Cisco Catalyst IW9167E Heavy Duty Access Point with Stadium Antenna Hardware Installation Guide

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CONTENTS

Preface

This preface describes this guide and provides information about the conventions used in this guide, and related documentation.

It includes the following sections:

About this Guide

This guide provides instructions to install your Cisco Access Point and provides links to resources that can help you configure it. This guide also provides mounting instructions and troubleshooting information.

Conventions

This document uses the following conventions for notes, cautions, and safety warnings. Notes and cautions contain important information that you should know.

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Caution Means *reader be careful*. Cautions contain information about something you might do that could result in equipment damage or loss of data.

Warning Safety warnings appear throughout this guide in procedures that, if performed incorrectly, can cause physical injuries. A warning symbol precedes each warning statement.

Related Documentation

All user documentation for the Catalyst IW9167E Heavy Duty access point is available at the following URL:

https://www.cisco.com/c/en/us/support/wireless/catalyst-iw9167-series/series.html

For detailed information and guidelines about configuring and deploying your access point in a wireless network, see the following documentation:

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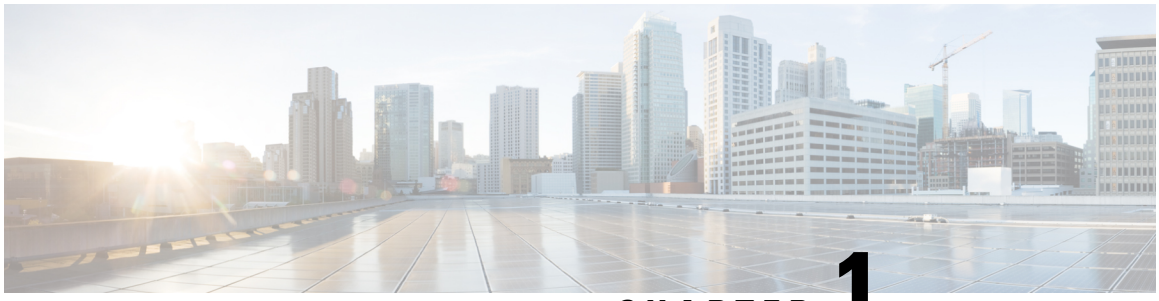


CHAPTER 1

Cisco Catalyst IW9167EH with Integrated Stadium Antenna

Cisco Catalyst IW9167E Heavy Duty Access Point with Stadium Antenna

The Cisco Catalyst IW9167EH Heavy Duty Access Point with Stadium Antenna is a Cisco IW9167EH AP integrated with a eight-port 4x4 triband directional panel antenna. The antenna supports Wi-Fi 6E and is designed to achieve low skyward radiation, meeting the FCC's 21-dBm EIRP skyward limit over the UNII-1, UNII-5, and UNII-7 bands. The device includes an integrated GNSS antenna supporting the GPS L1 C/A band for 6-GHz AFC location reporting.

The PIDs for this model are IW9167EH-x-STA, and IW9167EH-x-STA2.

- The Catalyst IW9167EH-x-STA bundle, consisting of the IW9167EH-x AP and IW-ANT-PNL25610-R= antenna, is a factory-assembled bundle for use in outdoor environments. The antenna features a wide horizontal beamwidth at 5 and 6 GHz, providing sector coverage. This model is only available in the -B (US) regulatory domain.
- The Catalyst IW9167EH-x-STA2 bundle, consisting of the IW9167EH-x AP and IW-ANT-PNL25613-R= antenna, is a factory-assembled bundle for use in outdoor environments. The antenna features a narrow, symmetric beamwidth at 5 and 6 GHz, providing extended distance coverage. This model is only available in the -B (US) regulatory domain.

A full listing of the AP's features and specifications is provided in the Cisco Catalyst IW9167E Heavy Duty Access Point Data Sheet.

Cisco Cisco Catalyst IW9167EH Heavy Duty Access Point with Stadium Antenna Features

Cisco Cisco Catalyst IW9167EH Heavy Duty Access Point with Stadium Antenna is supported on Cisco Catalyst 9800 wireless controller-based products, and has the following features:

- 2 GB DDR4 memory, 1 GB NAND Flash
- Tri-radio, dual band support: 2.4-GHz Slot 0, 5-GHz Slot 1, and 6 GHz Slot 2
- 4 x 4 MIMO with up to four spatial streams
- Built-in GNSS antenna
- 1x TNC jack (female) for an external GNSS antenna (optional)
- Multi-protocol IoT radio, Aux radio, Barometer
- Bluetooth Low Energy (BLE) radio enables IoT use cases such as location tracking and way finding.
- Operation mode—Cisco URWB, WGB, or AP
- 1 x multi-Gigabit (mGig) copper Ethernet port (supporting PoE, including IEEE 802.3at/bt, Cisco UPoE, 100 Mbps/1 Gbps/2.5 Gbps/5 Gbps)
- 1 x SFP interface—supports up to 10 Gbps

Note For 10G SFP fiber module, Cisco PID SFP-10G-LR10-I has guaranteed performance with the Catalyst IW9167E access point.

- Optional M12 adapter for network and power interfaces
- Dual power input options—PoE-in and 24–48VDC
- Water and dust resistance—IP 66/67
- Hardened for shock, vibration, and extreme temperatures
- Operating temperature:
  - -40°C to 70°C without solar loading
  - The Catalyst IW9167EH-x-STA, IW9167EH-x-STA2 models are limited to -40°C minimum operating temperature.

Technical Specifications

The following table lists the specifications for the antenna:

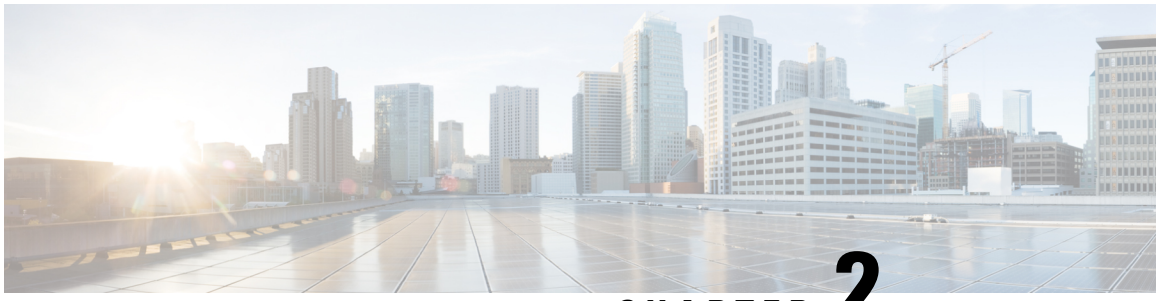
Table 1: Antenna Specifications

Specification	Catalyst IW9167EH-x-STA Bundle	Catalyst IW9167EH-x-STA2 Bundle
Frequency	2400-2482 MHz (Ports 1–4) 5170-5835 MHz (Ports 1–4) 5925-6875 MHz (Ports 5–8)	2400-2482 MHz (Ports 1–4) 5170-5835 MHz (Ports 1–4) 5925-6875 MHz (Ports 5–8)
Polarization	±45° dual slant	±45° dual slant
VSWR	2:1 maximum	2:1 maximum
Port-to-Port Isolation	20 dB minimum between ports of same band	20 dB minimum between ports of same band
Port-to-Port Isolation, 5 to 6 GHz	55 dB minimum	55 dB minimum
Peak Gain	2.4 GHz—8 dBi 5 GHz—9 dBi 6 GHz—10 dBi	2.4 GHz—7 dBi 5 GHz—13 dBi 6 GHz—13 dBi
3-dB Azimuth Beamwidth	2.4 GHz—90 degrees typical 5 GHz—75 degrees typical 6 GHz—75 degrees typical	2.4 GHz—75 degrees typical 5 GHz—35 degrees typical 6 GHz—35 degrees typical
3-dB Elevation Beamwidth	2.4 GHz—45 degrees typical 5 GHz—28 degrees typical 6 GHz—27 degrees typical	2.4 GHz—50 degrees typical 5 GHz—25 degrees typical 6 GHz—25 degrees typical
Dimensions	14.5 in x 14.5 in x 4.7 in 368.3 mm x 368.3 mm x 120.0 mm	14.5 in x 14.5 in x 4.7 in 368.3 mm x 368.3 mm x 120.0 mm
Weight	17.0 lb (7.7 kg)	17.0 lb (7.7 kg)
Operating temperature	-40 to +70°C	-40 to +70°C
Flammability rating	UL 94 V-0	UL 94 V-0
IP rating	IP66 and IP67	IP66 and IP67

Table 2: GNSS Specifications

Specification	Catalyst IW9167EH-x-STA Bundle	Catalyst IW9167EH-x-STA2 Bundle
Frequency	1164-1215 MHz 1559-1610 MHz	1164-1215 MHz 1559-1610 MHz
Polarization	Mixed	Mixed

Specification	Catalyst IW9167EH-x-STA Bundle	Catalyst IW9167EH-x-STA2 Bundle
VSWR	2:1 maximum	2:1 maximum
Maximum Gain	3 dBi	4 dBi



CHAPTER 2

Unpacking Your Access Point

Package Contents

Each AP package contains the following items:

- One Catalyst IW9167EH with Stadium Antenna
- Ground lug kit with oxide inhibitor
- One PG13.5 gland
- Weatherization tape

Unpacking the Access Point

To unpack the AP, follow these steps:

Procedure

Step 1 Unpack and remove the access point and the selected mounting accessory kit from the shipping box.

Step 2 Return the packing material to the shipping container and save it for future use.

Step 3 Verify that you have received all items ordered. If any item is missing or damaged, contact your Cisco representative or reseller for instructions.

Cisco Orderable Accessories

Order the following accessories separately from Cisco:

- AP mounting brackets

Table 3: Supported Mounting Bracket for Catalyst IW9167EH AP with Stadium Antenna

Cisco PID	Description
IW-ACC-BRK1=	Articulating Arm Bracket Assembly

- Accessory kits

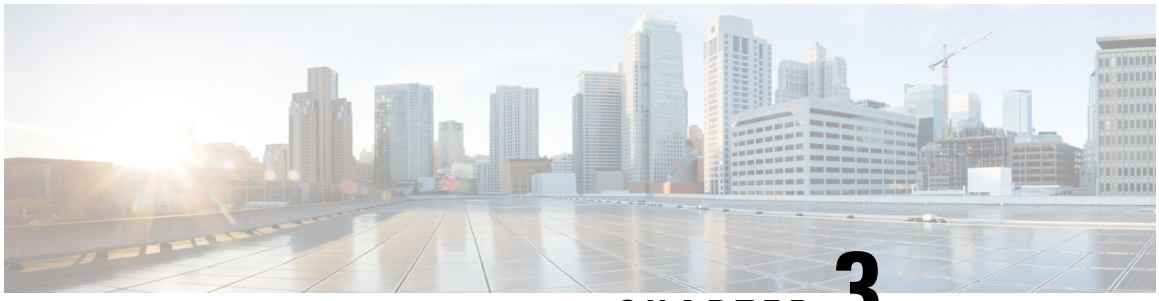
Cisco PID	Description	Usage Restrictions
AIR-SFP-KIT1=	Gland kit for SFP port (Qty: 5)	—
IW-ACC-M12ETH=	Adapter, M12 X-code to RJ45 Ethernet connector	Not applicable for Hazloc usage
IW-ACC-M12PWR=	Adapter, M12 4 Pin A-Code to Micro-fit power connector	Not applicable for Hazloc usage
IW-ACC-M12SPCR1=	Spacer for M12 when using on SFP port (Qty: 5)	Not applicable for Hazloc usage

- M12 Cables

Cisco PID	Description
CAB-PWR-M12-10=	M12 DC power cable, 4 pins, A-Code, 10 ft
CAB-RJ45-M12-10=	M12 to RJ-45 Ethernet cable, 8 pins, X-Code, 10 ft
CAB-ETHM12-M12-10=	M12 to M12 Ethernet cable, 8 pins, X-Code, 10 ft

- Power adapter and power injectors when PoE is not available

Power Supply	Description
IW-PWRADPT-MFIT4P=	Power Adapter, AC-DC, Micro-Fit 4-Pin connector
IW-PWRADPT-MFITIN=	Power Adapter, AC-DC, Micro-Fit 4-Pin connector, India use
IW-PWRINJ-60RGDMG=	Power Injector, 60W, outdoor 5GE
AIR-PWRINJ-60RGD1=	60W outdoor rated power injector, with North America AC power plug. For more information, see the power injector data sheet.
AIR-PWRINJ-60RGD2=	60W outdoor rated power injector, International version with blunt-end cable. For more information, see the power injector data sheet.



CHAPTER 3

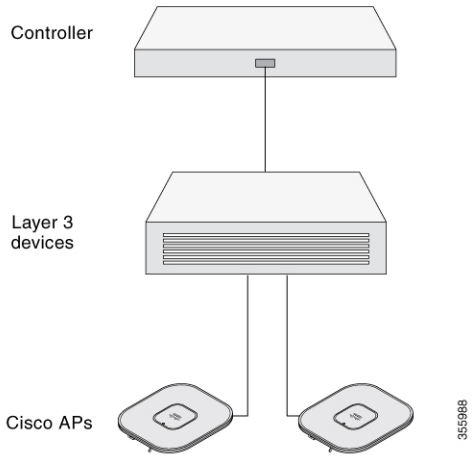
Installation Overview

Performing a Preinstallation Configuration (Optional)

The following procedures describe the processes to ensure that your AP installation and initial operation go as expected.

Note Performing a preinstallation configuration is an optional procedure. If your network controller is properly configured, you can install your AP in its final location and connect it to the network from there.

The following illustration shows the preinstallation configuration setup:



Perform the following steps:

Before you begin

Ensure that the Cisco Controller Distribution System (DS) port is connected to the network. Use the procedure for CLI or GUI as described in the release appropriate Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide.

- Enable Layer 3 connectivity between APs, Cisco Controller Management, and AP-Manager interface.
- Configure the switch to which your AP has to attach. See the Cisco Wireless Controller Configuration Guide for the release you are using, for additional information.
- Configure the Cisco Catalyst 9800 Series Wireless Controller as the primary so that new APs always join it.
- Ensure that the DHCP is enabled on the network. The AP must receive its IP address through DHCP.

Note An 802.11ax AP is assigned an IP address from the DHCP server only if a default router (gateway) is configured on the DHCP server (enabling the AP to receive its gateway IP address) and the gateway ARP is resolved.

- CAPWAP UDP ports must not be blocked in the network.
- The AP must be able to find the IP address of the controller. This can be accomplished using DHCP, DNS, or IP subnet broadcast. This guide describes the DHCP method to convey the controller IP address. For other methods, see the product documentation.

Note The AP requires a multi-gigabit Ethernet (5 Gbps) link to prevent the Ethernet port from becoming a bottleneck for traffic.

Procedure

Step 1 Power the AP using supported power source.

- As the AP attempts to connect to the controller, the LED cycles through a green, red, and off sequence, which can take up to five minutes.

  Note
  If the AP remains in this mode for more than five minutes, the AP cannot find the primary Cisco Catalyst 9800 Series Wireless Controller. Check the connection between the AP and the Cisco Catalyst 9800 Series Wireless Controller and be sure that they are on the same subnet.

- If the AP shuts down, check the power source.
- After the AP finds the Cisco Catalyst 9800 Series Wireless Controller, it attempts to download the new operating system code if the AP code version differs from the Cisco Catalyst 9800 Series Wireless Controller code version. While this is happening, the Status LED blinks blue.

If the operating system download is successful, the AP reboots.

Step 2 (Optional) Configure the AP. Use the controller CLI, GUI, or Cisco DNA Center to customize the access point-specific 802.11ax network settings.

Step 3 If the preinstallation configuration is successful, the Status LED is green, indicating normal operation. Disconnect the AP and mount it at the location at which you intend to deploy it on the wireless network.

Step 4 If your AP does not indicate normal operation, turn it off and repeat the preinstallation configuration.

Note
When you are installing a Layer 3 access point on a subnet that is different from the Cisco Catalyst 9800 Series Wireless Controller, ensure the following setup is configured:

- A DHCP server is reachable from the subnet on which you plan to install the AP.
- The subnet has a route back to the controller.
- This route has destination UDP ports 5246 and 5247 open for CAPWAP communications.
- The route back to the primary, secondary, and tertiary controller allows IP packet fragments.
- If address translation is used, the access point and the controller have a static 1-to-1 NAT to an outside address. Port Address Translation is not supported.

Preinstallation Checks and Installation Guidelines

Before you mount and deploy your access point, we recommend that you perform a site survey (or use the Site Planning tool) to determine the best location to install your access point.

You should have the following information about your wireless network available:

- Access point locations
- Access point mounting options: To a vertical or horizontal wall or a pole
- Access point power options: Use either of the following options to power the AP:
  - DC power input
  - Cisco-approved power injector
  - 802.3at (PoE+), 802.3bt, and Cisco Universal PoE (Cisco UPOE)
- Operating temperature: -40° to +158°F (-40° to +70°C) with solar load and still air.
- Console access using the console port

  We recommend that you use a console cable that is one meter or less in length.

Note The AP may face issues while booting if you use an unterminated console cable (not plugged into any device or terminal) or a console cable that is more than one meter in length.

We recommend that you make a site map showing access point locations so that you can record the device MAC addresses from each location and return them to the person who is planning or managing your wireless network.

Installing the Catalyst IW9167E with Stadium Antenna

You can install the access point on a wall or ceiling (must be a flat surface) or on a pole with a minimum diameter of 2 inches (5.08 cm) and a maximum diameter of 5 inches (12.7 cm).

Note Install the access point with the panel level that is aligned to the horizon or at lower angles. You must never point the access point upwards toward the sky to maintain compliance with radio emission regulations.

Procedure

Step 1 Decide on a mounting location.

See Deciding on a Mounting Location, on page 10.

Step 2 Ensure that you have the required tools and fasteners ready.

See Required Tools and Equipment, on page 11.

Step 3 Proceed with mounting the access point.

When mounting the access point:

a. Assemble the bracket hardware.

b. Connect the access point and the bracket to the mounting surface.

c. Connect the access point to the ground using the included ground screw and electrical joint compound.

d. Adjust the access point orientation.

The mounting options available are:

- Mount Using Articulating Bracket on a Wall or Ceiling, on page 15
- Mounting on a Pole or Mast

Deciding on a Mounting Location

The antenna should be mounted clear of any obstructions to the side or front of the enclosure, which contains the radiating elements. Remember to aim this antenna at the intended coverage area. Therefore, you should mount the antenna and adjust it to achieve the desired mechanical tilt.

Caution As with all the outdoor installations, you must install the antenna with cables exiting downward which helps prevent water from accumulating around the cable exit points.

Required Tools and Equipment

Warning **Statement 1071—**Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS

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

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

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

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

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

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

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

Warning **Statement 445—**Connect the Chassis to Earth Ground

To reduce the risk of electric shock, connect the chassis of this equipment to permanent earth ground during normal use.

Caution The fasteners and the mounting surface should be capable of maintaining a minimum pullout force of 150 pounds (68 kg) to support the weight of the antenna and bracket, along with the potential wind loading on the antenna.

Caution The pole or mast must be rigid enough to hold the weight of the antenna along with the associated forces produced by wind loads. Also, the pole or mast must be structurally strong enough to withstand the clamping force of the hose clamps.

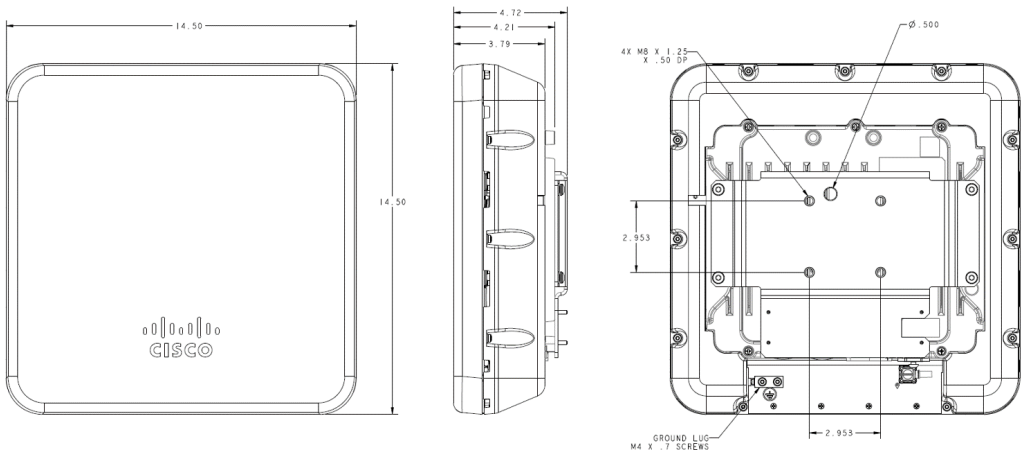
Before you mount the antenna, go through the supported mounting procedures and ensure that you have all tools and fasteners mentioned therein ready. The following is a general list of fasteners and tools not included in the antenna and brackets kit:

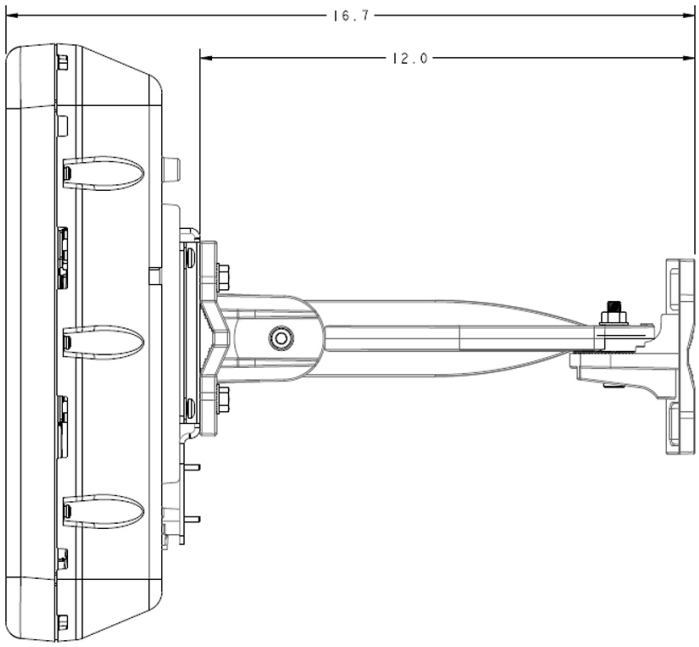
- To mount the antenna on a wall or ceiling, you need four mounting M8 screws or bolts and wall anchors.
- To mount the antenna on a pole or mast, you may need either or both of these supplies:
  - A slotted screwdriver or a wrench to tighten the screws on the hose clamps
  - A Hex key to tighten set screws

Dimensions of the Antenna and Bracket

The dimensions noted in the following illustrations are all in millimeters, unless noted otherwise.

Figure 1: Dimensions of the Antenna with Mounting Bracket

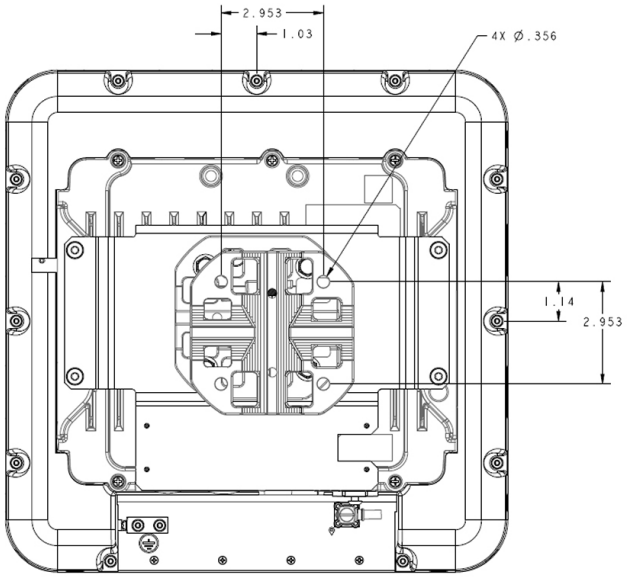




measurements in inches (in).

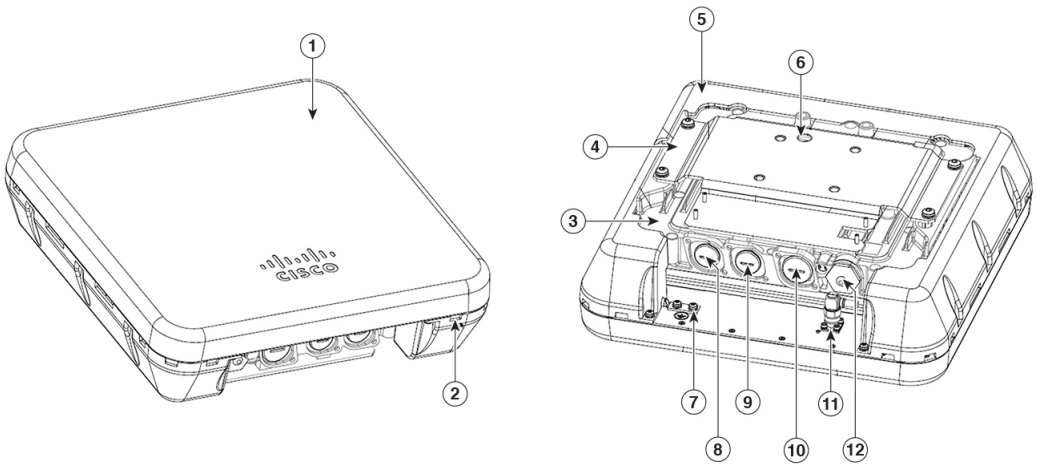
The pressure vent is located at the side of the antenna.

Figure 2: Locations of Screw Holes at the Back of the Antenna



The mounting hole location on the articulating mount flange. The flange supports VESA 75 mount pattern.

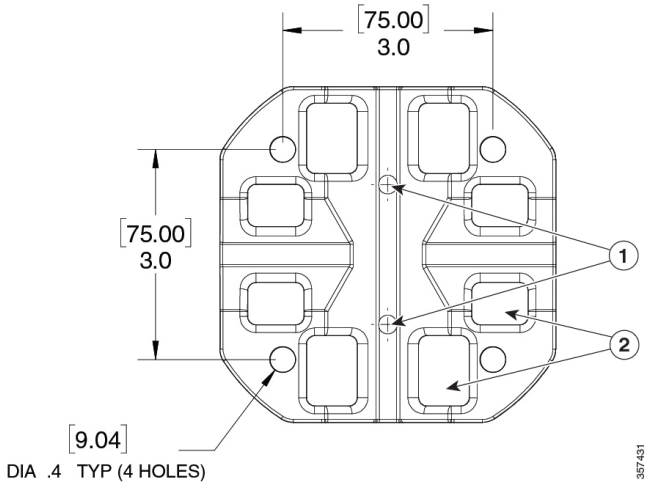
Figure 3: Assembly view



1	Stadium Antenna	7	Ground lug
2	Drain hole	8	DC IN port (PG 13.5)
3	Cisco Catalyst IW9167E-x AP	9	Ethernet/PoE port (PG 13.5)
4	Bracket adapter plate	10	SFP port (M25)
5	Shroud	11	GNSS port
6	Safety strap hole	12	Console port (M25)

Note Removing back shroud will void product warranty.

Figure 4: Locations of the Screw Holes on the Articulating Mount Flange

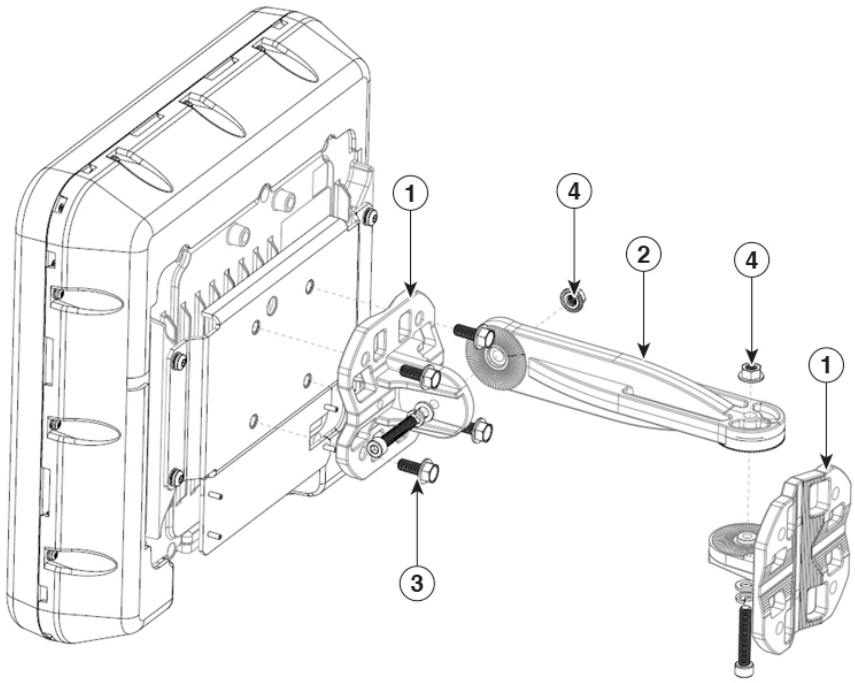


1	Pole / Mast mounting set screw holes
2	Slotted holes for hose clamps

Mount Using Articulating Bracket on a Wall or Ceiling

Note When using the articulating bracket, the antenna assembly and mounting hardware **must** be tethered to a secure mounting surface using the tether hole on the antenna assembly. The mounting kit does not include the tether strap.

Figure 5: Exploded View of Antenna and Bracket Hardware Assembly



Item #	Mounting Bracket Kit	Quantity	Tightening Values
1	Mounting flange	2	—
2	Mounting arm	1	—
3	M8 x20 screws	4	20.0 +/- 1.0 Nm
4	M8 nut	2	25.0 +/- 1.0 Nm

Figure 6: Close-Up View of the Azimuth and Elevation-Adjustment Pivots

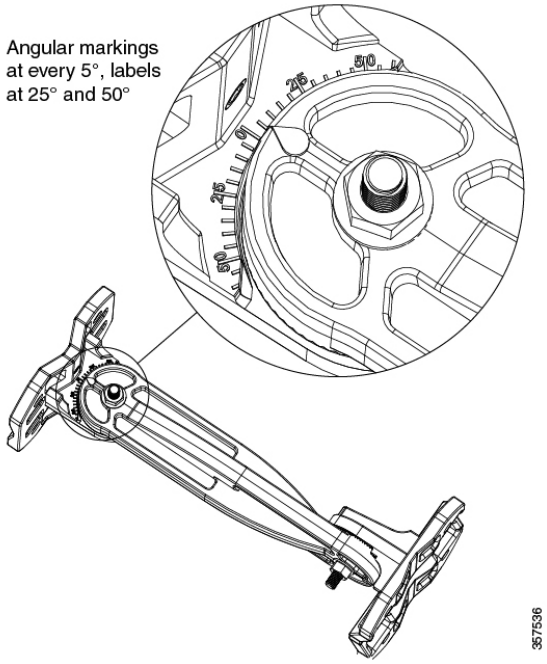


Figure 7: Azimuth Adjustment

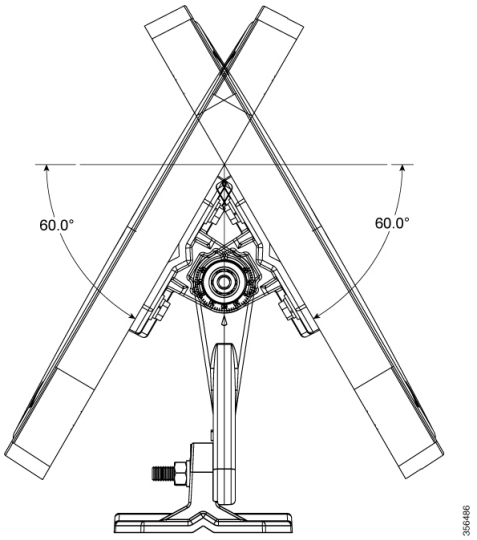
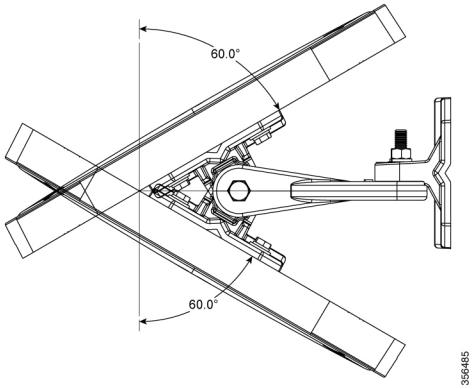


Figure 8: Elevation Adjustment



Procedure

Step 1 Determine the mounting location for the antenna.

Step 2 Attach one of the mount flanges to the wall or ceiling using four M8 screws through the holes in the bracket.

Note
The mounting kit does not include the M8 screws for securing the bracket to the mounting surface.

Step 3 Attach the other mount flange to the back of the antenna using four M8 screws through the holes in the bracket.

Tighten the screws to 20.0 +/- 1.0 Nm torque.

Step 4 Assemble the mounting arm to the flanges.

Use a wrench to tighten all screws and nuts. See Figure 5: Exploded View of Antenna and Bracket Hardware Assembly, on page 15.

Step 5 Orient the antenna correctly so that the antenna cable exits downwards.

Use a wrench to loosen or tighten the fasteners at the azimuth and elevation- adjustment pivots.

Step 6 Adjust the azimuth (side-to-side position) and elevation (up-and-down position) of the antenna.

Loosen the adjustment pivot nuts slightly to allow for adjustment. Use the azimuth and elevation markings on the articulating mounting arm and the flange brackets as a guide. See Figure 6: Close-Up View of the Azimuth and Elevation-Adjustment Pivots, on page 16. You may adjust the azimuth angle up to ±60 degrees, see Figure 7: Azimuth Adjustment, on page 16, and elevation up to ±60 degrees see Figure 8: Elevation Adjustment, on page 17.

Step 7 After adjusting the antenna position, tighten the pivot nuts.

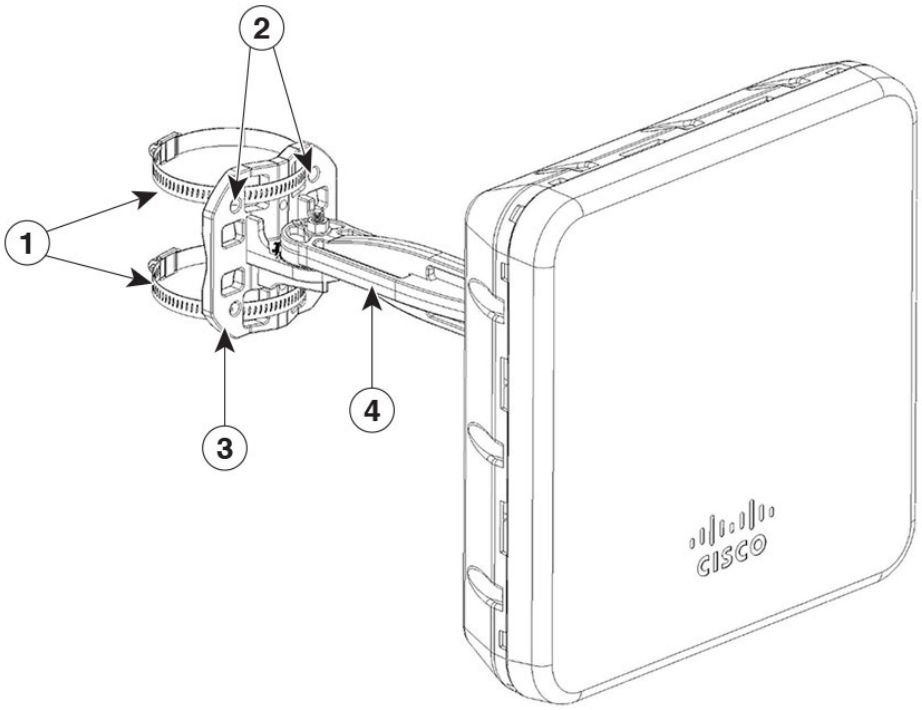
Tighten all nuts at the pivot points to 25.0 +/- 1.0 Nm torque.

Step 8 Connect the Ethernet cable to the antenna using the termination kit.

Step 9 Connect the antenna to the building ground using the grounding kit.

Mount Using Articulating Bracket on a Pole or Mast

Figure 9: Antenna Bracket Hose Clamp Assembly for Pole Mounting



1	Worm-gear-type hose clamp (50–135mm) for mounting the assembly on a pole or mast	3	Articulating mount flange that is fastened to the pole or mast using hose clamps
2	Screws holes to mount the assembly to a wall.	4	Articulating mount arm

Before you begin

Note The pole or mast must be rigid enough to hold the weight of an antenna along with the associated forces produced by wind loads. In addition, the mast must be structurally strong enough to withstand the clamping force of the hose clamps.

Procedure

Step 1 Determine the mounting location for the antenna on the pole or mast.

Step 2 Position and mount the mounting flange bracket onto the pole or mast using the hose clamps provided in the kit.

The hose clamps should pass through the slots on the free mounting flange bracket.

Step 3 Tighten the hose clamps and set screws until the antenna is fully secure on the mast.

Then, adjust the antenna to its final position. Then, use a slotted screwdriver to tighten the screws on the hose clamps.

Step 4 Attach the other mount flange through the holes in the bracket to the back of the antenna using four M8 screws.

The mounting kit includes the mounting flange and M8 screws. Tighten the screws to 20.0 +/- 1.0 Nm torque.

Step 5 Assemble the mounting arm to the flanges.

Use a wrench to tighten all screws and nuts.

Step 6 Ensure that the antenna cannot rotate about the mast.

Step 7 Adjust the azimuth (side-to-side position) and the antenna's elevation (up-and-down position).

Loosen the adjustment pivot nuts slightly to allow for adjustment.

You can use the azimuth and elevation markings on the articulating mounting arm and the flange brackets as a guide. See Figure 6: Close-Up View of the Azimuth and Elevation-Adjustment Pivots, on page 16. You can adjust the azimuth angle up to ±60 degrees, see Figure 7: Azimuth Adjustment, on page 16, and elevation up to ±60 degrees see Figure 8: Elevation Adjustment, on page 17.

Step 8 After adjusting the antenna position, tighten all nuts at the pivot points to 25.0 +/- 1.0 Nm torque.

Step 9 Connect the Ethernet cable to the antenna using the termination kit.

Grounding the Access Point

In all installations, after mounting the access point, you must properly ground the unit before connecting power cables.

Warning **Statement 1024**—Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

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

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

The access point is shipped with a grounding kit.

Figure 10: Access Point Grounding Kit Contents

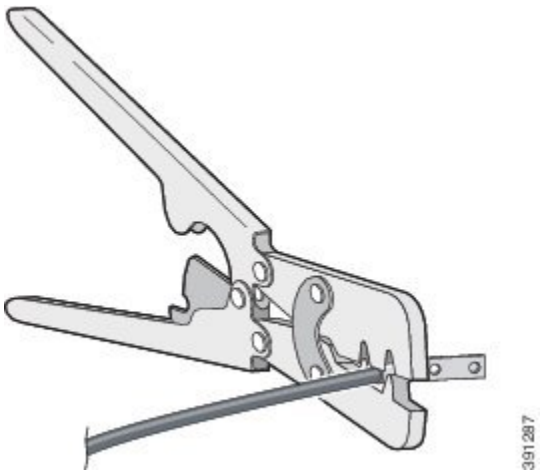
1	Grounding lug	2	Screws x 2, M4 x 6mm

Note The grounding kit also includes the oxide inhibitor, which is contained in a tube.

To ground the access point:

Procedure

Step 1 Use a crimping tool to crimp a 6-AWG (13.3 mm^2) ground wire (not included in the grounding kit) to the ground lug.



Step 2 Connect the supplied ground lug to the access point ground connection point using the supplied screws.

Apply supplied oxide inhibitor between the ground lug and the access point ground connection.

1	AP ground connection point

Step 3 Tighten the screws to 20-25 inch-lbs of torque.

Step 4 If necessary, strip the other end of the ground wire and connect it to a reliable earth ground such as a grounding rod or appropriate ground point on a grounded pole.

Length of the ground cable should not exceed 1 meter, and 0.5 meter is preferred.

Use supplied oxide inhibitor on the grounded interface.

Powering the Access Point

The AP supports these power sources:

- DC power – 24–48 VDC
- Power-over-Ethernet (PoE)

The AP can be powered via the PoE input from an inline power injector or a suitably powered switch port. Depending on the configuration and regulatory domain, the required power for full operation is 802.3bt or UPOE.

For more information, see Power Sources, on page 21.

Power Sources

The Cisco Catalyst IW9167 Series Access Points supports the following power sources:

- DC power input: 24 to 48 Vdc, 2.0 to 0.9 A

Note Use DC cable with only No. 18 AWG or larger.

- Power over Ethernet (PoE) input: 42.5 to 57 Vdc, 1.0 to 0.7 A

  802.3at (PoE+), 802.3bt (PoE++), Cisco Universal PoE (Cisco UPOE). For more information, see Powering the Access Point, on page 21.

Note Use CAT5e or better Ethernet cable with only No. 24 AWG or larger telecommunication line cord.

Warning **Statement 1033—**Safety Extra-Low Voltage (SELV)—IEC 60950/ES1–IEC 62368 DC Power Supply

To reduce the risk of electric shock, connect the unit *only* to a DC power source that complies with the SELV requirements in the IEC 60950-based safety standards or the ES1 requirements in the IEC 62368-based safety standards.

Power Adapters

The Cisco Catalyst IW9167E Heavy Duty Access Point supports the following DC power adapters:

- PID: IW-PWRADPT-MFIT4P=: Operating: -40°C to +65°C, 60W.

- PID: IW-PWRADPT-MFIT4IN=: Operating: -40°C to +65°C, 60W.

Power Injectors

The Cisco Catalyst IW9167E Heavy Duty Access Point supports the following power injectors:

- IW-PWRINJ-60RGDMG=: Operating: -40°C to +70°C. Power derating of 60W at 70°C, and 65W at 65°C. Supports 100M/1G/2.5G/5G/10G rates.
- AIR-PWRINJ-60RGD1=: Operation: -40°C to +50°C, 60W. Supports 10M/100M/1G rates.
- AIR-PWRINJ-60RGD2=: Operation: -40°C to +50°C, 60W. Supports 10M/100M/1G rates.

Caution When the AP is installed outdoors or in a wet or damp location, the AC branch circuit powering the AP should be provided with ground fault protection (GFCI), as required by Article 210 of the National Electrical Code (NEC).

Ethernet (PoE) Ports

The AP supports an Ethernet uplink port (also for PoE-IN). The Ethernet cable uses an RJ-45 connector (with weatherproofing) is used to send and receive Ethernet data and optionally supply inline power from the power injector or a suitably powered switch port.

Tip The AP senses the Ethernet and power signals, and automatically switch internal circuitry to match the cable connections.

Power Feature Matrix

The following table provides the AP power feature matrix.

Table 4: Catalyst IW9167EH Access Point Power Feature Matrix

Power Input	2.4 GHz Radio	dBm Per Path	5 GHz Radio	dBm Per Path	6 GHz Radio	dBm Per Path	Aux Radio	GNSS	mGig Eth	SFP
24-48V	4x4	24	4x4	24	4x4	17	Yes	Yes	max 5G	Yes
802.3bt/ UPOE	4x4	24	4x4	24	4x4	17	Yes	Yes	max 5G	Yes
802.3at	2x2	23	2x2	23	2x2	17	Yes	Yes	max 1G	Yes/1G

Connecting a Power Injector

The AP supports the following power injectors:

Table 5: Supporting Power Injectors

Power Source	Description
AIR-PWRINJ-60RGD1=	60W rated outdoor power injector, with North America AC plug
AIR-PWRINJ-60RGD2=	60W rated outdoor power injector, global version without AC plug
IW-PWRINJ-60RGDMG=	60W rated outdoor power injector, 5GE

The power injector provides DC voltage to the AP over the Ethernet cable and supports a total end-to-end Ethernet cable length of 100 m (328 ft) from the switch to the AP.

When an optional power injector powers your AP, follow these steps to complete the installation:

Procedure

Step 1 Before applying PoE to the AP, ensure that the AP is grounded (see Grounding the Access Point, on page 19).

Step 2 Connect a CAT5e or better Ethernet cable from your wired LAN network to the power injector.

Note
The installer is responsible for ensuring that powering the AP from this type of power injector is allowed by local and/or national safety and telecommunications equipment standards.

Step 3 Ensure that the antennas are connected, and that ground is attached to the AP before you apply power to the AP.

Step 4 Connect a shielded outdoor-rated Ethernet (CAT5e or better) cable between the power injector and the AP's PoE-in connector.

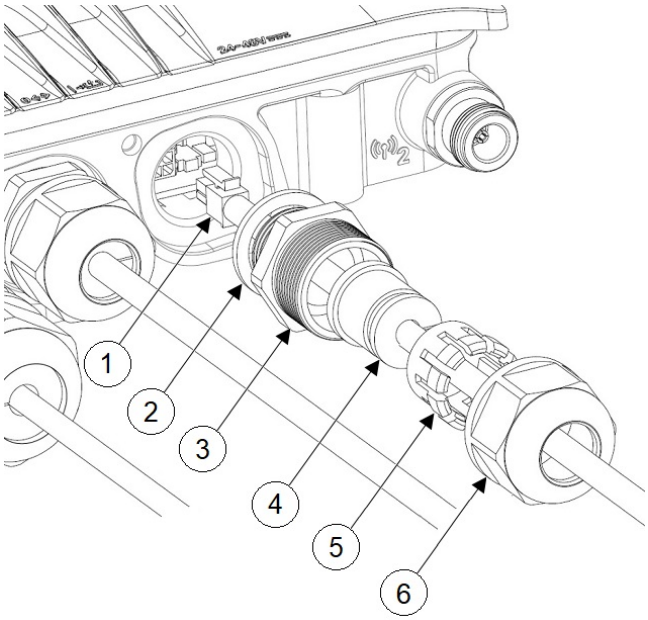
Step 5 Connect the Ethernet cable to the AP PoE-In port.

Connecting to the DC Power Port Using Cable Gland

Follow these steps to connect to the DC power port using Cable Gland:

Procedure

Step 1 Disassemble PG13 cable gland and slide parts over DC cable in the order shown in the following figure:



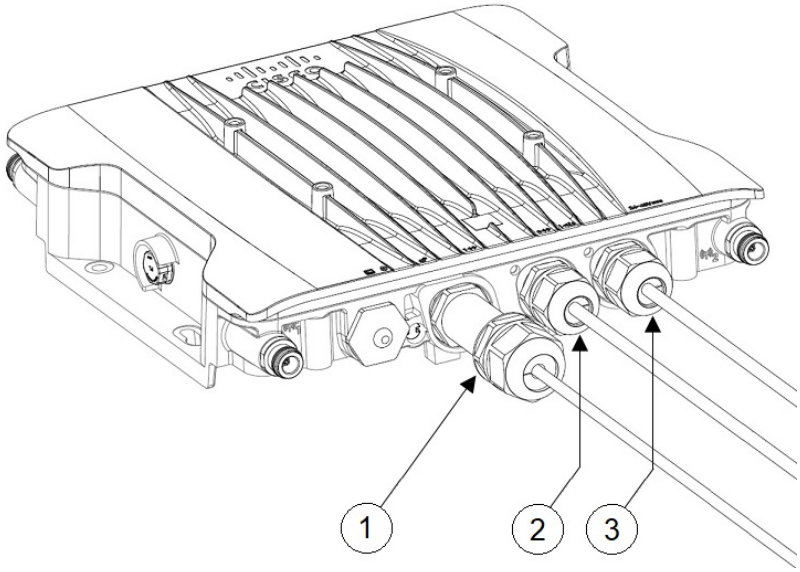
1	DC cable	4	Grommet
2	Gasket	5	Ferrule
3	PG13 body	6	Clamp nut

Step 2 Plug 4P connector cable into the DC connector in the chassis.

Step 3 Thread the PG13 body (with gasket) into the chassis.

Step 4 Insert the grommet into the ferrule, and press it into the PG13 body.

Step 5 Tighten the clamp nut onto the PG13 body until the grommet compresses onto the DC cable.



1	SFP port connected using cable gland
2	RJ-45 port connected using cable gland
3	DC power port connected using cable gland

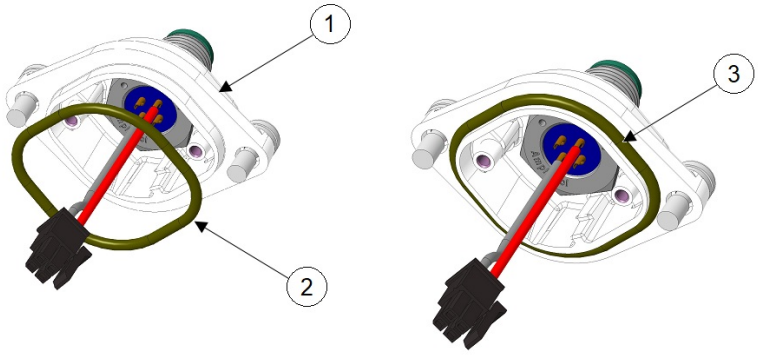
Connecting DC Power Port Using M12 Adapter

Follow these steps to connect to the DC power port using M12 adapter:

Before you begin

O-rings are shipped separately from the M12 adapter. You need to place the o-ring on the adapter before installing the M12 adapter to the chassis.

Figure 11: Installing O-ring on the M12 Adapter

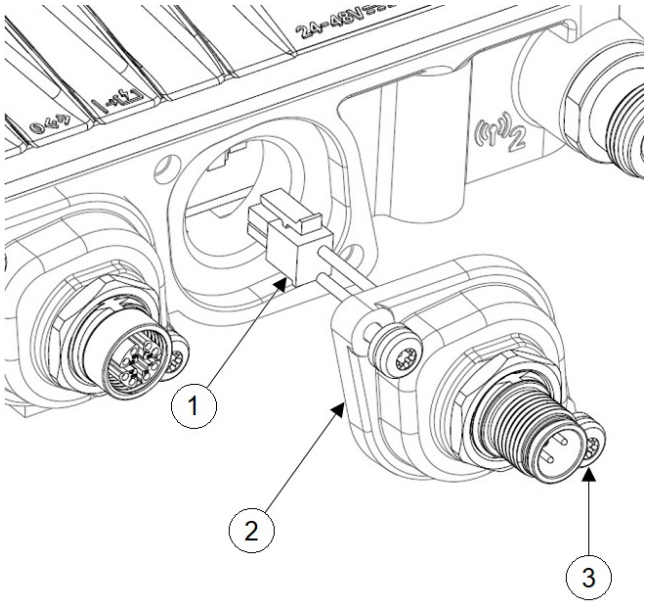


1	M12 adapter	2	O-ring
3	O-ring installed on M12 adapter		

Procedure

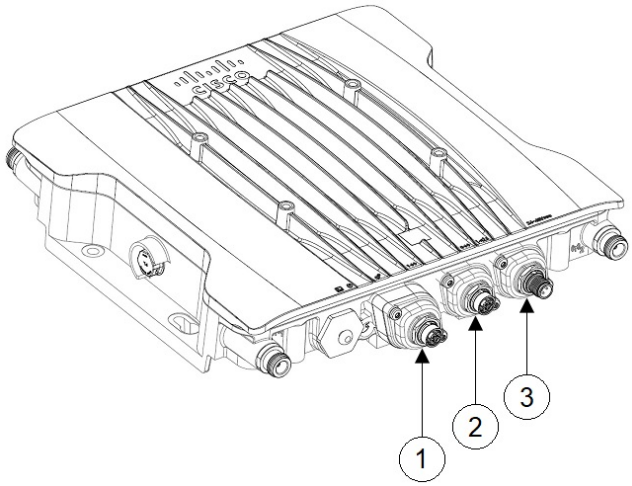
Step 1 Ensure the O-ring is on the M12-PWR adapter.

Step 2 Plug in DC connector into the chassis. Press M12-PWR adapter onto the chassis, and ensure that the wires are not pinched.



1	DC connector	3	Captive screws Tighten with 15-20 in-lbs torque.
2	M12-PWR adapter		

Step 3 Tighten the M12-PWR adapter captive screws into the chassis.



Tighten the M12 captive screws with 15-20 in-lbs torque.

1	SFP port connected using M12 adapter	3	DC power port connected using M12 adapter
2	RJ-45 port connected using M12 adapter		

Connecting Data Cables

This AP supports data connections through the Ethernet port and the Small Form-factor Pluggable (SFP) port.

If you are using the SFP port to deliver data through a fiber-optic cable, the AP must be powered by DC power, power adapter, PoE+ power source, or a power injector.

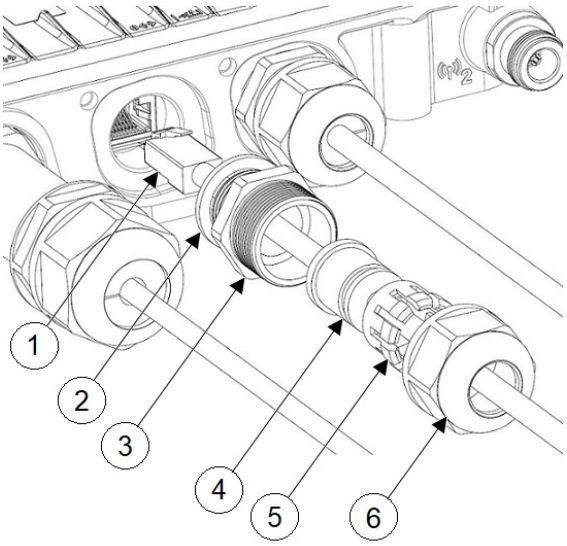
Connect using an Ethernet Cable

Connecting to the RJ-45 Port Using Cable Gland

Follow these steps to connect to the RJ-45 port using Cable Gland:

Procedure

Step 1 Disassemble PG13 cable gland and slide parts over RJ-45 cable in the order that is shown in the following figure:



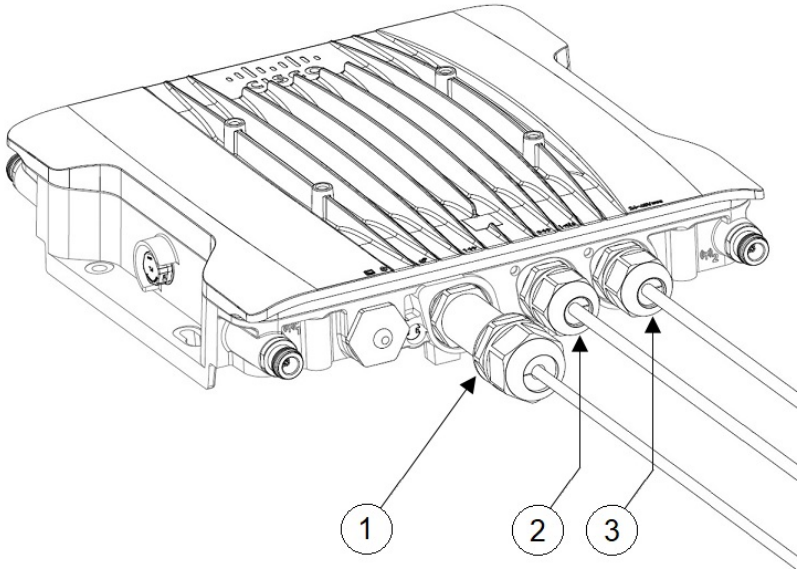
1	RJ-45 cable	4	Grommet
2	Gasket	5	Ferrule
3	PG13 body	6	Clamp nut

Step 2 Plug the RJ-45 cable into the RJ-45 connector in the chassis.

Step 3 Thread the PG13 body (with gasket) into the chassis.

Step 4 Insert the grommet into the ferrule, and press it into the PG13 body.

Step 5 Tighten the clamp nut onto the PG13 body until the grommet compresses onto the RJ-45 cable.



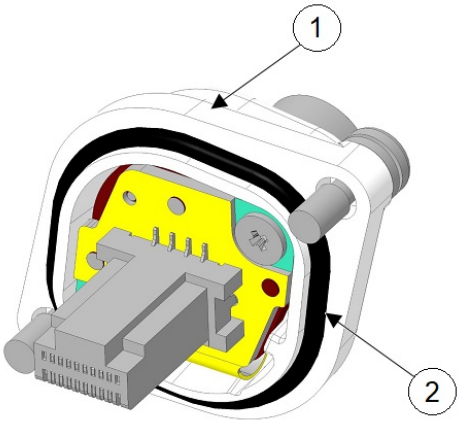
1	SFP port connected using cable gland
2	RJ-45 port connected using cable gland
3	DC power port connected using cable gland

Connecting to the RJ-45 Port Using M12 Adapter

Follow these steps to connect to the RJ-45 port using M12 adapter:

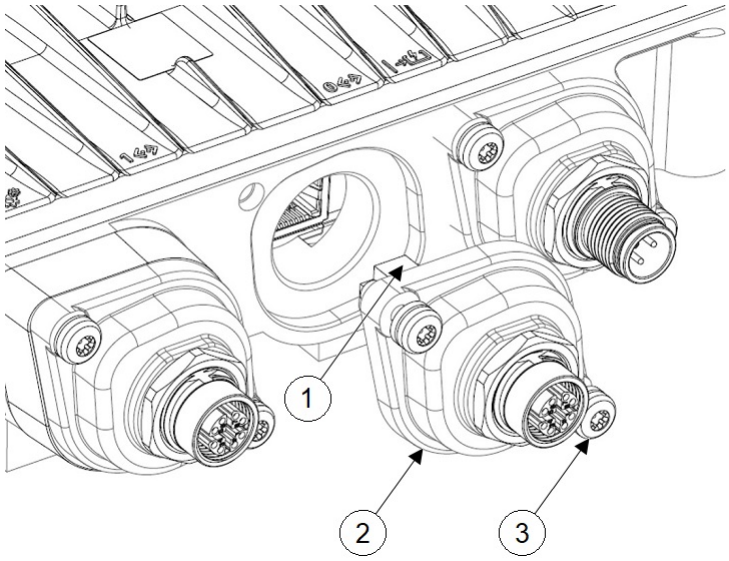
Procedure

Step 1 Ensure the O-ring is on the M12 adapter.



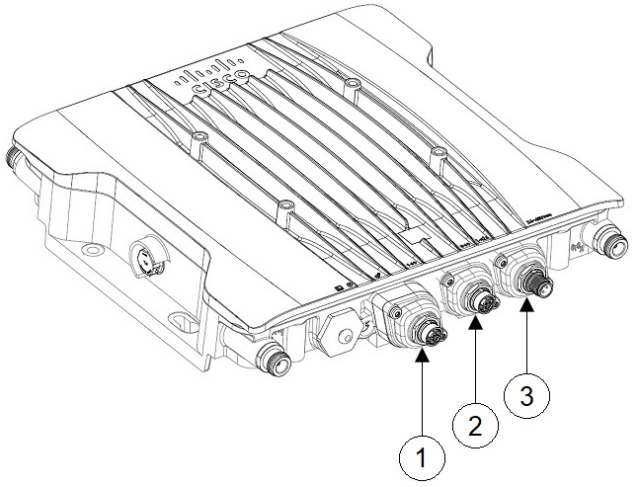
1	M12 adapter	2	O-ring

Step 2 Align the RJ-45 tab with the RJ-45 connector in the chassis, and plug the M12 adapter into the chassis.



1	RJ-45 tab	3	Captive screws Tighten with 15-20 in-lbs torque.
2	M12-RJ45 adapter		

Step 3 Tighten the M12 adapter captive screws into the chassis.



1	SFP port connected using M12 adapter	3	DC power port connected using M12 adapter
2	RJ-45 port connected using M12 adapter		

Connect using a Fiber-Optic Cable

Connecting to SFP Port Using Cable Gland

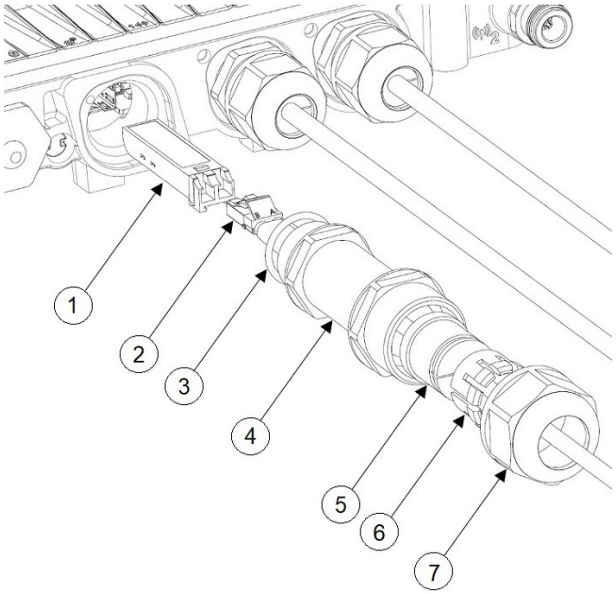
Follow these steps to connect to the SFP port using cable gland:

Note Copper SFP or Fiber SFP will be detected by the system only after a power cycle.

Procedure

Step 1 Insert the fiber SFP into the chassis.

Step 2 Disassemble the fiber adapter and slide parts over fiber cable in the order shown in the following figure:



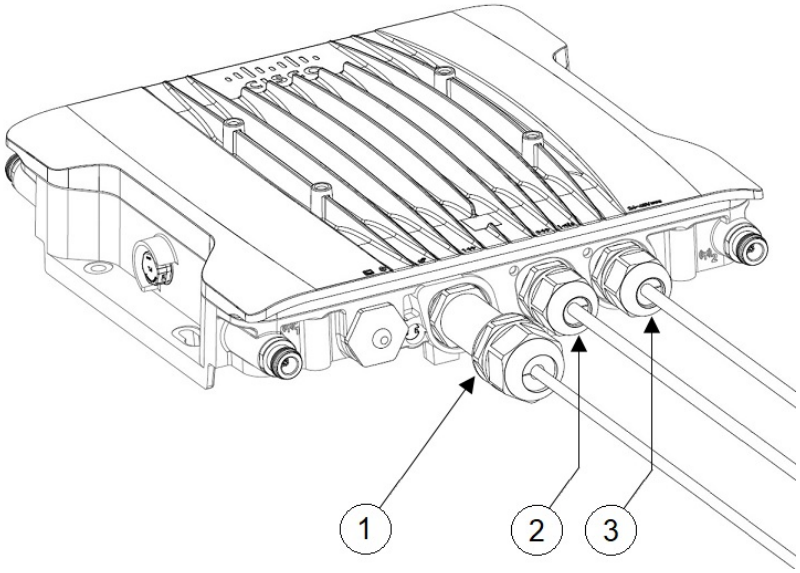
1	Fiber SFP	5	Grommet
2	Fiber cable	6	Ferrule
3	O-Ring	7	Clamp nut
4	Adapter body		

Step 3 Plug the fiber cable into the SFP.

Step 4 Thread the adapter body (with O-Ring) into the chassis.

Step 5 Insert the grommet into the ferrule, and press it into the adapter body.

Step 6 Tighten the clamp nut onto the adapter body until the grommet compresses onto the fiber cable.



1	SFP port connected using cable gland
2	RJ-45 port connected using cable gland
3	DC power port connected using cable gland

Using M12 Adapter on SFP Port

M12 adapter can be used only with a copper SFP and not supported with fiber SFP.

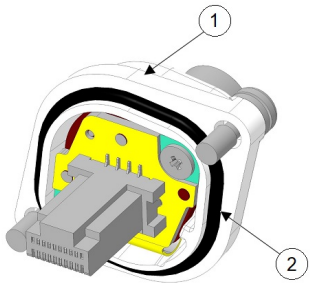
Note Copper SFP or Fiber SFP will be detected by the system only after a power cycle.

Follow these steps to connect M12 adapter to the SFP port:

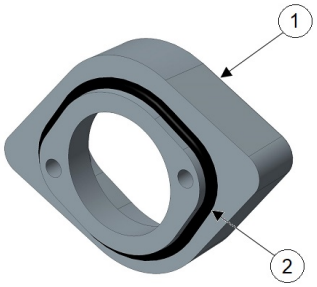
Procedure

Step 1 Insert the copper SFP in the chassis.

Step 2 Ensure the O-rings are on the M12 adapter and spacer.

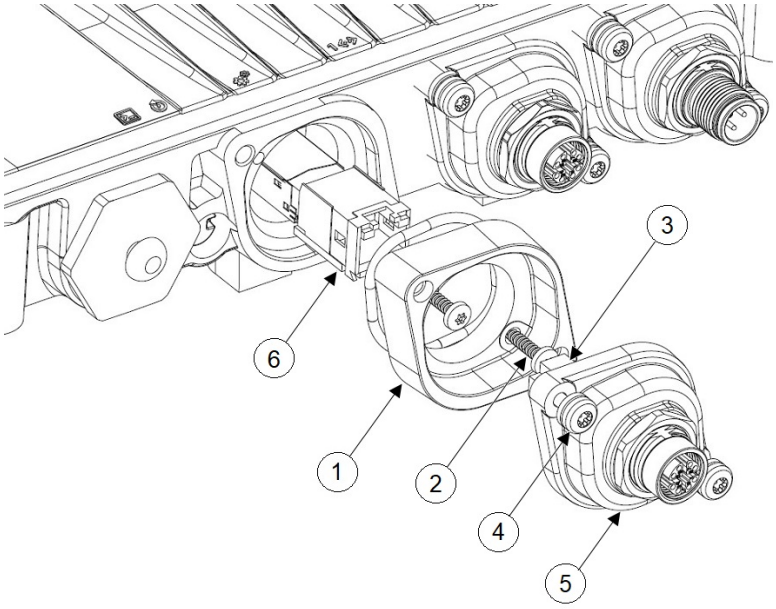


1	M12 adapter	2	O-ring



1	Spacer	2	O-ring

Step 3 Attach the spacer to the chassis with the screws provided (**2** in the following figure).

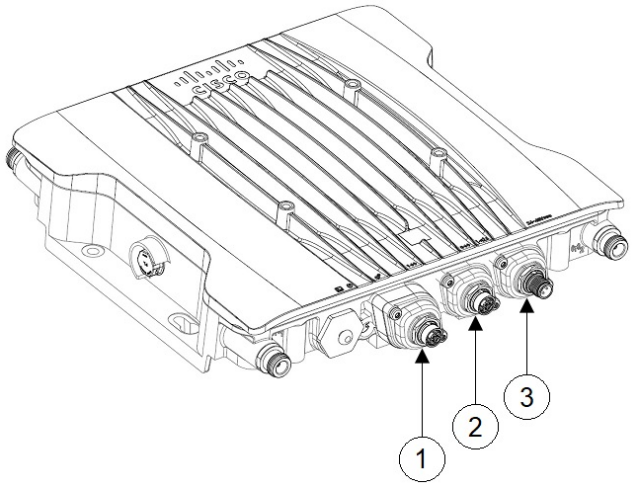


1	Spacer	4	Captive screws Tighten with 15-20 in-lbs torque.

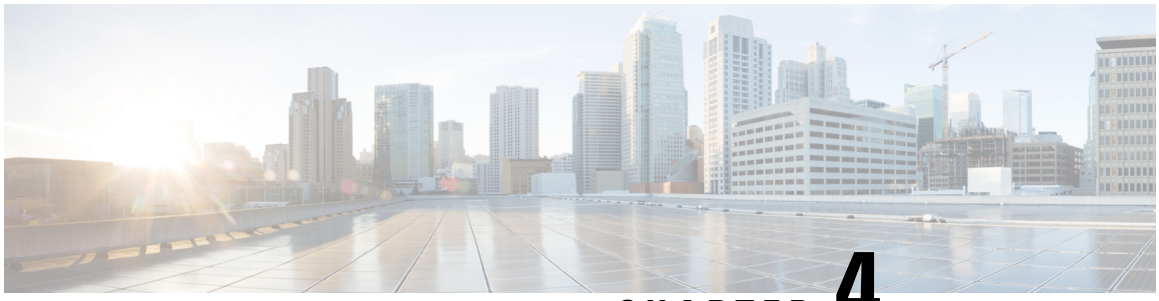
2	Spacer screws, M3 Tighten with 8-10 in-lbs torque minimum or until it sits flush.	5	M12-RJ45 adapter
3	RJ-45 tab	6	Copper SFP

Step 4 Align the RJ-45 tab with the RJ-45 connector in the chassis and plug the M12 adapter into the chassis

Step 5 Tighten the M12 adapter captive screws into the chassis (**4** in the above figure).



1	SFP port connected using M12 adapter	3	DC power port connected using M12 adapter
2	RJ-45 port connected using M12 adapter		



CHAPTER 4

Configuring and Deploying the Access Point

This section describes how to connect the AP to a controller. For instructions on how to configure the AP, see the relevant release's *Cisco Wireless Controller Configuration Guide.*

Controller Discovery Process

The Cisco AP must join a controller to function as an AP and start serving clients. Cisco uses a process called controller discovery process to join a controller. The devices use Lightweight Access Point Protocol (LWAPP) to communicate with each other. The AP can be plugged associated to a controller regardless of the physical location or logical location in the network. A new AP, out of the box, can be plugged in anywhere regardless of the subnet. After it is plugged in, it locates the controller, receives the controller version of the software image and configuration. After this is sent to the AP, it can start serving clients.

Guidelines and Limitations

- You cannot edit or query any AP using the controller CLI if the AP's name contains a space.
- Make sure that the controller is set to the current time. If the controller is set to a time that has already occurred, the AP might not join the controller because its certificate might not be valid for that time.

The controller must discover AP before it can become an active part of the network. The AP supports the following controller discovery processes:

- Locally stored controller IP address discovery: If the AP was previously joined to a controller, the primary, secondary, and tertiary controllers' IP addresses are stored in the AP's non-volatile memory. This process of storing controller IP addresses on an AP for later deployment is called priming the AP. For more information about priming, see Performing a Preinstallation Configuration (Optional), on page 7.
- DHCP server discovery: This feature uses DHCP option 43 to provide controller IP address to the AP. Cisco switches support a DHCP server option that is typically used for this capability. For more information about DHCP option 43, see Configuring DHCP Option 43, on page 41.
- DNS discovery: The AP can discover controllers through your domain name server (DNS). For the AP to do so, you must configure your DNS to return controller IP addresses in response to CISCO-CAPWAP-CONTROLLER.localdomain, where localdomain is the AP domain name. Configuring

the CISCO-CAPWAP-CONTROLLER provides backward compatibility in an existing customer deployment. When an AP receives an IP address and DNS information from a DHCP server, it contacts the DNS to resolve CISCO-CAPWAP-CONTROLLER.localdomain. When the DNS sends a list of controller IP addresses, the AP sends discovery requests to the controllers.

Deploying the Access Point in a Wireless Network

After you have mounted the AP, follow these steps to deploy it in a wireless network:

Procedure

Step 1 Connect the power supply and power up the AP.

Step 2 Observe the AP's LED.

For LED descriptions, see Checking the Access Point LEDs, on page 36.

a) When you power up the AP, it begins a power-up sequence that you can verify by observing the AP's LED. If the power-up sequence is successful, the discovery and join process begins. During this process, the LED blinks sequentially green, red, and off. When the AP has joined a controller, and there are no clients associated, the LED is green or blue when clients are associated with it.
b) If the LED is not on, the AP is most likely not receiving power.
c) If the LED blinks sequentially for more than five minutes, the AP could not find its primary, secondary, and tertiary controller. Check the connection between the AP and the controller, and be sure the AP and the controller are either on the same subnet or that the AP has a route back to its primary, secondary, and tertiary controller. If the AP is not on the same subnet as the controller, be sure that there is a properly configured DHCP server on the same subnet as the AP. See Configuring DHCP Option 43, on page 41 for additional information.

Step 3 Reconfigure the controller so that it is not the primary controller.

Note
Use the primary controller to configure the AP only. Avoid using this controller in a working network.

Checking the Access Point LEDs

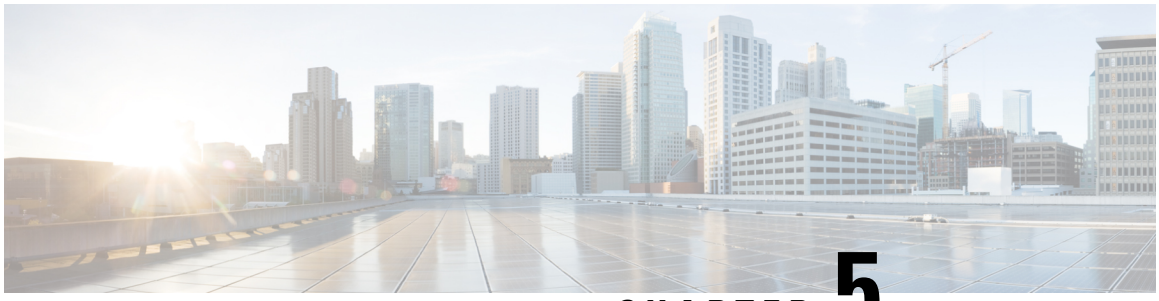
Note Regarding LED status colors, it is expected that there will be small variations in color intensity and hue from unit to unit. This is within the normal range of the LED manufacturer's specifications and is not a defect. However, the intensity of the LED can be changed through the controller.

The AP status LED indicates various conditions and are described in the following table.

Table 6: AP LED Signals

LED Message Type	Color	Meaning
Boot loader status sequence	Blinking Green	Boot loader status sequence: • DRAM memory test in progress • DRAM memory test OK • Board initialization in progress • Initializing FLASH file system • FLASH memory test OK • Initializing Ethernet • Ethernet OK • Starting AP OS • Initialization successful
Boot loader warnings	Blinking Red	Configuration recovery is in progress (the Reset button has been pushed for 2 to 3 seconds)
	Solid Red	There is an Ethernet failure or an image recovery (the Reset button has been pushed for 20-30 seconds)
	Blinking Green	Image recovery is in progress (the Reset button has been released)
CAPWAP OS		
Association status	Chirping (short blips) Green	This status indicates a normal operating condition. The unit is joined to a controller, but no wireless client is associated with it.
	Solid Green	Normal operating condition with at least one wireless client associated with the unit.
Operating Status	Blinking Amber	A software upgrade is in progress.
	Cycling through Green, Red, and Amber	Discovery or join process is in progress.
	Rapidly cycling through Red, Green, Amber, and Off	This status indicates that the AP location command has been invoked.
	Blinking Red	This status indicates that an Ethernet link is not operational.
	Cycling through Red, Green, and Amber	This is a general warning of insufficient inline power.
Cisco URWB OS		

LED Message Type	Color	Meaning
Link Quality/SNR Indicator	Blinking Green	SNR Excellent (>=25)
	Fade-in Green	SNR Good (15<=x<25)
	Fade-in Amber	SNR Poor (10<=x<15)
	Fade-in Red	SNR Unbearable (<10)
Operating Status	Cycling through Red, Green, and Amber	This is a general warning of insufficient inline power.
Limbo (Provisioning) mode: Fallback	Chirping (short blips) Amber	In the state of requesting IP address from DHCP server.
Limbo (Provisioning) mode: DHCP	Amber	This status indicates that the IP address is retrieved from DHCP server.



CHAPTER 5

Troubleshooting

Using the Reset Button

Using the **Reset** button, you can reset the AP to factory default or clear the AP's internal storage.

Note Using the **Reset** button does not change the booting OS (CAPWAP or URWB).

To reset the AP to the default factory-shipped configuration, perform the following steps:

Procedure

Step 1 Press, and continue to press the **Reset** button on the access point during the AP boot cycle.

Step 2 Press until the AP status LED changes to blinking red. It indicates that the Reset signal has been caught by u-boot.

Step 3
- Press the **Reset** button for less than 20 seconds to reset the AP to the default factory-shipped configuration. The AP configuration files are cleared.
- Press the **Reset** button for more than 20 seconds, but less than 60 seconds to clear the AP internal storage, including all the configuration files.

Note
- If the **Reset** button is pressed for more than 30 seconds, but less than 60 seconds, the FIPS mode flag is also cleared during the full factory reset of the AP. If the FIPS flag is set, the console access is disabled.
- The AP status LED changes to solid red, and all the files in the AP storage directory are cleared.

- If you keep the **Reset** button pressed for more than 60 seconds, the button is assumed as being faulty and no changes are made.

Troubleshooting the Access Point to Controller Join Process

AP can fail to join a controller for many reasons: a RADIUS authorization is pending; self-signed certificates are not enabled on the controller; the AP and the controller regulatory domains do not match, and so on.

Controller software enables you to configure the AP to send all CAPWAP-related errors to a syslog server. You do not have to enable any debug commands on the controller. View all the of the CAPWAP error messages from the syslog server itself.

The AP is not maintained on the controller until it receives a CAPWAP join request from the AP. Therefore, it can be challenging to determine why the CAPWAP discovery request from a particular AP was rejected. To troubleshoot such joining problems without enabling CAPWAP debug commands on the controller, the controller collects information for all APs that send a discovery message and maintains information for any AP that has successfully joined it.

The controller collects all join-related information for each AP that sends a CAPWAP discovery request to the controller. The collection begins with the first discovery message received from the AP and ends with the last configuration payload sent from the controller to the AP.

When the controller maintains join-related information for the maximum number of APs, it does not collect information for any more APs.

An AP sends all syslog messages to IP address 255.255.255.255 by default.

You can also configure a DHCP server to return a syslog server IP address to the AP using option 7 on the server. The AP then starts sending all syslog messages to this IP address.

You can configure the syslog server for APs and view the AP join information only from the controller CLI interface.

Important Information for Controller-based Deployments

Keep these guidelines in mind when you use the AP:

- The AP can only communicate with Cisco controllers.
- The AP does not support Wireless Domain Services (WDS) and cannot communicate with WDS devices. However, the controller provides functionality equivalent to WDS when the AP joins it.
- CAPWAP does not support Layer 2. The AP must get an IP address and discover the controller using Layer 3, DHCP, DNS, or IP subnet broadcast.
- The AP console port is enabled for monitoring and debugging purposes. All configuration commands are disabled when the AP is connected to a controller.

Configuring DHCP Option 43

You can use DHCP Option 43 to provide a list of controller IP addresses to the AP, enabling it to find and join a controller.

The following is a DHCP Option 43 configuration example on a Microsoft Windows 2003 Enterprise DHCP server for Cisco Catalyst lightweight APs. For other DHCP server implementations, consult the product documentation to configure DHCP Option 43. In Option 43, use the IP address of the controller management interface.

Note DHCP Option 43 is limited to one AP type per DHCP pool. You must configure a separate DHCP pool for each AP type.

The AP uses the type-length-value (TLV) format for DHCP Option 43. DHCP servers must be programmed to return the option based on the AP DHCP Vendor Class Identifier (VCI) string (DHCP Option 60). The VCI string for the AP:

The format of the TLV block is listed below:

- Type—0xf1 (decimal 241)
- Length—Number of controller IP addresses * 4
- Value—IP addresses of the controller management interfaces listed sequentially in hexadecimal format.

Procedure

Step 1 Enter configuration mode at the Cisco IOS CLI.

Step 2 Create the DHCP pool, including the necessary parameters such as default router and name server. A DHCP scope example is as follows:

Example:

```
ip dhcp pool <pool name>
network <IP Network> <Netmask>
default-router <Default router>
dns-server <DNS Server>
```

Where:

Example:

```
<pool name> is the name of the DHCP pool, such as IW9167EH
<IP Network> is the network IP address where the controller resides, such as 10.0.15.1
<Netmask> is the subnet mask, such as 255.255.255.0
<Default router> is the IP address of the default router, such as 10.0.0.1
<DNS Server> is the IP address of the DNS server, such as 10.0.10.2
```

Step 3 Add the option 43 line using the following syntax:

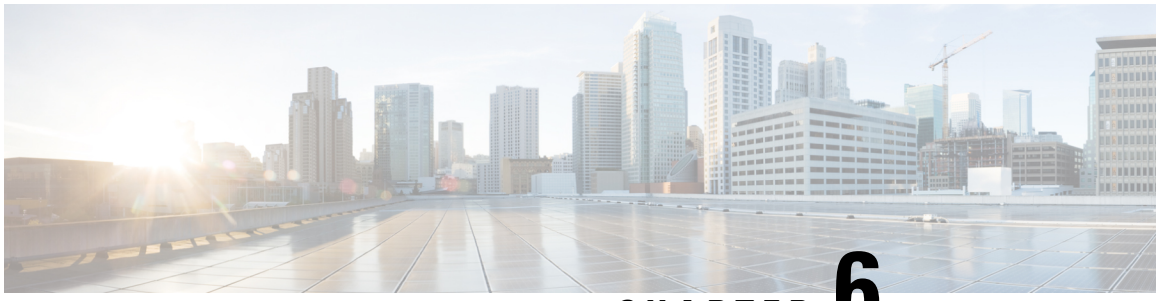
Example:

```
option 43 hex <hex string>
```

The hex string is assembled by concatenating the TLV values shown below:

Type + Length + Value

For example, suppose that there are two controllers with management interface IP addresses, 10.126.126.2 and 10.127.127.2. The type is f1(hex). The length is 2 * 4 = 8 = 08 (hex). The IP addresses translate to 0a7e7e02 and 0a7f7f02. Assembling the string then yields f1080a7e7e020a7f7f02. The resulting Cisco IOS command added to the DHCP scope is **option 43 hex f1080a7e7e020a7f7f02**.



CHAPTER 6

Safety Guidelines and Warnings

Safety Instructions

The translated warnings are available in the Translated Safety Warnings for Cisco Catalyst Access Points, which is available on Cisco.com.

Warning

Statement 1071—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS

Warning

Statement 1005—Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. To reduce risk of electric shock or fire, ensure that the protective device is rated not greater than:

20 A

Warning **Statement 9001—**Product Disposal

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

Caution **Ensure to connect the power cord of the power adapter to a socket outlet with an earthing connection.**

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

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

Note **Statement 438—**Taiwan RoHS

Restricted Substances Content Disclosure Table web address: http://www.cisco.com/go/taiwanrohs

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

This product is a Class 1 laser product.

FCC Safety Compliance Statement

The FCC, with its action in ET Docket 96-8, has adopted a safety standard for human exposure to RF electromagnetic energy emitted by FCC-certified equipment. When used with approved Cisco antennas, Cisco Catalyst products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio device according to the instructions in this publication results in user exposure substantially below the FCC recommended limits.

Safety Precautions

For safety and to achieve a good installation, please read and follow these safety precautions:

Note The recommended operating atmospheric pressure range for the Ex device shall be between 80 kPa (0,8 bar) and 110 kPa (1,1 bar).

- Select your installation site with safety as well as performance in mind. Remember: electric power lines and phone lines look alike. For safety, assume that any overhead line can kill.

- Call your electric power company. Tell them your plans, and ask them to come to look at your proposed installation
- Plan your installation carefully and thoroughly before you begin. Successful raising of a mast or tower is mostly a matter of coordination. Each person should be assigned to a specific task and know what to do and when to do it. One person should be in charge of the operation to issue instructions and watch for signs of trouble.
- When installing the AP or its antennas, remember:
  - Do not use a metal ladder.
  - Do not work on a wet or windy day.
  - Do dress properly—shoes with rubber soles and heels, rubber gloves, long-sleeved shirt or jacket.
- Use a rope to lift the AP. If the assembly starts to drop, get away from it and let it fall.
- If any part of the antenna system comes in contact with a power line, do not touch it or remove it yourself. Call your local power company. They will remove it safely.

If an accident should occur, call for qualified emergency help immediately.

Performing Site Surveys

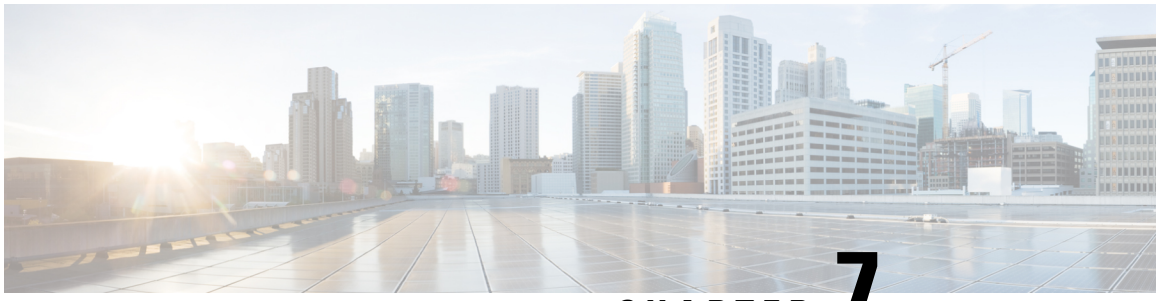
Every network application is a unique installation. Before installing multiple APs, you should perform a site survey to determine the optimum use of networking components and maximize range, coverage, and network performance.

Site surveys reveal problems that can be resolved before the network is operational. Because 802.11a/b/g/n/ac/ax operates in an unlicensed spectrum, there may be sources of interference from other 802.11a wireless devices (especially in multi-tenant buildings) that could degrade your 802.11 signals. A site survey can determine if such interference exists at the time of deployment.

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.
- Obstructions: Physical obstructions such as buildings, trees, or hills can hinder the performance of wireless devices. Avoid locating the devices in a location where there is an obstruction between the sending and receiving antennas.
- How far is your wireless link?
- Has a previous site survey been conducted?
- Do you have a clear Fresnel zone between the APs or radio line of sight?

- What is the minimum acceptable data rate within the link?
- Do you have the correct antenna (if more than one antenna is being offered?)
- Do you have the proper permits, if required?
- Are you following the proper safety procedures and practices?
- Have you configured the APs before you go onsite? It is always easier to resolve configurations or device problems first.
- Do you have the proper tools and equipment to complete your survey?



CHAPTER 7

Declarations of Conformity and Regulatory Information

Manufacturers Federal Communications Commission Declaration of Conformity Statement

Access Point Models	Certification Number
IW9167EH–B-STA	LDKIW9167EH
IW9167EH–B-STA2	LDKIW9167EH

Manufacturer:

Cisco Systems, Inc.

170 West Tasman Drive

San Jose, CA 95134-1706

USA

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference,

2. This device must accept any interference received, including interference that may cause undesired operation.

Federal Communications Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency when using the integrated antennas. Any changes or modification to the product not expressly approved by Cisco could void the user's authority to operate this device.

Caution The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft. Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

Compliance Statement for Canada

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance

requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.La bande 5 150-5 250 MHz est réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

Users are advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.Les utilisateurs êtes avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5 250-5 350 MHz et 5 650-5 850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Industry Canada

Access Point Models	Certification Number
IW9167EH-A-STA	IC:2461A-IW9167EH
IW9167EH-A-STA2	IC:2461A-IW9167EH

Declaration of Conformity for RF Exposure

This section contains information on compliance with guidelines related to RF exposure.

Generic Discussion on RF Exposure

The Cisco products are designed to comply with the following national and international standards on Human Exposure to Radio Frequencies:

- US 47 Code of Federal Regulations Part 2 Subpart J
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers / IEEE C 95.1 (99)
- International Commission on Non Ionizing Radiation Protection (ICNIRP) 98
- Ministry of Health (Canada) Safety Code 6. Limits on Human Exposure to Radio Frequency Fields in the range from 3kHz to 300 GHz
- Australia Radiation Protection Standard

To ensure compliance with various national and international Electromagnetic Field (EMF) standards, the system should only be operated with Cisco approved antennas and accessories.

This Device Meets International Guidelines for Exposure to Radio Waves

The device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) recommended by international guidelines. The guidelines

were developed by an independent scientific organization (ICNIRP) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

RF Exposure Distance
20 cm

The World Health Organization has stated that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing he antennas at a greater separation distance then recommended.

This Device Meets FCC Guidelines for Exposure to Radio Waves

The device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in FCC Part 1.1310. The guidelines are based on IEEE ANSI C 95.1 (92) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

The device has been tested and found compliant with the applicable regulations as part of the radio certification process.

RF Exposure Distance
107 cm

The US Food and Drug Administration has stated that present scientific information does not indicate the need for any special precautions for the use of wireless devices. The FCC recommends that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing the antennas at a greater separation distance then recommended or lowering the transmitter power output.

This Device Meets the Industry Canada Guidelines for Exposure to Radio Waves

The device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in Health Canada Safety Code 6. The guidelines include a substantial safety margin designed into the limit to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as

specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

RF Exposure Distance
60 cm

Health Canada states that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure you can easily do so by reorienting antennas away from the user, placing the antennas at a greater separation distance than recommended, or lowering the transmitter power output.

Cet appareil est conforme aux directives internationales en matière d'exposition aux fréquences radioélectriques

Cet appareil de la gamme comprend un émetteur-récepteur radio. Il a été conçu de manière à respecter les limites en matière d'exposition aux fréquences radioélectriques (champs électromagnétiques de fréquence radio), recommandées dans le code de sécurité 6 de Santé Canada. Ces directives intègrent une marge de sécurité importante destinée à assurer la sécurité de tous, indépendamment de l'âge et de la santé.

Par conséquent, les systèmes sont conçus pour être exploités en évitant que l'utilisateur n'entre en contact avec les antennes. Il est recommandé de poser le système là où les antennes sont à une distance minimale telle que précisée par l'utilisateur conformément aux directives réglementaires qui sont conçues pour réduire l'exposition générale de l'utilisateur ou de l'opérateur.

Distance d'exposition RF
60 cm

Santé Canada affirme que la littérature scientifique actuelle n'indique pas qu'il faille prendre des précautions particulières lors de l'utilisation d'un appareil sans fil. Si vous voulez réduire votre exposition encore davantage, selon l'agence, vous pouvez facilement le faire en réorientant les antennes afin qu'elles soient dirigées à l'écart de l'utilisateur, en les plaçant à une distance d'éloignement supérieure à celle recommandée ou en réduisant la puissance de sortie de l'émetteur.

Additional Information on RF Exposure

You can find additional information on the subject at the following links:

- Cisco Systems Spread Spectrum Radios and RF Safety white paper at this URL: http://www.cisco.com/warp/public/cc/pd/witc/ao340ap/prodlit/rfhr_wi.htm
- FCC Bulletin 56: Questions and Answers about Biological Effects and Potential Hazards of Radio Frequency Electromagnetic Fields
- FCC Bulletin 65: Evaluating Compliance with the FCC guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

You can obtain additional information from the following organizations:

- World Health Organization Internal Commission on Non-Ionizing Radiation Protection at this URL: www.who.int/emf
- United Kingdom, National Radiological Protection Board at this URL: www.nrpb.org.uk

- Cellular Telecommunications Association at this URL: www.wow-com.com
- The Mobile Manufacturers Forum at this URL: www.mmfai.org

Declaration of Conformity Statements

All the Declaration of Conformity statements related to this product can be found at the following location: https://pas.cisco.com/pdtcnc/#/