-3, OC-12 ports, OC-48, and OC-192 ports.

14-Port Serial Interface Module (A900-IMASER14A/S)

The Cisco (A900-IMASER14A/S) is a 14-port serial interface module for the router. The router module has the following interfaces:

- 12-in-1 Connector (6)-Supports synchronous and asynchronous RS-232 interfaces using EIA/TIA-232 DB-25 connectors
- 68-Pin Connector (2)-Supports up to 8 RS-232 interfaces in full or half duplex mode using 4 RS-232 connectors (DB-25, DB-9, or RJ-45)

Figure 37: Serial Interface Module

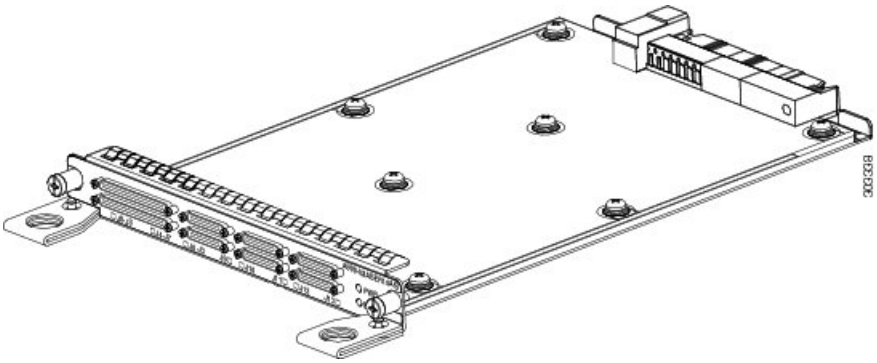
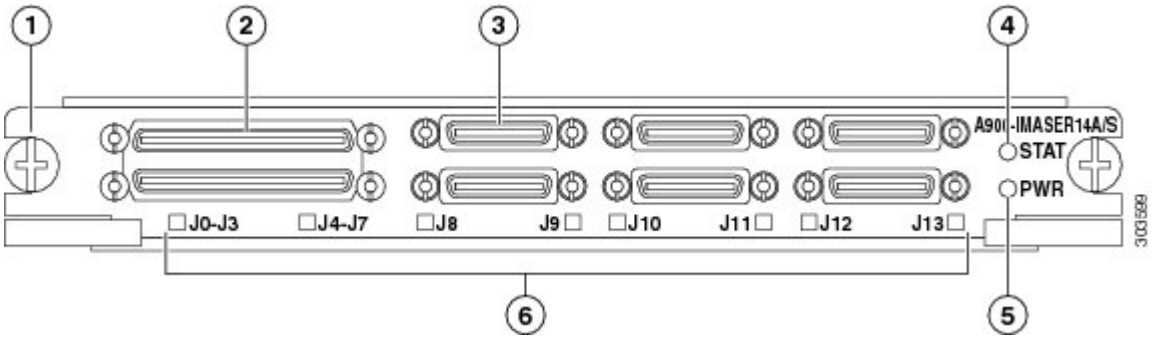


Figure 38: 14-port Serial Interfacce Module Front Panel



1	Captive screws (2)	2	68-Pin Connector (2)
3	12-in-1 Connector (6)	4	Status (STAT) LED
5	Power (PWR) LED	6	LEDs-The LEDs are as follows: • J0-J3 and J4-J7-Indicate the function of the 68-pin connectors • J8-J13-Indicate the status of the 12-in-1 connectors

For more information about using the LEDs to troubleshoot the router, see *LED Summary*.

Supported Standards

The 14-port serial interface module supports the following standards:

Standard	Definition
IEEE 1613 2009	IEEE Standard for Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations
IEC 61850-3	IEC standard specifying general requirements for substation automation systems (SAS) communications and related system requirements
IEC 60870-2-1:1995	IEC standard for substation environmental conditions
IEC 60870-2-2:1996	IEC standard for substation environmental conditions
IEC 61000-6-5:2001	IEC standard defining immunity for power station and substation environments

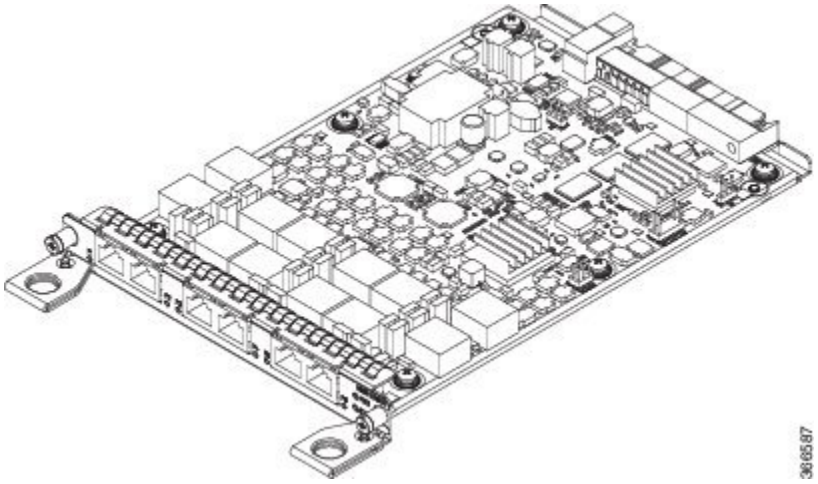
The serial interface module supports several cable types. For more information, see *Connecting Serial Cables and Serial Cable Pinouts*.

6-Port E and M Interface Module (A900-IMA6EM)

The Cisco (A900-IMA6EM) is a 6-port Ear and Mouth (E&M) interface module for the Cisco ASR 903 router. The interface module provides the router with connectivity to tele-protection equipments. The front panel of the module consists of:

- six port RJ45 connectors
- two LED that display Power and Status
- one LED per RJ45 port

Figure 39: E and M Interface Module



For information on LEDs, see E & M Interface Module LEDs.

For more information about installing the module, see the Interface Module Installation.

For more information, see Connecting Serial Cables and Serial Cable Pinouts.

4-Port C37.94 Interface Module (A900-IMA4C3794)

The Cisco (A900-IMA4C3794) is a 4-port interface module that provides IEEE C37.94-2002 compliant Nx64 kbps optical interface ports to the router. The interfaces support 50/62.5 multimode fiber at 850nm. The physical interfaces use 2.5mm ST connectors.

The front panel of the module consists of four ports of IEEE C37.94 interfaces.

Figure 40: C37.94 Interface Module

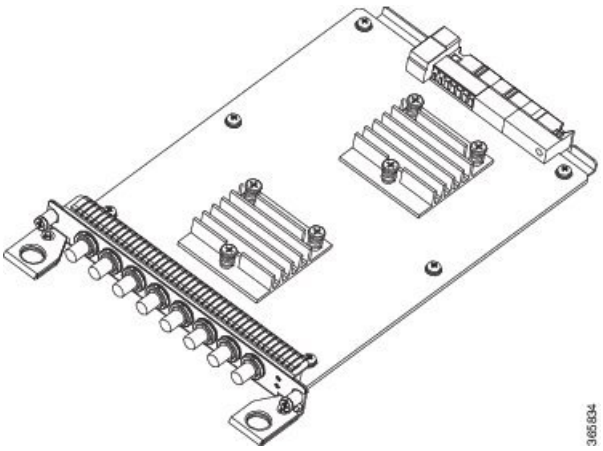
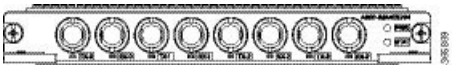


Figure 41: C37.94 Interface Module Front Panel



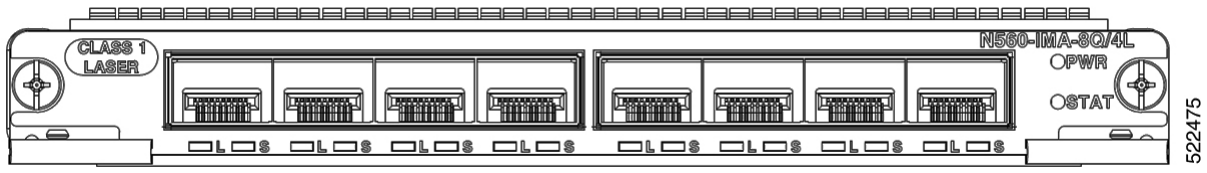
For information on LEDs, see 4-Port C37.94 Interface Module LEDs.

8-Port 10G SFP+ Single-Rate Interface Module (N560-IMA-8Q/4L)

The 8-Port 10G SFP+ Single-Rate Interface Module (N560-IMA-8Q/4L) is a single-width-single-height IM. The 8 ports of the IM are split into two modes of 4 ports each called as quads.

The single-rate optic is supported and can support on 10G.

Figure 42: Cisco N560-IMA-8Q/4L Interface Module



The interface module has a maximum power draw value of 50 W.

Blank Deflector (A900-IMA-BLNK-DEF)

The A900-IMA-BLNK-DEF is a special type of blank filler plate that can be used in empty interface module slots. In addition to just acting as a filler for the empty slots in the router, this blank deflects additional air towards the interface modules in the slot below it, thereby enhancing the cooling for the interface module.

Caution The A900-IMA-BLNK-DEF is module should not be used in slot 0 in the Cisco ASR 903 Router.

For slot 0, always use the filler blank (A900-IMA-BLANK) when a blank filler needs to be used.

For more information on operating temperature, see Example: Configuration with A900-RSP3-200-S with Blank Deflector (A900-IMA-BLNK-DEF).

Maximum Operating Ambient Temperature Support for RSP3 Modules

The router supports multiple fan trays with different cooling capacities. The maximum operating temperature of the router using the RSP3 modules, depends on the fan tray and the interface modules used in the router.

The tables below provide and overview of the operating ambient temperature limits for different fan tray and interface module combinations. These values are specified for side-to-side airflow configuration.

Note The temperature range could further be restricted by the optical modules are used in the router.

Note If you remove the fan tray from the system, the node thermal shut down is based on ASIC temperature and not based on the timer value, from release 16.6.x and later.

Table 10: Operating Temperature for A900-RSP3C-400-S Module

Interface Modules	Fan Tray	Operating Temerature Limit (°C)					
-	-	Side to side airflow (without air plenum)			Front to back airflow (with air plenum: A903-F2B-AIR-U)		
-	-	COM	EXT	IND	COM	EXT	IND
A900-IMA1X	A903-FAN	0 to 50	-5 to 55	-40 to 55	NA		
A900-IMA8T	A903-FAN-E	0 to 45[6]	-5 to 50	-40 to 50	0 to 45[1]	-5 to 45	-40 to 45
A900-IMA8S A900-IMA2Z A900-IMA8T1Z A900-IMA8S1Z	A903-FAN-H	0 to 55[1]	-5 to 60 [1]	-40 to 60[1]	0 to 55[1]	-5 to 55	-40 to 55

Interface Modules	Fan Tray	Operating Temerature Limit (°C)					
A900-IMA8Z[7]	A903-FAN	0 to 50	-5 to 55	NA			
	A903-FAN-E	0 to 40	-5 to 50	NA	0 to 40	-5 to 45	NA
	A903-FAN-H	0 to 50	-5 to 55	NA	0 to 45	-5 to 50	NA
A900-IMA2F A900-IMA1C[8]	A903-FAN	0 to 45	NA		NA		
	A903-FAN-H	0 to 50	NA		0 to 45	NA	
A900-IMA1Z8S-C A900-IMA48D-C A900-IMA48T-C A900-IMA8CS1Z A900-IMA8CT1Z A900-IMA3G-IMSG	A903-FAN-H	0 to 50	-5 to 60	-40 to 60	0 to 45	-5 to 55	-40 to 55
N560-IMA2C		0 to 50 (SR, LR) 0 to 45 (ER)	NA	NA	0 to 50 (SR, LR) 0 to 45 (ER)	NA	NA

[6] For 10 SFP + optics max allowable ambient temperature will reduce by 5°C
[7] Will operate 5°C lesser only in slot 0 and slot 1 if used with 1200W AC PSUs
[8] Values are based on CPAK SR10 Module

Legend:

- NA - Not Applicable or Supported
- COM - Commercial Optics
- EXT - Extended Range Optics
- IND - Industrial Grade optics

Table 11: Operating Temperature for A900-RSP3C-200-S Module

Interface Modules	Fan Tray	Operating Temerature Limit (°C)					
-	-	**Side to side airflow (without air plenum)**			**Front to back airflow (with air plenum: A903-F2B-AIR-U)**		
-	-	**COM**	**EXT**	**IND**	**COM**	**EXT**	**IND**

Interface Modules	Fan Tray	Operating Temerature Limit (°C)					
A900-IMA1X A900-IMA8T A900-IMA8S A900-IMA2Z A900-IMA8T1Z A900-IMA8S1Z	A903-FAN	0 to 50	-5 to 65	-40 to 65	NA		
	A903-FAN-E				0 to 50	-5 to 60	-40 to 60
	A903-FAN-H					-5 to 65	-40 to 65
A900-IMA8Z[9]	A903-FAN	0 to 45	-5 to 60	NA	NA		
	A903-FAN-E	0 to 40	-5 to 55	NA	NA	-5 to 50	NA
	A903-FAN-H	0 to 50	-5 to 65	NA	0 to 40	-5 to 55	NA
A900-IMA1C	A903-FAN	0 to 50	NA		NA		
	A903-FAN-E		NA		0 to 45	NA	
	A903-FAN-H	0 to 55	NA		0 to 50	NA	
A900-IMA2F	A903-FAN	0 to 55	NA		NA		
	A903-FAN-E	0 to 50	NA		0 to 45	NA	
	A903-FAN-H	0 to 60	NA		0 to 50	NA	

[9] Supports a maximum temperature of 65°C with A903-FAN or A903-FAN-E if A900-IMA-BLNK-DEF is used in the slot above the interface module with EXT/RGD/IND modules.

Example: Configuration with A900-RSP3-200-S with Blank Deflector (A900-IMA-BLNK-DEF)

In the below configuration, the overall operating temperature of the router is enhanced by using A900-IMA-BLNK-DEF in the slots above A900-IMA8Z interface module. The maximum operating temperature of the router is enhanced from 55°C to 65°C by using A900-IMA-BLNK-DEF in slots 1 and 5 (above A900-IMA8Z).

Note To support 65°C ambient temperature, EXT optics need to be used for 10G ports.

A900-IMA-BLNK-DEF	A900-RSP3C-200		A903-FAN-E
A900-IMA8Z			
A900-IMA-8T1Z	A900-RSP3C-200		
A900-IMA-8T1Z			
A900-IMA-BLNK-DEF	PSU	PSU	
A900-IMA8Z			

Temperature Sensor

The Cisco ASR 903 Router has a temperature sensor to detect overtemperature conditions inside the chassis.

Temperature Sensors on the A900 RSP2 modules

The overtemperature detection trips at 75 degrees C +/- 5% with the ambient (inlet) trip point at 67 degrees C. This condition is reported to the processor as an interrupt, and the software takes action to generate the appropriate alarms.

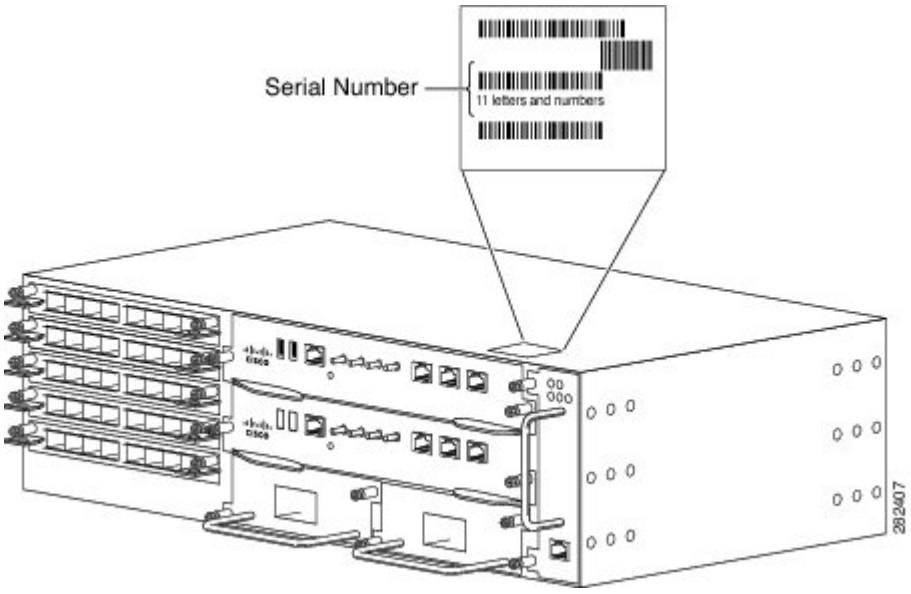
Temperature Sensors on the A900 RSP3 modules

The maximum operating temperature of RSP3 module and the interface modules is less than the maximum operating temperature of the Cisco ASR 903 router. The IOS software decides the appropriate temperature thresholds to generate warnings, and shuts down the system when abnormally high temperature is detected. For more information, see Maximum Operating Ambient Temperature Support for RSP3 Modules.

Serial Number Label Location

The figure below shows the serial number label location on the Cisco ASR 903 Router.

Figure 43: Cisco ASR 903 Router Serial Number Location



Patch Panels

The Cisco router has patch panels modules that provide interconnections with the interface modules.

The following table shows different types of patch panel:

Table 12: T1/E1 Patch Panel

Patch Panel	Description
PANEL-48-1-DIN	48X75 ohm E1/DS1 termination, through DIN 1.0/2.3 connectors
PANEL-48-1-RJ48	48X120 ohm E1/110 ohm DS1 termination, through RJ 48C connector
PANEL-48-1-AMP64	48X120 ohm E1/110 ohm DS1 termination, through 4xAMP 64-pin
PANEL-144-1-AMP64	144X120 ohm E1/110 ohm DS1 termination, through 12XAMP64-pin

Table 13: T3/E3 Patch Panel

Patch Panel	Description
PANEL-48-3-DIN	48X75 ohm E3/DS3 termination, through DIN 1.0/2.3 connectors
PANEL-48-3-HDBNC	48X75 ohm E3/DS3 termination, through HDBNC connectors

The 48 X T1/E1 TDM interface modules and 48 X T3/E3 TDM interface modules supports a maximum of 48 TDM ports. These ports are available on the interface modules through three Very-High-Density Cable Interconnect (VHDCI) 16-port connectors. The patch panels listed above make these 48 ports available to the user via different port densities (48- or 144-port patch panels) with standard Telco connectors (DIN, RJ48, and AMP64 for T1/E1 and DIN, HDBNC for T3/E3).

Figure 44: VHDCI 16-port Connectors Interface View

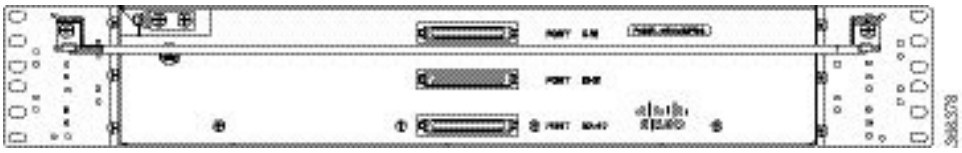


Figure 45: PANEL-48-1-RJ48 Interface View

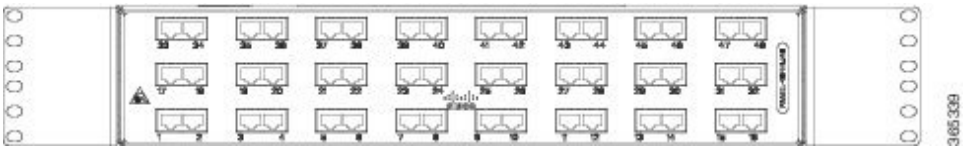


Figure 46: PANEL-48-1-AMP64 Interface View



Figure 47: PANEL-48-1-DIN or PANEL-48-3-DIN Interface View

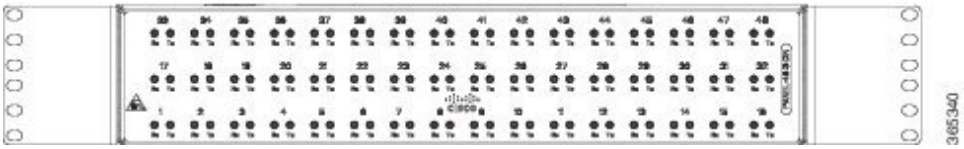


Figure 48: PANEL-144-1-AMP64 Interface View

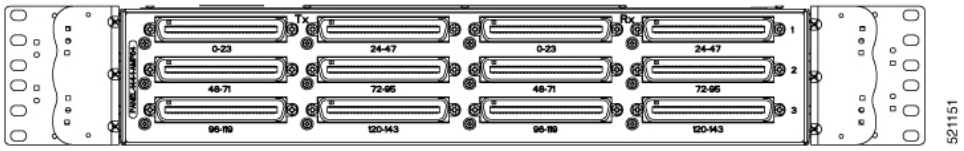


Figure 49: PANEL-48-3-HDBNC InterfaceView

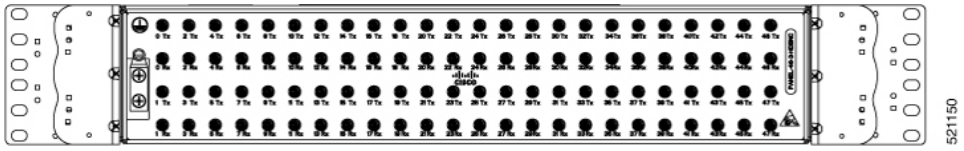


Figure 50: Patch Panel System Interface View

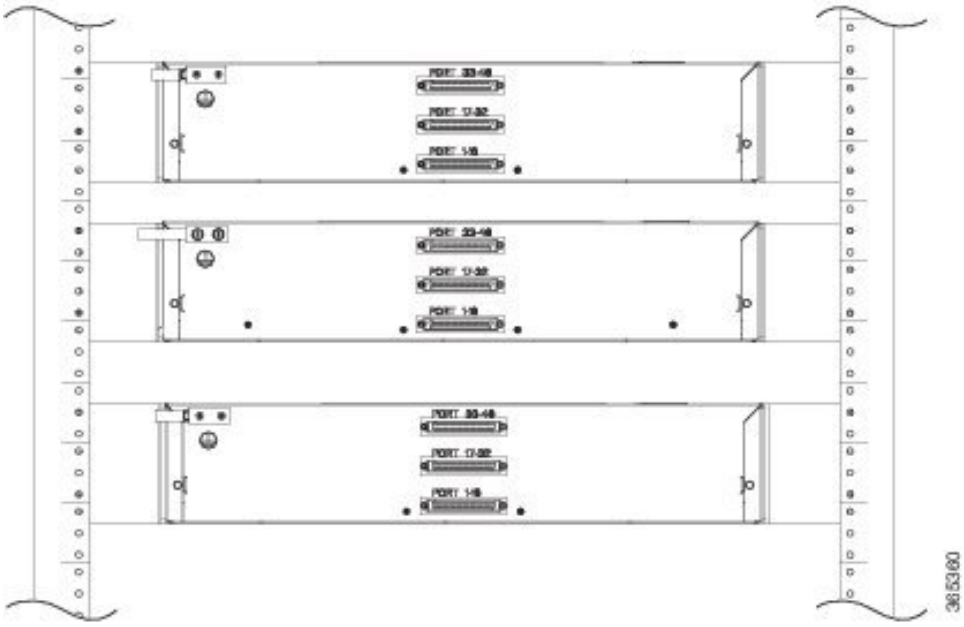
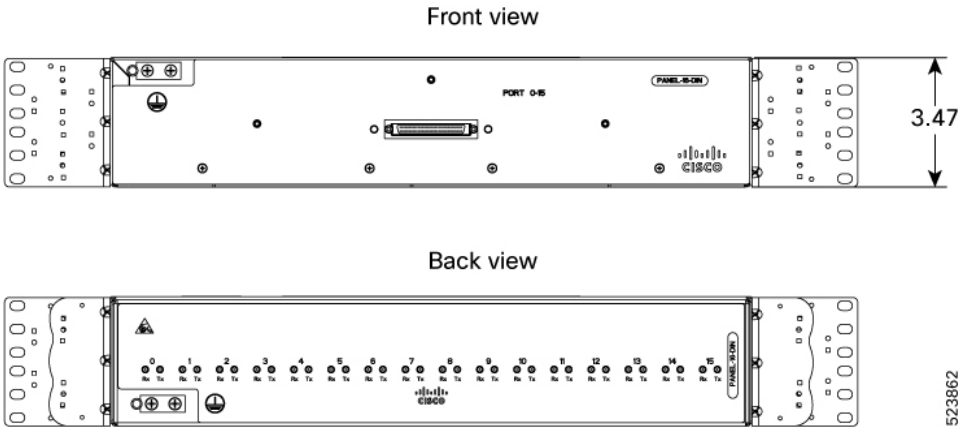


Table 14: PANEL-16-DIN

Patch Panel	Description
PANEL-16-DIN	16X75 ohm E1 termination, through DIN 1.0/2.3 connectors

The 48 X T1/E1 TDM interface modules and the 48 X T3/E3 TDM interface modules support a maximum of 48 TDM ports. These ports are available on the interface modules through three Very-High-Density Cable Interconnect (VHDCI) 16-port connectors. The patch panels listed above make these 48 ports available to the user via different port densities (48- or 144-port patch panels) with standard Telco connectors (DIN, RJ48, and AMP64 for T1/E1 and DIN, HDBNC for T3/E3).

Figure 51: PANEL-16-DIN Interface View



Interface Numbering

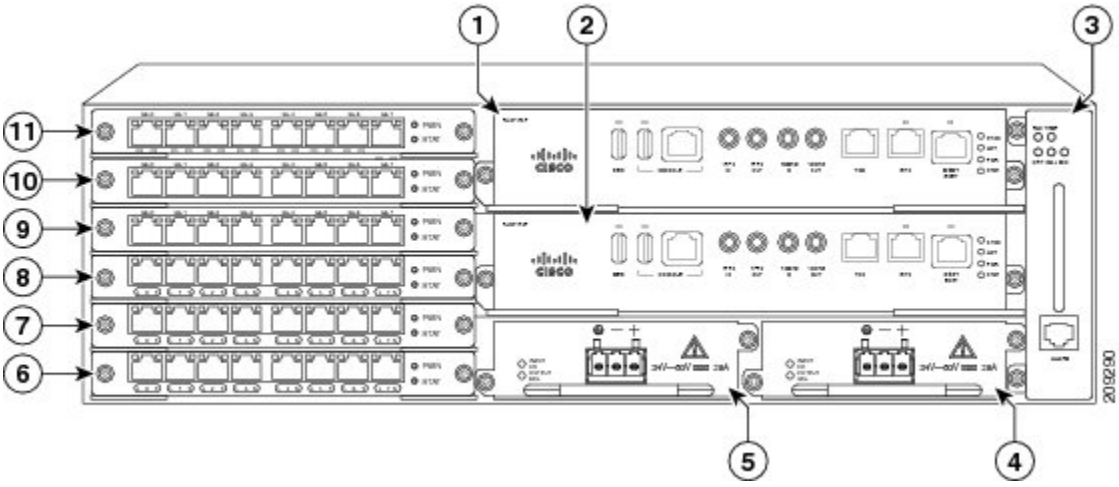
The Cisco ASR 903 Router chassis includes:

- Six interface module slots
- Two RSP module slots
- Two power supply slots
- One fan tray slot

Each network interface on a Cisco ASR 903 Router is identified by a slot number and a port number.

The figure below shows interface numbering in a Cisco ASR 903 Router.

Figure 52: Cisco ASR 903 Router Slot Numbers



1	RSP slot 1
2	RSP slot 0
3	Fan tray slot
4	Power supply slot 1
5	Power supply slot 0
6	Interface module slot 0
7	Interface module slot 1
8	Interface module slot 2
9	Interface module slot 3
10	Interface module slot 4
11	Interface module slot 5

Following is an explanation of the slot or port numbering:

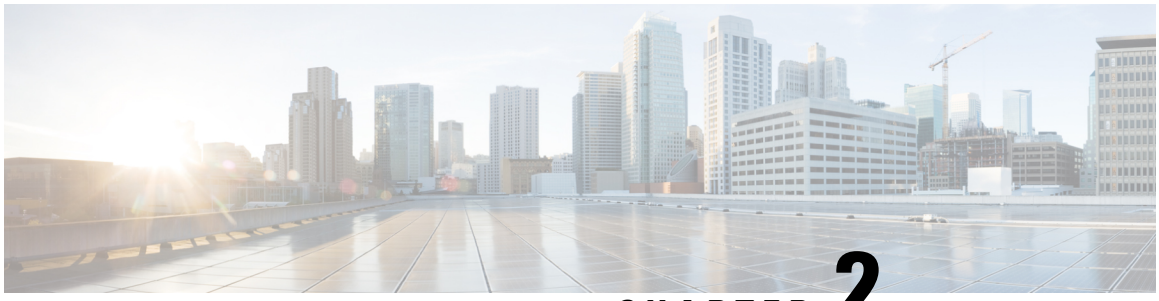
- The numbering format is **Interface type slot or interface number**. Interface (port) numbers begin at logical 0 for each interface type.
- Interface module slots are numbered from bottom to top, with logical interfaces on each module numbered from left to right. Interfaces are hard-wired. Therefore, port 0 is always logical interface 0/0, port 1 is always logical interface 0/1, and so on.

The input parameter for the following commands changes based on the active RSP slot number. The active RSP in slot 0 is refereed to as "0/ slot_num", else if the active RSP is slot 1, it is refereed as 1/"slot_num". The output for the command is displayed accordingly:

- **show diag all eeprom detail**
- **show platform software trace message iomd**
- **show platform software agent iomd**
- **show platform software peer shell-manager brief**
- **show platform software peer chassis-manager**
- **show platform software memory iomd**
- **set platform software trace iomd**

Regulatory Compliance

For regulatory compliance and safety information, see the Product Documentation and Compliance for the Cisco ASR 900 Series Aggregation Services Routers document.



CHAPTER 2

Preparing for Installation

This chapter describes how to prepare for the installation of the Cisco ASR 903 Router at your site.

- Safety Guidelines, on page 49
- Site Planning, on page 59
- Receiving the Cisco ASR 903 Router, on page 71

Safety Guidelines

Before you begin the installation of the Cisco ASR 903 Router, review the safety guidelines in this chapter to avoid injuring yourself or damaging the equipment.

In addition, before replacing, configuring, or maintaining the Cisco ASR 903 Router, review the safety warnings listed in Regulatory Compliance and Safety Information for the Cisco ASR 903 Router.

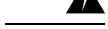
Standard Warning Statements

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

Warning The appliance must be connected to a grounded outlet. Statement 0414

Warning To avoid or reduce the risk of personal injury, do not use the product if the product has been exposed to irregular environmental conditions, if the product has been misused or if parts of the product have been damaged. Consult qualified service personnel. Never try to service the product yourself. Statement 0416

Warning To reduce the risk of shock, fire or personal injury, do not place power cables in areas where they may be walked on or damaged by items placed upon or against it. Statement 0417



Warning This product is intended for use in a normal environment based on the standard IEC 60950-1. Do not use the product in vehicles, on board ships, in aircrafts or in medical applications with physical connection to the patient, nor in environments with exposure to moisture, dust, vibration or ingress of water. Statement 0418



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



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



Warning To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety: This unit should be mounted at the bottom of the rack if it is the only unit in the rack. When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack. Statement 1006



Warning This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017



Warning To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord. Statement 1023



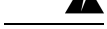
Warning If the symbol of suitability with an overlaid cross appears above a port, you must not connect the port to a public network that follows the European Union standards. Connecting the port to this type of public network can cause severe injury or damage your router. Statement 1031



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



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



Warning Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Statement 1037



Warning Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning. Statement 1038



Warning To report a gas leak, do not use a telephone in the vicinity of the leak. Statement 1039



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



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



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



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



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



Warning No user-serviceable parts inside. Do not open. Statement 1073



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

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

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

Safety Guidelines for Personal Safety and Equipment Protection

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

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

Safety Precautions for Module Installation and Removal

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

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

Warning For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection. Statement 1044

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

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

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

Warning Do not stare into the beam or view it directly with optical instruments. Statement 1011

Warning Invisible laser radiation present. Statement 1016

Warning Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026

Warning Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

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

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

Safety with Electricity

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

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

Warning To prevent accidental discharge in the event of a power line cross, route on-premise wiring away from power cables and off-premise wiring, or use a grounded shield to separate the on-premise wiring from the power cables and off-premise wiring. A power line cross is an event, such as a lightning strike, that causes a power surge. Off-premise wiring is designed to withstand power line crosses. On-premise wiring is protected from power line crosses by a device that provides overcurrent and overvoltage protection. Nevertheless, if the on-premise wiring is in close proximity to or not shielded from, the off-premise wiring or power cable during a lightning strike or power surge, the on-premise wiring can carry a dangerous discharge to the attached interface, equipment, or nearby personnel. Statement 338

Warning High leakage current – earth connection essential before connection to system power supply. Statement 342

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

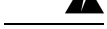
Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003

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

Warning This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated for 550 W DC Power Supply (PID A900-PWR550-D and A900-PWR550-D-E): For a -48/-60 VDC installation, the wire shall be 12 AWG minimum with a 20 A circuit breaker. For a 24 VDC installation, the wire shall be 8 AWG minimum with a 40 A branch circuit breaker. Statement 1005

Warning This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated for 1200 W DC Power Supply (PID A900-PWR1200-D): For a -48/-60 VDC installation, the wire shall be 10 AWG minimum with a 50 A circuit breaker. Statement 1005

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



Warning There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Statement 1015



Warning This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017



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



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



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



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



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



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



Warning Use copper conductors only. Statement 1025



Warning Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid c shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026



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



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



Warning Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards. Statement 1033



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



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



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



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



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



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

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

Warning Failure to securely tighten the power and relay connector captive screws can result in an electrical arc if the connector is accidentally removed. Statement 397

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

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

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

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

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

- Locate the room's emergency power-off switch. If an electrical accident occurs, you will be able to quickly turn off the power.
- Before working on the system, turn off the DC main circuit breaker and disconnect the power terminal block cable.
- Before doing the following, disconnect all power:
  - Working on or near power supplies
  - Installing or removing a router chassis or network processor module
  - Performing most hardware upgrades
- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit; always check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.

- If an electrical accident occurs, proceed as follows:
  - Use caution, and do not become a victim yourself.
  - Turn off power to the router.
  - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim, and then call for help.
  - Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

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

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

Power Supply Considerations

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

Warning This equipment is designed for connection to TN and IT power systems. Statement 16

Preventing ESD Damage

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

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

- Ensure that the router chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To channel unwanted ESD voltages safely to ground, connect the clip to an unpainted surface of the chassis frame. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.
- If no wrist strap is available, ground yourself by touching a metal part of the chassis.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use available ejector levers or captive installation screws, if any, to release the bus connectors from the backplane or midplane.
- Handle components by their handles or edges only; do not touch the printed circuit boards or connectors.

- Place a removed component board side up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.



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

Site Planning

The following sections describe how to plan for the installation of the Cisco ASR 903 Router:

General Precautions

Observe the following general precautions when using and working with your Cisco ASR 903 Router system:

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

Site Planning Checklist

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

- The site meets the environmental requirements.
- The site's air conditioning system can compensate for the heat dissipation of the Cisco ASR 903 Router.
- The floor space that the Cisco ASR 903 Router occupies can support the weight of the system.
- Electrical service to the site complies with the requirements.
- The electrical circuit servicing the Cisco ASR 903 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 Cisco ASR 903 Router Ethernet cabling distances are within limitations.
- The equipment rack in which you plan to install the Cisco ASR 903 Router complies with requirements.
- In selecting the location of the rack, careful consideration has been given to safety, ease of maintenance, and proper airflow.

Site Selection Guidelines

The Cisco ASR 903 Router requires specific environmental operating conditions. Temperature, humidity, altitude, and vibration can affect the performance and reliability of the router. The following sections provide specific information to help you plan for the proper operating environment.

The Cisco ASR 903 Router is designed to meet the industry EMC, safety, and environmental standards described in the Regulatory, Safety, and Compliance Information for the Cisco ASR 903 Router.

Environmental Requirements

The Cisco ASR 903 Router is Telcordia GR-3108-CORE Class-1 or GR-63-Core Indoor compliant.

Environmental monitoring in the Cisco ASR 903 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 900 Series Aggregation Services Routers Data Sheet.

For an outside plant installation (cell site cabinet, hut etc.), it is required that the Cisco ASR 903 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 –40ºC to 65ºC (depending upon which generation of RSP is used).

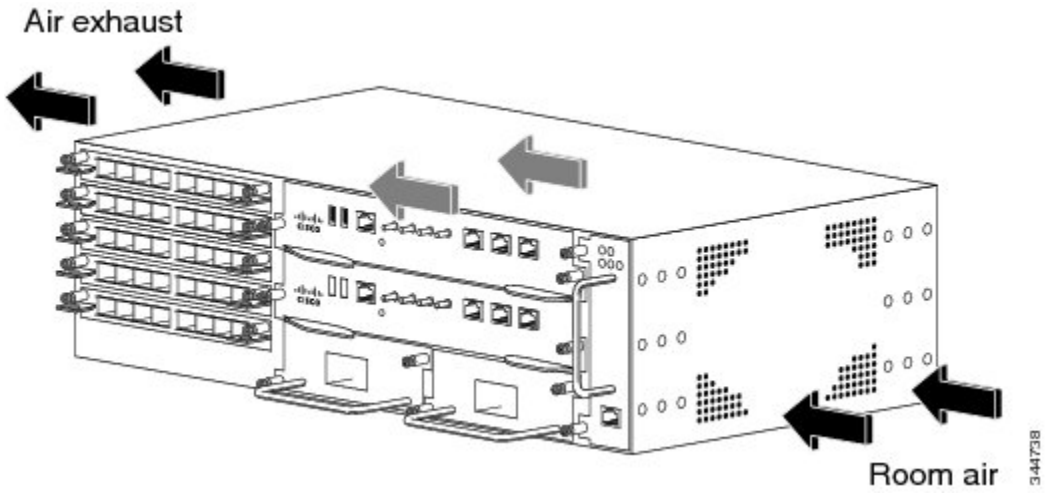
Physical Characteristics

Be familiar with the physical characteristics of the Cisco ASR 903 Router to assist you in placing the system in the proper location. For more information, see the Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

Air Flow Guidelines

Cool air is circulated through the Cisco ASR 903 Router by a fan tray located along the right side of the router. Air flow is side-to-side, right to left, as shown in the figure below.

Figure 53: Cisco ASR 903 Chassis Air Flow



To ensure adequate airflow, it is recommended that you maintain a minimum clearance distance always, as mentioned in the following figure.

Figure 54: Front View of Cisco A903-F2B-AIR Clearance

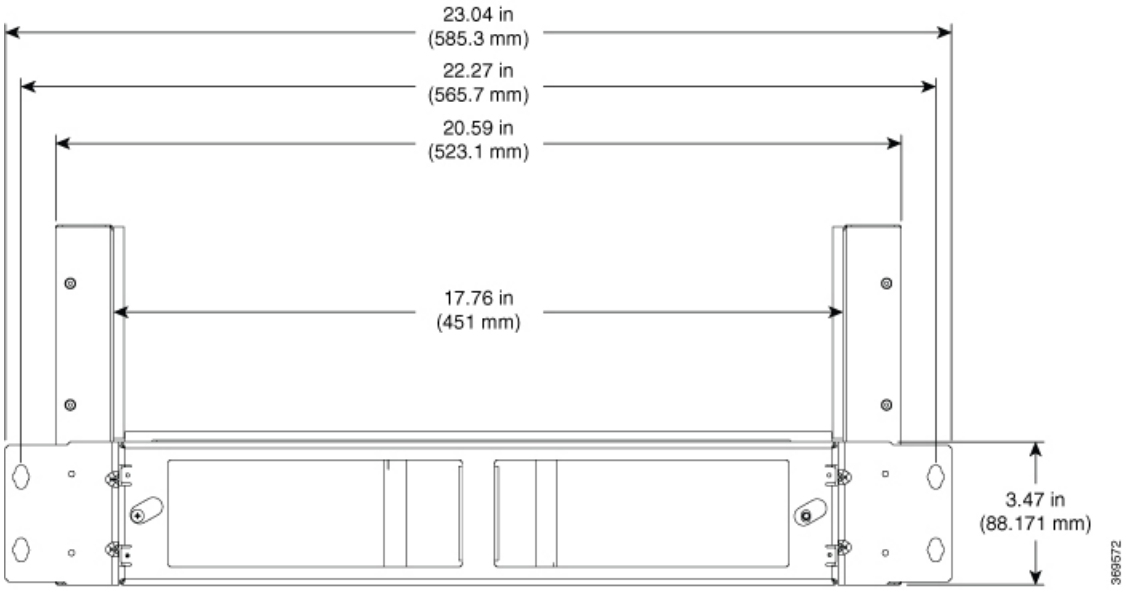


Figure 55: Side View of Cisco A903-F2B-AIR Clearance

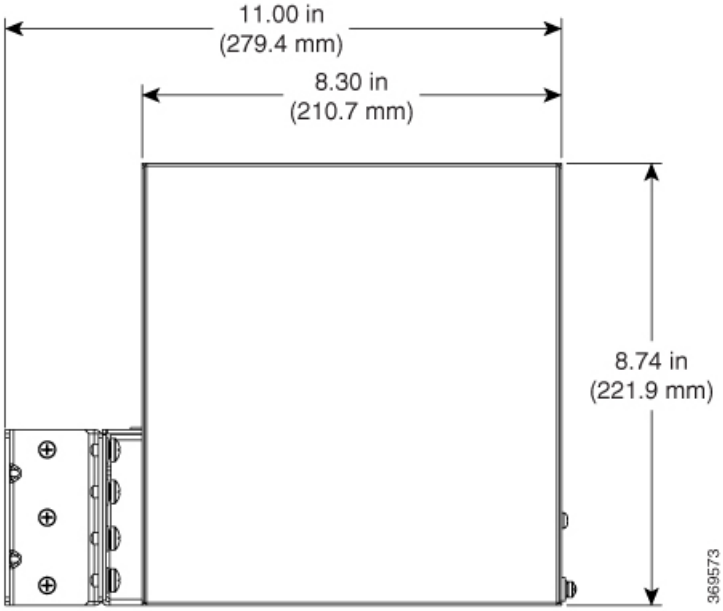


Figure 56: Front View of Cisco A903-F2B-AIR-U Clearance

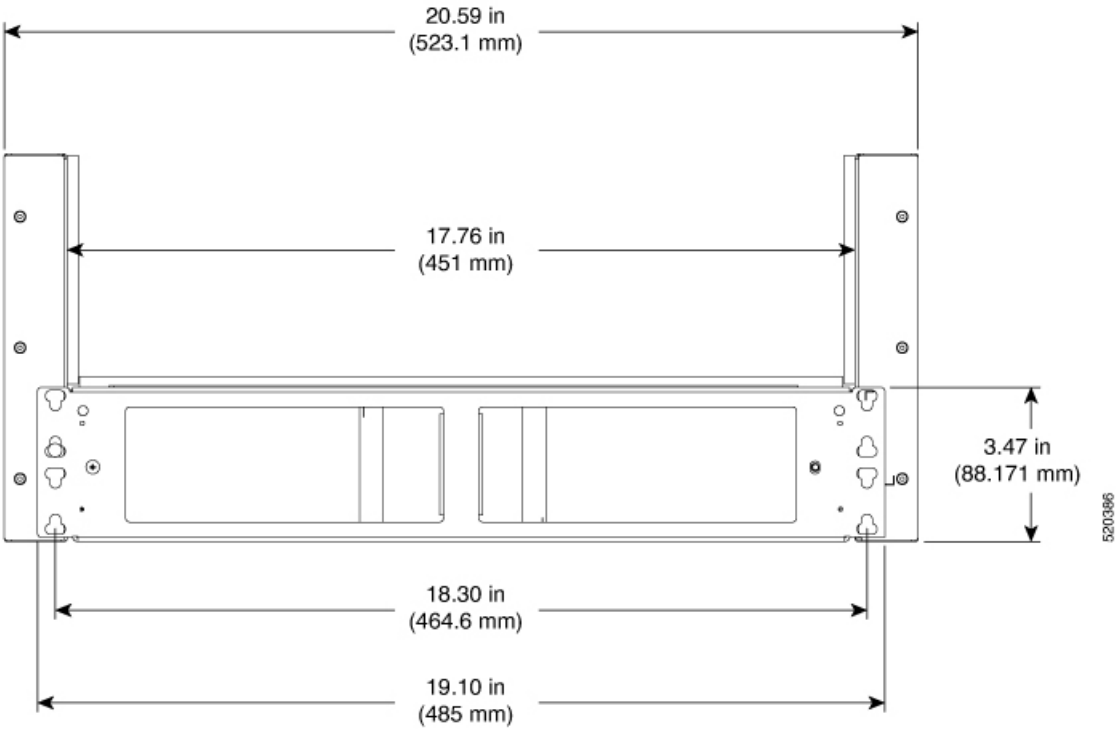
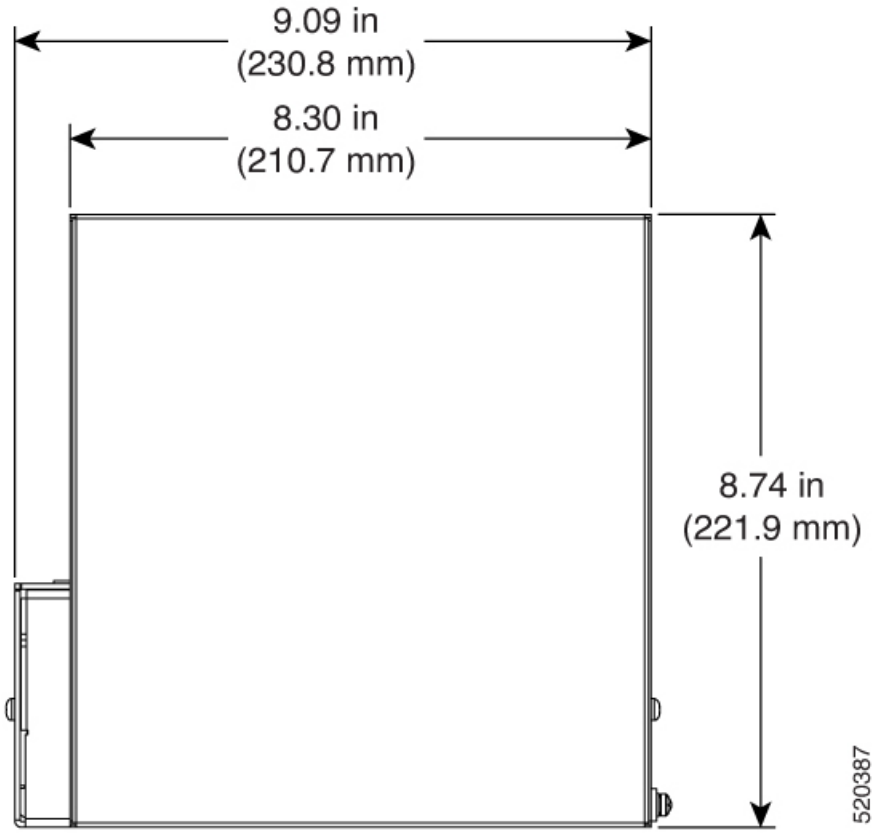


Figure 57: Side View of Cisco A903-F2B-AIR-U Clearance



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

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

- To ensure adequate air flow through the equipment rack, we recommend that you maintain a clearance of at least 80 mm on each side of the rack at all times.
- If airflow through the equipment rack and the routers that occupy it is blocked or restricted, or if the ambient air being drawn into the rack is too warm, an overtemperature condition can occur within the rack and the routers that occupy it.
- The site should also be as dust-free as possible. Dust tends to clog the router fans, reducing the flow of cooling air through the equipment rack and the routers that occupy it, thus increasing the risk of an overtemperature condition.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat that is generated by the equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the side intakes and the exhaust fans.

- When rack-installed equipment fails, especially equipment in an enclosed rack, try operating the equipment by itself, if possible. Power off all other equipment in the rack (and in adjacent racks) to give the router maximum cooling air and clean power.
- Avoid locating the Cisco ASR 903 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 side to side, with ambient air drawn in from the vents located on the front right of the chassis.
- Ensure that cables do not obstruct the air-inlet and air-exhaust grid of the chassis as it may lead to improper ventilation, overheating of the equipment, and dust accumulation.

Air Flow Guidelines for Enclosed Rack Installation

To install a Cisco ASR 903 Router in a 4-post enclosed cabinet, the front and rear doors of the cabinet must be removed or be perforated with a minimum of 65% open area (70% for ETSI 800mm racks).

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

Floor Loading Considerations

Ensure that the floor under the rack supporting the Cisco ASR 903 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 903 Router, refer to Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

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

Site Power Guidelines

The Cisco ASR 903 Router has specific power and electrical wiring requirements. Adhering to these requirements ensures reliable operation of the system. Follow these precautions and recommendations when planning your site power for the Cisco ASR 903 Router:

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

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

Note The Cisco ASR 903 Router installation must comply with all the applicable codes and is approved for use with copper conductors only. The ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system must be made with a 6 AWG gauge wire, copper ground conductor at a minimum.

The maximum power draw of the Cisco ASR 903 Router chassis and its configurable hardware components are listed in the following table. The maximum power draw values are not affected by whether the router chassis contains 1 or 2 power supplies AC or DC.

Table 15: Interface Module Power Draw Value

Hardware component(s)	Maximum power draw value
A900-RSP2A-64 (active) A900U-RSP2A-64 (active)	70 W
A900-RSP2A-64 (standby) A900U-RSP2A-64 (standby)	55 W
A900-RSP2A-128 (active) A900U-RSP2A-128 (active)	100 W
A900-RSP2A-128 (standby) A900U-RSP2A-128 (standby)	85 W
A900-RSP3-400-S (active)	230 W
A900-RSP3-400-S (standby)	230 W
A900-RSP3-200-S (active)	160 W
A900-RSP3-200-S (standby)	160 W
A900-IMA1X (1-port 10 GE XFP Interface Module)	13.0 W
A900-IMA8T (8-port 1 GE RJ45 Interface Module)	17.5 W
A900-IMA8S (8-port 1 GE SFP Interface Module)	17.5 W
A900-IMA8D (8-port T1/E1 Interface Module)	14.5 W
A900-IMA16D (16-port T1/E1 Interface Module)	14.5 W
A900-IMA32D (32-port T1/E1 Interface Module)	18 W

Hardware component(s)	Maximum power draw value
A900-IMA1Z8S-CX (OC-192 Interface Module + 8-port low rate Interface Module)	92 W
A900-IMA48D-C (48 port T1/E1 Interface Module)	35 W
A900-IMA48T-C (48 port T3/E3 Interface Module)	52 W
A900-IMA8S1Z (8-port 1GE SFP + 1-port 10 GE Interface Module)	29 W
A900-IMA8T1Z (8-port 1GE RJ-45 Copper + 1 10 GE Interface Module	27 W
A900-IMA2Z (2-port 10 GE Interface Module)	24 W
A900-IMA8Z (8-port 10 Gigabit Ethernet Interface Module)	60 W
A900-IMA1C (1-port 100 Gigabit Ethernet Interface Module)	60 W
A900-IMA2F (2-port 40 Gigabit Ethernet QSFP Interface Module)	60 W
A900-IMASER14A/S (14-port Serial Interface Module)	20 W
A900-IMA6EM (6-port E & M Interface Module)	20 W
A900-IMA4C3794 (4-port C37.94 Interface Module)	14 W
A900-IMA8CS1Z-M (8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module)	54 W
A900-IMA3G-IMSG (1-port OC-48/STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-port T1/E1 + 4-Port T3/E3 CEM Interface Module)	55 W
N560-IMA2C (2-Port 100 Gigabit Ethernet Interface Module (2X100GE))	56 W
N560-IMA-8Q/4L (8-port 10Gigabit Ethernet Interface Module)	50 W

Electrical Circuit Requirements

Each Cisco ASR 903 Router requires a dedicated electrical circuit. If you equip it with dual power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

The Cisco ASR 903 Routers can be powered by a DC source or an AC source. Ensure that equipment grounding is present and observe the power strip ratings. Make sure that the total ampere rating of all products plugged into the power strip does not exceed 80% of the rating.

For more information about the Cisco ASR 903 Router power supply, see Power Supply Features.

Site Cabling Guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the Cisco ASR 903 Router, consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, electromagnetic interference (EMI), and

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

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

Before you begin, read these important notes about cabling:

- The T1/E1 interface module for the Cisco ASR 903 Router uses a high-density connector that requires the use of a T1/E1 interface cable and a customer-provided patch panel. For more information, see Connecting T1/E1 cables.
- Shielded cables must be used to connect to the RS-48 alarm connector on the fan tray in order to comply with FCC/EN55022/CISPR22 Class A emissions requirements. For information about the fan tray alarm port, see Connecting the Fan Tray Alarm Port.

Before you install the Cisco ASR 903 Router, have all the additional external equipment and cables on hand. For information about ordering, contact a Cisco customer service representative.

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

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline in planning your network connections *prior to* installing the Cisco ASR 903 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 RSP provides a console port to connect a terminal or computer for local console access through RJ45 connector or USB connector. The RJ45 port connector supports RS-232 asynchronous data with distance recommendations specified in the IEEE RS-232 standard.

Interference Considerations

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

The following sections describe sources of interference and how to minimize its effects on the Cisco ASR 903 Router system.

Electromagnetic Interference

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

Strong EMI can destroy the signal drivers and receivers in the Cisco ASR 903 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 903 Router, see *Regulatory Compliance and Safety Information for the* Cisco ASR 903 Router.

Radio Frequency Interference

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

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

Lightning and AC Power Fault Interference

If signal wires exceed the recommended cabling distances, or if signal wires pass between buildings, you should consider the effect that a lightning strike in your vicinity might have on the Cisco ASR 903 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 903 Router operating environment.

Rack-Mounting Guidelines

The following sections provide guidelines for rack-mounting the Cisco ASR 903 Router:

Precautions for Rack-Mounting

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

- Do not move large racks by yourself. Due to the height and weight of a rack, a minimum of two people are required to accomplish this task.
- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to the components in the rack.
- Do not step on or stand on any component or system when servicing other systems or components in a rack.
- When mounting the Cisco ASR 903 Router in a partially filled rack, load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Rack Selection Guidelines

The Cisco ASR 903 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 65°C.

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

Consider installing the Cisco ASR 903 Router in a rack with the following features:

- Network Equipment Building System (NEBS) compliant, 19-inch (48.3 cm) wide rack.
- EIA or European Telecommunications Standards Institute (ETSI) hole patterns in the mounting rails. The required mounting hardware is shipped with the Cisco ASR 903 Router. If the rack that you plan to install the system in has metric-threaded rails, you must provide your own metric-mounting hardware.
- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.

Note The Cisco ASR 903 Router should *not* be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. Installing the router in any type of enclosed rack—*even with the side doors removed* —could disrupt the air flow, trap heat next to the chassis, and cause an overtemperature condition inside the router. If you use an enclosed rack, ensure that there are air vents on all sides of the rack and there is proper ventilation.

Equipment Rack Guidelines

The placement of the rack can affect personnel safety, system maintenance, and the system's ability to operate within the environmental characteristics described in the Cisco ASR 900 Series Aggregation Services Routers Data Sheet.

Choose a proper location for the Cisco ASR 903 Router by following the guidelines listed below.

Locating for Safety

If the Cisco ASR 903 Router is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack's center of gravity is as low as possible.

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

Locating for Easy Maintenance

Keep at least 3 feet of clear space at the front and back of the rack. This space ensures that you can remove the Cisco ASR 903 Router components and perform routine maintenance and upgrades easily.

Avoid installing the Cisco ASR 903 Router in a congested rack and consider how routing of cables from other pieces of equipment in the same rack could affect access to the router cards.

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

Allow the following clearances for normal system maintenance:

- At the top of the chassis—At least 3 inches (7.6 cm)

- Sides of the chassis—3 to 4 ft (91.44 cm to 121.92 cm)

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

- Use the **show environment all** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings about high temperature and creates reports on other potentially dangerous occurrences. If warning messages are displayed, take immediate action to identify the cause, and correct the problem.
- Keep the Cisco ASR 903 Router off the floor and out of areas that collect dust.
- Follow ESD-prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

Locating for Proper Airflow

Ensure that the Cisco ASR 903 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 Air Flow Guidelines .

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 903 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 16: Cisco ASR 903 Router 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)		
Shared port adapters are operational		
Correct software configuration displayed after system banner appears		

Creating a Site Log

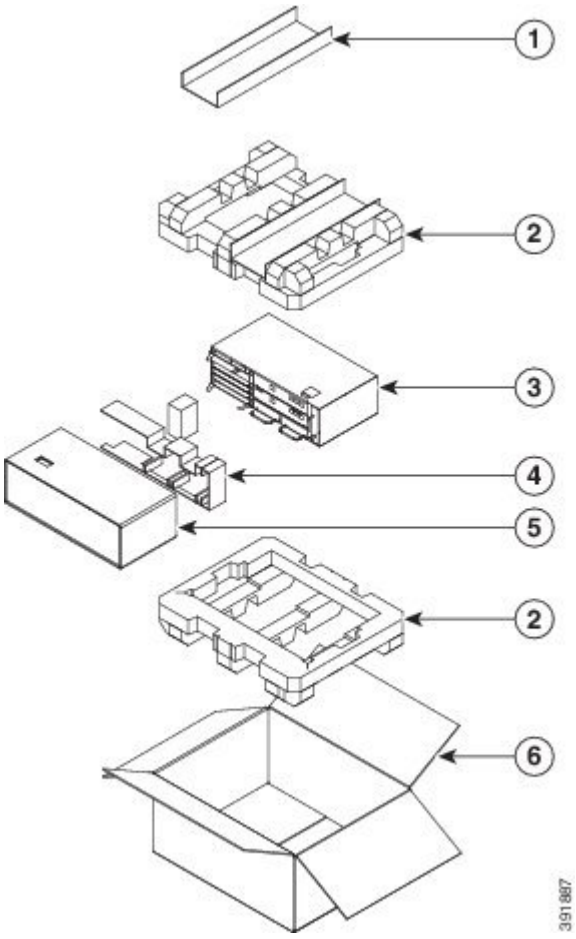
The Site Log provides a record of all the actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that anyone who performs tasks has access to it.

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

Receiving the Cisco ASR 903 Router

Each Cisco ASR 903 Router chassis is shipped in a container. See the figure below .

Figure 58: Cisco ASR 903 Router Packaged for Shipping



1	Cap of Accessories tray	4	Packaging Material
2	Accessories tray	5	Packaging Material
3	Cisco ASR 903 router	6	Packaging Container

Chassis-Lifting Guidelines

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

Each time you lift the chassis, follow these guidelines:

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

- Always disconnect all external cables before lifting or moving the chassis.
- Do not carry the chassis in any other packaging except as provided by Cisco packaging. Usage of other inferior packaging for equipment movement may cause severe damage to the product.
- If the equipment is opened for testing purposes, and has to be re-packaged for movement, package it exactly the same way (orientation) as it was previously packaged at the time of product delivery by including all the packaging counter parts. Wrong orientation may cause damage to the product during transportation.
- Always use ESD cover to wrap the hardware before packing it into packaging carton.
- If faulty hardware has to be shipped to RMA depot, use same Cisco packaging which was provided at the time of product delivery.

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

Tools and Equipment

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

- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- Flat-blade screwdrivers: Small 3/16-inch (0.476 cm) and medium 1/4-inch (0.625 cm):
  - To install or remove modules
  - To remove the cover if you are upgrading the memory or other components
- #12-24 pan-head screws to secure the router to the equipment rack
- Cables for connecting to the WAN and LAN ports (depending on the configuration)

Note For more information on cable specifications, see Troubleshooting.

- Ethernet hub or switch or PC with a network interface card for connecting to the Ethernet ports
- Console terminal (an ASCII terminal or a PC running terminal emulation software) that is configured for 9600 baud, 8 data bits, no parity, and 2 stop bits
- Console cable for connecting to the console port
- (Optional) Modem for connecting to the auxiliary port for remote administrative access
- Auxiliary cable for connecting to the auxiliary port (you can supply this cable or order one)
- Ratcheting torque screwdriver with a Phillips head that exerts up to 30 pound-force per square inch (in-lb) of pressure
- Crimping tool as specified by the ground lug manufacturer
- 18 AWG copper wire for the power cord
- Wire-stripping tools for stripping both 6 AWG and 18 AWG wire
- 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 and use the Shipping Contents Checklist:

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 903 Router.

Step 3 Perform a visual inspection of the chassis.

Step 4 Use the table below to check the contents of the Cisco ASR 903 Router shipping container. Do not discard the shipping container. You will need the container if you move or ship the Cisco ASR 903 Router in the future.

What to do next

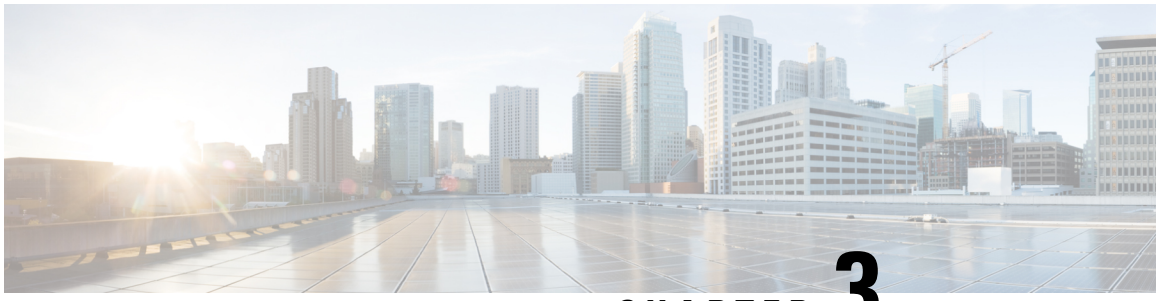
Table 17: Cisco ASR 903 Router Shipping Container Contents

Component	Description
Chassis	Cisco ASR 903 Router chassis
	Fan tray
	Power supplies
	RSP
	Interface modules
Accessories kit	Chassis rack-mount brackets (19-inch EIA)
	Three sets of screws: • Front and rear rack-mount bracket screws (2 sets) • Cable-management bracket screws
	Six cable-management brackets (one per bracket)
	One earth lug with two 10-32 screws.
	1 RJ45 to RJ45 crossover cable 1 RJ45 to DB-9 (female) adapter
ESD, wrist strap (disposable)	One disposable wrist strap (optional)

Component	Description
Documentation	*Regulatory Compliance and Safety Information for the* Cisco ASR 903 Router
Optional equipment	Check the container for the following optional equipment: • Power cord if an AC power supply was shipped. There are no cords for the DC power supply units. • T1/E1 cable connector (required only for T1/E1 interface modules)



Note Most Cisco documentation is available online. Documentation that is shipped with your Cisco ASR 903 Router includes the *Regulatory Compliance and Safety Information for the* Cisco ASR 903 Router document, and the Cisco ASR 903 Router Documentation Roadmap that contains information about the various documents that are available online and the links to them.



CHAPTER 3

Installing the Cisco ASR 903 Router

This chapter describes how to install the Cisco ASR 903 Router.

- Prerequisites, on page 77
- Installing the Router in a Rack, on page 77
- Installing the Chassis Ground Connection, on page 92
- Installing the Fan Tray, on page 95
- RSP Installation, on page 99
- Interface Module Installation, on page 103
- Installing the Power Supply, on page 108
- Connecting the Cisco ASR 903 Router to the Network, on page 126

Prerequisites

Before installing the Cisco ASR 903 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)
- Unpacking and inspecting the Cisco ASR 903 Router
- Gathering the tools and test equipment required to properly install the Cisco ASR 903 Router

For more instructions on how to prepare for the installation of the Cisco ASR 903 Router, see Preparing for Installation, on page 49.

Installing the Router in a Rack

The following sections describe how to install the Cisco ASR 903 Router in a rack:

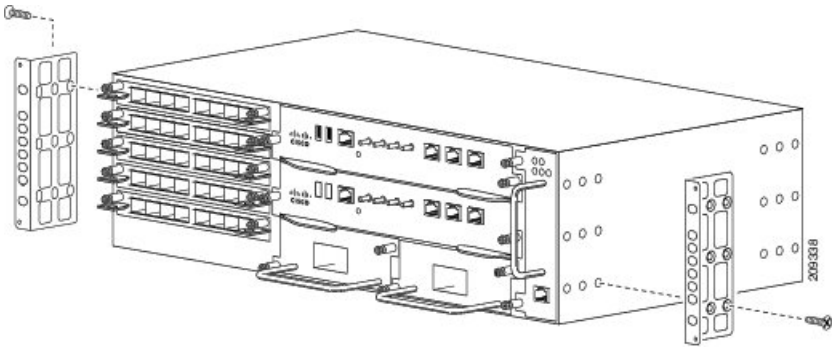
Installing the Chassis Brackets

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

Procedure

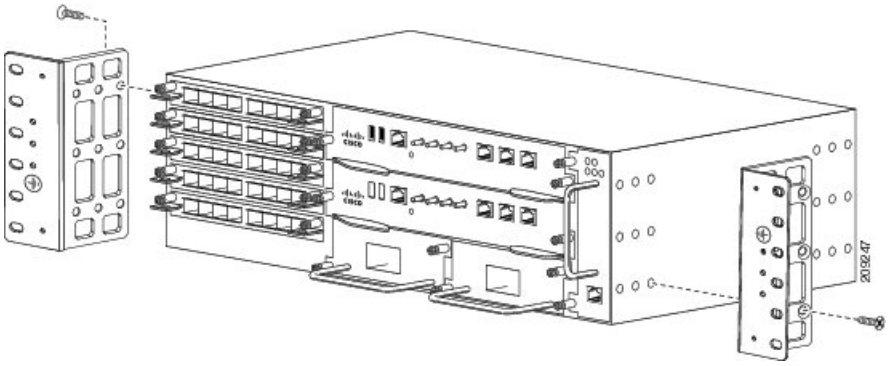
Step 1 Remove the rack-mount brackets from the accessory kit and position them beside the router chassis. The figure below hows how to attach the brackets on the Cisco ASR 903 Router for a 19-inch EIA rack.

Figure 59: Attaching Mounting Brackets for a 19-inch EIA Rack



The figure below shows how to attach the brackets on the Cisco ASR 903 Router for a 300 mm ETSI cabinet.

Figure 60: Attaching Mounting Brackets for a 300 mm ETSI Cabinet



Step 2 Position one of the brackets against the chassis side, and align the screw holes.

Step 3 Secure the bracket to the chassis with the screws removed when performing Step 1 . The recommended maximum torque is 28 in.-lb (3.16 N-m).

The A903-FAN-E fan tray with filter (A903-FAN-F) cannot be mounted using the mounting screws that are supported for A903-FAN fan tray. This is not an issue with the FAN tray filter blank panel (A903-FAN-F-B). We recommend that you use the short screws provided in the following rack mount kits to avoid interference of the air filter during rack mounting and while replacing the fan tray (A903-FAN) with the fan tray (A903-FAN-E):

- 19” rack mount kit (A903-RCKMT-19IN)
- ETSI rack mount kit (A903-RCKMT-ETSI)

What to do next

Repeat Step 2 and Step 3 for the other bracket.

Installing the Router Chassis in the Rack

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

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.

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.

Figure 61: Installing the Chassis in a 19-inch EIA Rack

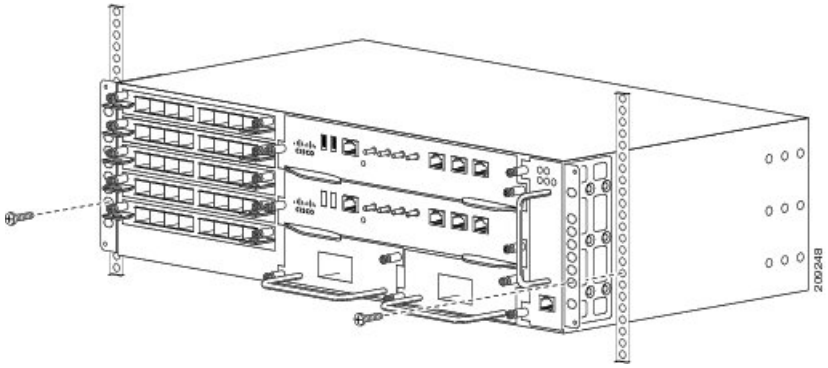


Figure 62: Installing the Chassis to support the Japanese JIS Rack Standard

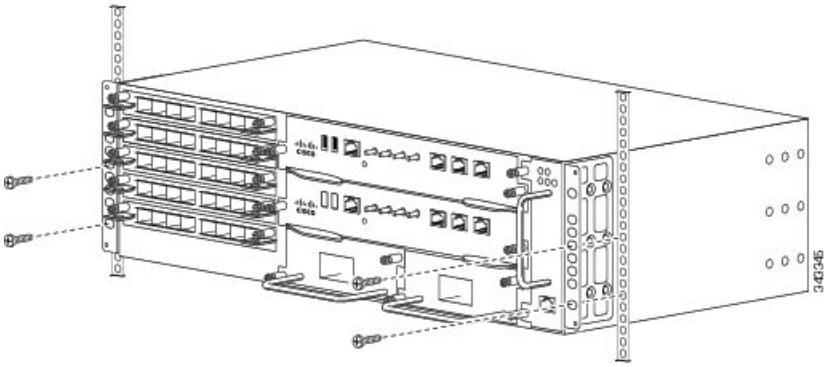
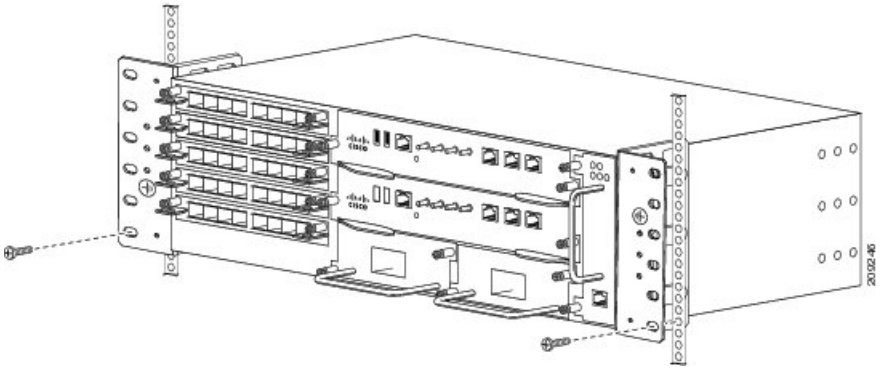


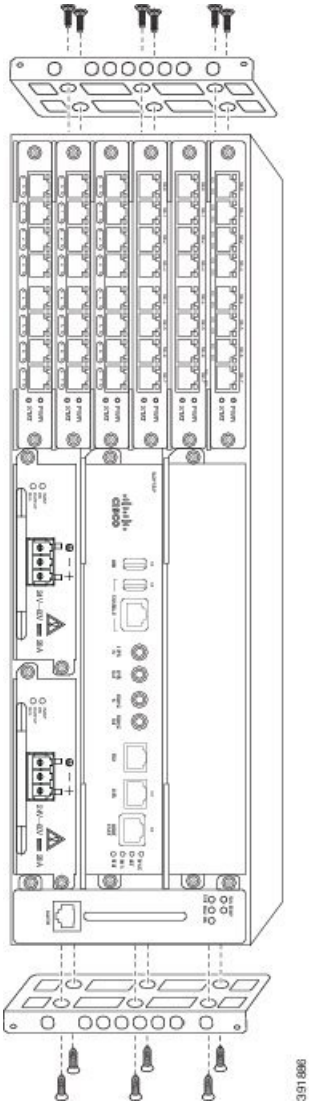
Figure 63: Installing the Chassis in a 300 mm ETSI Cabinet



Note
The router can be mounted in an ETSI rack but the required bend radius for the cables and fibers within the 300 mm ETSI specification cannot be maintained.

If you want to mount the router in ETSI cabinets, you need to have a custom-made cabinet front door to meet the fiber bend radius requirement.

Figure 64: Vertical Mounting Installation



Note
During vertical installation of the router, ensure that the equipment is mounted only on concrete or other non-combustible surfaces.

Step 3 Install the 8 or 12 (4 or 6 per side) 12-24 x 3/4-inch or 10-32 x 3/4-inch screws through the holes in the bracket and into the threaded holes in the equipment rack posts.

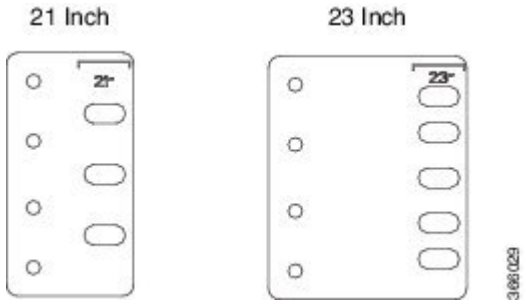
Step 4 Use a tape measure and level to verify that the chassis is installed straight and level.

Installing Plenum A903-F2B-AIR-U Assembly and Chassis in the Rack

Following steps help you to install the plenum assembly irrespective of the chassis and rack size.

Note The 19-inches bracket (A903-RCKMNT-19IN3) is an integral part of the plenum base. Ensure to select the 21-inches or 23-inches adapter for your plenum based on your rack size.

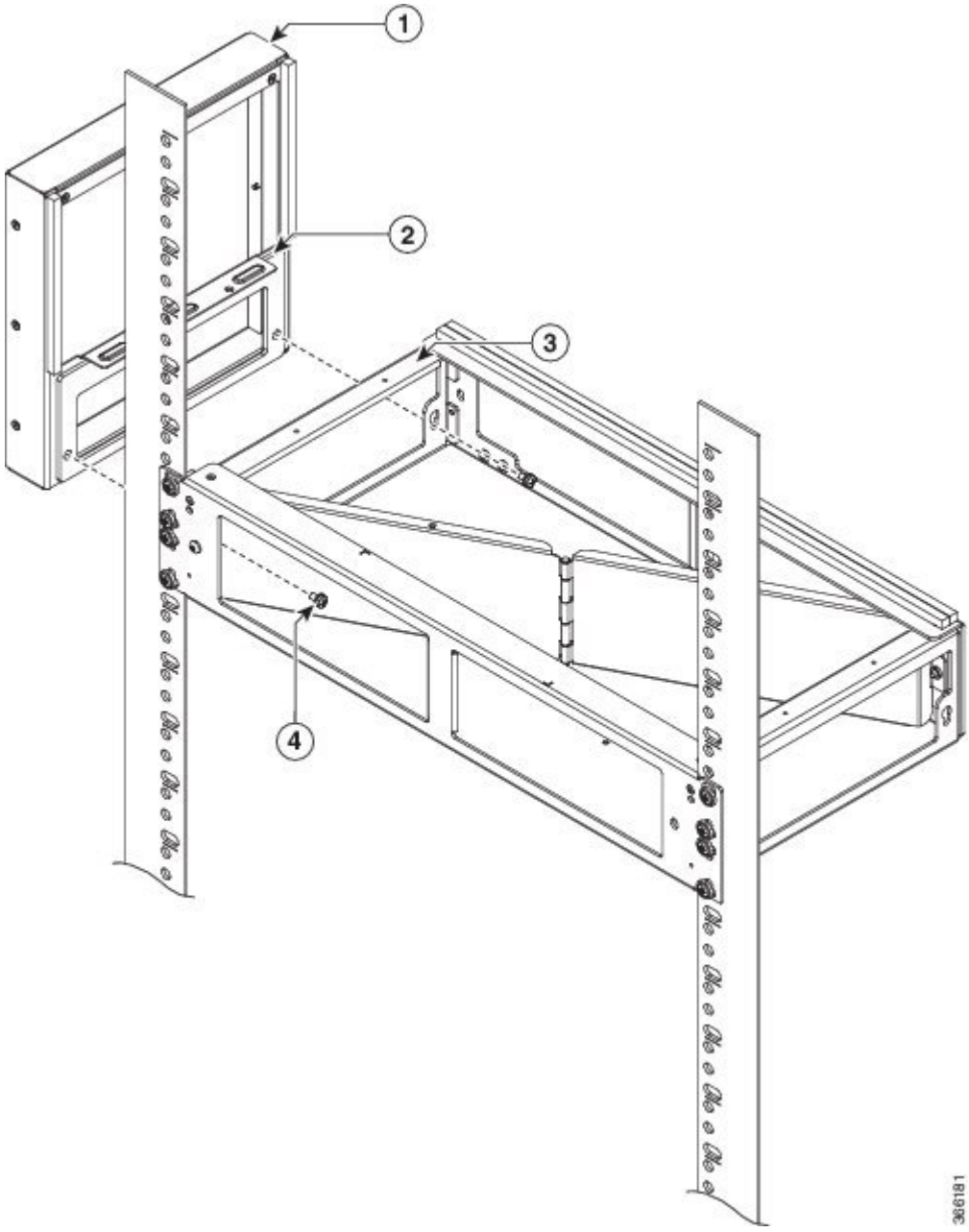
Figure 65: Different Adapters



Procedure

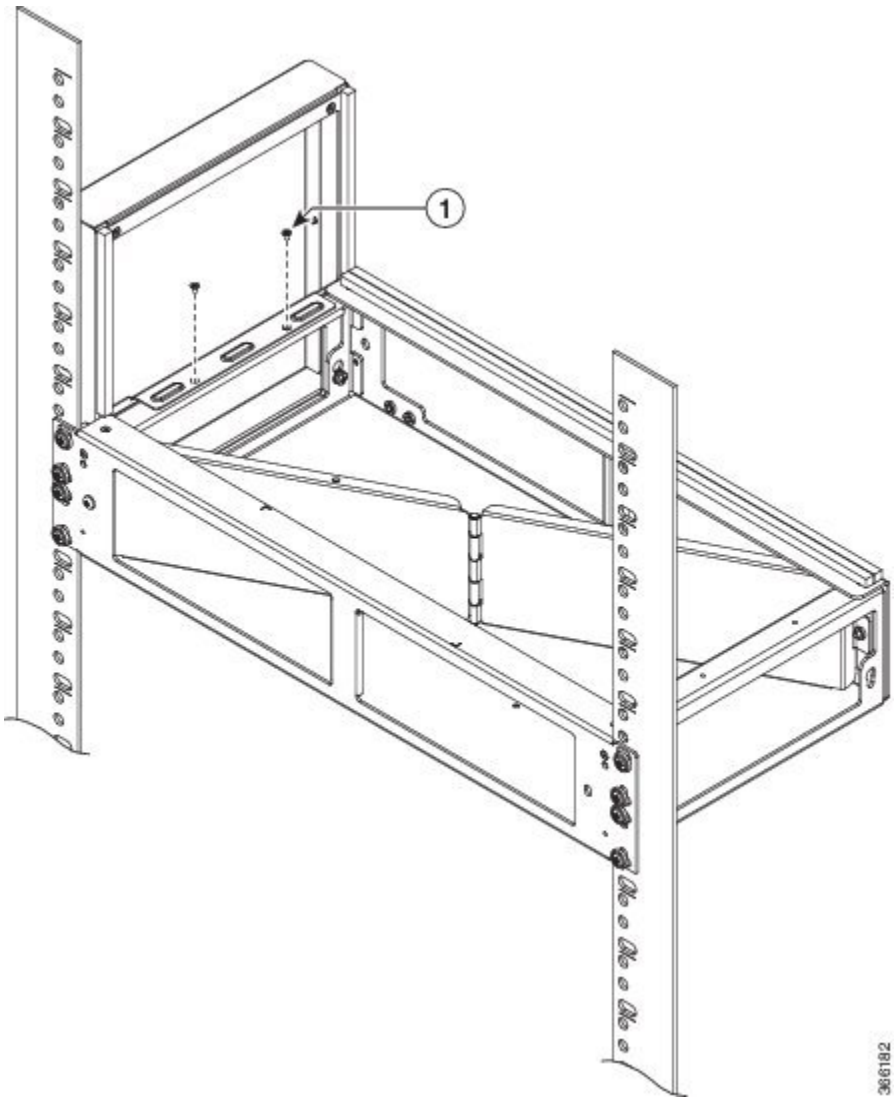
Step 1 Position the air baffle and the side plate to the plenum. See figure below.

Figure 66: Securing the Air Baffle Tray

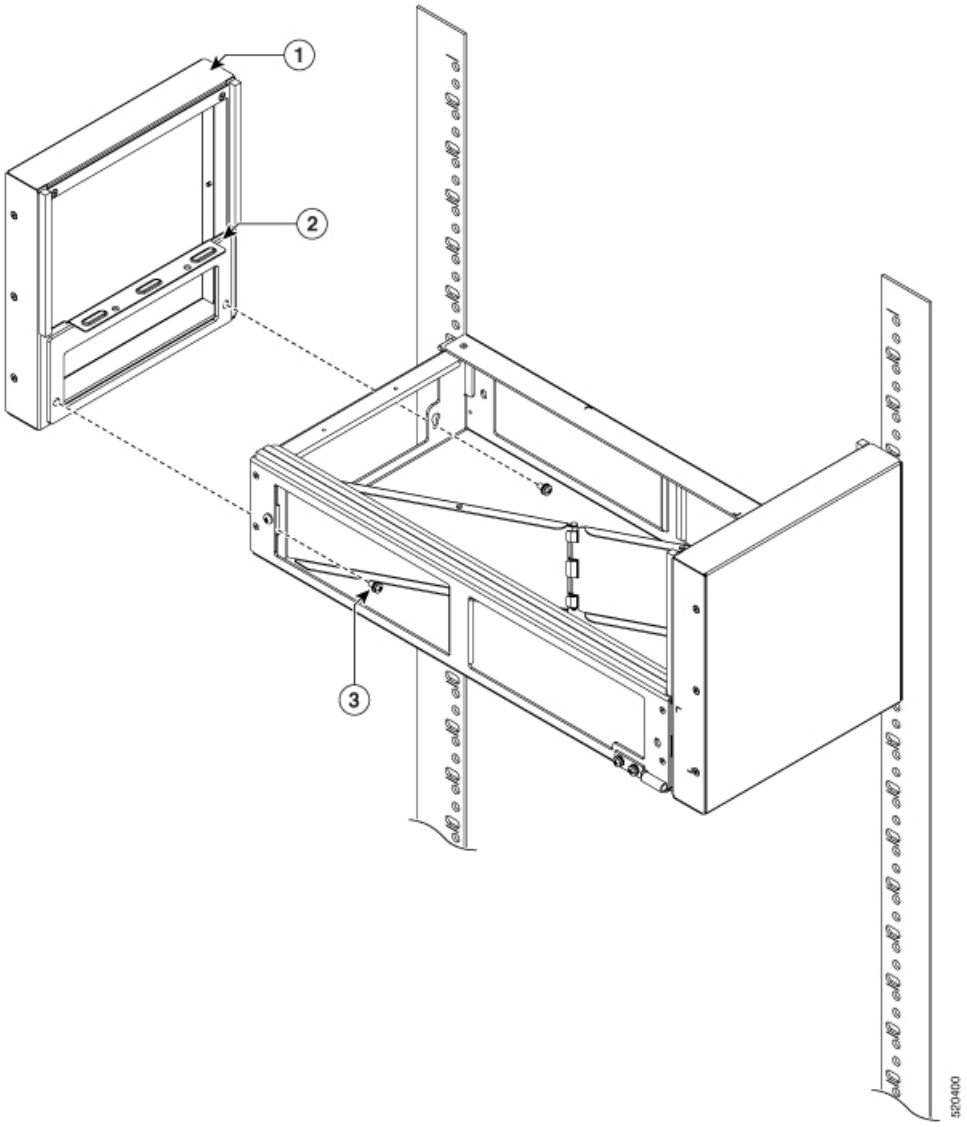


1	Air baffle	3	Plenum base
2	Side plate	4	Secure screw to Plenum base

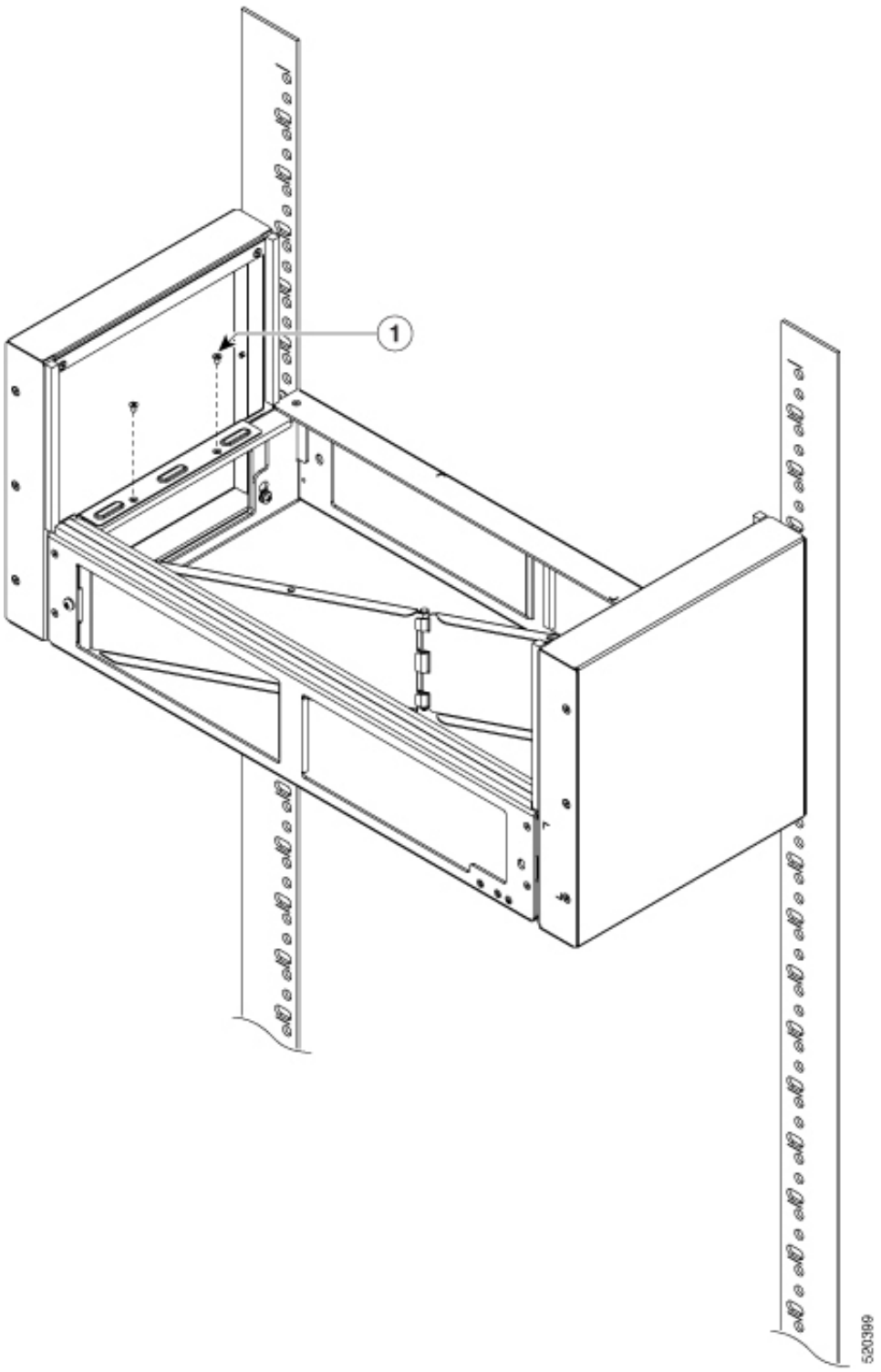
Figure 67: Securing the Side Plate



1	Securing side plate to plenum base	—	—



1	Air baffle
2	Side plate
3	Secure screw to Plenum base



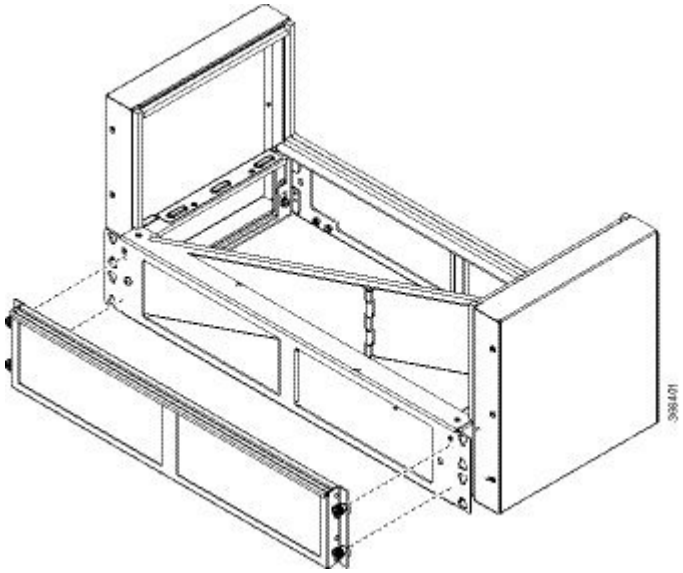
1	M3 Screw

Step 2 Secure the air baffle and the side plate using a maximum torque of 11.5 in.-lb (1.3 N-m). See figure below.

Step 3 Repeat Step-1 and Step-2 to complete the plenum assembly on the other side of the plenum base.

Step 4 Position the air filter (A903-F2B-AIR-F or A903-S2B-AIR) assembly on the plenum deflector. Secure the front cover using a recommended torque of 11.5 in.-lb (1.3 N-m). See figure below.

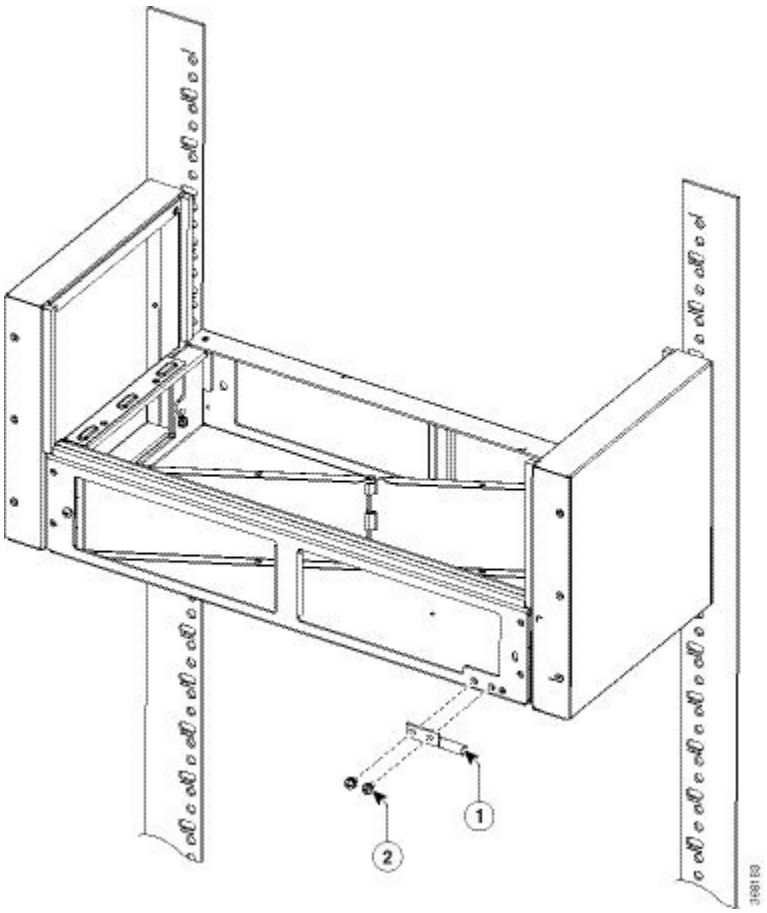
Figure 68: Air Filter



Note
The filter is applicable only when fans A903-FAN and A903-FAN-H are used and the filter is not applicable for A903-FAN-E.

Step 5 Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire and connect the other end of the ground wire to a suitable grounding point at your site. See figure below.

Figure 69: Attaching the Ground Lug and Wire Assembly



1	Dual-hole ground adapter and dual-hole lug	2	Dual ground screws

Step 6 Position the plenum assembly to the rack and secure the cable brackets to the rack using a torque of 11.5 in.-lb (1.3 N-m). See figure below.

Note
For a 19-inch rack installation, the rack has to have a flat post.

Figure 70: Plenum Assembly to 21-inch Rack

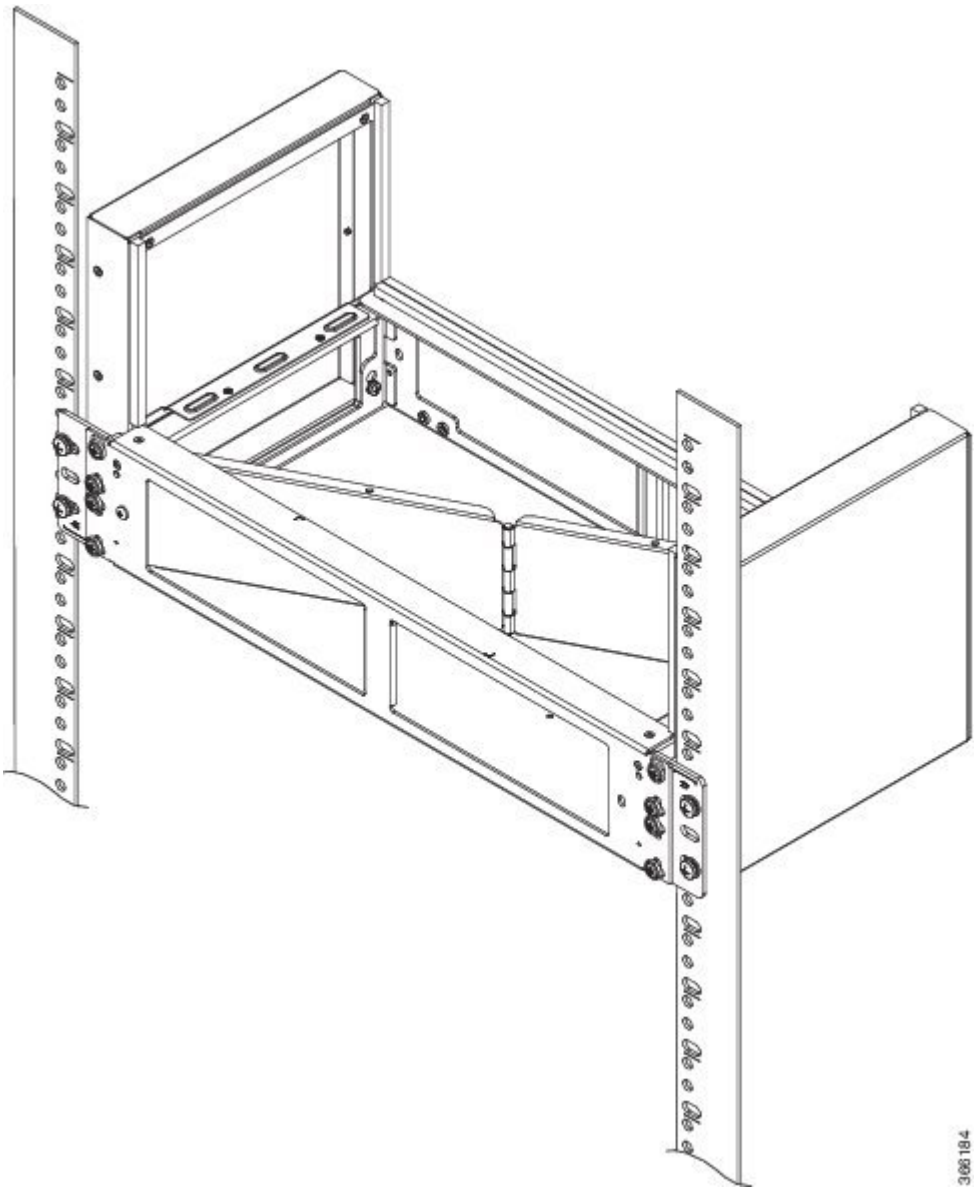
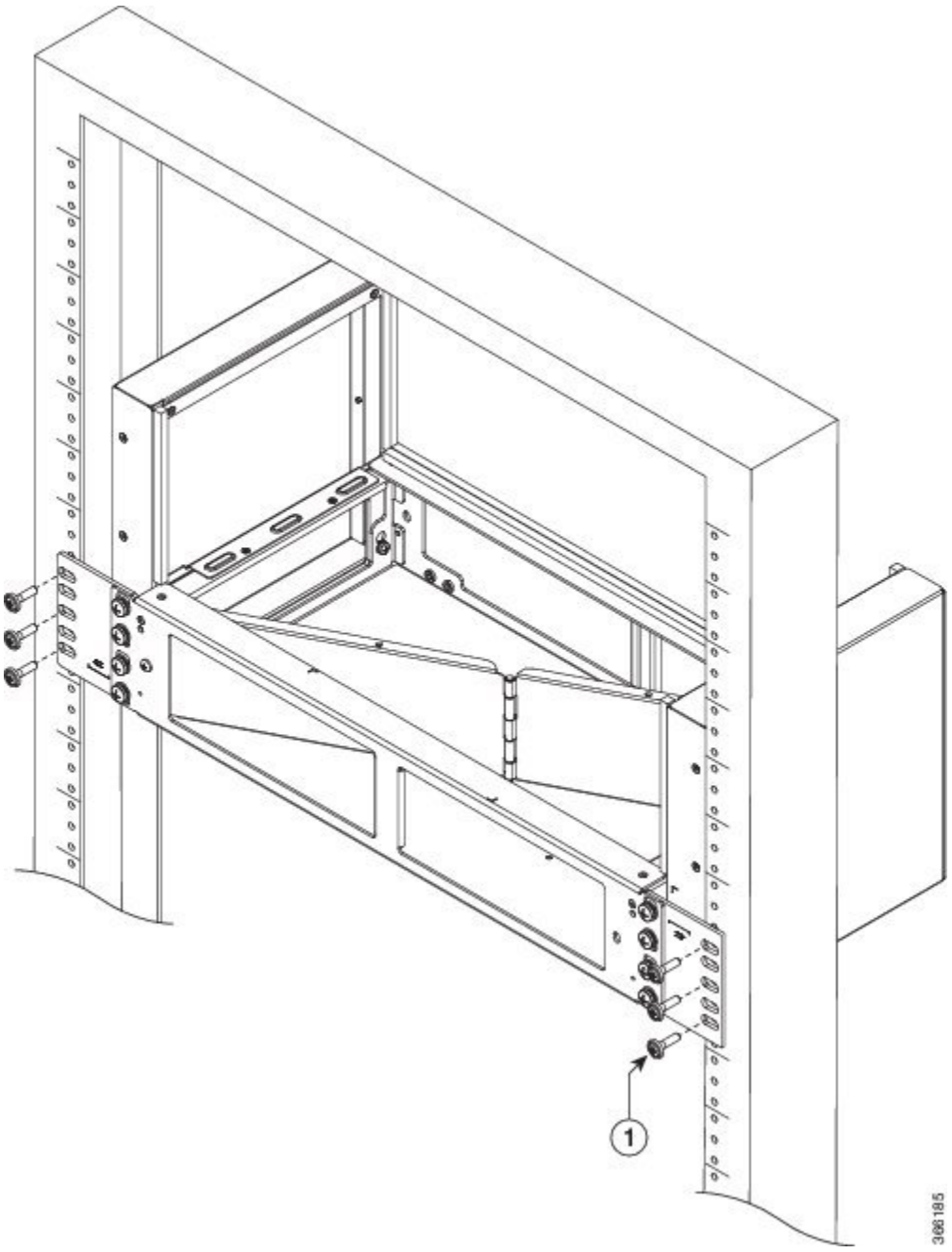


Figure 71: Plenum Assembly to 23-inch Rack



1	Secure screws to rack	—	—

Installing the Chassis in the Air Plenum

Note Ensure that the router is not installed in the air plenum while mounting it on the rack.

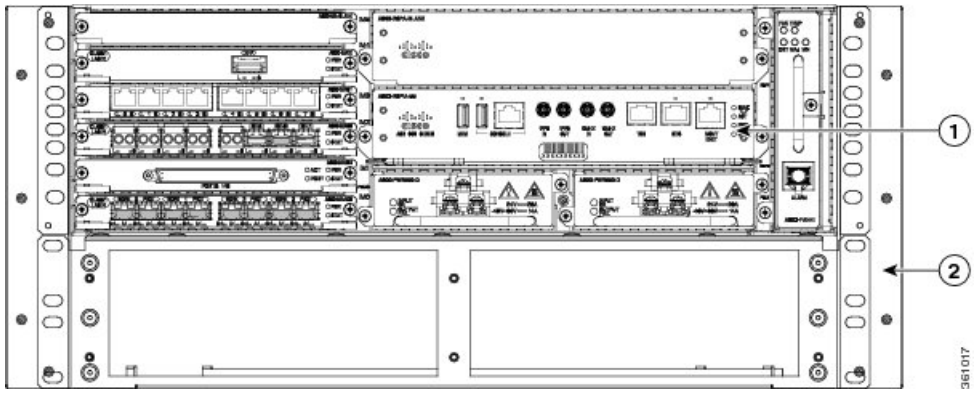
For instructions on mounting the air plenum on the rack, (see Table A-2).

Procedure

Step 1 Position the chassis so that the rear of the chassis is at the front of the plenum. See the figure below.

Step 2 Slide the chassis into the plenum so that the front of the chassis is in flush with the mounting rails and brackets.

Figure 72: Cisco ASR 903 Chassis with Air Plenum



1	Cisco ASR 903 router	2	Air plenum

Attaching the Cable Management Brackets

The router supports the following brackets:

- A903-CABLE-GUIDE
- A903-CAB-BRACKET—This bracket helps in routing the cables from the interface modules; therefore enabling a proper cable bending radius.

Note The mounting brackets and cable mounting brackets are assembled together. We recommend that the brackets are installed before the chassis is installed in the Air Plenum.

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 four screw holes, as shown in the figure below.

Figure 73: Cable Management Bracket Installation

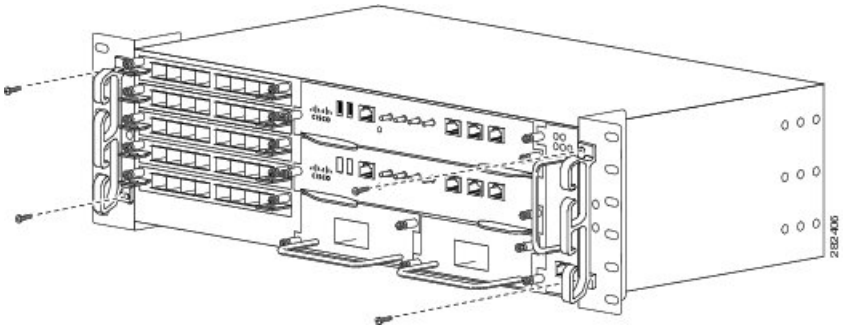
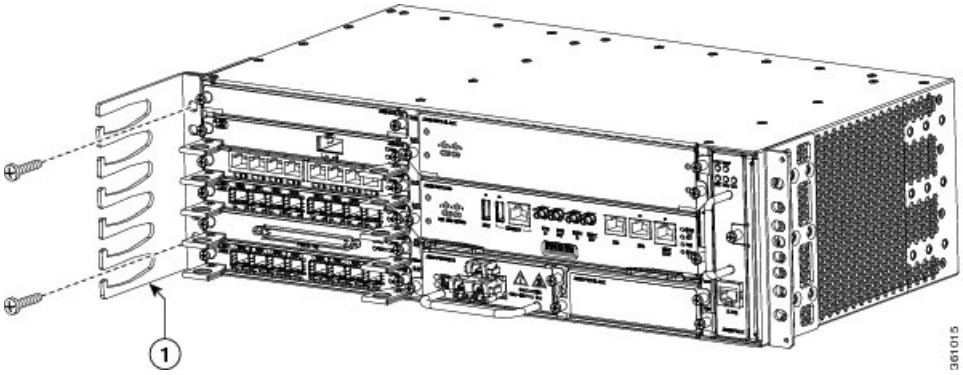


Figure 74: Cable Management Bracket (A903-CAB-BRACKET)



Step 2 Secure the cable management brackets with four M4 screws. The recommended maximum torque is 10 in.-lb (1.12 N-m).

Installing the Chassis Ground Connection

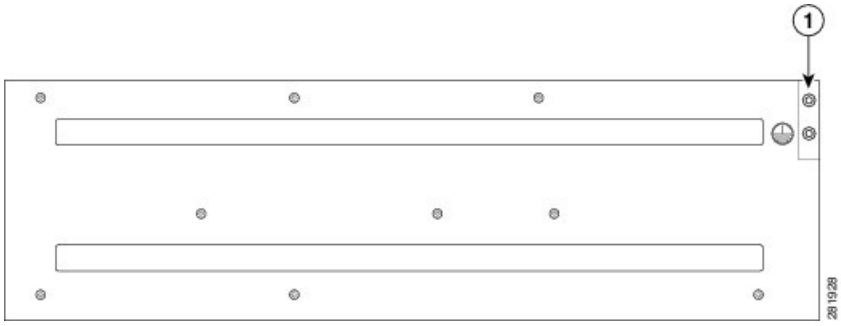
Before you connect the power or turn on the power to the Cisco ASR 903 Router, you must provide an adequate chassis ground (earth) connection to your router.

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 Cisco ASR 903 Router chassis. The router provides two locations for attaching a 2-hole grounding lug according to the rack-mounting brackets you use to install the router. The Cisco ASR 903 Router supports the following rack-mounting types:

- EIA 19-inch rack—Attach the grounding lug to the rear of the router, as shown in the figure below.

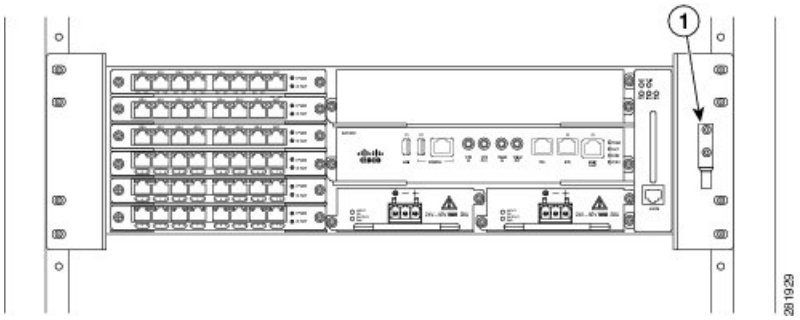
Figure 75: Attaching a Grounding Lug to the Rear of the Router



1	Grounding lug (19-inch EIA rack)

- 300 mm ETSI cabinet—Attach the grounding lug on the rack-mount bracket on the front of the router, as shown in the figure below.

Figure 76: Attaching a Grounding Lug to the Rack-Mount Bracket



1	Grounding lug (300 mm ETSI cabinet)

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

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

⚠

Caution Before making connections to the Cisco ASR 903 Router, ensure that you disconnect the power at the circuit breaker. Otherwise, severe injury to you or damage to the router may occur.

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

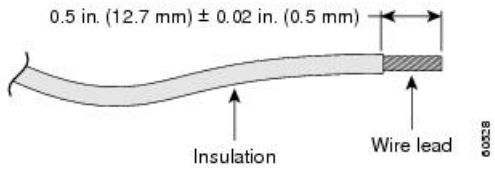
This unit is to be installed in a restrictive access location and must be permanently grounded to minimum 6 AWG copper ground wire.

Perform the following procedure to ground the Cisco ASR 903 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) (as shown in the figure below).

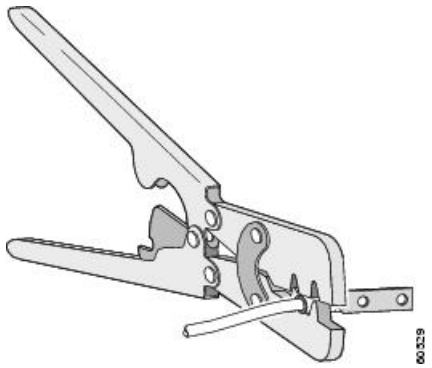
Figure 77: Stripping a Ground Wire



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 figure below.

Figure 78: Crimping a Ground Lug onto 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. For a 19-inch EIA rack, attach the 2-hole ground lug to the rear of the router.

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

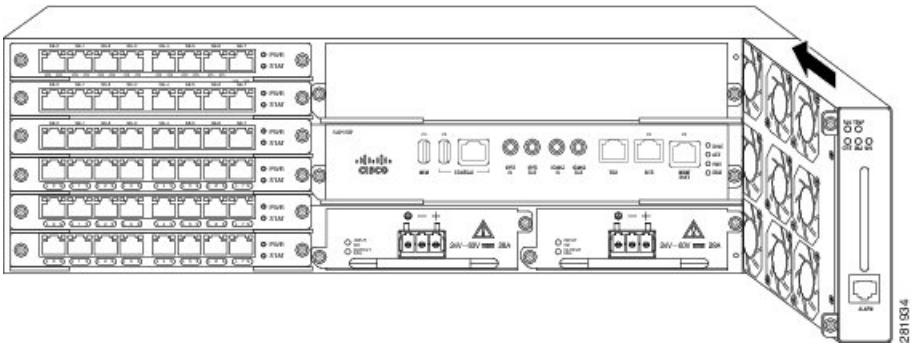
Installing the Fan Tray

The fan tray is a modular unit that provides cooling to the Cisco ASR 903 Router. Follow these steps to install the fan tray in the chassis:

Procedure

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

Figure 79: Installing the Fan Tray



Step 2 Guide the fan tray into the chassis until it is fully seated.

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

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

Step 3 Secure the fan tray to the chassis using the attached captive installation screws. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

This completes the procedure for installing or replacing the fan tray in a Cisco ASR 903 Router.

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

Installing the Dust Filter

Procedure

Step 1 Follow the steps for removing the fan tray (if installed) from the chassis. See Removing and Replacing the Fan Tray, on page 97.

Step 2 Remove the dummy cover from the fan tray. See the figure in section Fan Tray (A903-FAN-E), on page 10.

Step 3 Slide the dust filter onto the fan tray. See the figure in section Fan Tray (A903-FAN-E), on page 10.

Step 4 Insert the dummy cover on the fan tray to secure the filter within the chassis.

Step 5 Follow the steps to install the fan tray in the chassis. See Installing the Fan Tray, on page 95.

Removing the Dust Filter

Remove the dust filter for a replacement.

Note

- The dust filter is a single-use component.
- Use the dust filter (A903-FAN-F) within 6 months of buying as the shelf or storage life is less than 6 months. The ideal storage condition for a filter is a cool, dry, and dark environment. Surroundings that adversely affect the dust filter are high heat, humidity at high temperatures, and ultraviolet light.

Dust Filter Maintenance

A periodic health check of the filter, every three months based on the level of dust in the environment, helps in avoiding over clogging of the filters and provide a better life. This product's filter is used as a single-use component. If the product is installed in a controlled environment, check and replace the filter every three months, otherwise replace the filter every month with PID (A903-FAN-F=) or equivalent.

Procedure

Step 1 Remove the dummy cover from the fan tray.

Step 2 Remove the dust filter from the fan.

Note
The filter can be accessed by pulling the pull tab by using fingers or pliers. See the figure in section Fan Tray (A903-FAN-E), on page 10.

Step 3 Slide the replacement dust filter onto the fan tray

Step 4 Insert the dummy cover onto the fan tray to secure the filter within the chassis.

Removing and Replacing the Fan Tray

The fan tray supports online insertion and removal (OIR). There is no need to power down the Cisco ASR 903 Router to remove or replace the fan tray. However, there is a finite time to replace the fan tray. This time depends upon the specific RSP and fan tray combination and also the ambient temperature. The following table provides the time interval for replacing the fan tray. At higher ambient temperatures, the replacement time is lower.

Note If a fan tray is removed, and not replaced within the stipulated time the system will automatically power-off. The actual shutdown time depends on few parameters like the total traffic load, ambient temperature, type of fan tray that is used and the dust filter condition (if a filter is present). If the system is powered with PSUs other than 900W DC or 1200W AC and if the system is powered off, then the system should be completely powered off for 30 seconds with all the PSU in the system simultaneously, and then turned on for the system to power on.

Note If the system shuts down due to overheating, the removed fan tray must be reinserted before powering up the system. After the system is online, the alarms generated before the shutdown must be cleared in the Cisco Evolved Programmable Network Manager (EPNM) or any other server manager used to manage the device.

Table 18: Fan Tray Replacement Time

RSP Module	Fan Tray	Replacement Time at 25°C Ambient
RSP2	A903-FAN, A903-FAN-E	5 minutes
RSP3-200	A903-FAN	2 minutes 15 seconds
RSP3-200	A903-FAN-E	2 minutes 15 seconds
RSP3-200	A903-FAN-H	3 minutes 30 seconds
RSP3-400	A903-FAN	1 minute

RSP Module	Fan Tray	Replacement Time at 25°C Ambient
RSP3-400	A903-FAN-E	35 seconds
RSP3-400	A903-FAN-H	2 minutes

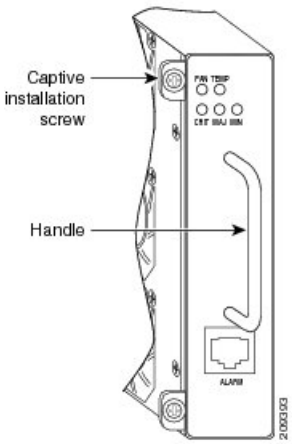
Caution To avoid erroneous failure messages, allow at least 2 minutes for the system to reinitialize, after the fan tray has been removed or replaced. This is applicable when the RSP2 modules are installed in the chassis.

Follow these steps to remove and replace the fan tray on the Cisco ASR 903 Router:

Procedure

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

Figure 80: Detaching the Fan Tray

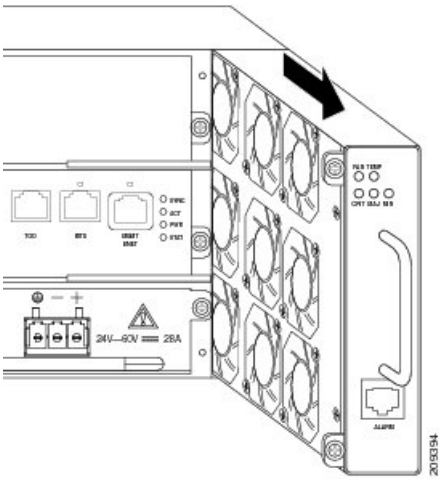


Step 2 Grasp the fan tray handle with one hand and the outside of the chassis with the other hand.

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

Step 3 Pull the fan tray backward toward you no more than 1 inch to disengage it from the power receptacle on the midplane, as shown in the following figure.

Figure 81: Fan Tray Removal



When removing the fan tray, keep your hands and fingers away from the spinning fan blades. Let the fan blades completely stop before you remove the fan tray. Statement 258

Step 4 Wait at least 5 seconds to allow the fans to stop spinning. Then, pull the fan tray backward toward you and out of the chassis.

Note
As the fan tray slides out of the chassis, support the bottom of the fan tray with one hand and keep your other hand on the fan tray handle.

This completes the steps for removing the fan tray from the chassis.

To install the new fan tray, follow the steps in Installing the Fan Tray.

RSP Installation

Follow these steps on handling an RSP module in the Cisco ASR 903 Router:

Installing an RSP Module

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

Procedure

Step 1 Choose a slot for the module. Make sure that there is enough clearance to accommodate any equipment that will be connected to the ports on the module. If a blank module filler plate is installed in the slot in which you plan to install the module, remove the plate by removing its 2 Phillips pan-head screws.

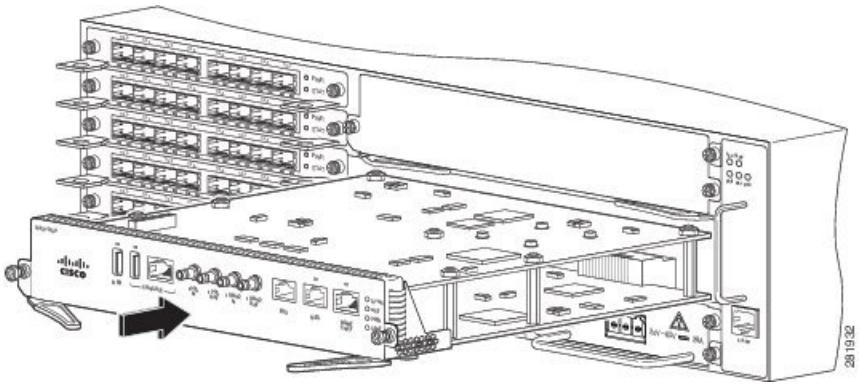
Step 2 Fully open both the ejector levers on the new module, as shown in the figure below.

Caution

To prevent ESD damage, handle modules by carrier edges only.

Step 3 Position the module in the slot. Make sure that you align the sides of the module with the guides on each side of the slot, as shown in the figure below .

Figure 82: Cisco ASR 903 Router RSP Installation



Step 4 Carefully slide the module into the slot until the EMI gasket on the module makes contact with the module in the adjacent slot and both the ejector levers have closed to approximately 45 degrees with respect to the module faceplate.

Caution
If the top slot already has an RSP module installed, and you install a second RSP module in the slot below it, be careful not to damage the EMI gasket of the bottom RSP module against the ejector levers of the top RSP during insertion.

Step 5 While pressing down, simultaneously close both the ejector levers to fully seat the module in the backplane connector. The ejector levers are fully closed when they are flush with the module faceplate.

Step 6 Tighten the two captive installation screws on the module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

Note
Make sure that the ejector levers are fully closed before tightening the captive installation screws.

Step 7 Verify that the captive installation screws are tightened on all of the modules installed in the chassis. This step ensures that the EMI gaskets on all the modules are fully compressed in order to maximize the opening space for the new or replacement module.

Note
If the captive installation screws are loose, the EMI gaskets on the installed modules will push adjacent modules toward the open slot, which reduces the size of the opening and makes it difficult to install the new module.

Note
Blank module filler plates (Cisco part number A900-RSPA-BLANK) should be installed in any empty chassis slots to keep dust out of the chassis and to maintain consistent airflow through the chassis.

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

Note
Close all unused RJ-45 and USB ports on the RSP module using the appropriate dust caps to prevent dust from accumulating inside the cage. For information on dust caps, see Installing Dust Caps.

Removing an RSP Module

Before you remove an RSP from the router, you should save the current configuration using the **write {host file | network | terminal}** command. This saves you time when bringing the module back online.

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

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

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

To remove an RSP module, perform the following steps:

Procedure

Step 1 Disconnect any cables attached to the ports on the module.

Step 2 Verify that the captive installation screws on all the modules in the chassis are tight. This step ensures that the space created by the removed module is maintained.

Note
If the captive installation screws are loose, the EMI gaskets on the installed modules will push the modules toward the open slot, which in turn reduces the size of the opening and makes it difficult to remove the module.

Step 3 Loosen the two captive installation screws on the module you plan to remove from the chassis.

Step 4 Place your thumbs on the ejector levers (see the figure Cisco ASR 903 Router RSP Installation) and simultaneously rotate the ejector levers outward to unseat the module from the backplane connector.

Step 5 Grasp the front edge of the module and slide the module straight out of the slot. If the chassis has horizontal slots, place your hand under the module to support its weight as you slide it out from the slot. Do not touch the module circuitry.

Caution
To prevent ESD damage, handle modules by the carrier edges only.

Step 6 Place the module on an antistatic mat or antistatic foam, or immediately reinstall the module in another slot.

Step 7 Install blank module filler plates (Cisco part number A900-RSPA-BLANK) in empty slots, if any.

Warning
Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

Hot-Swapping an RSP Module

The Cisco ASR 903 Router provides a feature that allows you to remove and replace a redundant RSP module without powering down the router. This feature is called hot-swapping or OIR, allows you to remove and replace a redundant module without disrupting router operation.

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

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

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



Note Before performing a hot-swap of the redundant RSP module, ensure the following to avoid system failure:

- Don't hot-swap the redundant RSP module if it is not in the hot standby software state. It might disrupt the stateful sync information maintained in the active RSP module.

  If the redundant RSP module is not in a hot standby software state, shut down all interface modules before performing the hot-swap. To shut down the interface modules, enter the following command into the CLI:

  ```
  hw-module subslot <> stop
  ```

- Don't remove the hot-swapped redundant RSP module until it has reached stateful sync with the active RSP module and is in the hot standby software state.
- Don't remove any interface modules until the hot-swapped RSP module has reached stateful sync with the active RSP module and is in the hot standby software state.

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

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

Interface Module Installation

The following sections describe the various tasks of associated with interface module installation on the Cisco ASR 903 Router:

Installing an Interface Module

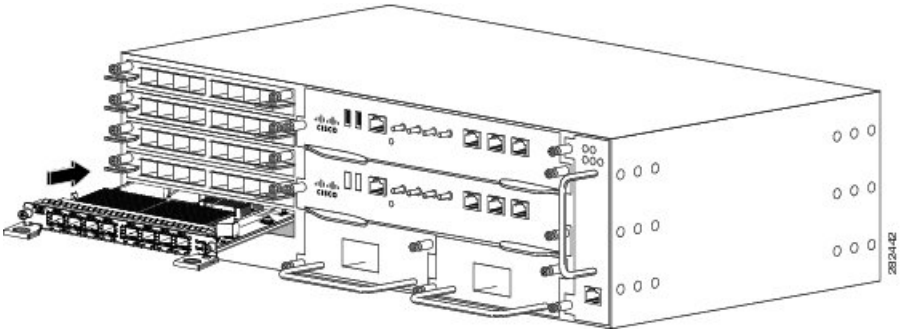
Procedure

Step 1 Before inserting an interface module, make sure that the chassis is grounded.

Step 2 To insert the interface module, carefully align the edges of the interface module between the upper and lower edges of the router slot.

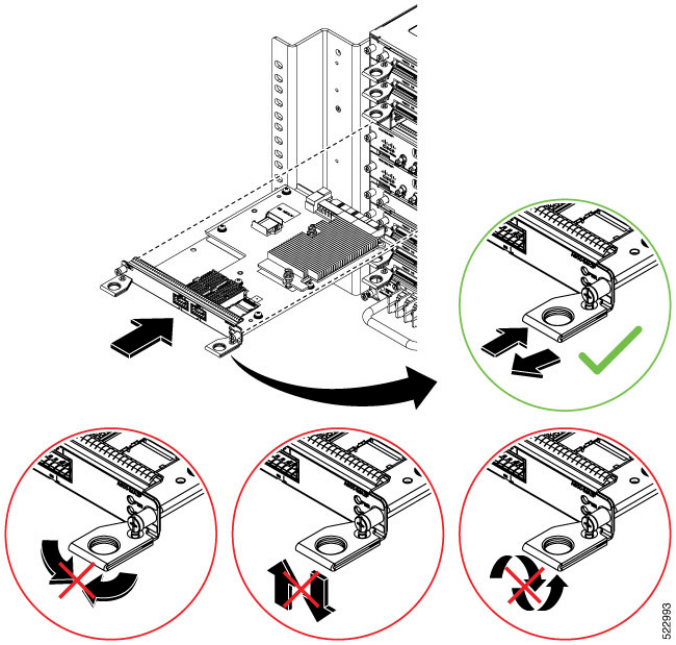
Step 3 Carefully slide the interface module into the router slot until the interface module makes contact with the backplane. The figure below shows how to install the interface module.

Figure 83: Inserting an Interface Module



Caution
Use the pull tab on the interface module only to insert and pull the card out straightly. Don’t use the pull tab to turn on its axis or bend it up or down, which can deform or damage the pull tab.

Figure 84: Using the Pull Tab



Step 4 Tighten the locking thumbscrews on both sides of the interface module. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

Step 5 Connect all the cables to each interface module.

Note
Close all unused SFP ports using SFP dust caps to prevent dust from accumulating inside the cage. The dust caps (Cisco part number A900-DCAP-SFP-S= (24 caps per package) or Cisco part number A900-DCAP-SFP-L= (240 caps per package)) can be ordered from Cisco.

Note
10 Gigabit Ethernet interface modules on the A900-RSP2A-64 module aren't supported in slots 4 and 5.

Note
Close all unused RJ-45, SFP, XFP, and QSFP ports on the interface module using the appropriate dust caps to prevent dust from accumulating inside the cage. For information on dust caps, see Installing Dust Caps.

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

Removing an Interface Module

Procedure

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

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

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

Hot-Swapping an Interface Module

The Cisco ASR 903 Router provides a feature that allows you to remove and replace an interface module without powering down the router. This feature, called hot-swapping or OIR, allows you to remove and replace a redundant module without disrupting router operation.

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

- Allow at least 2 minutes for the system to reinitialize before inserting a new IM.
- Avoid inserting a new IM during bootup until the active and standby RSPs have reached an OK state.
- When inserting multiple IMs into the chassis, wait until each IM reaches an OK state before inserting the next IM.
- When an IM is reloaded using the **hw-module subslot** *0/x* **reload** command, allow at least 4 minutes to reinitialize the router before proceeding with any physical or soft OIR operations on any of the IM slots.

The following interface modules take around 60 to 70 seconds to reach OK state after a soft OIR is performed:

- Copper Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet Interface Module(1X10GE) (PN:A900-IMA8T1Z)
- SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE) (PN:A900-IMA8S1Z)
- 2-port 10 Gigabit Ethernet Interface Module(2X10GE) (PN:A900-IMA2Z). A900-IMA2Z IM supports SFP+ and XFP on ports 0 and 1. Either SFP+ or XFP can be connected on each port. If both are connected on the same port, the port will go down.

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

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

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

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

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

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

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

Swapping of Interface Modules

The Ethernet interface modules support swapping on the Cisco A900-RSP2A module.

- 8-port Gigabit Ethernet SFP Interface Module (8X1GE)
- 8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8X1GE)
- 1-port 10 Gigabit Ethernet XFP Interface Module (1X10GE)
- SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)
- Copper Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet Interface Module(1X10GE)
- 2-port 10 Gigabit Ethernet Interface Module(2X10GE)

Use the **hw-module subslot default** command before performing a swap of the modules. to default the interfaces on the interface module.

Note The **hw-module subslot default** command is *not* supported on the TDM and OC-3 interface modules.

Note Always refer to Interface Module compatibility matrix tables in the Data Sheet before you swap any IM.

Table 19: Supported Hot Swapping Combinations

Interface Module	A900-RSP2A-64 and A900-RSP2A-128	A900-RSP3C-400-S
—	Cisco IOS Release 3.13	Cisco IOS Release 3.16

Interface Module	A900-RSP2A-64 and A900-RSP2A-128	A900-RSP3C-400-S
8-port Gigabit Ethernet SFP Interface Module (8X1GE)	Swapping allowed on all Ethernet Interface Modules	Swapping allowed on all Ethernet Interface Modules
8-port Gigabit Ethernet RJ45 (Copper) Interface Module (8X1GE)		
SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)		
Copper Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet Interface Module(1X10GE		
1-port 10 Gigabit Ethernet XFP Interface Module (1X10GE)		
2-port 10 Gigabit Ethernet Interface Module(2X10GE)		
8-port 10 Gigabit Ethernet Interface Module (8X10GE)	No support	
1-port 100 Gigabit Ethernet Interface Module (1X100GE)	No support	
2-port 100 Gigabit Ethernet (QSFP) Interface Module (2X100GE)[10]	No support	
2-port 40 Gigabit Ethernet QSFP Interface Module (2X40GE)	No support	
48-port T1/E1 Interface Module	No support	
48-port T3/E3 Interface Module	No support	
1-port OC-192 Interface Module + 8-port Low Rate Interface Module	No support	
16 x T1/E1 Interface Module	16 T1/E1	No support
32 x T1/E1 Interface Module	32 T1/E1	
8 X T1/E1 Interface Module	8 T1/E1	
8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module	No support	Swapping allowed on all Ethernet Interface Modules
1-port OC48[11]/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-port T1/E1 + 4-Port T3/E3 CEM Interface Module	Swapping allowed on all Ethernet Interface Modules[12]	

[10] Only QSFP28 (Port0) is enabled and other ports remain disabled.
[11] Any of the 4 ports can be used as an OC48, but if a port is configured as OC48, then the remaining 3 ports are disabled.
[12] Supported only on ASR900-RSP2A-128 with FAN-H and not FAN-E.

Failure in executing the command may cause the interface to enter the Out of Service state. To recover from out of service state, perform the following:

- Insert the original IM and execute the **hw-module subslot 0/bay default** command. Swap the module. For more information, see Cisco IOS Interface and Hardware Component Command Reference.
- If the module does not come up, perform a reload of the router.

Installing the Power Supply

The Cisco ASR 903 Router provides the choice of following power supplies:

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

The DC power supply uses 3 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.

- DC power supply
  - 900 W power: –40VDC to –72VDC
  - 550 W power: 19.2VDC to -72VDC
  - 1200 W power: 19.2VDC to -72VDC

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.

Each power supply provides a dual primary input power connection.

- AC power supply
  - 550 W power: 85VAC to -264VAC
  - 1200 W power: 85VAC to -264VAC



Caution The power supply must be wired before plugging the power supply in the chassis. Ensure the branch circuit breaker is turned off. Only after installing the power supply in the chassis, should the branch circuit breaker be turned on. The branch circuit breaker must be turned off before unplugging the power supply.Read the installation instructions before connecting the system to the power source. Statement 10



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

Preventing Power Loss

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

- To prevent loss of input power, ensure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- In some systems, you can use an UPS to protect against power failures at your site. Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems like the Cisco ASR 903 Router, which can have substantial current draw fluctuations due to bursty data traffic patterns.

Use the information in the DC Power Specifications, on page 4 to estimate the power requirements and heat dissipation of a Cisco ASR 903 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.

Power Connection Guidelines

This section provides guidelines for connecting the Cisco ASR 903 Router 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.

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.

Installing the DC Power Supply

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

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

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

Installing the DC Power Supply Module

Perform the following procedure to install the power supply module:

Procedure

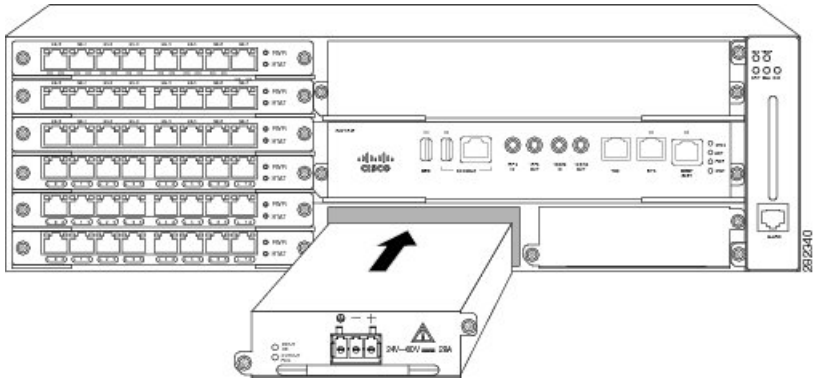
Step 1 Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see Installing the Chassis Ground Connection.

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

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

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

Figure 85: Installing the DC Power Supply



Step 5 Tighten the captive installation screws of the power supply. The recommended maximum torque is 25 in.-lb (2.82 N-m).

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

Connecting DC Power Supply Unit (A900-PWR900-D2)

A900-PWR900-D2 is a dual feed 900W DC PSU. The DC power supply accepts a dual-hole type lug. The lug must be a UL listed, CSA certified and rated to accept the 8 AWG cable. The lug is assembled on the unit with two nuts.

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

Installing DC Power Supply Unit (A900-PWR550-D)

Perform the following procedure to install the terminal block.

Procedure

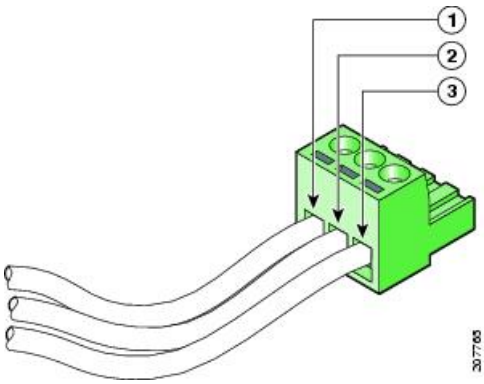
Step 1 Locate the terminal block plug.

Step 2 Use a wire-stripping tool to strip the ends of each of the two wires coming from the DC-input power source to 0.27 inch (6.6 mm) ± 0.02 inch (0.5 mm) and the wire for grounding. Do not strip more than 0.29 inch (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave behind exposed wire from the terminal block plug after installation.

Step 3 Identify the ground, positive, and negative feed positions for the terminal block connection. The recommended wiring sequence is (see the figure below):

a) Ground lead wire (left)
b) Negative (-) lead wire (middle)
c) Positive (+) lead wire (right)

Figure 86: DC Power Supply with Lead Wires



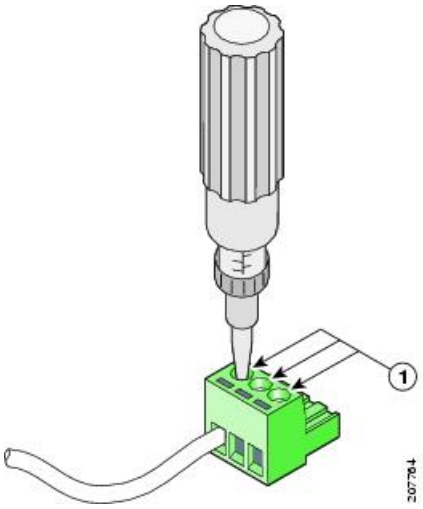
1	Ground lead wire	3	Positive (+) lead wire
2	Negative (–) lead wire	—	—

Step 4 Insert the exposed wire of one of the three DC-input power source wires into the terminal block plug. Make sure that you cannot see any wire lead. Only wire with insulation should extend from the terminal block.

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

Step 5 Use a ratcheting torque screwdriver to torque the terminal block plug captive screw (above the installed wire lead) from 4.425 in.-lb (.5 N-m) to 5.310 in-lb (.6 N-m) as shown in the figure below .

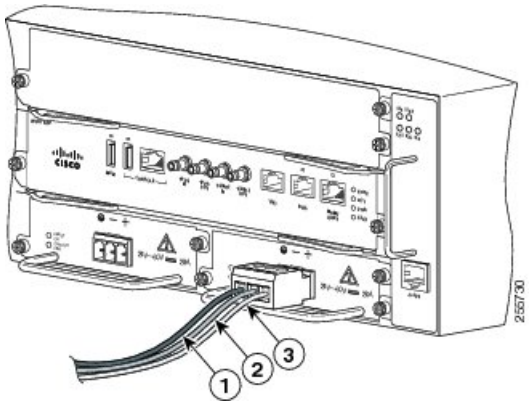
Figure 87: Torquing the DC Power Supply Terminal Block Plug Screws



1	Torque is from 4.425 in.-lb (.5 N-m) to 5.310 in-lb (.6 N-m).

Step 6 Repeat Step 4 through Step 5 for the remaining DC input power source wire and the ground wire. The figure below shows the wiring completed for a terminal block plug.

Figure 88: Inserting the DC Power Supply Terminal Block Plug in the Block Header



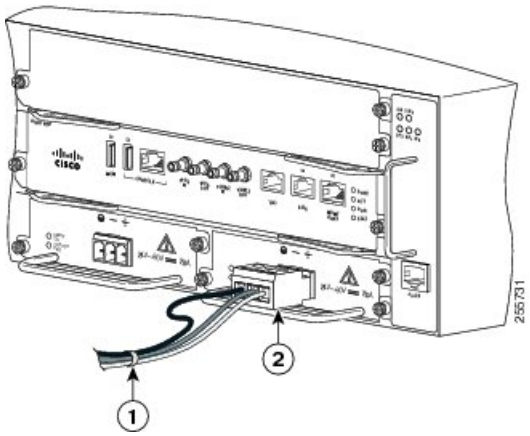
1	DC power supply ground lead wire	3	DC power supply positive (+) lead wire
2	DC power supply negative (-) lead wire	—	—

Caution
Secure the wires coming in from the terminal block plug so that they cannot be disturbed by casual contact.

Step 7 Ensure that the terminal block plug is fully seated in the terminal block header on the DC power supply panel. The plug has a locking feature. You should hear a snap or click when it is installed properly.

Step 8 Use a tie wrap to secure the wires to the rack, so that the wires are not pulled from the terminal block plug by casual contact. Make sure the tie wrap allows for some slack in the ground wire, as shown in the figure below .

Figure 89: Complete DC Terminal Block Plug Insertion and Secure Tie Wrap



1	Lead wires secured with a tie wrap	2	DC power supply terminal block plug being inserted into terminal block header.

Step 9 Use a tie wrap to secure the wires to the handle. Leave a service loop on the ground wire between the handle and the connector such that it is the last to receive strain if the wires are pulled.

This completes the procedure for connecting the DC power supply in the Cisco ASR 903 Router.

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

Installing DC Power Supply Unit (A900-PWR550-D-E and A900-PWR1200-D)

The following tools are required:

- Cables of suitable gauge required for each type of PSU
  - 10 AWG to 12 AWG for 550 W PSU
  - 10 AWG to 12 AWG for 1200 W PSU
- Lugs fork-type or ring-type (Burndy, see Table A-2)—TP10 -6 or TP10-8F (recommended)

Note Fork type lug can be used with A900-PWR550-D-E and A900-PWR1200-D PSUs.

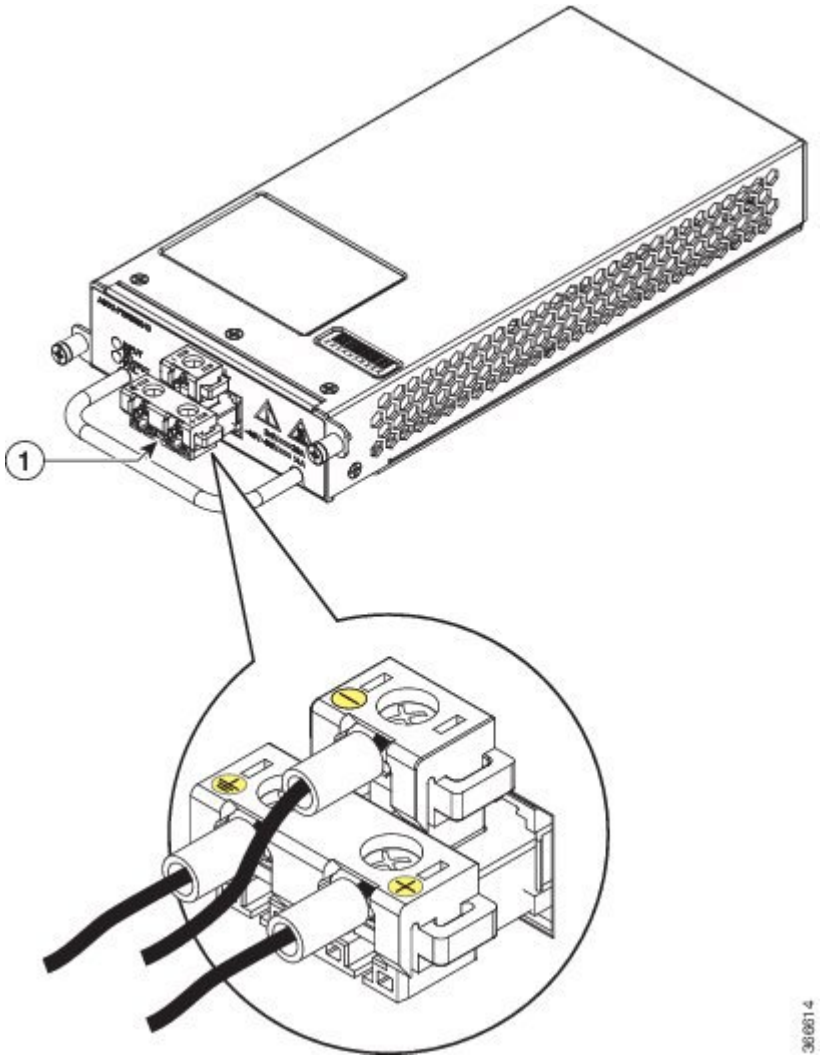
Note The PSU load sharing can be guaranteed only if the system load is higher than 10% of the total PSU capacity. You can observe one of the PSUs with 0A output condition if there are three PSUs in the system and load is <10% of total PSU load.

Procedure

Step 1 Follow the steps to remove the power supply unit if installed in the chassis. See Removing and Replacing the DC Power Supply.

Step 2 Locate the T-shaped terminal block plug on the DC power supply unit. See the figure below.

Figure 90: DC PSU (A900-PWR550-D-E) with T-Shaped Connector



1	T-shaped connector	—	

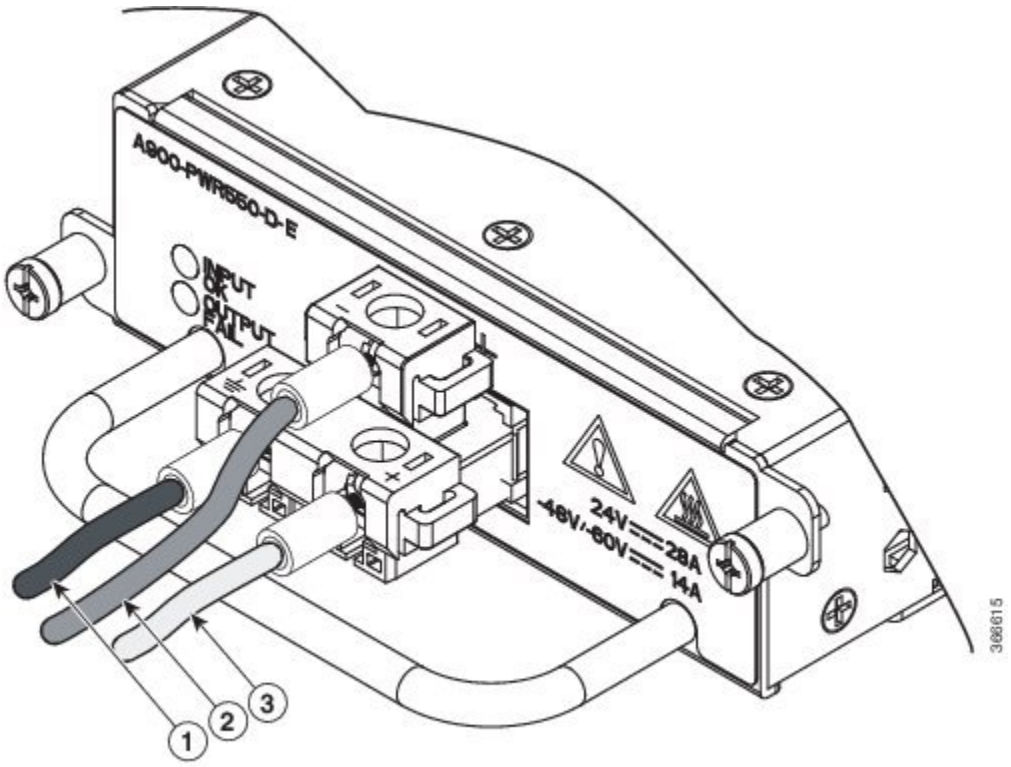
Step 3 Use a wire-stripping tool to strip the ends of each of the two wires coming from the DC-input power source to 0.27 inch (6.6 mm) ± 0.02 inch (0.5 mm) and the wire for grounding. Do not strip more than 0.29 inch (7.4 mm) of insulation from the wire. Stripping more than the recommended amount of wire can leave behind exposed wire from the terminal block after installation.

Step 4 Prepare the cables by attaching the lugs to the cables.

Step 5 Identify the ground, positive, and negative feed positions for the terminal block connection (see the figure below). The recommended wiring sequence is:

- Negative (-) lead wire (top)
- Ground lead wire (left)
- Positive (+) lead wire (right)

Figure 91: DC Power Supply Terminal Block Plug in the Block Header



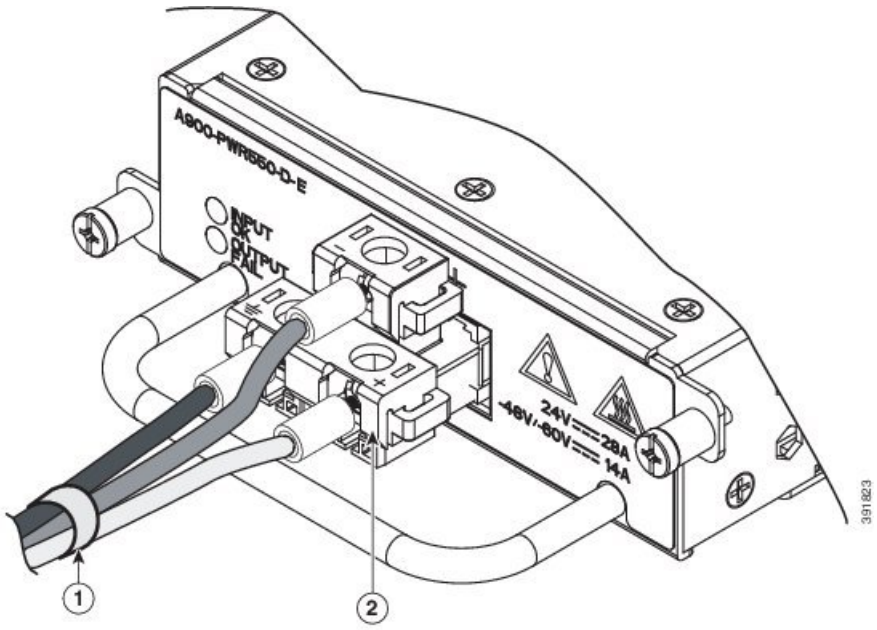
1	DC power supply ground lead wire	3	DC power supply positive (+) lead wire
2	DC power supply negative (-) lead wire	—	

Step 6 Insert the lugged end of the cables to the connector and secure the cables using the captive screws.

Note
The recommended torque for securing the captive screws is 0.7 N-m.

Step 7 Ensure that the terminal block plug is fully seated in the terminal block header (see the figure below) on the DC power supply panel. See Installing the DC Power Supply for installing the power supply unit into the chassis.

Figure 92: DC Terminal Block Plug Insertion



1	Lead wires secured	2	DC power supply terminal block plug being inserted into terminal block header.

Tools and Equipment

- Dual-hole lugs
- Double barrel with inspection hole
- Hole spacing is 5/8 in.
- Lug tab width max 0.46 in.
- Nuts
- PSU can accommodate 10 – 6 AWG
- Number 2 Phillips Screwdriver
- 7 mm nut driver or 7 mm socket on a torque wrench

Procedure

Step 1 Locate the terminal block on the power supply unit.

Step 2 Flap open the front protective cover on the power supply unit.

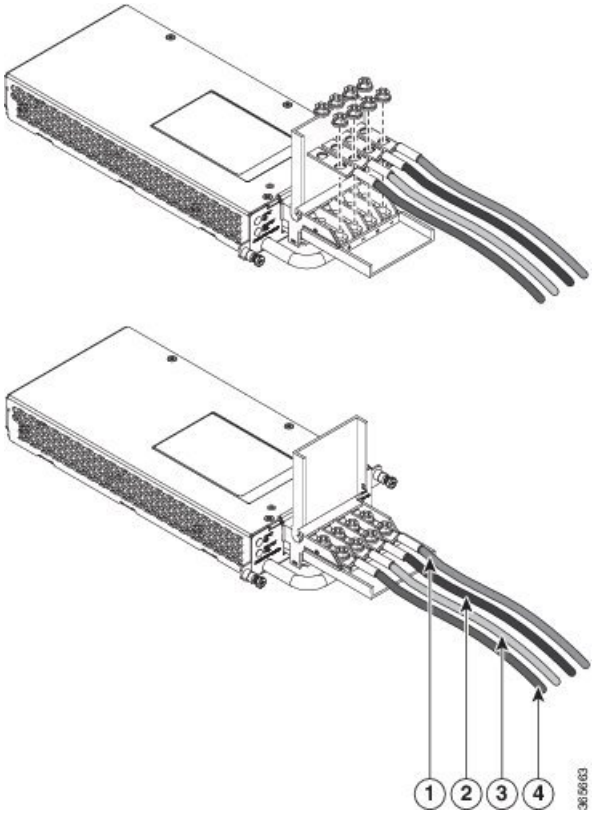
Step 3 Use a wire-stripping tool to strip the ends of each of the two wires coming from the DC-input power source as recommended by the lug manufacturer.

Note
Stripping more than the recommended amount of wire can leave behind exposed wire from the terminal block after installation.

Step 4 Identify the positive and negative feed positions for the terminal block. The recommended wiring sequence is as in the figure below.

Step 5 Attach the lugs on the terminal block, see the figure below.

Figure 93: Power Supply with Lead Wires



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

Caution
Do not overtorque the fasteners of the terminal block. The recommended maximum torque is from 25 in.-lb (2.82 N-m).

Step 6 Use a tie wrap to secure the wires to the rack, so that the wires are not pulled from the terminal block by casual contact. Make sure the tie wrap allows for some slack in the wire.

Activating the DC Power Supply

Perform the following procedure to activate the DC power supply:

Procedure

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

Step 2 Verify power supply operation by checking if the power supply front panel LEDs are in the following states:

- INPUT OK LED is green
- OUTPUT FAIL LED is red

If the LEDs indicate a power problem, see Troubleshooting.

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

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

Removing and Replacing the DC Power Supply

This section provides information about removing and replacing the DC power supply in the Cisco ASR 903 Router.

Note The Cisco ASR 903 Router power supplies are hot-swappable. If you have installed redundant power supply modules, you can replace a single power supply without interrupting power to the router.

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

Follow these steps to remove and replace the DC power supply on the Cisco ASR 903 Router:

Procedure

Step 1 Verify the circuit breaker connected to the power supply that has to be replaced.

Step 2 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 3 Slip on the ESD-preventive wrist strap that was included in the accessory kit.

Note
The power supplies are not fed by both power units. Shutting off the incorrect power supply may cause a traffic outage.

Step 4 Measure the DC voltage on the failed power supply input, thus ensuring that the correct unit has been powered off.

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

Step 6 Grasping the power supply handle with one hand, pull the power supply out from the chassis while supporting it with the other hand.

Step 7 Remove the lugs from the PSU.

Step 8 Replace the new DC PSU and connect the DC leads to the power supply as before

Step 9 Turn on the circuit breaker or the reinstall the fuse.

Step 10 Verify the power supply by checking if the front panel LEDs are as below:

- Input OK LED is green
- Output FAIL LED is green

Note
Replace the DC power supply within 5 minutes. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number A900-PWR-BLANK) over the opening, and secure it with the captive installation screws.

Installing the AC power Supply

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

Installing the AC Power Supply Module for A900-PWR550-A (550 W) and A900-PWR1200-A (1200 W)

Follow these steps to install the power supply module:

Procedure

Step 1 Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the Installing the Chassis Ground Connection.

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, as shown in the figure below. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Figure 94: Installing the A900-PWR550-A AC Power Supply

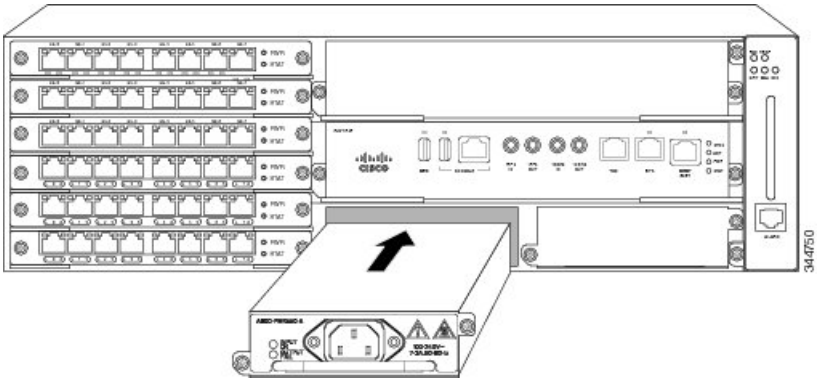
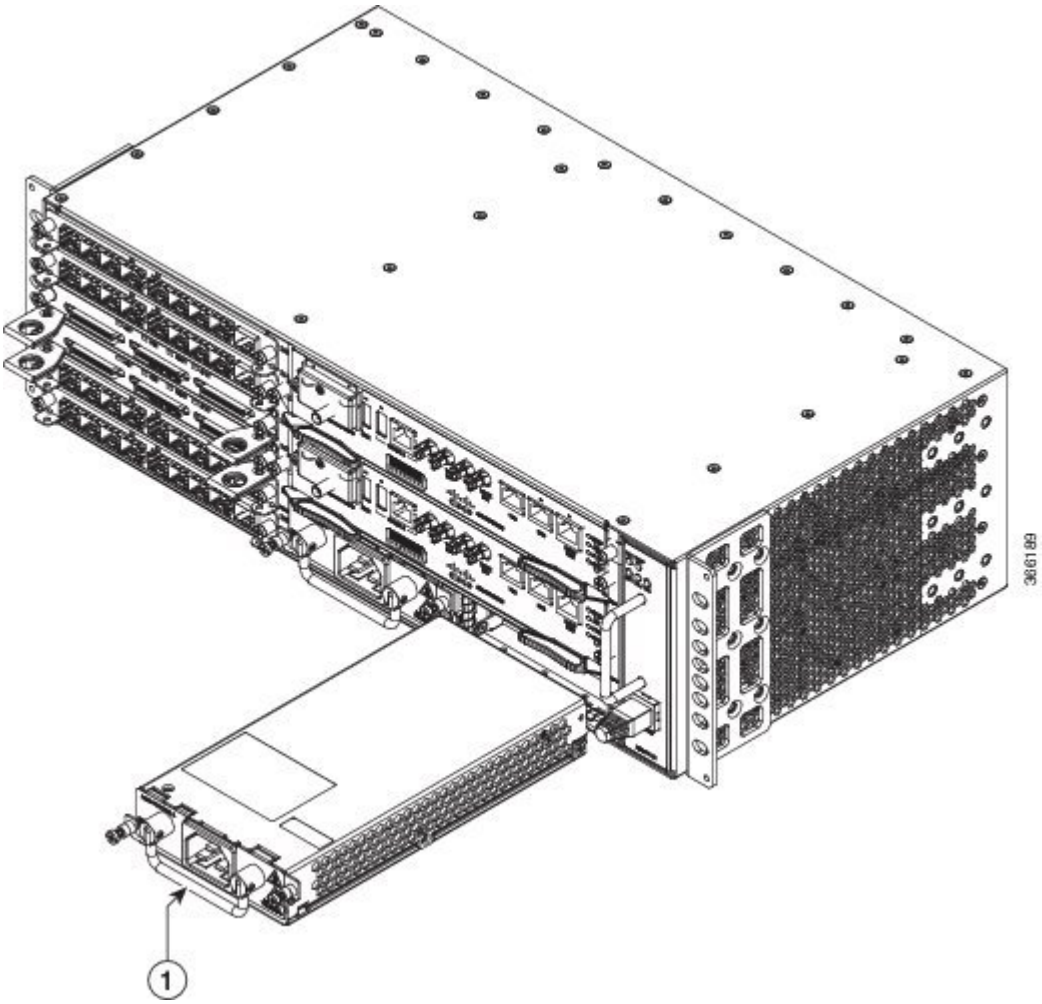


Figure 95: Installing the A900-PWR1200-A AC Power Supply



Step 4 Tighten the captive installation screws of the power supply. The recommended maximum torque is 25 in.-lb (2.82 N-m).

Warning

Power supply captive installation screws must be tight to ensure protective grounding continuity.

Recommended Power Cables

We recommend the following power cables for Cisco ASR 903 routers:

Table 20: Power Cable PIDs for A900-PWR550-A (550 W)

PID	Description
CAB-AC	AC POWER CORD, UNITED STATES, 125V, 10A, 2.5m, C13,NEMA, 5-15P
CAB-AC-RA	AC POWER CORD, UNITED STATES, 125V, 10A, 2.5m, RA-C13, NEMA, 5-15P
CAB-ACA	AC Power Cord (Australia), C13, AS 3112, 2.5m
CAB-ACA-RA	AC Power Cord, Australian, 10A, Right Angle
CAB-ACC	AC Power Cord (China), C13, GB15934, CCC, 2.5m
CAB-ACC-RA	AC Power Cord China, Right Angle
CAB-ACE	AC Power Cord (Europe), C13, CEE 7, 1.5M
CAB-ACE-RA	AC Power Cord Europe, Right Angle
CAB-ACI	AC Power Cord (Italy), C13, CEI 23-16, 2.5m
CAB-ACI-RA	AC Power Cord, Italian, Right Angle
CAB-ACR	AC Power Cord (Argentina), C13, EL 219 (IRAM 2073), 2.5m
CAB-ACR-RA	AC POWER CORD ARGENTINA, Right Angle
CAB-ACS	AC Power Cord (Switzerland), C13, IEC 60884-1, 2.5m
CAB-ACS-RA	AC Power Cord, Switzerland, Right Angle
CAB-ACU	AC Power Cord (UK), C13, BS 1363, 2.5m
CAB-ACU-RA	AC Power Cord UK, Right Angle
CAB-IND	AC Power Cord (India), C13
CAB-IND-RA	AC Power Cord (India), RA-C13
CAB-JPN	AC Power Cord (Japan), C13, JIS C 8303, 2.5m
CAB-JPN-RA	AC Power Cord (Japan), RA-C13, JIS C 8303, 2.5m

Table 21: Power Cable PIDs for A900-PWR1200-A (1200 W)

PID	Description
PWR-CAB-AC-USA520	US AC Power Cord for Cisco ASR 900, NEMA 5-20
PWR-CAB-AC-USA	Power Cord for AC V2 Power Module (USA), NEMA L6-20P
PWR-CAB-AC-AUS	Power Cord for AC V2 Power Module (Australia), AS 3112
PWR-CAB-AC-EU	Power Cord for AC V2 Power Module (Europe), CEE 7/7
PWR-CAB-AC-ITA	Power Cord for AC V2 Power Module (Italy), CEI-23-50
PWR-CAB-AC-SA	Power Cord for AC V2 Power Module (South Africa), SABS 164
PWR-CAB-AC-UK	Power Cord for AC V2 Power Module (UK), EN 60309-2
PWR-CAB-AC-ISRL	Power Cord for AC V2 Power Module (Israel), SI 32
PWR-CAB-AC-CHN	Power Cord for AC V2 Power Module (China), GB2099.1/GB1002
PWR-CAB-AC-BRA	Power Cord for AC V2 Power Module (Brazil), NBR 14136
PWR-CAB-AC-SUI	Power Cord for AC V2 Power Module (Swiss), SEV 1011
PWR-CAB-AC-JPN	Power Cord for AC V2 Power Module (Japan), JIS C8303
PWR-CAB-AC-IND	India AC Power Cord for Cisco ASR 900, IS:1293
PWR-CAB-AC-ARG	AC POWER CORD, WIRE HARNESS, Argentina, IRAM 2073, IEC60320 C21, ST, 4M, 30 AWG, STRANDED, 250.0 V, 16.0 A

Activating the AC Power Supply

Follow these steps to activate the 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 that the power supply LEDs are in the following states:

- INPUT OK LED is green
- OUTPUT FAIL LED is red

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

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

Note

If you are installing 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 and Replacing the AC Power Supply

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

Note The Cisco ASR 903 Router power supplies are hot-swappable. If you have installed redundant power supply modules, you can replace a single power supply without interrupting power to the router.

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

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

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

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

Warning Installation of the equipment must comply with local and national 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 the metal prongs on the power cord when it is still connected to the power supply.

Step 2 Remove the power cord from the power connection on the power supply. Do not touch the metal prongs embedded in the power supply.

Step 3 Loosen the captive installation screws.

Step 4 Grasp the AC power supply with one hand, and slide it part of the way out of the chassis. Place your other hand underneath the power supply, and slide it completely out of the chassis.

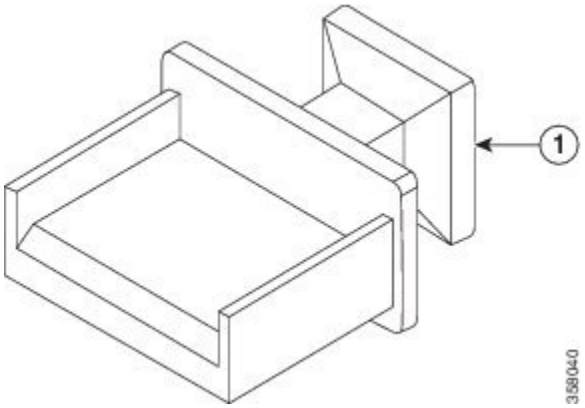
Step 5 If the power supply bay is to remain empty, install a blank filler plate (Cisco part number A900-PWR-BLANK) over the opening, and secure it with the captive installation screws.

Installing Dust Caps

The following list provides the product IDs (PIDs) for the dust caps that are available for each port type:

- RJ-45—A900-DCAP-RJ45-S= (24 dust caps per package) or A900-DCAP-RJ45-L= (240 caps per package)
- SFP—A900-DCAP-SFP-S= (24 caps per package) or A900-DCAP-SFP-L= (240 caps per package)
- USB—A900-DCAP-USB-S= (12 dust caps per package) or A900-DCAP-USB-L= (120 dust caps per package)
- XFP/QSFP—A900-DCAP-XFP-S= (12 dust caps per package) or A900-DCAP-XFP-L= (120 dust caps per package)

Figure 96: Dust Cap



1	Dust cap	—

To install the dust cap:

1. Hold the dust cap by its handle.
2. Insert the dust cap in to the appropriate unused ports (RJ-45, SFP, USB, or XFP/QSFP) on the chassis front panel.

Connecting the Cisco ASR 903 Router to the Network

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

Connecting Console Cables

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

Connecting to the Serial Port using Microsoft Windows

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

Note Install the USB device driver before establishing a physical connection between the router and the PC, by using the USB Console cable plugged into the USB serial port. Otherwise, the connection will fail. For more information, see the *Installing the Cisco Microsoft Windows USB Device Driver* section in the *Cisco ASR 903 and ASR 903U Aggregation Services Router Hardware Installation Guide*.

Procedure

Step 1 Connect the end of the console cable with the RJ45 connector to the light blue console port on the router. or Connect a USB Type A-to-Type A cable to the USB console port as shown in the figure below . If you are using the USB serial port for the first time on a Windows-based PC, install the USB driver now according to the instructions in the following sections.

Note
You cannot use the USB port and the EIA port concurrently. See the *Connecting to the Auxiliary Port* section in the *Cisco ASR 903 and ASR 903U Aggregation Services Router Hardware Installation Guide*. When the USB port is used it takes priority over the RJ45 EIA port.

Note
The USB Type A-to-Type A cable is not included with the Cisco ASR 903 Router; it is ordered separately.

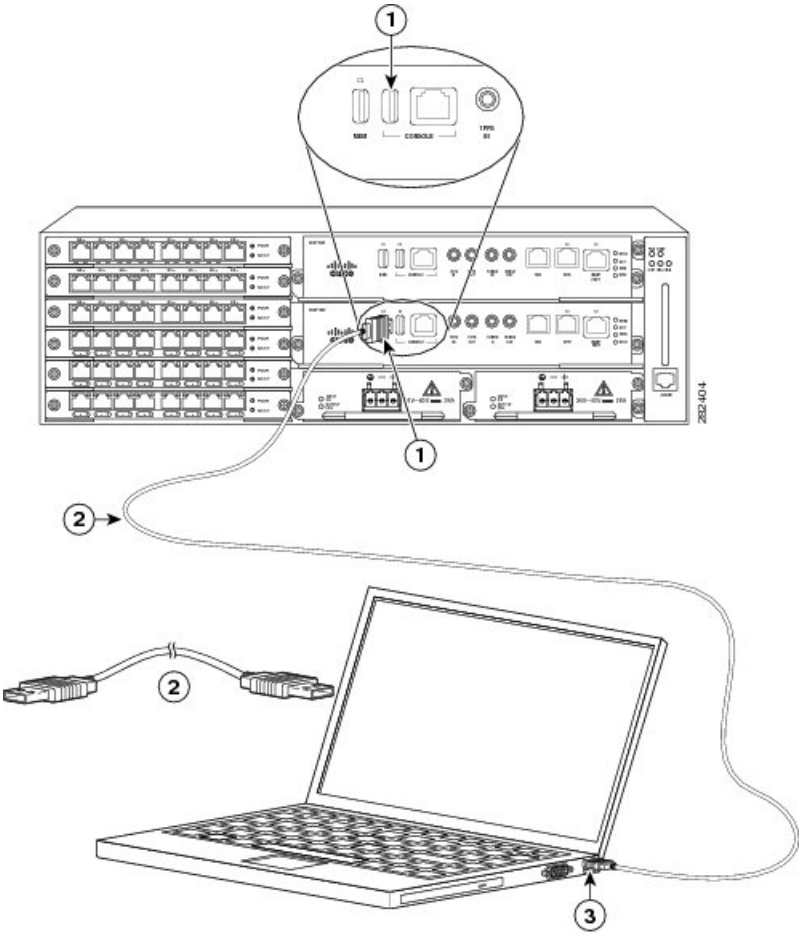
Step 2 Connect the end of the cable with the DB-9 connector (or USB Type-A) to the terminal or PC. If your terminal or PC has a console port that does not accommodate a DB-9 connector, you must provide an appropriate adapter for that port.

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

- 9600 baud

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

Figure 97: Connecting the USB Console Cable to the Cisco ASR 903 Router



1	USB Type-A console port	2	USB Type-A to USB Type-A Console cable
3	USB Type-A	—	—

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 go to Applications > Utilities > Terminal.

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

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

Example:

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

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

Example:

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

To disconnect the OS X USB console from the Terminal window

Enter Ctrl-a followed by Ctrl-\

Connecting to the Console Port using Linux

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

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 Microsoft Windows USB Device Driver

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

Installing the Cisco Microsoft Windows XP USB Driver

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

https://www.cisco.com/c/en/us/support/index.html

Procedure

Step 1 Unzip the file Cisco_usbconsole_driver_X_X.zip (where X is a revision number).

Step 2 If using 32-bit Windows XP double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows XP double-click the file setup(x64).exe from the Windows_64 folder.

Step 3 The Cisco Virtual Com InstallShield Wizard begins. Click Next.

Step 4 The Ready to Install the Program window appears, Click Install.

Step 5 The InstallShield Wizard Completed window appears. Click Finish.

Step 6 Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments the Found New Hardware Wizard appears. Following the instructions to complete the installation of the driver.

Step 7 The USB console is ready for use.

Installing the Cisco Microsoft Windows 2000 USB Driver

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

Procedure

Step 1 Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com web site and unzip it.

Step 2 Double-click the file setup.exe.

Step 3 The Cisco Virtual Com InstallShield Wizard begins. Click Next.

Step 4 The Ready to Install the Program window appears, Click Install.

Step 5 The InstallShield Wizard Completed window appears. Click Finish.

Step 6 Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a series of Found New Hardware Wizard windows appear. Following the instructions to complete the installation of the driver.

Step 7 The USB console is ready for use.

Installing the Cisco Microsoft Windows Vista USB Driver

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

Procedure

Step 1 Obtain the file Cisco_usbconsole_driver.zip from the Cisco.com web site and unzip it.

Step 2 If using 32-bit Windows Vista double-click the file setup.exe from the Windows_32 folder, or if using 64-bit Windows Vista double-click the file setup(x64).exe from the Windows_64 folder.

Step 3 The Cisco Virtual Com InstallShield Wizard begins. Click Next.

Step 4 The Ready to Install the Program window appears, Click Install.

Note
If a User Account Control warning appears, click "Allow - I trust this program..." to proceed.

Step 5 The InstallShield Wizard Completed window appears. Click Finish.

Step 6 Connect the USB cable to the PC and router USB console ports. The EN LED for the USB console port turns green, and within a few moments a pop up window stating "Installing device driver software" appears. Following the instructions to complete the installation of the driver.

Step 7 The USB console is ready for use.

Uninstalling the Cisco Microsoft Windows USB Driver

Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver Using the Add Remove Programs Utility



Note Disconnect the chassis console terminal before uninstalling the driver.

Procedure

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

Step 2 Scroll to Cisco Virtual Com and click **Remove**.

Step 3 When the Program Maintenance window appears, select the **Remove** radio button. Click **Next**.

Uninstalling the Cisco Microsoft Windows XP and 2000 USB Driver Using the Setup.exe Program



Note Disconnect the chassis console terminal before uninstalling the driver.

Procedure

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

Uninstalling the Cisco Microsoft Windows Vista USB Driver

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

Note Disconnect the router console terminal before uninstalling the driver.

Procedure

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

Note
If a User Account Control warning appears, click “Allow - I trust this program...” to proceed.

Step 5 When the InstallShield Wizard Completed window appears click Finish.

Connecting to the Auxiliary Port

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

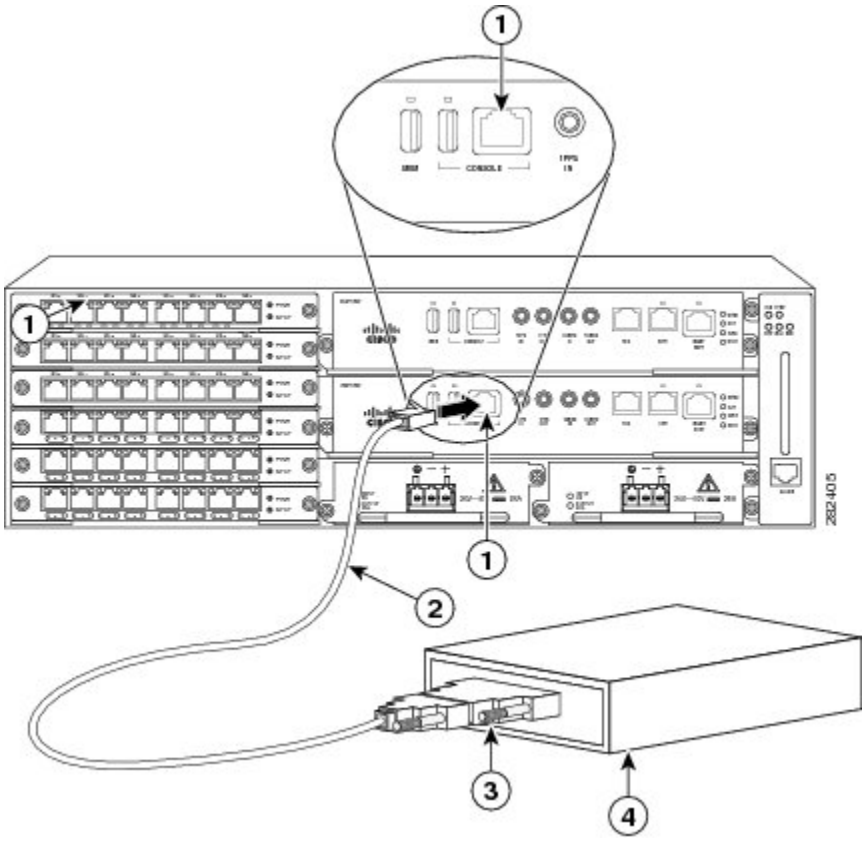
Note The console cable and DB-9-to-DB-25 connector are not included with the Cisco ASR 903 Router; they are ordered separately.

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

Procedure

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

Figure 98: Connecting a Modem to the Cisco ASR 903 Router



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

Step 2 Connect the DB-9 end of the console cable to the DB-9 end of the modem adapter.

Step 3 Connect the DB-25 end of the modem adapter to the modem.

Step 4 Make sure that your modem and the router auxiliary port are configured for the same transmission speed (up to 115200 bps is supported) and for mode control with data carrier detect (DCD) and data terminal ready (DTR) operations.

Connecting a Management Ethernet Cable

When using the Ethernet Management port in the default mode (speed-auto and duplex-auto) the port operates in auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the

Auto-MDI/MDI-X feature. The port automatically senses a crossover or straight-through cable and adapts to it.

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

When in a fixed-speed configuration and MDI mode:

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

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

The Cisco ASR 903 Router supports a variety of SFP and XFP modules, including optical and Ethernet modules. For information on how to install and remove SFP and XFP modules, see the documentation for the SFP or XFP module at:

https://www.cisco.com/c/en/us/td/docs/interfaces_modules/transceiver_modules/installation/note/78_15160.html.

For information about inspecting and cleaning fiber-optic connections, see https://www.cisco.com/c/en/us/support/docs/optical/synchronous-digital-hierarchy-sdh/51834-cleanfiber2.html.

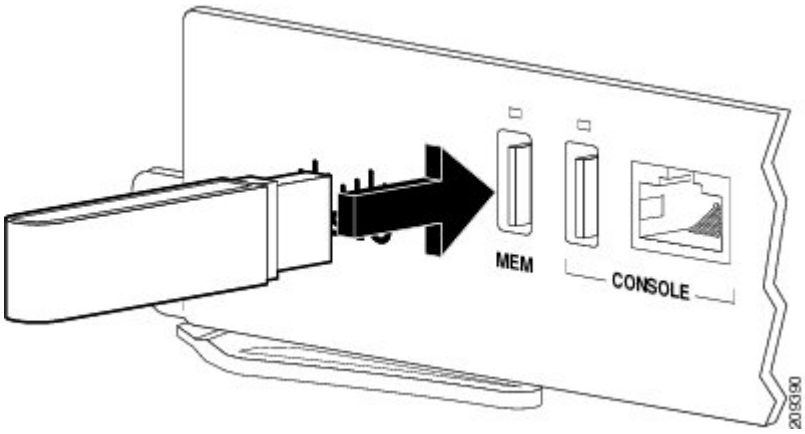
Caution We recommend that you wait 30 seconds between removal and insertion of an SFP on an interface module. This time is recommended to allow the transceiver software to initialize and synchronize with the standby RSP. Changing an SFP more quickly could result in transceiver initialization issues that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

Connecting a USB Flash Device

To connect a USB flash device to the Cisco ASR 903 Router, insert the memory stick in the USB port labeled MEM. The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.

The figure below shows the USB port connector on the Cisco ASR 903 Router.

Figure 99: Cisco ASR 903 Router Flash Token Memory Stick



Removing a USB Flash Device

To remove and then replace a USB flash token memory stick from a Cisco ASR 903 Router, follow these steps:

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 a Cisco USB Flash memory stick, simply insert the module into the USB port labeled MEM as shown in the figure below . The Flash memory module can be inserted in only one way, and can be inserted or removed regardless of whether the router is powered up or not.

Note
You can insert or remove the memory stick whether the router is powered on or not.

This completes the USB Flash memory installation procedure.

Connecting Timing Cables

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

Connecting Cables to the BITS Interface

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

Procedure

Step 1 Confirm that the router is powered off.

Step 2 Connect one end of the cable to the BITS port using a straight-through, shielded RJ48C-to-RJ48C cable.

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

Step 4 Turn on power to the router.

For information about the BITS port pinouts, see Troubleshooting.

Note
Use of two BITS sources or a Y-cable is optional. Each BITS input port is routed to both RSPs, so that SETS device on each RSP has visibility to both BITS inputs.

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

Connecting Cables to a GNSS Interface

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

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

Connecting Cables to the Input 10Mhz or 1PPS Interface

Procedure

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

Step 2 Connect one end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the primary RSP of the Cisco ASR 903 Router.

Step 3 Connect the other end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the backup RSP of the Cisco ASR 903 Router.

Connecting Cables to the Output 10Mhz or 1PPS Interface

Procedure

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

Step 2 Connect one end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the primary RSP of the Cisco ASR 903 Router.

Step 3 Connect the other end of the split-side Y-cable mini-coax to the 10Mhz or 1PPS port on the backup RSP of the Cisco ASR 903 Router.

Connecting Cables to the ToD Interface

Procedure

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

Step 2 Connect one end of the split-side Y-cable Ethernet to the ToD port on the primary RSP of the Cisco ASR 903 Router.

Step 3 Connect the other end of the split-side Y-cable Ethernet to the ToD port on the backup RSP of the Cisco ASR 903 Router.

Note
For instructions on how to configure clocking, see the Cisco ASR 903 Router Software Configuration Guide.

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

Connecting a Cable to the GNSS Antenna Interface

Note The GNSS module is not hot swappable.

Procedure

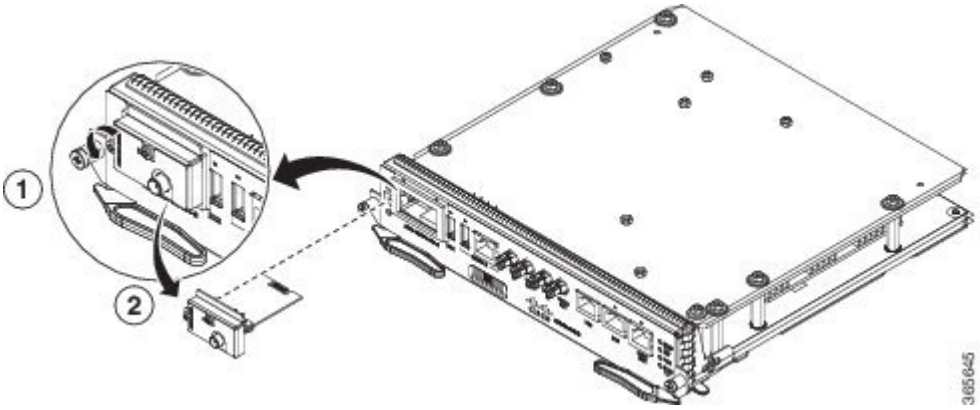
Step 1 Connect one end of a shielded coaxial cable to the GNSS RF IN port.

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.

Figure 100: Installing the GNSS Module in the RSP



1	Screw on the GNSS Module	2	Inserting the GNSS Module

Connecting Ethernet Cables

The Cisco ASR 903 Router interface modules support RJ45 or SFP Ethernet ports. For instructions on how to connect cables to Ethernet SFP ports, see Connecting Cables to SFP Modules.

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

Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Gigabit Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be 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 When installing the cabling to the RSPs, we recommend that you leave a service loop of extra cabling sufficient to allow for fan tray removal.

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

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.

Connecting T1/E1 cables

The physical layer interface for the Cisco ASR 903 Router T1/E1 port is a customer-installed high-density connector. The high-density connector has thumbscrews which should be screwed into the interface when the cable is installed.

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

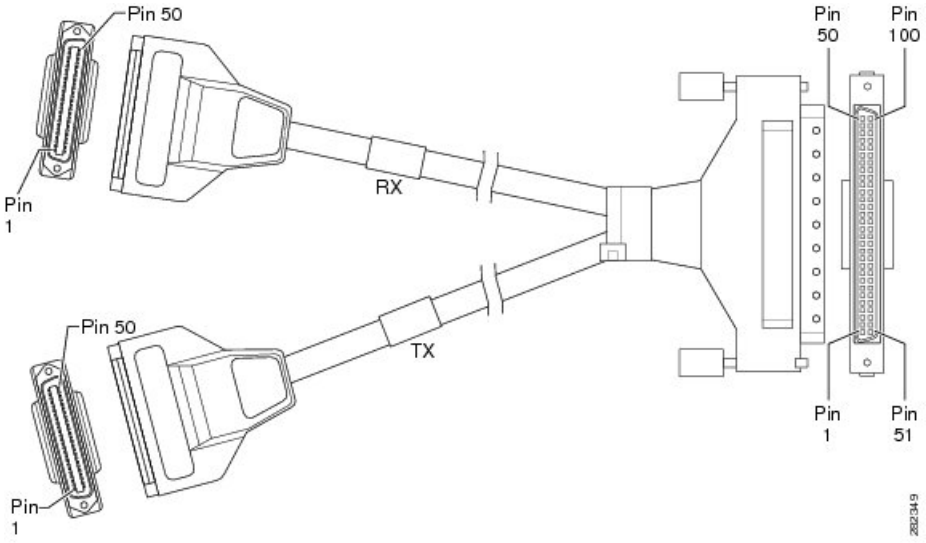
Installing the Cable Connectors

16 x T1/E1 Cable Connectors

The 16 x T1/E1 interface module requires a patch cable (see Recommended Patch Panel). One end of the cable (see the figure below) has a 100-pin connector that plugs into the T1/E1 interface module. Use the thumbscrews on either side of the connector to secure the cable to the interface.

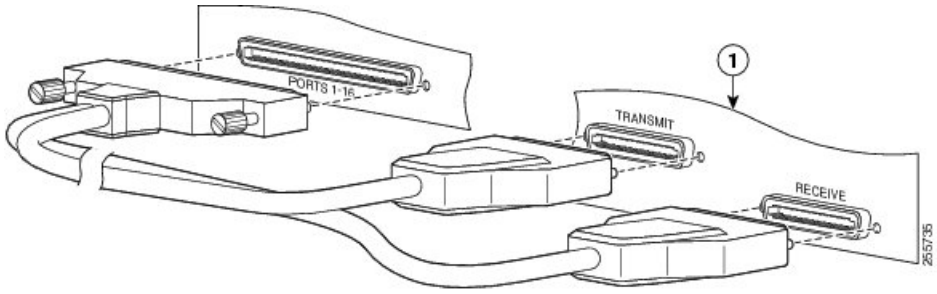
The other end of the cable has two 50-pin Telco connectors that attach to the rear of a 24-port RJ45 patch panel. Both connectors are identical: one is for Transmit (TX) and the other is for Receive (RX).

Figure 101: 16 x T1/E1 Cable Connector



The figure below shows how the cable is connected between the 16 x T1/E1 interface module and the patch panel.

Figure 102: Cable Installation between 16 x T1/E1 Interface and Patch Panel



1	Patch panel interfaces

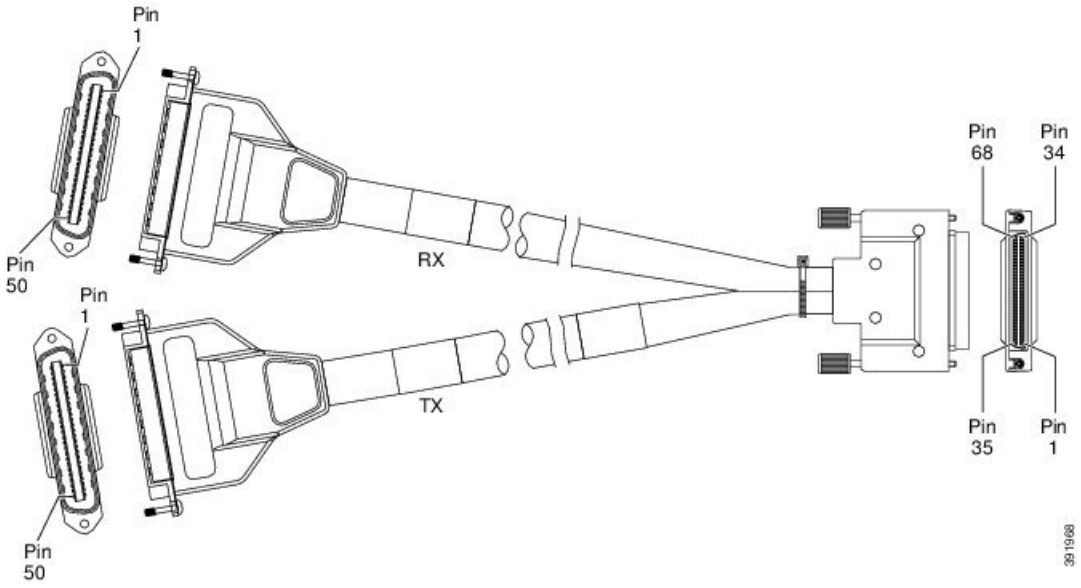
For information about the pinout of the cable connecting the T1/E1 interface to the rear of the patch panel, see the T1/E1 Port Pinout.

32 x T1/E1 Cable Connector

The 32 x T1/E1 interface module requires two patch cables (see Recommended Patch Panel). Each patch cable (see the figure below) has a 68-pin connectors that connects with each connector port on the front panel of the 32 x T1/E1 interface module.

Use the thumbscrews on either side of the connectors to secure the cable to the interface.

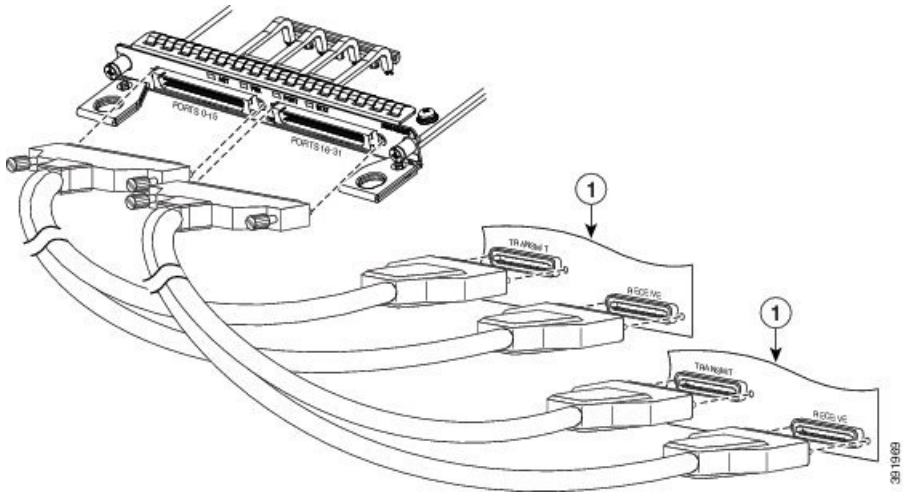
Figure 103: 32 x T1/E1 Cable Connector



The other end of the cable has two 50-pin Telco connectors that attach to the rear of a 24-port RJ45 patch panel. Both connectors are identical: one is for Transmit (TX) and the other is for Receive (RX).

The figure below shows how the cable is connected between the 32 x T1/E1 interface module and the patch panel.

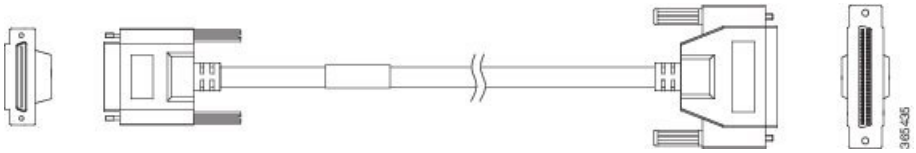
Figure 104: Cable Installation between 32 x T1/E1 Interface and Patch Panel



1	Patch panel interfaces

T1/E1 Cable Connectors

Figure 105: T1/E1 Cable Connector



One end of the cable (see the figure above) has a 68-pin connector that plugs into the T1/E1 interface module and the other end of the cable with a 68-pin connector is connected to a RJ48, AMP64 or a DIN patch panel. Use the thumbscrews on either side of the connector to secure the cable to the interface.

For information about the pinout of the cable connecting the T1/E1 interface to the rear of the patch panel, see T1/E1 Port Pinout.

Patch Panel Cabling for Redundancy

You can connect the patch panels with the interface modules for redundancy, using the Y-cables. The Y-cable stub lengths are reduced, so that the cable does not exceed from the rack spacer. The Y-cables are numbered based on the different stub length. Cable lengths differ for even numbered and odd numbered slots in the chassis.

Table 22: Y-Cable for Redundancy

Bundle PID	Cable Marking	Description
CABLE-16TDM-R1EL1	T1/E1-Cable S-3	16-port cable for TDM CEM Interface Module, 42 inches cable length and 10 inches stub length, even slot
	T1/E1 Cable S-2	16-port cable for TDM CEM Interface Module, 42 inches cable length and 7.5 inches stub length, even slot
	T1/E1 Cable S-1	16-port cable for TDM CEM Interface Module, 42 inches cable length and 6.5 inches stub length, even slot
CABLE-16TDM-R1EL2	T3/E3-Cable M-3	16-port cable for TDM CEM Interface Module, 62 inches cable length and 10 inches stub length, even slot
	T3/E3-Cable M-2	16-port cable for TDM CEM Interface Module, 62 inches cable length and 7.5 inches stub length, even slot
	T3/E3-Cable M-1	16-port cable for TDM CEM Interface Module, 62 inches cable length and 6.5 inches stub length, even slot

Bundle PID	Cable Marking	Description
CABLE-16TDM-R1EL3	T1/E1-Cable L-3	16-port cable for TDM CEM Interface Module, 78 inches cable length and 10 inches stub length, even slot
	T1/E1 Cable L-2	16-port cable for TDM CEM Interface Module, 78 inches cable length and 7.5 inches stub length, even slot
	T1/E1 Cable L-1	16-port cable for TDM CEM Interface Module, 78 inches cable length and 6.5 inches stub length, even slot
CABLE-16TDM-R3EL1	T3/E3-Cable S-3	16-port cable for TDM CEM Interface Module, 42 inches cable length and 10 inches stub length, even slot
	T3/E3-Cable S-2	16-port cable for TDM CEM Interface Module, 42 inches cable length and 7.5 inches stub length, even slot
	T3/E3-Cable S-1	16-port cable for TDM CEM Interface Module, 42 inches cable length and 6.5 inches stub length, even slot
CABLE-16TDM-R3EL2	T3/E3-Cable M-3	16-port cable for TDM CEM Interface Module, 62 inches cable length and 10 inches stub length, even slot
	T3/E3-Cable M-2	16-port cable for TDM CEM Interface Module, 62 inches cable length and 7.5 inches stub length, even slot
	T3/E3-Cable M-1	16-port cable for TDM CEM Interface Module, 62 inches cable length and 6.5 inches stub length, even slot
CABLE-16TDM-R3EL3	T3/E3-Cable L-3	16-port cable for TDM CEM Interface Module, 78 inches cable length and 10 inches stub length, even slot
	T3/E3-Cable L-2	16-port cable for TDM CEM Interface Module, 78 inches cable length and 7.5 inches stub length, even slot
	T3/E3-Cable L-1	16-port cable for TDM CEM Interface Module, 78 inches cable length and 6.5 inches stub length, even slot

RJ45 Cable Pinouts

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

For the T1/E1 ports, see T1/E1 Port Pinout.

Connecting Cables to the Patch Panel

Figure 106: Interface Module with the Connector

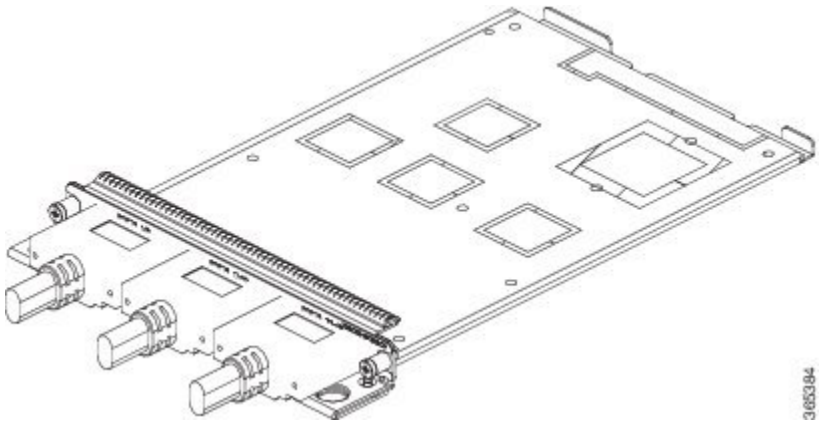
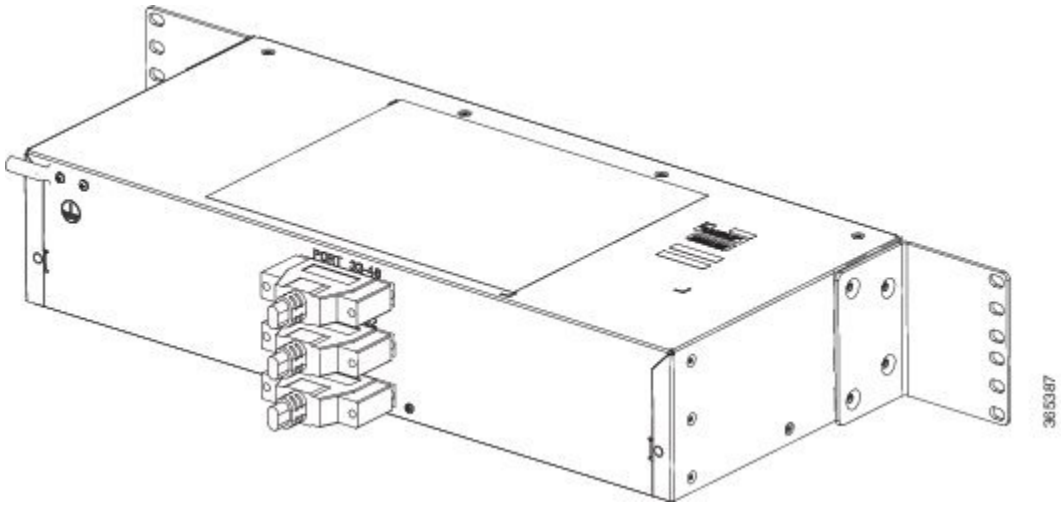


Figure 107: Patch Panel with the Connector



If you are connecting two T1/E1 interfaces to each other, you must cable both interfaces' patch panels together using a T1 cross-over cable or a T1 straight-through cable. Use shielded cables. The type of cable you use (cross-over or straight-through) depends on how the T1/E1 interfaces are cabled to their patch panels:

- If both T1/E1 interfaces are connected to their patch panels in the same manner (TX to Transmit and RX to Receive, or TX to Receive and RX to Transmit), use a T1 cross-over cable to connect the patch panels.
- If both T1/E1 interfaces are connected to their patch panels in a different configuration (TX to Transmit and RX to Receive on one interface, and TX to Receive and RX to Transmit on the other interface), use a T1 straight-through cable (standard RJ45 patch cable) to connect the patch panels.

Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the T1/E1 ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be 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.

Patch Panel Connectors

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

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

Figure 108: Patch Panel Connector on the Patch Panel

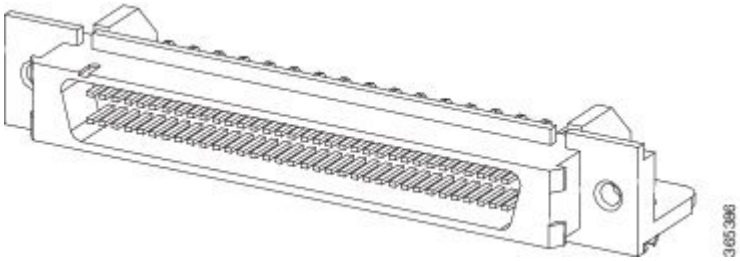
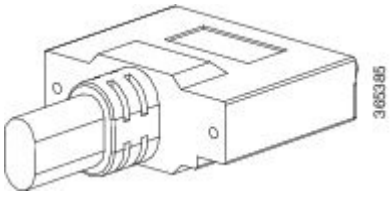


Figure 109: Patch panel Connector on the Interface Module



Recommended Patch Panel

We recommend using the following T1/E1 patch panels:

The following patch panels are introduced:

- CABLE-16T1E1—Cable for 16-Port T1/E1 Interface Module, 12 feet
- CABLE-32T1E1—Cable for 32-Port T1/E1 Interface Module
- PANEL-16-BNC—Breakout panel with 16 T1/E1 75-ohm BNC ports
- PANEL-32-RJ4—Breakout panel with 32 T1/E1 100/120- ohm RJ48 ports8

Also, the following patch panels are available from Optical Cable Corporation (http://www.occfiber.com).

- 48-port T1 RJ45 patch panel (part number DCC4884/25T1-S)
- 16-port E1 BNC patch panel (part number DCC16BNC/25T1-S)

To order a patch panel, contact the Sales and Marketing Support staff at Optical Cable Corporation:

- 800-622-7711 (toll-free in the U.S.A.)
- 540-265-0690 (outside the U.S.A.)

Installing Patch Panel

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

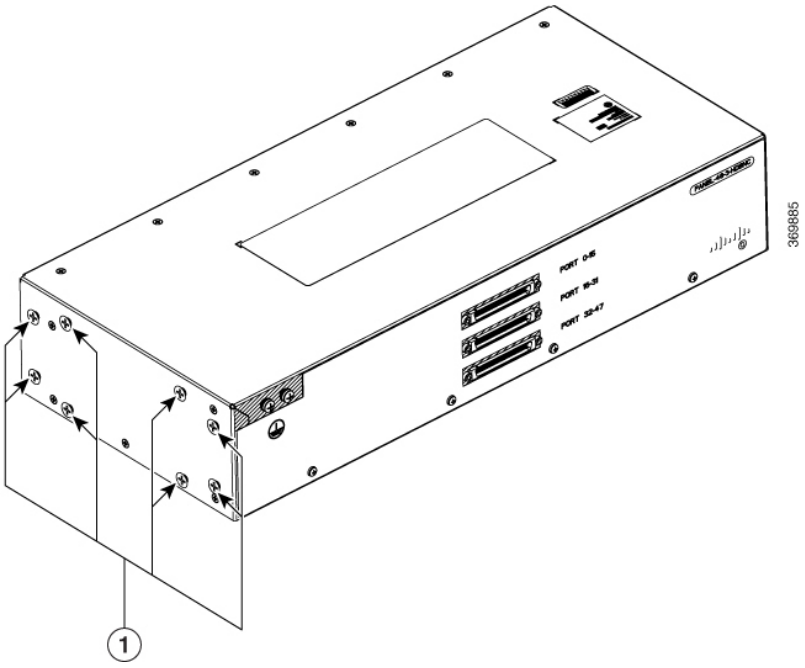
Procedure

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.

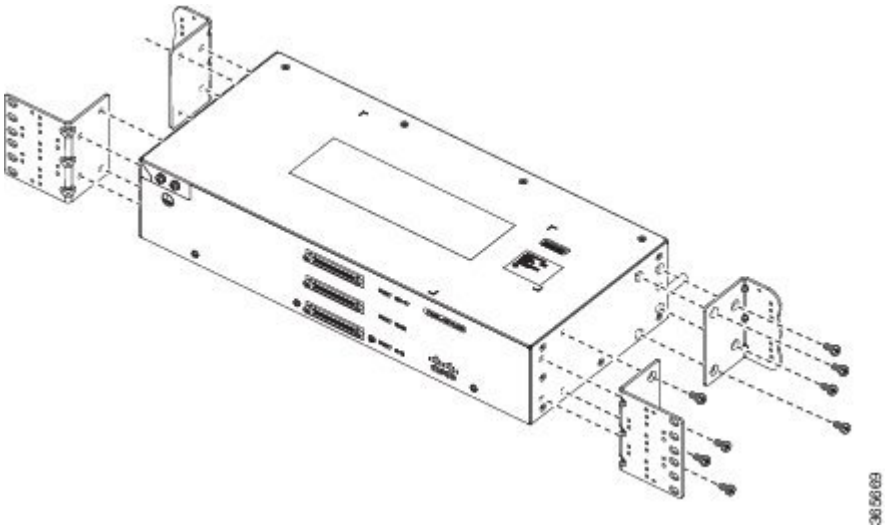
Step 3 Position the brackets against the patch panel sides, and align with the screw holes. Secure the rack mount bracket to patch panel using a torque of 13.2 in.-lb (1.5 N-m) see the figure below.

Figure 110: Rack Mount Screws



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

Figure 111: 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 112: Patch Panel Front View with Brackets and Guides

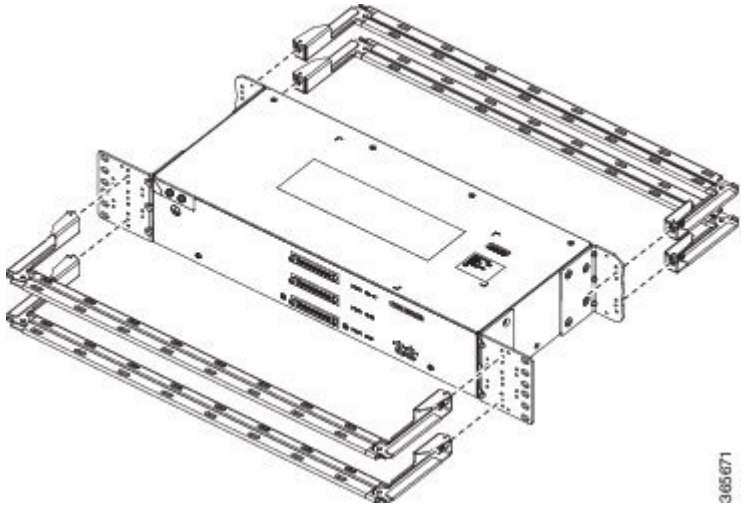
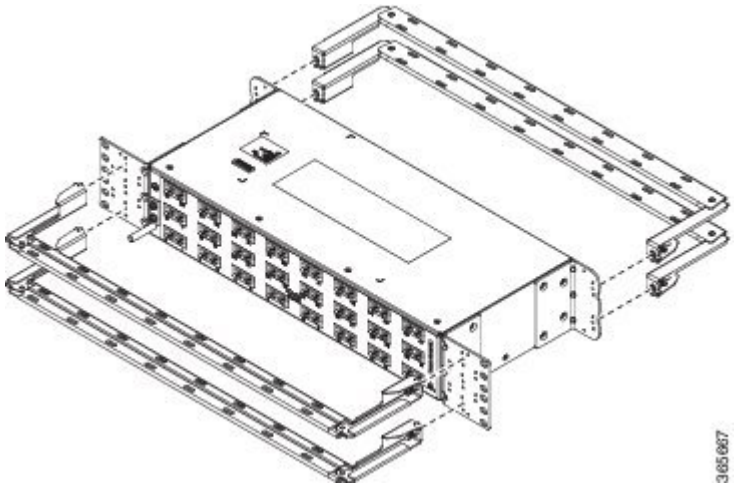


Figure 113: Patch Panel Rear View with Brackets and Guides



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

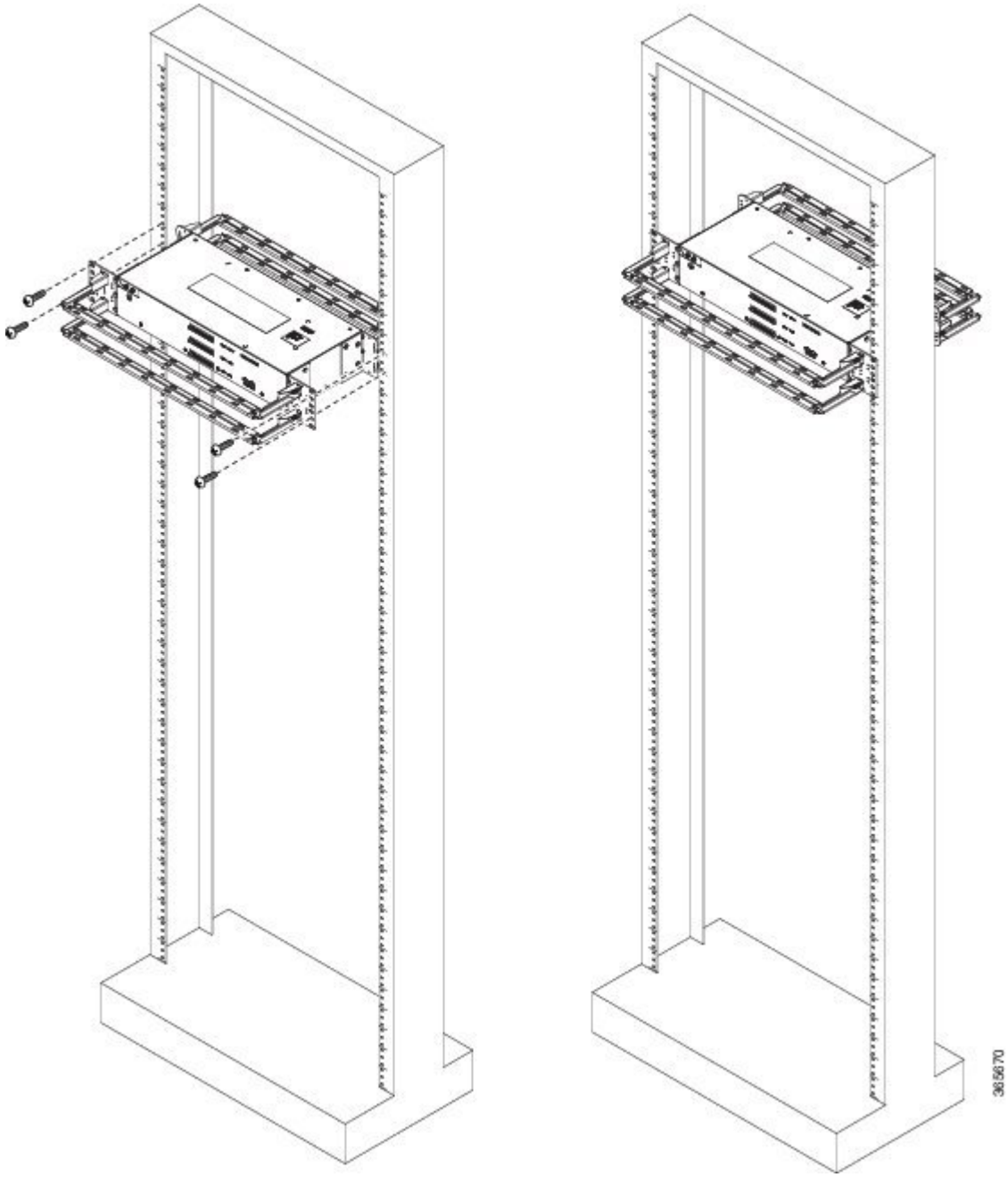


Figure 115: Patch Panel Rear View with Brackets and Guides Installed on Rack

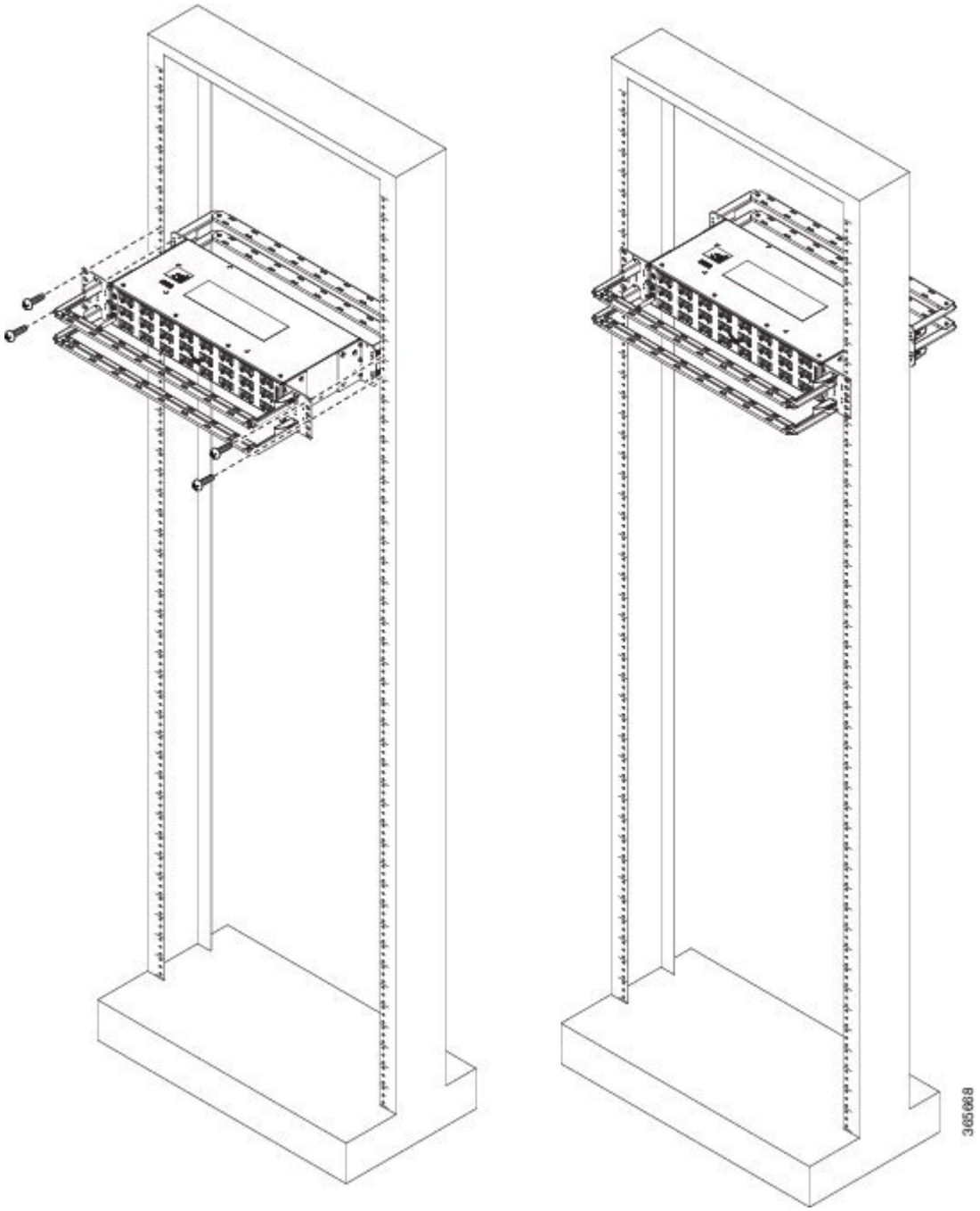


Figure 116: PANEL-16-DIN Patch Panel Mounting Installed on Rack

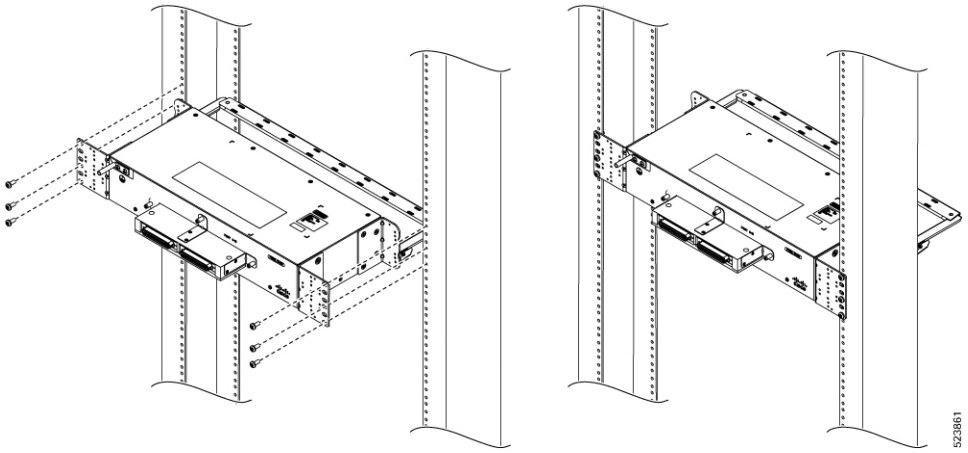


Figure 117: PANEL-48-1-AMP64

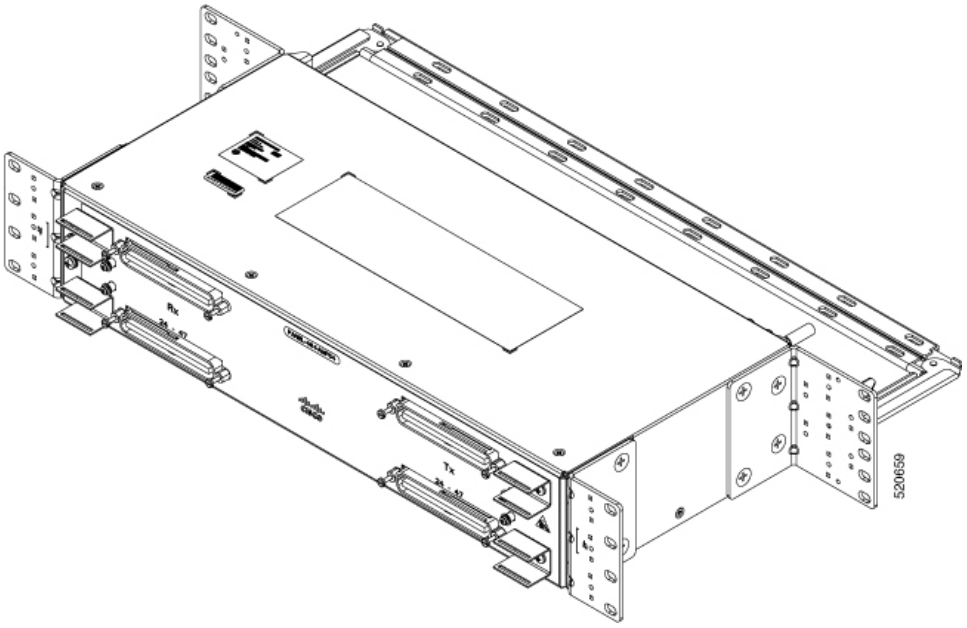


Figure 118: PANEL-48-1-DIN

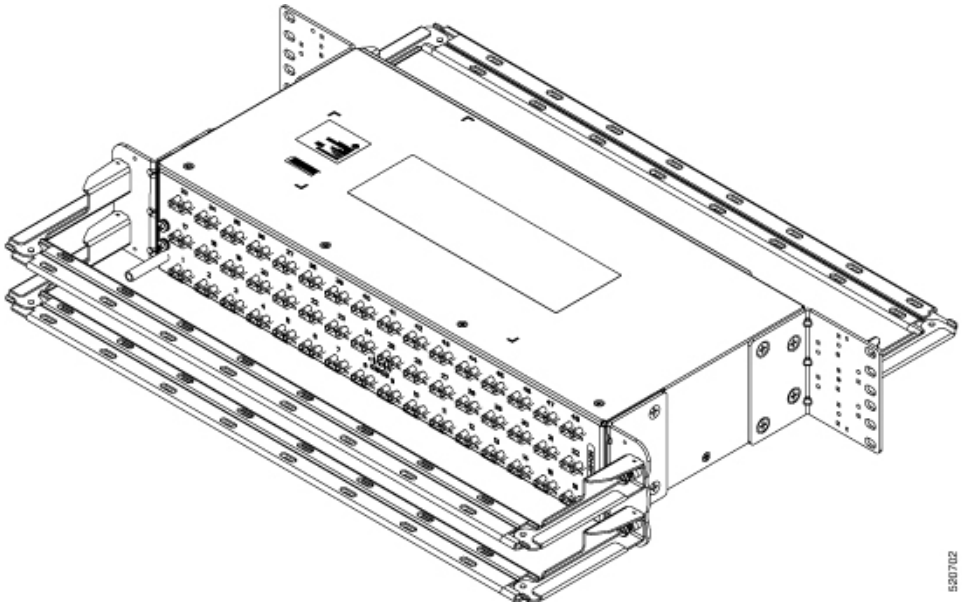


Figure 119: PANEL-48-1-RJ48

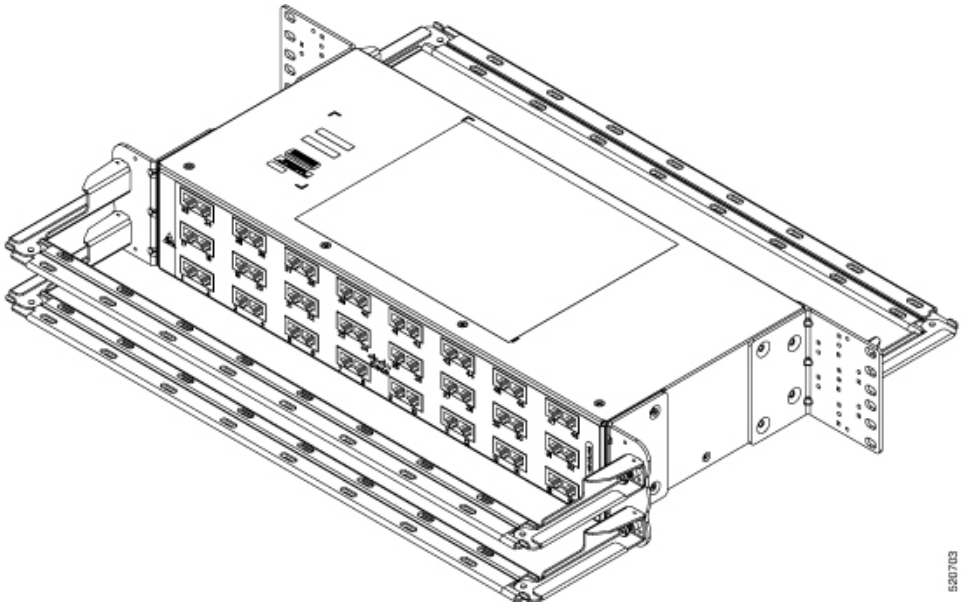
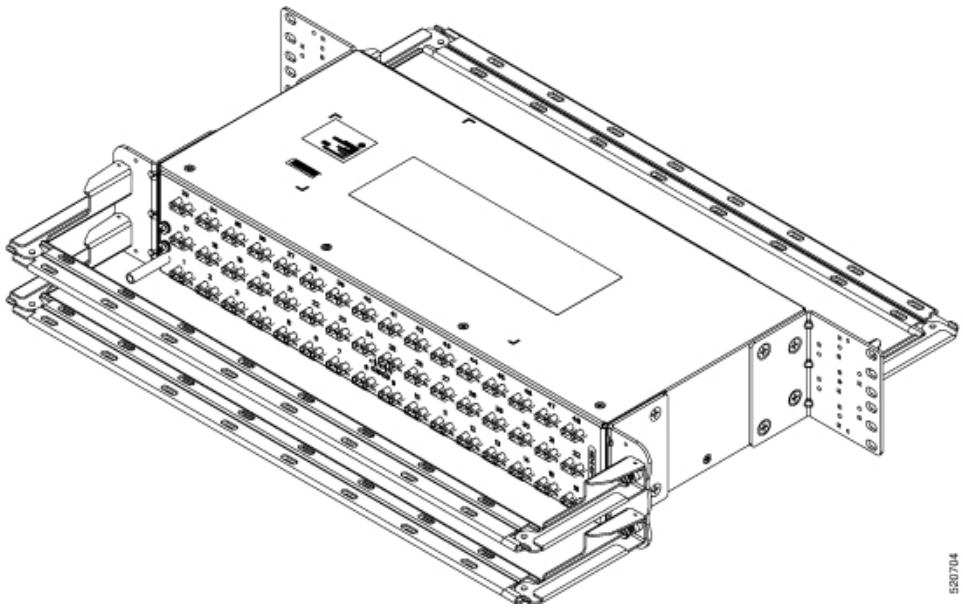


Figure 120: PANEL-48-3-DIN



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 121: PANEL-48-3-HDBNC

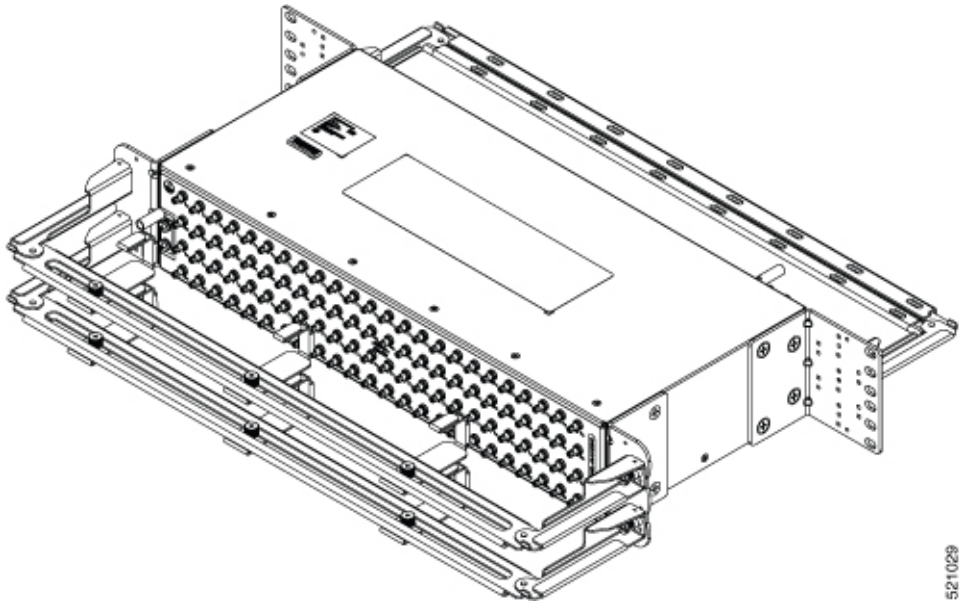


Figure 122: PANEL-144-1-AMP64

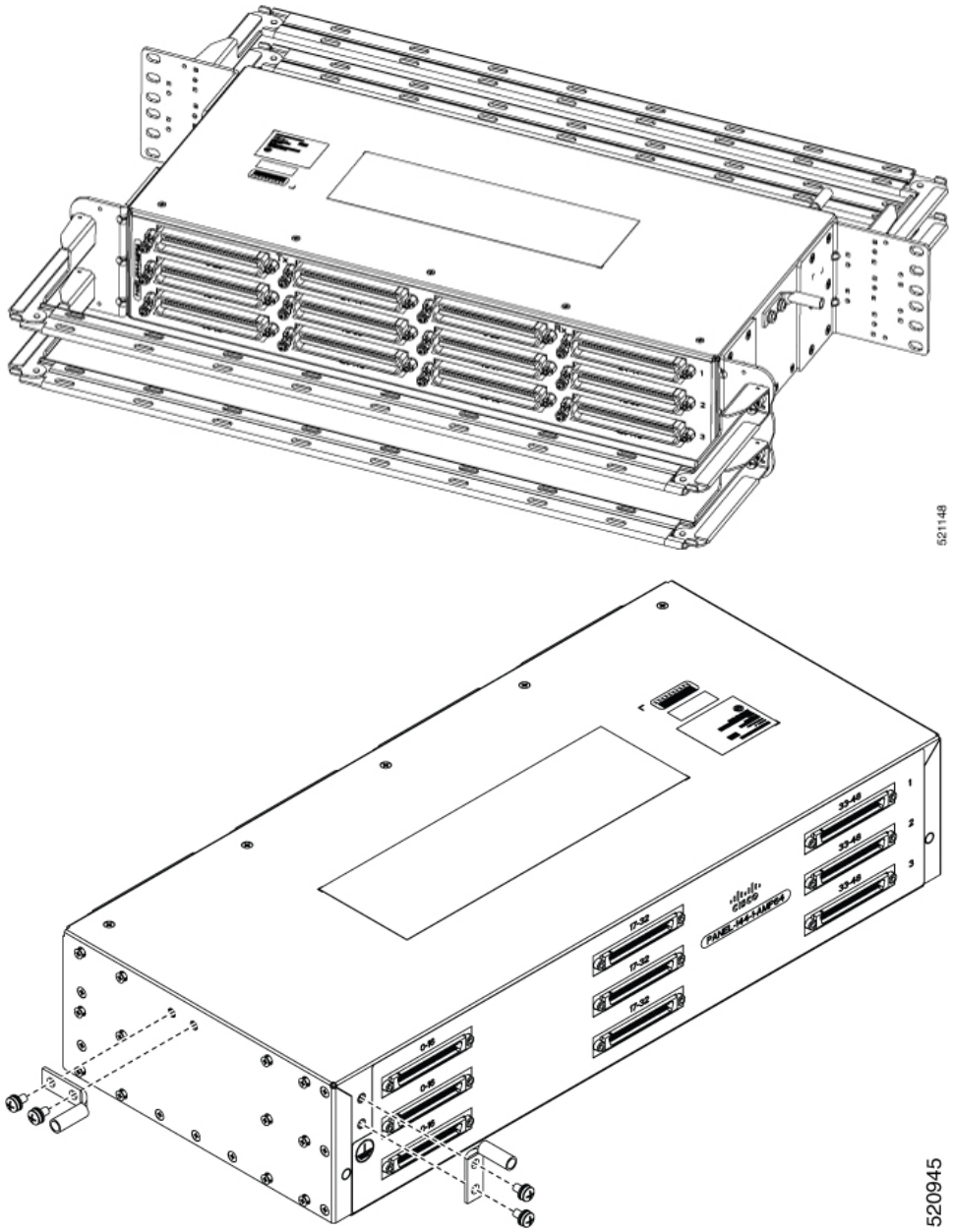
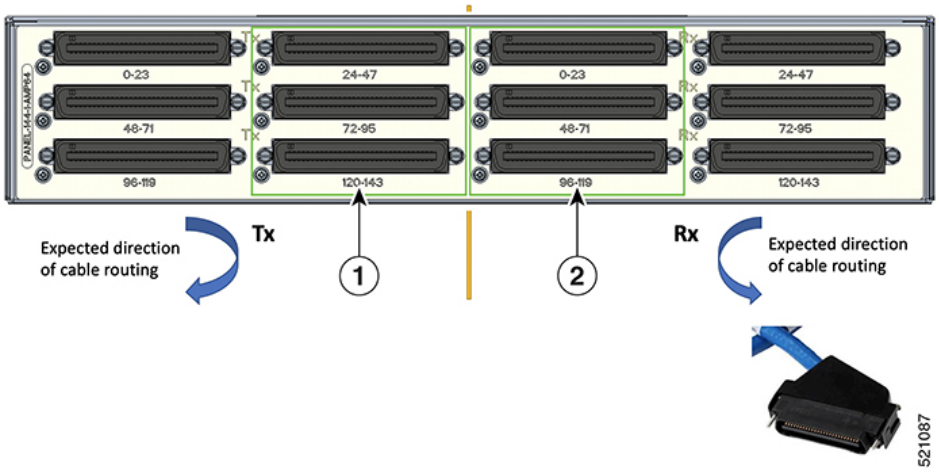


Figure 123: Example of 120° Exit Cable Hood



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

Table 23: 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.

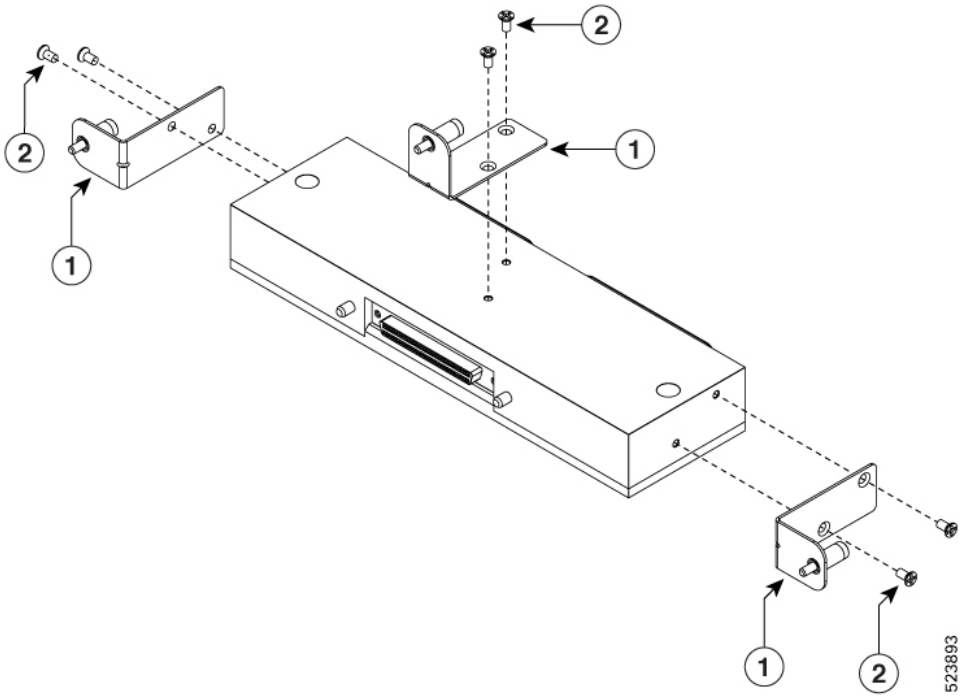
Installing Brackets and Adapter to the Patch Panel (PANEL-16-DIN)

Perform the following procedure to install the adapter brackets and the adapter on the patch panel:

Procedure

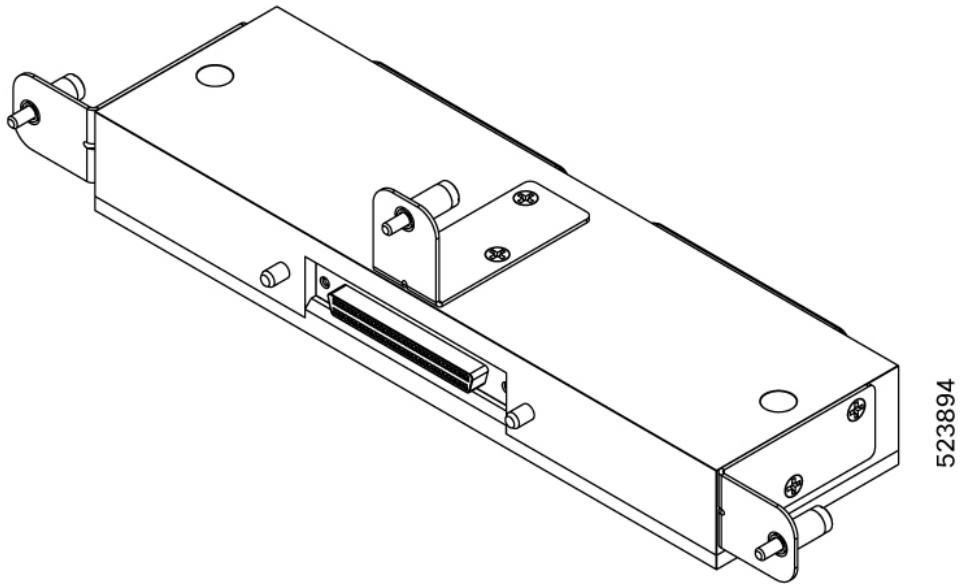
Step 1 Position the brackets against the adapter (as shown in the following figure).

Figure 124: Installing the Brackets on the Adapter



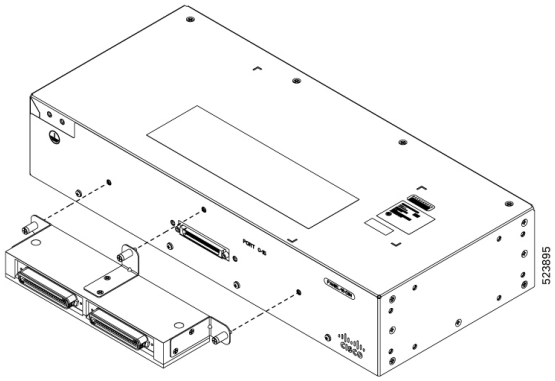
Step 2 Secure the brackets with the screws. The recommended maximum torque is 6.8 in-lb (0.75N-m).

Figure 125: Adapter with the Brackets



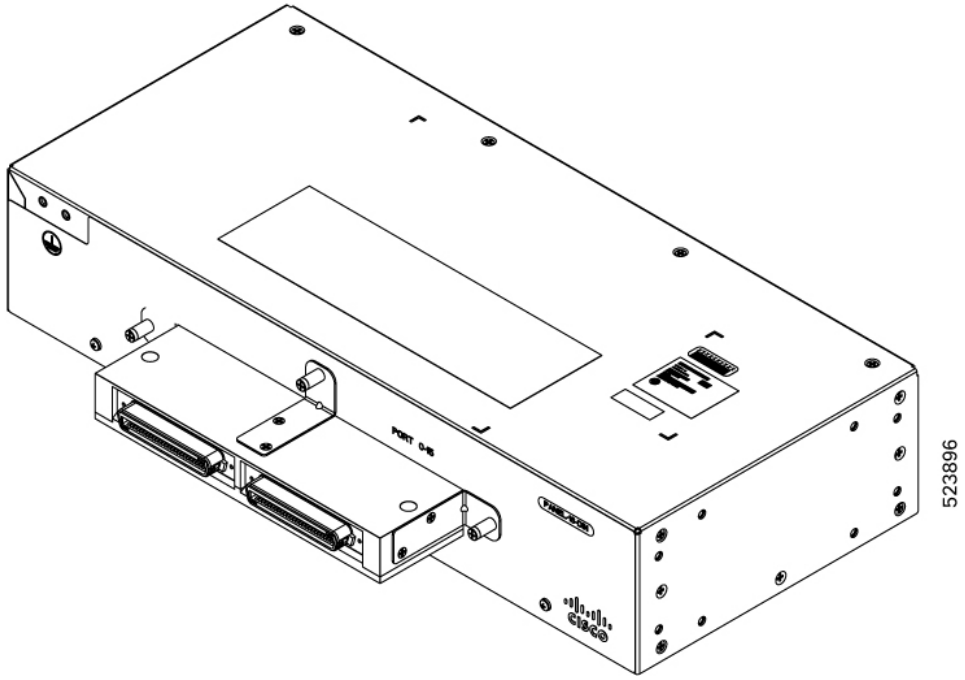
Step 3 Position the adapter with the brackets against the patch panel (as shown in the following figure).

Figure 126: Installing the Adapter on the Patch Panel (PANEL-16-DIN)



Step 4 Secure the adapter with the screws. The recommended maximum torque is 6.8 in-lb (0.75N-m).

Figure 127: Patch Panel with the Adapter



Ground Connection for Patch Panel

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

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

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

Grounding points on patch panel may vary between different PIDs.

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 128: Patch Panel Grounding - Single

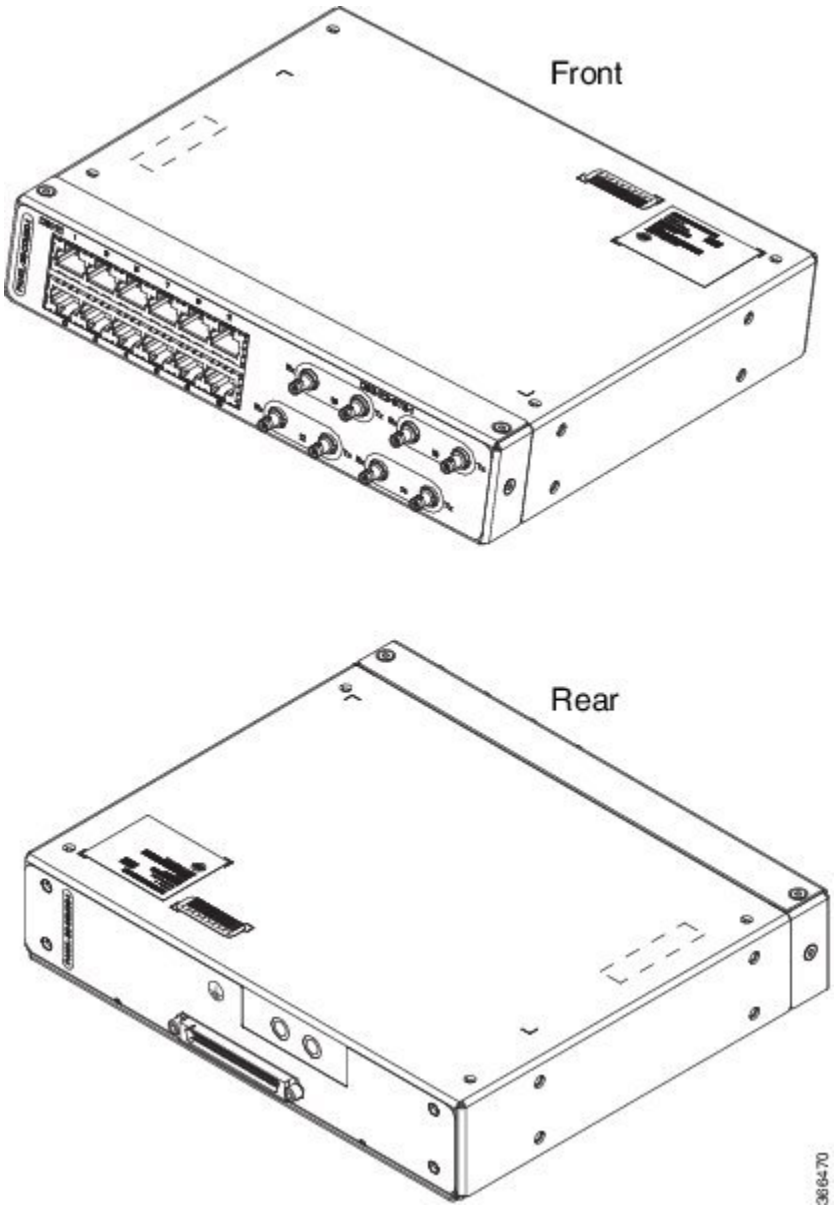
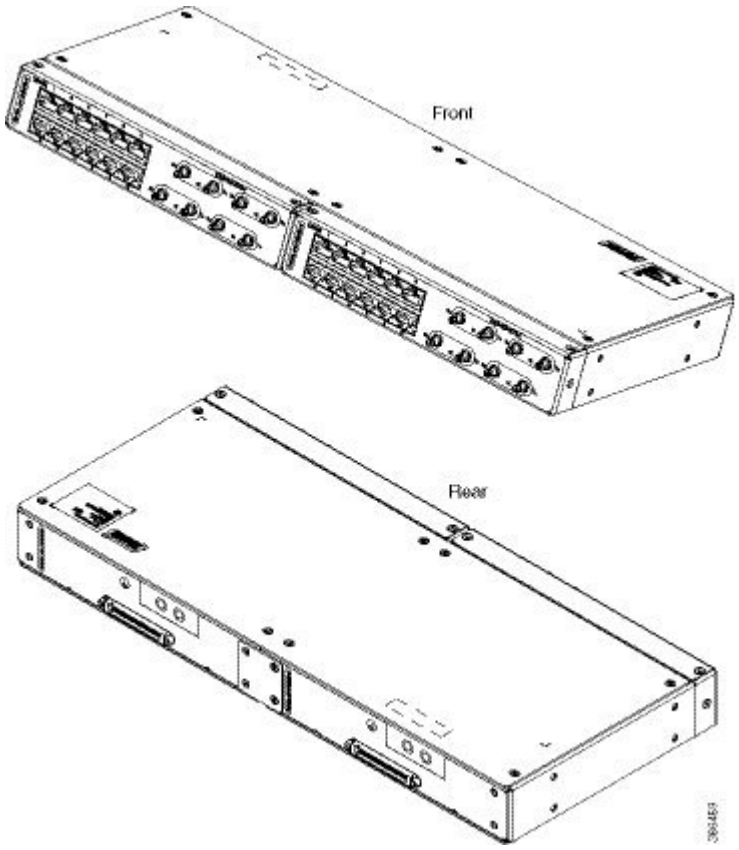


Figure 129: Patch Panel Grounding - Dual



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

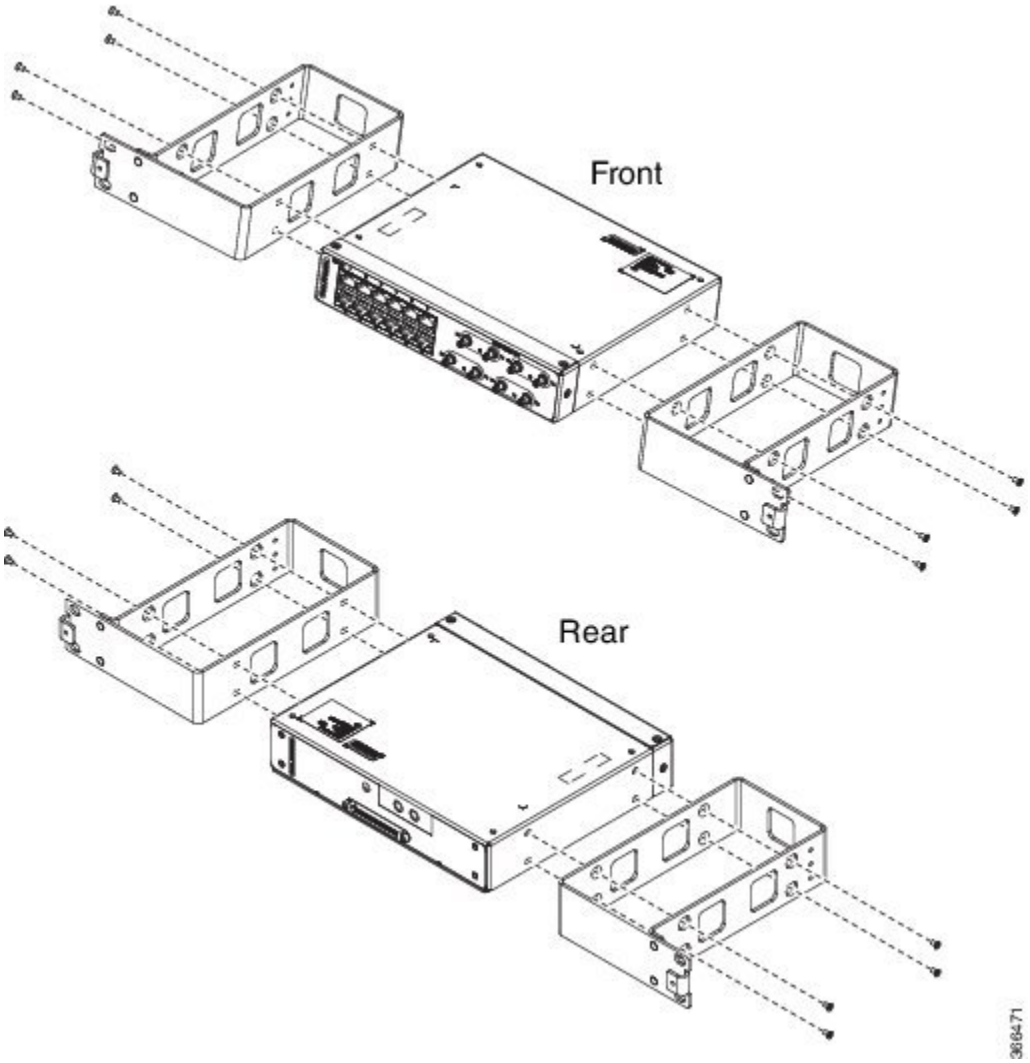


Figure 131: Installing the Patch Panel - Dual in a 19-inch Rack

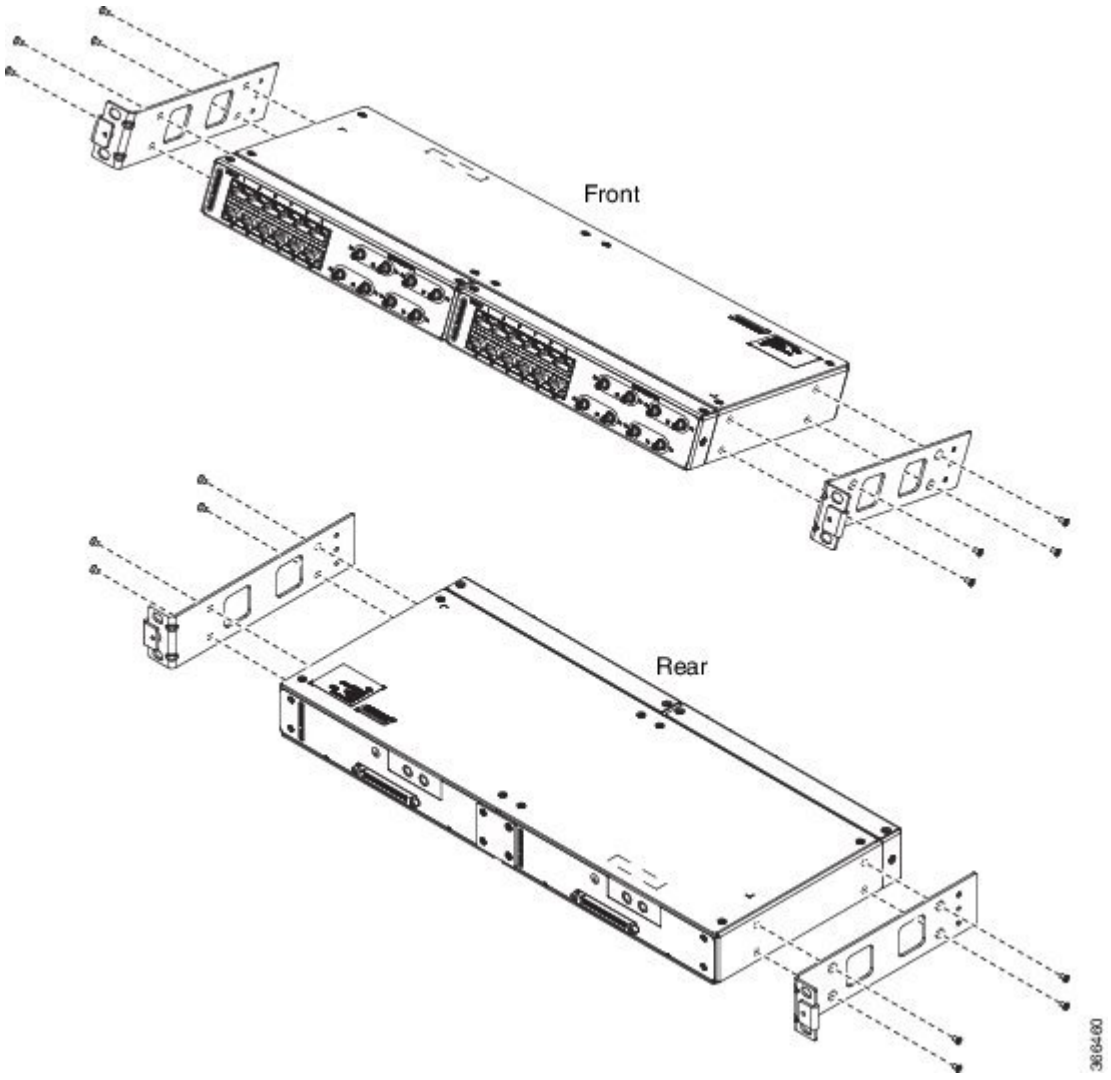


Figure 132: Installing the Patch Panel - Single in a 21-inch Rack

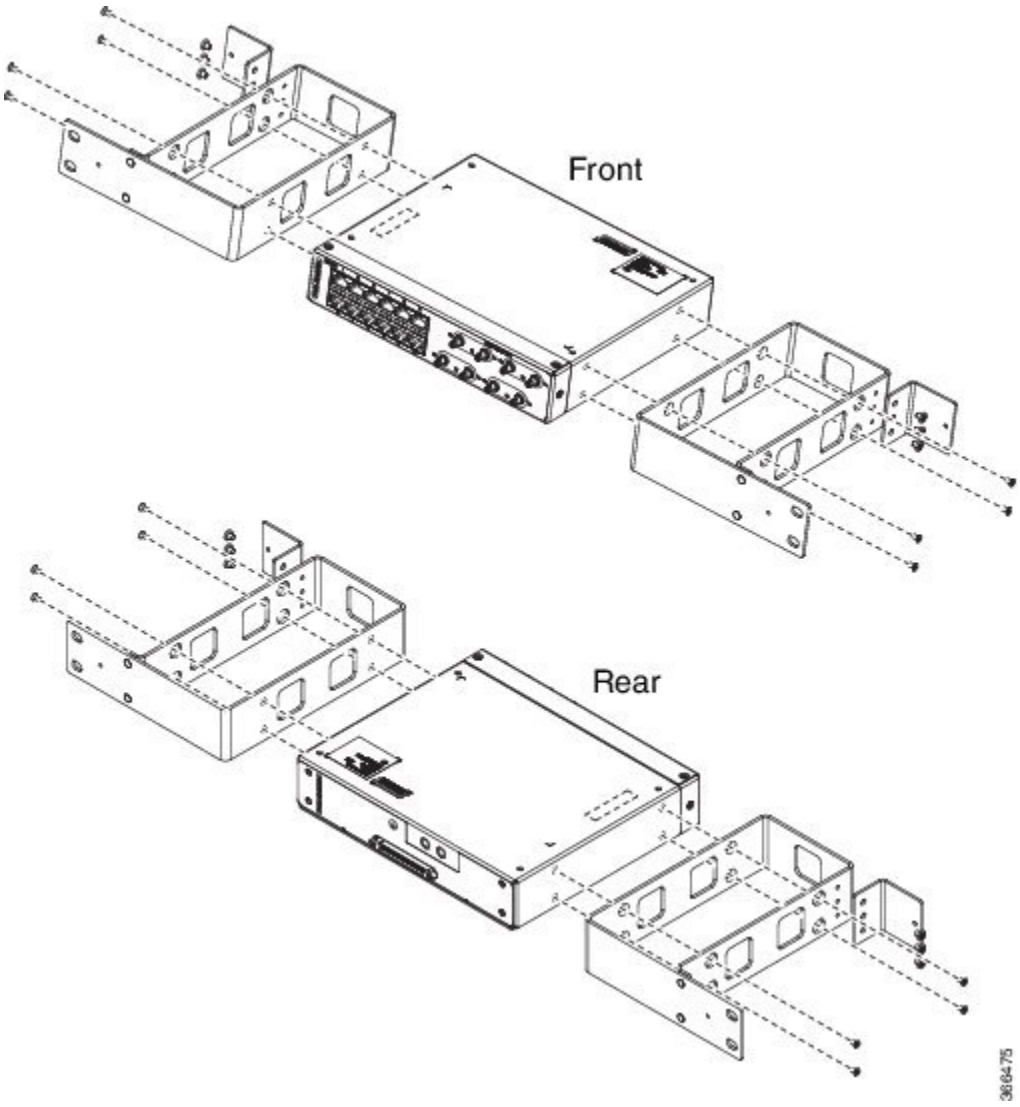


Figure 133: Installing the Patch Panel - Dual in a 21-inch Rack

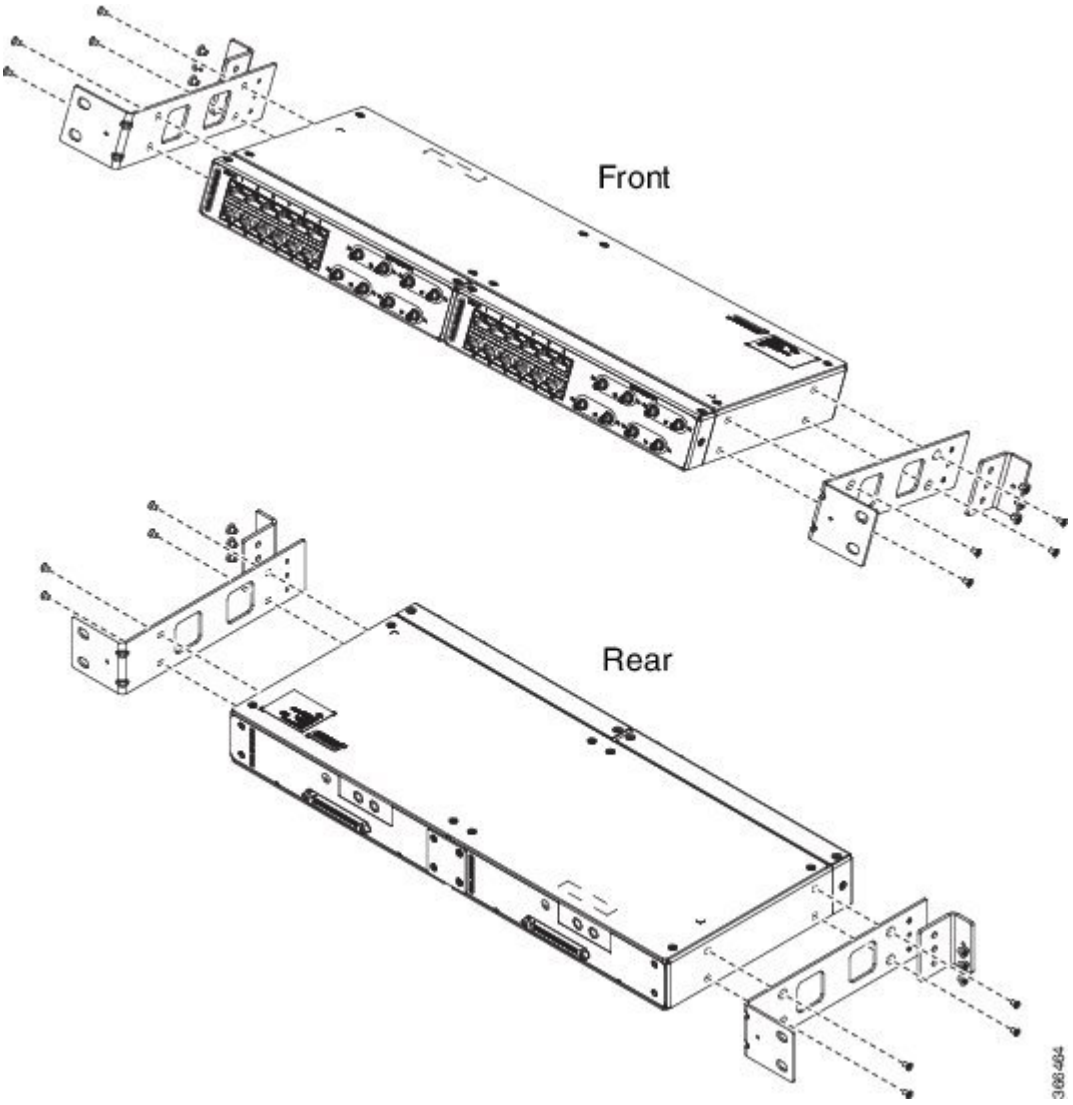


Figure 134: Installing the Patch Panel - Single in a 23-inch Rack

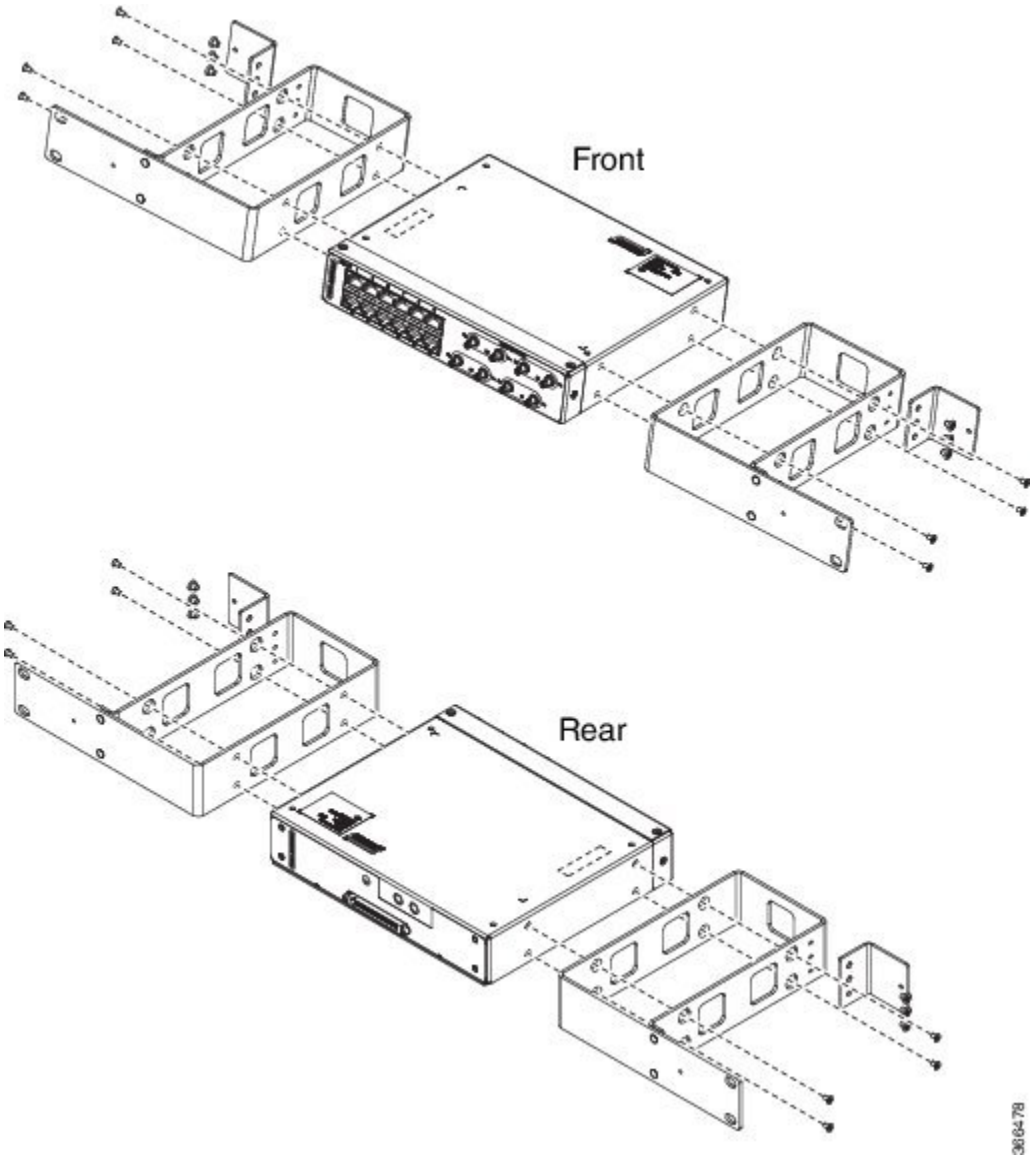
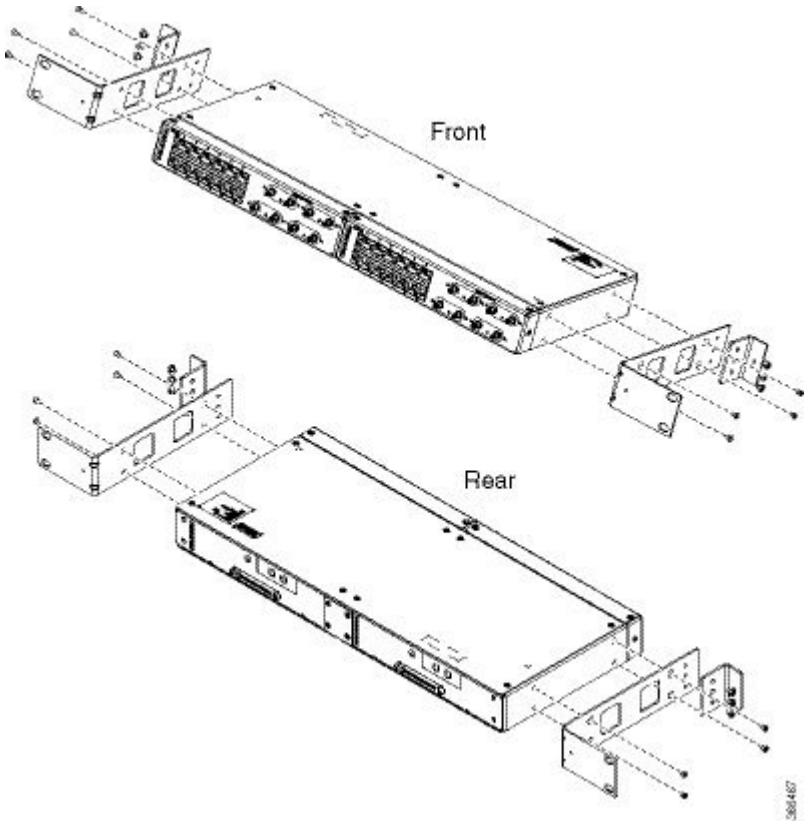


Figure 135: Installing the Patch Panel - Dual in a 23-inch Rack



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 136: Attaching 19-inch Brackets to Patch Panel - Single

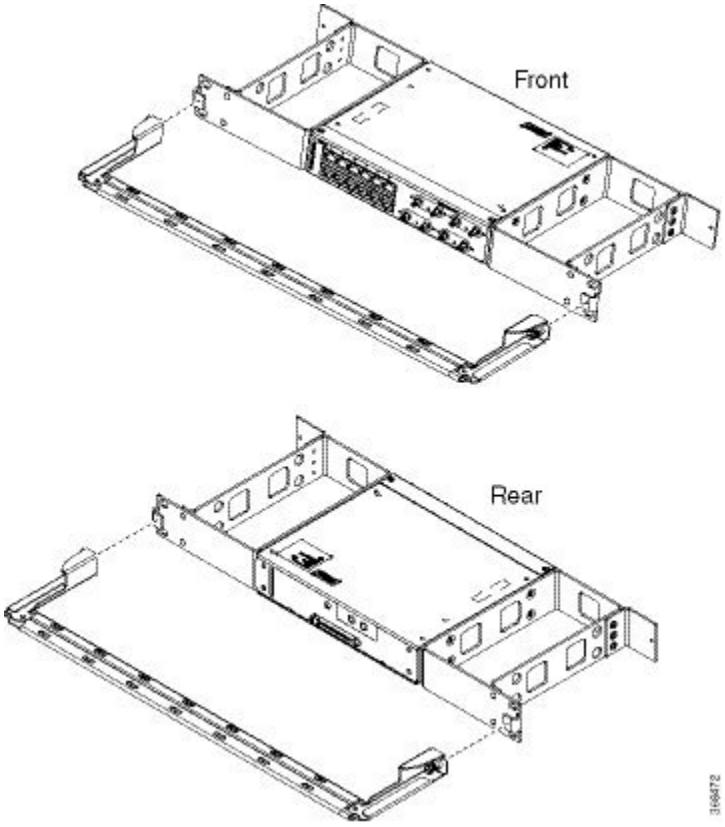


Figure 137: Installing 19-inch Brackets on to Rack - Single

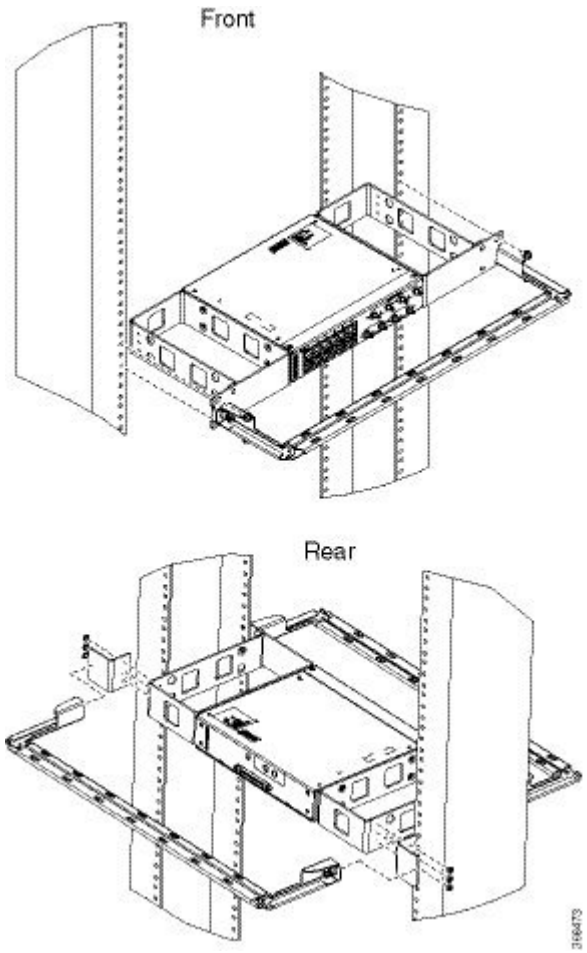


Figure 138: Attaching 19-inch Brackets to Patch Panel - Dual

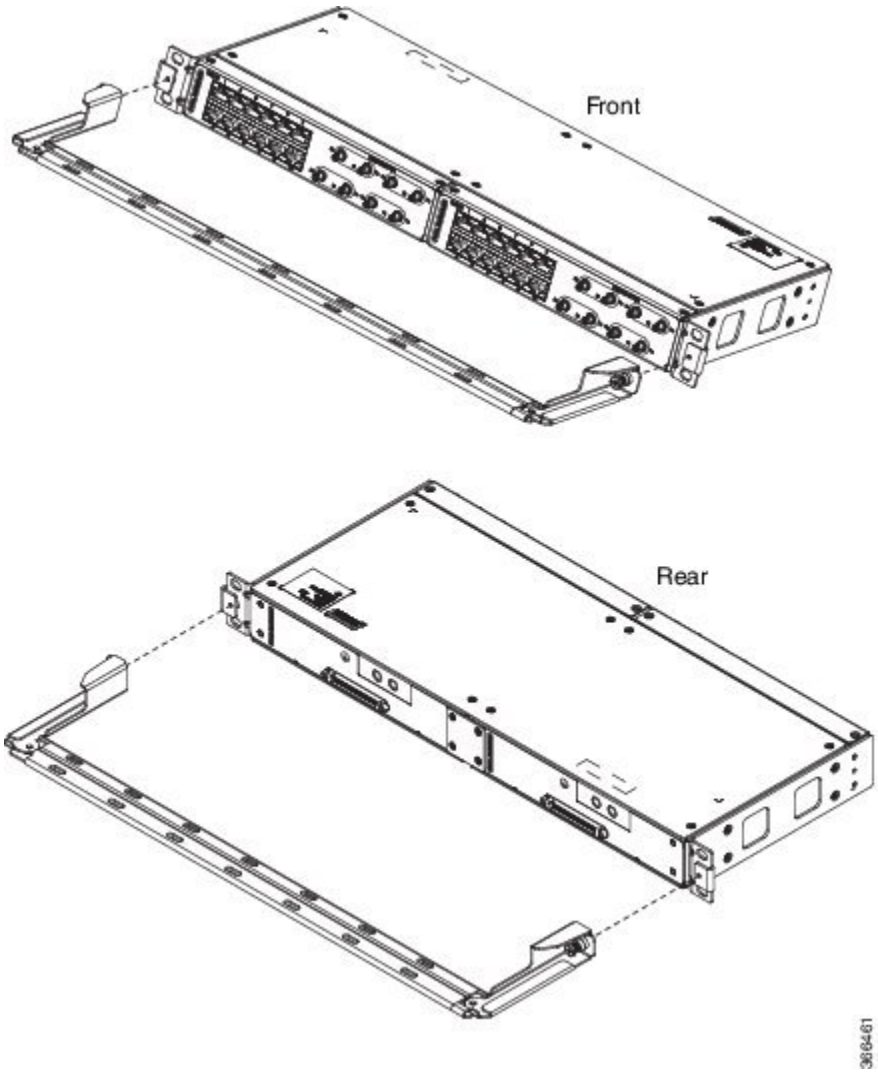


Figure 139: Installing 19-inch Brackets on to Rack - Dual

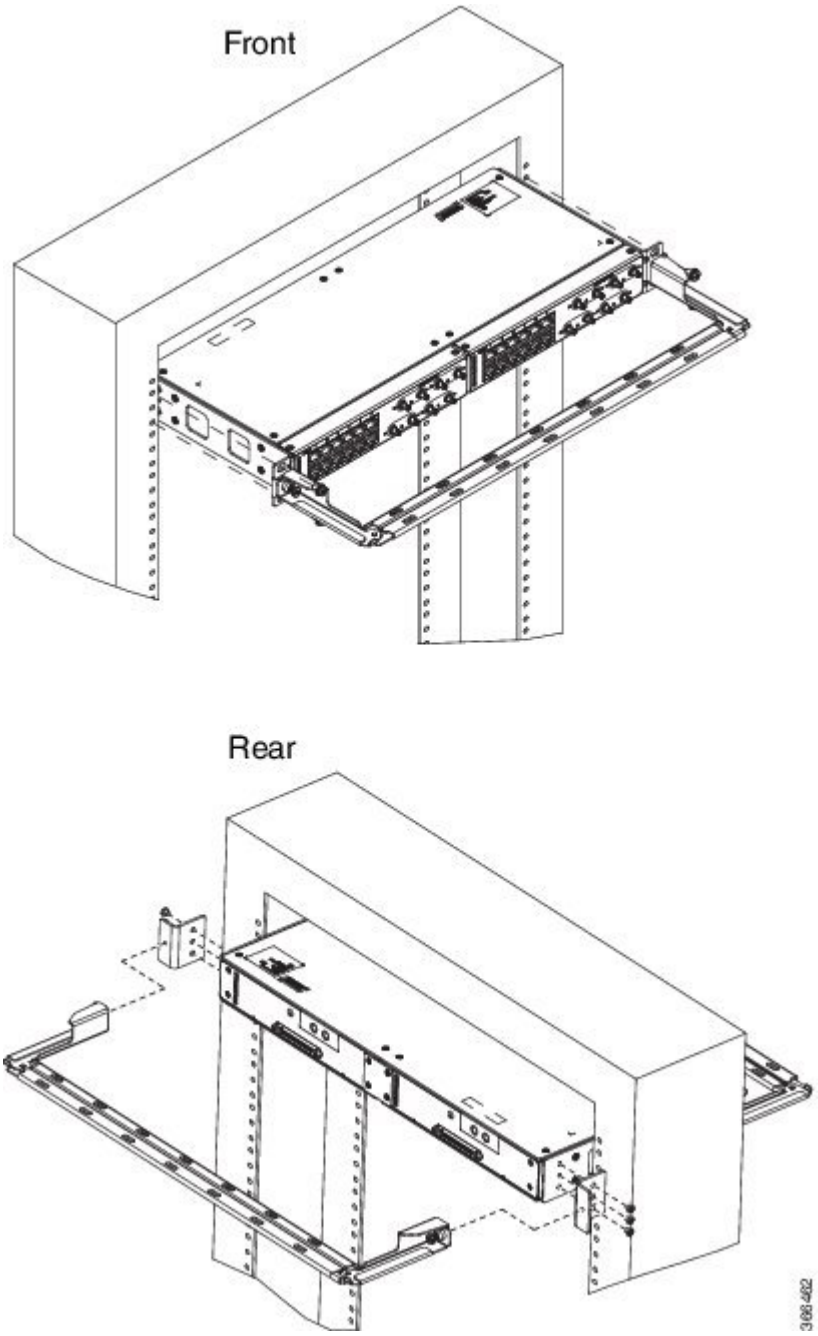


Figure 140: Attaching 21-inch Brackets to Patch Panel - Single

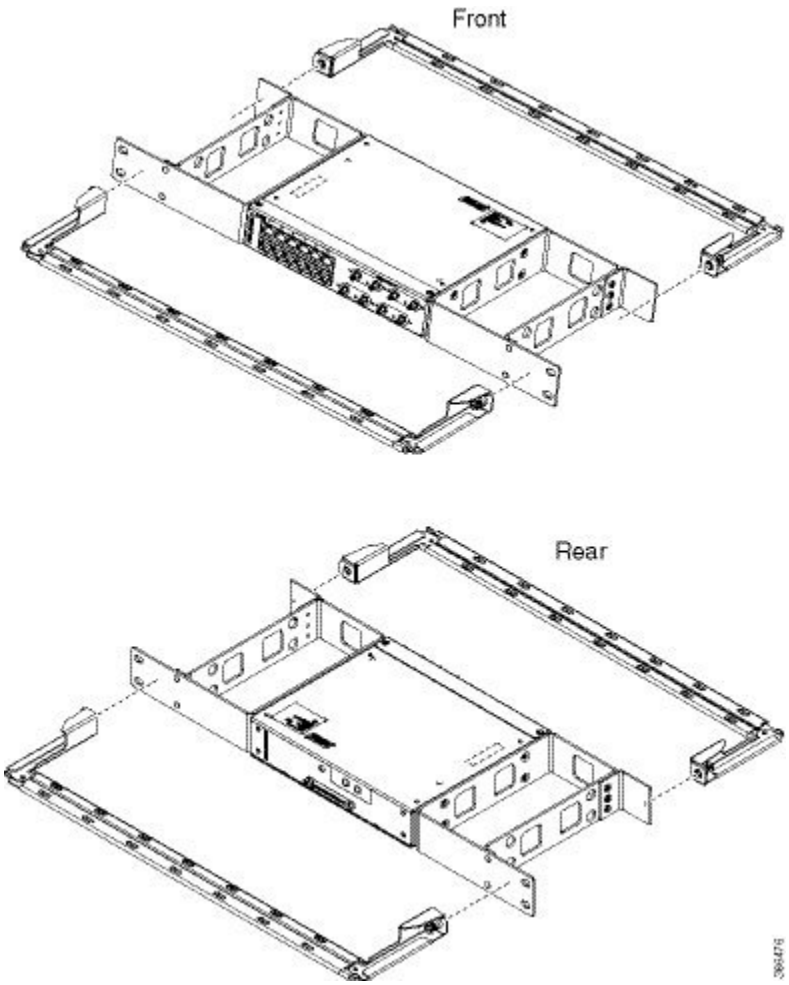


Figure 141: Installing 21-inch Brackets on to Rack - Single

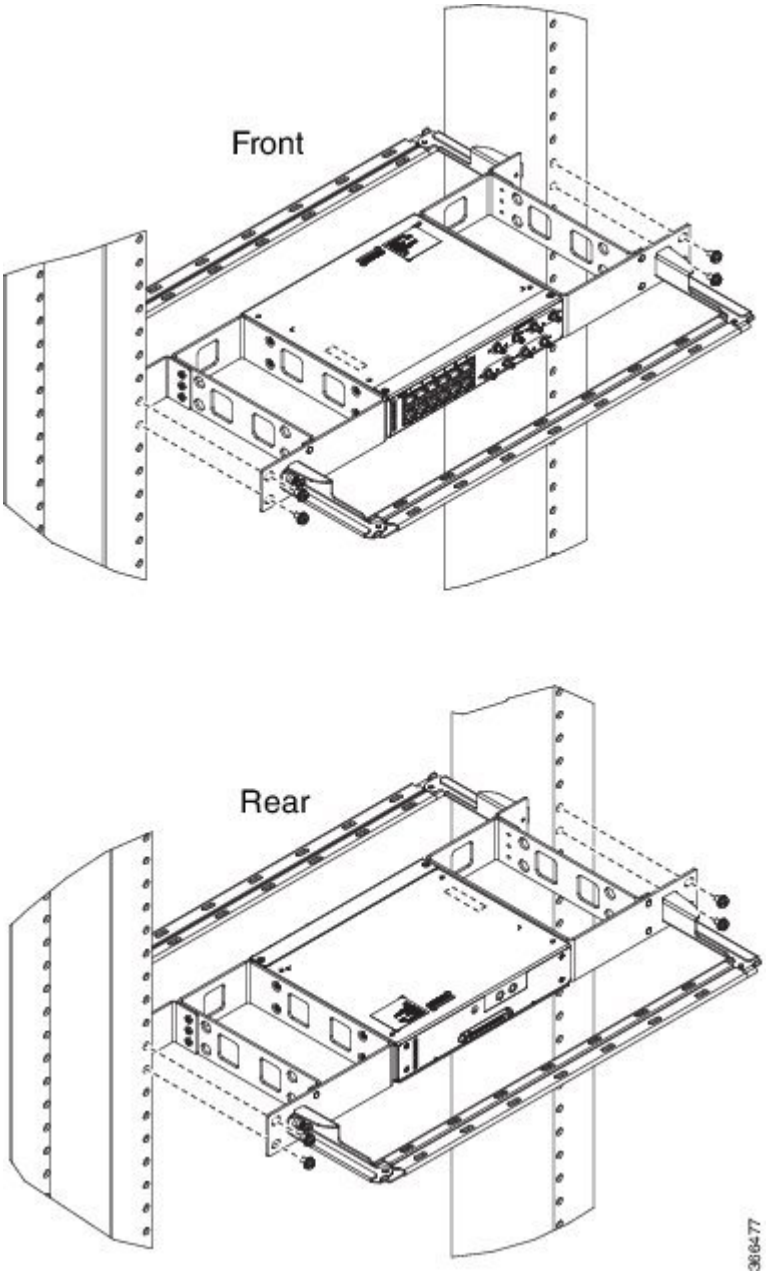


Figure 142: Attaching 21-inch Brackets to Patch Panel - Dual

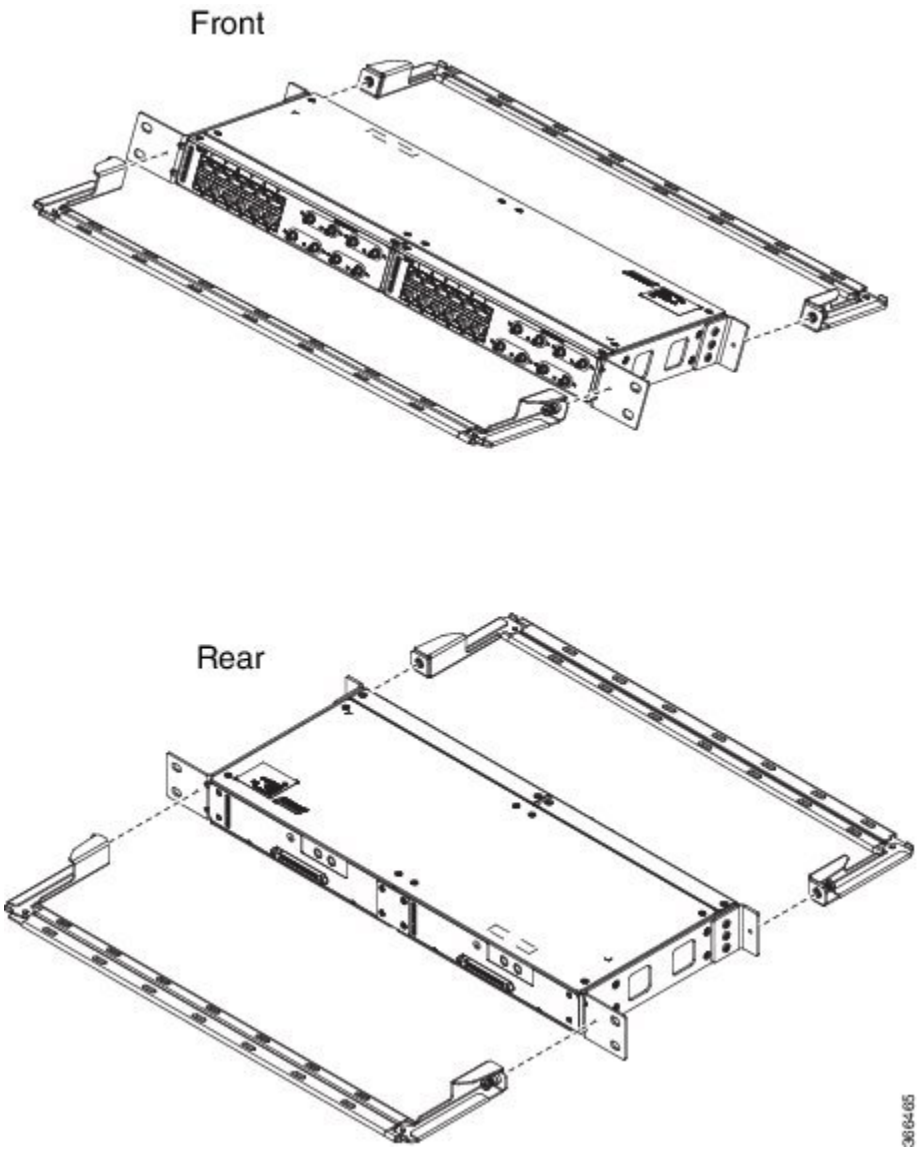


Figure 143: Installing 21-inch Brackets on to Rack - Dual

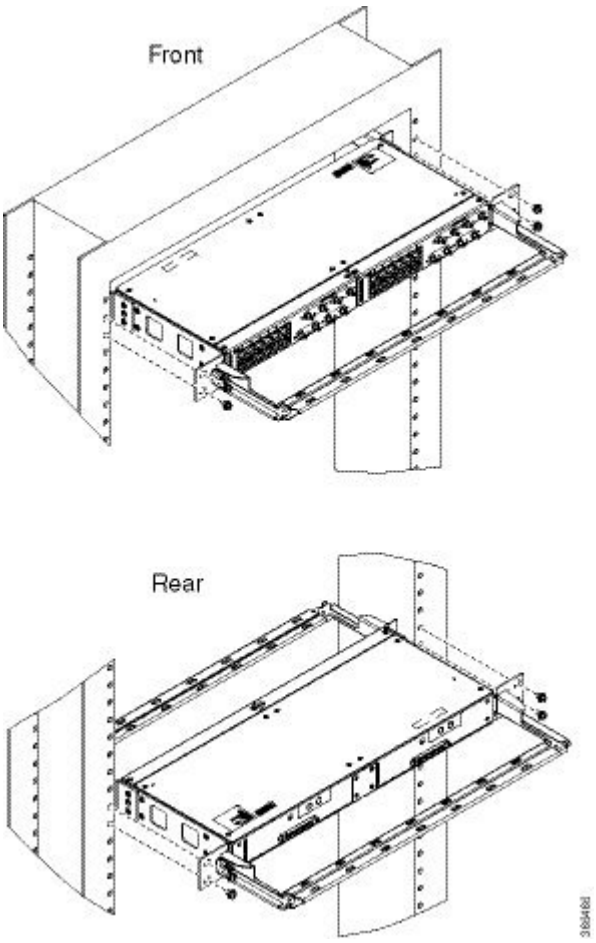


Figure 144: Attaching 23-inch Brackets to Patch Panel - Single

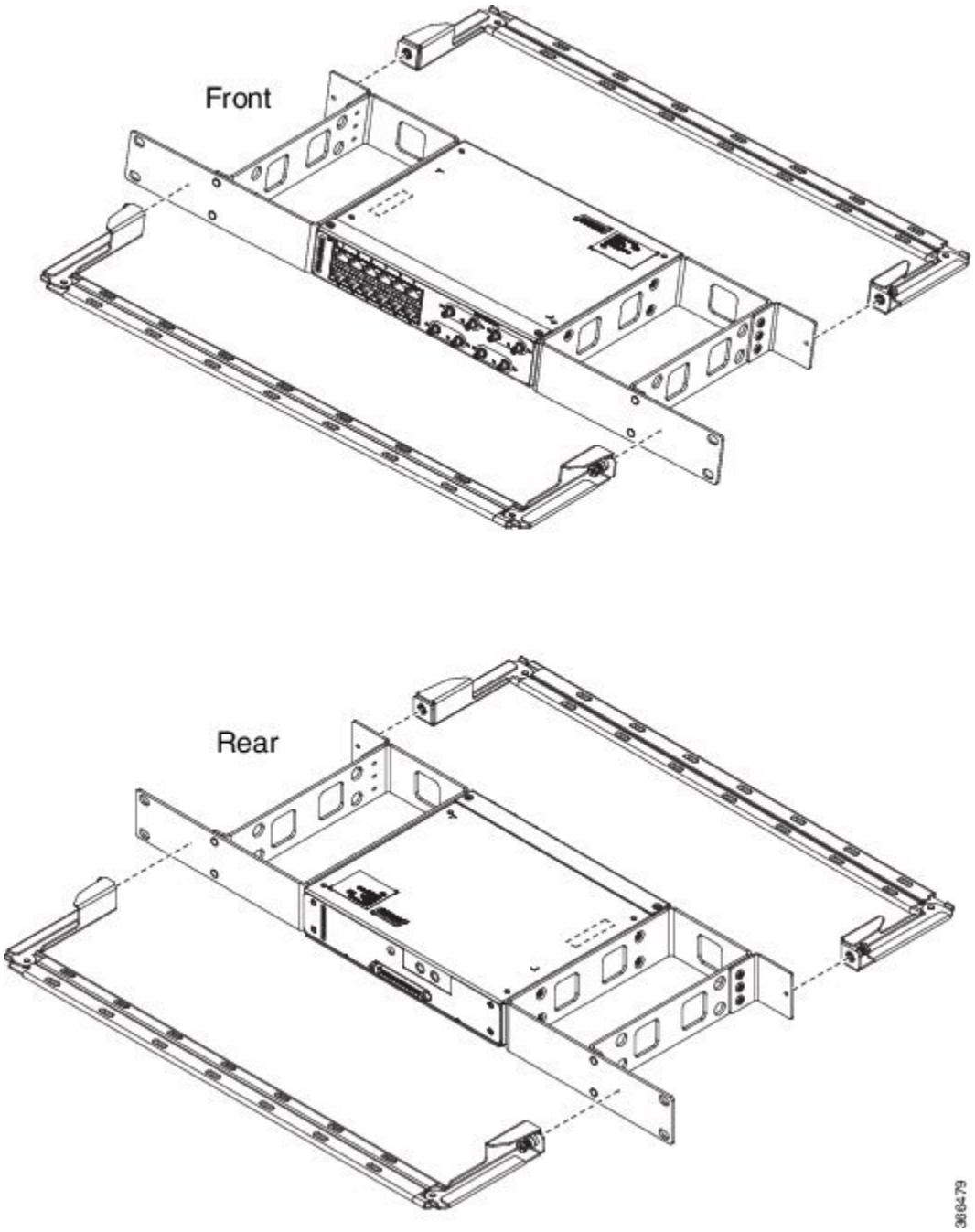


Figure 145: Installing 23-inch Brackets on to Rack - Single

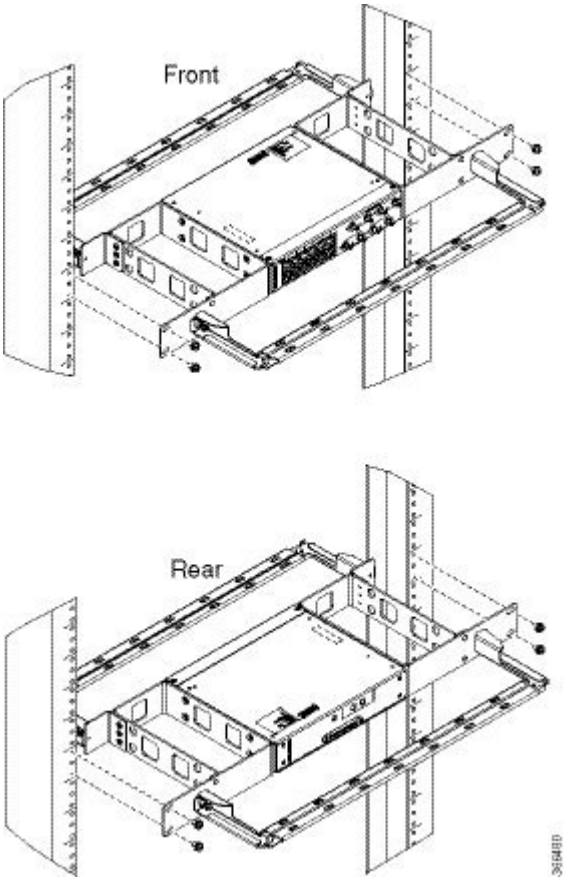


Figure 146: Attaching 23-inch Brackets to Patch Panel - Dual

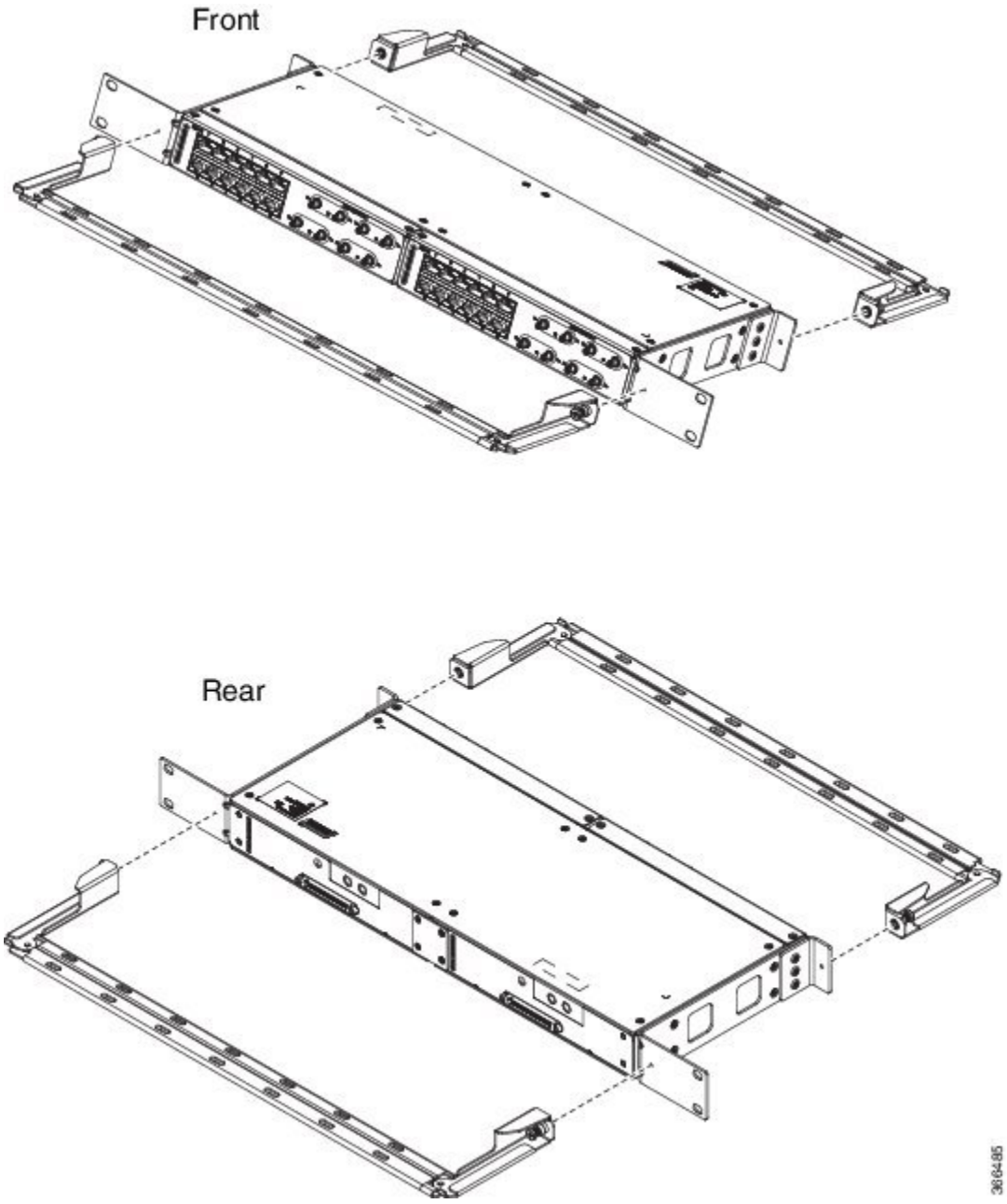
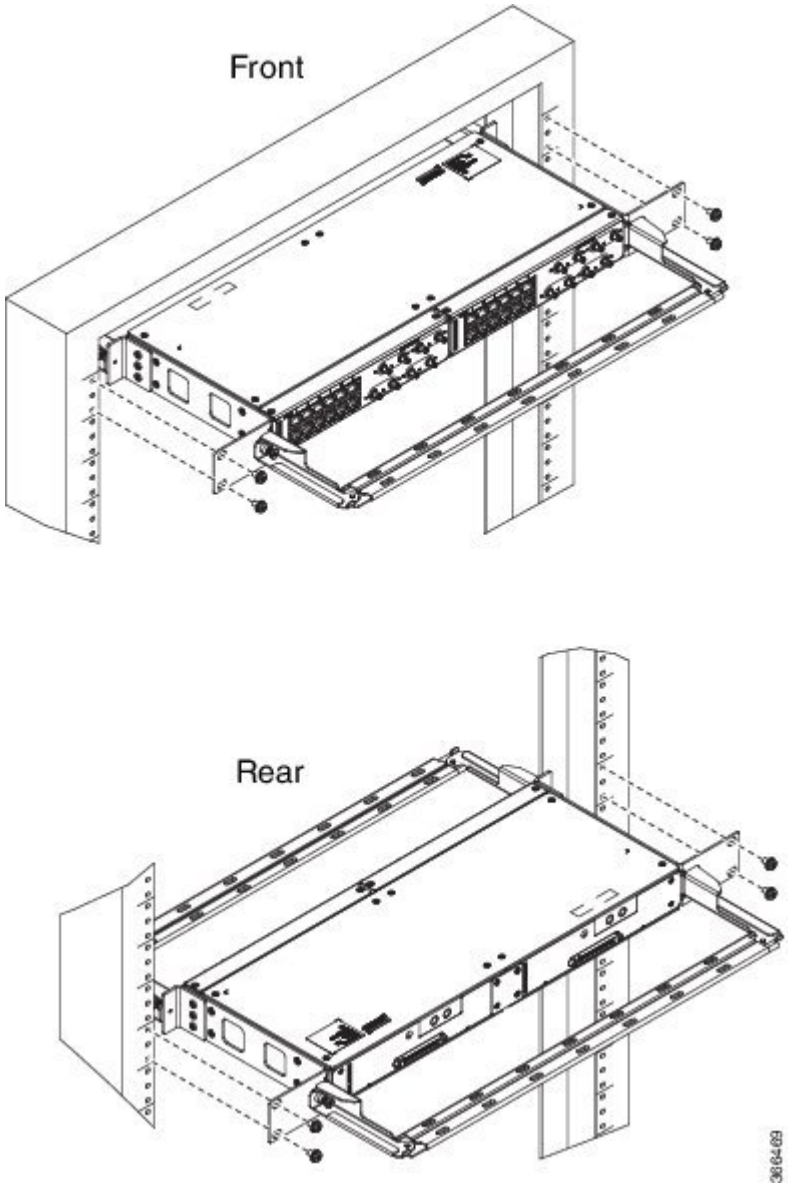


Figure 147: Installing 23-inch Brackets on to Rack - Dual



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 148: Wall Mount - Single

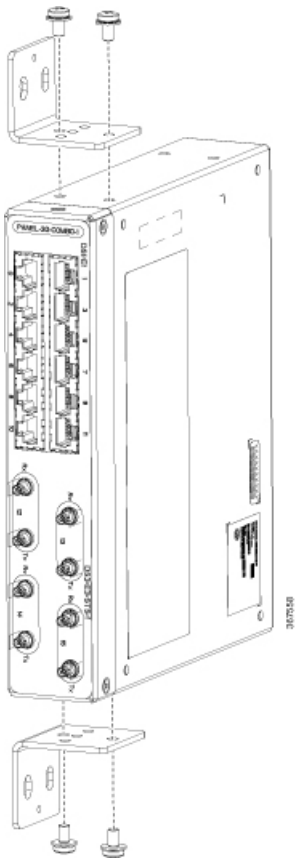
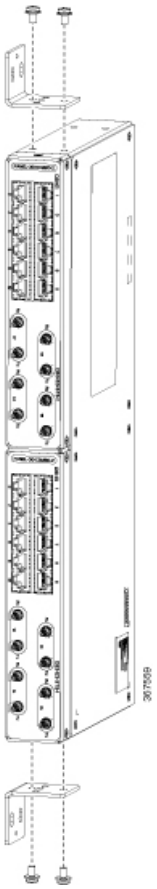


Figure 149: Wall Mount - Dual



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 150: Patch Panel Without Brackets

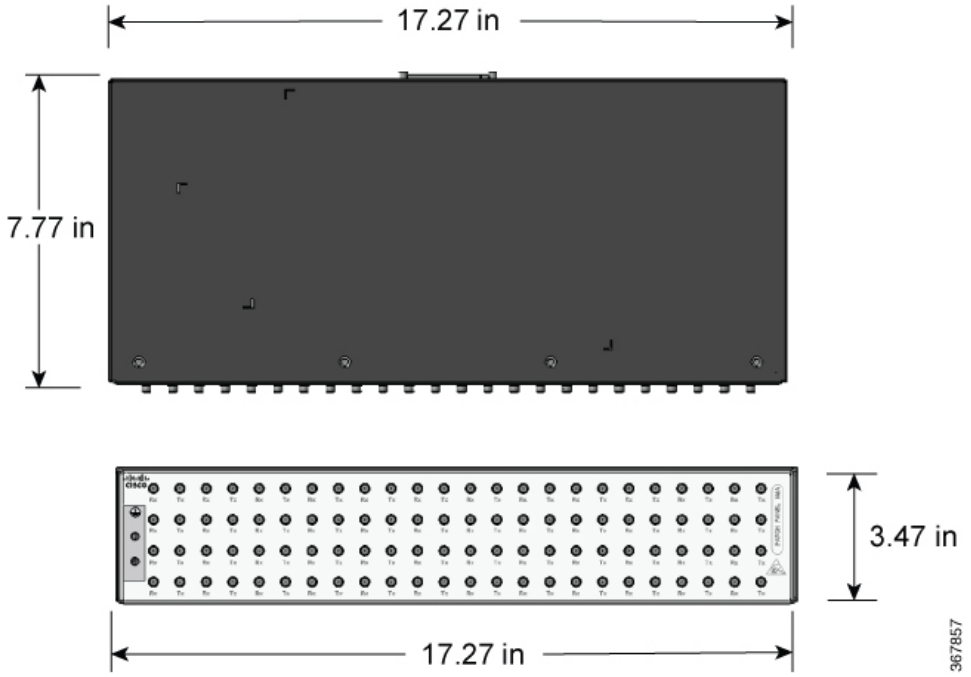


Figure 151: Patch Panel With Brackets

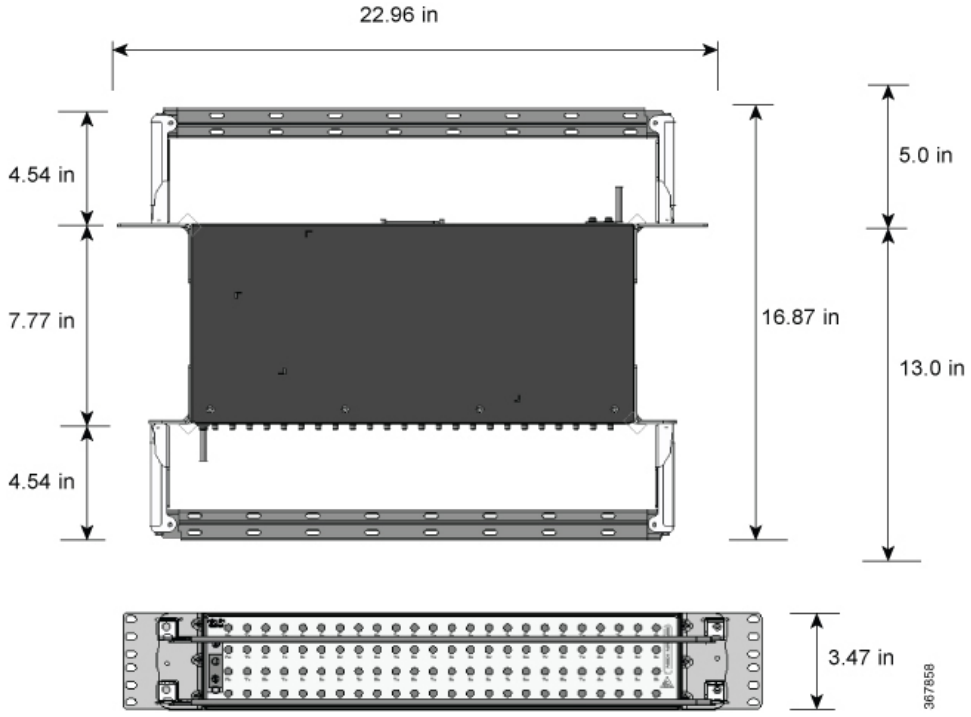


Figure 152: AMP64 Patch Panel With Brackets

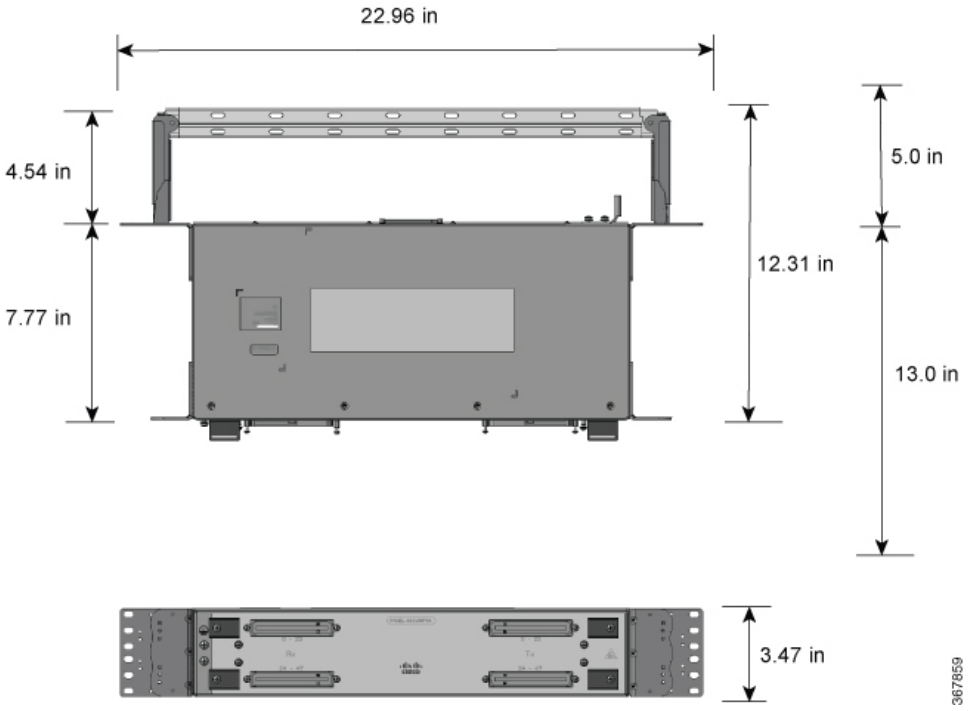


Figure 153: 3G Patch Panel Without Brackets - Single

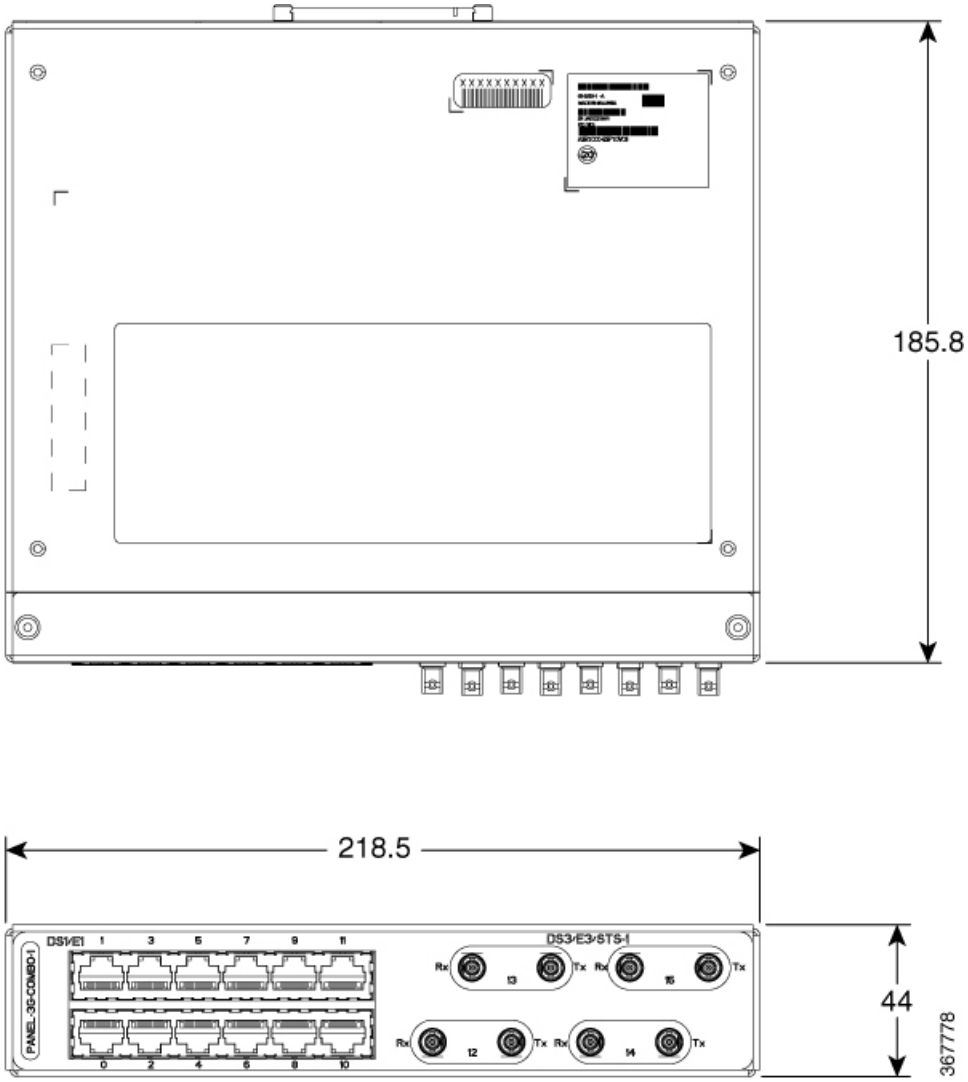
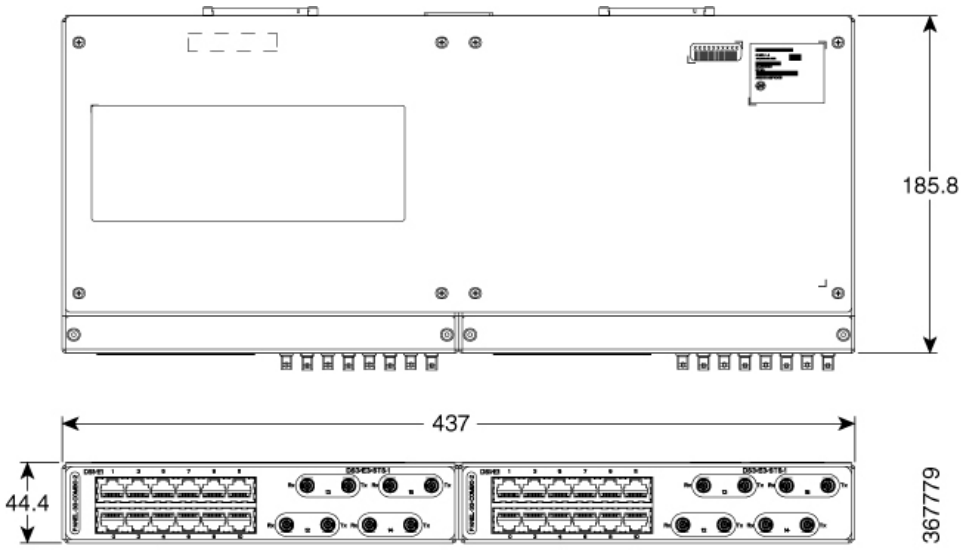


Figure 154: 3G Patch Panel Without Brackets - Dual



Patch Panel Pinout

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

Table 24: 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 25: 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

Connecting Serial Cables

The tables below detail the supported cables with the Cisco ASR 903 Router.

Note The Cisco ASR 903 Router currently only supports the EIA/TIA-232 connector.

Table 26: Interface Cables for 12-in-1 Connector

Cable Type	Product Number	Length	Male/Female	Connector
V.35 DTE	CAB-SS-V35MT	10 ft.	Male	M34
V.35 DCE	CAB-SS-V35FC	10 ft.	Female	M34

Cable Type	Product Number	Length	Male/Female	Connector
EIA/TIA-232 DTE	CAB-SS-232MT	10 ft.	Male	DB-25
EIA/TIA-232 DCE	CAB-SS-232FC	10 ft.	Female	DB-25
EIA/TIA-449 DTE	CAB-SS-449MT	10 ft.	Male	DB-37
EIA/TIA-449 DCE	CAB-SS-449FC	10 ft.	Female	DB-37
X.21 DTE	CAB-SS-X21MT	10 ft.	Male	DB-15
X.21 DCE	CAB-SS-X21FC	10 ft.	Female	DB-15
EIA/TIA-530 DTE	CAB-SS-530MT	10 ft.	Male	DB-25
EIA/TIA-530 DTE	CAB-SS-530FC	10 ft.	Female	DB-25

Table 27: Interface Cables for 68-Pin Connector

Cable Type	Product Number	Length	Male/Female	Connector
4-port EIA-232 DTE	CAB-HD4-232MT	10 ft.	Male	DB-25
4-port EIA-232 DCE	CAB-HD4-232FC	10 ft.	Female	DB-25
4-port EIA-232 DTE	CAB-QUAD-ASYNC-F	10 ft.	Female	RJ-45
4-port EIA-232 DTE	CAB-QUAD-ASYNC-M	10 ft.	Male	RJ-45
4-port EIA-232 DTE	CAB-9AS-M	10 ft.	Male	DB-9

Connecting the Fan Tray Alarm Port

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

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



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

Only Pins 1, 2, 4, 5, and 8 are available for customer use. The remaining pins are for Cisco manufacturing test, and should not be connected. Use a shielded cable for connection to this port for EMC protection. Table 5-6 summarizes the pinouts on the alarm port in Troubleshooting.

Procedure

Step 1 Attach an RJ45 cable to the alarm port.

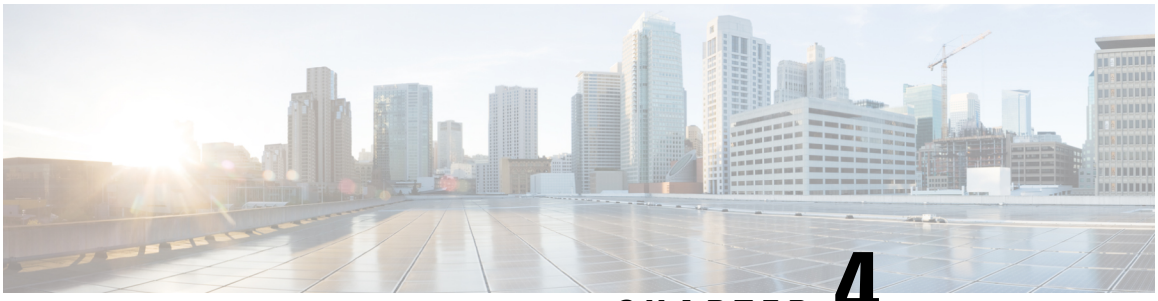
Step 2 Attach the other end of the RJ45 cable to the relay controller.

What to do next

For information about how to map alarm inputs to critical, major, and minor alarm conditions, see the Cisco ASR 903 Router Software Configuration Guide.

Connector and Cable Specifications

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



CHAPTER 4

Cisco ASR 903 Initial Configuration

This chapter guides you through a basic 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 the Cisco ASR 903 router from a console, you need to connect a terminal to the console port.

- Checking Conditions Prior to System Startup , on page 187
- Powering Up the Cisco ASR 903 Router, on page 188
- Configuring the Cisco ASR 903 Router at Startup, on page 191
- Safely Powering Off the Cisco ASR 903 Router, on page 194

Checking Conditions Prior to System Startup

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

- The Route Switch Processor (RSP) is installed.
- 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 with terminal emulation program is configured for 9600 baud, 8 data bits, 1 stop-bit, no parity, and flow control is set to none.
- You have selected passwords for access control.
- Captive installation screws are tight on all removable components.
- The console terminal is turned on.
- You have determined the IP addresses for the Ethernet and serial interfaces.
- Empty card slots or card bays are filled with card blanks. This ensures proper air flow through the chassis and electromagnetic compatibility (EMC).

Powering Up the Cisco ASR 903 Router

Make certain that all card slots and compartments are closed off. Install blank faceplates on any empty slots. Always have power supply slots filled. If you leave a power supply slot uncovered, then you risk exposure to hazardous voltages on the power pins on the midplane.



Warning Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the router; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the router. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

After installing your Cisco ASR 903 Router and connecting cables, start the router and follow these steps:

Procedure

Step 1 Activate the DC power supply using the steps described in Activating the DC Power Supply.

Caution
Do not press any keys on the keyboard until the messages stop and the SYS 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 process takes a few seconds), the Cisco ASR 903 Router RSP begins to initialize.

Note
This is only an example of what can display. The system boots differently depending upon the configuration that ships with your system.

Example:

Loading the Default System Boot Image

```
rommon 1 >
rommon 1 > boot
Located rp_super.ppc.nader.5g.evfc.bin
Image size 211681484 inode num 12, bks cnt 51681 blk size 8*512
################################################################################
##########################################
Boot image size = 211681484 (0xc9e00cc) bytes

Using midplane macaddr
Package header rev 0 structure detected
Calculating SHA-1 hash...done
validate_package: SHA-1 hash:
calculated 479a7d62:6c128ba8:3616b8da:93cb3224:5c1aeb34
expected 479a7d62:6c128ba8:3616b8da:93cb3224:5c1aeb34
Image validated


PPC/IOS XE loader version: 0.0.3
loaded at: 00800000 0D1E2004
```

```
image at: 00807673 009B8C69
initrd at: 009B9000 01006219
isord at: 01007000 0D1DF800
avail ram: 00400000 00800000

Kernel load:
Uncompressing image... dst: 00000000 lim: 00400000 start: 00807673 size: 001B15F6...done.
Now booting the IOS XE kernel

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Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706


Router# show version

Cisco IOS Software, IOS-XE Software (PPC_LINUX_IOSD-ADVENTERPRISEK9-M), Version 12.2(33)XNA, RELEASE
 SOFTWARE
Technical Support: http://www.cisco.com/techsupport
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Compiled Thu 01-May-08 00:29 by mcpre
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or the applicable URL provided on the flyer accompanying the IOS-XE
software.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html

If you require further assistance please contact us by sending email to
export@cisco.com.

cisco ASR903 processor with 541737K/6147K bytes of memory.
4 Gigabit Ethernet interfaces
32768K bytes of non-volatile configuration memory.
1869396K bytes of physical memory.
7798783K bytes of eUSB flash at bootflash:.


--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: no


Press RETURN to get started!


*Feb 19 17:34:27.361: % Error opening nvram:/ifIndex-table No such file or directory
*Feb 19 17:34:28.235: %ASR1000_MGMTVRF-6-CREATE_SUCCESS_INFO: Management vrf Mgmt-intf created with
 ID 4085, ipv4 table-id 0xFF5, ipv6 table-id 0x1E000001
```

```
*Feb 19 17:34:29.720: %PARSER-4-BADCFG: Unexpected end of configuration file.

*Feb 19 17:34:29.809: %NETCLK-5-NETCLK_MODE_CHANGE: Network clock source not available. The network
 clock has changed to freerun

*Feb 19 17:34:10.138: %CPPHA-7-SYSREADY: F0: cpp_ha: CPP client process FMAN-FP (5 of 5) ready.
*Feb 19 17:34:29.824: %LINK-3-UPDOWN: Interface GigabitEthernet0, changed state to up
*Feb 19 17:34:10.269: %IOSXE-6-PLATFORM: F0: cpp_cp: cpp_mlp_svr_client_bind: cpp_mlp_svr_ifm_init()
 successful
*Feb 19 17:34:10.362: %CPPHA-7-START: F0: cpp_ha: CPP 0 preparing image /usr/cpp/bin/cpp-mcplo-ucode
*Feb 19 17:34:10.473: %CPPHA-7-START: F0: cpp_ha: CPP 0 startup init image /usr/cpp/bin/cpp-mcplo-ucode
*Feb 19 17:34:14.688: %CPPHA-7-START: F0: cpp_ha: CPP 0 running init image /usr/cpp/bin/cpp-mcplo-ucode
*Feb 19 17:34:14.919: %CPPHA-7-READY: F0: cpp_ha: CPP 0 loading and initialization complete
*Feb 19 17:34:14.919: %CPPHA-6-SYSINIT: F0: cpp_ha: CPP HA system configuration start.
*Feb 19 17:34:15.179: %IOSXE-6-PLATFORM: F0: cpp_cp: Process CPP_PFILTER_EA_EVENT__API_CALL__REGISTER
*Feb 19 17:34:15.286: %CPPHA-6-SYSINIT: F0: cpp_ha: CPP HA system enabled.
*Feb 19 17:34:15.287: %CPPHA-6-SYSINIT: F0: cpp_ha: CPP HA system initializaton complete.
*Feb 19 17:34:30.823: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0, changed state
 to down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to administratively
 down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to administratively
 down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/2, changed state to administratively
 down
*Feb 19 17:35:12.865: %LINK-5-CHANGED: Interface GigabitEthernet0/0/3, changed state to administratively
 down
*Feb 19 17:35:13.865: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed
 state to down
*Feb 19 17:35:13.865: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed
 state to down
*Feb 19 17:35:13.866: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/2, changed
 state to down
*Feb 19 17:35:13.866: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/3, changed
 state to down
*Feb 19 17:35:19.167: %ASR1000_OIR-6-REMSPA: SPA removed from subslot 0/0, interfaces disabled
*Feb 19 17:35:19.171: %ASR1000_OIR-6-INSCARD: Card (fp) inserted in slot F0
*Feb 19 17:35:19.171: %ASR1000_OIR-6-ONLINECARD: Card (fp) online in slot F0
*Feb 19 17:35:19.187: %ASR1000_OIR-6-INSCARD: Card (cc) inserted in slot 0
*Feb 19 17:35:19.187: %ASR1000_OIR-6-ONLINECARD: Card (cc) online in slot 0
*Feb 19 17:35:19.189: %ASR1000_OIR-6-INSSPA: SPA inserted in subslot 0/0
*Feb 19 17:35:19.452: %SYS-5-RESTART: System restarted --
Cisco IOS Software, IOS-XE Software (PPC_LINUX_IOSD-ADVENTERPRISEK9-M), Version 12.2(33)XNA, RELEASE
 SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2008 by Cisco Systems, Inc.
Compiled Thu 20-Dec-07 18:10 by mcpre
*Feb 19 17:35:19.455: %SYS-6-BOOTTIME: Time taken to reboot after reload = 78809 seconds
*Feb 19 17:35:19.551: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Feb 19 17:35:19.551: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
*Feb 19 17:35:21.669: %DYNCMD-7-CMDSET_LOADED: The Dynamic Command set has been loaded from the Shell
 Manager
*Feb 19 17:35:22.221: %CRYPTO-6-ISAKMP_ON_OFF: ISAKMP is OFF
Router>
```

During the boot process, observe the system LEDs. The LEDs on the shared port adapter go on and off in an irregular sequence. Once the router has booted, the green STATUS 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 Troubleshooting.

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 router.

Checking Hardware and Software Compatibility

To check the minimum software requirements of the Cisco IOS software with the hardware installed on your Cisco ASR 903 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, click **Login** at Cisco.com, type **Software Advisor** in the search box, and click **Go**. Click the link for the Software Advisor Tool.

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

Configuring the Cisco ASR 903 Router at Startup

This section explains how to create a basic running configuration for your Cisco ASR 903 router.

Note You need to acquire the correct network addresses from your system administrator or consult your network plan to determine 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. The **show version** 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 command reference guides.

To configure a Cisco ASR 903 Router from the console, you must connect a terminal or terminal server to the console port on the Cisco ASR 903 Router RSP. To configure the Cisco ASR 903 Router using the management Ethernet port, you must have the router's IP address available.

Using the Console Interface

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

Procedure

Step 1 Your system is booting and if you answer 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 user EXEC mode. The following prompt appears:

Router>

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

Router > enable

Step 4 At the password prompt, enter your system password. If an enable password has not been set on your system, this step may be skipped. The following example shows entry of the password called *enablepass* :

Password: enablepass

Step 5 When your enable password is accepted, the privileged EXEC mode prompt appears: #

Step 6 You now have access to the CLI in privileged EXEC mode and you can enter the necessary commands to complete your desired tasks. 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, you must 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.

Note
This is only an example of the output display; prompts may vary.

When you see this information, you have successfully booted your router:

Example:

```
Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706
.
.
.
--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: yes

Press RETURN to get started!
```

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 asked if you would like 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. For detailed information about setting global parameters, refer to the *Cisco ASR 903 Router Software Configuration Guide.*

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 make to the configuration, use the EXEC mode **show startup-config** command to see the changes and copy run-start stored in NVRAM.

The ROMMON variable is set from factory to boot the IOS as -“BOOT=bootflash:Image/packages.conf”. However, the boot command is not pre-configured.

As the boot command is not configured, the router boots to ROMMON mode after the first power cycle, and the following message is displayed:

```
no valid BOOT image found
Final autoboot attempt from default boot device...
Located tracelogs.030
Image size 6181 inode num 13, bks cnt 2 blk size 8*512
Boot image size = 6181 (0x1825) bytes
Unknown image structure
boot: cannot determine first file name on device "bootflash:/"
rommon1>
```

To avoid the router booting into ROMMON state, it is highly recommended that you set the boot command prior to the first reload.

```
router(config)# boot system flash bootflash:/Image/asr903rsp1-universalk9.x.x.x.-ext.bin
```

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 configuration mode and the setup facility. If you fail to do this, your configuration will be lost the next time you reload the router.

Safely Powering Off the Cisco ASR 903 Router

This section explains how to shut down the Cisco ASR 903 Router. It is recommended that before turning off all power to the router, you issue the **reload** command. This insures that the operating system cleans up all the file systems. Once the reload operation is complete, then the Cisco ASR 903 Router can be powered off safely.

To remove power from the Cisco ASR 903 Router safely, follow this procedure and see the examples:

Procedure

Step 1 Slip on the ESD-preventive wrist strap that was 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 displays before powering off the system.

Example:

```
System Bootstrap, Version 12.2(33r)XN2, RELEASE SOFTWARE (fc1)
Technical Support: tap://www.cisco.com/techsupport
Copyright (c) 2008 by cisco Systems, Inc.
```

```
Current image running: Boot ROM0
Last reset cause: LocalSoft

ASR1000-RP1 platform with 4194303 Kbytes of main memory

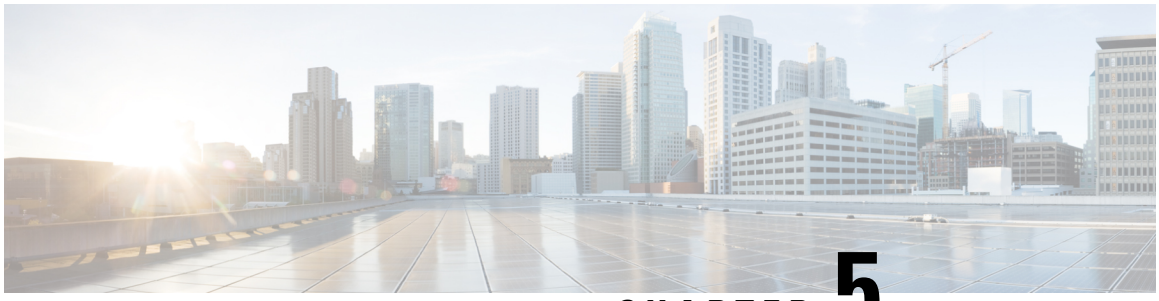
mcp-6ru-1-rp0-rommon 1>
```

Step 5 Remove any power cables from the Cisco ASR 903 Router.

a) For power supplies with a circuit breaker switch, position the switch to the Off (O) position.

b) For power supplies with a Standby switch, place the Standby switch in the Standby position.

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



CHAPTER 5

Troubleshooting

This chapter provides information for troubleshooting problems on the Cisco ASR 903 Router.

- BITS Port Pinout, on page 197
- GPS Port Pinout, on page 198
- Time of Day Port Pinout, on page 199
- Alarm Port Pinout, on page 200
- Console/Aux RJ45 RS232 Serial Port Pinout, on page 200
- T1/E1 Port Pinout, on page 207
- Serial Cable Pinouts, on page 208
- E and M Interface Module Pinouts, on page 210
- Management Ethernet Port Pinout, on page 210
- USB Console Port Pinout, on page 211
- USB Flash/MEM Port Pinout, on page 212
- Fiber-Optic Specifications, on page 212
- LED Summary, on page 213

BITS Port Pinout

The table below summarizes the BITS port pinout of the Front Panel “Building Integrated Timing Supply” RJ48 port.

Table 28: BITS Port Pinout

Pin	Signal Name	Direction	Description
1	RX Ring	Input	Receive Ring
2	RX Tip	Input	Receive Tip
3	—	—	Not used
4	TX Ring	Output	TX Ring
5	TX Tip	Output	TX Tip

Pin	Signal Name	Direction	Description
6	—	—	Not used
7	—	—	Not used
8	—	—	Not used

GPS Port Pinout

The platform is capable of receiving or sourcing GPS signals of 1 PPS & 10 MHz. These interfaces are provided by two mini-coax 50-Ohm, 1.0/2.3 DIN series connector on the front panel. Similarly there are two mini-coax 50-Ohm connectors provided in the front panel to output this 1PPS and 10MHz.

The table below summarizes the GPS port pinouts.

Table 29: GPS Port Pinout

	10 Mhz (input and output)	1PPS (input and output)
Waveform	Input—Sine wave Output—Square wave	Input—Rectangular pulse Output—Rectangular 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% duty cycle	26 microseconds
Rise Time	Input—AC coupled Output—5 nanoseconds	40 nanoseconds

Table 30: GPS Port Pinout for ASR 900 RSP3

	10 Mhz (input and output)	1PPS (input and output)
Waveform	Input—Sine wave Output—Sine and Square wave	Input—Rectangular pulse Output—Rectangular 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% duty cycle	26 microseconds

	10 Mhz (input and output)	1PPS (input and output)
Rise Time	Input—AC coupled Output—5 nanoseconds	40 nanoseconds

Time of Day Port Pinout

The table below summarizes the TOD pinout for A900-RSP2A and A900-RSP3-3C-400 modules.

Note This port requires the use of SHIELDED cable for GR-1089-core “Intra-Bldg lightning surge” protection. RS422 interface is per industry standard EIA-422 /RS422 specification.

Note In order to comply with IEEE 1613.1-2013 the cables used to connect the 10MHz and 1PPS ports to other equipment must be less than 2 meters long in order to protect these ports from exposure to damaging transients.

Note In order to comply with IEC 61850-3:2013 the 10MHz and 1PPS ports must be classified as Class 1 Reliability Level for Local Connection use in order to protect these ports from exposure to damaging transients.

Table 31: RJ48 IPPS/ToD Port Pinout

Pin	Signal Name	Direction	Description
1	RESERVED	Output or Input	V.11 Cable Corporation
2	RESERVED	Output or Input	
3	1PPS_N	Input	1PPS RS422 signal
4	GND	—	—
5		—	—
6	1PPS_P	Input	1PPS RS422 signal
7	TOD_N	Output or Input	Time of Day R422 output or input signal
8	TOD_P	Output or Input	Time of Day R422 output or input signal

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 32: 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 Pinout

The table below summarizes the external alarm input pinout.

Table 33: External Alarm Input Pinout

Pin	Signal Name	Description
1	ALARM0_IN	Alarm input 0
2	ALARM1_IN	Alarm input 1
3	—	No connect
4	ALARM2_IN	Alarm input 2
5	ALARM3_IN	Alarm input 3
6	—	No connect
7	—	No connect
8	COMMON	Alarm common

Console/Aux RJ45 RS232 Serial Port Pinout

The table below summarizes the console/aux RJ45 RS232 serial port pinout.

Table 34: Console/Aux RJ45 RS232 serial port

Pin	Signal Name	Direction	Description
1	RTS	Output	Request to send
2	DTR	Output	Data Terminal Ready (always On).
3	TXD	Output	Transmit data

Pin	Signal Name	Direction	Description
4	RI		Ring Indicator
5	GND		
6	RXD	Input	Receive data
7	DSR/DCD	Input	Data set ready/Data Carrier detect
8	CTS	Input	Clear to send

16 T1/E1 Interface Module Pinout

The table below summarizes the pinouts of the cable (Tyco part number 2163442-1, Cisco part number 72-5184-01) used to connect the T1/E1 interface module to the rear of the patch panel.

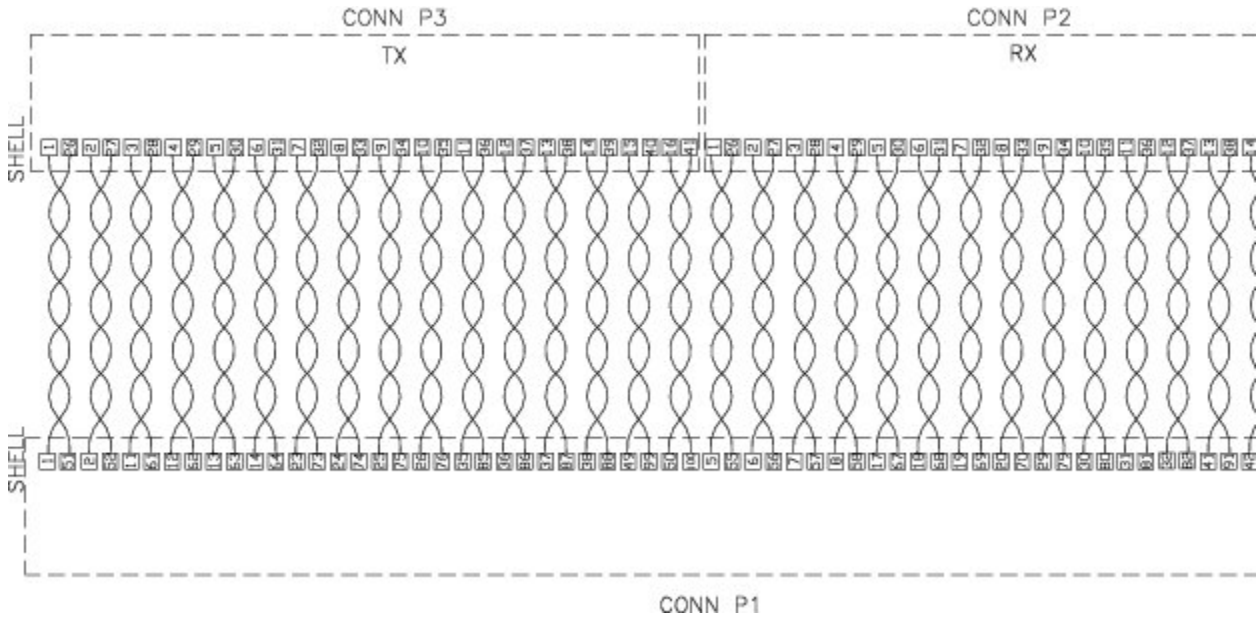
Table 35: 16 T1/E1 Interface Pinouts

Line	Board PIns	Signal Name	Telco TX	Jack Pin	Board Pins	Signal Name	Telco RX	Jack Pin
Line 0	88	TX_RING_P1	39	1	92	RX_RING_P1	39	4
	38	TX_TIP_P1	14	2	42	RX_TIP_P1	14	5
Line 1	87	TX_RING_P2	38	1	91	RX_RING_P2	38	4
	37	TX_TIP_P2	13	2	41	RX_TIP_P2	13	5
Line 2	76	TX_RING_P3	35	1	80	RX_RING_P3	35	4
	26	TX_TIP_P3	10	2	30	RX_TIP_P3	10	5
Line 3	75	TX_RING_P4	34	1	79	RX_RING_P4	34	4
	25	TX_TIP_P4	9	2	29	RX_TIP_P4	9	5
Line 4	100	TX_RING_P5	41	1	94	RX_RING_P5	41	4
	50	TX_TIP_P5	16	2	44	RX_TIP_P5	16	5
Line 5	99	TX_RING_P6	40	1	93	RX_RING_P6	40	4
	49	TX_TIP_P6	15	2	43	RX_TIP_P6	15	5
Line 6	86	TX_RING_P7	37	1	82	RX_RING_P7	37	4
	36	TX_TIP_P7	12	2	32	RX_TIP_P7	12	5
Line 7	85	TX_RING_P8	36	1	81	RX_RING_P8	36	4
	35	TX_TIP_P8	11	2	31	RX_TIP_P8	11	5

Line	Board Plns	Signal Name	Telco TX	Jack Pin	Board Pins	Signal Name	Telco RX	Jack Pin
Line 8	64	TX_RING_P9	31	1	68	RX_RING_P9	31	4
	14	TX_TIP_P9	6	2	18	RX_TIP_P9	6	5
Line 9	63	TX_RING_P10	30	1	67	RX_RING_P10	30	4
	13	TX_TIP_P10	5	2	17	RX_TIP_P10	5	5
Line 10	52	TX_RING_P11	27	1	56	RX_RING_P11	27	4
	2	TX_TIP_P11	2	2	6	RX_TIP_P11	2	5
Line 11	51	TX_RING_P12	26	1	55	RX_RING_P12	26	4
	1	TX_TIP_P12	1	2	5	RX_TIP_P12	1	5
Line 12	74	TX_RING_P13	33	1	70	RX_RING_P13	33	4
	24	TX_TIP_P13	8	2	20	RX_TIP_P13	8	5
Line 13	73	TX_RING_P14	32	1	69	RX_RING_P14	32	4
	23	TX_TIP_P14	7	2	19	RX_TIP_P14	7	5
Line 14	62	TX_RING_P15	29	1	58	RX_RING_P15	29	4
	12	TX_TIP_P15	4	2	8	RX_TIP_P15	4	5
Line 15	61	TX_RING_P16	28	1	57	RX_RING_P16	28	4
	11	TX_TIP_P16	3	2	7	RX_TIP_P16	3	5

The figure below shows the wiring schematic of the cable used to connect the T1/E1 interface module to the rear of the patch panel.

Figure 155: Wiring Schematic of Cable between 16 T1/E1 Interface and Patch Panel



32 T1/E1 Interface Module Pinout

The table below summarizes the pinouts of the cable used to connect the 32 T1/E1 interface module to the rear of the patch panel.

Table 36: 32 T1/E1 Pinout

Board Connector	Line	Board PIns	Signal Name	Telco TX	Jack Pin	Board Pins	Signal Name	Telco RX	Jack Pin
PORTS 0-15	Line 0	48	TX_RING_P0	39	1	66	RX_RING_P0	39	4
		14	TX_TIP_P0	14	2	32	RX_TIP_P0	14	5
	Line 1	47	TX_RING_P1	38	1	65	RX_RING_P1	38	4
PORTS 0-15		13	TX_TIP_P1	13	2	31	RX_TIP_P1	13	5
PORTS 0-15	Line 2	44	TX_RING_P2	35	1	62	RX_RING_P2	35	4
		10	TX_TIP_P2	10	2	28	RX_TIP_P2	10	5
PORTS 0-15	Line 3	43	TX_RING_P3	34	1	61	RX_RING_P3	34	4
		9	TX_TIP_P3	9	2	27	RX_TIP_P3	9	5
PORTS 0-15	Line 4	50	TX_RING_P4	41	1	68	RX_RING_P4	41	4
		16	TX_TIP_P4	16	2	34	RX_TIP_P4	16	5

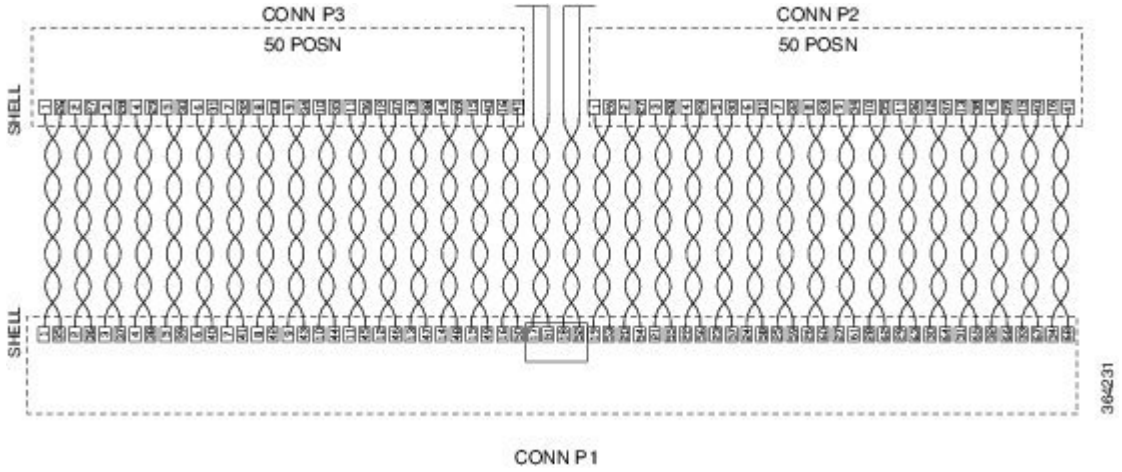
Board Connector	Line	Board PIns	Signal Name	Telco TX	Jack Pin	Board Pins	Signal Name	Telco RX	Jack Pin
PORTS 0-15	Line 5	49	TX_RING_P5	40	1	67	RX_RING_P5	40	4
		15	TX_TIP_P5	15	2	33	RX_TIP_P5	15	5
PORTS 0-15	Line 6	46	TX_RING_P6	37	1	64	RX_RING_P6	37	4
		12	TX_TIP_P6	12	2	30	RX_TIP_P6	12	5
PORTS 0-15	Line 7	45	TX_RING_P7	36	1	63	RX_RING_P7	36	4
		11	TX_TIP_P7	11	2	29	RX_TIP_P7	11	5
PORTS 0-15	Line 8	40	TX_RING_P8	31	1	58	RX_RING_P8	31	4
		6	TX_TIP_P8	6	2	24	RX_TIP_P8	6	5
PORTS 0-15	Line 9	39	TX_RING_P9	30	1	57	RX_RING_P9	30	4
		5	TX_TIP_P9	5	2	23	RX_TIP_P9	5	5
PORTS 0-15	Line 10	36	TX_RING_P10	27	1	54	RX_RING_P10	27	4
		2	TX_TIP_P10	2	2	20	RX_TIP_P10	2	5
PORTS 0-15	Line 11	35	TX_RING_P11	26	1	53	RX_RING_P11	26	4
		1	TX_TIP_P11	1	2	19	RX_TIP_P11	1	5
PORTS 0-15	Line 12	42	TX_RING_P12	33	1	60	RX_RING_P12	33	4
		8	TX_TIP_P12	8	2	26	RX_TIP_P12	8	5
PORTS 0-15	Line 13	41	TX_RING_P13	32	1	59	RX_RING_P13	32	4
		7	TX_TIP_P13	7	2	25	RX_TIP_P13	7	5
PORTS 0-15	Line 14	38	TX_RING_P14	29	1	56	RX_RING_P14	29	4
		4	TX_TIP_P14	4	2	22	RX_TIP_P14	4	5
PORTS 0-15	Line 15	37	TX_RING_P15	28	1	55	RX_RING_P15	28	4
		3	TX_TIP_P15	3	2	21	RX_TIP_P15	3	5
PORTS 16-31	Line 16	48	TX_RING_P16	39	1	66	RX_RING_P16	39	4
		14	TX_TIP_P16	14	2	32	RX_TIP_P16	14	5
	Line 17	47	TX_RING_P17	38	1	65	RX_RING_P17	38	4
PORTS 16-31		13	TX_TIP_P17	13	2	31	RX_TIP_P17	13	5

Board Connector	Line	Board PIns	Signal Name	Telco TX	Jack Pin	Board Pins	Signal Name	Telco RX	Jack Pin
PORTS 16-31	Line 18	44	TX_RING_P18	35	1	62	RX_RING_P18	35	4
		10	TX_TIP_P18	10	2	28	RX_TIP_P18	10	5
PORTS 16-31	Line 19	43	TX_RING_P19	34	1	61	RX_RING_P19	34	4
		9	TX_TIP_P19	9	2	27	RX_TIP_P19	9	5
PORTS 16-31	Line 20	50	TX_RING_P20	41	1	68	RX_RING_P20	41	4
		16	TX_TIP_P20	16	2	34	RX_TIP_P20	16	5
PORTS 16-31	Line 21	49	TX_RING_P21	40	1	67	RX_RING_P21	40	4
		15	TX_TIP_P21	15	2	33	RX_TIP_P21	15	5
PORTS 16-31	Line 22	46	TX_RING_P22	37	1	64	RX_RING_P22	37	4
		12	TX_TIP_P22	12	2	30	RX_TIP_P22	12	5
PORTS 16-31	Line 23	45	TX_RING_P23	36	1	63	RX_RING_P23	36	4
		11	TX_TIP_P23	11	2	29	RX_TIP_P23	11	5
PORTS 16-31	Line 24	40	TX_RING_P24	31	1	58	RX_RING_P24	31	4
		6	TX_TIP_P24	6	2	24	RX_TIP_P24	6	5
PORTS 16-31	Line 25	39	TX_RING_P25	30	1	57	RX_RING_P25	30	4
		5	TX_TIP_P25	5	2	23	RX_TIP_P25	5	5
PORTS 16-31	Line 26	36	TX_RING_P26	27	1	54	RX_RING_P26	27	4
		2	TX_TIP_P26	2	2	20	RX_TIP_P26	2	5
PORTS 16-31	Line 27	35	TX_RING_P27	26	1	53	RX_RING_P27	26	4
		1	TX_TIP_P27	1	2	19	RX_TIP_P27	1	5
PORTS 16-31	Line 28	42	TX_RING_P28	33	1	60	RX_RING_P28	33	4
		8	TX_TIP_P28	8	2	26	RX_TIP_P28	8	5
PORTS 16-31	Line 29	41	TX_RING_P29	32	1	59	RX_RING_P29	32	4
		7	TX_TIP_P29	7	2	25	RX_TIP_P29	7	5
PORTS 16-31	Line 30	38	TX_RING_P30	29	1	56	RX_RING_P30	29	4
		4	TX_TIP_P30	4	2	22	RX_TIP_P30	4	5

Board Connector	Line	Board PIns	Signal Name	Telco TX	Jack Pin	Board Pins	Signal Name	Telco RX	Jack Pin
PORTS 16-31	Line 31	37	TX_RING_P31	28	1	55	RX_RING_P31	28	4
		3	TX_TIP_P31	3	2	21	RX_TIP_P31	3	5

The table below shows the wiring schematic of the cable used to connect the 32 T1/E1 interface module to the rear of the patch panel.

Figure 156: 32 T1/E1 Wiring Schematic of Cable between 32 T1/E1 Interface and Patch Panel



8 T1/E1 Interface Module RJ48C Port Pinouts

Table 37: RJ48C Connector Pin-out for 8 T/E1 Interface Module

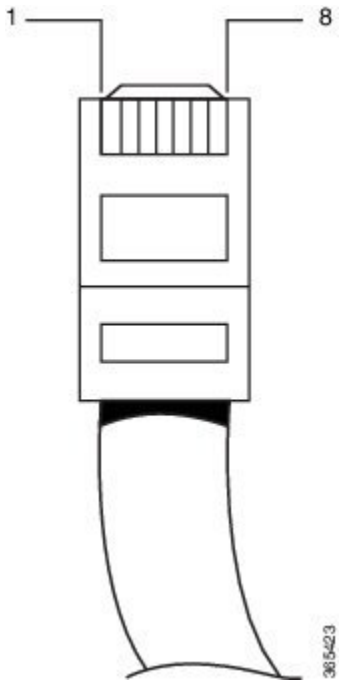
Pin	Signal	Direction	Description
1	RX_TIP	Input	Receive Tip
2	RX_RING	Output	Receive Ring
3	—	—	Not Connected
4	TX_TIP	Input	Receive Tip
5	TX_RING	Output	Receive Ring
6	—	—	Not Connected
7	—	—	Not Connected
8	—	—	Not Connected

T1/E1 Port Pinout

RJ48 T1/E1 Port Pinouts

The figure below shows the RJ48 connector wiring for the T1/E1 cable for the interface module. The table shows the pinout configuration for the RJ4C connectors for both the shielded and unshielded cables for either T1 or E1.

Figure 157: RJ48 Connector Wiring



The table below summarizes the RJ48 port pinout.

Table 38: RJ48 Port Pinouts

Shielded	**Unshielded**		
Pin	Description	Pin	Description
1	Receive Ring	1	Receive Ring
2	Receive Tip	2	Receive Tip
3	Receive Shield	3	
4	Transmit Ring	4	Transmit Ring
5	Transmit Tip	5	Transmit Tip
6	Transmit Shield	6	

Shielded	Unshielded		
7	Not Used	7	
8	Not Used	8	

The table below summarizes the RJ45 port pinout.

Table 39: RJ45 Port Pinout

Pin	Signal Name	Direction	Description
1	1PPS_P	Output or Input	1PPS RS422 signal
2	1PPS_N	Output or Input	1PPS RS422 signal
3	RESERVED	Output	Do NOT connect
4	GND		
5	GND		Time of Day character
6	RESERVED	Input	Do NOT connect
7	TOD_P	Output or Input	Time of Day character
8	TOD_N	Output or Input	Time of Day character

Serial Cable Pinouts

The following sections summarize the pinouts for 14-port serial interface module when used with the cable types specified in Connecting Serial Cables.

DB-9 Connector Pinouts

The table below summarizes the pinouts for each serial interface type when using a DB-9 connector.

Table 40: DB-9 Pin-outs

Pin	Standard DB-9	Direction	Description	RS-485	IRIG-B
1	NC	Output	Unused	NC	NC
2	RxD	Input	Receive	NC	NC
3	TxD	Output	Transmit	NC	IRIG-B (RS232)
4	DTR	Output	DTR	TxD-	IRIG-B- (RS485)
5	GND	—	GND	GND	GND

Pin	Standard DB-9	Direction	Description	RS-485	IRIG-B
6	DSR	Input	DSR	RxD-	NC
7	RTS	Output	RTS	TxD+	IRIG-B+
8	CTS	Input	CTS	RxD+	NC
9	NC/GND	—	Unused or Ring	NC	NC

Note Twisted Pairs are 2-5, 6-8, 4-7.

Note IRIG-B standards are not currently supported by software.

RJ-45 Connector Pinouts

The table below summarizes the pinouts for each serial interface type when using an RJ-45 connector.

Table 41: RJ45 Pinout

Pin	Standard DB-9	Direction	Description	RS-485	IRIG-B
1	RTS	Input	Ready to send	RxD+ (RS485)	NC
2	DTR	Input	DTR	RxD- (RS485)	NC
3	TxD	Input	Transmit	NC	NC
4	GND	—	Signal ground	Gnd	Gnd
5	GND	—	Signal ground	Gnd	Gnd
6	RxD	Output	Receive data	NC	IRIG-B (RS232)
7	DST	Output	DSR	TxD-	IRIG-B- (RS485)
8	CTS	Output	CTS	TxD+	IRIG-B+ (RS485)

Note Twisted Pairs are: 1-2, 3-6, 4-5, 7-8.

Note IRIG-B standards are not currently supported by software.

E and M Interface Module Pinouts

Table 42: RJ45 Front End Pinout

Pin	Signal	Description	Type 1	2	3	5	Usage
1	SIG_BAT_N48V	48V signaling battery	—	SB	SB	—	
2	M_SIG_IN	Signaling input	M				
3	RING_AUDIO_IN	Ring, audio input	R				Not used in 2-wire mode
4	RING_AUDIO_IN_OUT	Ring, audio input/ouput or output	R1				4-wire mode: Output 2-wire mode: InOut
5	TIP_AUDIO_IN_OUT	Tip, audio input/output or output	T1				
6	TIP_AUDIO_IN	Tip, audio input	T				Not used in 2-wire mode
7	E_SIG_OUT	Signaling output	E				
8	SIG_GND_RETURN	Signaling ground return	—	SG	SG	—	

Management Ethernet Port Pinout

A single management copper ENET port supporting 10/100/1000Base-T operation exists on each RSP. There is no direct access to the CPU of the other RSP. It uses a standard RJ45 jack.

Note This is not a data plane port.

The table below summarizes the Management Ethernet port pinout.

Table 43: Management Ethernet Port Pinout

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

USB Console Port Pinout

Two individual Type-A USB connector are used for USB console and USB mass storage. One single USB 2.0 Type-A receptacle is provided on the RSP front panel for providing console access to ROMMON, IOS-XE and diagnostics. It operates as a USB peripheral only for connection to an external host PC. This requires the use of a Type-A to Type-A connector instead of a standard USB cable.

Note The use of the USB console is mutually exclusive with the RS232 console/Aux port. While a USB cable is inserted, access is automatically switched to this port.

The other single USB 2.0 Type-A receptacle is provided on the RSP front panel for inserting external USB mass storage devices such as standard USB flash drives. It is used to load images, store configurations, write logs, etc. It supports operation up to 12Mbps.

The table below summarizes the USB console port pinout.

Table 44: Single USB Console Port

Pin	Signal Name	Direction	Description
A1	Vcc	—	+5VDC (500mA)
A2	D-	—	Data -
A3	D+	—	Data +
A4	Gnd	—	Ground

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

USB Flash/MEM Port Pinout

The table below summarizes the USB flash/MEM port pinout.

Table 45: Single USB Flash/MEM Port

Pin	Signal Name	Direction	Description
A1	Vcc	—	+5VDC (500mA)
A2	D-	—	Data -
A3	D+	—	Data +
A4	Gnd	—	Ground

Note USB TYPE-A receptacle used.

Note The USB flash/MEM port +5VDC is output. We provide power for USB flash/MEM, and it operates as a USB host device.

Fiber-Optic 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 .

Cabling Guidelines

The guidelines are recommended during the installation of fiber cables:

- Avoid the following actions that can stress the cable:
  - Pulling or stretching beyond the specified pulling load rate
  - Bending it beyond the specified bend radius

- Creating tension in the suspension runs

- Do not touch the fiber tips of fiber cables.
- Use single mode or multi-mode optical fiber cables as per the optical transceiver requirement.
- Use fiber cleaner to clean the fiber tip as well as transceiver before inserting the fiber cable into the optical transceiver during installation.
- To avoid excessive bending of fiber cable and efficient routing of cables, cable guides or cable brackets are recommended to be used with the chassis.

LED Summary

The following sections describe the meanings of the LEDs on the Cisco ASR 903 Router.

RSP LEDs

The table below summarizes the RSP LEDs for the supported RSP modules.



Note A major alarm condition indicates the failure of a single fan in the fan tray; a critical alarm indicates the failure of multiple fans. In the event that a single fan fails, the Cisco ASR 903 Router software adjusts the fan speed to prevent excessive heat within the chassis.

ASR900-RSP LED

Table 46: A900-RSP LEDs

LED	Color/State	Description (two LEDs for each port)
Power (PWR)	Off	Disabled/no power to RSP
	Green	Power rails on RSP in range
Status (STAT)	Off	Disabled/power down
	Red	Failure to boot (lit at reset)
	Yellow	Rommon booted
	Green	IOS booted and running
Active (ACT)	Off	Not available
	Yellow	Standby (indicates standby RSP)
	Green	Active (indicates active RSP)

LED	Color/State	Description (two LEDs for each port)
Management port (MGMT)	Off	No connection
	Green	Connected with no activity
	Flashing green	Connected with activity
Sync status (SYNC)	Off	Not enabled
	Yellow	Free run
	Flashing yellow	Holdover
	Green	Locked to source
USB flash (MEM)	Flashing green	USB activity
BITS	Off	Out of service/not configured
	Amber	Fault or loop condition
	Green	In frame/working properly

A900-RSP2 and A900-RSP3 LED Information

The PWR and STAT LEDs are available on the front panel. These LEDs provide power on the board (PWR) and overall router health (STAT) 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 47: A900-RSP2 and A900-RSP3 LED

PWR LED State	STAT LED State	Indication	Comment
Light Green	Red	Power is OK and the field-programmable gate array (FPGA) is nfigured successfully, but FPGA image validation failed.	Image validation failed. System is in hung state.

PWR LED State	STAT LED State	Indication	Comment
Flashing Light Green and Green alternatively	Off	FPGA configured and core validated successfully. FPGA image passed the control to micro-loader to boot ROMMON.	System is up with ROMMON. Both the FPGA image is validated successfully, but the booted ROMMON (primary or secondary) is undetermined.
	Amber	The digital code signing functionality reported upgrade FPGA image validation error and is continuing with the FPGA image.	System is up with ROMMON. FPGA image is validated successfully, but the booted ROMMON (primary or secondary) is undetermined.
	Red	The digital code signing functionality reported failure in the ROMMON image validation.	FPGA is up but both primary and secondary ROMMON failed. System is in hung state.
Green	Off	IOS is successfully booted	IOS writes into FPGA register to indicate that it has booted, FPGA stops flashing PWR LED and turns Green. Software now controls the STAT LED.

Interface Module LEDs

This LED summary applies to the following interface module:

- 8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module

The Status LED is Amber for the 10 Gigabit Ethernet ports when operating in WAN mode for the following:

- 8x1 Gigabit Ethernet SFP + 1x10 Gigabit Ethernet SFP+ Interface Module
- 8x1 Gigabit Ethernet RJ45 + 1x10 Gigabit Ethernet SFP+ Interface Module
- 2x10 Gigabit Ethernet SFP+ Interface Module

Table 48: Interface Module LEDs

LED	Color/State	Description
Power (PWR)	Off	Disabled/no power to IM
	Green	Enabled and power rails on IM in range
Status (STAT)	Off	Disabled/power-down
	Red	Failure (on at reset)
	Flashing Red	Booting (if local CPU)
	Green	Operational

LED	Color/State	Description
Link status (L)	Off	Inactive or no connection
	Amber	Fault/loop condition
	Green	Ok with activity or no activity
Speed (S)	Off	Inactive port status
	Green	Activity or no activity

OC-3 and OC-192 Interface Module LEDs

The table below summarizes the LEDs for the OC-3 and OC-192 interface module.

Table 49: Interface Module LEDs

LED	Color/State	Description
Power (PWR)	Off	Disabled/no power to IM
	Green	Enabled and power rails on IM in range
Status (STAT)	Off	Disabled/power-down
	Red	Failure (on at reset)
	Amber	Booting (if local CPU)
	Green	Operational
Carrier/Alarm (C/A)	Green	SFP receiving good remote signal
	Yellow	Remote or local alarm activated
Active/Loopback(A/L)	Green	SFP ready and operating normally
	Yellow	SFP port in loopback state

T1/E1 Interface Module LEDs

Table 50: 16-port T1/E1 Interface Module LEDs

LED	Color/State	Description (two LEDs for eachT1/E1 port)
Active	Green	Active
	Blinking green	Standby
	Off	Operationally down; card is disabled or shut down

LED	Color/State	Description (two LEDs for eachT1/E1 port)
Port	Green	All ports up
	Blinking green	All ports up and one or more ports in a loopback state
	Amber	One or more configured ports are down
	Blinking amber	One or more configured ports are down and at least one configured port is in a loopback state
	Off	All ports disabled or shut down
PWR	Green	All power rails are within supported range
	Red	Disabled
	Off	No power on the interface module
STAT	Red	Failed
	Off	Disabled or powered down
	Blinking red	Booting
	Green	Active

Table 51: 8-port T1/E1 Interface Module LEDs

LED	Color/State	Description (two LEDs for eachT1/E1 port)
Active	Green	Active
	Blinking green	Standby
	Off	Card is disabled or shut down
Port	Green	All ports up
	Amber	One or more configured ports are down
	Off	All ports disabled or shut down
PWR	Green	All power rails are within supported range
	Red	Disabled
	Off	No power on the interface module
STAT	Red	Failed
	Off	Disabled or powered down
	Green	Active

Table 52: 32-port T1/E1 Interface Module LEDs

LED	Color/State	Description (two LEDs for eachT1/E1 port)
Active	Green	Active
	Blinking green	Standby
	Off	Operationally down; card is disabled or shut down
Port	Green	All ports up
	Blinking green	All ports up and one or more ports in a loopback state
	Amber	One or more configured ports are down
	Blinking amber	One or more configured ports are down and at least one configured port is in a loopback state
	Off	All ports disabled or shut down
STAT	Green	Operational
	Pulsing Green	Booting
	Red	Failure; On at reset
	Off	Disabled or power down
PWR	Green	IM power rails are in range and are enabled
	Off	Disabled; No power to IM

Table 53: 48-port T1/E1 and 48-port T3/E3 interface Module LEDs

LED	Color/State	Description (two LEDs for eachT1/E1 port)
Active	Green	Active
	Blinking green	Standby
	Off	Card is disabled or shut down
Port	Green	All ports up
	Amber	One or more configured ports are down
	Off	All ports disabled or shut down
PWR	Green	All power rails are within supported range
	Red	Disabled
	Off	No power on the interface module

LED	Color/State	Description (two LEDs for eachT1/E1 port)
STAT	Red	Failed
	Off	Disabled or powered down
	Green	Active

Serial Interface Module LEDs

The table below summarizes the LEDs for the serial interface module.

Table 54: Cisco ASR 903 Router Serial IM LEDs

LED Label	Color/State	Meaning
Power (PWR)	Green	All power rails are within spec.
	Red	Disabled
	Off	No Power
Operating Status (STAT)	Red	Failure
	Yellow	Booting (if IM has a local CPU)
	Green	Operational
	Off	No Power
68-Pin Connector LEDs	Green	At least one of the 4 ports is in an up state.
	Blinking Green	At least one of the 4 ports is passing traffic
	Yellow	All four ports are successfully initialized and in a down state
	Blinking Yellow	At least one of the port has failed
	Off	All the ports are not enabled (at POR)
12-in-1 Connector LEDs	Green	Port is passing traffic
	Yellow	Port successfully initialized and in a down state
	Blinking Yellow	Port has failed
	Off	Not Enabled (at POR)

E and M Interface Module LEDs

The table below summarizes the LEDs for the E & M interface module.

Table 55: Cisco ASR 903 Router EandM IM LEDs

LED Label	Color/State	Description
Power (PWR)	Green	All power rails are within spec.
	Red	Disabled
	Off	No Power
Operating Status (STAT)	Red	Failure
	Yellow	Booting (if IM has a local CPU)
	Green	Operational
	Off	No Power
Port Bi-color LEDs	Green	Call established
	Blinking Green	Not used
	Yellow	Call not established
	Blinking Yellow	Not used
	Off	Initialized

4-Port C37.94 Interface Module LEDs

The table below summarizes the LEDs for the 37.94 interface module.

Table 56: Cisco ASR 903 Router C37.94 IM LEDs

LED Label	Color/State	Description
Power (PWR)	Green	All power rails are within spec.
	Red	Disabled
	Off	No Power
Operating Status (STAT)	Red	Failure
	Yellow	Booting
	Green	Operational
	Off	No Power
Rx LEDs	Green	Link up with activity
	Yellow	Fault/Error/Alarm/No Sync
	Off	Link Down

LED Label	Color/State	Description
Tx LEDs	Green	Link up with activity
	Yellow	Fault/Error/Alarm
	Off	Link Down

Power Supply LEDs

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

Table 57: DC Power Supply LEDs (A900-PWR-550-D)

LED	Color/State	Description
Input OK	Off	No Input Voltage
	Amber	Input voltage out of range
	Green	Input voltage within acceptable operating range
Output Fail	Off	Disabled/Forced Shut down/No input power
	Red	Power supply fault (internal failure such as over temperature)
	Green	Operational

Table 58: DC Power Supply LEDs (A900-PWR-1200-D)

LED	Color/State	Description
Input OK	Off	No Input Voltage
	Amber	Input voltage out of range
	Green	Input voltage within acceptable operating range
Output Fail	Off	Disabled/Forced Shut down/No input power
	Red	Power supply fault (internal failure such as over temperature)
	Green	Operational
	Blinking Red	Output ORING FET Failed

Table 59: AC Power Supply LEDs (A900-PWR-550-A) and (A900-PWR-!200-A)

LED	Color/State	Description
Input Power (PWR)	Off	No input voltage
	Amber	Input voltage out of range
	Green	Input voltage within acceptable operating range
Status (STAT)	Off	Disabled/power-down/no power
	Red	Power supply fault (internal failure)
	Green	Operational

Fan Tray LEDs

The table below summarizes the fan tray LEDs.

Table 60: Fan Tray LEDs

LED	Color/State	Description
Status (TEMP)	Off	Disabled/power down
	Amber	Over temperature
	Green	OK
Fan (FAN)	Green	Fan rotation in range
	Amber	Single fan fault
	Red	Two or more fan faults
Minor (MIN)	Off	No minor alarm
	Amber	Minor alarm
Major (MAJ)	Off	No major alarm
	Red	Major alarm
Critical (CRIT)	Off	No critical alarm
	Red	Critical alarm (defaults to ON upon RSP reset)

Alarm Conditions

The table below summarizes the meaning of alarm conditions on the Cisco ASR 903 Router.

Table 61: Alarm Condition Summary

Alarm Type	Alarm Description
Critical	RSP OIR
	Power supply OIR
	Port in down state
	Environmental sensor threshold exceeded (voltage, temperature)
	IM OIR
	IM crash
Major	Standby RSP in ROMmon mode
	RSP removed
	RSP failure
Info	Port administratively shut down



APPENDIX **A**

Site Log and Manufactures

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 performs tasks have access to it. Use the Installation Checklist (see Site Planning) to verify the steps in the installation and maintenance of your router. Site Log entries might include the following:

- Installation progress—Make a copy of the Cisco ASR 903 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 903 Router, update the Site Log to reflect the following:
    - Removal or replacement of interface modules, fan tray, power supplies, or RSPs
    - Configuration changes
    - Maintenance schedules and requirements
    - Maintenance procedures performed
    - Intermittent problems
    - Comments and notes

The tables below show a sample site log. Make copies of the sample or design your own site log to meet the needs of your site and equipment.

Table 62: Site Log

Date	Description of Action Performed or Symptom Observed	Initials

- Manufactures, on page 226

Manufactures

The table below lists the manufacturers for equipment used with the Cisco ASR 903 router.

Table 63: Manufactures

Manufacturer	Web Site or Phone Number	Products/Model
GAW[13]	Gaw Technology A Gaw Associates, Inc. Company Toll Free: 877-429-7225 Email: info@GawTechnology.com Website: www.GawTechnology.net	Air Plenum (GAW Part Number: 404ASR903PLM)
Burndy	http://www.burndy.com	Lugs

[13] For ordering, visit www.GawTechnology.net