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Cisco ASR 901S Series Aggregation Services Router Hardware Installation Guide

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CONTENTS

Preface

This section describes the objectives, audience, organization, and conventions of this document—*Cisco ASR 901S Series Aggregation Services Router Hardware Installation Guide.*

Audience

This guide is designed for personnel who install, configure, and maintain the router. These persons should be familiar with electronic circuitry and wiring practices and be experienced electronic or electromechanical technicians. They should also be familiar with network structures, terms, and concepts. This guide identifies certain procedures that should be performed only by trained and qualified personnel.

Organization

Chapter No.	Title	Description
Chapter 1	Introduction	Describes the hardware and features of the router.
Chapter 2	Preparing to Install the Router	Describes safety recommendations, safety warnings, site requirements, network connection considerations, required tools and equipment, and provides the installation checklist.
Chapter 3	Installing the Router	Includes router installation information, and shows how to connect the router cables and modules.

Chapter 4	Troubleshooting	Describes how to isolate problems, read LEDs, interpret error and status messages, and recover software images.
Appendix A	Specifications and Part Numbers	Provides information on part numbers of the router variants, SFP modules, product, power, and environmental specifications. It also contains safety and compliance information.
Appendix B	Cable Specifications	Provides cable specifications to use if you plan to build your own cables.
Appendix C	Site Log	Provides a sample site log.

Conventions

Table 1: Conventions Followed in This Document

Convention	Indication
bold font	Commands and keywords and user-entered text appear in **bold** font.
italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
[ ]	Elements in square brackets are optional.
{x | y | z }	Required alternative keywords are grouped in braces and separated by vertical bars.
[x | y | z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
`courier` font	Terminal sessions and information the system displays appear in `courier` font.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Note Means *reader take note*.

Tip Means *the following information will help you solve a problem*.

Caution Means *reader be careful*. In this situation, you might perform an action that could result in equipment damage or loss of data.

Warning **Means *reader be warned*. In this situation, you might perform an action that could result in bodily injury**.

Table 2: Conventions Followed in This Document

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Related Documentation

For additional information, refer to the following documents:

- *Cisco Regulatory Compliance and Safety Information for Cisco ASR 901S Series Aggregation Services Router*
- *Cisco ASR 901S Series Aggregation Services Router Software Configuration Guide*
- *Cisco ASR 901S Series Aggregation Services Router Command Reference*
- *Release Notes for Cisco ASR 901S Series Aggregation Services Router*

To access the related documentation on Cisco.com, go to:

http://www.cisco.com/en/US/partner/products/ps12077/tsd_products_support_series_home.html

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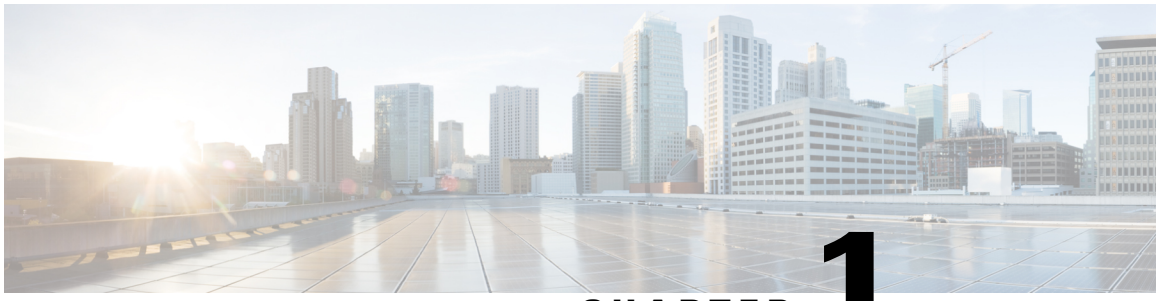


CHAPTER 1

Introduction

The ASR 901S Series Aggregation Services Router is a small cell, environmentally-hardened (IP65 rated), low-power, cost-effective router. This small cell router (SCR) is designed to support small cell networks to increase capacity and coverage, thereby reducing operational expenses.

These routers provide carrier class metro Ethernet access connectivity in small cell areas and support packet-based synchronization based on IEEE1588 and synchronous Ethernet.

The ASR 901S Series Aggregation Services Router is compact and can be easily deployed in challenging locations such as lamp posts, side walls, telephone poles, and cabinets.

Hardware Description

The ASR 901S Series Aggregation Services Router provides fixed port configuration that is supported on the FD and FA chassis models. These provide fixed 1 GE optical port for backhaul and 1 GE copper (Cu) port for downstream connectivity.

The router weighs 13.2 pounds (5.99 kgs [FD chassis model with two SFPs and antenna]) or 15. 8 pounds (7.2 kgs [FA chassis model with two SFPs and antenna]). It measures 16 inches high x 11 inches wide x 2.5 inches deep (40.64 cm x 27.94 cm x 6.35 cm).

For information about the chassis models for the ASR 901S Series Aggregation Services Router, see Components and Options, on page 71.

The ASR 901S Series Aggregation Services Routers provide the following hardware features:

- Four optical GE ports
- Two Cu 10/100/1000BASE-T ports
- One management Ethernet port
- One console port
- One alarm port with four dry-alarm inputs

- Three LEDs (System, Management, and Network/Link status)

Note The LEDs may be turned off in some chassis models using the Cisco IOS CLI.

- Wi-Fi interface
- Zero Touch Provisioning (ZTP)
- Fanless passively-cooled design
- DC and AC input options
- IP-65 compliant, sealed enclosure designed for outdoor deployment
- Mechanical mounting options to enable mounting on Alcatel Lucent (ALU) bracket, side walls, lamp posts, telephone poles, and cabinets.

The Cisco ASR 901S Series Aggregation Services Router has the following operational views:

- Front View
- Back View
- Top and Bottom Views

Cisco ASR 901S Series Aggregation Services Router: Front View

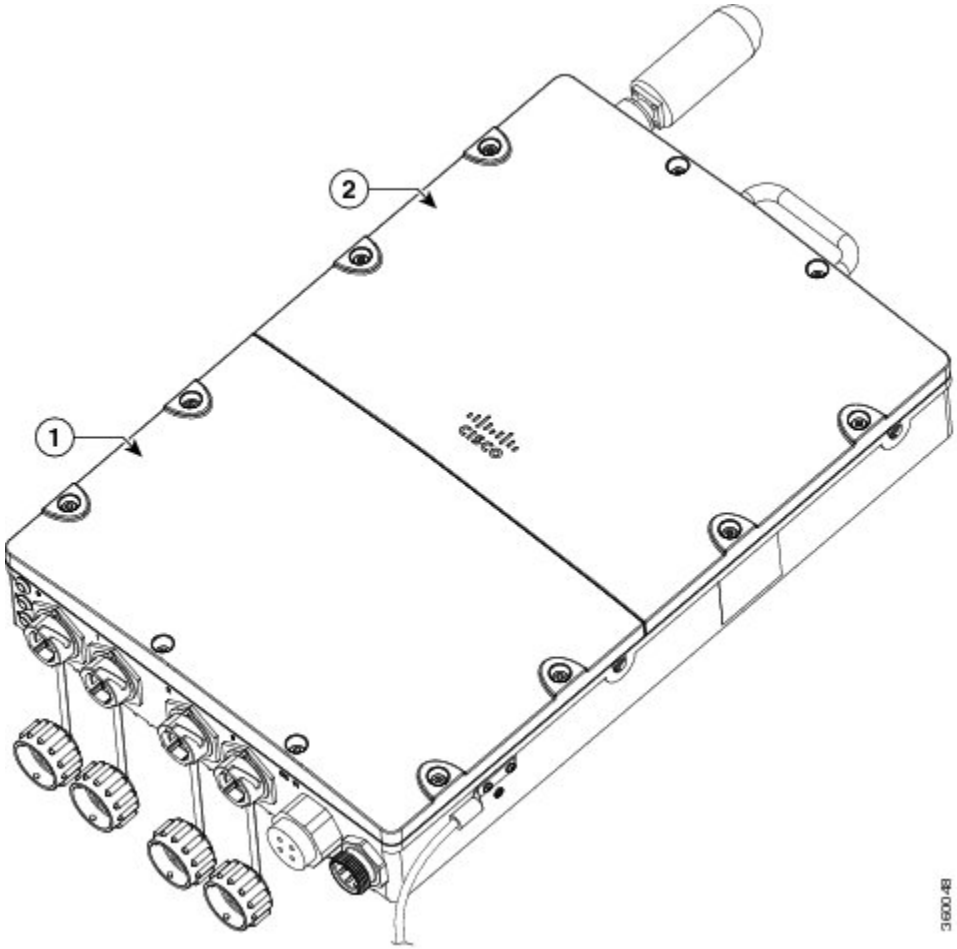
The Cisco ASR 901S Series Aggregation Services Router front view has two distinct two sections:

Upper Section

This section has a door that is fixed and sealed. It cannot be opened at the outside plant (OSP). This section houses the electrical circuitry of the router.

The following figure illustrates the front view of the router.

Figure 1: Cisco ASR 901S Series Aggregation Services Router—Front View



1	Lower section (detachable, houses the cable bay)	2	Upper section

Lower Section

This section of the router has a door that can be opened at the OSP. It houses the cable bay and provides access to the port interfaces and enables the ports to be serviced (like changing the optical modules, cables, and so on), when required.

Cable Bay—The cable bay is used to route and fix the cables to the bottom panel of the router and connect power. The FD chassis model has an onboard DC-input and the FA chassis model contains a AC power supply unit (PSU) that is housed on the right side, inside the cable bay.

The following figures shows the open view of the cable bay of the FD and FA router chassis models.

Figure 2: Cable Bay of the FD Chassis

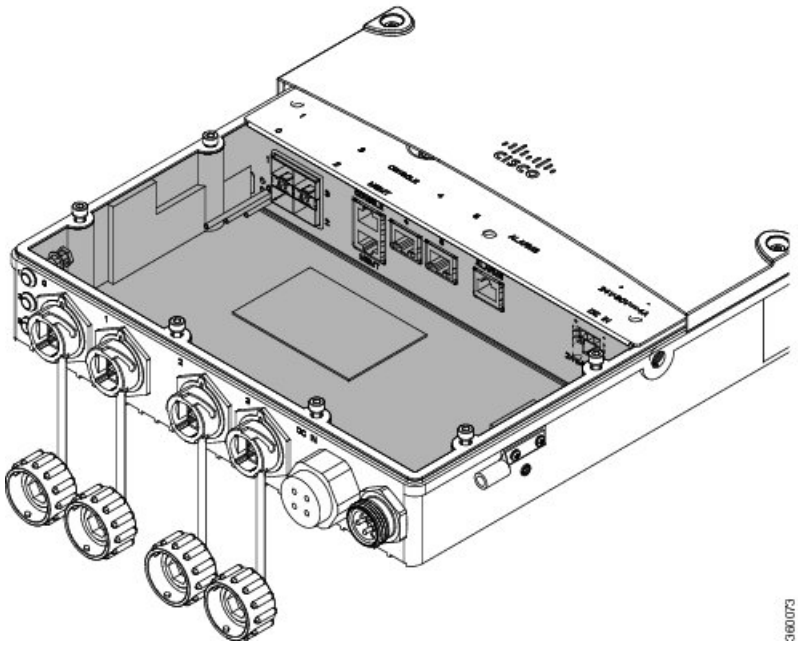
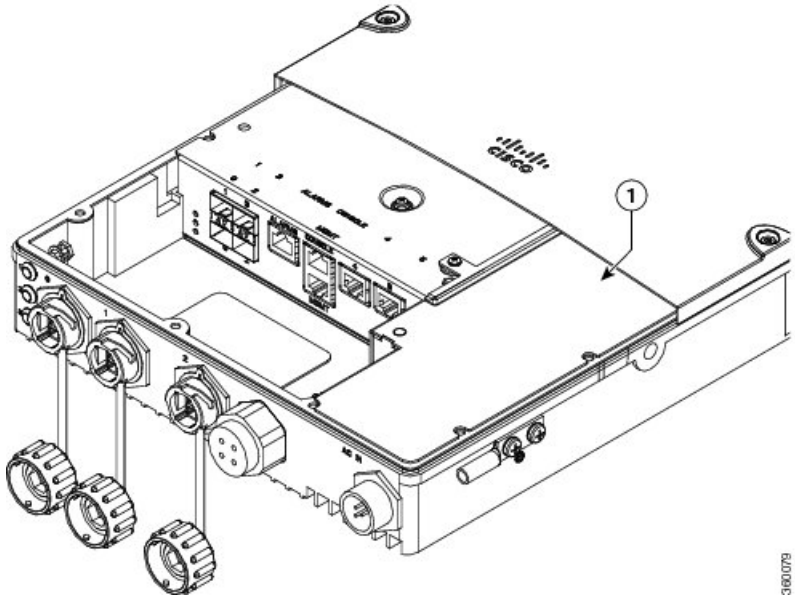


Figure 3: Cable Bay of the FA Chassis



1	AC power supply unit

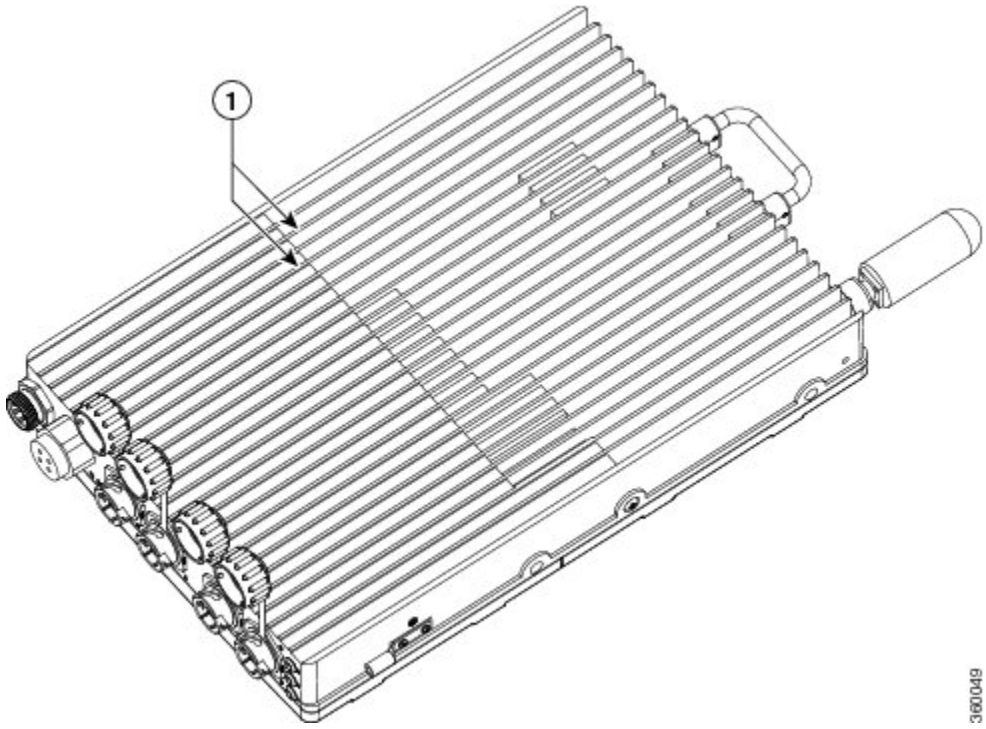
For details about the internal interfaces available in the cable bay, see Cisco ASR 901S Series Aggregation Services Router: Top and Bottom View, on page 5.

Cisco ASR 901S Series Aggregation Services Router: Back View

The Cisco ASR 901S Series Aggregation Services Router has an conduction-cooled fanless design. The back panel of the router acts as the heat sink for all the components.

The following figure illustrates the back view of the router, with heat sink fins.

Figure 4: Cisco ASR 901S Series Aggregation Services Router—Back View



1	Heat sink fins

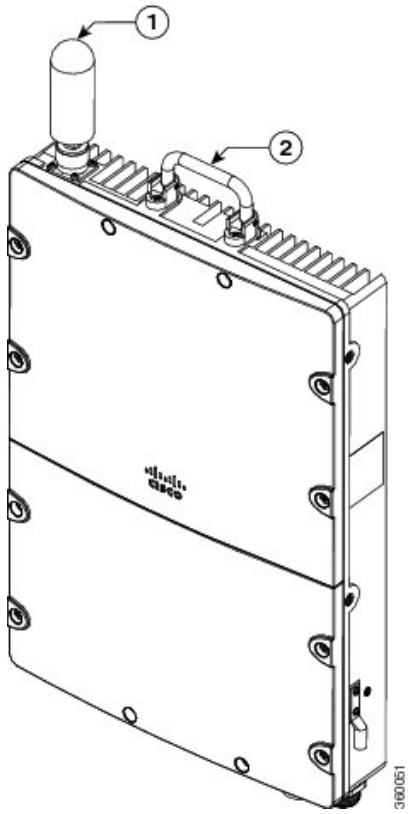
Cisco ASR 901S Series Aggregation Services Router: Top and Bottom View

At the top of the Cisco ASR 901S Series Aggregation Services Router is an antenna connector and a handle that helps to easily carry or remove the router.

The antenna connector provides support for integrated or external antennas. For detailed information about the router antenna, including installation instructions, see Antenna Installation and Replacement, on page 58.

The following figure shows the top view of the router.

Figure 5: Cisco ASR 901S Series Aggregation Services Router—Top View



1	Antenna	2	Router handle

The bottom of the router contains the following interfaces:

- **LEDs—**There are three LEDs are supported on the front plate of the router: System, Management, and Network/Link. The LEDs can be disabled using Cisco IOS CLIs.
- **Gigabit Ethernet SFP Ports—**The router supports four *SFP only* ports. The SFP ports support optical 1 GE ports.

Note The SFPs supported on the Cisco ASR 901S Series Aggregation Services Router is dependent on the router chassis model. For the list of SFPs supported on the router, see Table 5 in Product Specifications, on page 72.

- **Cable Gland Interface Port—**A cable gland interface is provided to thread management, alarm, console, and copper RJ45 cables when installing the router.
- **Power Supply—**The router is provided with a single AC power supply or DC power supply. The power input connector is located at the bottom of the router.

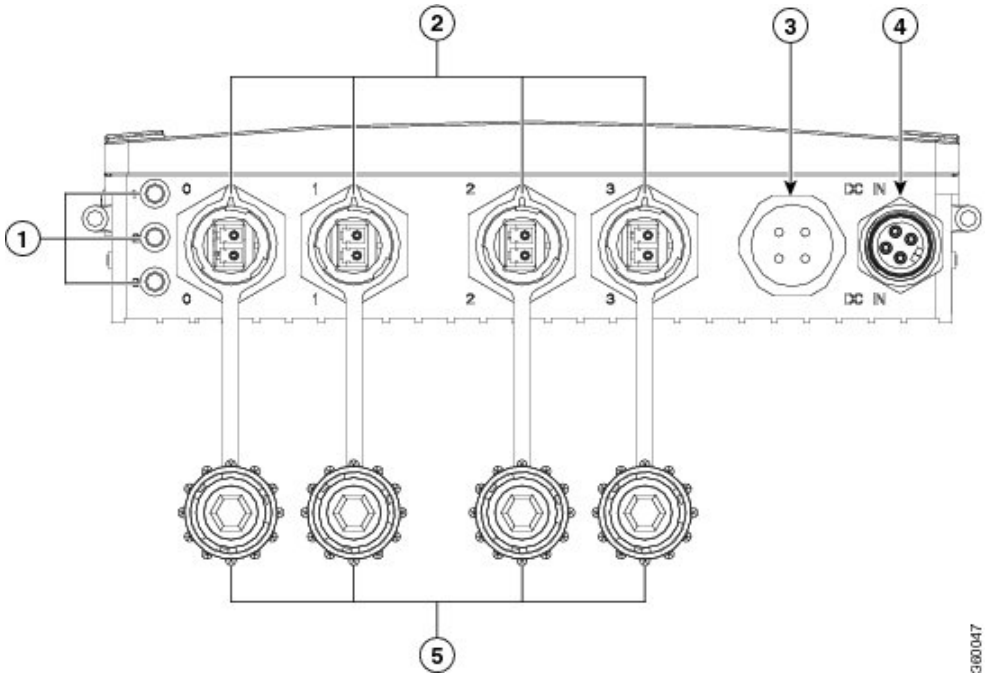
The FA model of the router is provided with a single AC power supply unit (PSU). This module supplies 54 VDC to the main board to power the main board and the power over Ethernet (POE) circuitry. The AC PSU can provide up to 120 W power.

The FD variant of the router has a built-in DC-input. The DC power supply is compatible with the range of DC input voltages specifically available at cell sites.

For details about the power specifications, see Table 7 in Product Specifications, on page 72.

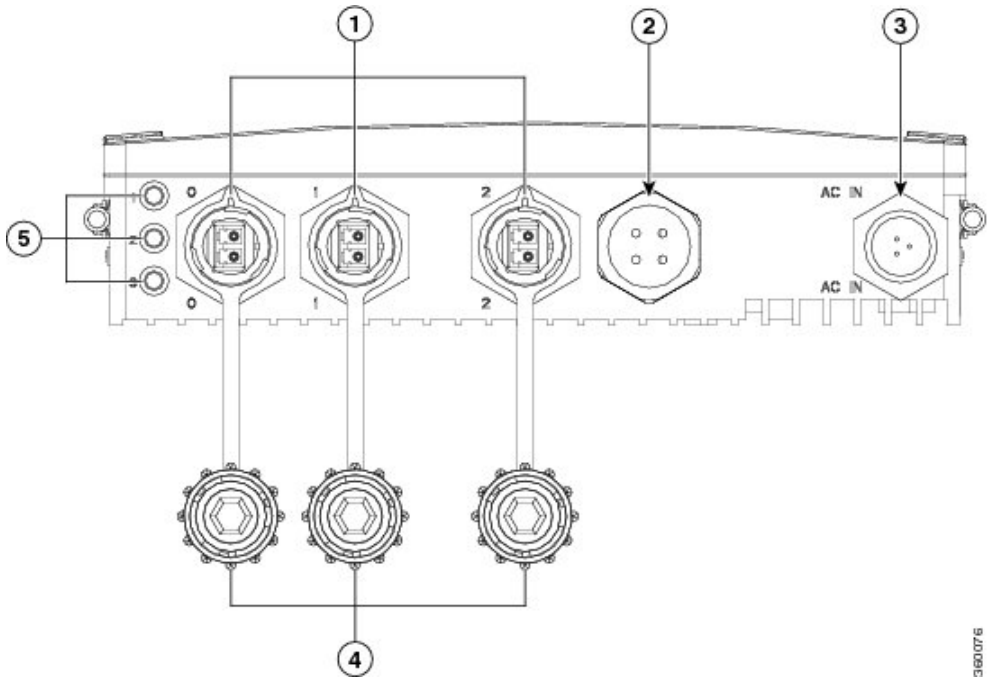
The following figures shows the bottom view of one of the FD and FA chassis models.

Figure 6: Cisco ASR 901S Series Aggregation Services Router—Bottom View (A901S-4SG-F-D)



1	LEDs	4	DC power input
2	SFP ports	5	Dust caps
3	Cable gland interface		—

Figure 7: Cisco ASR 901S Series Aggregation Services Router—Bottom View (A901S-2SG-F-AH)



1	SFP ports	4	Dust caps
2	Cable gland interface	5	LEDs
3	AC power input		—

The following table provides the list of interface ports supported on Cisco ASR 901S Series Aggregation Services Router.

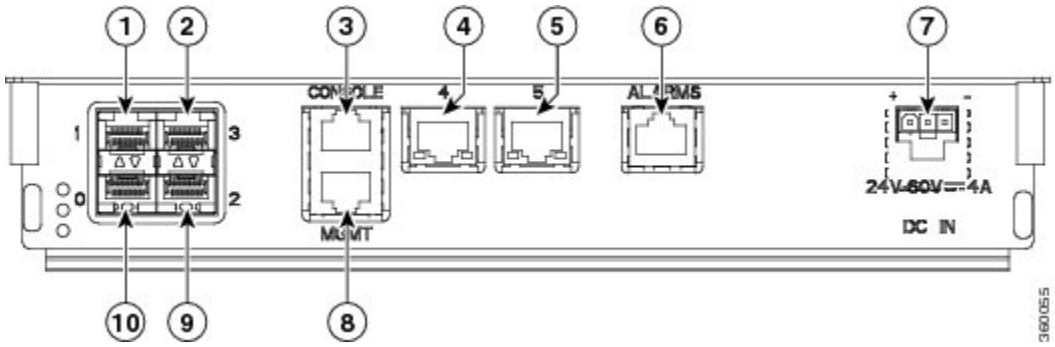
Table 3: Interface Ports Supported on the Cisco ASR 901S Series Aggregation Services Router

Chassis PID	Description
A901S-4SG-F-D	4 external SFP ports + 1 gland interface for internal ports, DC power supply
A901S-3SG-F-D	3 external SFP ports + 1 external copper (Cu) port + 1 gland interface for internal ports, DC power supply
A901S-2SG-D	2 external SFP ports + 2 external Cu ports + 1 gland interface for internal ports, DC power supply
A901S-3SG-F-AH	3 external SFP ports + 1 gland interface for internal ports, AC PSU, 1 sec holdover for 1 power over Ethernet plus (POE+)
A901S-2SG-F-AH	2 external SFP ports + 1 external Cu port + 1 gland interface for internal ports, AC PSU, 1 sec holdover for 1 POE+

The following section provides details about the internal interface ports (within the cable bay area) supported on Cisco ASR 901S Series Aggregation Services Router.

- **Gigabit Ethernet and Fast Ethernet Ports—**The router supports two Gigabit Ethernet and Fast Ethernet Cu (RJ45) ports. The ports support standard 100/1000 Base-T Ethernet features including auto-MDIX.
- **Management Ports—**The router supports two types of management port: an RS-232 serial console and 10/100 Base-T Ethernet ports. Both ports use the RJ45 connector and are accessible via the cable gland interface. .
  - The *RS-232 serial console port* can operate with flow control signals clear-to-send and ready-to-send and without flow controls. The default baud rate is 9600 and can be reconfigured to operate at a maximum baud rate of 115200.
  - The *10/100 Base-T Ethernet port* can auto-negotiate or force to operate at either 10 Mbps or 100 Mbps, half or full duplex. The traffic on this port is isolated from switching ports.
- **Alarm Inputs—** The router supports four dry-contact alarm inputs. These alarm inputs can be configured to trigger on open or closed, individually. Each input can be provisioned to generate minor, major, or critical alarms.

Figure 8: Cable Bay Interfaces (FD chassis)



1, 2, 9, 10	SFP ports	6	Alarm port
3	Console port	7	DC input port
4, 5	GE ports	8	Management port

For the list of interfaces supported on the FD and FA chassis, see Cisco ASR 901S Series Aggregation Services Router: Top and Bottom View, on page 5.

Safety Precautions

Observe the following general safety precautions and recommendations in planning the source power requirements for the Cisco ASR 901S Series Aggregation Services Router (for additional safety information, see Safety Guidelines, on page 13).

- Check the power at your site before router installation (and periodically after installation) to ensure clean power (free of spikes and noise) is being received.
- Always disconnect the power source and unplug the power cable before working on the router.
- Install proper grounding for the site to avoid damage from lightning and power surges.

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 RJ-45 connectors. Use caution when connecting cables. Statement 1021

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

Environmental Monitoring Temperature Sensor

The Cisco ASR 901S Series Aggregation Services Routers has a temperature sensor to detect over temperature conditions inside the chassis. The over temperature detection trips at 158°F (70°C). This condition is reported to the processor as an interrupt, where the software generates the appropriate alarms. If the router reaches a temperature of 181.4°F (83°C), the power supply cycles itself to prevent the router from exceeding the maximum temperature while being powered up.

The following table provides the over temperature alert settings.

Description	Threshold	Warning
Board temperature	181.4 to -40°F (83 to -40°C)	Enabled
Inlet temperature	181.4 to -40°F (83 to -40°C)	Enabled
CPU temperature	181.4 to -40°F (83 to -40°C)	Enabled

For environmental specifications, see table 8 in Product Specifications, on page 72.

External Connections and Chassis Cable Ports

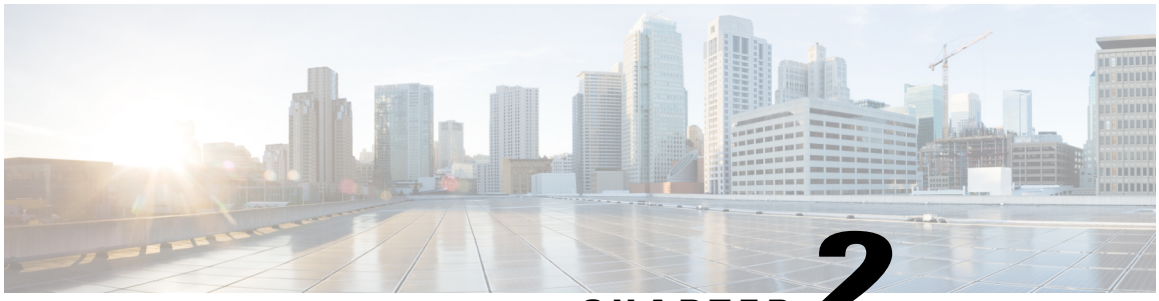
When connecting the router internal ports to external cables or exterior devices, the router cables must be threaded through the chassis cable ports designated for this purpose. Some chassis ports are reserved for specific cables and remaining ports can be used based on the network configuration and cabling requirements.

For details about the interfaces, see Cisco ASR 901S Series Aggregation Services Router: Top and Bottom View, on page 5.
The cable connectivity can be provided as follows:

- The power input is provided on the extreme right through an IP-65 compliant gland for DC. An ordinary DC cable can be routed through the gland. For AC inputs, a special IP-65 compliant connector system should be used. The AC input cable can be removed from the system without opening the door.
- Each SFP port is connected with an LC-LC patch cable from the SFP module to the bottom panel. For the external connectivity, an LC cable system with IP-65 sealing should be used.
- For configurations with two or three SFP ports, one or two copper ports will have an internal patch cable arrangement. For these configurations, an external RJ-45 connection with IP-65 sealing should be used.
- For configurations with four SFP ports, the RJ-45 connections for the copper ports with common copper cables (non IP-65 compliant) should be used. These cables can be routed through the four-wire gland shown adjacent to the power entry cable.
- The alarm port has a single Cat5e cable routed through the four-wire gland.
- The management, Ethernet, and console ports are usually not used in the OSP because the access to the router is limited (the Wi-Fi interface is used instead). However, when these ports are used, the corresponding cables should be routed through the four-wire gland.

Note In certain configurations, like 4 SFPs, 2 CUs, and alarm, it is not possible to route the console and management ports through the four-wire gland.

- For the optical ports, multimode patch cables are supplied by default with the router. The single mode cables can be ordered separately.



CHAPTER 2

Preparing to Install the Router

This chapter guides you through the process of preparing for your Cisco ASR 901S Series Aggregation Services Router installation. It contains safety information and warnings, site preparation details and instructions on unpacking the router. It contains the following sections:

Safety Guidelines

Before you begin installing the Cisco ASR 901S Aggregation Services Router, review the safety guidelines provided in the Safety Precautions, on page 9 and General Safety Information for Mounting, on page 24 to avoid injuries or damaging the equipment.

For safety and compliance information, see Table 9 in Product Specifications, on page 72.

In addition, before replacing, configuring, or maintaining the router, review the safety warnings listed in the document *Cisco Regulatory Compliance and Safety Information for Cisco ASR 901S Series Aggregation Services Router*.

Safety with Equipment

To ensure your safety and protect the equipment, follow these guidelines. However, these guidelines may not cover all potentially hazardous situations you may encounter during system installation, so *be alert.*

Warning Before connecting the system to the power source, read the installation instructions. Statement 1004

- 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 clean and dust-free.
- Keep tools and assembly components away from walk areas to avoid tripping over them.
- Do not work alone in potentially hazardous conditions.
- 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 hazardous to your eyes, wear safety glasses.

Safety with Electricity

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

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 RJ-45 connectors. Statement 1021

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

When working on electrical equipment, follow these guidelines:

- Locate the emergency power switch. If an electrical accident occurs, you can quickly switch off the power.
- Before working on the system, switch off the DC main circuit breaker and disconnect the power terminal block cable.
- Disconnect all power before performing the following :

  - 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 wet 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.
  - Switch 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 un-insulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- When installing or modifying telephone lines, use caution.

Preventing Electrostatic Discharge Damage

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.

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

Safety Warnings

This section contains important safety warnings for the installation and use of the router.

Translated versions of all safety warnings are available in the safety warnings document that shipped with your router, and which is available on Cisco.com.

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

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

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

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 Class 1 laser product. Statement 1008

Warning To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 181.4°F (83°C). Statement 1047

Prerequisites

Before installing the Cisco ASR 901S Series Aggregation Services Router, it is important to prepare for installation by :

- Preparing the site (site planning) and reviewing the installation plans or method of procedures (MOPs).
- Unpacking and inspecting the Cisco ASR 901S Series Aggregation Services Router.

Site Planning

Ideally, you should have prepared the installation site beforehand. As part of your preparation, obtain a plan of the site and the equipment rack where the Cisco ASR 901S Series Aggregation Services Router would be housed. Determine the location of any existing routers and their interconnections, including communications and power.

All personnel involved in the installation of the router including installers, engineers, and supervisors should participate in the preparation of a Method of Procedure (MOP) for approval by the customer.

Site Environment

Every network application is a unique installation. Before installing the Cisco ASR 901S Series Aggregation Services Router, you should perform a site survey to determine the optimum use of networking components and to maximize range, coverage, and network performance.

Consider the following operating and environmental conditions when performing a site survey:

- **Data rates—**Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. A decrease in receiver sensitivity occurs as the radio data increases.
- **Antenna type and placement—**Proper antenna configuration is a critical factor in maximizing radio range. As a general rule, range increases in proportion to antenna height. However, do not place the antenna higher than necessary, because the extra height also increases potential interference from other unlicensed radio systems and decreases the wireless coverage from the ground.
- **Physical environment—**Clear or open areas provide better radio range than closed or filled areas.

  Always follow ESD-prevention procedures described in Preventing Electrostatic Discharge Damage, on page 15 to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- **Obstructions—**Physical obstructions such as buildings, trees, or hills can hinder performance of wireless devices. Avoid locating the devices in a location where there is an obstruction between the sending and receiving antennas.

Method of Procedure

Part of site preparation includes reviewing installation plans or method of procedures (MOPs). An example of a MOP that includes pre-installation checklist of tasks, considerations to address and agree upon before proceeding with the installation, is as follows:

- Read this hardware installation guide.
- Assign personnel.
- Determine protection requirements for personnel, equipment, and tools.
- Evaluate potential hazards that may affect service.
- Schedule time for installation.

- Determine space requirements.
- Determine power requirements.
- Identify required procedures or tests.
- Make a preliminary plan that locates each Cisco ASR 901S Series Aggregation Services Router that you plan to install.
- Verify the list of replaceable parts for installation (screws, bolts, washers, and so on).
- Check the required tools list to make sure the necessary tools and test equipment are available (see Customer-Supplied Materials and Tools, on page 29).
- Perform the installation.

Installation Checklist

To assist you with your installation and to provide a historical record of completed tasks and users, use the following installation checklist. Make a copy of this checklist and mark the entries as you complete each task. When the checklist is completed, include a copy of the checklist for each router in your site log along with other records for your new router. For information on the site log, including a sample site log, see Site Log, on page 85.

Installation Checklist for Site:

Router Name:

Sl. No.	Task	Verified by	Date
1	Installation checklist copied		
2	Background information placed in site log		
3	Site power voltages verified		
4	Installation site power check completed		
5	Required tools available		
6	Additional equipment available		
7	Router received		
8	Documentation DVD received (if ordered)		
9	Cisco Information Packet publication received		
10	Chassis components verified		
11	Initial electrical connections established		

12	ASCII terminal (for local configuration) or modem (for remote configuration)		
13	Signal distance limits verified		
14	Start-up sequence steps completed		
15	Initial operation verified		
16	Software image verified		

Unpacking the Router

Procedure

Step 1 Open the shipping container and carefully remove the contents.

Tip When you unpack the router, do not remove the foam blocks attached to antennas and antenna connectors. The foam protects the antennas and connectors during installation.

Step 2 Return all packing material to the shipping container, and save it.

Note Do not discard the packaging materials used in shipping your Cisco ASR 901S Series Aggregation Services Router. You will need the packaging materials in the future if you move or ship the router.

Step 3 Ensure that all items listed in Router Package Contents, on page 19 are included in the shipment. If any item is damaged or missing, notify your authorized Cisco sales representative.

Router Package Contents

Your router kit contains the items listed in the following table:

Qty.	Item	Description
1	Router	Cisco ASR 901S Series Aggregation Services Router For details about the chassis models, see Components and Options, on page 71
1	Accessory kit	For DC routers: • Two-hole lug, 6-AWG ground wire, number10 blue stud (part number: 32-0619-01) • Four pan-head Phillips grounding lug screws used to attach the lug to the router (part number: 48-0501-01)

Qty.	Item	Description
		For AC routers: • Two-hole lug, 6-AWG ground wire number 10 blue stud (part number 32-0619-01) • Four pan-head Phillips grounding lug screws used to attach the lug to the router (part number: 48-0501-01)
1	Console cable	RJ-45-to-DB-9
1	Grounding kit	• Two grounding lug and four screws • Paste PENA 1/2 Burndy Pentrone For details, see Grounding the Router, on page 44
	Optional Items (Ordered Separately)	
1	Pole mount kit	• Pole clamp bracket • Two pole clamp gussets • Required hardware For details, see Pole Mount Kit, on page 25
1	Wall mount kit	• Mounting bracket • Required hardware For details, see Wall Mount Bracket Kit, on page 27
1	Band strap kit	Two steel straps. For details, see Band Strap Kit, on page 28
1	Strap tool kit	BAND-IT strap tool. For details, see Strap Tool Kit, on page 28
1	Antenna plug	For details about the antenna, see Antenna Installation and Replacement, on page 58
1	Security tool	Used to remove security screws from the router top cover. See Opening the Router Door, on page 47.
1	Cisco Information Packet publication	

Inspect all items for shipping damage. If an item appears to be damaged, or if you encounter problems installing or configuring your router, contact customer service. The *Cisco Information Packet* provides warranty, service, and support information.

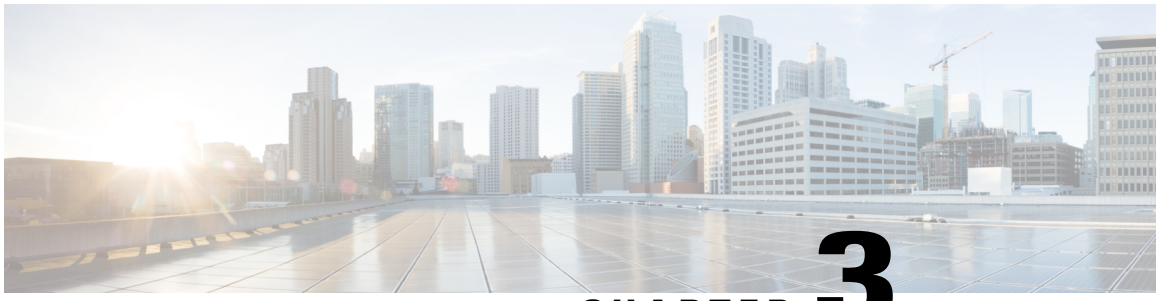
Installation Checklist

To assist you with your installation and to provide a historical record of completed tasks and users, use the following installation checklist. Make a copy of this checklist and mark the entries as you complete each task. When the checklist is completed, include a copy of the checklist for each router in your site log along with other records for your new router. For information on the site log, including a sample site log, see Site Log, on page 85.

Installation Checklist for Site:

Router Name:

Sl. No.	Task	Verified by	Date
1	Installation checklist copied		
2	Background information placed in site log		
3	Site power voltages verified		
4	Installation site power check completed		
5	Required tools available		
6	Additional equipment available		
7	Router received		
8	Documentation DVD received (if ordered)		
9	Cisco Information Packet publication received		
10	Chassis components verified		
11	Initial electrical connections established		
12	ASCII terminal (for local configuration) or modem (for remote configuration)		
13	Signal distance limits verified		
14	Start-up sequence steps completed		
15	Initial operation verified		
16	Software image verified		



CHAPTER 3

Installing the Router

This chapter describes the safety information, equipment, and procedures required to mount the Cisco ASR 901S Series Aggregation Services Router onto a vertical pole, wall, H-frame, or cabinet. This chapter contains these sections:

Mounting Kits Overview

You will need some or all of the kits described in this section to install the router in the outside plant (OSP). Your installation environment and requirements determine the kits you need.

The includes a detailed description of each kit.

Cisco Product ID (PID)	Name	Description
-	Wall Mount Bracket Kit, on page 27	This kit is required if your installation requires a Cisco mounting bracket to mount the router. This kit is included with the router accessory kit, and is used with the pole kit and includes the hardware required to attach the mounting bracket onto the pole clamp bracket.
CGR-PMK1000	Pole Mount Kit, on page 25	This kit is required for all pole or streetlight installations and includes a mounting bracket, pole clamp bracket, pole clamp gusset, and the hardware required to attach the pole clamp bracket assembly to a pole.
CGR-PMK-BAND	Band Strap Kit, on page 28	This kit includes two steel straps for mounting the router on poles larger than 5 inches (14 cm) in diameter. This kit is used together with the Pole Mount Kit, on page 25. A Band-It Tool is required to install the steel straps on a pole.
AIR-BAND-INST-TL=	Strap Tool Kit, on page 28	This kit includes a Band-It tool that is required when using steel straps to install the router on poles larger than 4.5 inches (11.4 cm) in diameter.

General Safety Information for Mounting

Before performing any of the tasks in this chapter, read the safety warnings in this section and the Safety Guidelines, on page 13.

Two technicians are required to properly and safely mount the router.

Caution All mounting methods at any location are subject to the acceptance of local jurisdiction.

Caution The mounting surface, attaching screws, and optional wall anchors must be able to support 13.2 pounds (5.99 kgs [FD chassis model with two SFPs and antenna]) or 15. 8 pounds (7.2 kgs [FA chassis model with 2 SFPs and antenna]) static weight.

Caution Personnel mounting the router must understand grounding methods.

Warning Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54). Statement 1052

Contents of the Mounting Kits

This section describes the contents of the mounting kits available for the router and when you should use each kit.

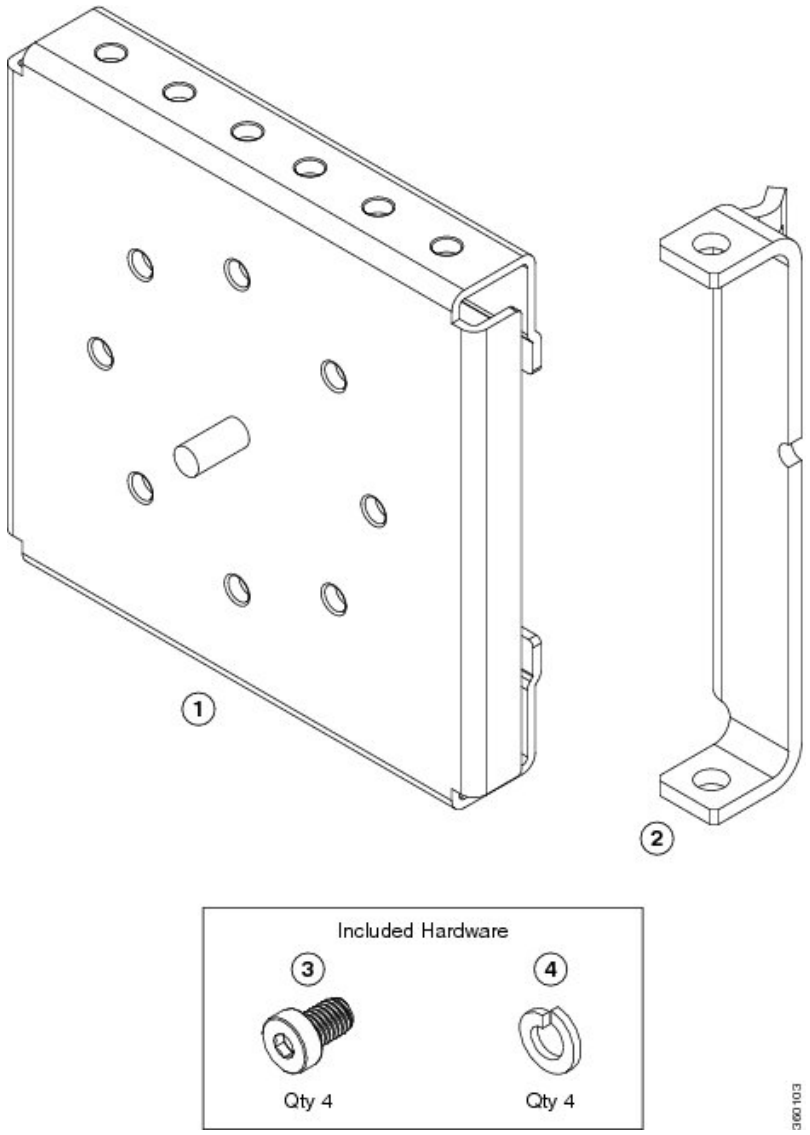
Pole Mount Kit

Use the Cisco pole mount kit to install the pole clamp bracket onto any pole or streetlight. The kit supports poles that meet the following criteria:

- **Size:** 2 to 16 inch diameter poles

- **Material:** Metal, wood, or fiberglass poles

Figure 9: Pole Mount Kit Contents



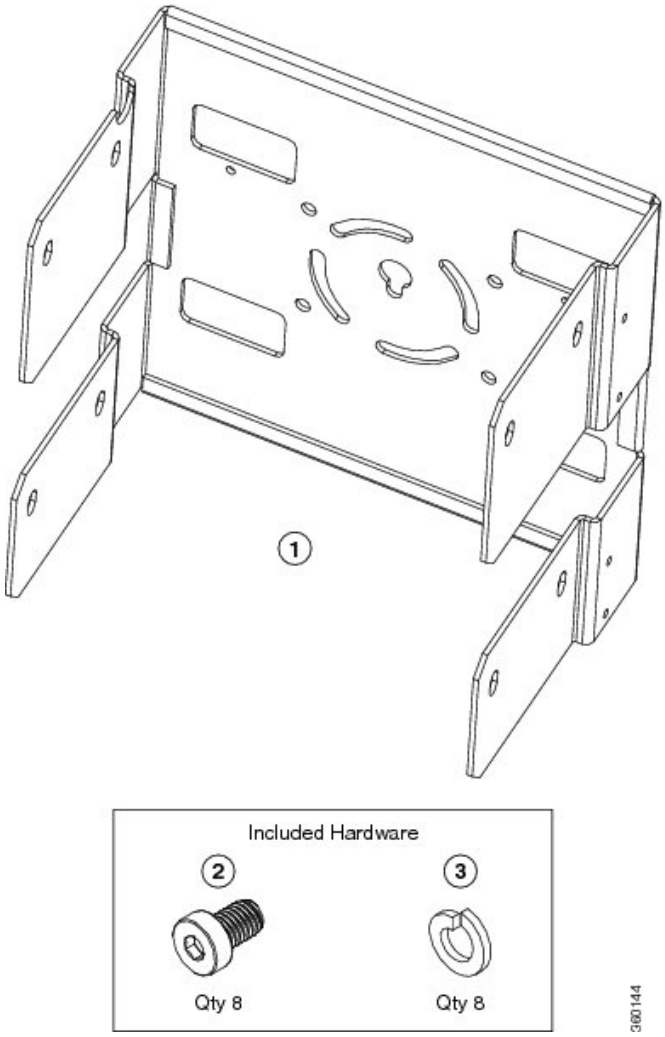
Item	Name	Qty.	Description
1	Pole clamp bracket	1	Install pole clamp bracket onto a pole. Wall mount bracket attaches to pole clamp.
2	Pole clamp gusset	2	Use the pole clamp gusset to install the pole clamp bracket onto a pole.
3	M8 x 12 screw	4	Use the included hardware to attach the pole clamp bracket onto the pole, as described in Mounting the Router onto a Pole, on page 33.
4	M8 spring washer	4	

Wall Mount Bracket Kit

Use the wall mount bracket kit if you require a Cisco mounting bracket. The wall mount bracket is attached to a wall or to the pole clamp bracket assembly and then the router is installed onto the wall mount bracket.

Note This wall mount bracket is used with the Cisco Pole Mount Kit, on page 25.

Figure 10: Wall Mount Bracket Kit Contents



Item	Name	Qty.	Description
1	Wall mount bracket	1	Mounts onto a wall or to a pole clamp bracket assembly, which is installed on a pole.

2	M8 x 12 screw	8	Use this hardware to attach the wall mount bracket to the wall or to the pole clamp bracket, and the router to the wall mount bracket. Assemble the pole clamp bracket, pole clamp gusset, screw, and washer as described in Assembling the Pole Clamp Bracket and the Pole Clamp Gusset, on page 30. Use the included hardware to attach the pole clamp bracket onto the pole, as described in Mounting the Router onto a Pole, on page 33 and to attach the wall mount bracket onto the wall, as described in Mounting the Router onto a Wall, on page 40.
3	M8 spring washer	8	

Band Strap Kit

Use the straps in the Band Strap Kit when you mount the router on a pole larger than 4.5 inches (11.4 cm) in diameter. This installation also requires the Pole Mount Kit, on page 25 and the Strap Tool Kit, on page 28.

Figure 11: Band Strap Kit Contents

Item	Qty.	Description
1	2	Steel straps

Strap Tool Kit

Use the tool in the Strap Tool Kit to attach the steel straps included in the Strap Tool Kit, on page 28. Steel straps are required to install the mounting plate on poles larger than 4.5 inches (11.4 cm) in diameter.

Note The tool in the Strap Tool Kit is manufactured and supported by BAND-IT. For more information about the tool, see www.band-it-idex.com.

Figure 12: Band Strap Kit Contents

Item	Description
1	Strap tool
2	Strap tool documentation (not shown)

Customer-Supplied Materials and Tools

You must supply some or all of these items to mount the router onto a pole or wall. The items you supply depends on the installation procedure that you use.

Item	Required for These Procedures
13-mm box-end wrench or socket set	Assembling the Pole Clamp Bracket and the Pole Clamp Gusset, on page 30
M8 x 12 screws and M8 spring washers	Assembling the Pole Clamp Bracket and the Pole Clamp Gusset, on page 30
Drill and drill bit	Mounting the Router onto a Wall, on page 40

Phillips screwdriver, or other screwdriver for cross-recessed screws	Grounding the Router, on page 44
Crimping tool or pliers	Grounding the Router, on page 44
Grounding block	Grounding the Router, on page 44
Grounding rod	Grounding the Router, on page 44

Router-Mounting Instructions

This section includes all the procedures required to mount the router onto any supported pole type, wall, or cabinet.

Router Orientation

When mounting the router, ensure that:

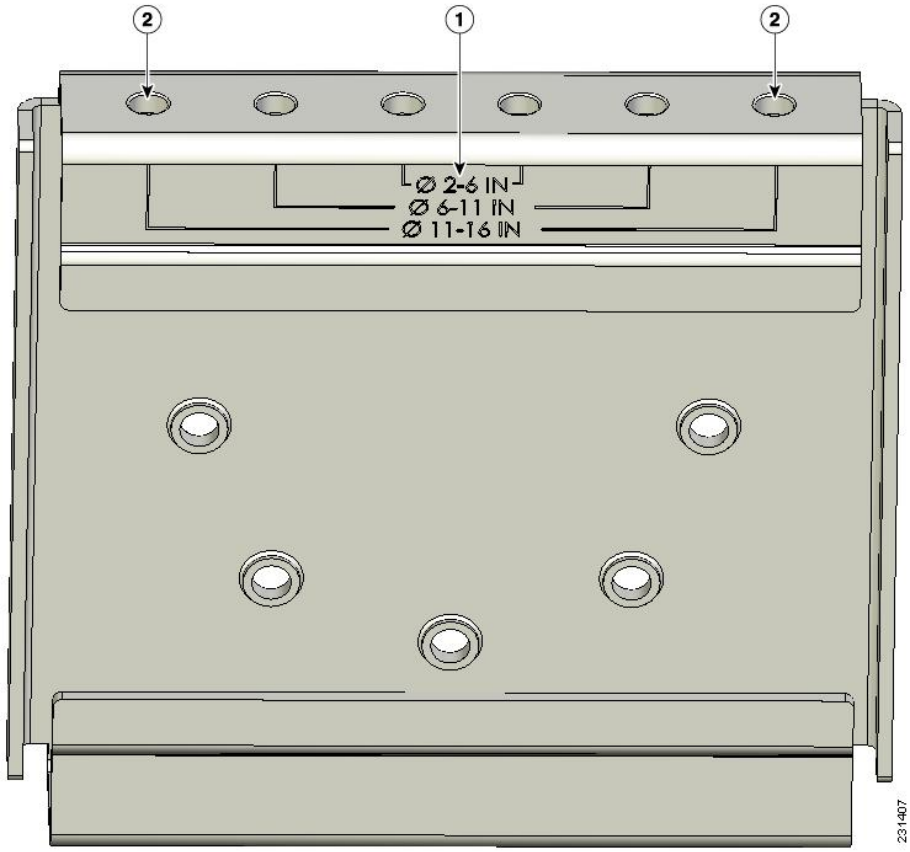
- The router is oriented with the chassis cabling openings pointing down so the router cables can be correctly connected through the openings and so the router door opens correctly.
- The router is mounted with the access cover facing out.

Assembling the Pole Clamp Bracket and the Pole Clamp Gusset

The pole mount kit contains several parts that you must assemble prior to mounting onto a pole. First you need to assemble two pole clamp gussets on the pole clamp bracket that are positioned for the pole diameter

you are using to mount the router. The following figure illustrates the pole diameter indicators and bolt holes on the pole clamp.

Figure 13: Pole Clamp Bracket Adjustment Hole Locations

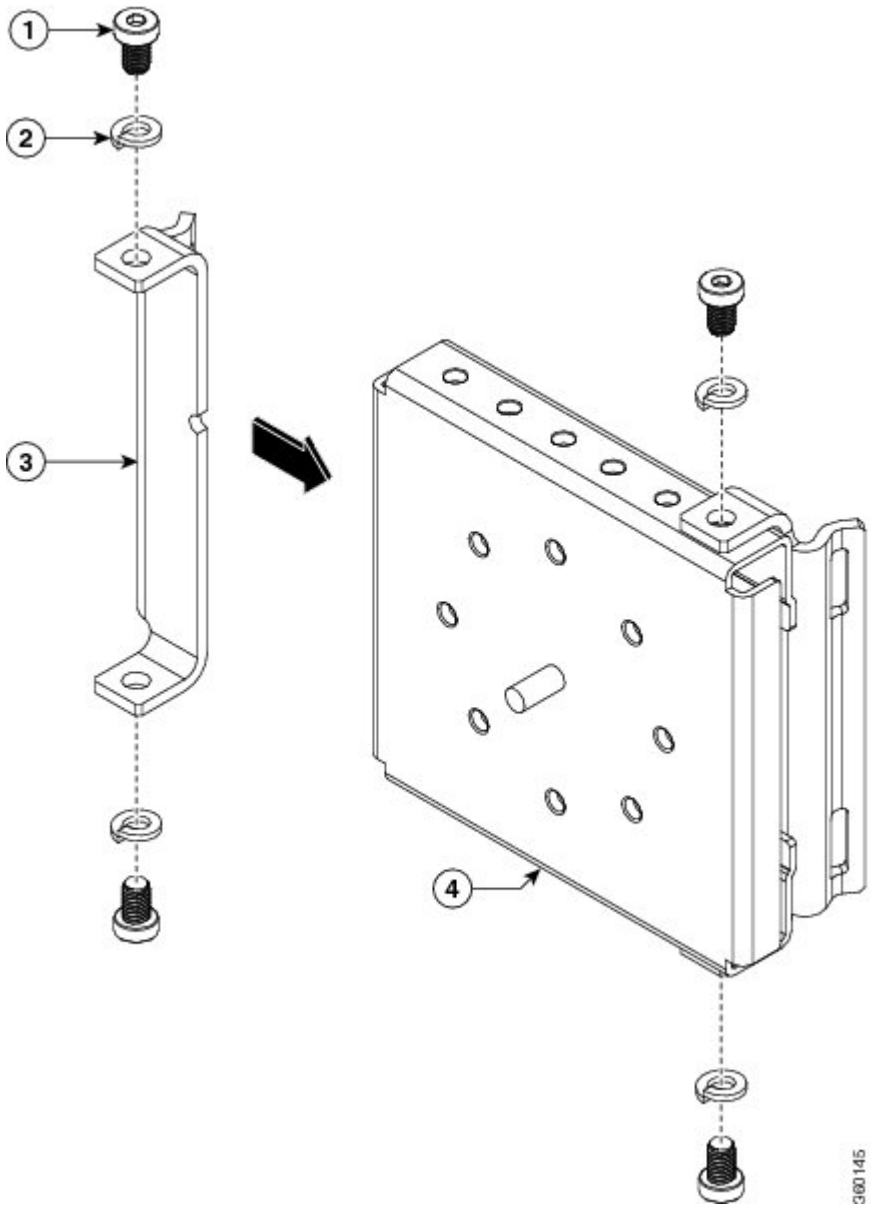


1	Pole size indicators • 2 to 6 in. • 6 to 11 in. • 11 to 16 in.	2	Bolt holes for pole diameters (11 to 16 inches indicated)

Procedure

Step 1 Position the pole clamp gussets on the pole clamp bracket for the pole diameter you are using and secure each pole clamp gusset with two M8 x 12 screws (with M8 spring washers). Tighten the screws to 13 to 15 ft lbs (17.6 to 20.3 Nm). (See the following figure.)

Figure 14: Assembling the Pole Clamp Gusset onto the Pole Clamp Bracket



1	M8 x 12 screw (with M8 spring washer)	3	Pole clamp gusset
2	M8 spring washer	4	Pole clamp bracket

Step 2 Screw the M8 screw onto the pole clamp bracket hole, and tighten just enough to prevent the bolt from falling off as shown in the figure above.

Step 3 Go to Mounting the Router onto a Pole.

Mounting the Router onto a Pole

The router can be installed where power is available, without the need for a wired LAN connection.

To mount the router onto a vertical pole or lamp-post, you need to install two metal bands around the pole to support the router. This process requires extra tools and material not provided in the pole mount kit.

Before You Begin

- Two 0.75-in. (1.9 cm) stainless steel bands
- Banding strap tool (BAND IT) (Cisco AIR-BAND-INST-TL=)
- Ground lug (provided with router)
- Crimping tool for ground lug, Panduit (http://onlinecatalog.panduit.com)
- #6 AWG Ground wire

Procedure

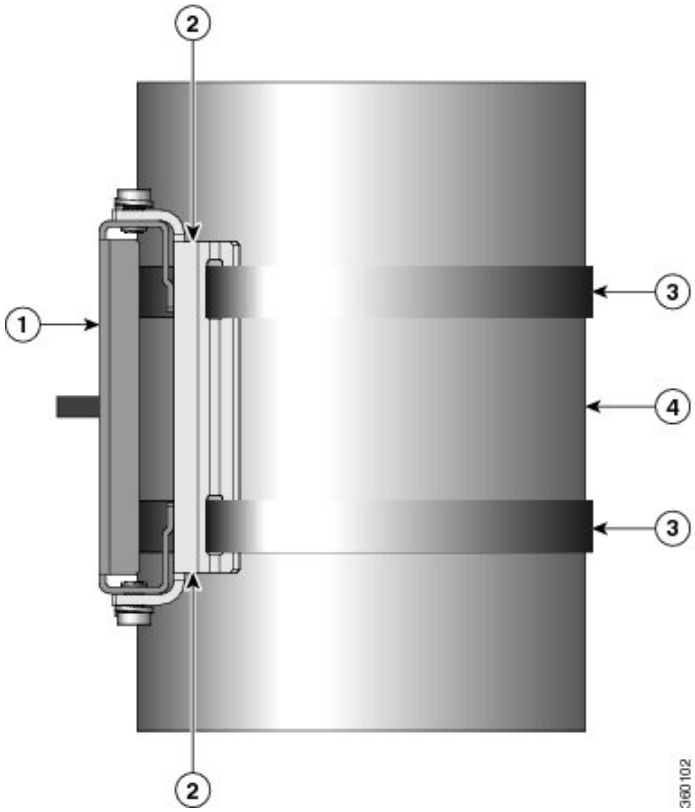
Step 1 Select a mounting location on the pole to mount the router. You can attach the router to any pole from 2 to 16 in. (5.1 to 40.6 cm) in diameter.

Note If you will be using a streetlight power tap adapter, position the router within 3 ft (1 m) of the outdoor light control.

Step 2 For poles larger than 3.5 in. (8.9 cm), mount the pole clamp bracket assembly to a pole (see the following figure) using two metal straps. Following the instructions provided with the banding strap tool (BAND IT) (AIR-BAND-INST-TL=), loop each metal strap twice through the slots on the strap bracket.

Caution Do not place the metal straps in the large open area between the pole clamp bracket and the mounting plate because this does not properly secure the router.

Figure 15: Clamp Bracket Assembly Mounted on Poles Larger than 3.5 in. (8.9 cm)

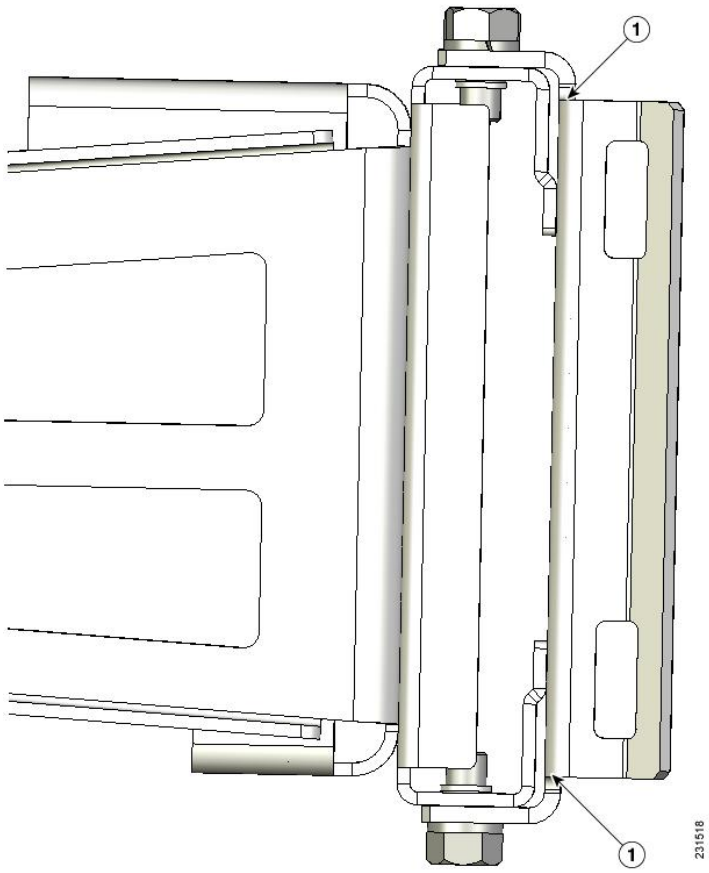


1	Pole clamp bracket	3	Metal mounting strap
2	Strap slot in pole clamp gusset	4	Pole

Step 3 For pole diameters of 3.5 in. (8.9 cm) or less, mount the pole clamp bracket assembly to a pole using two metal straps looped through the space between the pole clamp bracket and the pole clamp gussets (see the

following figure) to provide maximum holding strength for extreme environments. Following the instructions provided with the banding strap tool (BAND IT) (AIR-BAND-INST-TL=), loop each metal strap twice.

Figure 16: Metal Strap Open Space for 3.5 in. (8.9 cm) and Smaller Poles



1	Metal strap open space

Caution Do not place the metal straps in the large open area between the pole clamp bracket and the pole clamp gussets because this does not properly secure the router.

Step 4 Position the pole clamp bracket on the pole as needed before tightening the metal bands.

Note Position the pole clamp bracket on the pole as needed before tightening the metal bands.

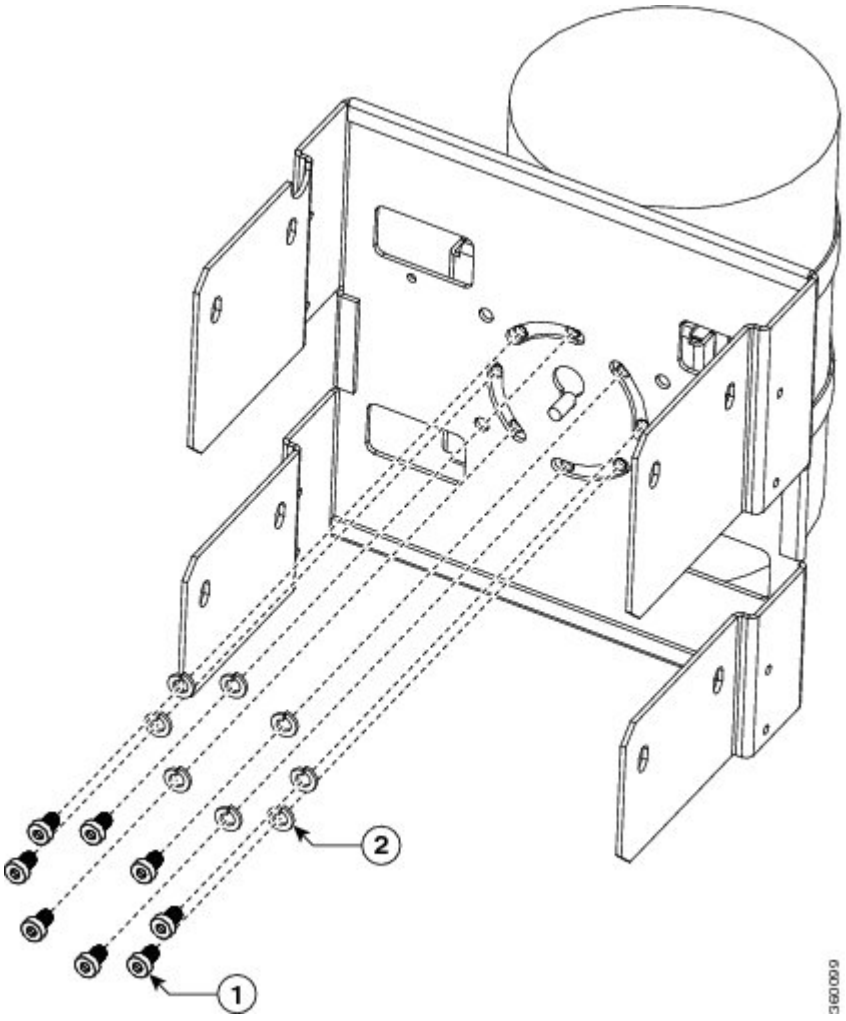
Step 5 Tighten the metal bands using the banding strap tool (BAND IT) (Cisco AIR-BAND-INST-TL=), following the operating instructions in the box with the tool. Ensure the metal bands are as tight as possible.

Step 6 Place the wall mount bracket onto the pole clamp bracket support bolt (see the following figure).

Step 7 For vertical poles, position the wall mount bracket as shown in the following figure. For horizontal streetlight poles, rotate the wall mount bracket 90 degree from the position shown in the following figure.

Step 8 Install eight M8 x12 screws (with M8 spring washers) into the bolt holes.

Figure 17: Fixing the Wall Mount Bracket onto the Pole Clamp Bracket Assembly



1	M8 x 12 screws	2	M8 spring washers

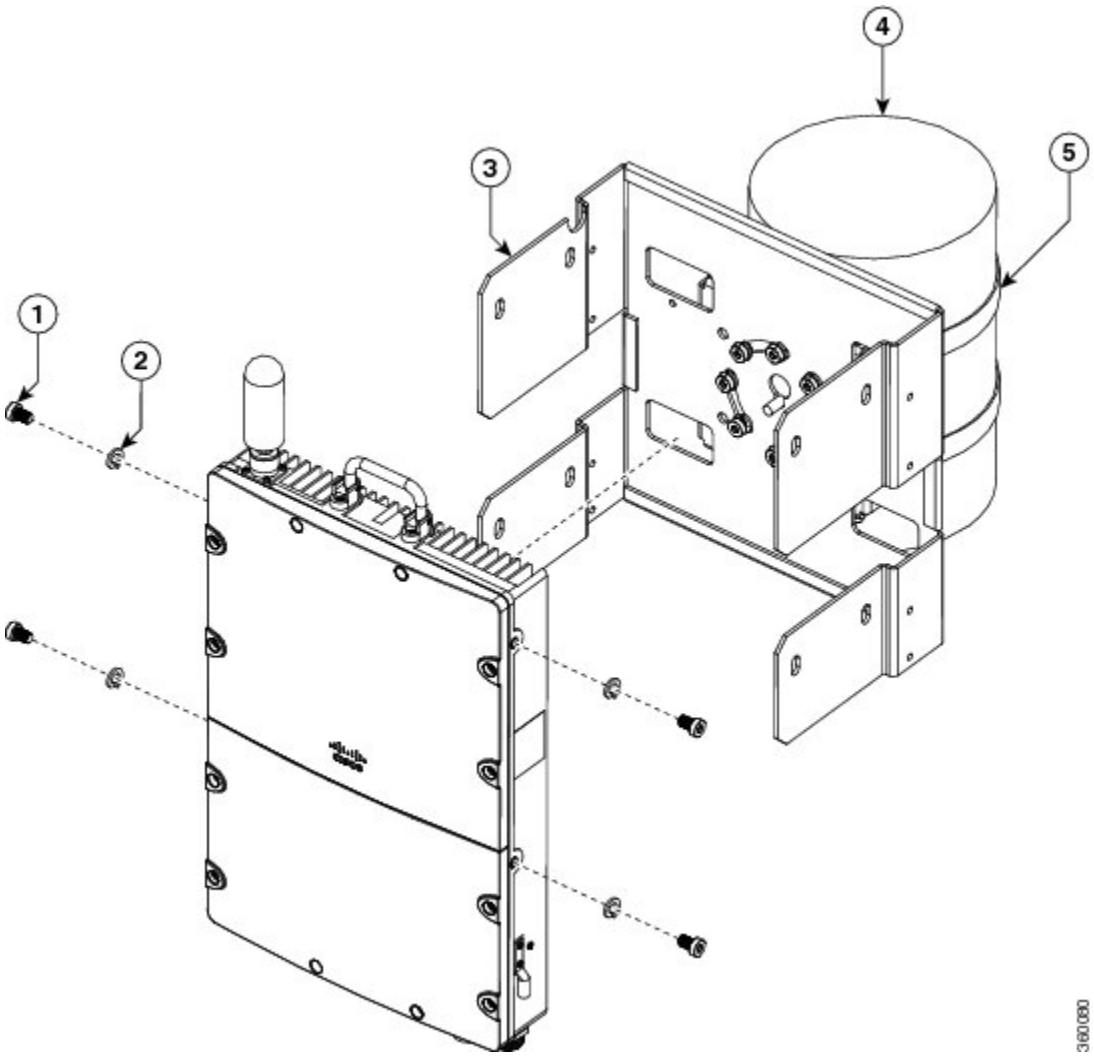
Step 9 Hand-tighten the bolts and the nut (do not overtighten).

Step 10 Adjust the top edge of the wall mount bracket until it is horizontal and tighten the screws and the flange nut (see the above figure) to 13 to 15 ft lbs (17.6 to 20.3 Nm).

Note The wall mount bracket can be adjusted up to 45 degrees to compensate for tilted horizontal streetlight poles.

Step 11 Screw a M8 x12 bolt (with M8 spring washer) into the two support bolt holes on each side the router (see the following figure). Do not screw the bolt all the way in. Leave a gap of approximately 0.25 in (0.635 cm).

Figure 18: Mounting the Router onto the Wall Mount Bracket on the Pole

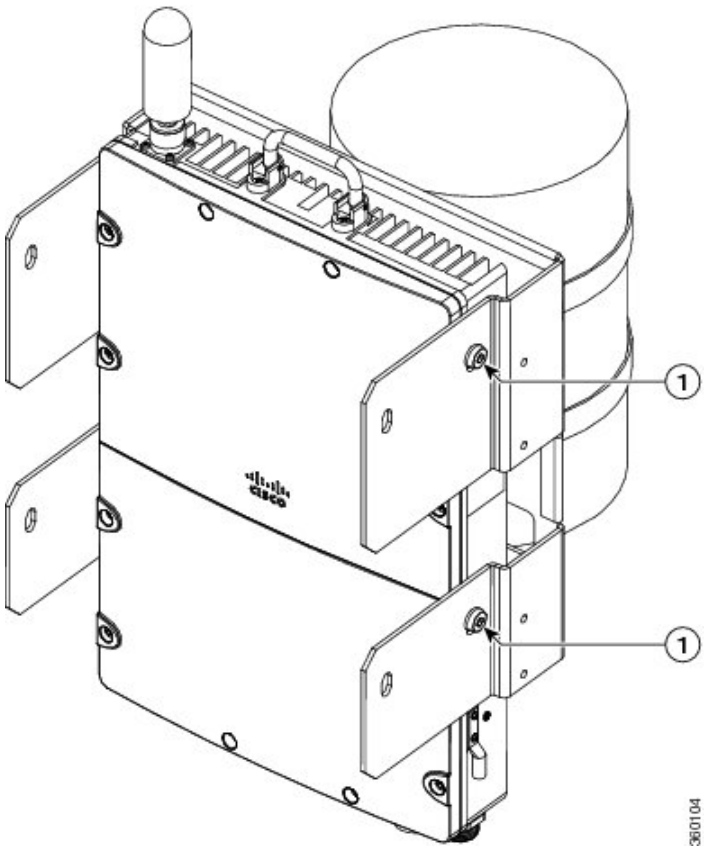


1	M8 x 12 screws	4	Pole
2	M8 spring washers	5	Metal straps
3	Wall mount bracket		—

Step 12 Position the two bolts on either side of the router with the bolt holes on the wall mount bracket (see the following figure).

Note The router should be positioned with the LEDs on the bottom to allow viewing from the ground.

Figure 19: Location of Router Support Bolt Hole



1	M8 x 12 screws (screwed onto the wall mount bracket)

Step 13 Screw a M8 x12 bolt (with M8 spring washers) into the second bolt hole on each side of the router (see the above figure).

Step 14 Ensure that the front of the router is vertical, and tighten the four bolts to 13 to 15 ft lbs (17.6 to 20.3 Nm).

Step 15 (Optional) When using the optional Cisco external omnidirectional antenna, connect it to the router. Hand-tighten the antenna to the router. For instructions on installing the antenna on the router, see Installing the Chassis-Mount Antenna on the Router, on page 59.

Step 16 Continue with Grounding the Router, on page 44 and Powering on the Router, on page 61.

Router Orientation When Mounting Router on a Wall

When mounting the router onto a wall, ensure that the router is oriented with the chassis cabling openings pointing downward so the router cable hangs down.

Note Never mount the router with the bottom (facing up) or to the side.

Wall-Mount Location

Identify an area on a wall that meets the safety, space, and environmental requirements.

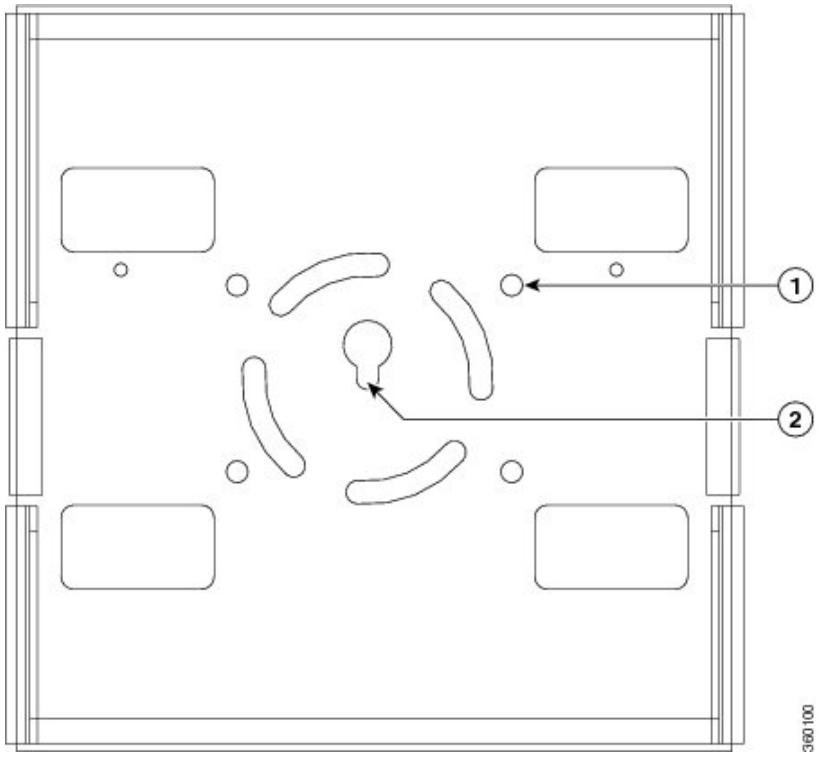
Wall-Mount Height

The router should be mounted at a height at which you are able to view the top of the module-side panel and at which the cables are able to be managed without adding stress to the router ports.

Wall-Mount Hardware Distance

Any reinforcement hardware you provide should be mounted to the wall with the correct distance apart so when the bolts are installed through the mounting bracket wall mount holes (Item 1, in the following figure), they will align with the holes in the wall.

Figure 20: Distance for Wall-Mounting Hardware



1	Use this hole for hanging the bracket to allow hands-free install	2	These holes can be used but a 5" tall space must be used to offset bracket from the wall

Mounting the Router onto a Wall

You can use the wall mount bracket as a template to mark the positions of the mounting holes for your installation. You then install the wall mount bracket, and attach the router when you are ready. The following section lists the material that you will need to mount the router onto a wall.

Before You Begin

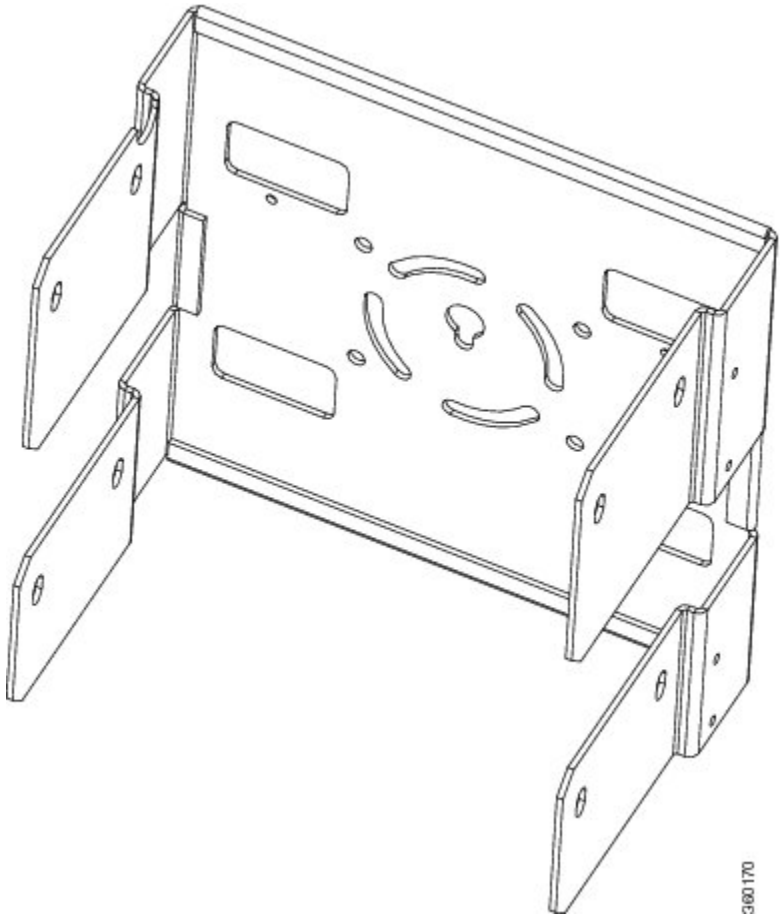
- Ground lug and screws (provided with the router)
- Crimping tool for ground lug, Panduit (http://onlinecatalog.panduit.com)
- Eight M8 or 5/16 in. screws
- Electric drill and standard screwdriver
- #6-AWG ground wire
- Shielded outdoor-rated Ethernet (CAT5e or better) cable
- Grounding block
- Grounding rod
- 13-mm box-end wrench or socket set

Procedure

Step 1 Use the wall mount bracket as a template to mark four screw hole locations on your mounting surface. See the following figure for the wall mount screw hole locations. You can optionally use the individual mounting holes or the mounting slots.

Caution The mounting surface, attaching screws, and optional wall anchors must be able to support 13.2 pounds (5.99 kgs [FD chassis model with two SFPs and antenna]) or 15. 8 pounds (7.2 kgs [FA chassis model with 2 SFPs and antenna]) static weight.

Figure 21: Wall Mount Bracket for Wall-Mounting

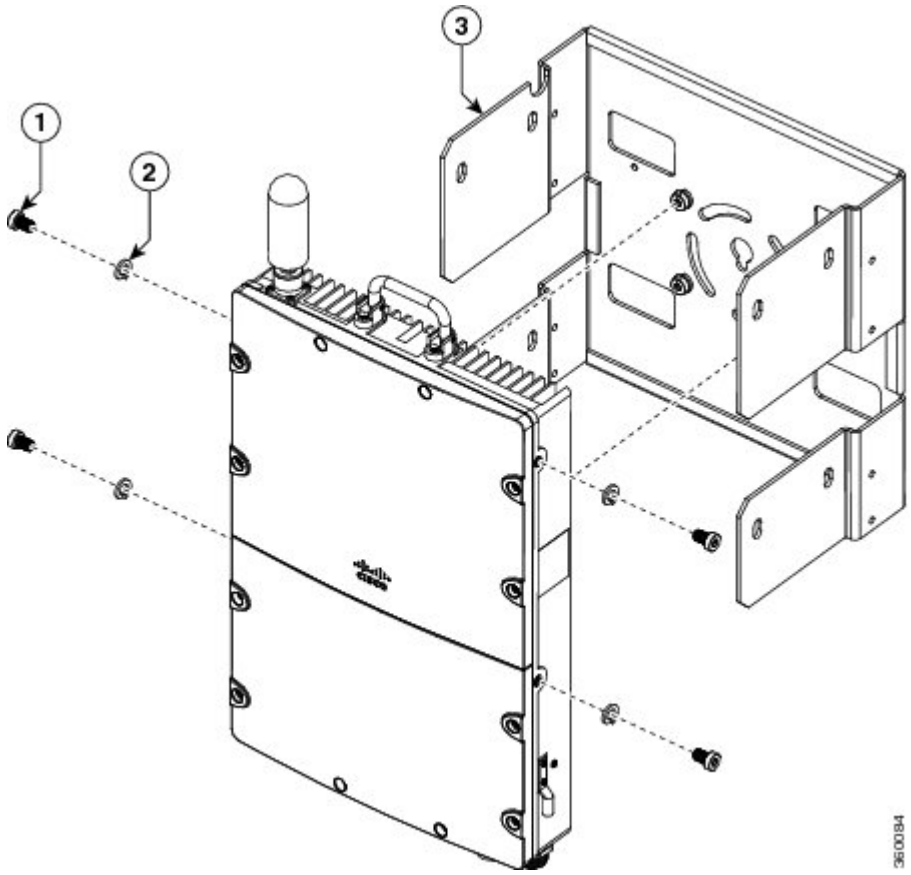


Step 2 Use four customer-supplied screws and optional screw anchors to attach the wall mount bracket to the mounting surface.

Note If necessary, use suitable screw anchors and an exterior-grade plywood backboard to mount the router to a stucco, cement, or dry wall.

Step 3 Hold the router inside the wall mount bracket such that the four bolts on each side of the router are aligned with the four holes the on each side of the wall mount bracket (see the following figure).

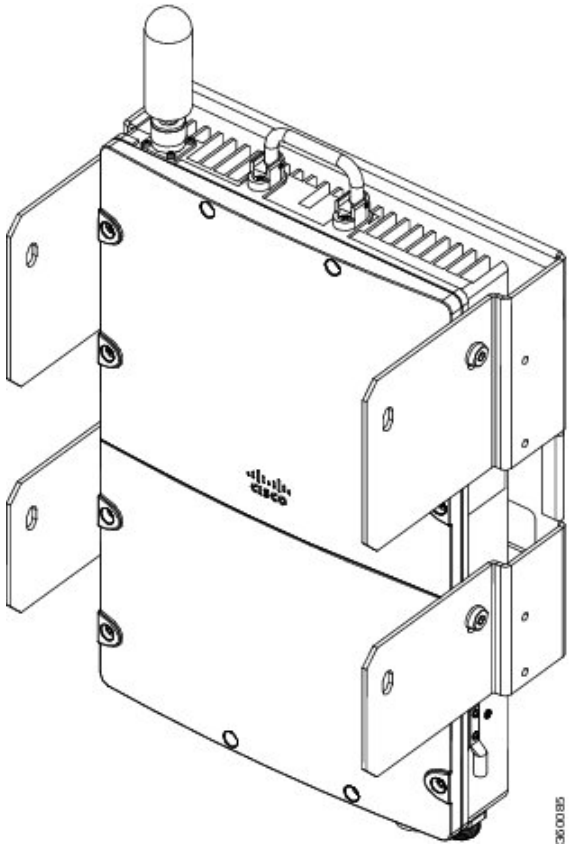
Figure 22: Mounting the Router onto the Wall Mount Bracket on the Wall



1	M8 x 12 screws	3	Wall mount bracket
2	M8 spring washers		—

Step 4 Screw the M8 x 12 bolts in the support bolt holes on either side the router (see the above figure). Do not screw the bolt all the way in; leave approximately a 0.25 in. (0.635 cm) space.

Figure 23: Router in Wall Mount Bracket



Step 5 Ensure that the front of the router is vertical, and tighten the eight bolts to 13 to 15 ft lbs (17.6 to 20.3 Nm).

Step 6 (Optional) When using the optional Cisco external omnidirectional antenna, connect it to the router point as shown in the above figure. Hand-tighten the antenna to the router. For instructions on installing the antenna on the router, see Installing the Chassis-Mount Antenna on the Router, on page 59.

Step 7 Continue with Grounding the Router, on page 44and Powering on the Router, on page 61.

Connecting the Chassis Ground and Power

Before you connect power or turn on power to the Cisco ASR 901S Series Aggregation Services Router, you must provide an adequate chassis ground (earth) connection to your router.

Grounding the Router

The Cisco ASR 901S Series Aggregation Services Router provides a grounding point on either side of the unit for a 2-hole lug.

Caution Before making connections to the Cisco ASR 901S Series Aggregation Services Router, ensure that you disconnect the power at the circuit breaker. Otherwise it may result in severe injury to yourself, or damage to the router.

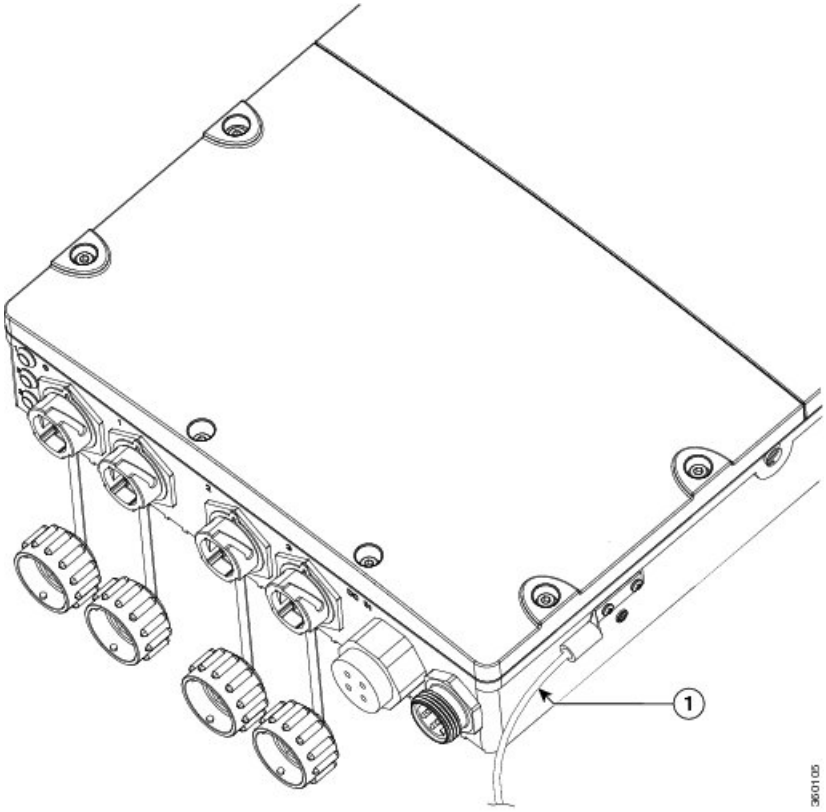
Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

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

The following figure shows the grounding point marked on the right side of the Cisco ASR 901S Series Aggregation Services Router for ease of installation.

Figure 24: Grounding Point on the Router



1	Grounding point lug cable

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

Perform the steps given below to ground the Cisco ASR 901S Series Aggregation Services Router using a 2-hole lug and the corresponding mounting point. Most routers require a 6-AWG ground connection. Verify your router requirements for the ground connection.

Before You Begin

To ensure 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 pound-force inches (lbf-in) of pressure for attaching the ground wire to the router.
- Crimping tool as specified by the ground lug manufacturer.
- 16-AWG copper wire for the power cord

- Appropriate wire-stripping tools

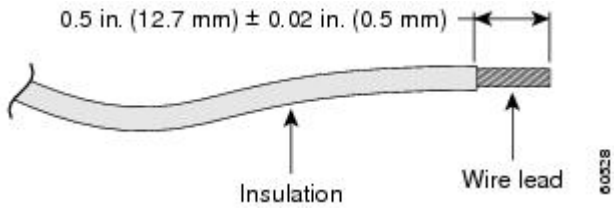
Procedure

Step 1 In the accessory kit, locate the 2-hole lug, 2 pan-head Phillips head screws used to attach the lug to the router, and the 6-AWG ground wire. (Lug, screws, and wire are part number 32-0629-01.)

Step 2 Set the parts aside.

Step 3 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) for the ring terminal (see the following figure).

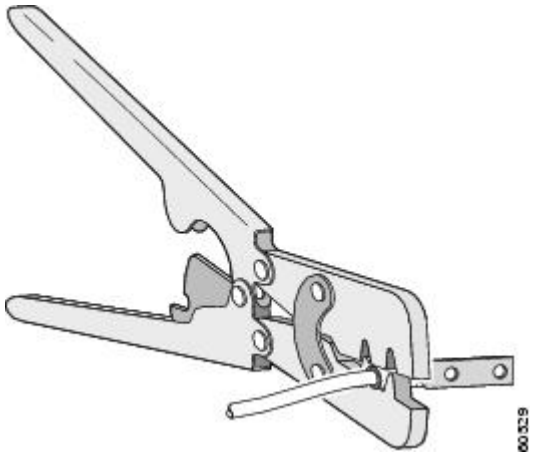
Figure 25: Stripping a Ground Wire



Step 4 Slide the open end of the ground lug over the exposed area of the ground wire.

Step 5 Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire (as shown in the following figure).

Figure 26: Crimping a Ground Lug onto the Ground Wire



Step 6 Use a Phillips head screwdriver to attach the ground lug and wire assembly with the two screws from the accessory kit.

Step 7 Connect the other end of the ground wire to a suitable grounding point at your site.

Step 8 Repeat steps 3 to 7 to attach the cable to the ground lug on the left side of the router.

Opening the Router Chassis

This section describes how to open the Cisco ASR 901S Series Aggregation Services Router door so that you can access the interior of the chassis.
To access the router interior, you must open the router door that is located in the lower section of the front panel of the router chassis. Many of the router hardware installation tasks require you to open the router door and access the router interior to install or change cables, optical modules, and so on).

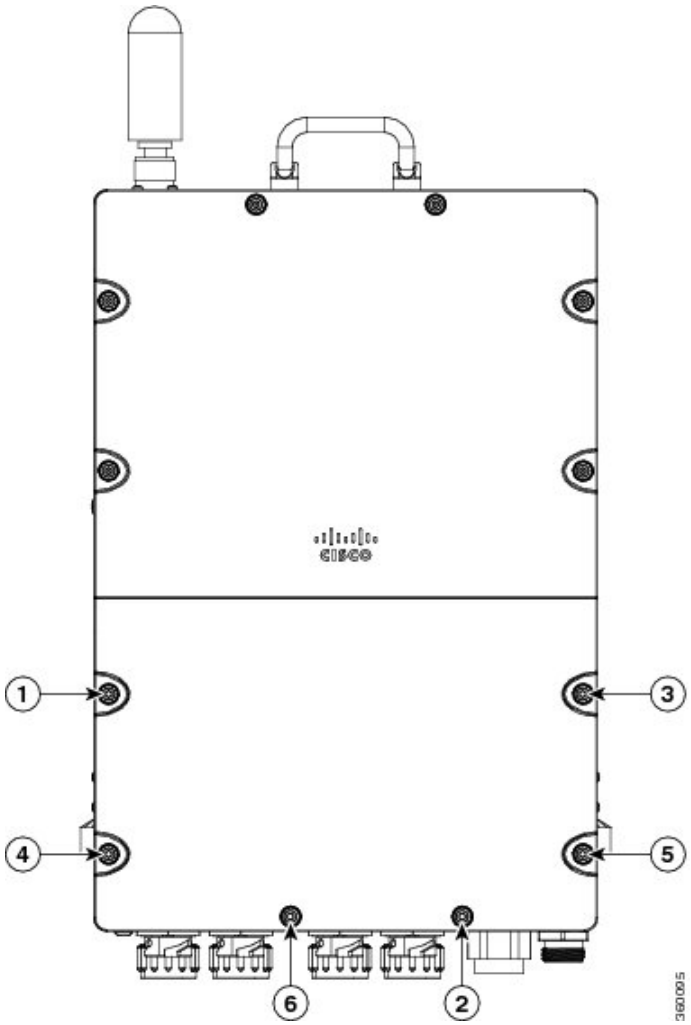
Opening the Router Door

The router door can be opened while the router is powered on and connected to the network. Take any safety precautions described in the Safety Guidelines, on page 13.

The router door features four captive, M8 bolts and two M3 bolts (see following figure).

We recommend that you loosen and tighten the door bolts in the order as shown in the following figure.

Figure 27: Recommended Order of Loosening and Tightening Bolts



The chassis door features an environmental seal that protects the chassis against environmental elements when the door is closed. This seal creates pressure, which can cause the door to open suddenly when the last bolt is loosened.

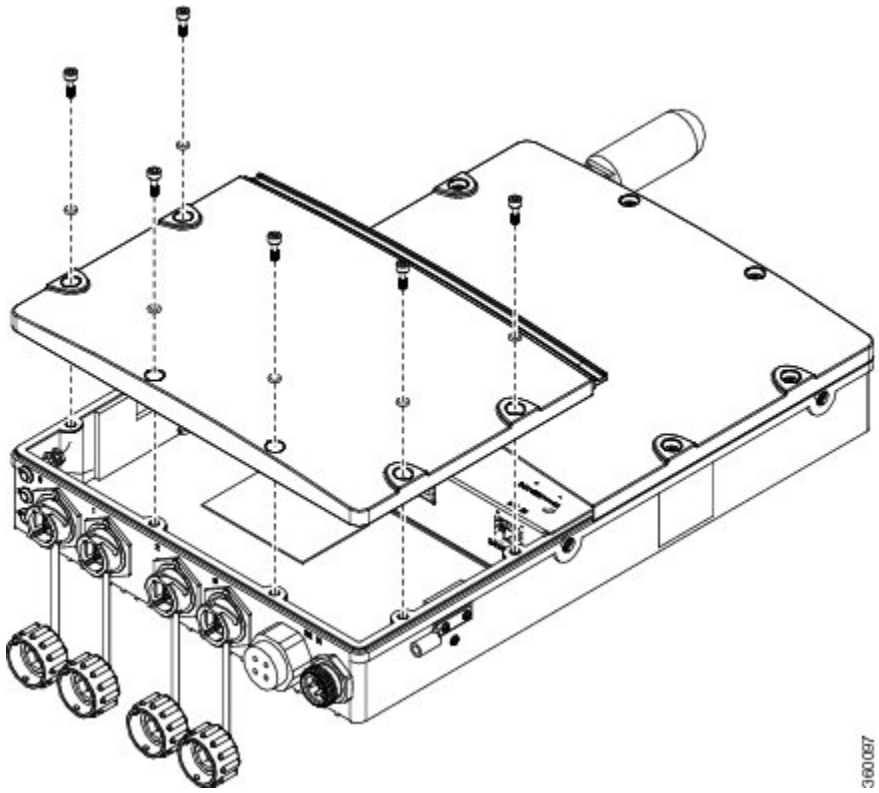
Before You Begin

You must provide a 1/2-inch (13 mm) socket wrench to open and close the router chassis door.

Procedure

Step 1 To open the router door, use the socket wrench to loosen all six captive bolts in the order shown in the following figure.

Figure 28: Router Door, Showing Captive Bolts



Step 2 After all six bolts are loose, remove the door.

Closing the Router Door

Before You Begin

When closing the door, alternate tightening bolts on each side of the chassis, in the order shown in the section Opening the Router Door, on page 47, to evenly seal the door.

Procedure

Step 1 Verify that the door seal is clean and that all cables are tucked back into the chassis.

Step 2 To close the door, use the socket wrench to evenly tighten all six bolts in the order as shown in the section Opening the Router Door, on page 47.

Step 3 Evenly tighten the bolts again, this time using 6 to 7 foot-pounds of torque.

Power Connection Compliance

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

Warning Use copper conductors only. Statement 1025

Note The installation must comply with the 2002 National Electric Code (NEC) and other applicable codes.

Connecting the DC Power Cable to the Router

When powering the router with DC power, you must ensure that DC power can be conveniently removed from the unit. The power should not be removed by disconnecting the DC power connector on the unit.

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

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

Before You Begin

To connect a DC power cable, you need to supply these tools and material:

- Shielded outdoor-rated DC power cable (minimum 18 AWG) with outside cable diameter of 0.20 to 0.35 inch (0.51 to 0.89 cm).
- Adjustable or open-end wrench
- Small flat screw driver
- Four-pin DC power connector (Cisco supplied)

Procedure

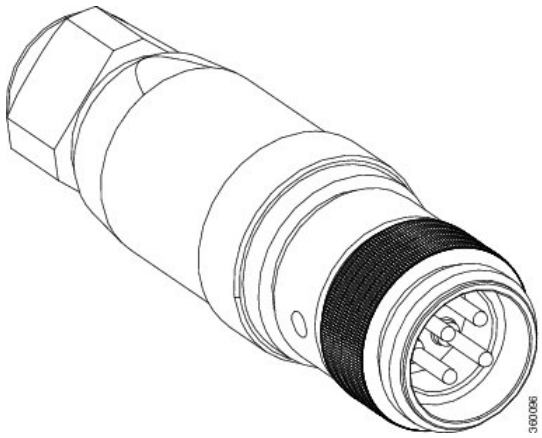
Step 1 Before connecting DC power to the router, ensure that the ground is connected to the router (see Grounding the Router, on page 44).

Step 2 Turn off all power sources to the router, including the DC power source.

Caution When installing DC power to the router, always connect the router of the cable FIRST. When removing the DC power connector, always disconnect the router end of the cable LAST.

Step 3 Connect the DC power connector to the DC input plug (see the following figure) on the bottom of the router.

Figure 29: DC Power Connector



AC Power Cable

The router supports the Cisco AC power cable that is shipped with the unit. One end of the cable has the router AC power connector; the other end is unfinished and you must provide and attach an AC power plug, or terminate the cable at your installation site. The AC power plug or termination method you use depends on the power source, such as a junction box, at your site.
If you attach an AC power plug:

- Use a plug that complies with local and national electrical codes.
- Verify the connection between the cable and plug is weatherproof.

You might have to cut the cable if a specific cable length is needed for your installation.

⚠

Caution Ensure that the power source is OFF before connecting or disconnecting the power cord wires from the power source.

Caution To attach the appropriate connector the AC power cable, follow the manual or other instructions provided by the electrical equipment vendor, ensuring that you comply with the electrical codes for your installation location.

Figure 30: Router AC Power Cable (Router Connector End)

Connecting the AC Power Cable to the Router

Before You Begin

When connecting the router to AC power, you must ensure that the following conditions are met:

- AC power can be readily and conveniently removed from the router. The power should not be removed by disconnecting the AC power connector on the unit. It should be removed by disabling AC power at the power circuit.

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

Caution Before connecting or disconnecting the power cord, you must remove AC power from the power cord using a suitable service disconnect.

- You must protect AC power plugs and AC receptacles from water and other outdoor elements. You can use a UL-listed waterproofing enclosure suitable for covering the AC receptacle and AC power plug that supplies power to the unit, as described in Article 406 of the National Electric Code (NEC).

- When you install the unit outdoors, or in a wet or damp location, the AC branch circuit that powers the unit should have ground fault protection (GFCI), as required by Article 210 of the NEC.
- If the power cord goes through a metal cover, a bushing should be installed to prevent fraying of the cord. When using a strain relief bushing, you should follow these recommendations:
  - Use properly sized parts
  - Use bushings that are safety certified
  - Use parts that are suitable for outdoor installation
- Ensure that the user-supplied AC power plug is certified for outdoor use and has a minimum IP67 rating.

Note To meet EN/IEC60950-22 (Clause 4.2) requirements, ensure that additional protection is provided external to this equipment to reduce transient surges from Overvoltage IV to Overvoltage Category II at the AC power input of the router. The overvoltage and fault-current protection components used to achieve this protection must comply with the IEC 61643 series of standards. To meet CAN/CSA-C22.2 No. 60950-22-07/UL60950-22 requirements, use alternative components to provide this additional protection. Those components may comply with ANSI/IEEE C62.11, CSA Certification Notice No. 516, CSA C22.2 No. 1, or UL 1449. Suitability of the components for the application must be determined for the intended installation. (For example, some devices are suitable for installation on the load side of the service entrance only, and some are suitable for use with cord-connected equipment only.)

Caution When connecting the router AC power connector, always connect the router end of the cable first. When removing the AC power connector, always disconnect the router end of the cable last.

Procedure

Step 1 Verify that the unit is grounded as described in Grounding the Router, on page 44.

Step 2 Turn off power to the AC power source at the designated circuits.

Step 3 Align the notch in the AC power cable with the key in the router AC power connector, then push the cable connector into the router connector. When the cable connector is fully seated, rotate the cable connector ring clockwise until hand-tight.

Step 4 Confirm that the router antenna is connected to the router before you apply power to the router.

Step 5 Connect the other end of the AC power cable to the power source, using the instructions that came with the connecting device.

Step 6 Turn on AC power at the designated circuits. The router will power on and boot the software image.

Connecting Cables

This section describes how to connect the Cisco ASR 901S Series Aggregation Services Router to external devices and networks. Follow the procedures in this section based on your network configuration and requirements.

Using Cable Glands

This section describes how to use cable glands with router cables that are threaded through the chassis cable ports.

Caution Cables must be a minimum of 0.20 inches in diameter to create an adequate seal within the cable glands. Using smaller cables could result in an inadequate seal and therefore expose the router interior to environmental elements.

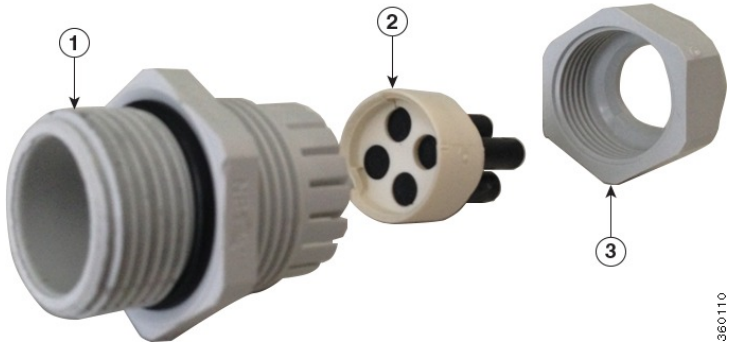
Ordering Cisco Cable Glands

You can order a cable gland from Cisco using the model number 51-6436-01.

Tools You Supply

- 33-mm A/F suitable wrench to remove the hexagonal lock nut from the router
- 15/16-inch (24 mm) open-end wrench

Figure 31: Cable Gland Components



Item	Name	Description
1	Adapter gland	Connects directly to the chassis cable port on the router
2	Split gasket	Fits over the cable and creates an liquid-tight seal inside the glands
3	Grommet/lock nut	Secures the split gasket over the cable

Cable Requirements

Cables used with the cable glands should meet the following criteria:

- Outdoor-rated
- UV-stabilized
- Diameter of 0.20-0.23 inches (5.0-5.8 mm)

Caution Cables must be a minimum of 0.20 in. in diameter to create an adequate seal within the cable glands. Using smaller cables could result in an inadequate seal and therefore expose the router interior to environmental elements.

Installing Cable Glands

Follow these steps for every cable that you will connect through the chassis cable ports on the router. Step 4 and Step 5 can be done ahead of time and the prepared cable gland assembly can be transported to the router installation site.

The cable glands components referred to in this section are shown in the figure above.

Note The steps in the following procedure are the same for all cable types.

Procedure

Step 1 Verify that the cable you are using meets the requirements described in requirements section above.

Step 2 Remove the dust cap from the port on the router.

Note Billet plugs (part number, 51-6438-01) are used in the unused ports of the cable gland because dust caps cannot be used when a cable gland port is in use.

Step 3 Use your hands to attach the cable glands adapter (see figure in Using Cable Glands, on page 54) into the chassis cable port on the router.

Step 4 Insert the terminated cables through the cable gland adapter.

Step 5 Thread the following cable glands components over the cable in this order:

- Split gasket
- Grommet
- Billet plug (in case of unused gland ports)

Step 6 Slide the split gasket along the cable and into the grommet, pressing firmly to ensure the gasket is completely seated in the grommet.

Step 7 Align and press the grommet-gasket assembly into the adapter gland.

Step 8 Hand-tighten, then use the open-end wrench to tighten until the split gasket seals around the cable (6 to 7 foot-pounds of torque). There should be 5-10 pounds of cable pull support.

Note The cable glands supports up to four terminated cable connectors. Repeat steps 4 to 9 to thread additional cable connectors.

Step 9 Insert the billet plugs into the unused ports of the cable gland adapter to seal it as per IP65 standards.

Connecting the Console Port

To configure the router through the Cisco IOS CLI, you must establish a connection between the router console port and either a terminal or a PC. The console port is located on the router interior is labeled **CONSOLE**.

The Cisco ASR 901S Series Aggregation Services Router has a single console port that functions as a DTE-mode console (terminal) port for connecting a console terminal. Use this port to connect a PC terminal, enabling you to log directly into the router system software to perform configuration or other commands.

Note The console port functions are asynchronous serial ports; any devices connected to the console port must be cabled for asynchronous transmission. (Asynchronous is the most common type of serial device; for example, most modems are asynchronous devices.)

The Cisco ASR 901S Series Aggregation Services Router uses a RJ-45 port for the console port function.

Complete the following steps to connect a terminal or a PC running terminal emulation software to the console port on the router:

Procedure

Step 1 Connect the terminal using an RJ-45 rollover cable and an RJ-45-to-DB-25 or RJ-45-to-DB-9 adapter (labeled TERMINAL) to the console port. For cable pinouts, see Connecting Console Port and Pinouts.

Note The RJ-45-to-DB-25 adapter (Cisco part number 29-0810-01) can be purchased from Cisco Systems, Inc.

Step 2 Configure the terminal or terminal emulation software for 9600 baud, 8 data bits, no parity, and 2 stop bits.

Note Hardware flow control is not possible on the console port.

Connecting Network Cables

This section describes how to connect the following router interfaces:

Connecting Gigabit Ethernet Interface Cables

The RJ-45 port supports standard straight-through and crossover Category 5 (Cat5), shielded twisted pair (STP) cable.

Note The Cisco ASR 901S Aggregation Services Router is not shipped with Category 5 STP cables; these cables are available commercially and need to be procured.

Before You Begin

Cat5 STP cable

Procedure

Step 1 Ensure that the router is powered off.
Step 2 Connect one end of the Cat5 STP cable to the GE port on the router.
Step 3 Connect the other end to the BTS patch or demarcation panel at your site.

Connecting SFP Cables

Before You Begin

SFP module patch cable required

Procedure

Step 1 Ensure that the router is powered off.
Step 2 Insert the SFP module patch cable into the slot until you feel the connector on the cable snap into place in the rear of the slot.
Step 3 Connect the other end to the patch or demarcation panel at your site.
Step 4 Turn on power to the router (for more details, see Powering on the Router, on page 61).

Connecting to the Alarm Port

Use a straight cable to connect to the alarm port. For details on the pinouts, see Alarm Port Pinouts, on page 83.

Connecting to the Management Ethernet Port

Use a straight or a cross over ethernet cable to connect to the management ethernet port. For details on the pinouts, see Management Ethernet Port Pinouts, on page 83.

Dressing Router Cables

Ensure all Cisco router cables are properly insulated so as not to interfere with each other or other pieces of equipment. Use local practices to ensure that the cables attached to your router are properly insulated.
To continue the installation, proceed to Powering on the Router, on page 61.

Antenna Installation and Replacement

Depending on the configuration you specified, the router could arrive in the shipping container with the required Wi-Fi antenna packed separately. The router Wi-Fi link enables users to connect to the router from anywhere within Wi-Fi range. For example, a technician can check the status of the router from the ground (instead of having to physically open the router on its pole-top installation) by remotely connecting to the router over the Wi-Fi link.

For detailed technical information about the Wi-Fi antenna, see Antenna Specifications, on page 76.

You may need to install or replace an antenna when:

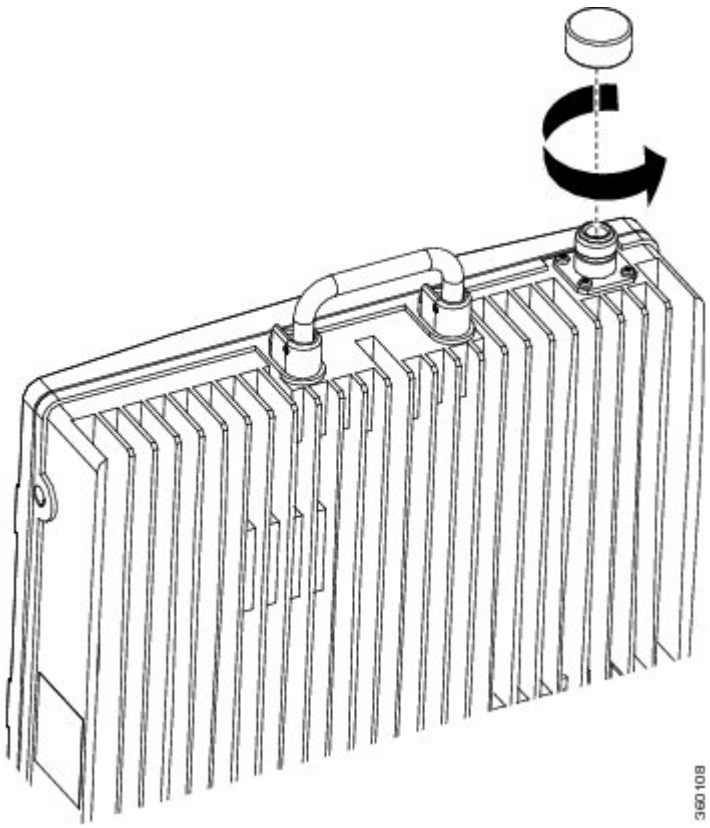
- You purchase a module separately from the router. The antenna is included with the module, and must be installed on the router to complete the module installation.
- You purchase an antenna separately to replace a faulty or damaged antenna.

Unused Antenna Ports

Liquid-tight, female N-connector is installed in any unused antenna port. The N-connector protects the router interior from environmental elements including water, heat, cold, and dust. A port plug installed in the unused antenna port before the router is shipped.

When you install or replace an antenna remove the port plug as illustrated in the following figure.

Figure 32: Antenna Port Plug



There are two antenna-mounting configurations available for the ASR 901S Series Aggregation Services Router:

- **Direct Chassis-Mount Antennas—**Install the chassis-mounted antenna directly to the antenna port. For instructions on installing the antenna on the router, see Installing the Chassis-Mount Antenna on the Router, on page 59.
- **External-Mount Antennas—**Connect the supported Cisco lightening arrestor to the N-connector, and then use the antenna feeder cable to connect the antenna (female N-connector) and lightning arrestor.

Installing the Chassis-Mount Antenna on the Router

The antenna is vertically polarized. Because the antenna has vertical gain, it is very important to mount the antenna in a vertical (not leaning) position for optimal performance.

Before You Begin

Direct chassis-mount antenna

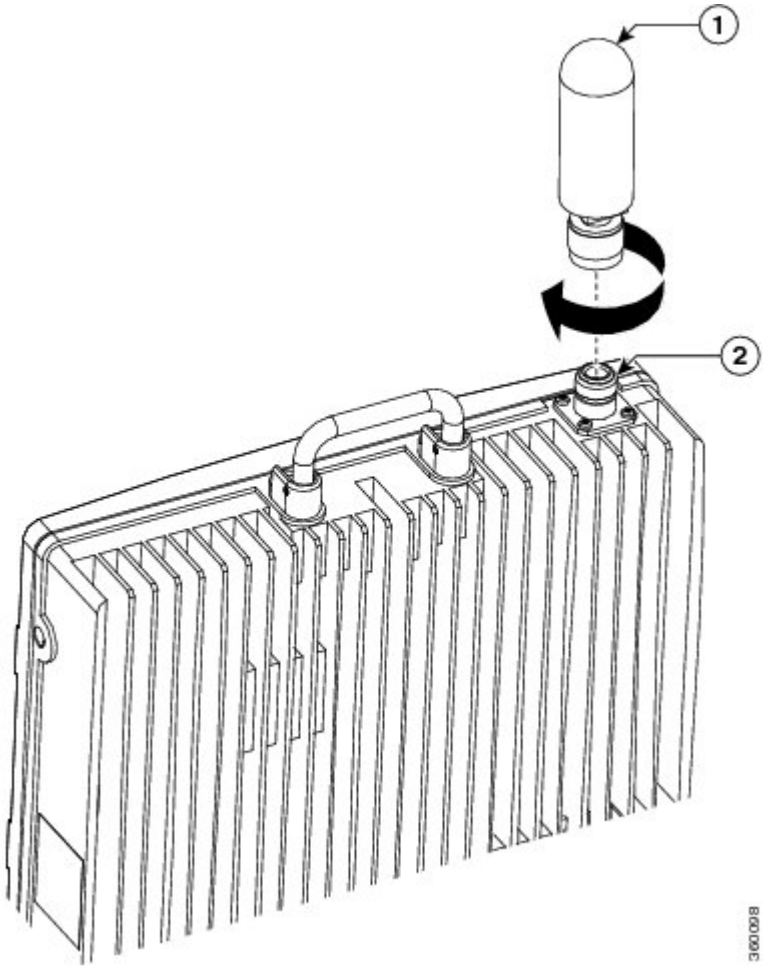
Procedure

Step 1 Remove the antenna port plug located at top of the router.

Step 2 Connect the N-type male connector end of the antenna through the N-type female connector in the antenna holder.

Step 3 Turn the antenna connector clock-wise to screw the antenna as shown in the following figure.

Figure 33: Installing the Antenna on the Router



1	Antenna	2	N-type female connector

Powering on the Router

Warning Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. Statement 4

Warning This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use. Statement 39

Checklist for Power on

- Securely mount the router.
- Properly connect the power, network, and interface cables.

Interpreting Bottom-Panel LEDs

The Cisco ASR 901S Aggregation Services Router provides three LEDs on the bottom panel to monitor conditions and to aid in troubleshooting problems. For a description of the LEDs, see Reading LEDs , on page 70.

Complete these steps to power on the Cisco ASR 901S Aggregation Services Router and verify its initialization and self-test:

Procedure

Step 1 Remove the tape from the circuit breaker switch handle.

Step 2 Restore power by moving the handle of the circuit breaker to the ON position.
The System LED on the bottom panel should go ON.

Depending on your installation, the other bottom-panel LEDs can also come on.

If you encounter problems when you power on the router, see the Troubleshooting, on page 67.

Enabling Zero Touch Provisioning on the Router

Before You Begin

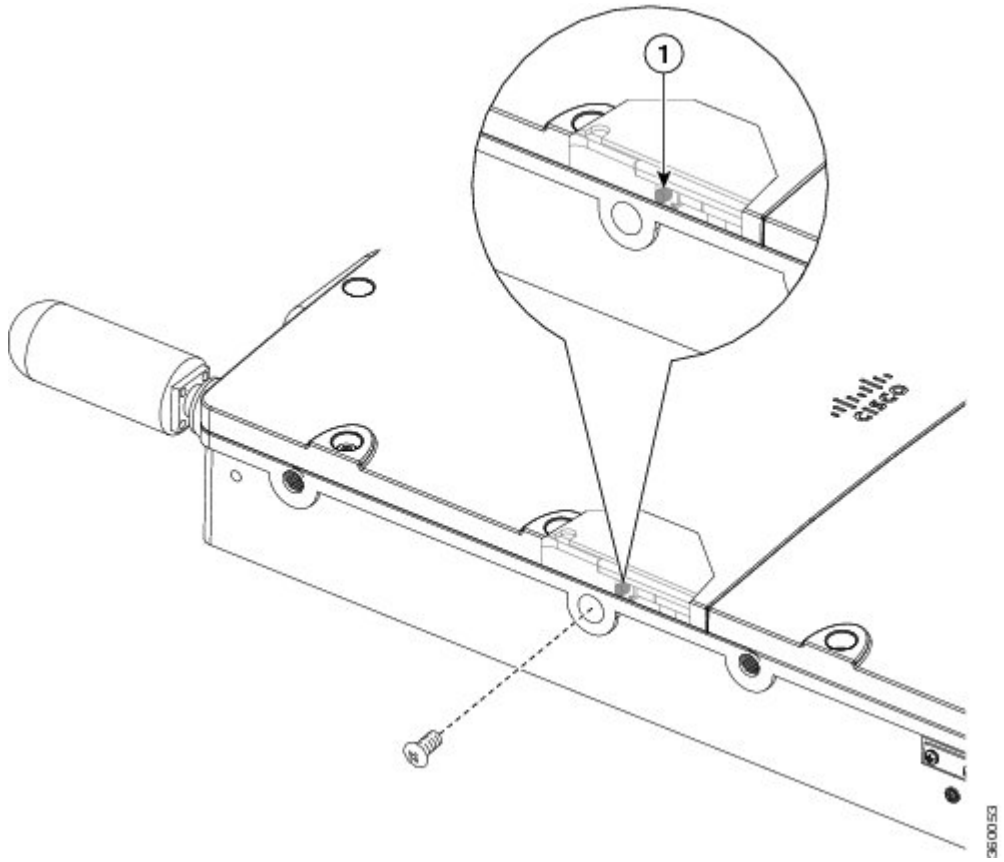
- Phillips screwdriver
- Straightened paperclip or thin non-metallic pin no larger than 3/16 inches in diameter

Procedure

Step 1 Use a Phillips screwdriver to remove the zero touch provisioning (ZTP) reset button screw. Be careful not to loose the screw.

Step 2 Use a straightened paperclip, thin non-metallic pin, or thin non-metallic pin no larger than 3/16 inches in diameter and push the ZTP reset button for 0.5 seconds to initiate zero touch provisioning. (See the following figure.)

Figure 34: Accessing the ZTP Reset Button



1	ZTP reset button

Push the ZTP reset button for more than 8 seconds to reboot (power cycle); all LEDs will turn off for approximately 5 seconds, and then the LEDs will reactivate.

Step 3 Replace the reset button screw and use a Phillips screwdriver to tighten to 22 to 24 in. lbs (2.49 to 2.71 Nm).

REVIEW DRAFT - CISCO CONFIDENTIAL

Using CLIs for Flash Memory and Directory Procedures

The following sections contain the formatting procedures for flash memory and file and directory procedures using Cisco IOS CLIs.

Formatting Procedures for Flash Memory

We recommend that you erase the (Class B) flash memory to initialize with a Class B flash file system.

The Class B flash file system is also known as the low end file system (LEFS).

Formatting Flash Memory as a DOS File System

To format the flash memory or to remove the files from it, use the **erase flash:** command.

The following is sample output for formatting the flash memory, formatted with a Class B flash file system:

```
Router# erase flash :

Erasing the flash filesystem will remove all files! Continue? [confirm]

eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
...erased

Erasing device
```

File and Directory Procedures

The following sections describe file and directory procedures for flash memory, formatted with a Class B flash file system.

Copying Files

To copy files to another location, use the **copy tftp:flash:** command.

The following is sample output for copying the file from an external location to the internal flash memory.

```
Router# copy tftp: flash

Address or name of remote host []? 10.64.71.240

Source filename []? /ngmwr-advipservicesk9-mz

Destination filename [ngmwr-advipservicesk9-mz]?

Accessing tftp://10.64.71.240//ngmwr-advipservicesk9-mz...

Erase flash: before copying? [confirm]n

Loading /ngmwr-advipservicesk9-mz from 10.64.71.240 (via FastEthernet0/0):

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```
[OK - 30480936 bytes]

Verifying checksum... OK (0xA6AD)

30480936 bytes copied in 196.968 secs (154751 bytes/sec)
```

Displaying Contents of the Flash Memory

To display the contents (directories and files) of the flash memory formatted with a Class B flash file system, use the **dir:** command.

The following is sample output for displaying the contents of the flash memory with a Class B flash file system:

```
Router# dir

Directory of flash:/

1 -rw- 30564420 <no date> ngmwr-advipservicesk9-mz
2 -rw- 30564420 <no date> ngmwr-backup
83623932 bytes total (22494964 bytes free)
```

Deleting Files from the Flash Memory

To delete a file from the flash memory, use the **delete: filename** command followed by the **squeeze flash:** command.
When a file is deleted in the Class B flash file system, the memory space occupied by the deleted file is not released until you use the squeeze command. Although the memory space once occupied by the deleted file remains, the deleted file cannot be recovered. To release the memory space occupied by a deleted file, enter the **squeeze flash:** command.

The following is sample output for deleting a Cisco IOS file from the flash memory, and releasing the memory space originally occupied by the file.

```
Router# dir

Directory of flash:/

1 -rw- 30564420 <no date> ngmwr-advipservicesk9-mz

2 -rw- 30564420 <no date> ngmwr-backup

2 -rw- 30564420 <no date> ngmwr-backup

Router# delete ngmwr-advipservicesk9-mz

Delete filename [ngmwr-advipservicesk9-mz]?

Delete flash:ngmwr-advipservicesk9-mz? [confirm]

Router# show flash :

les_flash_info : 1006 :

File Length Name/status

1 30564420 ngmwr-advipservicesk9-mz [deleted]

2 30564420 ngmwr-backup

[61128968 bytes used, 22494964 available, 83623932 total]
```

```
81920K bytes of processor board System flash (Read/Write)
Router# squeeze flash :
Squeeze operation may take a while. Continue? [confirm]
squeeze in progress...
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
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eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeee
Squeeze of flash complete
Router# dir
Directory of flash:/
2 -rw- 30564420 <no date> ngmwr-backup
83623932 bytes total (22661932 bytes free)
```

Displaying File Content

To display the contents of a file in the flash memory, use the more **flash: filename** command.

The following is sample output from the **more flash** command on a flash card:

```
Router# more flash:ngmwr-advipservicesk9-mz
00000000: 7F454C46 01020100 00000000 00000000 .ELF .... .... ....
00000010: 00020061 00000001 80008000 00000034 ...a .... .... ...4
00000020: 00000054 20000001 00340020 00010028 ...T ... .4. ...(
00000030: 00050008 00000001 0000011C 80008000 .... .... .... ....
00000040: 80008000 00628A44 00650EEC 00000007 .... .b.D .e.l ....
00000050: 0000011C 0000001B 00000001 00000006 .... .... .... ....
00000060: 80008000 0000011C 00004000 00000000 .... .... ..@. ....
00000070: 00000000 00000008 00000000 00000021 .... .... .... ...!
00000080: 00000001 00000002 8000C000 0000411C .... .... ..@. ..A.
00000090: 00000700 00000000 00000000 00000004 .... .... .... ....
000000A0: 00000000 00000029 00000001 00000003 .... ...) .... ....
000000B0: 8000C700 0000481C 00000380 00000000 ..G. ..H. .... ....
000000C0: 00000000 00000004 00000000 0000002F .... .... .... .../
```

```
000000D0: 00000001 10000003 8000CA80 00004B9C .... .... ..J. ..K.
000000E0: 00000020 00000000 00000000 00000008 ... .... .... ....
000000F0: 00000000 0000002F 00000001 10000003 .... .../ .... ....
00000100: 8000CAA0 00004BBC 00623FA4 00000000 ..J ..K< .b?$ ....
00000110: 00000000 00000008 00000000 3C1C8001 .... .... .... <...
00000120: 679C4A80 3C018001 AC3DC70C 3C018001 g.J. <... ,=G. <...
00000130: AC3FC710 3C018001 AC24C714 3C018001 ,?G. <... ,$G. <...
00000140: AC25C718 3C018001 AC26C71C 3C018001 ,%G. <... ,&G. <...
00000150: AC27C720 3C018001 AC30C724 3C018001 ,'G <... ,0G$ <...
00000160: AC31C728 3C018001 AC32C72C 3C018001 ,1G( <... ,2G, <...
.
.
.
```

Enter a Directory and Determine the Current Directory

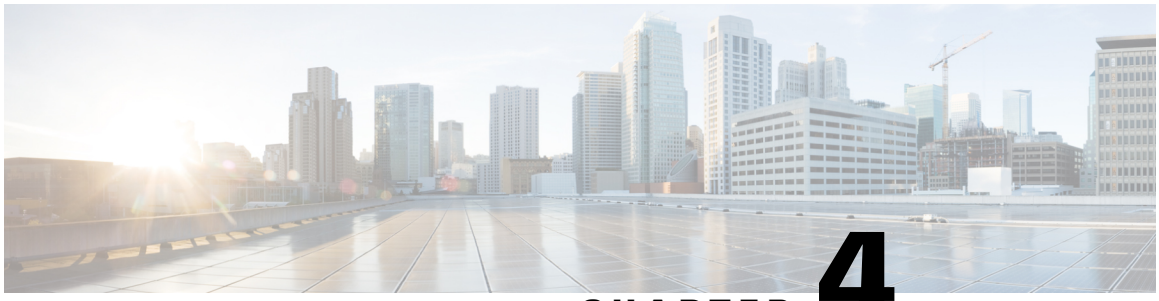
To enter a directory in the flash memory, use the **cd flash:***/directory-name* command. To determine which directory you are in, use the **pwd** command.
The following example shows output for the following actions:

- Entering the home directory of a flash memory card (flash:/)
- Verifying that you are in the flash:/ directory

```
Router# cd flash:
Router# pwd
flash:/
```

What to Do After Installing the Hardware

After you install the router hardware, refer to the *Cisco ASR 901 Series Aggregation Services Router Software Configuration Guide* for the software configuration information.



CHAPTER 4

Troubleshooting

If you encounter problems while the router is in operation, use the information in this appendix to help isolate problems or to eliminate the router as the source of the problem.

If you cannot locate the source of the problem, contact a customer service representative for information on how to proceed. For technical support information, see the Cisco Information Packet publication that shipped with your router. Before you call, have the following information ready:

- Chassis type and serial number
- Maintenance agreement or warranty information
- Type of software and version number
- Date you received the new chassis
- Brief description of the problem
- Brief explanation of the steps you took to isolate the problem

Note Ensure you provide the customer service representative with any upgrade or maintenance information that was performed on the router after your initial installation (see Site Log, on page 85for Site Log information.)

This appendix contains the following sections:

Problem Solving

To solve a problem, isolate the problem to a specific subsystem by comparing the current router activity to the expected router activity.
The LEDs on the bottom panel of the router enable you to determine router performance and operation. For a description of these LEDs, see Reading LEDs , on page 70.

When solving a problem, check the following router subsystems:

- **Power and cooling systems—**External power source, power cable, router power supply, and circuit breaker. Also check for inadequate ventilation or air circulation.
- **Modules—**Checking the LEDs on the modules can help you to identify a failure.
- **Cables—**Ensure that the external cables connecting the router to the network are all secure.

Troubleshooting the Power and Cooling Systems

See the following table for information to help you isolate the problem.

Symptom	Possible Cause	Corrective Action
The System LED on the bottom panel is not on.	The cause is environmental.	Check for an environmentally induced shutdown. (See Environmental Reporting Features, on page 68).
	Light pipe is not connected properly.	Check the light pipe connection.
The router shuts down after being on for only a short time.	The power source is not connected properly.	• Check the DC or AC input. • Check the DC or AC source.
	The chassis intake and heat sink fins are obstructed.	Check the chassis intake and heat sink fins for obstructions. Clear any obstructions.
	Installation does not meet environmental site requirements.	Check the environmental site requirements provided in Table 8 in Product Specifications, on page 72.
The router partially boots, but the LEDs do not come on.	There is a possible power supply failure.	Check the power LED on the front panel of the router. If the LED is on, the power supply is functional. If the LED is off, refer to the *Cisco Information Packet* for warranty information or contact customer service.

Environmental Reporting Features

The router has a temperature sensor to detect over temperature conditions inside the chassis. The over temperature detection triggers an alert at 158°F (70°C). This condition is reported to the processor as an interrupt, where software takes action to generate the appropriate alarms. If the router reaches a temperature

of 181.4°F (83°C), the power supply will cycle to prevent the router from exceeding that temperature while being powered up state.

See the following table for help in interpreting environmental reporting features.

Symptom	Possible Cause	Corrective Action
The router operates at an abnormally high temperature. The following message appears on the console screen: `%SYS-1-OVERTEMP: System detected OVERTEMPERATURE condition. Please resolve cooling problem immediately!`	The air flow to cooling vents is blocked.	Take corrective steps. For information about environmental operating conditions, see Table 8 in Product Specifications, on page 72. For over temperature alert settings, see Environmental Monitoring Temperature Sensor , on page 10.

Troubleshooting Cables and Connections

Network problems can be caused by a cable or cable connection, or external device such as a modem, transceiver, hub, wall jack, WAN interface, or terminal. See the following table for information to help you isolate the problem.

Symptom	Possible Cause	Corrective Action
The router is experiencing network problems.	The router does not boot properly. The router constantly or intermittently reboots.	Check the router chassis or software. For warranty information, refer to the *Cisco Information Packet* publication that shipped with your router or contact customer service.
	The router boots, but the console screen is frozen.	Verify that the parameters for your terminal are set as follows: • The terminal should have the same data rate as the router (9600 bps is the default). • 8 data bits. • No parity generated or checked. • 2 stop bits.

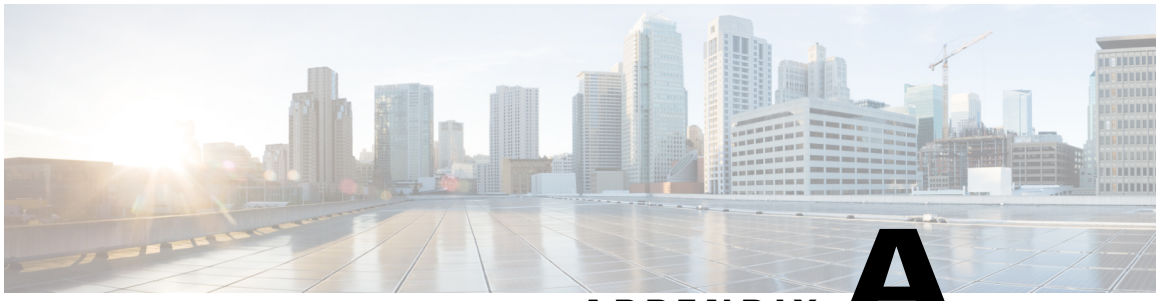
	The router powers on and boots only when a particular cable is disconnected.	There may be a problem with the module or cable. For warranty information, refer to the *Cisco Information Packet* publication that shipped with your order or contact customer service.

Reading LEDs

The following table summarizes the LEDs on the chassis of the router. These LEDs are common to all chassis models, however, these LEDs may be turned off in some models using Cisco IOS CLIs.

LED Label	Function	Color/State	Description
1	System status	Off	No power
		Green	Links are up
		Amber	Some links are down due to minor hardware failure
		Red	All links are down due to major hardware or environmental failure
2	Management status	Off	No power
		Green	Links are up
		Amber	Cisco IOS boot in progress
		Red	Software upgrade is in progress
3	Network/Link status	Off	No power
		Green	Links are up
		Amber	No management connectivity
		Red	No IP address

Note When Zero Touch Provisioning (ZTP) is enabled, the management and network LEDs blink. When the ZTP reset button is reset, all the above three LEDs will blink.



APPENDIX A

Specifications and Part Numbers

This appendix provides information on the part numbers of the router variants, SFP modules, product, power, and environmental specifications of the Cisco ASR 901S Series Aggregation Services Router components. It also contains safety and compliance information and technical specifications of the antenna.

Components and Options

The tables in this section list the hardware parts and part numbers available for the Cisco ASR 901S Series Aggregation Services Router.

Table 4: Chassis Models for the Cisco ASR 901S Series Aggregation Services Router

Part Number	Description
A901S-4SG-F-D	4 external ports (4 SFP) + 1 gland interface for internal ports (2 Cu), DC power supply
A901S-3SG-F-D	4 external ports (3 SFP +1 Cu) + 1 gland interface for internal ports (1 Cu), DC power supply
A901S-2SG-F-D	4 external ports (2 SFP + 2 Cu) + 1 gland interface for internal ports , DC power supply
A901S-3SG-F-AH	3 external ports (3 SFP) + 1 gland interface for internal ports (2 Cu), AC PSU, 1 sec holdover for 1 PoE+
A901S-2SG-F-AH	3 external ports (2 SFP + 1 Cu) + 1 gland interface for internal ports (1 Cu) , AC PSU, 1 sec holdover for 1 PoE+

The router supports a wide range of SFP optics modules. The following table lists their part numbers. The operational temperatures supported for the optics are defined by individual SFP or SFP+ modules.

Table 5: SFP Modules Supported

Type	Part Number
Ethernet SFP	GLC-LH-SM, GLC-LH-SMD, GLC-EX-SMD, GLC-T, GLC-ZX-SMD, GLC-LX-SM-RGD, GLC-SX-MM, GLC-SX-MMD, GLC-SX-MM-RGD, GLC-ZX-SM, GLC-ZX-SM-RGD, GLC-BX-U, GLC-BX-D, SFP-GE-L, SFP-GE-S, SFP-GE-Z, SFP-GE-T, GLC-FE-100FX-RGD, CWDM-SFP-1470, CWDM-SFP-1490, CWDM-SFP-1510, CWDM-SFP-1530, CWDM-SFP-1550, CWDM-SFP-1570, CWDM-SFP-1590, CWDM-SFP-1610, ranging from DWDM-SFP-3033 to DWDM-SFP-6141 (40 wavelengths)

Product Specifications

The following tables list product, power, and environmental specifications, and safety and compliance information for the Cisco ASR 901S Series Aggregation Services Router.

Table 6: Cisco ASR 901S Series Aggregation Services Router Specifications

Description	Specifications
Dimensions (H x W x D)	16 inches high x 11 inches wide x 2.5 inches deep (40.64 cm x 27.94 cm x 6.35 cm)
Weight	• Approximately 11. 7 lbs. (5.8 kgs [FD chassis model]) • Approximately14.9 lbs. (6.8 kgs [FA chassis model])
Memory	• Flash memory: 128 MB (onboard flash) • System memory: 512 MB (DDR3)
Rack-mount options	• Lamp post mount kit • Wall mount kit • H-frame mount kit

Ethernet ports	• **FD models**
	  • External ports (4 x 1 SFP Gigabit Ethernet), internal ports 2 x 10/100/1000 RJ-45
	  • External ports (3 x 1 SFP Gigabit Ethernet + 1 x 10/100/1000 RJ-45) , internal ports (1 x 10/100/1000 RJ-45)
	  • External ports (2 x 1 SFP Gigabit Ethernet + 2 x 10/100/1000 RJ-45)
	• FA modes
	  • External ports (3 x 1 SFP Gigabit Ethernet), internal ports (2 x 10/100/1000 RJ-45)
	  • External ports (2 x 1 SFP Gigabit Ethernet + 1 x 10/100/1000 RJ-45), internal ports (1 x 10/100/1000 RJ-45)

Console port	1 (up to 115.2 Kbps)
Fans	Fanless design
Cabling	Closed cable bay for external connections
Power supplies	1 power supply (AC or DC)
Mean Time Between Failure (MTBF)	150,000 hours

Table 7: Power Specifications

Description	**Specifications**

Power consumption	• DC-input power and power dissipation:
	  ◦ 40 W for all DC models
	• AC-input power and power dissipation:
	  ◦ 40 W without PoE+
	  ◦ 70 W with 1 PoE+ (1-sec backup)
	  ◦ 100 W with 2 PoE+ ports (1-sec backup on 1 PoE+ port only)

AC input voltage and frequency	100-240 Vac, 50-60 Hz

DC power rating	• **DC-input voltage rating:** 24 VDC, -48 VDC, -60 VDC • **DC-input current rating:** 2.8 A maximum
Power connector	• DC connector (AMPHENOL ELVP03100) • AC connector (AIR-PWR-ST-LT-R3P=)

Table 8: Environmental Specifications

Description	Specifications
Operating temperature	-40 to 149°F (-40 to 65°C); optics used may limit the temperature range
Nonoperating temperature	-40 to 158°F (-40 to 70°C) -40 to 113°F (-40 to +45°C) with solar loading
Relative humidity	10% to 85%, noncondensing, ±5 %
Operational altitude	13,000 ft (4000m) maximum 104°F (40°C) ambient

Table 9: Safety and Compliance

Type	Standards
Safety	• UL/CSA 60950-1 • IEC/EN 60950-1 • IEC/EN 60950-22 • AS/NZS 60950.1

EMC emissions	• FCC 47CFR15, Class B • EN55022, Class B • CISPR 22, Class B • AS/NZS CISPR 22, Class B • ICES 003, Class B • VCCI, Class B • KN 22, Class B • CNS-13438 • EN61000-3-3 Voltage Changes, Fluctuations, and Flicker • EN61000-3-2 Power Line Harmonics • KN 22 • EN61000-3-12 Power Line Harmonics • EN61000-3-11 Voltage Fluctuations and Flicker
EMC immunity	• EN/IEC61000-4-2 Electrostatic Discharge Immunity - Enclosure • EN/IEC61000-4-3 Radiated Immunity - Enclosure • EN/IEC61000-4-4 Electrical Fast Transient Immunity • EN/IEC61000-4-5 Surge • EN/IEC61000-4-6 Immunity to Conducted Disturbances
Network Equipment Building Standards (NEBS)	This product is designed to meet the following requirements: • GR-63-CORE • GR-1089-CORE
ETSI/EN	• EN 300 386 Telecommunications Network Equipment (EMC) • EN55022 Information Technology Equipment (Emissions) • EN55024 Information Technology Equipment (Immunity) • EN61000-6-1 Generic Immunity Standard

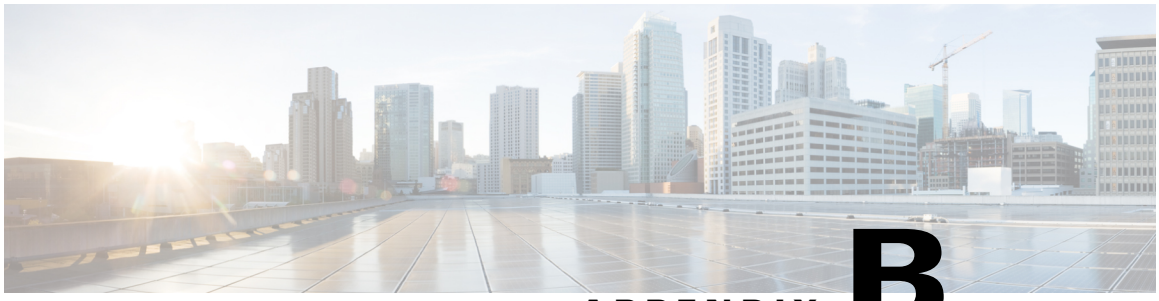
Network synchronization	• GR-1244-CORE • ITU-T G.813 • ITU-T G.703 clause 5 • ITU-T G.703 clause 9 • ITU-T G.8261/Y.1361 • ITU-T G.781 • ITU-T G.8264 • IEEE1588-2008
• Ethernet ◦ 1000Base-T 100Base-T ◦ 100Base-FX ◦ 1000Base-S ◦ 1000BaseL ◦ 1000Base-Z ◦ 1000Base-E ◦ 1000Base-BX-U ◦ 1000Base-BX-D ◦ DWDM-SFP-GE: ◦ CWDM-SFP-GE: ◦ 10000Base-S ◦ 10000Base-L ◦ 10000Base-Z ◦ 10000Base-E	DSPR Technical Requirement 2005 • IEEE 802.3 • IEEE 802.3ae DSPR Technical Condition 2004 • IEEE-802.3ah • ANSI X3.263-1995 • ISO/IEC 9314-3

Antenna Specifications

The following table lists the technical information for the Wi-Fi antenna supported on the Cisco ASR 901S Series Aggregation Services Router.

Table 10: Wi-Fi Antenna Specifications

Specification	Wi-Fi Antenna (Omnidirectional)
Type	Dipole
Environment	Outdoor
Height	3.7 in. (9.3 cm)
Width	1.0 in. (2.5 cm)
Operating frequency range	2400-2500 MHz
Characteristic impedance	50 Ohm
VSWR	1.7:1 Max
Gain	3 dBi TYP, 3.4 dBi Peak
Polarization	• Linear • Vertical
Connector	N-Type (Male)
Operating temperature	-40 to 158°F (-40 to 70°C)
DC ground	Yes
Maximum input power	10 W (average)
Compliance	RoHS



APPENDIX B

Cable Specifications

If you prefer to build your own cables, this appendix provides cable specifications for the Cisco ASR 901S Series Aggregation Services Router.

The appendix includes the following sections:

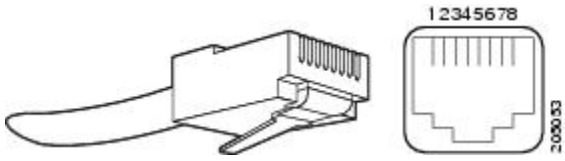
Gigabit Ethernet Connector Pinouts

This section illustrates the Gigabit Ethernet RJ-45 connector and lists its pinout and signal descriptions.

Note The RJ-45 ports are capable of operating in both 100BaseT and 1000BaseT modes.

The following figure shows the RJ-45 connector and port, and the table lists the connector pinouts and signals.

Figure 35: Connector and Port



Pin	FE Signal	GE Signal
1	TX data+	TX A+
2	TX data-	TX A-

3	RX data+	RX B+
4	Not used	TX C+
5	Not used	TX C-
6	RX data-	RX B-
7	Not used	RX D+
8	Not used	RX D-

SFP and SFP+ Port Pinouts and Cable Specifications

The following figures show the SFP and SFP+ modules supported by the Cisco ASR 901S Series Aggregation Services Router.

Note Pins not listed in the tables in this appendix are not connected.

The Cisco ASR 901S Series Aggregation Services Router supports the SFP module patch cable, a 0.5-meter, copper, passive cable with SFP module connectors at each end (see the following figures).

Figure 36: Duplex LC Cable Connector

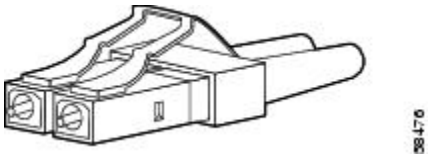


Figure 37: Simplex LC Cable Connector

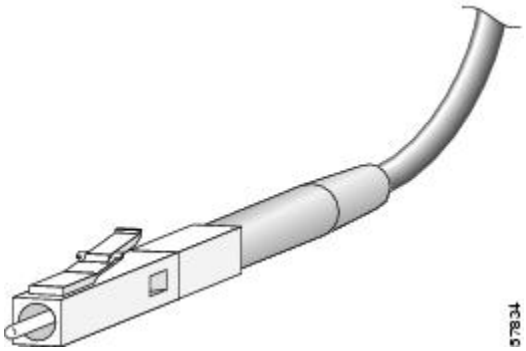


Figure 38: Copper SFP Module RJ-45 Connector

Pin	Label	1 2 3 4 5 6 7 8
1	TP0+	
2	TP0-	
3	TP1+	
4	TP2+	
5	TP2-	
6	TP1-	
7	TP3+	
8	TP3-	

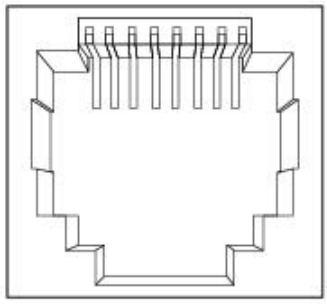
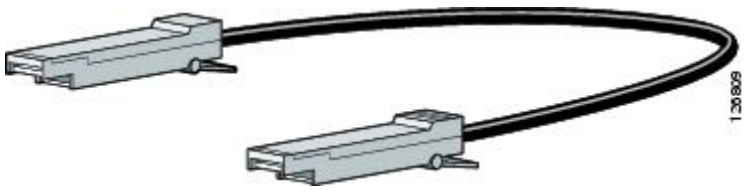


Figure 39: SFP Module Patch Cable



Console Port Signals and Pinouts

The Cisco ASR 901S Aggregation Services Router ships with a console cable kit, which contains the cable and adapters to connect a console terminal (an ASCII terminal or PC running terminal emulation software). The console cable kit includes the following items:

- RJ-45-to-RJ-45 rollover cable
- RJ-45-to-DB-9 female DTE adapter (labeled TERMINAL)
- RJ-45-to-DB-25 female DTE adapter (labeled TERMINAL)

To connect a modem, you need to order an auxiliary cable.

Figure 40: Connecting the Console Port to a PC

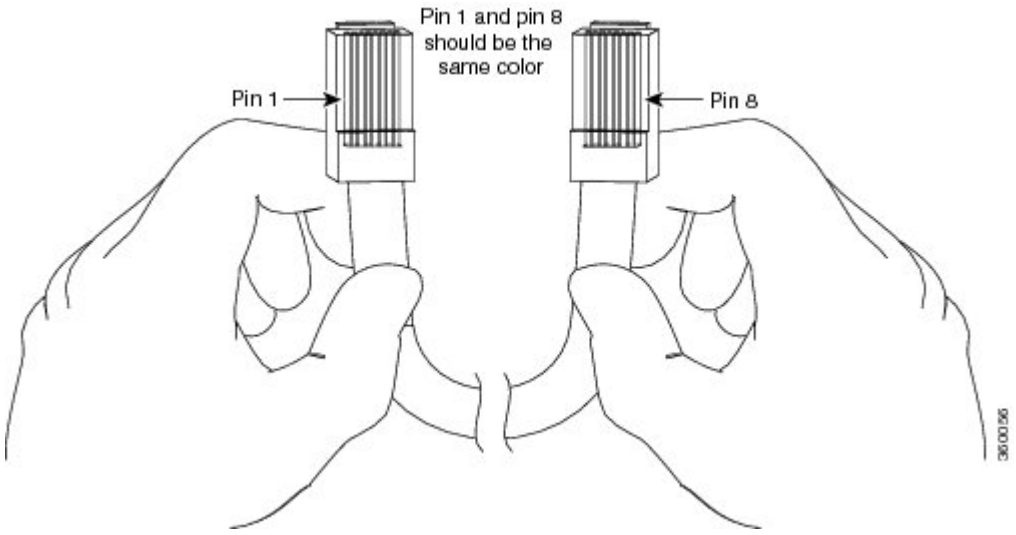
Illustration showing the console port to PC connection will be shown here.

For console connections, see Connecting Console Port and Pinouts.

Identifying a Rollover Cable

To identify a rollover cable, compare the modular plugs at the two ends of the cable. When you hold the plugs side by side, with the tab at the back, the wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug (see figure below). If you purchased your cable from Cisco Systems, pin 1 is white on one connector, and pin 8 is white on the other (a rollover cable connects pins 1 and 8, 2 and 7, 3 and 6, and 4 and 5).

Figure 41: Identifying a Rollover Cable



Alarm Port Pinouts

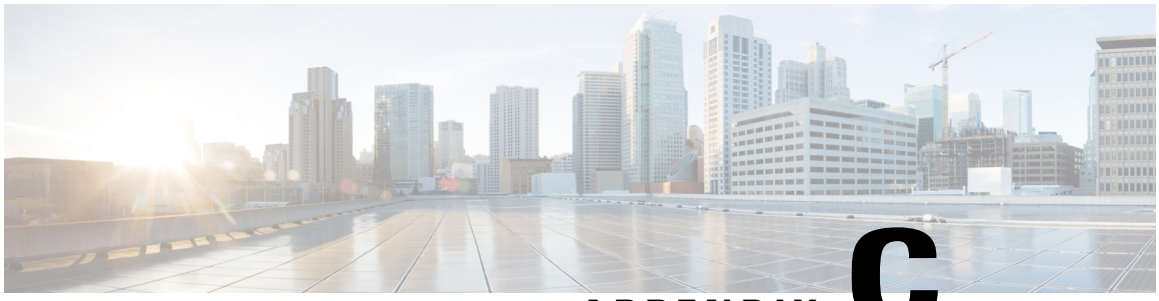
The following table lists the pinouts for the alarm port (RJ45) on the Cisco ASR 901S Series Aggregation Series Router.

Pin	Signal Name	Description
1	Alarm input 1	—
2	Alarm input 2	—
3	—	Not connected
4	Alarm input 3	—
5	Alarm input 4	—
6		Not connected
7		Not connected
8		Not connected

Management Ethernet Port Pinouts

The following table lists the pinouts for the management Ethernet port (RJ-45) on the Cisco ASR 901S Series Aggregation Services Router.

Pin	Signal Name	Description
1	RxD_P	—
2	RxD_N	—
3	TxD_P	—
4	—	Not connected
5	—	Not connected
6	TxD_N	—
7	—	Not connected
8	—	Not connected



APPENDIX C

Site Log

Use the site log to provide a record of actions related to installing and maintaining the router. Keep it in an accessible place near the chassis so that users performing tasks have access to it. Use the installation checklist (see the "Installation Checklist" section) to verify the steps in the installation and maintenance of your router.

Site Log

Site Log entries might include the following:

- Installation progress—Make a copy of the Cisco ASR 901S Aggregation Services Router installation checklist, and insert it into the site log. Make entries as you complete each task.
- Upgrade, removal, and maintenance procedures—Use the site log as a record of ongoing router maintenance and expansion history. Each time a task is performed on the Cisco ASR 901S Aggregation Services Router, update the site log with the following information:
  - Removal or replacement of interface modules
  - Configuration changes
  - Maintenance schedules and requirements
  - Maintenance procedures performed
  - Intermittent problems
  - Comments and notes

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

Date	Description of Action Performed or Symptom Observed	Initials

Site Log