



Cisco Catalyst 9124AX Series Outdoor Access Point Hardware Installation Guide

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

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



Note

The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. Exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on standards documentation, or language that is used by a referenced third-party product.

It includes the following sections:

- [About this Guide, on page vii](#)
- [Conventions, on page vii](#)
- [Related Documentation, on page viii](#)
- [Communications, Services, and Additional Information, on page viii](#)

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.

REVIEW DRAFT - CISCO CONFIDENTIAL**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 Cisco Catalyst 9124AX series access point is available at the following URL:

<https://www.cisco.com/c/en/us/support/wireless/catalyst-9124ax-series/series.html>

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

- Cisco Catalyst 9124AX Series Access Point Deployment Guide, at the following URL:

[Link to be added at FCS.](#)

- Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide, Release 17.5.1, at the following URL:

https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-5/config-guide/b_wl_17_5_cg.html

- Video Series: Best Practices for Installing Outdoor Wireless Access Points at the following URL:

<https://www.cisco.com/go/ap-best-practices-videos>

Cisco Bug Search Tool

[Cisco Bug Search Tool](#) (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.

Communications, Services, and Additional Information

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- To obtain general networking, training, and certification titles, visit [Cisco Press](#).
- To find warranty information for a specific product or product family, access [Cisco Warranty Finder](#).



CHAPTER 1

About the Cisco Catalyst 9124AX Series Outdoor Access Point

- [Introduction to Cisco Catalyst 9124AX Series Outdoor Access Point, on page 1](#)
- [Cisco Catalyst 9124AX Series Outdoor Access Point Features, on page 1](#)
- [AP Model Numbers and Regulatory Domains, on page 3](#)
- [Antennas and Radios, on page 4](#)

Introduction to Cisco Catalyst 9124AX Series Outdoor Access Point

Cisco Catalyst 9124AX Series Outdoor Access Point is a Wi-Fi 6 technology based outdoor access point. This AP series has three models—one with omni antennas, one with directional antennas and the third with external antennas designed to use both the 2.4-GHz and the 5-GHz bands. This series supports 4x4:4SS on the 2.4-GHz and 5-GHz bands, with downlink and uplink Orthogonal Frequency Division Multiple Access (OFDMA), and Multi-User, Multiple Input, Multiple Output (MU-MIMO).

Cisco Catalyst 9124AX Series Outdoor Access Point Features

Cisco Catalyst 9124AX Series Outdoor AP is a Cisco Catalyst 9800 wireless controller-based product, and has the following features:

- Two radios—a dual-band 5-GHz (4x4) flexible radio with 2.4-GHz and 4x4 5-GHz radio, and an Internet of Things (IoT) radio that works with Bluetooth Low Energy (BLE) and other multiprotocol 802.15.4 devices.



Note The C9124AX Series AP uses an omni BLE antenna.

- Available in three model SKUs—Omni (-I) antenna (C9124AXI-x), Directional (-D) antenna (C9124AXD-x), and External (-E) antenna (C9124AXE-x).
- Four dual-band 2.4-GHz and 5-GHz integrated antennas on the C9124AX AP models (C9124AXI-x and C9124AXD-x).

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- Four dual-band 2.4-GHz and 5-GHz, and two 5-GHz antenna ports on the C9124AXE AP model (C9124AXE-*x*).

**Note**

The *x* in the model numbers represents the regulatory domain. For information about supported regulatory domains, see [AP Model Numbers and Regulatory Domains](#), on page 3.

- MU-MIMO technology for uplink and downlink.
- OFDMA-based scheduling for both uplink and downlink.
- Multigigabit Ethernet (mGig)
- The following hardware external interfaces:
 - 1x100/1000/2500 Multigigabit Ethernet (PD or PoE-IN)
 - 1xSFP port (Uplink)
 - 1x1G Ethernet port (PSE or PoE-Out)
 - RS-232 Console Interface through RJ-45
 - Recovery push button (enables partial or full system configuration recovery)
 - One multicolor LED status indicator. For information about the colors of the LED status indicator, see [Checking the Access Point LEDs](#), on page 80.
- Integrated Bluetooth Low Energy (BLE) radio enables IoT use cases such as location tracking and wayfinding.
- Cisco RF ASIC, a fully integrated Software Defined Radio (SDR), can perform advanced radio frequency (RF) spectrum analysis, and deliver features such as next-generation CleanAir, Wireless Intrusion Prevention System (WIPS), Dynamic Frequency Selection (DFS) detection.
- Intelligent Capture probes the network and provides Cisco Digital Network Architecture (DNA) Center with in-depth analysis.
- Spatial Reuse (also known as Basic Service Set [BSS] coloring) allows the AP and their clients to differentiate between BSS, thus permitting simultaneous transmissions.
- A new power savings mode called Target Wake Time (TWT) allows clients to stay asleep and wake up only at prescheduled (target) times to exchange data with the AP. This mode provides significant energy savings for battery-operated devices.
- Cisco DNA Center support enables Cisco DNA Spaces, Apple FastLane, and Cisco Identity Services Engine (ISE).
- Optimized AP Roaming to ensure that client devices associate with the AP in their coverage range, which offers the fastest data rate available.
- Cisco CleanAir technology enhanced with 160-MHz channel support. CleanAir delivers proactive, high-speed spectrum intelligence across 20, 40, 80, and 160-MHz-wide channels to combat performance issues from wireless interference.

The AP also supports the following operational modes:

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- **Local mode:** This is the default mode for the AP. In this mode, the AP serves clients. In Local mode, the AP creates two CAPWAP tunnels to the controller, one for management and the other for data traffic. This is known as central switching because the data traffic is switched (bridged) from the AP to the controller.
- **FlexConnect mode:** In FlexConnect mode, the data traffic is switched locally and is not sent to the controller. In this mode, the AP behaves like an autonomous AP, but is managed by the controller. Here, the AP continues to function even if the connection to the controller is lost.
- **Monitor mode:** In the monitor mode, the AP is excluded from handling data traffic between clients and infrastructure. The AP acts as dedicated sensor for location-based services (LBS), rogue AP detection, and Intrusion Detection System (IDS). When the AP is in monitor mode, it actively monitors the airwaves and typically does not serve clients.
- **Sniffer mode:** In the wireless sniffer mode, the AP starts sniffing the air on a given channel. It captures and forwards all the clients' packets on that channel to a remote machine that runs Airopeek or Wireshark (packet analyzers for IEEE 802.11 wireless LANs). This includes information about the time stamp, signal strength, packet size, and so on.



Note In the sniffer mode, the server where the data is sent and the wireless controller management VLAN must reside on the same VLAN. Otherwise, an error is displayed.

AP Model Numbers and Regulatory Domains

Table 1: AP Model Numbers and Regulatory Domains

AP Type	Model Number	Details
AP for outdoor environments, with internal antennas	C9124AXI-x	The AP has integrated omni antennas and contains a 2.4-GHz and a 5-GHz radio to configure in centralized, FlexConnect, and Mobility Express modes. The AP is a standalone unit that can be pole mounted or tower mounted. It can also operate as a relay node for other APs that are not directly connected to a wired network.
AP for outdoor environments, with directional antennas	C9124AXD-x	The AP has integrated directional antennas and contains a 2.4-GHz and a 5-GHz radio to configure in centralized, FlexConnect modes. The AP is a standalone unit that can be pole mounted or tower mounted. It can also operate as a relay node for other APs that are not directly connected to a wired network.

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AP Type	Model Number	Details
AP for outdoor environments, with external antennas	C9124AXE-x	The AP has 6 external antenna ports and contains a 2.4-GHz and 5-GHz radio with an option to configure in centralized and Flexconnect mode. This is a stand alone unit that can be wall, pole or tower mounted. It can also operate as a relay node for other access points that are not directly connected to a wired network.

You must verify whether the AP model you have is approved for use in your country. To verify approval and to identify the regulatory domain that corresponds to a particular country, visit <http://www.cisco.com/go/aironet/compliance>. Not all regulatory domains have been approved. As and when they are approved, the compliance list is updated.

Antennas and Radios

The Cisco Catalyst 9124AX Series Outdoor Access Point configurations are:

- C9124AXI-x
- C9124AXD-x
- C9124AXE-x

The C9124AXI-x and 9124AXD-x AP models have four internal dual-band antennas with dedicated 2.4-GHz and 5-GHz radios, one internal single-band antenna with a dedicated 2.4-GHz IoT radio, and two dual-band antenna with a dedicated 2.4-GHz and 5-GHz AUX radio.

The C9124AXE-x AP model has six antenna ports to support multiple antenna options, such as the self-identifying antennas (SIA) on designated three SIA ports, dual-band antennas, and single-band antennas. To see the list of supported antennas and the radio bands they operate at, see the **Supported External Antennas** section.

The C9124AXE-x AP model supports 1 to 6 antenna configurations for the 2.4GHz and 5GHz radios. In addition, the IoT radio has its separate internal antenna, and Aux radio shares the same antennas with serving radios through splitters.

The C9124AXE supports a Dual Radio mode and a dynamic Tri-Radio mode.

C9124AXE in Dual Radio mode:

- 2.4GHz and 5GHz 802.11ax concurrent radios
- 2G - 4TX x 4RX; four spatial streams
- 5G - 4TX x 4RX; four spatial streams (2SS for 80+80 contiguous channel)

The C9124AXE in Tri-Radio mode:

- 5G Radio1 - 2TX x 2RX; 2SS for channel bandwidth <= 80MHz
- 5G Radio2 - 2TX x 2RX; 2SS for channel bandwidth <= 80MHz
- 2G Radio - 2TX x 2RX; 2SS for 20 MHz only



CHAPTER 2

Hardware Features

This section describes the following hardware features of the C9124AXI-x, C9124AXD-x, and C9124AXE-x models:

- [Access Point Views, Ports, and Connectors, on page 5](#)
- [C9124AXI \(Internal Antenna\) Model: Antenna Radiation Patterns, on page 9](#)
- [C9124AXD \(Directional Antenna\) Model: Antenna Radiation Patterns, on page 12](#)
- [C9124AXE \(External Antenna\) Model: Antenna Radiation Patterns, on page 15](#)
- [Supported External Antennas, on page 21](#)
- [Power Sources, on page 24](#)

Access Point Views, Ports, and Connectors

Cisco Catalyst 9124AX Series Outdoor AP has multiple options that you can use to power the AP or join the AP to the controller. Section [Connectors and Ports on the AP, on page 5](#) shows the connectors and ports for the AP models.



Note

The illustrations in this document show all the available connections for the AP. The connector plugs seal the unused connection ports to ensure that the AP is watertight. Liquid-tight adapters are provided for connector openings. You can install the adapters before or after deploying the AP.

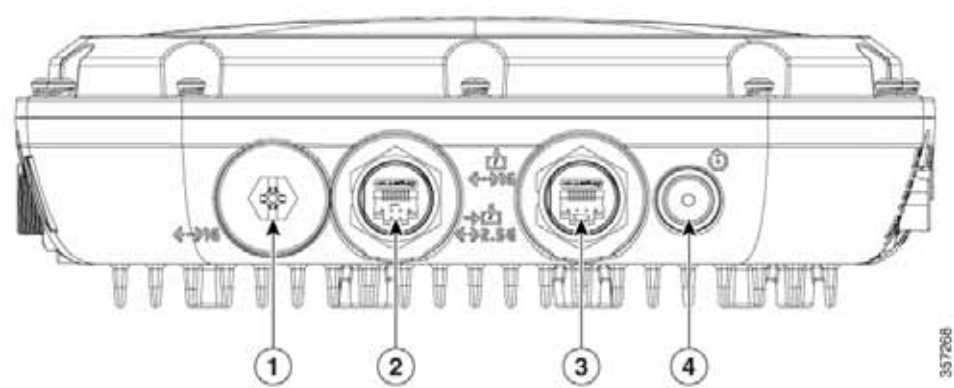
Connectors and Ports on the AP

The following illustrations show the different connector and port options available on the base and sides of the AP.

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C9124AXI and C9124AXD Connectors and Ports on the Base

Figure 1: Models C9124AXI and C9124AXD Base Connectors and Ports



1	SFP port for uplink ¹ . The SFP port only supports DC power IN. If the port is not used, do not remove the covering plug. Otherwise, it might lead to water leaking into the AP	3	1 Gig PSE (PoE-OUT) Ethernet Port
2	2.5G mGig PD (PoE-IN) Ethernet port	4	Reset / Status LED

¹ Use the SFP port or the Gigabit Ethernet port as the uplink port. However, if you do this, you cannot use the Ethernet port as a local client port. Connectors on the Sides

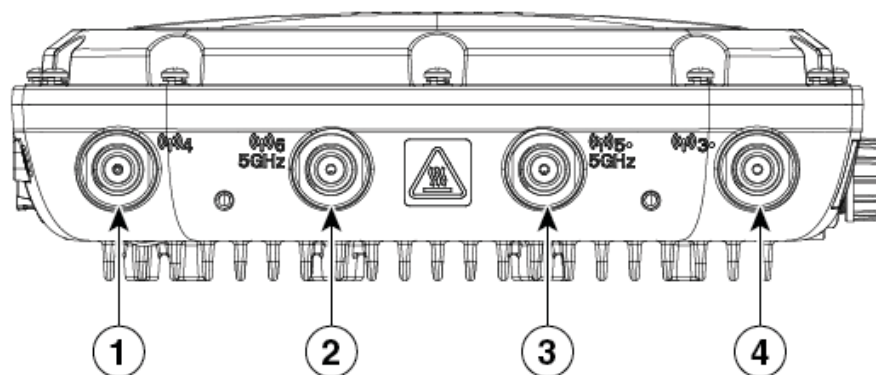


Note

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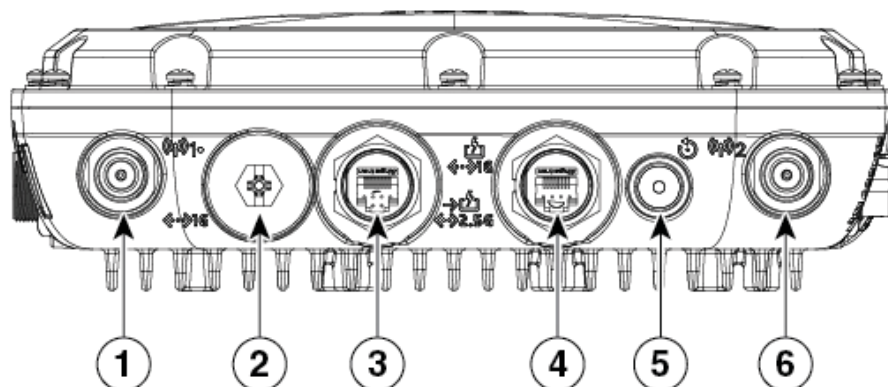
Using SFP port for uplink uses wired0 MAC address as the source-MAC even though the packets get routed out from the wired1 interface. So all data packets going out of the AP, including the dot1x packets use the wired0 MAC address.

The only exception is the CDP and LLDP packets that would use the wired1 MAC address as the source-MAC.

REVIEW DRAFT - CISCO CONFIDENTIAL**C9124AXE Connectors and Ports on the Top***Figure 2: Model C9124AXE Top Connectors and Ports*

357474

1	Port 4	3	Port 5 This port supports 5-GHz antenna only. This port supports SIA with 5-GHz band only.
2	Port 6 This port supports 5-GHz antenna only.	4	Port 3 This port supports SIA.

C9124AXE Connectors and Ports on the Base*Figure 3: Model C9124AXE Base Connectors and Ports*

357475

1	Port 1 This port supports SIA.	4	1 Gig PSE (PoE-OUT) Ethernet Port
---	-----------------------------------	---	-----------------------------------

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2 	SFP port for uplink ² . The SFP port only supports DC power IN. If the port is not used, do not remove the covering plug. Otherwise, it might lead to water leaking into the AP	5 	Reset/Status LED
3 	2.5G mGig PD (PoE-IN) Ethernet port	6 	Port 2

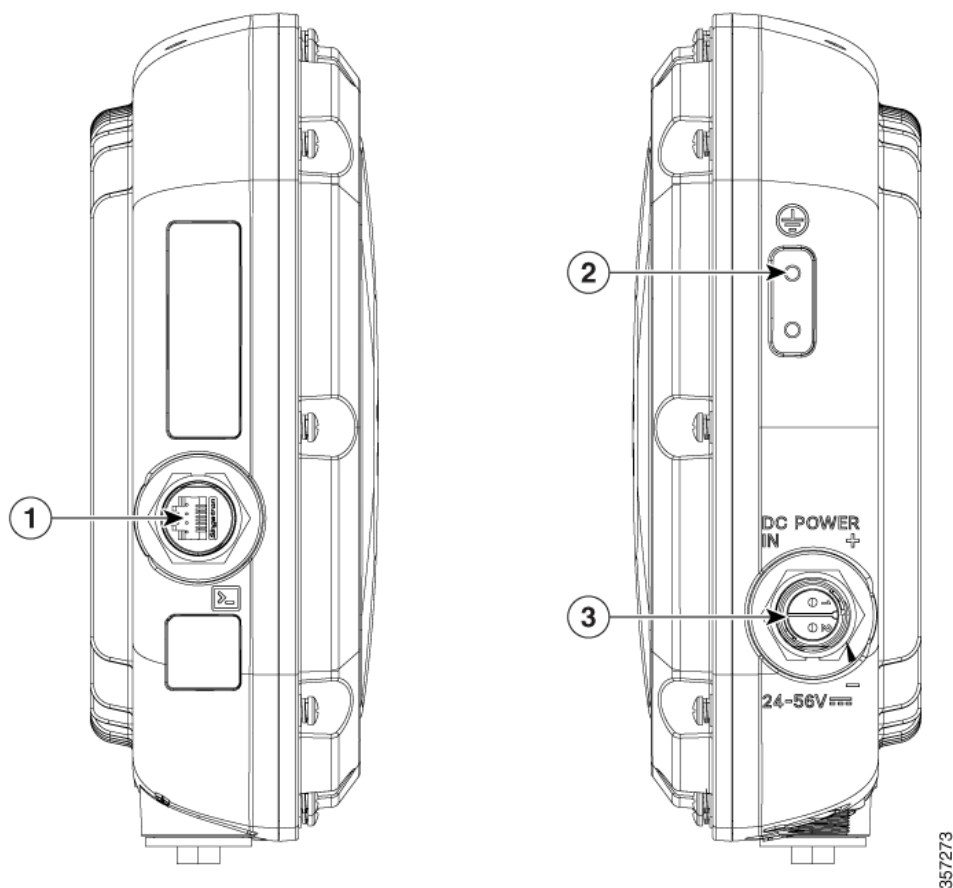
² Use the SFP port or the Gigabit Ethernet port as the uplink port. However, if you do this, you cannot use the Ethernet port as a local client port. Connectors on the Sides

**Note**

Draft comment: CSCvw59634

Using SFP port for uplink uses wired0 MAC address as the source-MAC even though the packets get routed out from the wired1 interface. So all data packets going out of the AP, including the dot1x packets use the wired0 MAC address.

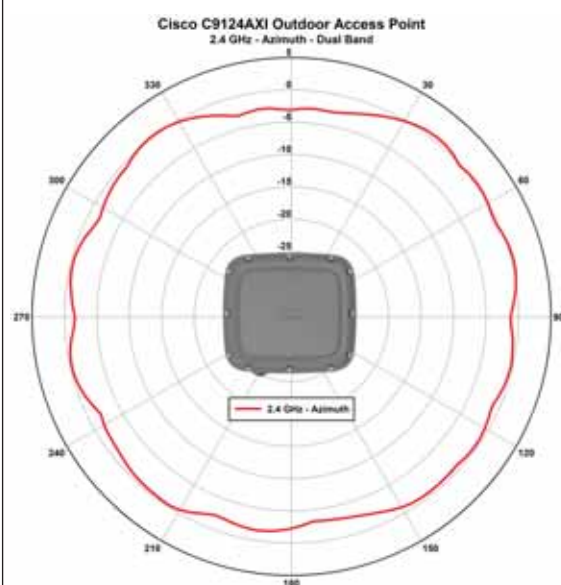
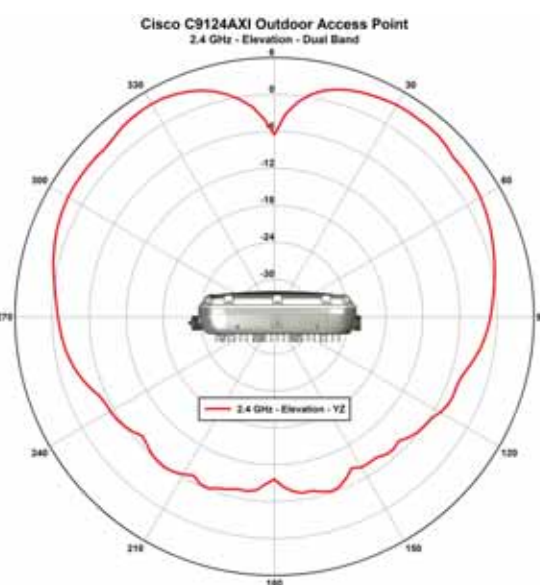
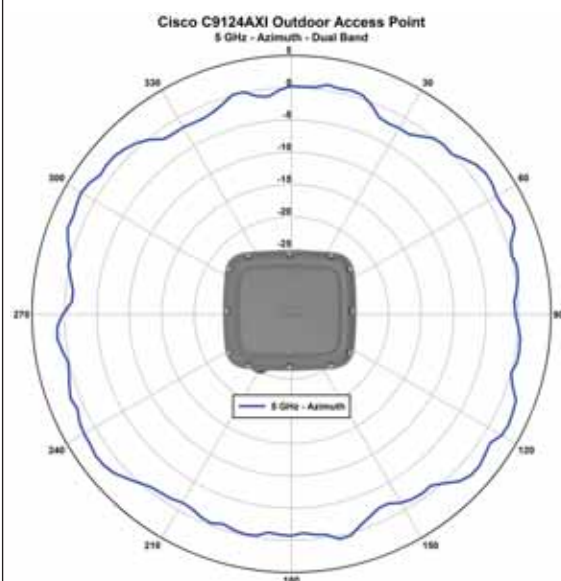
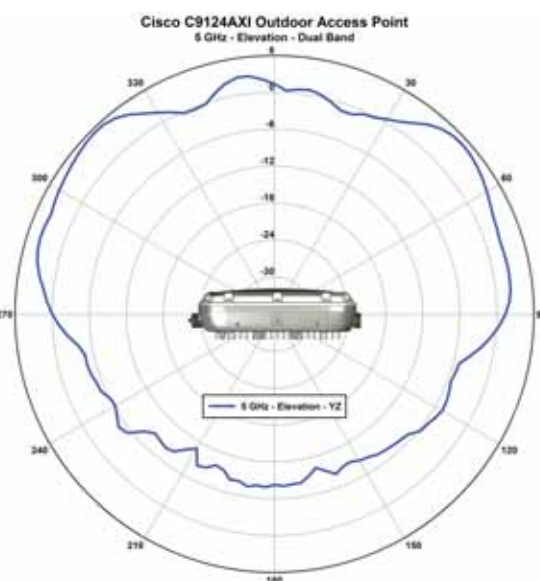
The only exception is the CDP and LLDP packets that would use the wired1 MAC address as the source-MAC.

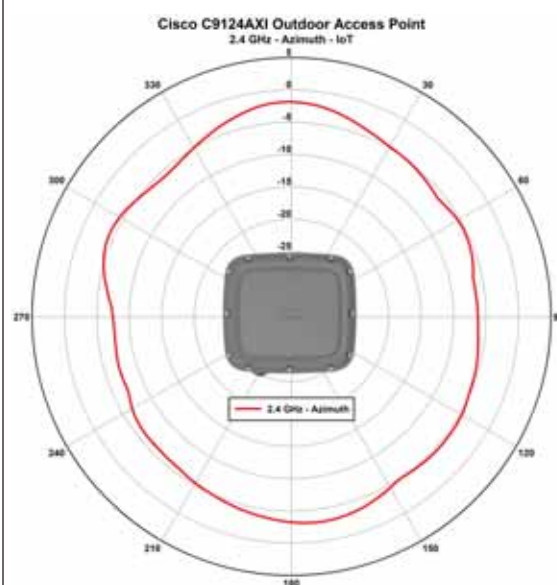
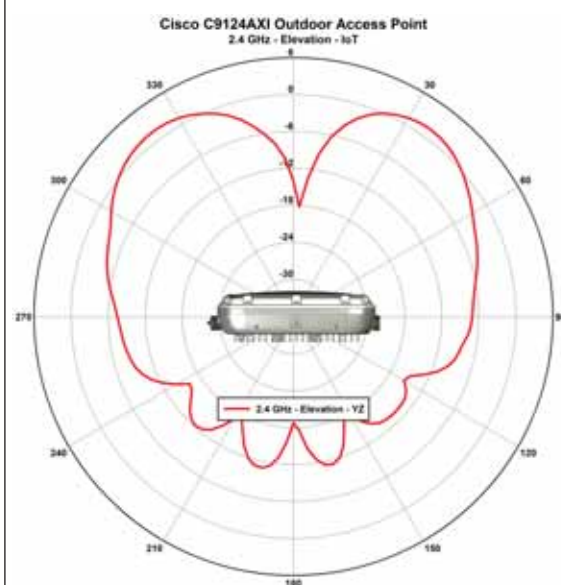
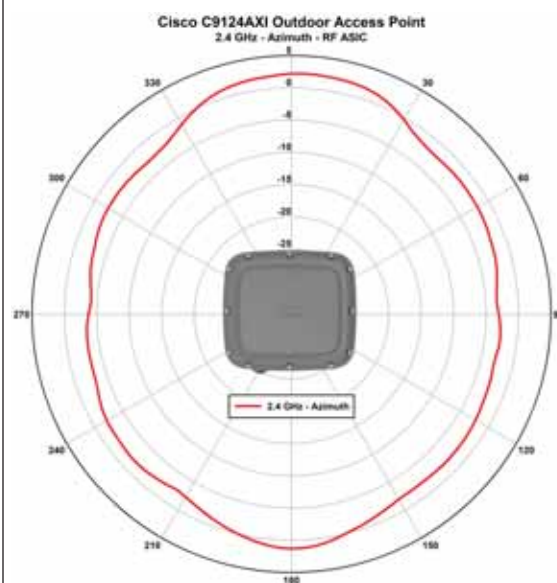
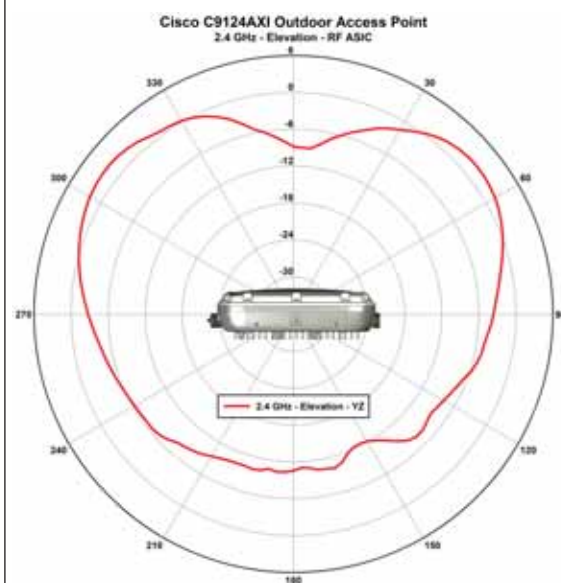
REVIEW DRAFT - CISCO CONFIDENTIAL**Connectors and Ports on the Sides***Figure 4: Models C9124AXI, C9124AXD, and C9124AXE Left-Side and Right-Side Connectors and Ports*

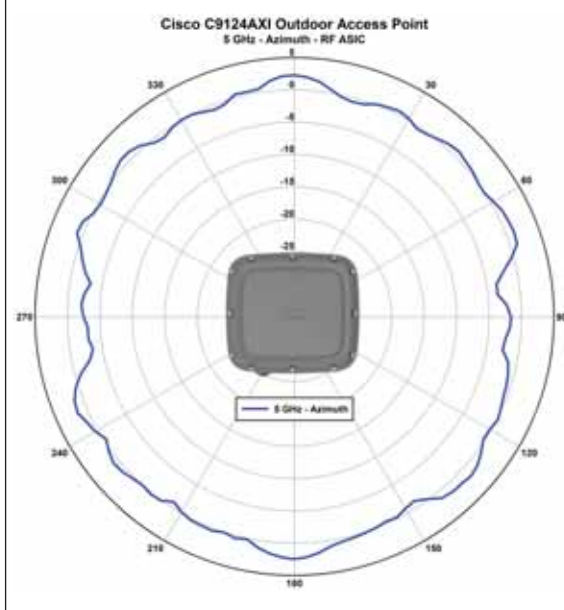
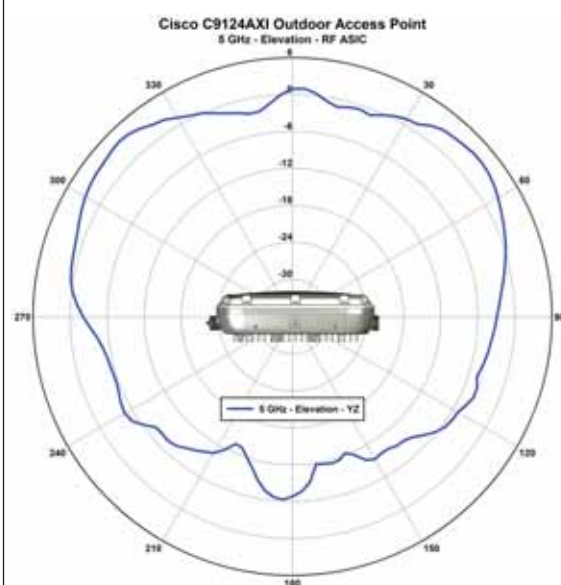
1	Console Port
	
2	Grounding Pad
	
3	DC Power In

C9124AXI (Internal Antenna) Model: Antenna Radiation Patterns

The following illustrations show the C9124AXI model with internal antenna radiation patterns:

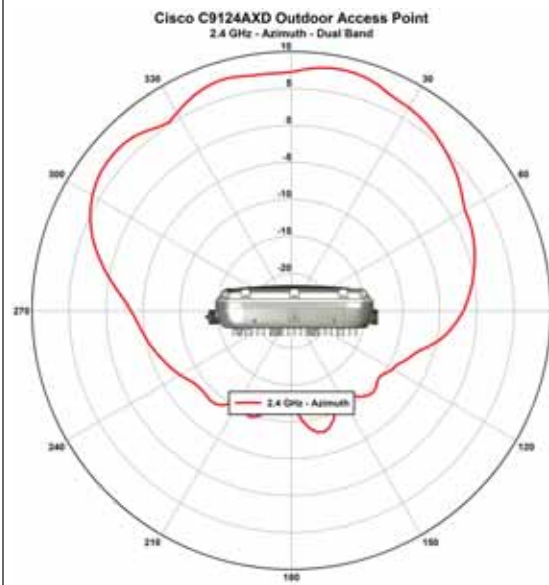
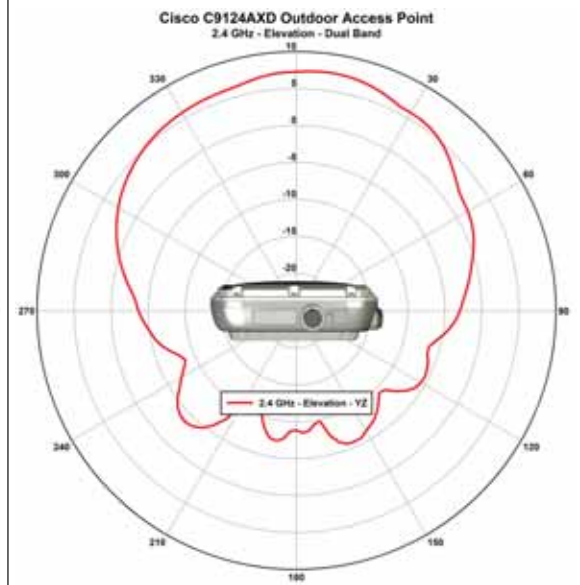
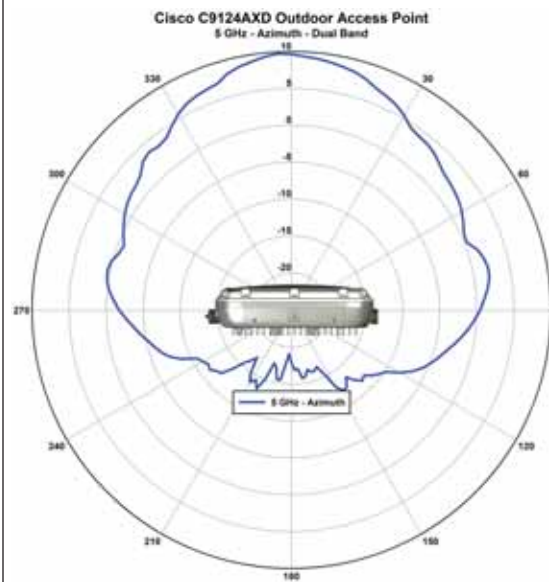
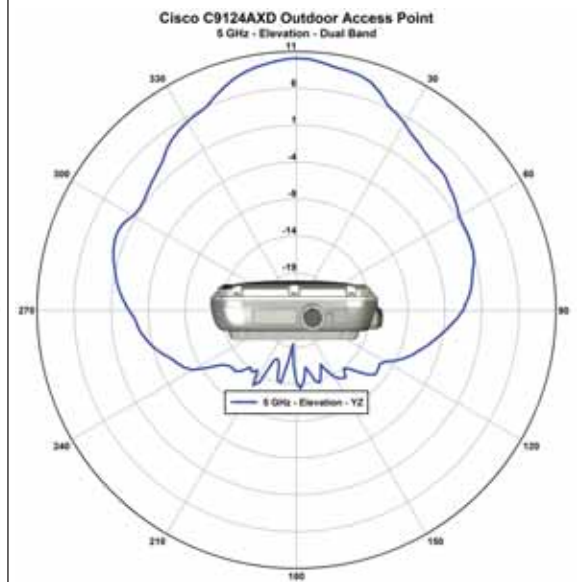
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 5: C9124AXI–Dual-Band Antenna Radiation Pattern (2.4–GHz Azimuth)****Figure 6: C9124AXI–Dual-Band Antenna Radiation Pattern (2.4–GHz Elevation)****Figure 7: C9124AXI–Dual-Band Antenna Radiation Pattern (5–GHz Azimuth)****Figure 8: C9124AXI–Dual-Band Antenna Radiation Pattern (5–GHz Elevation)**

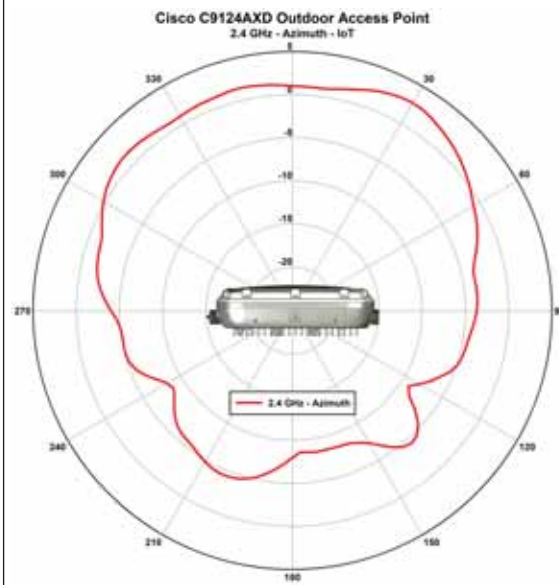
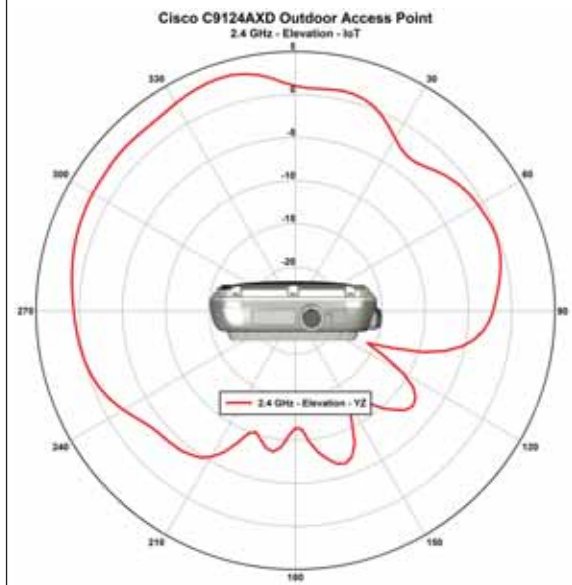
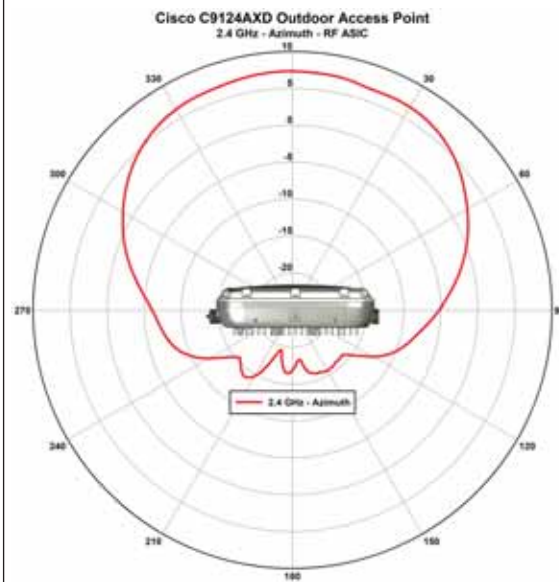
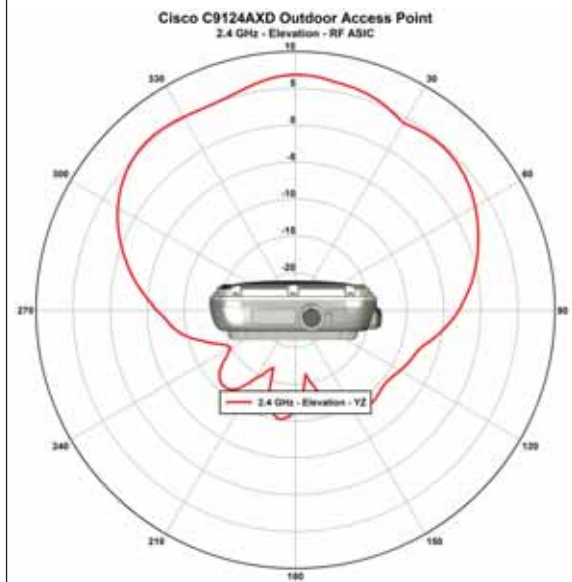
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 9: C9124AXI–IoT Antenna Radiation Pattern (2.4–GHz Azimuth)****Figure 10: C9124AXI–IoT Antenna Radiation Pattern (2.4–GHz Elevation)****Figure 11: C9124AXI–AUX RF ASIC Antenna Radiation Pattern (2.4–GHz Azimuth)****Figure 12: C9124AXI–AUX RF ASIC Antenna Radiation Pattern (2.4–GHz Elevation)**

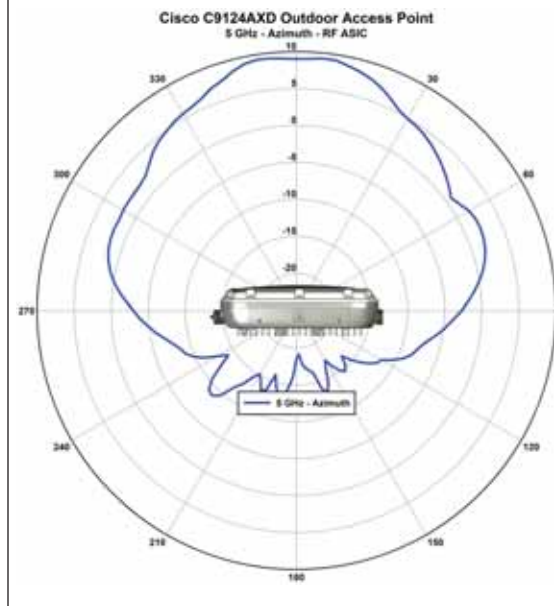
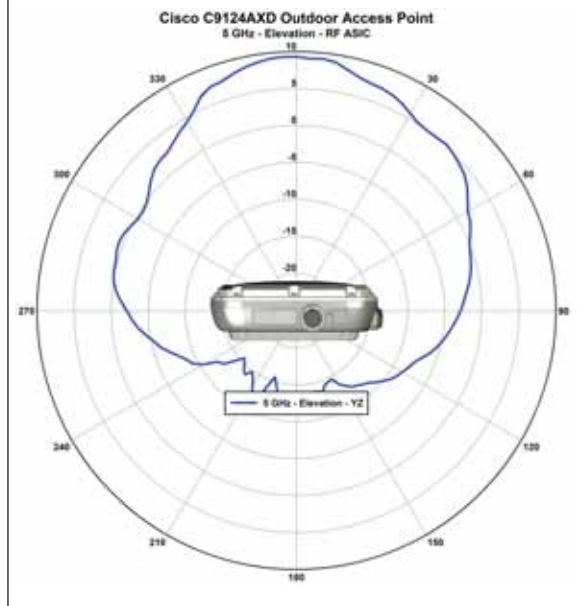
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 13: C9124AXI–AUX RF ASIC Antenna Radiation Pattern (5-GHz Azimuth)****Figure 14: C9124AXI–AUX RF ASIC Antenna Radiation Pattern (5-GHz Elevation)**

C9124AXD (Directional Antenna) Model: Antenna Radiation Patterns

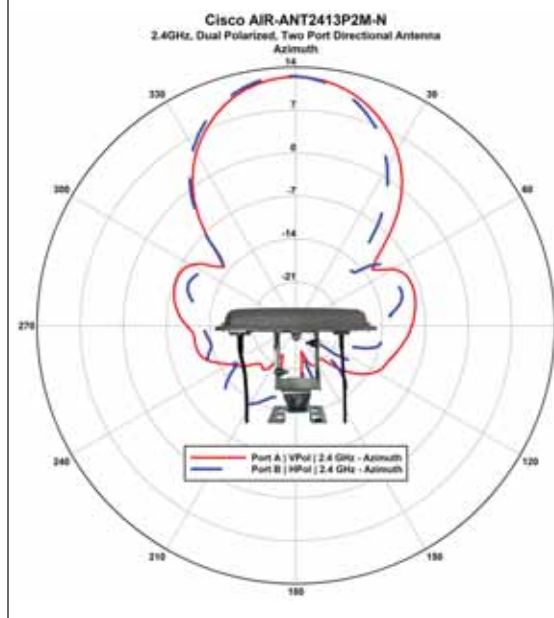
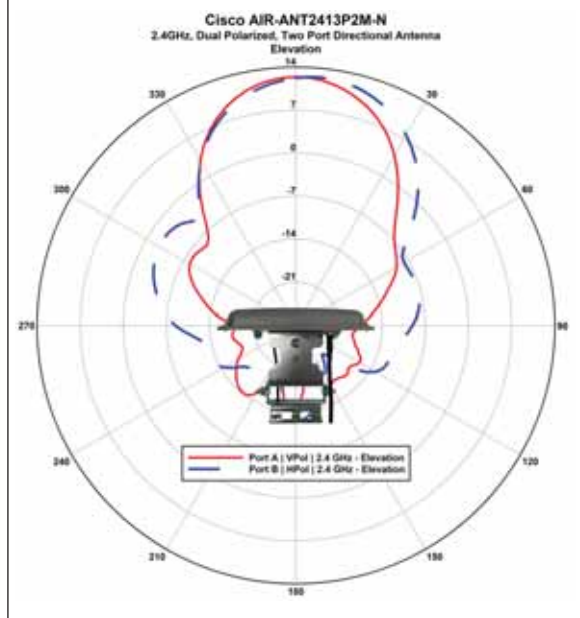
The C9124AXD model with directional internal antenna has its radio radiation patterns shown in the following images:

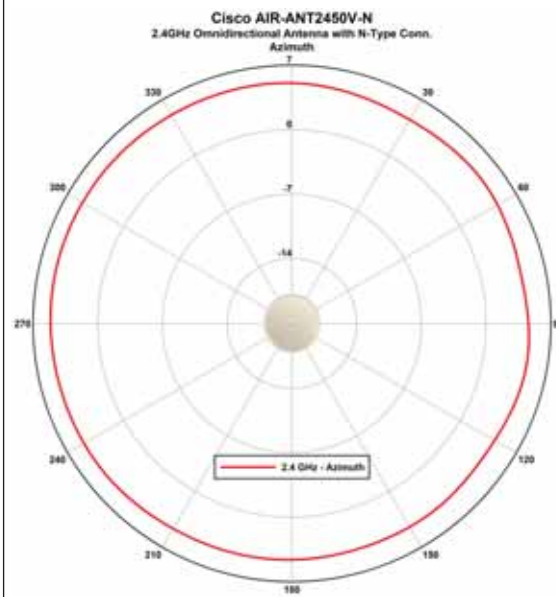
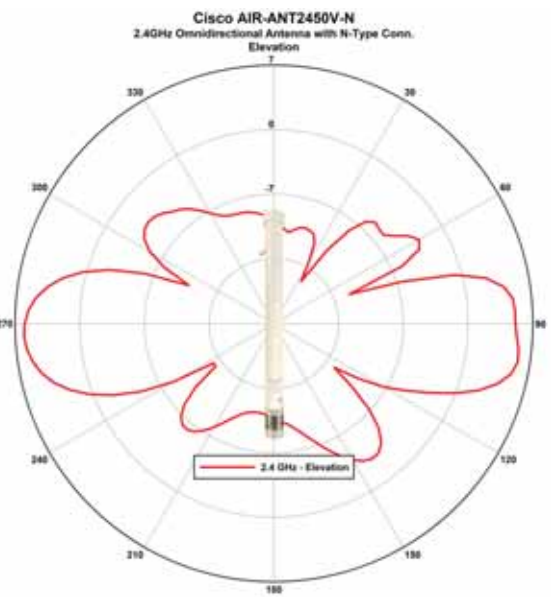
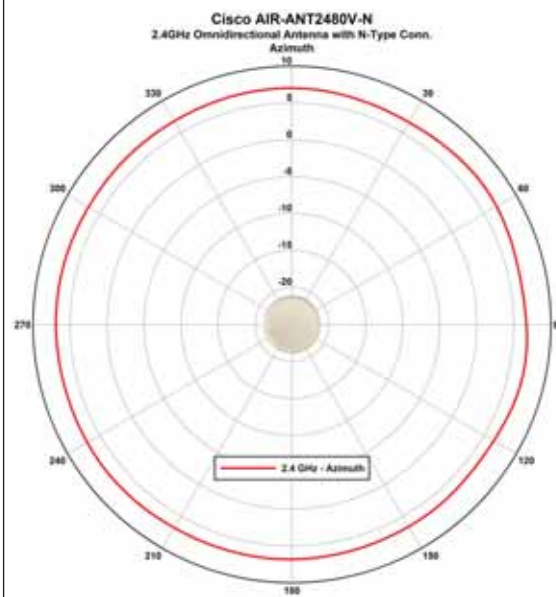
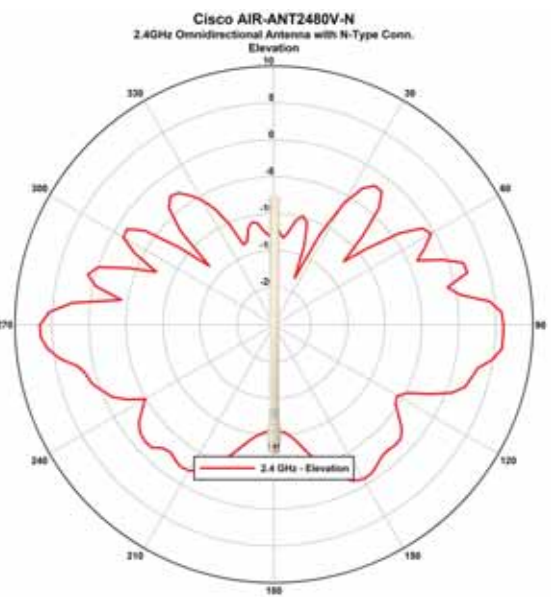
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 15: C9124AXD–Dual-Band Antenna Radiation Pattern (2.4-GHz Azimuth)****Figure 16: C9124AXD–Dual-Band Antenna Radiation Pattern (2.4-GHz Elevation)****Figure 17: C9124AXD–Dual-Band Antenna Radiation Pattern (5-GHz Azimuth)****Figure 18: C9124AXD–Dual-Band Antenna Radiation Pattern (5-GHz Elevation)**

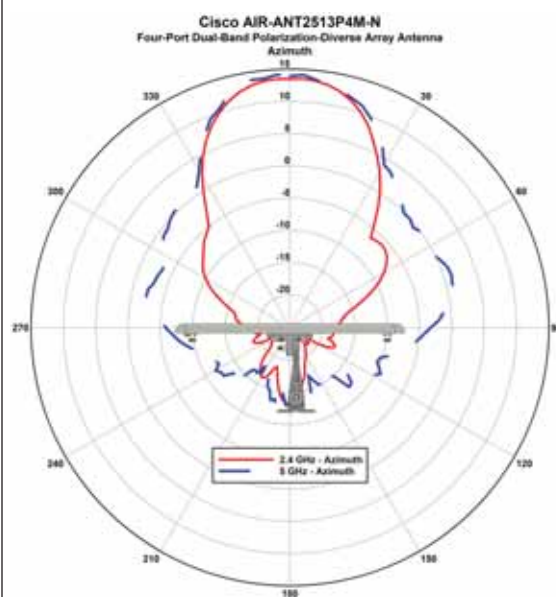
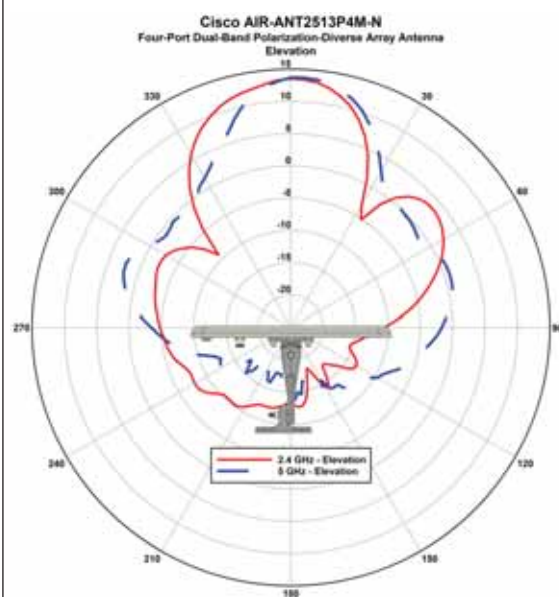
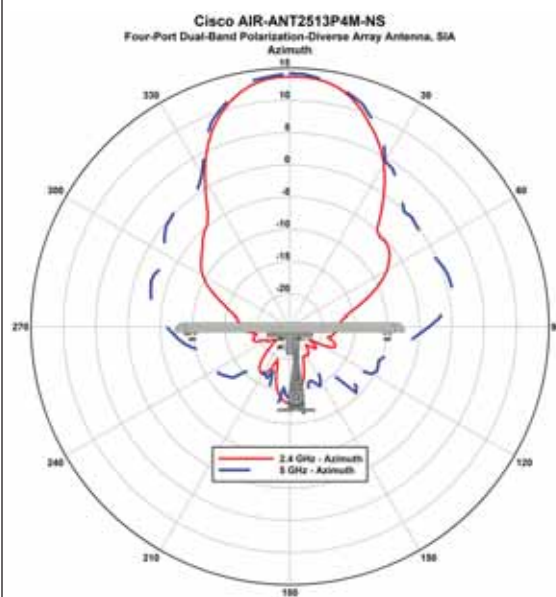
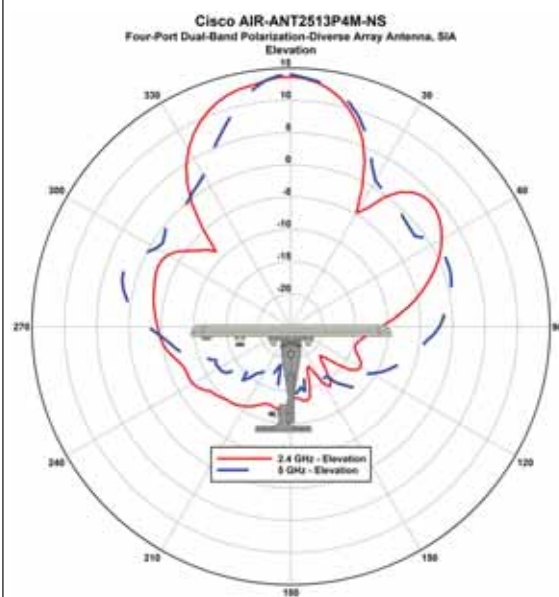
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 19: C9124AX-IoT Antenna Radiation Pattern (2.4-GHz Azimuth)****Figure 20: C9124AX-IoT Antenna Radiation Pattern (2.4-GHz Elevation)****Figure 21: C9124AXD-AUX RF ASIC Antenna Radiation Pattern (2.4-GHz Azimuth)****Figure 22: C9124AXD-AUX RF ASIC Antenna Radiation Pattern (2.4-GHz Elevation)**

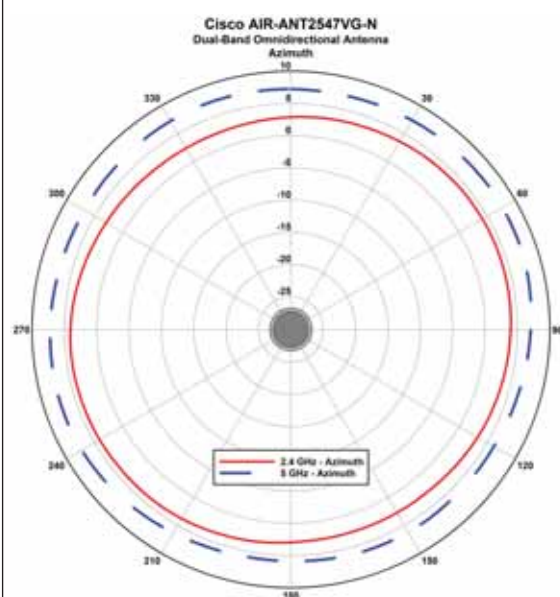
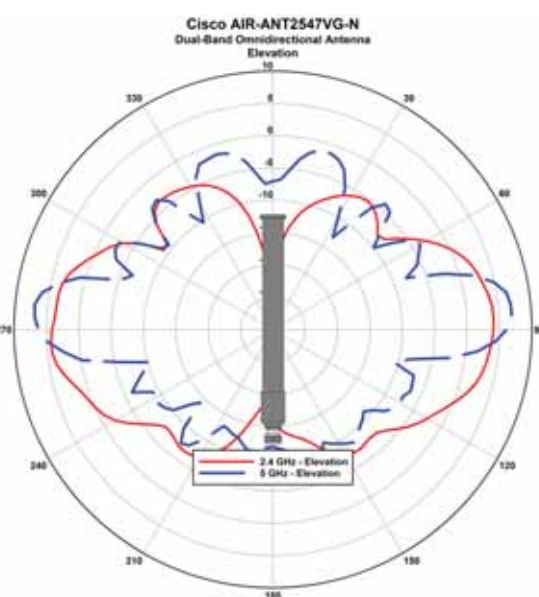
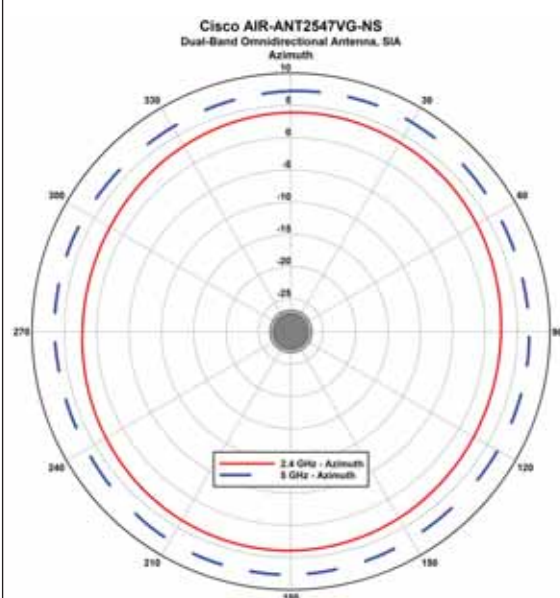
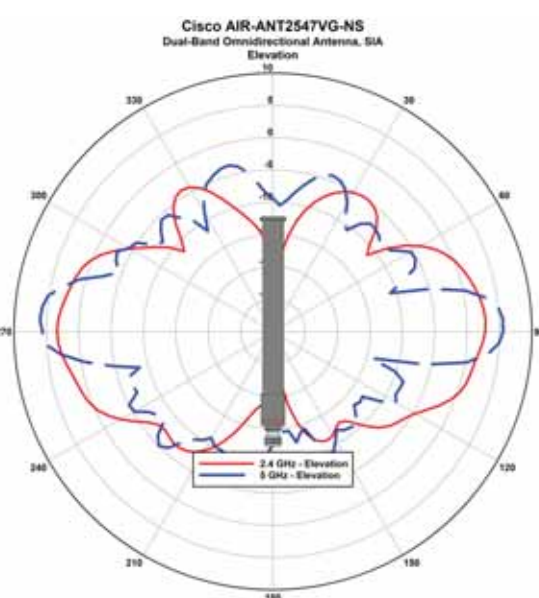
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 23: C9124AXD–AUX RF ASIC Antenna Radiation Pattern (5–GHz Azimuth)****Figure 24: C9124AXD–AUX RF ASIC Antenna Radiation Pattern (5–GHz Elevation)****C9124AXE(ExternalAntenna)Model:AntennaRadiationPatterns**

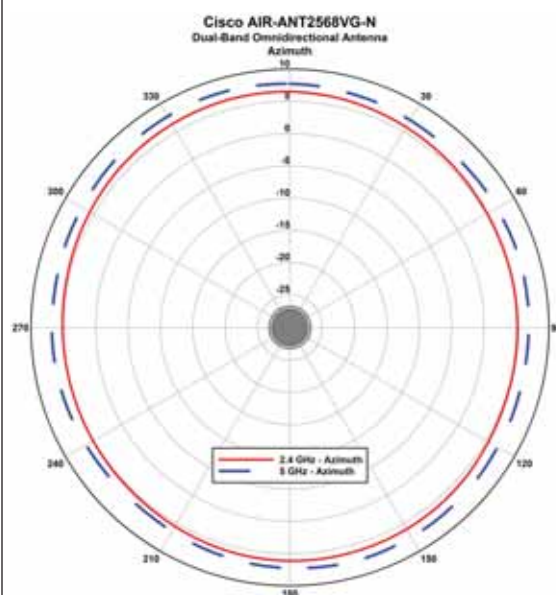
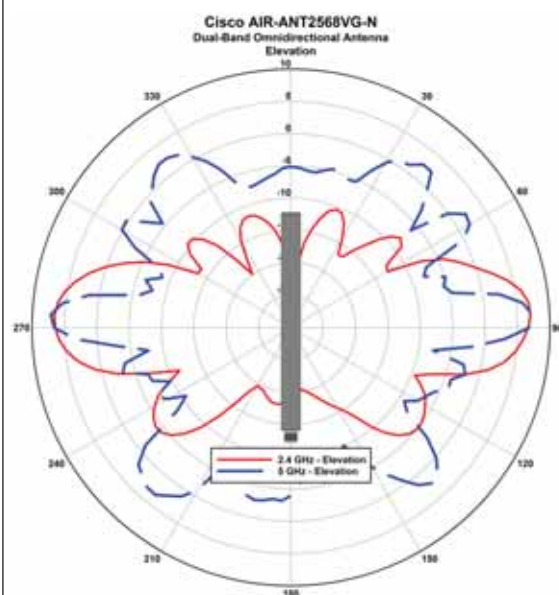
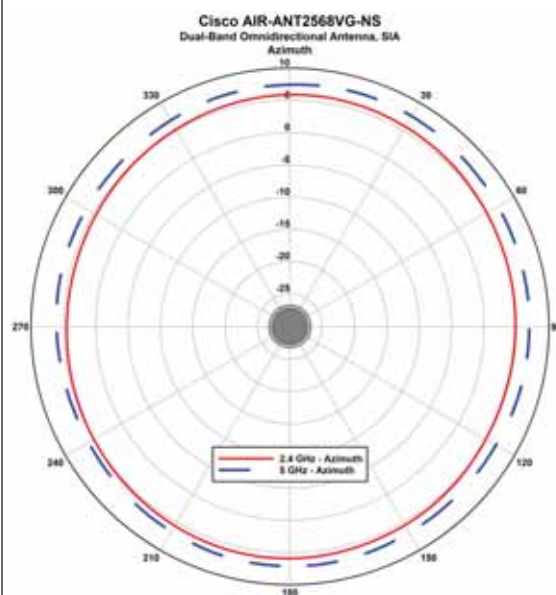
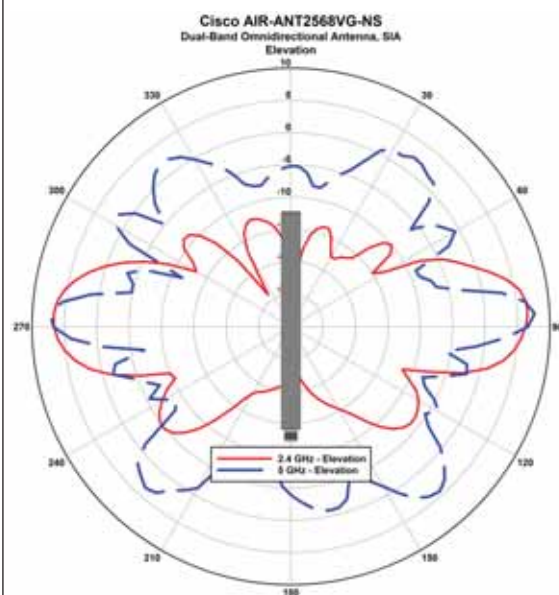
The following illustrations show the C9124AXE model with external antenna radiation patterns:

Figure 25: AIR-ANT2413P2M-N: 2.4–GHz Dual-Polarized Two Port Directional Antenna Radiation Pattern (Azimuth)**Figure 26: AIR-ANT2413P2M-N: 2.4–GHz Dual-Polarized Two Port Directional Antenna Pattern (Elevation)**

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 27: AIR-ANT2450V-N: 2.4-GHz Omnidirectional Antenna Radiation Pattern (Azimuth)****Figure 28: AIR-ANT2450V-N: 2.4-GHz Omnidirectional Antenna Radiation Pattern (Elevation)****Figure 29: AIR-ANT2480V-N: 2.4-GHz Omnidirectional Antenna Radiation Pattern (Azimuth)****Figure 30: AIR-ANT2480V-N: 2.4-GHz Omnidirectional Antenna Radiation Pattern (Elevation)**

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 31: AIR-ANT2513P4M-N: Four-Port Dual-Band Polarization Diverse-Array Radiation Pattern (Azimuth)****Figure 32: AIR-ANT2513P4M-N: Four-Port Dual-Band Polarization Diverse-Array Antenna Radiation Pattern (Elevation)****Figure 33: AIR-ANT2513P4M-NS: Four-Port Dual-Band Polarization Diverse-Array Antenna SIA Radiation Pattern (Azimuth)****Figure 34: AIR-ANT2513P4M-NS: Four-Port Dual-Band Polarization Diverse-Array Antenna SIA Radiation Pattern (Elevation)**

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 35: AIR-ANT2547VG-N: Dual-Band Omnidirectional Antenna Radiation Pattern (Azimuth)****Figure 36: AIR-ANT2547VG-N: Dual-Band Omnidirectional Antenna Radiation Pattern (Elevation)****Figure 37: AIR-ANT2547VG-NS: Dual-Band Omnidirectional Antenna Radiation Pattern (Azimuth)****Figure 38: AIR-ANT2547VG-NS: Dual-Band Omnidirectional Antenna Radiation Pattern (Elevation)**

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 39: AIR-ANT2568VG-N: Dual-Band Omnidirectional Antenna Radiation Pattern (Azimuth)****Figure 40: AIR-ANT2568VG-N: Dual-Band Omnidirectional Antenna Radiation Pattern (Elevation)****Figure 41: AIR-ANT2568VG-NS: Dual-Band Omnidirectional Antenna Radiation Pattern (Azimuth)****Figure 42: AIR-ANT2568VG-NS: Dual-Band Omnidirectional Antenna Radiation Pattern (Elevation)**

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Figure 43: AIR-ANT2588P3M-N: 3-Port Dual-Band Polarization-Diverse Patch Antenna Radiation Pattern (Azimuth)

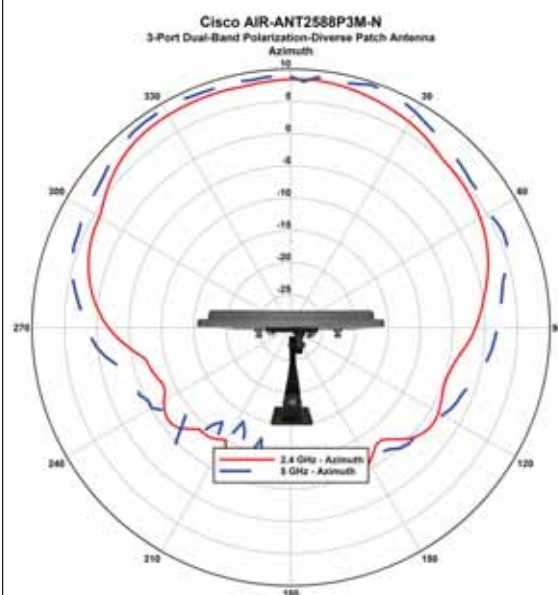


Figure 44: AIR-ANT2588P3M-N: 3-Port Dual-Band Polarization-Diverse Patch Antenna Radiation Pattern (Elevation)

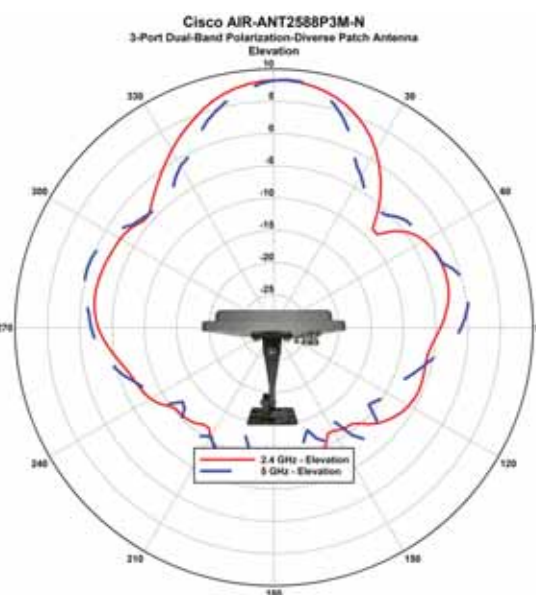


Figure 45: AIR-ANT2588P4M-NS: 4-Port Dual-Band Polarization-Diverse Patch Antenna, SIA Radiation Pattern (Azimuth)

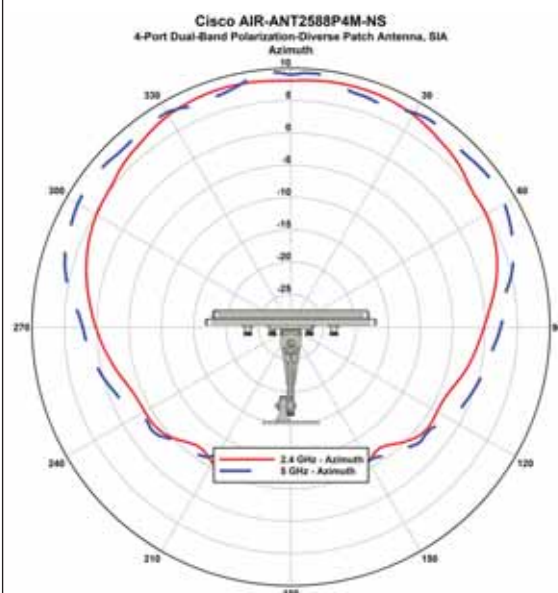
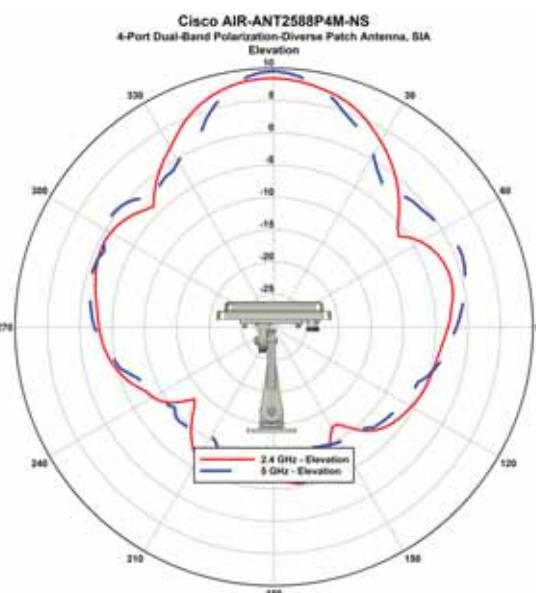
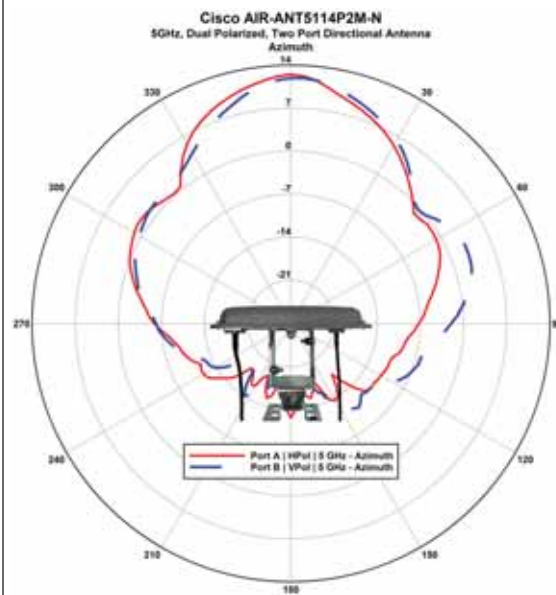
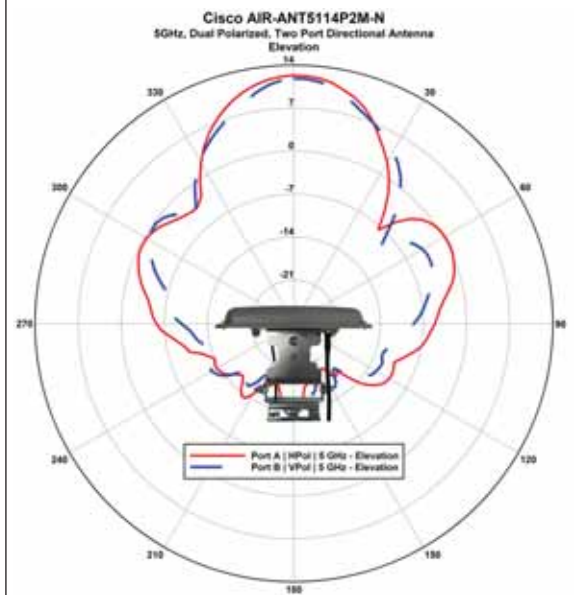
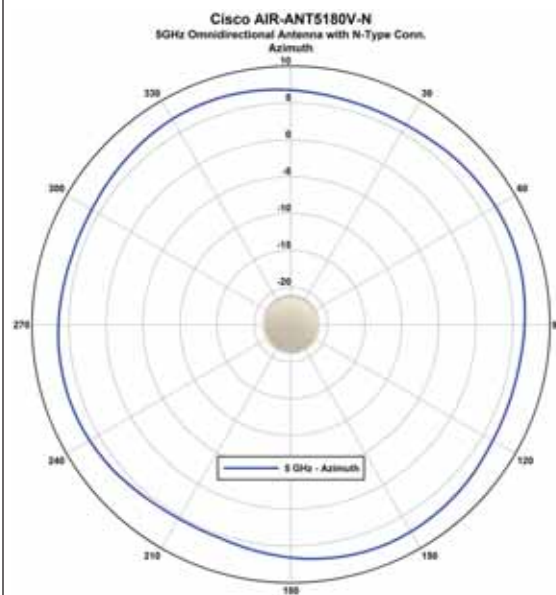
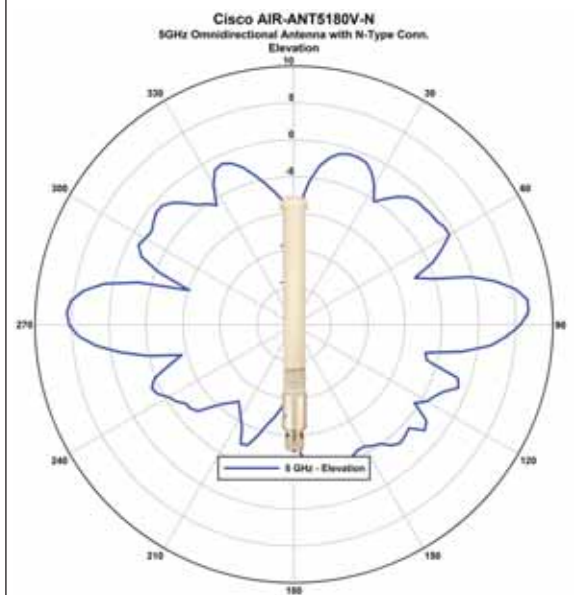


Figure 46: AIR-ANT2588P4M-NS: 4-Port Dual-Band Polarization-Diverse Patch Antenna, SIA Radiation Pattern (Elevation)



REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 47: AIR-ANT5114P2M-N: 2-Port 5-GHz Dual Polarized Directional Antenna Radiation Pattern (Azimuth)****Figure 48: AIR-ANT5114P2M-N: 2-Port 5-GHz Dual Polarized Directional Antenna Radiation Pattern (Elevation)****Figure 49: AIR-ANT5180V-N: 5-GHz Omnidirectional Antenna Radiation Pattern (Azimuth)****Figure 50: AIR-ANT5180V-N: 5-GHz Omnidirectional Antenna Radiation Pattern (Elevation)**

Supported External Antennas

The following table shows the external antennas supported by the C9124AXE access point

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1	Port 1 Supports SIA	4	Port 4
2	Port 2	5	Port 5 Supports SIA with 5-GHz band only.
3	Port 3 Supports SIA	6	Port 6 Supports 5-GHz band only.

Table 2: 9124AXE Access Point Supported External Antennas

PID	Antenna Gain (dBi)		Antenna Name
	2.4-GHz	5-GHz	
AIR-ANT2547V-N	4	7	Cisco Aironet Dual-Band Omnidirectional Colinear Array Antenna (White) Connectors: N-Male
AIR-ANT2547VG-N	4	7	Cisco Aironet Dual-Band Omnidirectional Colinear Array Antenna (Gray) Connectors: N-Male

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PID	Antenna Gain (dBi)		Antenna Name
AIR-ANT2547VG-NS	4	7	Cisco Aironet Dual-Band Omnidirectional Colinear Array (Gray), Self-Identifying Antenna Connectors: N-Male
AIR-ANT2588P3M-N=	8	8	Cisco Aironet 2.4-GHz/5-GHz 8-dBi 3-Element Dual Polarized Patch Antenna Connectors: N-Female Bulkhead x3
AIR-ANT2588P4M-NS=	8	8	Cisco Aironet 2.4-GHz/5-GHz 8-dBi 4-Element Dual-Polarized Patch Self-Identifying Antenna Connectors: N-Female Bulkhead
AIR-ANT2450V-N=	5	—	Cisco Aironet 5-dBi Omnidirectional Antenna
AIR-ANT2480V-N=	8	—	Cisco Aironet 8-dBi Omnidirectional Antenna
AIR-ANT2413P2M-N=	13	—	Cisco Aironet 2.4-GHz 13-dBi Directional Antenna
AIR-ANT2413P2M-NS=	13	—	Cisco Aironet 2.4-GHz 13-dBi Directional Antenna, Self-Identifying
AIR-ANT5180V-N=	—	8	Cisco Aironet 8-dBi Omnidirectional Antenna
AIR-ANT5114P2M-N=	—	14	Cisco Aironet 5-GHz 14-dBi Directional Antenna
AIR-ANT5114P2M-NS=	—	14	Cisco Aironet 5-GHz 14-dBi Directional Antenna, Self-Identifying
AIR-ANT2568VG-N	6	8	Cisco Aironet Dual-Band Omnidirectional Antenna
AIR-ANT2568VG-NS	6	8	Cisco Aironet Dual-Band Omnidirectional Antenna, Self-Identifying
AIR-ANT2513P4M-N=	13	13	Cisco Aironet Four-Port Dual-Band Polarization-Diverse Array Antenna
AIR-ANT2513P4M-NS=	13	13	Cisco Aironet Four-Port Dual-Band Polarization-Diverse Array Antenna, Self-Identifying

For installation instructions and detailed information on any of these antennas, refer to the antenna guide at:

<http://www.cisco.com/c/en/us/support/wireless/aironet-antennas-accessories/products-installation-guides-list.html>

Follow all safety precautions when installing the antennas. For information on safety, see [Safety Precautions when Installing Antennas](#), on page 91.

REVIEW DRAFT - CISCO CONFIDENTIAL**Non-Cisco Antennas**

Cisco does not support any third-party antennas. RF connectivity and compliance of third party antennas is the user's responsibility. Cisco does not recommend any third-party antennas, and Cisco Technical Assistance Center will not be able to provide any support for third-party antennas. Cisco's FCC Part 15 compliance is only guaranteed with Cisco antennas or antennas that are of the same design and gain as Cisco antennas.

Cisco Flexible Antenna Port

The Cisco Flexible Antenna Port feature on the C9124AXE access points allows support for either dual-band or single-band antennas on the same AP. This is configurable using a CLI command from the wireless LAN controller.

Power Sources

The Cisco Catalyst 9124AX Series Outdoor Access Point is supported on these power sources:

- DC power: 24 to 56 VDC
- Power over Ethernet (PoE): For more information, see [Powering the Access Point, on page 65](#).

**Danger**

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

**Caution**

For PoE options and their corresponding modes of operation, see [Table 12: Cisco Catalyst 9124AX AP Reduced Power Feature Matrix, on page 65](#).

**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).

Power Injectors

The Cisco Catalyst 9124AX Series Outdoor Access Point supports the following power injectors:

- AIR-PWRINJ-60RGD1=
- AIR-PWRINJ-60RGD2=
- AIR-PWRINJ6=

**Danger**

To reduce the risk of fire, use only No. 24 AWG or larger telecommunications line cord. Statement 1023

REVIEW DRAFT - CISCO CONFIDENTIAL**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 uplink port on the AP uses an RJ-45 connector (with weatherproofing) to link the AP to the 100BASE-T, 1000BASE-T, or 2.5GBASE-T network. The Ethernet cable 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.

**Danger**

To reduce the risk of fire, use only No. 24 AWG or larger telecommunication line cord. Statement 1023

The Ethernet cable must be a *shielded*, outdoor rated, Category 5e (CAT 5e) or better cable. The AP senses the Ethernet and power signals and automatically switches internal circuitry to match the cable connections.

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CHAPTER 3

Unpacking Your Access Point

- [Package Contents, on page 27](#)
- [Unpacking the Access Point, on page 27](#)
- [Optional Tools and Hardware from Cisco, on page 28](#)
- [Cisco Orderable Accessories, on page 28](#)
- [Preinstallation Checks and Installation Guidelines, on page 30](#)
- [Typical Access Point Installation Components, on page 30](#)

Package Contents

Each AP package contains the following items:

- One C9124AXI or C9124AXD or C9124AXE Outdoor AP
- Ground lug and screws with lock washers
- CAT 5e RJ45 Ethernet port termination plug
- Weatherization tape and anticorrosion sealant
- Cisco product documentation and pointer card

Unpacking the Access Point

To unpack the AP, follow these steps:

Procedure

- | | |
|---------------|--|
| Step 1 | Unpack and remove the AP and the 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 following items: <ul style="list-style-type: none">• The access point• Accessory kit (Ethernet port termination plug, ground lug kit) |

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- (Optional) Mounting brackets only if you opted for these when ordering the AP.

If any item is missing or damaged, contact your Cisco representative or reseller for instructions.

Optional Tools and Hardware from Cisco

Depending on what you ordered, the following optional equipment may be part of your shipment:

- [Cisco Orderable Accessories, on page 28](#)
- AP paintable cover C9124-CVR1= Spare only
- Spare part kit containing extra cable glands, power connector, ground lug, and so on. (AIR-ACC-KIT1=)

Additional Tools and Hardware Required for Installation

You must independently procure the following tools and materials, which might be required during various stages of installing the AP:

- Ground lug crimping tool (Panduit CT-720 with CD-720-1 die)
- #2 Phillips Screwdriver
- 5-mm Hex driver or Allen wrench
- Adjustable wrench or 28-mm box wrench
- 6-AWG copper ground wire
- 10-mm open-end or box wrench
- 13-mm box-end wrench or socket set
- 16-mm box-end wrench or socket set
- Large flat or Phillips screwdriver (for SFP port plug)
- 2.54-mm (0.10 inch) hex crimp tool for DC power connector
- Shielded outdoor-rated Ethernet (CAT5e or better) cable of 0.20 to 0.35 inch (5 to 9 mm) diameter.
- Ethernet RJ-45 connector and installation tool
- Shielded outdoor-rated DC power cable with 18-AWG 2 conductor, 0.21 to 0.35 inch (5.5 to 9.0mm) outer diameter
- Ground rod, as required by local regulations

Cisco Orderable Accessories

Order the following accessories separately from Cisco:

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- AP-mounting brackets to mount the C9124AXI or C9124AXD AP.

Mounting Brackets	Description
AIR-MNT-VERT1=	Vertical mount to a wall or 2 to 5 inch (51 to 127 mm) diameter pole
AIR-MNT-ART1=	Articulating mount to a wall or 2 to 5 inch (51 to 127 mm) diameter pole
AIR-MNT-VERT2=	Vertical mount with DC adapter to a wall or 2 to 5 inch (51 to 127 mm) diameter pole
AIR-MNT-HORZ1=	Horizontal mount to a wall or 2 to 5 inch (51 to 127 mm) diameter pole
AIR-ACC-PS-MNT1	Optional for AIR-MNT-HORZ1= kit to mount DC power supply
AIR-MNT-STRAND1=	Cable strand horizontal mount

- Accessory kits

Accessory Kit	Description
AIR-SFP-KIT1=	Gland kit for SFP port (Qty: 5)
C9124-CVR1=	AP paintable cover
AIR-ACC-KIT1=	This kit contains the following items: • CAT 5e RJ45 Ethernet port plug and gland assembly (Qty: 5) • RJ45 port dust caps (Qty: 2) • Ground lug (Qty: 1) • DC plug (Qty 1)
AIR-ACC245LA-N=	Lightning Arrestor kit
AIR-ACC-CAT6=	CAT 6/6A Ethernet connector and cable gland assembly. Qty: 5

- Power injectors when PoE is not available.

Power Supply	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
AIR-PWRINJ6=	30W rated single-port PoE injector

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Preinstallation Checks and Installation Guidelines

Because the AP is a radio device, it is susceptible to common causes of interference that can reduce throughput and range. Follow these basic guidelines to ensure the best possible performance:

- Thoroughly review the information provided in [Installation Overview](#), on page 33.
- Install the AP in an area where structures, trees, or hills do not obstruct radio signals to and from the AP.
- We recommend that you install the AP no higher than 40 feet to support the wireless clients on the ground. Mounting all the APs at the same height provides the best throughput.
- If the SFP port is not in use, the port plug should remain in place and must be tightened to 12.5 lbf-in torque. If the DC, console, or PoE ports are not in use, the port cap should remain in place.

**Note**

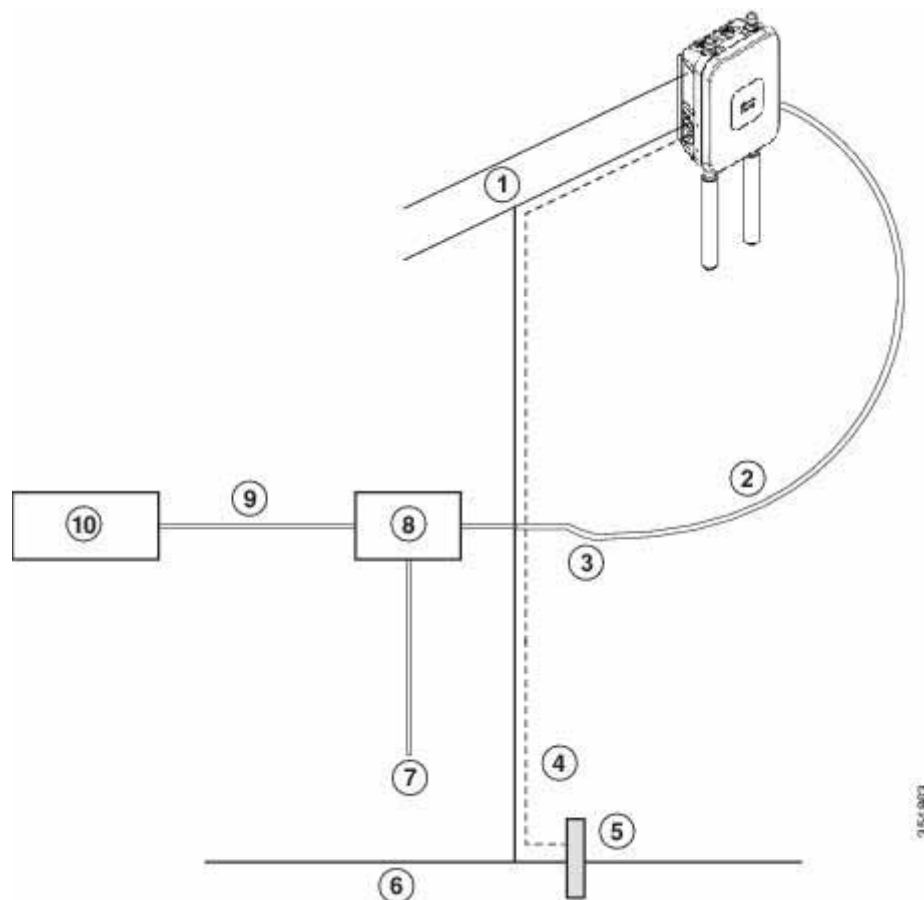
To calculate path loss and determine how far apart to install the APs, consult an RF planning expert.

Before you begin the installation process, ensure the following:

- Perform a site survey. For more information, see [Performing Site Surveys](#), on page 92.
- Your network infrastructure devices must be operational and properly configured.
- Your controllers must be connected to switch trunk ports.
- Your switch must be configured with untagged access ports for connecting your APs.
- A DHCP server with Option 43 configured must be reachable by your AP, or manually configure the controller information in the AP. For information about configuring DHCP Option 43, see <http://www.cisco.com/c/en/us/support/docs/wireless-mobility/wireless-lan-wlan/97066-dhcp-option-43-00.html>
- Become familiar with the AP installation components, see [Typical Access Point Installation Components](#), on page 30.
- Familiarize yourself with the best practices to install Cisco outdoor wireless access points video series, see https://www.cisco.com/c/en/us/td/docs/wireless/access_point/outdoor/video/ap-best-practices.html

Typical Access Point Installation Components

The Cisco Catalyst 9124AX Series Outdoor Access Point is designed to be installed in an outdoor environment, such as the exterior roof overhang of a tall building or a streetlight pole. Carefully review the [Figure 51: Components in a Typical Access Point Installation](#), on page 31 to become familiar with the system components, connectors, indicators, cables, system interconnection, and grounding.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 51: Components in a Typical Access Point Installation**

1	Building roof overhang	6	Ground
2	Shielded outdoor-rated Ethernet (CAT5e or better) cable ³	7	Power cord
3	Water drip loop	8	Power injector
4	6-AWG copper grounding wire ¹	9	Shielded Ethernet (CAT5e or better) cable ¹
5	Ground rod ¹	10	Controller (through a switch)

³ Independently sourced by the user.

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CHAPTER 4

Installation Overview

Installing an AP involves the following high-level tasks.

- [Preparing the AP for Installation, on page 33](#)
- [Performing a Preinstallation Configuration \(Optional\), on page 34](#)
- [Mounting the Access Point, on page 36](#)

Preparing the AP for Installation

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

You should have the following information about your wireless network on hand:

- AP locations
- AP-mounting options: To a vertical or horizontal wall or pole



Note The AP can be mounted in various orientations. Depending on the orientation, you may have to purchase additional mounting hardware. For more information, see [Mounting the Access Point, on page 36](#) section.

- AP power options: 802.3at (PoE+), 802.3bt, and Cisco Universal PoE (Cisco UPOE)



Note When you use 802.3af to power an AP, both the 2.4-GHz and 5-GHz radios are disabled, and the Ethernet gets downgraded to 1-GbE speeds. The SFP port and PoE-OUT are also disabled.

- Operating temperature:
 - C9124AXI: -40° to 149°F (-40° to 65°C) and 131°F (55°C) with solar loading
 - C9124AXD: -40° to 149°F (-40° to 65°C) and 131°F (55°C) with solar loading
 - C9124AXE: -40° to 149°F (-40° to 65°C) and 131°F (55°C) with solar loading

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We recommend that you prepare a site map showing AP 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.

Performing a Preinstallation Configuration (Optional)

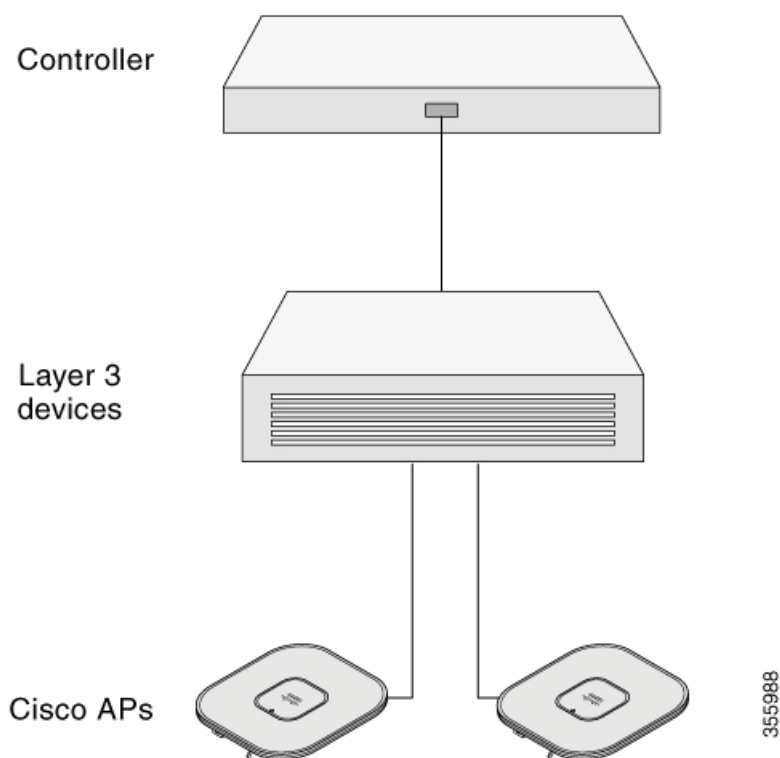
Performing the following procedures ensure that the AP installation and the initial operation proceed as expected. This procedure is optional.

**Note**

If your wireless controller is configured properly, you can install the AP in its final location and connect it to the network from there. For additional information, see [Deploying the Access Point in a Wireless Network](#), on page 80.

The preinstallation configuration setup is illustrated in [Figure 52: Preinstallation Configuration Setup](#), on page 34:

Figure 52: Preinstallation Configuration Setup



To perform preinstallation configuration, follow these steps:

REVIEW DRAFT - CISCO CONFIDENTIAL**Procedure**

- Step 1** Ensure that the Cisco Controller Distribution System port is connected to the network. Use the procedure for the CLI or the GUI interface, as described in the release appropriate *Cisco Controller Configuration guide*.
- Note** To use an SFP module, you must insert it into an AP's SFP port before the AP boots, in order to ensure correct power consumption and PoE derating.
- a) Ensure that the AP has Layer 3 connectivity to the Cisco Controller Management and AP-Manager interfaces.
 - b) Configure the switch to which the AP should be attached. See the release specific *Cisco Wireless Controller Configuration Guide* for the release your controller is running on.
 - c) Set the controller as the primary controller so that new AP always joins to it.
 - d) Ensure that you have enabled DHCP on the network.
- The AP must receive its IP address through DHCP.
- Note** The DHCP server assigns an IP address to an 802.11AX Cisco AP 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..
- e) Ensure that the network is configured not to block the CAPWAP UDP ports.
 - f) 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, refer to the product documentation. For more information, see [Configuring DHCP Option 43, on page 84](#).
- Note** The AP requires a Gigabit Ethernet (GbE) link to prevent the Ethernet port from becoming a bottleneck for traffic because wireless traffic speeds exceed transmit speeds of a 10/100 Ethernet port.
- Step 2** Apply power to the AP. For more information, see [Powering the Access Point over Power-over-Ethernet, on page 77](#).
- a) When the AP attempts to connect to the controller, the LED cycles through an off, green, and red sequence, taking up to five minutes.
- Note** If the AP remains in this mode for more than five minutes, the AP is unable to find the primary controller. Check the connection between the AP and the primary controller and ensure they are on the same subnet.
- b) If the AP shuts down, check the power source.
 - c) After the AP finds the primary controller, it attempts to download the software image if the AP software release differs from the controller release version. While this is happening, the status LED blinks blue.
 - d) If the software image download is successful, the AP reboots.
- Step 3** Configure the AP 802.11AX network settings using the controller CLI, controller GUI, or Cisco DNA Center.
- Step 4** If the preinstallation configuration is successful, the status LED is green, indicating normal operation.
- Disconnect the AP and mount it at the location you intend to deploy it on the wireless network.
- Step 5** If the AP does not indicate normal operation, turn it off and repeat the preinstallation configuration.

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- Note** When you are installing a Layer 3 AP on a different subnet than the controller, ensure the following:
- Ensure that a DHCP server is reachable from the subnet on which you want to install the AP.
 - The subnet has a route back to the controller and ensure that the route back to the controller has the destination UDP ports 5246 and 5247 open for CAPWAP communications.
 - Ensure that the route back to the primary, secondary, and tertiary controllers allows IP packet fragments.
 - Ensure that the AP and the controller have a static 1-to-1 NAT to an outside address if address translation is used. (Port Address Translation is not supported.).

Mounting the Access Point

This section provides instructions to mount the AP. Personnel mounting the AP must have knowledge of the wireless AP, bridging techniques, and grounding methods.

Choosing a Mounting Kit

You can mount the AP in one of the following configurations that best fits installation application:

- Vertically mounted to a wall or pole.
- Horizontally mounted to an eave, ceiling, or pole.
- On a cable strand



Note The following table shows the typical mount used for each AP model.

AP Mounting Kit ⁴	9124AXI	9124AXD	9124AXE	Purpose
AIR-MNT-VERT1=	N	Y	Y	Fixed mounting kit for vertical mounting on wall and for pole of diameter 2 to 5 inch (51 to 127 mm). See: Vertically Mounting the AP to a Wall, on page 38 Vertically Mounting the AP to a Pole, on page 40

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AP Mounting Kit ⁴	9124AXI	9124AXD	9124AXE	Purpose
AIR-MNT-VERT2=	N	Y	Y	Fixed mounting kit, allowing mounting of both AP and power supply, for vertical mounting on wall and for pole of diameter 2 to 5 inch (51 to 127 mm). See: Vertically Mounting the AP with DC Supply to a Wall, on page 42 Vertically Mounting the AP with DC Supply to a Pole, on page 44
AIR-MNT-ART1=	Y	Y	Y	Pivoted mounting kit for both vertical and horizontal mounting, on wall or ceiling and for pole of diameter 2 to 5 inch (51 to 127 mm). See: Articulating Mount for the AP to a Wall or Ceiling, on page 46 Articulating Mount for the AP to a Pole, on page 50
AIR-MNT-HORZ1= AIR-ACC-PS-MNT1 (Optional)	Y	N	Y	Fixed mounting kit, allowing mounting the AP to mounted horizontal to the ground. Horizontal mount to a wall or for pole of diameter 2 to 5 inch (51mm to 127 mm). See: Pole Mounting the AP with Horizontal Kit, on page 55 Wall Mounting the AP with Horizontal Kit, on page 53 Optional AIR-ACC-PS-MNT1 kit to mount DC power supply. See: DC Supply Mount Bracket, on page 57
AIR-MNT-STRAND1=	Y	N	N	Cable strand horizontal mount. See: Strand Mounting the AP, on page 58

⁴ Mount the AP using no less than four screw holes on a bracket. For the AIR-MNT-STRAND1= bracket, use no less than two screws.

REVIEW DRAFT - CISCO CONFIDENTIAL**Note**

- When mounting an AP vertically, ensure that the AP is oriented with the LED indicators pointing down.
- Mount the AP in such a way that all antenna ports and the console port are visible and accessible for future use.
- Align the AP's omnidirectional antennas vertical to the ground.
- Align the AP's directional antenna such that the main beam is parallel to or tilted down toward the horizon.

Vertically Mounting the AP to a Wall

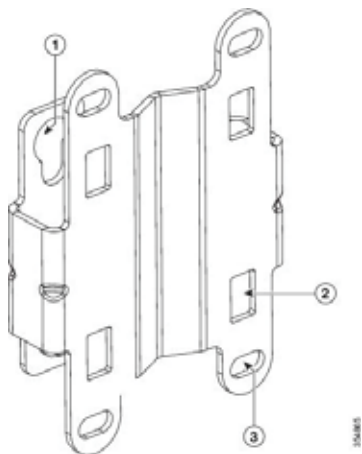
The AIR-MNT-VERT1= mounting kit contains a mounting bracket for wall mounting or pole mounting.

You can use the mounting bracket as a template to mark the mounting holes' positions for your installation, install the mounting bracket, and then attach the AP to the bracket.

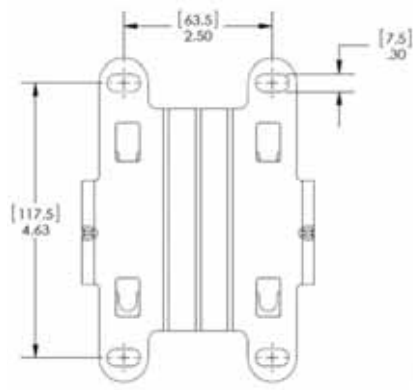
**Caution**

The mounting wall, attaching screws, and wall anchors must support a 50-lb (22.7-kg) static weight.

Figure 53: Mounting Bracket for Wall and Pole Mounting



1	One of four keyhole slots to mount the AP.
2	One of four slots for steel band clamps, used for pole mounting only.
3	Bracket mount holes for fastening bracket to the wall. You can use bolts of up to 1/4" or 6 mm in diameter.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 54: Mounting Bracket Dimensions****Before you begin**

Ensure that you have the following materials before beginning to mount the AP to a wall:

Table 3: Material Required to Mount Access Point to a Wall using AIR-MNT-VERT1= Kit

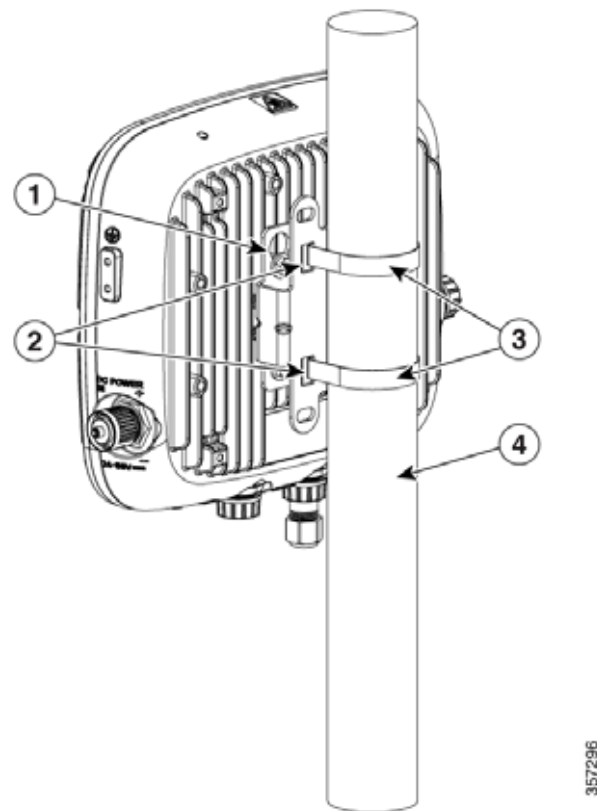
Materials Required	Supplied in the Kit?
Ground lug and screws (provided with the access point)	Yes
Wall Mount Bracket	Yes
Four M6 x 12-mm Hex-head Bolts	Yes
Crimping tool for ground lug, Panduit CT-720 with CD-720-1 die	No
Four wall mounting screws	No
Four wall anchors (specified for all material)	No
Drill bit for wall anchors	No
Electric drill and standard screwdriver	No
#6 AWG ground wire	No
Shielded outdoor-rated Ethernet (CAT5e or better) cable	No
Grounding block	No
Grounding rod	No
10-mm box-end wrench or socket set	No

REVIEW DRAFT - CISCO CONFIDENTIAL**Procedure**

-
- Step 1** Use the mounting bracket as a template to mark four screw hole locations on the mounting wall. The mounting bracket screw hole locations are shown in [Figure 53: Mounting Bracket for Wall and Pole Mounting, on page 38](#). The dimensions of the mounting bracket are shown in [Figure 54: Mounting Bracket Dimensions, on page 39](#).
- Step 2** Use four screws and, if required, wall anchors to attach the mounting plate to the mounting surface. These screws and anchors are to be sourced independently.
- Note**
- You can use an exterior-grade plywood backboard to mount the AP to stucco, cement, or drywall.
 - The mounting wall, attaching screws, and wall anchors must support a 50-lb (22.7 kg) static weight.
- Step 3** Screw an M6 x12-mm bolt into each of the four support bolt holes on the back of the AP. Do not screw the bolt all the way in, but leave a gap of approximately 0.13 inch (3.3 mm).
- Step 4** Position the AP against the mounting bracket such that the four support bolts on the back of the AP slot into the keyhole slots on the mounting bracket.
- Step 5** Slide the AP down to sit securely in keyhole slots on the mounting bracket.
- Note** The AP should be mounted with the status LED on the base facing downwards.
- Step 6** Using a 10-mm wrench, tighten the four bolts that connect the AP to the bracket to 40 lbf-in (4.5 Nm) of torque.
- Step 7** Proceed with installing antennas (only for external antenna models), connecting the data cables, grounding the AP, powering, and configuring the AP.
-

Vertically Mounting the AP to a Pole

The AIR-MNT-VERT1= mounting kit contains a mounting bracket used for both wall mounting and pole mounting. This kit can be used to install the AP on a pole or mast. It supports metal, wood, or fiberglass poles of 2 to 5 inches (51 to 127 mm) in diameter.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 55: AP Mounted on a Pole**

1	One of four M6 keyhole slots for mounting the AP on the bracket.
2	Top and bottom sets of band clamp slots for passing the clamps through.
3	Top and bottom steel band clamps
4	Pole (wood, metal, or fiberglass), 2 to 5 inch (51 to 127mm) diameter

Before you begin

Ensure that you have the following materials before beginning to mount the AP to a pole:

Table 4: Materials Needed to Mount the AP on a Vertical Pole using AIR-MNT-VERT1= Kit

Materials Required	Supplied in the Kit?
One wall mount bracket	Yes
Four M6 x12 mm hex head bolts	Yes
Two stainless steel band clamps (adjustable 2 to 5 inch (51 to 127 mm))	Yes
10-mm box-end wrench	No

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Materials Required	Supplied in the Kit?
Outdoor rated shielded Ethernet cable	No
Ground lug (provided with the access point)	Yes
Ground block and rod	No
Crimping tool for ground lug, Panduit CT-720 with CD-720-1 die	No
#6 AWG ground wire	No

Procedure

-
- Step 1** Select a mounting location on the pole to mount the AP. You can attach the AP to a pole having a diameter of 2 to 5 inch (51 to 127 mm).
- Step 2** Hold the bracket up against the pole and slide the two band straps through the top and bottom sets of mounting slots on the mounting bracket.
- Step 3** Wrap the band straps around the pole, lock them, and then lightly tighten the clamps using a wrench. Only tighten them enough to keep the bracket from sliding down the pole.
- Step 4** Screw an M6 bolt into each of the four bolt holes on the backside of the AP. Do not screw the bolt in all the way. Leave a gap of about 0.13 inch (3.3 mm).
- Step 5** Position the four bolts on the AP into the bracket keyhole slots. Ensure that the AP is seated correctly in the slots.
- Note** The AP should be mounted with the status LED on the base facing downwards.
- Step 6** Using a 10-mm wrench, tighten the four bolts that connect the AP to the bracket to 40 lbf-in (4.5 Nm) of torque.
- Step 7** Locate the AP to its final position. Tighten the band clamps with the wrench so that the AP does not slide on the pole. Ensure that the clamps are tight enough not to let the AP move.
- Step 8** Proceed with installing antennas (only for external antenna models), connecting the data cables, grounding the AP, powering, and configuring the AP.
-

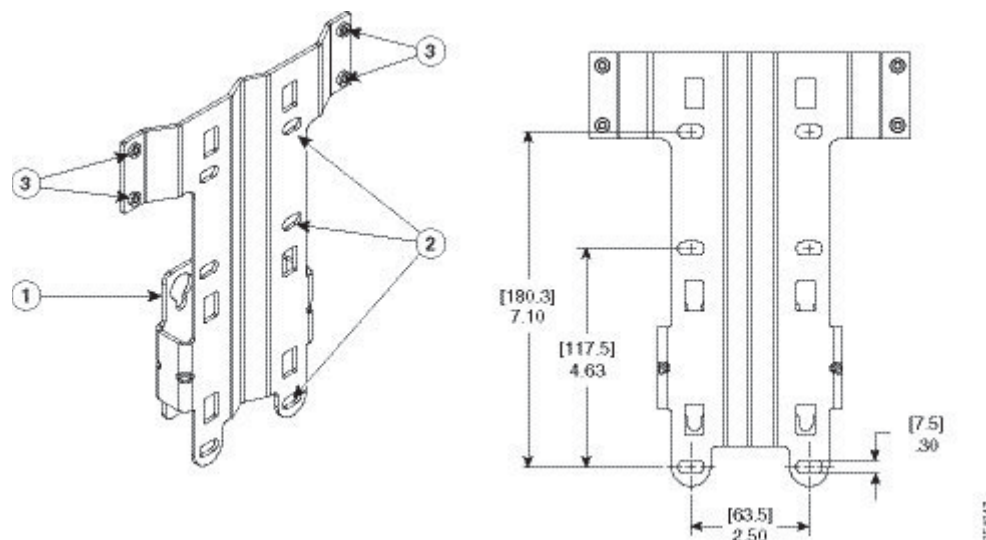
Vertically Mounting the AP with DC Supply to a Wall

The AIR-MNT-VERT2= mounting kit contains a mounting bracket for wall mounting or pole mounting, the AP, and the power supply together.

You can use the mounting bracket as a template to mark the mounting holes' positions for your installation, install the mounting bracket, and then attach the AP to the bracket.



Caution The mounting wall, attaching screws, and wall anchors must support a 50-lb (22.7-kg) static weight.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 56: Mounting Bracket for Wall and Pole Mounting AP with Power Supply**

1	One of four keyhole slots to mount the AP.
2	Three of six bracket mount holes for fastening the bracket to a wall. Support bolts of up to 0.25 inch (6 mm) in diameter
3	Screw holes for fastening the power supply to the bracket

Before you begin

Ensure that you have the following materials before beginning to mount the AP to a wall:

Table 5: Materials Required to Mount AP to a Wall using AIR-MNT-VERT2= Kit

Materials Required	Supplied in the Kit?
Ground lug and screws (provided with the access point)	Yes
Wall Mount Bracket	Yes
Four M6 x 12-mm Hex-head Bolts	Yes
Four #8-32 screws to mount the power supply	Yes
Crimping tool for ground lug, Panduit CT-720 with CD-720-1 die	No
Four wall mounting screws	No
#6 AWG ground wire	No
Shielded outdoor-rated Ethernet (CAT5e or better) cable	No
Grounding block	No

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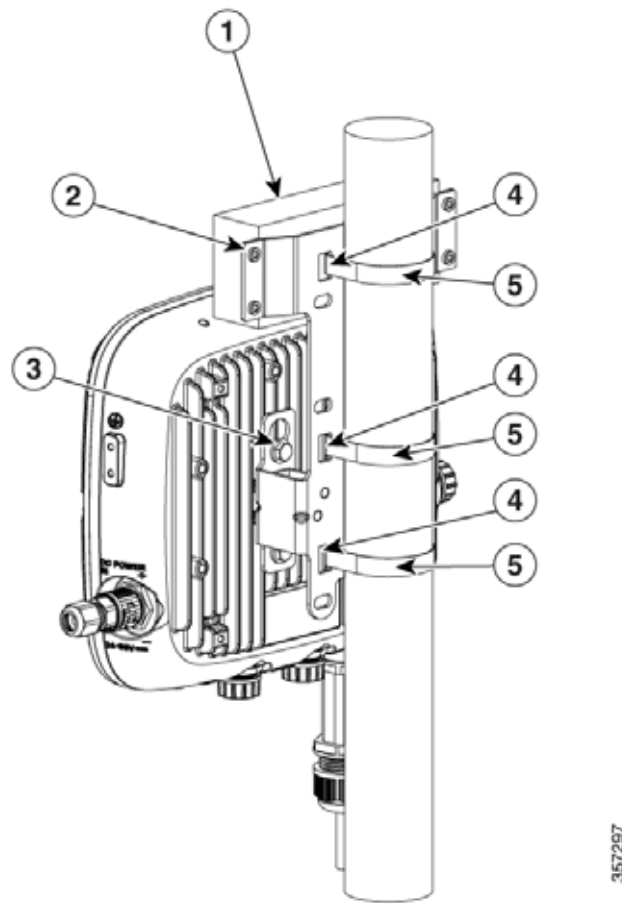
Materials Required	Supplied in the Kit?
Grounding rod	No
10-mm box-end wrench or socket set	No

Procedure

-
- Step 1** Use the mounting bracket as a template to mark six screw hole locations on the mounting wall. The mounting bracket screw hole locations and the dimensions of the mounting bracket are shown in .
- Step 2** Use six screws and, if required, wall anchors to attach the mounting plate to the mounting surface. These screws and anchors are to be sourced independently.
- Note** You can use an exterior-grade plywood backboard to mount the AP to stucco, cement, or drywall.
- Note** The mounting wall, attaching screws, and wall anchors must be able to support a 50-lb (22.7-kg) static weight.
- Step 3** Screw an M6 x12-mm bolt into each of the four support bolt holes on the back of the AP. Do not screw the bolt all the way in, but leave a gap of approximately 0.13 inch (3.3 mm).
- Step 4** Position the AP against the mounting bracket such that the four support bolts on the back of the AP slot into the keyhole slots on the mounting bracket.
- Step 5** Slide the AP down to sit securely in keyhole slots on the mounting bracket.
- Note** The AP should be mounted with the status LED on the base facing downwards.
- Step 6** Using a 10-mm wrench, tighten the four bolts that connect the AP to the bracket to 40 lbf-in (4.5 Nm) of torque.
- Step 7** Proceed with installing antennas (only for external antenna models), connecting the data cables, grounding the AP, powering and configuring the AP.
-

Vertically Mounting the AP with DC Supply to a Pole

The AIR-MNT-VERT2= fixed mounting kit contains a mounting bracket for both wall-mounting and pole-mounting, the AP, along with the power supply kit. This mounting kit supports metal, wood, or fiberglass poles from 2 to 5 inch (51 to 127 mm) in diameter.

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1	Power supply	4	Band clamp slots for passing the clamps through.
2	Screw holes for four #8-32 screws.	5	Steel band clamps.
3	One of four M6 keyhole slots for mounting the AP on the bracket.		

Before you begin

Ensure that you have the following materials before beginning to mount the AP to a pole:

Table 6: Materials Needed to Mount the AP using AIR-MNT-VERT2= Kit

Materials Needed	Supplied in the Kit?
One wall mount bracket	Yes
Four M6 x12 mm hex head bolts	Yes
Four #8-32 screws to mount the power supply	Yes
Three stainless steel band clamps (adjustable 2 to 5 inch (51 to 127 mm))	Yes

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Materials Needed	Supplied in the Kit?
10-mm box-end wrench	No
Outdoor rated shielded ethernet cable	No
Ground lug (provided with the access point)	Yes
Ground block and rod	No
Crimping tool for ground lug, Panduit CT-720 with CD-720-1 die	No
#6 AWG ground wire	No

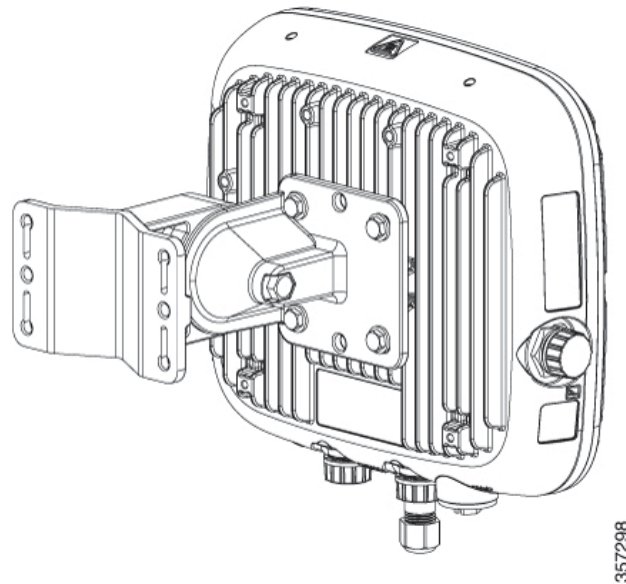
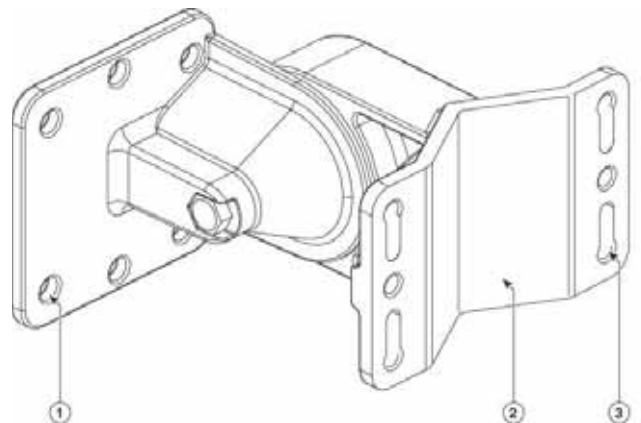
Procedure

-
- Step 1** Select a mounting location on the pole to mount the AP. You can attach the AP to a pole having a diameter of 2 to 5 inch (51 to 127 mm).
- Step 2** Hold the bracket up against the pole and slide the three-band straps through the top, middle, and bottom sets of mounting slots on the mounting bracket.
- Step 3** Wrap the band straps around the pole, lock them, and then lightly tighten the clamps using a wrench. Only tighten them enough to keep the bracket from sliding down the pole.
- Step 4** Screw an M6 bolt into each of the four bolt holes on the backside of the AP. Do not screw the bolt in all the way. Leave a gap of about 0.13 inch (3.3 mm).
- Step 5** Position the four bolts on the AP into the bracket keyhole slots. Ensure that the AP is seated correctly in the slots.
- Note** The AP should be mounted with the status LED on the base facing downwards.
- Step 6** Using a 10-mm wrench, tighten the four bolts that connect the AP to the bracket to 40 lbf-in (4.5 Nm) of torque.
- Step 7** Mount the power supply to the bracket with four #8-32 screws.
- Step 8** Locate the AP to its final position. Tighten the band clamps with the wrench. Ensure that the clamps are tight enough not to let the AP move.
- Step 9** Proceed to [Grounding the Access Point, on page 64](#).
-

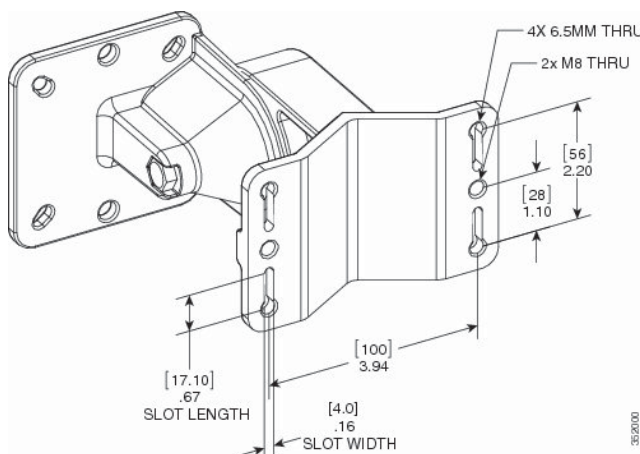
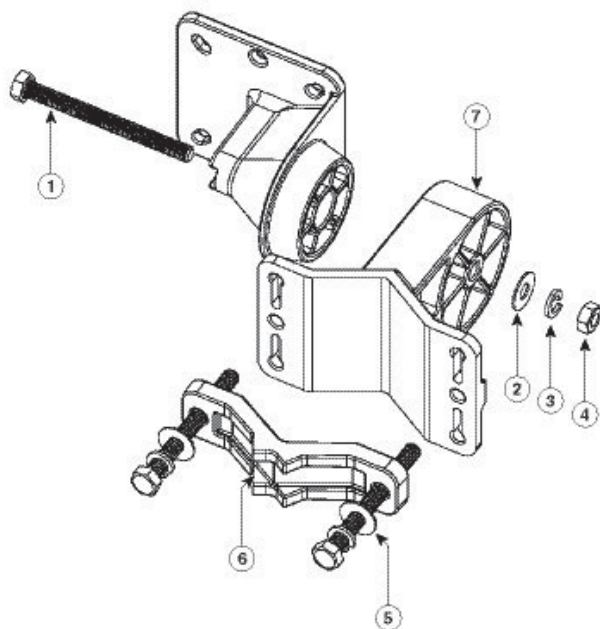
Articulating Mount for the AP to a Wall or Ceiling

The optional pivoting mounting kit AIR-MNT-ART1= contains a pivoting mounting bracket for both wall and pole mounting. This kit allows for adjusting the position of the AP by pivoting the AP along its vertical plane.

You can also, using this kit, mount the AP to a ceiling in a horizontal plane.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 57: Visualization of AP Fastened to the Pivoting Wall Mounting Kit****Figure 58: Pivoting Wall Mounting Bracket**

1	One of four bolt holes for fastening to the back of the AP. This is the AP-plate end of the bracket and is fastened to the back of the AP.	3	Screw holes for wall mounting. These screw holes can also be used as slots for steel band clamps in pole-mount installations.
2	Wall-plate end of the bracket. This plate is fastened to the wall.		

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 59: Pivoting Wall Mounting Bracket Dimensions****Figure 60: Exploded View of the Pivoting Mounting Kit**

1	90.0 mm M8 screw	5	80.0 mm M8 screw with washer and spring washer for fastening the pole-mount screw clamp to the pivoting bracket base plate.
2	M8 washer	6	Pole-mount screw clamp
3	M8 spring washer	7	Pivoting bracket base plate
4	M8 nut		

Before you begin

Ensure that you have the following materials before beginning to mount the AP to a wall:

REVIEW DRAFT - CISCO CONFIDENTIAL**Table 7: Materials for Mounting AP to a Wall with AIR-MNT-ART1= Kit**

Materials Needed	Supplied in the Kit?
Ground lug and screws (provided with the access point)	Yes
Pivoting mount kit and hardware	Yes
(8) M6 x 12-mm Hex-head Bolts	Yes
Adapter bracket for option horizontal mount	Yes
Two stainless steel band clamps (adjustable 2 to 5 inch (51 to 127 mm))	Yes
Crimping tool for ground lug, Panduit CT-720 with CD-720-1 die	No
Four wall mounting screws (6 mm max)	No
#6 AWG ground wire	No
Shielded outdoor-rated Ethernet (CAT5e or better) cable	No
Grounding block	No
Grounding rod	No
13-mm box-end wrench or socket set	No
10-mm box-end wrench	No



Caution The mounting surface, attaching screws, and optional wall anchors to support a 50 lb (22.7 kg) static weight.

Procedure

- Step 1** Disassemble the pivot kit, if not already disassembled.
- Step 2** Use the mounting bracket's wall-plate end as a template to mark four screw hole locations on the mounting surface. See [Figure 58: Pivoting Wall Mounting Bracket](#), on page 47 for the mounting bracket screw hole locations (screw holes of maximum 6 mm). See [Figure 59: Pivoting Wall Mounting Bracket Dimensions](#), on page 48 for the dimensions of the pivoting mounting bracket.
- Step 3** Use four screws and, if required, wall anchors to attach the mounting bracket's wall-plate end to the mounting surface. These screws and anchors are to be sourced independently.
- Note**
- You can use an exterior-grade plywood backboard to mount the AP to stucco, cement, or drywall.
 - The mounting surface, attaching screws, and wall anchors must support a 50-lb (22.7 kg) static weight. It is important to use proper anchoring for the mount surface to support the static load.
- Step 4** Align the AP-plate end of the bracket with the screw holes in the AP's back.

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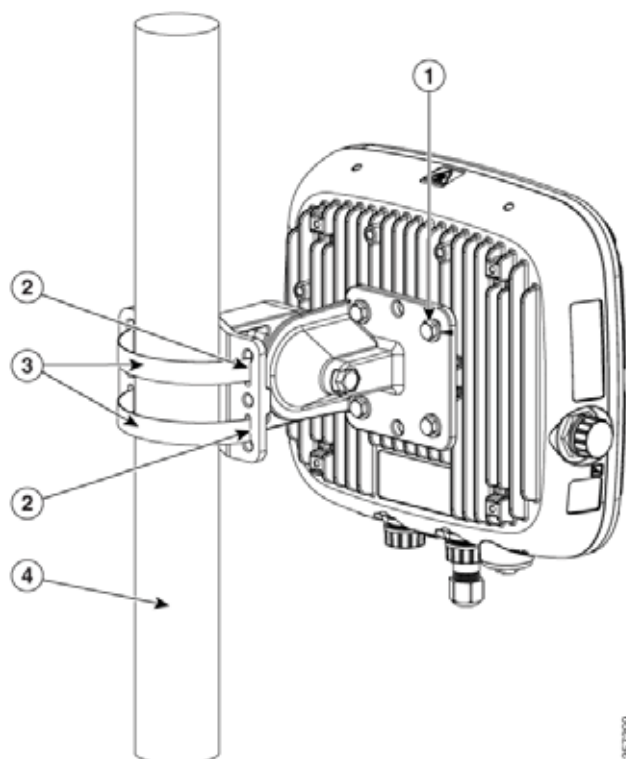
- Step 5** Fasten the bracket plate to the AP by using four M6 x12 mm bolts and a 10-mm box or socket wrench. Tighten the bolts to 40 lbf-in (4.5 Nm) of torque.
- Step 6** Using the 90 mm M8 long screw and the hardware supplied with the pivoting bracket, bolt the AP and bracket plate to the wall plate mounted on the wall. See [Figure 58: Pivoting Wall Mounting Bracket](#), on page 47 for this assembly. Do not fully tighten the assembly.
- Note** The AP should be mounted with the status LED on the base facing downwards.
- Step 7** Pivot the AP as required, and then fully tighten the 90 mm M8 long screw using a 13-mm wrench.
- Step 8** Proceed with installing antennas (only for external antenna models), connecting the data cables, grounding the AP, powering, and configuring the AP.

Articulating Mount for the AP to a Pole

The optional articulating mounting kit AIR-MNT-ART1= contains a pivoting mounting bracket for both wall and pole mounting. This kit can be used to install the AP on a pole or mast. It supports metal, wood, or fiberglass poles from 2 to 5 inch (51 to 127mm) in diameter.

The AIR-MNT-ART1= articulating mounting kit allows for adjusting the AP position by pivoting the AP along its vertical plane.

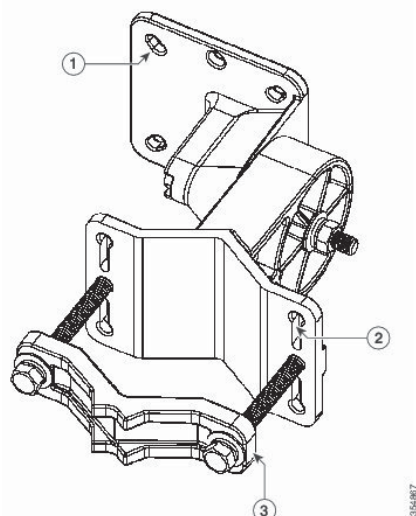
Figure 61: AP Pole Mounted Using the Pivoting Mounting Bracket



1	One of four mounting holes for mounting the AP to the bracket	3	Steel band clamps
---	---	---	-------------------

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2 | Slots for band clamps | 4 | Pole

Figure 62: Pivoting Mounting Kit with Pole Mount Clamp

1	One of four mounting holes for the AP. This is the AP-plate end of the bracket and is fastened to the back of the AP	3	Pole mount screw clamp. It can fit poles having a diameter of up to 2 to 3 inches (50 to 76 mm)
2	One of four slots for band clamps. This is the pivot bracket base plate and is fastened to the pole. Pole mount installation using band clamps are shown in Figure 61: AP Pole Mounted Using the Pivoting Mounting Bracket , on page 50.		

Before you begin

Ensure that you have the following materials before beginning to mount the AP to a pole:

Table 8: Materials for Mounting the AP on a Pole using AIR-MNT-ART1= Kit

Materials Required	Supplied in the Kit?
Ground lug and screws (provided with the access point)	Yes
Pivoting mount kit and hardware	Yes
(8) M6 x 12-mm Hex-head Bolts	Yes
Adapter bracket for option horizontal mount	Yes
Two stainless steel band clamps (adjustable 2 to 5 inch (51 to 127mm))	Yes
Crimping tool for ground lug, Panduit CT0720 with CD-720-1 die	No

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Materials Required	Supplied in the Kit?
Four wall mounting screws (6 mm max)	No
#6 AWG ground wire	No
Shielded outdoor-rated Ethernet (CAT5e or better) cable	No
Grounding block	No
Grounding rod	No
13-mm box-end wrench or socket set	No
10-mm box-end wrench	No

Procedure

-
- Step 1** Select a mounting location on the pole to mount the AP. You can attach the AP to any pole with a diameter of 2 to 5 inch (51 to 127mm).
- Step 2** Disassemble the pivot kit, if not already disassembled.
- Step 3** Fasten the pivot bracket base plate to the pole using either one set of the adjustable band clamps or the screw clamp (the screw clamp can be used only on poles that are 2 to 3 inch (50 to 76 mm) in diameter).
- Step 4** Position the pivot bracket base plate and clamp(s) on the pole. Tighten only enough to hold the bracket base plate in place to prevent it from sliding along the pole but still pivot on the pole. Fully tighten only after the AP is mounted and positioned.
- Step 5** Align the AP-plate end of the bracket with the screw holes in the AP's back.
- Step 6** Fasten the bracket plate to the AP by using four M6 x12-mm bolts and a 10-mm box or socket wrench. Tighten the bolts to 40-lbf-in (4.5 Nm) of torque.
- Step 7** Using the 90 mm M8 long screw and the hardware supplied with the pivoting bracket, bolt the AP and bracket plate to the base plate mounted on the pole. Do not fully tighten the assembly.
- Note** The AP should be mounted with the status LED on the base facing downwards.
- Step 8** Pivot and position the AP as required, and then fully tighten the 90 mm M8 long screw using a 13-mm wrench and then tighten the clamps on the pole.
- Note** Use caution when tightening the 80 mm bolts on the pole-mount screw clamp. Ensure the clamp face remains parallel to the bracket base plate while tightening the bolts. Tighten the M8 x 80 mm bolts to 52 to 61 lbf-in (5.9 to 6.9 Nm) of torque.
- Caution** Misalignment and over-torquing can result in breaking the screw clamp.
-

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Wall Mounting the AP with Horizontal Kit

**Caution**

The mounting wall, attaching screws, and wall anchors must support the least 50-lb (22.7-kg) static weight. The installer must supply proper screws and anchors in accordance with local codes.

Before you begin

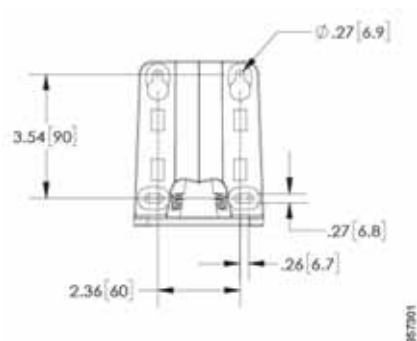
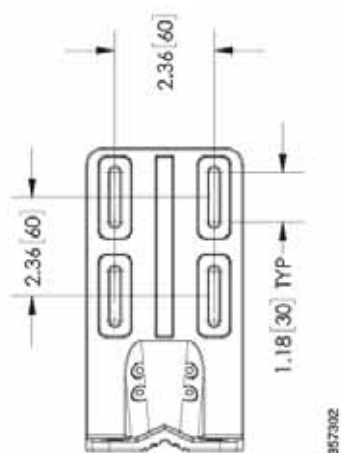
Ensure that you have the following materials before beginning to mount the AP horizontally to a wall:

Table 9: Materials Needed for Mounting the AP using AIR-MNT-HORZ1= Kit

Materials Required	Supplied in the Kit?
Wall/Pole Mount L-Bracket	Yes
Solar Shield Cover	Yes
(4) M6 x 12-mm Hex-head Bolts	Yes
(2) Adjustable Band Clamps 2 to 5 inch (51 to 127 mm) Dia	Yes
(4) 8-32 x 0.62" Phillips Pan Head Screw	Yes
(4) wall screws and anchors (specified for wall material)	No
Drill bit for wall anchors	No
10-mm box-end wrench or socket set	No
Phillips Screwdriver	No

Procedure**Step 1**

Use the mounting bracket as a template to mark four screw hole locations on the mounting wall. See [Figure 63: Wall mount L-bracket screw hole dimensions, on page 54](#) for the mounting bracket screw hole locations and dimensions. See [Figure 64: L-bracket AP mount dimensions, on page 54](#) for dimensions of the mounting L-bracket.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 63: Wall mount L-bracket screw hole dimensions****Figure 64: L-bracket AP mount dimensions**

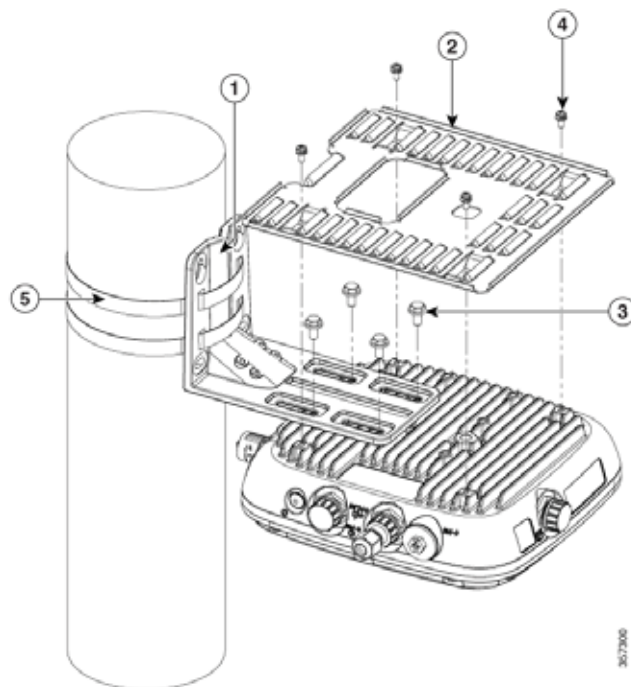
- Step 2** Use four screws and, if required, wall anchors to attach the L-bracket to the mounting surface. You must procure these screws and anchors, and they must follow local codes to support at least 50 lbs (22.7 kg.)
- Step 3** Position the AP horizontally against the L-bracket's bottom to align the four mounting holes on the AP's back with the slots in the mounting bracket.
- Note** The AP has additional mounting holes to be positioned and located to best accommodate on site cabling. Ensure to review before mounting the AP to the bracket.
- Step 4** Screw an M6 x12-mm bolt into each of the four support bolt holes on the back of the AP by hand. Do not tighten the bolt completely. Leave it loose to slide in the bracket slot.
- Step 5** Ensure that the AP and all attached cables have clearance to install and provide drip loops.
- Step 6** Tighten the four M6 bolts to 40-lbf-in (4.5 Nm) torque using a 10-mm wrench.
- Step 7** Position and install the solar shield on top of the L-bracket and AP. Align four holes in the shield to mount holes in AP. Insert four #8-32 screws through the shield into AP. Torque tighten the screws to 15 lbf-in (17 kgf-cm).
- Note** We recommend you install the solar shield. However, if the AP's installed location is shaded from the sun (For example: indoors or under an eave), the solar shield is not required.

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Pole Mounting the AP with Horizontal Kit

The AIR-MNT-HORZ1= mounting kit contains a mounting L-bracket and components for both pole mounting and wall mounting. Using this kit, you can install the AP on a pole or mast. It supports metal, wood, or fiberglass poles from 2 to 5 inches (51 to 127 mm) in diameter.

Figure 65: Pole Mounted Horizontal Kit (AIR-MNT-HORZ1=)



1	L-Bracket
2	Solar Shield
3	(4) M6 x 12-mm Hex-head Bolts
4	(4) 8-32 x 0.62" Phillips Pan Head Screw
5	(2) Adjustable Band Clamps 2 to 5 inch (51 to 127 mm) Dia. passing through the bracket slots

Before you begin

Ensure that you have the following materials before beginning to mount the AP horizontally to a pole:

Table 10: Materials Needed for Mounting the AP using AIR-MNT-HORZ1= Kit

Materials Required	Supplied in the Kit?
Wall/Pole Mount L-Bracket	Yes
Solar Shield	Yes

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Materials Required	Supplied in the Kit?
(4) M6 x 12-mm Hex-head Bolts	Yes
(2) Adjustable Band Clamps 2 to 5 inch (51 to 127 mm) Dia	Yes
(4) 8-32 x 0.62" Phillips Pan Head Screw	Yes
(4) wall screws and anchors (specified for wall material)	No
Drill bit for wall anchors	No
10-mm box-end wrench or socket set	No
Phillips Screwdriver	No

Procedure

-
- Step 1** Select a mounting location on the pole to mount the AP. You can attach the AP to a pole with a diameter of 2 to 5 inch (51 to 127 mm).
- Step 2** Hold the bracket up against the pole, slide the two band straps through the top and bottom sets of mounting slots on the mounting bracket, see [Figure 65: Pole Mounted Horizontal Kit \(AIR-MNT-HORZ1=\)](#), on page 55.
- Step 3** Wrap the band straps around the pole, lock them, and lightly tighten the clamps using a wrench. Only tighten them enough to keep the bracket from sliding down the pole.
- Step 4** Position the AP horizontally against the L-bracket's bottom to align the four mounting holes on the AP's back with the slots in the mounting bracket.

Note The AP has additional mounting holes to be positioned and located to best accommodate on site cabling. Ensure to review before mounting the AP to the bracket.

- Step 5** Screw an M6 x12-mm bolt into each of the four support bolt holes on the back of the AP by hand. Do not completely tighten the bolt. Leave it loose to slide in the bracket slot.
- Step 6** Hold the AP position to its final position. Tighten the band clamps with the wrench so that the AP does not slide or rotate on the pole. Ensure that the clamps are tight enough not to let the AP move. Ensure that the AP and all attached cables have clearance to install and provide drip loops.
- Step 7** Using a 10-mm wrench, tighten the four M6 bolts to 40-lbf-in (4.5 Nm) torque.
- Step 8** Position and install the solar shield on top of the L-bracket and AP. Align four holes in the shield to mount holes in AP. Insert four #8-32 screws through the shield into AP. Torque tighten the screws to 15 lbf-in (17 kgf-cm).

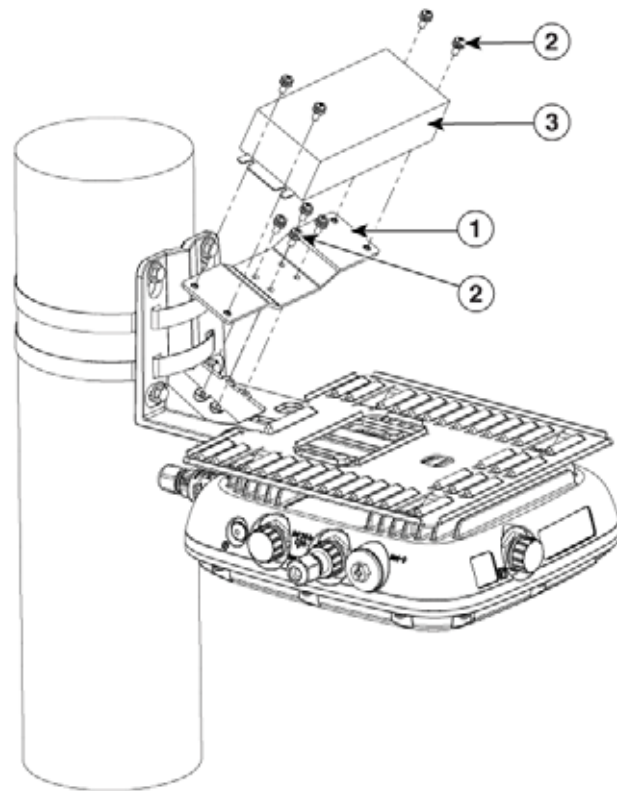
Note We recommend you install the solar shield. However, if the AP's installed location is shaded from the sun (For example: indoors or under an eave), the solar shield is not required.

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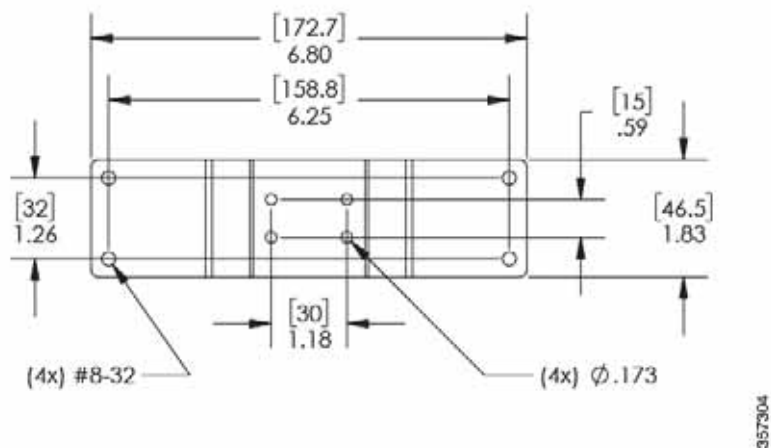
DC Supply Mount Bracket

The AIR-ACC-PS-MNT1= bracket is an orderable option to mount a DC supply to the AIR-MNT-HORZ1= L-bracket kit.

Figure 66: Installing the DC supply bracket on to the L-bracket



1	DC supply mount bracket
2	8-32 x 0.62 lg Bracket screws
3	DC Supply

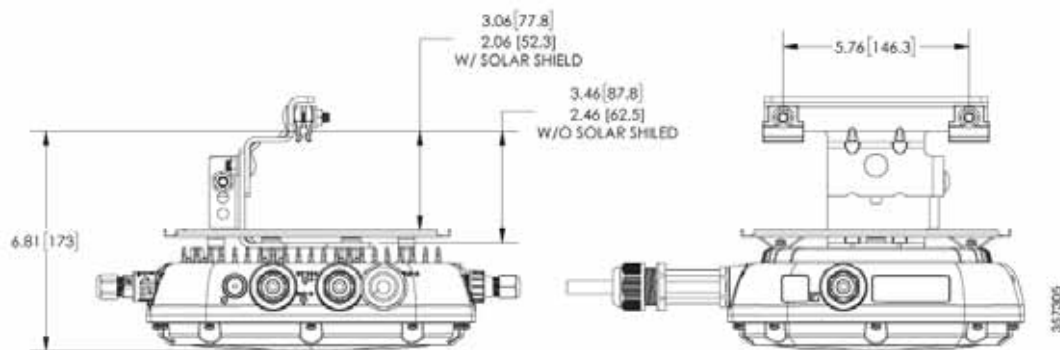
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 67: DC Supply Bracket Dimensions****Procedure**

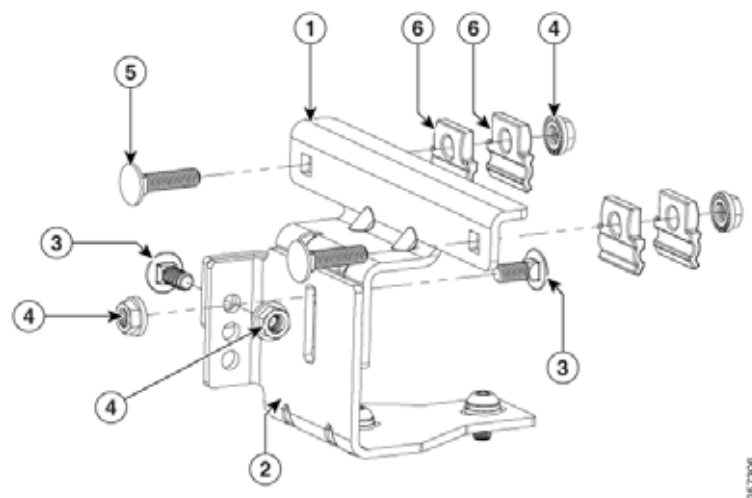
- Step 1** Install the DC bracket to the L-bracket with the four screws supplied. Tighten the screws to 15 lbf-in (17 kgf-cm) of torque. See [Figure 66: Installing the DC supply bracket on to the L-bracket, on page 57.](#)
- Step 2** Mount the DC supply to the bracket. For bracket dimensions, see [Figure 67: DC Supply Bracket Dimensions, on page 58.](#)

Strand Mounting the AP

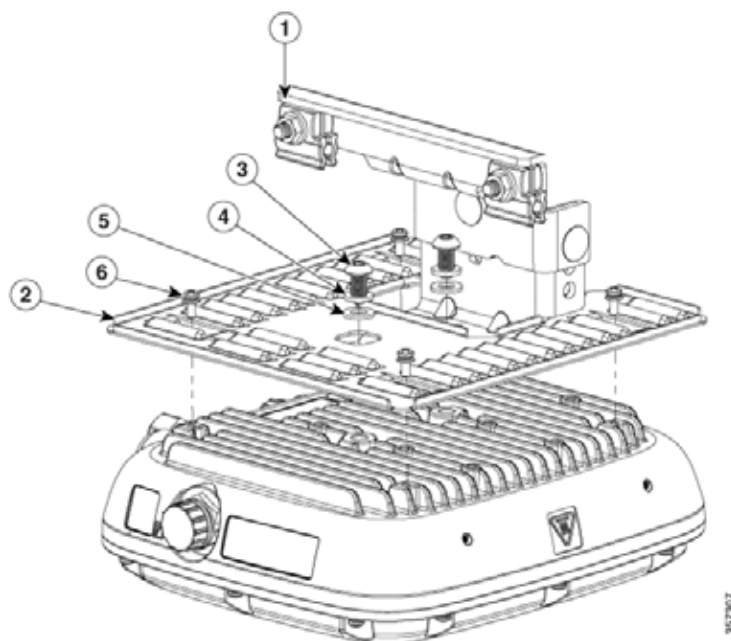
The Strand Mount Kit (SMK) is used to mount the AP horizontally onto a cable strand. The SMK can accommodate a 2 to 3-inch (51 to 76-mm) cable bundle between the support cable strand and the AP's back surface.

The SMK can also accommodate up to 10 degrees of strand or cable droop.

Figure 68: SMK Bracket Assembly Dimensions with Mounted AP

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 69: Assembling the cable bracket and Clamps**

1	SMK Upper Bracket	4	5/16-18 Hex Nut with Serrated flange
2	SMK Lower Bracket	5	5/16-18 x 1.25 inch Bolt
3	5/16-18 x 0.75" Bolt	6	Cable Clamp

Figure 70: Assembling the AP to the SMK and Solar Shield

1	SMK Bracket Assembly	4	M8 split lock washer
2	Solar Shield	5	M8 flat washer
3	M8 x 16 mm Button head hex bolt	6	8-32 x 0.62 inch Phillips Pan Head Screw

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To mount the AP horizontally onto a cable strand, follow these steps:

Before you begin

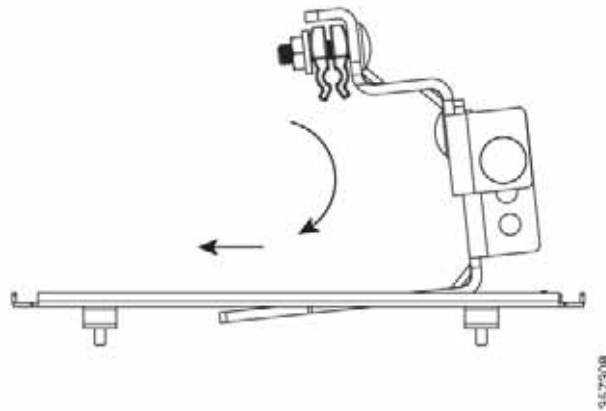
Ensure that you have the following materials before strand mounting the AP:

Table 11: Materials Needed for Mounting the AP using AIR-MNT-STRAND1= Kit

Materials Required	Supplied in the Kit?
Strand Mount Kit (including hardware)	Yes
Solar Shield Cover	Yes
(2) M8 x 16 mm Button head hex bolts	Yes
(2) M8 split lock washer	Yes
(2) M8 flat lock washer	Yes
(4) 8-32 x 0.62" Phillips Pan Head Screw	Yes
5-mm Hex wrench	No
13-mm box-end wrench or socket set	No
Phillips Screwdriver	No

Procedure

-
- Step 1** Assemble the cable clamps to the cable bracket on both cable brackets (see [Figure 70: Assembling the AP to the SMK and Solar Shield, on page 59](#)). Set the height of the cable brackets as required. You should hand-tighten the cable clamp nuts sufficiently enough to only prevent them from falling off.
- Step 2** Install the solar shield over the SMK bracket assembly. See [Figure 71: Assembling the cable bracket and Clamps, on page 61](#).
- Note** We recommend you install the solar shield. However, if the AP's installed location is shaded from the sun (For example: indoors or under an eave), the solar shield is not required.
- Step 3** Secure SMK bracket assembly with two M8 x16 bolts (with flat and lock washers) on the AP's back surface. Using a 5-mm Hex wrench, tighten the bolts to 13 to 15 lb.-ft (17.6 to 20.3 Nm) of torque.
- Step 4** Secure the solar shield with four 8-32 screws. Tighten the screws to 15 lbf-in (17 kgf-cm) of torque.
- Step 5** Place the cable bracket, attached to the AP, on the cable strand, with each pair of cable clamps clamping on to the cable strand. Tighten the cable clamps by tightening the two 5/16"-18 nuts to 13 to 15 lb-ft (17.6 to 20.3 Nm) of torque.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 71: Assembling the cable bracket and Clamps**

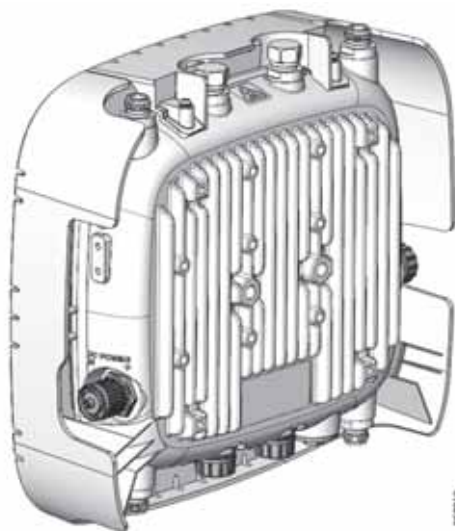
Note If needed, reposition the AP on the bracket assembly so it hangs level. Loosen the M8 screws just enough to move on a slotted hole, then re-tighten the screws to 15 lbf-in (17 kgf-cm) of torque.

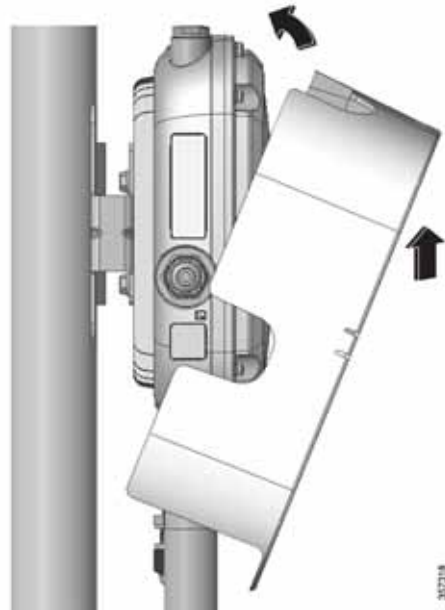
Step 6 Connect the data cables, ground the AP, and power the AP.

Note You may require to pull the cable strand or support cable away from the fiber or cable bundle during installation. Ensure to re-secure the cable after the installation.

AP Paintable Cover Kit

You can install a cover C9124-CVR1= and paint these covers to blend the AP in its surrounding environment. You can install the cover before or after all connections are completed. However, if you require to install the remote cabled antennas, the shield may need to be installed before the antenna cables are attached to the AP.

Figure 72: AP with Paintable Cover Kit

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 73: Installing the AP Cover on an Installed AP****Procedure**

- Step 1** Position and rotate the cover over the AP.

Figure 74: Installing the AP Cover Kit

- Step 2** Carefully pull back the flanged wall with screws to pass the cover over the AP. The covers are a snug fit to the AP.
- Step 3** Align the two captive screws on the top of the cover with the screw holes.

Installing a Lightning Arrestor

Overvoltage transients can be created through lightning static discharges, switch processes, direct contact with power lines, or through earth currents. The Cisco Aironet AIR-ACC245LA-N Lightning Arrestor limits the amplitude and duration of disturbing interference voltages and improves the over voltage resistance of in-line equipment, systems, and components. A lightning arrestor installed according to these mounting instructions balances the voltage potential, thus preventing inductive interference to parallel signal lines within the protected system.

REVIEW DRAFT - CISCO CONFIDENTIAL**Installation Considerations**

Cisco recommends that you bulkhead mount the lightning arrestor so it can be installed as a wall-feed through on the wall of the protected space.

The importance of obtaining a good ground and bonding connection cannot be overstressed. Consider these points when grounding the lightning arrestor:

- Connect the lightning arrestor components directly to the grounding point.
- The contact points of the ground connection must be clean and free of dust and moisture.
- Tighten threaded contacts to the torque specified by the manufacturer.

Lightning Arrestor Installation Notes

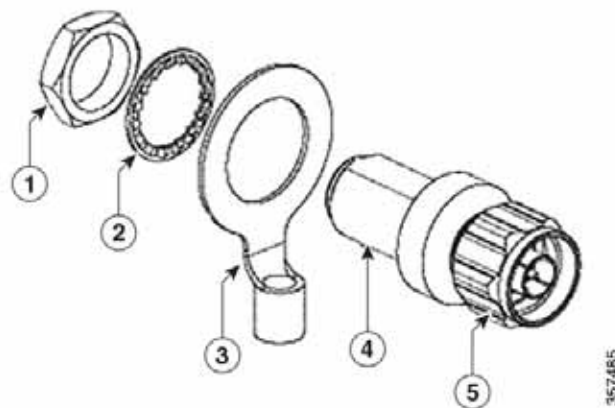
This lightning arrestor is designed to be installed between the antenna cable that is attached to an outdoor antenna and the Cisco Aironet wireless device. You can install the lightning arrestor either indoors or outdoors. It can be connected directly to a wireless device having an external N connector. It can also be mounted inline or as a feed-through. Feed-through installations require 5/8 in. (16 mm) hole to accommodate the lightning arrestor.

**Note**

- This lightning arrestor is part of a lightning arrestor kit. The kit contains a lightning arrestor and a grounding lug.
- When you install the lightning arrestor, follow the regulations or best practices applicable to lightning protection installation in your local area.

Installing the Lightning Arrestor Outdoors

If you install the lightning arrestor outdoors, use the supplied ground lug and a heavy wire (#6 solid copper) to connect it to a good earth ground, such as a ground rod. The connection should be as short as possible.



1	Nut	4	Unprotected Side (to antenna)
2	Lockwasher	5	Protected side (to wireless device)

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3	Ground lug		
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Cable for the Lightning Arrestor

Coaxial cable loses efficiency as the frequency increases, resulting in signal loss. The cable should be kept as short as possible because cable length also determines the amount of signal loss (the longer the run, the greater the loss).

Cisco recommends a high-quality, low-loss cable for use with the lightning arrestor.

Grounding the Access Point

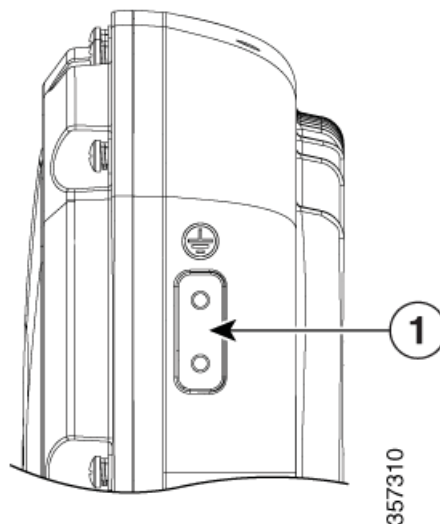
The AP must be grounded before connecting power.

In all outdoor installations, you must follow these steps to ground the case properly:

Procedure

-
- Step 1** If using insulated 6-AWG copper ground wire, strip the insulation required for the grounding lug.
- Step 2** Use the appropriate crimping tool to crimp the bare 6-AWG copper ground wire to the supplied grounding lug.
- Note** The grounding lug and hardware used must comply with local and national electrical codes.
- Step 3** Open the anti-corrosion sealant (supplied) and apply a liberal amount over the metal surface called the Ground Pad, where the ground strap screw holes are located.
- Step 4** Connect the grounding lug to the AP grounding screw holes using the supplied two Phillips head screws (M4 x10–mm) with lock washers. Tighten the grounding screw with 22 to 24 lb-in (2.5 to 2.7 Nm) of torque.
- Step 5** If necessary, strip the other end of the ground wire and connect it to a reliable earth ground, such as a grounding rod or an appropriate grounding point on a metal streetlight pole that is grounded.

Figure 75: Position of the Ground Pad on the Right Side of the AP



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1	Ground pad, where the ground strap screw holes are located.
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Powering the Access Point

The AP supports these power sources:

- DC power – 24–56 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.


Note

The supporting outdoor power injectors are AIR-PWRINJ-60RGD1 and AIR-PWRINJ-60RGD2 rated at 60W each. These power injectors support 10/100/1000BASE-T operation only. They do not support the 2.5GBAST-T (mGig) Ethernet speed.

Table 12: Cisco Catalyst 9124AX AP Reduced Power Feature Matrix

SKU	PoE-in/DC Input	Radio 0	dBm	Radio 1	dBm	AUX Radio	Ethernet mGig	SFP Module	GbE PHY	PoE-out	Notes
		SS	Per Path	SS	Per Path						
		2.4-GHz radio		5-GHz Primary radio		Chillwave					
C9124AXI, C9124AXD, C9124AXE Dual Radio mode	.3af	disabled	—	disabled	—	enabled	1G	N	N	N	Serving radios disabled
	.3at	2x2	23	2x2	23	enabled	1G	N	Y	N	-
	.3bt / UPOE	4x4	24	4x4	24	enabled	2.5G	Y	Y	15.4W	PoE output is 802.3af compliant
	DC input	4x4	24	4x4	24	enabled	2.5G	Y	Y	15.4W	using DC power source ≥60W

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SKU	PoE-in/DC Input	Radio 0	dBm	Radio 1	dBm	AUX Radio	Ethernet mGig	SFP Module	GbE PHY	PoE-out	Notes
C9124AXE Tri-Radio mode	.3af	disabled	—	disabled	—	enabled	1G	N	N	N	Serving radios disabled
	.3at	disabled	—	disabled	—	enabled	1G	N	N	N	-
	.3bt / UPOE	2x2	24	2x2	24	enabled	2.5G	Y	Y	15.4W	PoE output is 802.3af compliant
	DC input	2x2	24	2x2	24	enabled	2.5G	Y	Y	15.4W	using DC power source ≥60W

Connecting a Power Injector

The AP supports the following power injectors:

Table 13: 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
AIR-PWRINJ6=	30W rated single-port PoE injector

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 64).
- Step 2** Identify the components needed for the installation, see the [Typical Access Point Installation Components](#), on page 30.
- Step 3** Connect a CAT5e or better Ethernet cable from your wired LAN network to the power injector.
- Danger** To reduce the risk of fire, use only No. 24 AWG or larger telecommunication line cord.
Statement 1023
- 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.

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- Step 4** Ensure that the antennas are connected, and that ground is attached to the AP before you apply power to the AP.
- Step 5** Connect a shielded outdoor-rated Ethernet (CAT5e or better) cable between the power injector and the AP's PoE-in connector.
- Step 6** Connect the Ethernet cable to the AP PoE-In port. See [Installing a CAT 5e Ethernet Cable and Gland Assembly to the Access Point, on page 70](#).

Connecting a DC Power Cable to the Access Point

When powering the AP 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.

If you supply DC power using your own DC supply, you need to use the DC plug kit supplied with the AIR-ACC-KIT1= accessory kit.

**Danger**

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

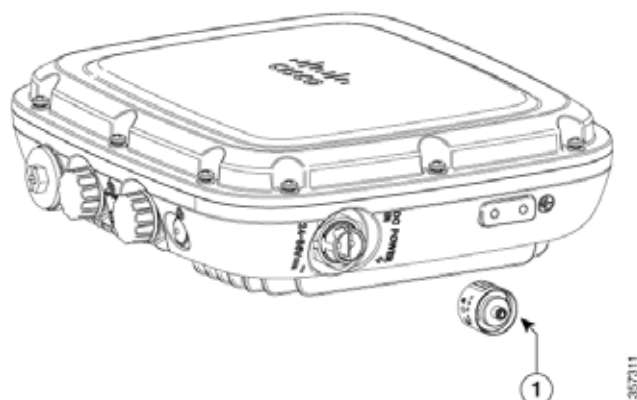
To connect a DC power cable, you need to supply these tools and material:

- Shielded outdoor-rated DC power cable (18 AWG) with outside cable diameter of 0.20 to 0.35 inch (0.51 to 0.89 cm)
- Adjustable or open-end wrench
- Hex crimp tool: 0.10 inch (2.54-mm)

To connect the DC power cable to the AP, follow these steps:

Procedure

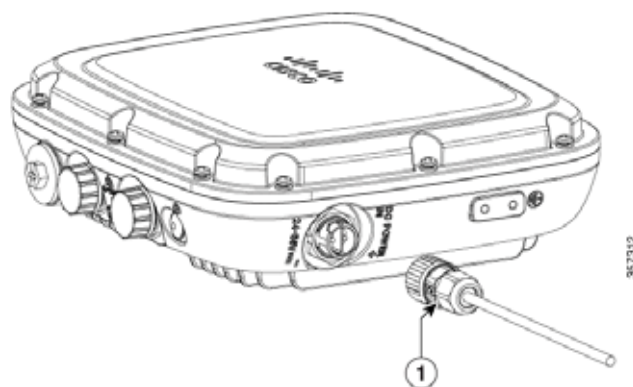
- Step 1** Before connecting DC power to the AP, ensure that the ground is connected to the AP. See [Grounding the Access Point, on page 64](#).
- Step 2** Turn off all power sources to the AP, including the DC power source.
- Danger** **This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.** Statement 1028
- Caution** When installing DC power to the AP, always connect the AP end of the cable FIRST. When removing the DC power connector, always disconnect the AP end of the cable LAST.
- Step 3** Remove the cap from the DC connector located on the right side of the AP. Push inward toward the AP and turn counterclockwise about a ¼ turn. The cap should dis-engage from the bayonet thread on the 2-pin DC connector. Do not discard the cap unless you are sure the port will never need to be sealed in the future. See the following image for the location of the DC power connector.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 76: Position of the DC Power-In Port on the Right Side of the AP**

1	DC Connector Cap
---	------------------

Step 4

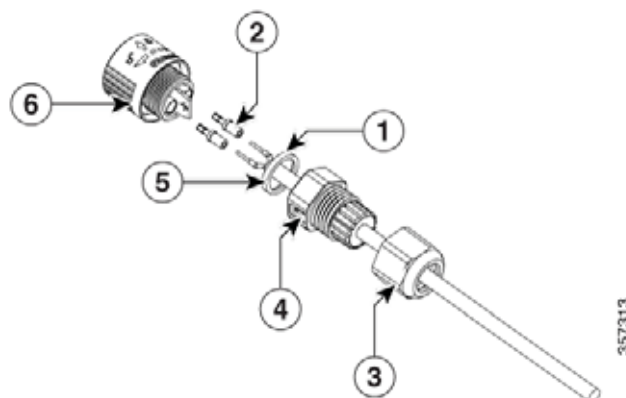
Insert DC supply 2-pin connector into plug located on the left side of the AP. Position and orient the plug to align with the keyed pins on the connector. Push inward toward the AP until the connector body rotates and clicks into place. The plug is a bayonet-style. It should automatically lock into place when pushed inward.

Figure 77: Installing the DC plug

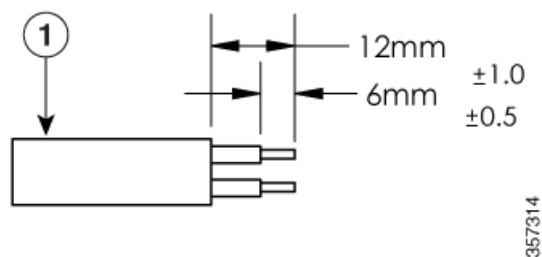
1	2-Pin DC plug
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Step 5

If the AP is to be power with customer supplied DC source. The following steps show how to terminate the Cisco-supplied DC plug to the cable.

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 78: Terminating DC plug to the cable**

1	DC 2-conductor 18 AWG cable	4	Grommet and Seal Ring
2	Crimp Pins	5	Gasket
3	Seal Nut	6	Connector body

Figure 79: Wire Stripping Length

1	cable
---	-------

- Dis-assemble the DC plug .
 - Pass the cable through the plug components.
 - Strip the cable end.
- Note** Remove the wire jacket and tin the wire strands. Tinning the strands helps to insert the wire into the crimp pins.
- Insert wire conductor into crimp pins. Using a 0.10 inch (2.54 mm) Hex crimp tool, crimp the pin to the wire to secure it in place. Repeat for the second pin. If you must re-do the crimping process, you can use the 2 extra pins supplied.
 - Insert the crimped pins and wire into the female barrel of the connector body. Be sure to insert the proper wire polarity into the corresponding barrel shown on the body. Push to be sure the pin is fully seated into the barrel.

Note Pin 1 (+V) Pin 2 (-V), the connector body is marked (+) and (-) to show polarity pin assignments.

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- f) Slide the gasket and seal the ring down the cable, thread the ring on to the body. Use caution to be sure the gasket is correctly seated into the ring. Hand tighten to seal gasket fully.
- g) Thread the seal nut on to the seal ring. Hand tighten until the ring grommet seals onto the cable jacket.

Step 6 Install the DC plug into the AP connector.

Connecting Data Cables

All the models of this AP support data connections through the Ethernet port and the Small Form-factor Pluggable (SFP) port. However, both the Ethernet port and the SFP port cannot be used for data simultaneously.

If the SFP is detected and active, the Ethernet port is disconnected. If the SFP is not detected, the Ethernet port stays connected.

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, or a power injector.

For details on installing Ethernet cable, see

[Installing a CAT 5e Ethernet Cable and Gland Assembly to the Access Point, on page 70](#)

[Installing a CAT 6/6A Ethernet Cable and Gland Assembly to the Access Point, on page 72](#)

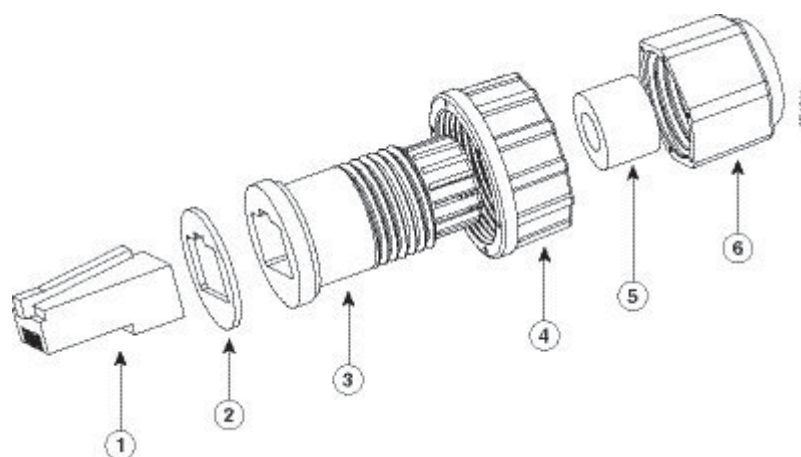
.

For details on installing a fiber-optic cable, see [Connecting a Fiber-optic Cable to the AP \(AIR-SFP-KIT1=\)](#), on page 73.

Connecting an Ethernet Cable to the Access Point

Installing a CAT 5e Ethernet Cable and Gland Assembly to the Access Point

Figure 80: CAT 5e Cable Gland Assembly



1	CAT 5e RJ45 Plug	4	Screw nut
2	Gasket	5	Seal

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3	Clamp ring	6	Thread-lock sealing nut
---	------------	---	-------------------------

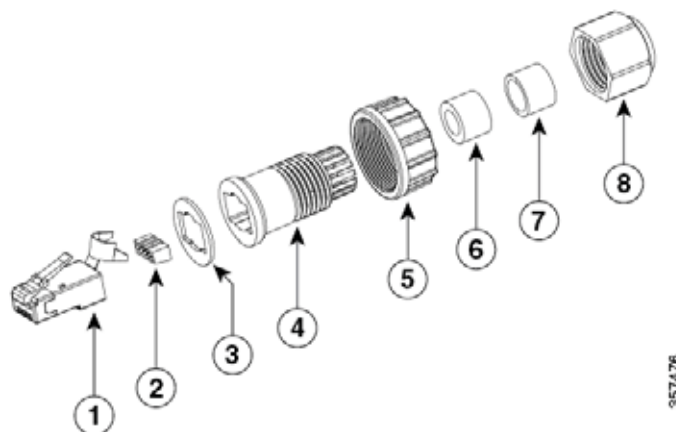
Before you begin

You must supply these tools and materials:

- Shielded outdoor-rated CAT 5e Ethernet cable with a diameter of 0.2 to 0.35 inch (5 to 9 mm)
- CAT 5e RJ-45 connector and installation tool
- Adjustable wrench or 28-mm box wrench
- CAT 5e gland kit is supplied standard with AP

Procedure

-
- Step 1** Disconnect power to the power injector and ensure all power sources to the AP are turned off.
- Danger** This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028
- Step 2** Ensure a 6 AWG ground wire is connected to the AP (see [Grounding the Access Point, on page 64](#)).
- Step 3** Remove the covering cap from the PoE port.
- Step 4** Loosen and remove the cable sealing nut of the cable gland by turning it counterclockwise.
- Note** Verify that the cable gland has a rubber seal and ensure that it is not damaged.
- Caution** If the cable gland and rubber gasket is not installed correctly, it causes the cable grip to leak.
- Step 5** Insert the Ethernet cable's unterminated end through the sealing nut end of the cable gland.
- Pass the Ethernet cable through the appropriate size cable seal and pull several inches of cable through the adapted components.
- Step 6** Install an RJ-45 connector on the Ethernet cable's unterminated end using your Ethernet cable installation tool.
- Step 7** Carefully connect the RJ45 cable connector to the PoE port on the AP.
- Step 8** Slide the cable gland with the rubber seal towards the AP and screw the threaded end of the body into the AP, and hand-tighten.
- Step 9** Use an adjustable wrench or a 28-mm wrench to tighten the body's threaded end into the enclosure. Tighten to 15 lbf-in (17 kgf-cm) of torque.
- Step 10** Use an adjustable wrench and tighten the thread-lock seal nut to 15 lbf-in (17 kgf-cm) of torque.
- Step 11** Route your Ethernet cable and cut off any excess cable.
- Step 12** Install an RJ45 connector on the unterminated cable end and insert it into the power injector.
- Step 13** Turn on the power to the power injector.
-

REVIEW DRAFT - CISCO CONFIDENTIAL**Installing a CAT 6/6A Ethernet Cable and Gland Assembly to the Access Point***Figure 81: CAT 6/6a Cable Gland Assembly*

1	CAT 6/6A RJ45 Plug	5	Screw nut
2	RJ45 wire load bar Note the orientation into plug	6	Cable Seal (Cable OD range 5 mm to 7 mm)
3	Gasket	7	Cable Seal (Cable OD range 7 mm to 9 mm)
4	Clamp ring	8	Cable sealing nut

**Danger**

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

Before you begin

You must supply these tools and materials:

- Shielded outdoor-rated Ethernet (CAT 6 or CAT 6A) cable with a diameter of 0.2 to 0.35 inch (5 to 9 mm)
- CAT 6 RJ-45 connector installation tool
- Adjustable wrench or 28-mm box wrench
- CAT 6 / CAT 6A gland ordered separately with AIR-ACC-CAT6= kit

Procedure

- Step 1** Disconnect power to the power injector and ensure all power sources to the AP are turned off
- Step 2** Ensure a 6 AWG ground wire is connected to the AP (see [Grounding the Access Point, on page 64](#)).
- Step 3** Remove the covering cap from the PoE port.

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- Step 4** Loosen and remove the cable sealing nut of the cable gland by turning it counterclockwise.
- Note** Verify that the cable gland has a rubber seal and ensure that it is not damaged.
- Caution** If the cable gland and rubber gasket is not installed correctly, it causes the cable grip to leak.
- Step 5** Insert the Ethernet cable's unterminated end through the sealing nut end of the cable gland.
- Pass the Ethernet cable through the appropriate size cable seal and pull several inches of cable through the adapted components.
- Note** Install the proper cable seal that fits the OD of the Ethernet cable used.
- Step 6** Install the CAT 6/6A RJ-45 connector on the Ethernet cable's unterminated end using your Ethernet cable installation tool.
- Follow the common CAT6/6A Ethernet connector installation procedures. Fold and crimp the connector metal strain lug end over the outer cable jacket, foil and ground wire if equipped.
- Note**
- Position and insert load bar with notches aligned to connector as shown in the figure.
 - Ensure individual conductor sequence matches opposite connection end. Typical sequence follows the T568B pinout standard.
- Step 7** Carefully connect the RJ45 cable connector to the PoE port on the AP.
- Step 8** Slide the cable gland with the rubber seal towards the AP over the RJ45 connector.
- Screw the threaded screw nut of the body into the AP, and hand-tighten it.
- Step 9** Slide the cable seal into the Clamp Ring fluted end, be sure it is fully seated.
- Install the Seal nut on to the Clamp Ring and hand tighten enough to compress seal onto the cable jacket.
- Step 10** Use an adjustable wrench or a 28-mm wrench to tighten the body's threaded end into the enclosure.
- Tighten to 15 lbf-in (17 kgf-cm) of torque.
- Step 11** Use an adjustable wrench and tighten the thread-lock seal nut to 15 lbf-in (17 kgf-cm) of torque.
- Step 12** Route your Ethernet cable and cut off any excess cable.
- Step 13** Install an RJ45 connector on the unterminated cable end and insert it into the power injector.
- Note** Ensure individual conductor sequence matches opposite connection end. Typical sequence follows T568B pinout standard.
- Step 14** Turn on the power to the power injector.

Connecting a Fiber-optic Cable to the AP (AIR-SFP-KIT1=)

The optional Cisco accessory fiber-optic kit enables the AP to support fiber-optic network connections.

You can connect the fiber-optic networking cable to the SFP port. The small form-factor pluggable (SFP) transceiver module connects the cable to the SFP port.

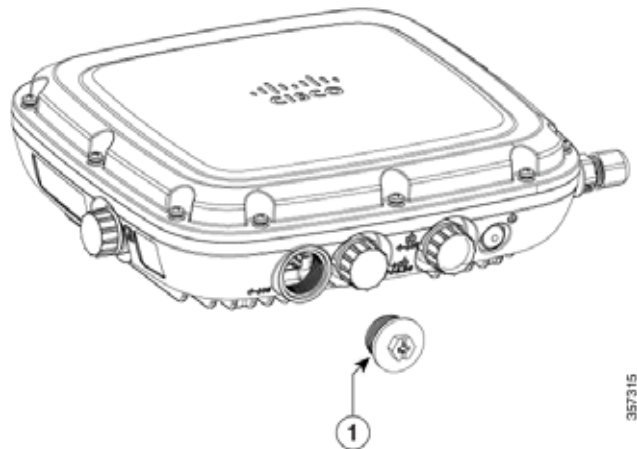
REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 82: Fiber-Optic cable and gland installed to AP****Before you begin**

You require the following materials for connecting the fiber-optic cable to the AP:

- Cisco Small form-factor pluggable (SFP) adapter kit
- SFP transceiver module
- SC or Duplex LC fiber-optic cables. The fiber optic cable's outer diameter should be 0.24 to 0.50 inch (6 to 12.7 mm). The cable gland cannot hold a cable with a diameter more than 0.50" (12.7 mm)
- 12-mm wrench or large flat blade or Philips screwdriver
- Adjustable wrench

Procedure

-
- | | |
|---------------|---|
| Step 1 | Disconnect all power sources from the AP. |
| Step 2 | Remove the plug from the SFP port by following the guidelines given in this step. |

REVIEW DRAFT - CISCO CONFIDENTIAL**Figure 83: Removing the SFP port plug**

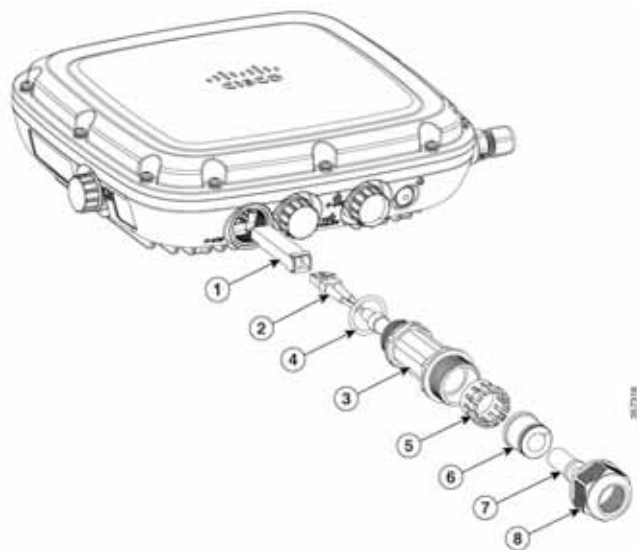
1	SFP Port Plug
---	---------------

Do not discard the plug unless you are sure the SFP port will never need to be sealed in the future.

- a) Place the AP on its back (resting on the heat fins) on a stable but padded surface to avoid scratching the paint.
- b) Using a 12-mm wrench or large flat blade, or Philips screwdriver, turn the SFP port plug counterclockwise and remove it.

Step 3 Insert the SFP module into the SFP port and ensure that it latches properly.

Step 4 Loosen and dis-assemble the SFP adapter gland components.

Figure 84: Exploded view of Fiber-Optic cable and Gland assembly

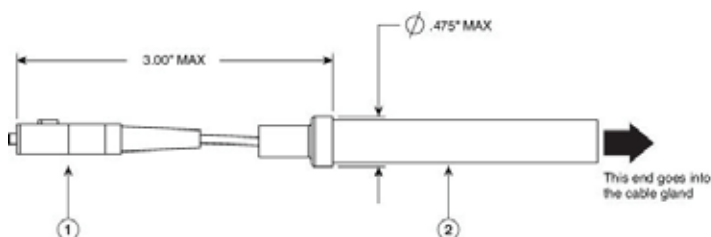
1	SFP Transceiver Module	5	Gland Compression Ferrule
---	------------------------	---	---------------------------

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2	Duplex LC Fiber-optic cable	6	Large Cable Rubber Gland 0.30 to 0.50 inch (7.6 to 12.7 mm) diameter
3	SFP Gland Adapter body	7	Small Cable Rubber Gland 0.24 to 0.30 inch (6.0 to 7.6 mm) diameter
4	Body O-ring	8	Gland nut

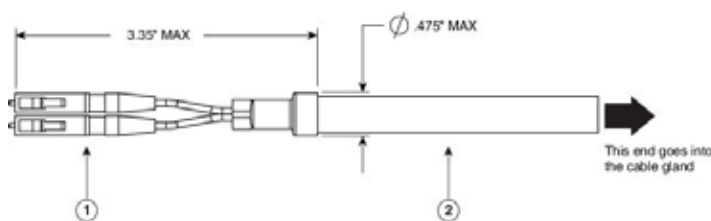
Step 5 Terminate the SC or LC fiber optic cable.

Figure 85: SC Fiber-optic cable



1	SC optic fiber connector	2	Optic fiber cable
---	--------------------------	---	-------------------

Figure 86: Duplex LC Fiber Optic Cable



1	Duplex LC optic fiber connector	2	Optic fiber cable
---	---------------------------------	---	-------------------

Step 6 Using caution not to damage the fiber connector end, pass the fiber connector through the adapter gland components. Ensure components are ordered and orientated, as shown in [Figure 86: Duplex LC Fiber Optic Cable, on page 76](#).

Note Ensure you use the proper rubber gland combination. If the fiber cable outside diameter (OD) is 0.30 to 0.50 inches (7.6 to 12.7 mm), then the small rubber gland can be discarded. If the cable OD is 0.24 to 0.30 inches (6.0 to 7.6 mm), then the small rubber gland is inserted into the large rubber gland.

Step 7 Verify the O-ring is correctly seated on the gland adapter body. Re-assemble the components of the adapter gland. Do not tighten the gland nut on the rubber inserts. Leave it loose so the gland can easily slide on the fiber cable. If you tightened the cable in this step, you might damage the cable.

Step 8 Insert the SC or LC optic fiber connector-end of the cable into the SFP transceiver module and ensure it latches into place.

Step 9 Thread the adapter body into the SFP port on the AP. Tighten the adapter body by hand until it is fully seated. Inspect that the body is seated correctly. Using an adjustable wrench, tighten the body snugly to the AP body to approximately 13 to 17 lb-in (15 to 20 kgf-cm) of torque.

REVIEW DRAFT - CISCO CONFIDENTIAL**Step 10**

To seal the rubber gland to the fiber cable, hand tighten the gland nut. Using an adjustable wrench, tighten the nut $\frac{1}{4}$ revolution to make a water-tight seal on the cable to approximately 15 to 22 lbf-in (17 to 25 kgf-cm) torque.

Caution When removing this SFP assembly, you must proceed in the reverse order of this installation. Start by loosening the cable gland's nut.

Powering the Access Point over Power-over-Ethernet

The AP can be powered through Power-over-Ethernet (PoE) using the following:

- 802.3at (PoE+): Any 802.3at (30W) compliant switch port or Cisco Power Injector AIR-PWRINJ6=
- 802.3bt: Any 802.3bt compliant switch port or IEEE 802.3bt compliant Power Injector
- Cisco Universal PoE (Cisco UPOE)

**Note**

If 802.3af is used, both the 2.4-GHz and 5-GHz radios are disabled, and Ethernet gets downgraded to 1 GbE speeds. The SFP port and PoE-OUT is also disabled.

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CHAPTER 5

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, on page 79](#)
- [Deploying the Access Point in a Wireless Network, on page 80](#)
- [Checking the Access Point LEDs, on page 80](#)

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 34](#).
- **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 84](#).
- **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

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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 80.](#))

- 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 84](#) 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

The location of the AP status LED is shown in [Connectors and Ports on the AP, on page 5.](#)



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.

REVIEW DRAFT - CISCO CONFIDENTIAL**Table 14: 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
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
Boot loader warnings	Blinking Amber	Configuration recovery is in progress (the Reset button has been pushed for 2 to 3 seconds)
	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)

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CHAPTER 6

Troubleshooting

- [Troubleshooting the Access Point to Cisco Controller Join Process](#), on page 83
- [Important Information for Controller-based Deployments](#), on page 84
- [Configuring DHCP Option 43](#), on page 84

Troubleshooting the Access Point to Cisco 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.

When the AP joins a controller for the first time, the controller sends the global syslog server IP address (the default is 255.255.255.255) to the AP. After that, the AP sends all Syslog messages to this IP address until it is overridden by one of the following scenarios:

- The AP is still connected to the same controller, and the global syslog server IP address configuration on the controller has been changed using the **config ap syslog host global syslog_server_IP_address** command. In this case, the controller sends the new global syslog server's IP address to the AP.

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- The AP is still connected to the same controller, and a specific syslog server's IP address has been configured for the AP on the controller using the **config ap syslog host specific Cisco_AP syslog_server_IP_address** command. In this case, the controller sends the new specific syslog server's IP address to the AP.
- The AP is disconnected from the controller and joins another controller. In this case, the new controller sends its global syslog server's IP address to the AP.
- Whenever a new syslog server's IP address overrides the existing syslog server's IP address, the old address is erased from persistent storage, and the new address is stored in its place. The AP also starts sending all syslog messages to the new IP address, provided the AP can reach the syslog server's IP address.

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

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 Cisco Catalyst 9124AX Series Outdoor 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 43). The VCI string for the AP:

Cisco AP C9124AX

The format of the TLV block is listed below:

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

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 AP9124AX
<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**.

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CHAPTER 7

Safety Guidelines and Warnings

Translated versions of the following safety warnings are provided in the translated safety warnings document shipped with your AP. The translated warnings are also in the Translated Safety Warnings for Cisco Catalyst Access Points, available on Cisco.com.



Danger

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. **SAVE THESE INSTRUCTIONS** Statement 1071



Danger

This equipment is to be installed by trained and qualified personnel, as per these installation instructions. The installer is responsible for obtaining any required local or national safety inspections of the structural integrity of the installation by the local authority/inspection department.



Danger

Do not operate the unit near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use. Statement 364



Danger

The cables specified in this installation guide that are used with the specified cable glands provide protection against ingress of moisture for a Type 4/IP67 classified enclosure. If substitute cable are used, the installer must ensure that the size (OD) of the cable meets the acceptable range allowed by the cable gland.



Danger

This equipment must be installed in restricted access locations in Norway, Finland, and Sweden. Only trained and qualified personnel are allowed to install, replace, or service this equipment as instructed in this installation guide.

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Danger This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 366



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



Danger Read the installation instructions before using, installing or connecting the system to the power source. Statement 1004



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



Danger To reduce the risk of fire, use only No. 24 AWG or larger telecommunication line cord. Statement 1023



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



Danger 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



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



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



Danger Class 1 Laser Product. Statement 1008

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



Danger 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, because 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



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



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



Danger All installation methods for mounting an AP on any wall surface is subject to the acceptance of local jurisdiction.



Danger This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 20A. Statement 1005



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



Danger In order to comply with FCC radio frequency (RF) exposure limits, antennas should be located at a minimum of 12 inches (30 cm) or more from the body of all persons. Statement 332



Danger This equipment is suitable for use in environment air spaces (plenums) in accordance with Section 300.22 (C) of the National Electrical Code, and Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, CSA C22.2. External power supply, power adapter and/or power injector, if provided, are not suitable for installation in air spaces. Statement 440

- [FCC Safety Compliance Statement, on page 90](#)
- [Safety Precautions, on page 90](#)

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- [Safety Precautions when Installing Antennas, on page 91](#)
- [Avoiding Damage to Radios in a Testing Environment, on page 91](#)
- [Performing Site Surveys, on page 92](#)

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:

- 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.

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Safety Precautions when Installing Antennas

**Danger**

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 (e.g. U.S.: NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54). Statement 280

- Before you install an antenna, contact your Cisco account representative to explain which mounting method to use for the size and type of antenna that you are about to install
- Select your installation site with safety, as well as performance, in mind. Remember that electric power lines and phone lines look alike. For your safety, assume that any overhead line can kill you.
- Contact your electric power company. Tell them your plans and ask them to come look at your proposed installation.
- Plan your installation carefully and completely before you begin. Each person involved in an installation should be assigned to a specific task and should 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 your antenna, follow these guidelines:
 - Do not use a metal ladder
 - Do not work on a wet or windy day
 - Do dress properly—wear shoes with rubber soles and heels, rubber gloves, and a long-sleeved shirt or jacket
- If the assembly starts to drop, move away from it and let it fall. Because the antenna, mast, cable, and metal guy wires are all excellent conductors of electrical current, even the slightest touch of any of these parts to a power line completes an electrical path through the antenna and the installer.
- If any part of the antenna system should come in contact with a power line, do not touch it or try to remove it yourself. Call your local power company to have it removed safely.
- If an accident should occur with the power lines, call for qualified emergency help immediately.

Avoiding Damage to Radios in a Testing Environment

The radios on outdoor units (bridges) have higher transmit power levels than radios on indoor units (APs). When you test high-power radios in a link, you must avoid exceeding the receiver's maximum receive input level. At levels above the normal operating range, packet error rate (PER) performance is degraded. At even higher levels, the receiver can be permanently damaged. To avoid receiver damage and PER degradation, you can use one of the following techniques:

- Separate the omnidirectional antennas by at least 2 ft (0.6 m) to avoid receiver damage or by at least 25 ft (7.6 m) to avoid PER degradation.

REVIEW DRAFT - CISCO CONFIDENTIAL**Note**

These distances assume free space path loss and are conservative estimates. Required separation distances for damage and performance degradation levels in actual deployments are less if conditions are not non-line-of-sight.

- Reduce the configured transmit power to the minimum level.
- Use directional antennas, and keep them away from each other.
- Cable the radios together using a combination of attenuators, combiners, or splitters to achieve a total attenuation of at least 60 dB.

For a radiated testbed, the following equation describes the relationships among transmit power, antenna gain, attenuation, and receiver sensitivity:

$$\text{txpwr} + \text{tx gain} + \text{rx gain} - [\text{attenuation due to antenna spacing}] < \text{max rx input level}$$

Where:

txpwr = Radio transmit power level

tx gain = transmitter antenna gain

rx gain = receiver antenna gain

For a conducted test bed, the following equation describes the relationships among transmit power, antenna gain, and receiver sensitivity:

$$\text{txpwr} - [\text{attenuation due to coaxial components}] < \text{max rx input level}$$
**Caution**

Under no circumstances should you connect the antenna port from one AP to the antenna port of another AP without using an RF attenuator. If you connect antenna ports, you must not exceed the maximum survivable receive level of 0 dBm. Never exceed 0 dBm, or damage to the AP can occur. Using attenuators, combiners, and splitters having a total of at least 60 dB of attenuation ensures that the receiver is not damaged and that PER performance is not degraded.

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 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.

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- 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?

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CHAPTER 8

Declarations of Conformity and Regulatory Information

This section provides declarations of conformity and regulatory information for the Cisco Catalyst 9124AX Series Outdoor APs. You can find additional information at this URL: <http://www.cisco.com/go/aironet/compliance>.

- Manufacturers Federal Communication Commission Declaration of Conformity Statement, on page 95
- Operation of Cisco Catalyst Access Points in México, on page 96
- VCCI Statement for Japan, on page 96
- Canadian Compliance Statement, on page 98
- European Community, Switzerland, Norway, Iceland, and Liechtenstein, on page 101
- Administrative Rules for Cisco Catalyst Access Points in Taiwan, on page 102
- Operation of Cisco Catalyst Access Points in Brazil, on page 103
- Declaration of Conformity for RF Exposure, on page 104
- Declaration of Conformity Statements, on page 107

ManufacturersFederalCommunicationCommissionDeclaration of Conformity Statement



Access Point Models	Certification Number
C9124AXI-B	LDK-HTIAK2282
C9124AXD-B	LDK-HTIAK2282
Draft comment: Pending	XXX-XXXXXXX
C9124AXE-B	

Manufacturer:

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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.

This equipment has been tested and found to comply with the limits of a Class B 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 residential environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.

**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.

Operation of Cisco Catalyst Access Points in México

Declaración para México

La operación de este equipo está sujeta a las siguientes dos condiciones: (1) es posible que este equipo o dispositivo no cause interferencia perjudicial y (2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

VCCI Statement for Japan

**Danger**

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

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	Danger	This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.
警告	Danger	この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。 取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

Guidelines for Operating Cisco Catalyst Access Points in Japan

This section provides guidelines for avoiding interference when operating Cisco Catalyst access points in Japan. These guidelines are provided in both Japanese and English.

この機器の使用周波数帯では、電子レンジ等の産業・科学・医療用機器のほか工場の製造ライン等で使用されている移動体識別用の構内無線局（免許を要する無線局）及び特定小電力無線局（免許を要しない無線局）が運用されています。

- 1 この機器を使用する前に、近くで移動体識別用の構内無線局及び特定小電力無線局が運用されていないことを確認して下さい。
- 2 万一、この機器から移動体識別用の構内無線局に対して電波干渉の事例が発生した場合には、速やかに使用周波数を変更するか又は電波の発射を停止した上、下記連絡先にご連絡頂き、混信回避のための処置等(例えば、パーティションの設置など)についてご相談して下さい。
- 3 その他、この機器から移動体識別用の特定小電力無線局に対して電波干渉の事例が発生した場合など何かお困りのことが起きたときは、次の連絡先へお問い合わせ下さい。

連絡先： 03-6434-6500

English Translation

This equipment operates in the same frequency bandwidth as industrial, scientific, and medical devices such as microwave ovens and mobile object identification (RF-ID) systems (licensed premises radio stations and unlicensed specified low-power radio stations) used in factory production lines.

1. Before using this equipment, make sure that no premises radio stations or specified low-power radio stations of RF-ID are used in the vicinity.
2. If this equipment causes RF interference to a premises radio station of RF-ID, promptly change the frequency or stop using the device; contact the number below and ask for recommendations on avoiding radio interference, such as setting partitions.
3. If this equipment causes RF interference to a specified low-power radio station of RF-ID, contact the number below.

Contact Number: **03-6434-6500**

REVIEW DRAFT - CISCO CONFIDENTIAL**Statement 371—Power Cable and AC Adapter**

接続ケーブル、電源コード、AC アダプタ、バッテリーなどの部品は、必ず添付品または指定品をご使用ください。添付品・指定品以外の部品をご使用になると故障や動作不良、火災の原因となります。また、電気用品安全法により、当該法の認定（PSE とコードに表記）でなく UL 認定（UL または CSA マークがコードに表記）の電源ケーブルは弊社が指定する製品以外の電気機器には使用できないためご注意ください。

English Translation

When installing the product, please use the provided or designated connection cables/power cables/AC adaptors. Using any other cables/adaptors could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of UL-certified cables (that have the “UL” shown on the code) for any other electrical devices than products designated by CISCO. The use of cables that are certified by Electrical Appliance and Material Safety Law (that have “PSE” shown on the code) is not limited to CISCO-designated products.

Canadian Compliance Statement

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 réservée uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

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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.

List of Internal Antennas Supported on C9124AXI

Antenna Type	Antenna Gain	Antenna Impedance
Single-Port Single-Band omni (Mixed POL) BLE/IOT	5 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL) AUX	2.4 GHz—6 dBi 5 GHz—7 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL) AUX	2.4 GHz—6 dBi 5 GHz—7 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL)	2.4 GHz—7 dBi 5 GHz—7 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL)	2.4 GHz—7 dBi 5 GHz—7 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL)	2.4 GHz—7 dBi 5 GHz—7 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL)	2.4 GHz—7 dBi 5 GHz—7 dBi	50 ohms

List of Internal Antennas Supported on C9124AXD

Antenna Type	Antenna Gain	Antenna Impedance
Single-Port Single-Band omni (Mixed POL) BLE/IOT	4 dBi	50 ohms

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Antenna Type	Antenna Gain	Antenna Impedance
Single-Port Dual-Band Omni (VPOL) AUX	2.4 GHz—9 dBi 5 GHz—9 dBi	50 ohms
Single-Port Dual-Band Omni (HPOL) AUX	2.4 GHz—9 dBi 5 GHz—9 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL)	2.4 GHz—9 dBi 5 GHz—9 dBi	50 ohms
Single-Port Dual-Band Omni (HPOL)	2.4 GHz—9 dBi 5 GHz—9 dBi	50 ohms
Single-Port Dual-Band Omni (VPOL)	2.4 GHz—9 dBi 5 GHz—9 dBi	50 ohms
Single-Port Dual-Band Omni (HPOL)	2.4 GHz—9 dBi 5 GHz—9 dBi	50 ohms

List of External Antennas Supported on C9124AXE

Antenna Type	Antenna Gain	Antenna Impedance
Single-Port Single-Band omni (Mixed POL) BLE/IOT	3 dBi	50 ohms
Single-Band Omni	2.4 GHz—5 dBi	50 ohms
Single-Band Omni	2.4 GHz—8 dBi	50 ohms
Single-Band Omni	2.4 GHz—13 dBi	50 ohms
Single-Band Omni	5 GHz—8 dBi	50 ohms
Single-Band Omni	5 GHz—14 dBi	50 ohms
Dual-Band Omni	2.4 GHz—4 dBi 5 GHz—7 dBi	50 ohms

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Antenna Type	Antenna Gain	Antenna Impedance
Dual-Band Polarized Patch	2.4 GHz—8 dBi 5 GHz—8 dBi	50 ohms
Dual-Band Omni	2.4 GHz—6 dBi 5 GHz—8 dBi	50 ohms
Dual-Band Polarized Diverse Patch	2.4 GHz—13 dBi 5 GHz—13 dBi	50 ohms

Industry Canada

Access Point Models	Certification Number
C9124AXI-A	2461N-HTIAK2282
C9124AXD-A	2461N-HTIAK2282
Draft comment: Pending	XXXX-XXXXX
C9124AXE-A	

European Community, Switzerland, Norway, Iceland, and Liechtenstein**Access Point Models:**

- C9124AXI-E
- C9124AXD-E
- C9124AXE-E

**Note**

This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. For more details, contact Cisco Corporate Compliance.

The product carries the CE Mark:



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Administrative Rules for Cisco Catalyst Access Points in Taiwan

This section provides administrative rules for operating Cisco Catalyst APs in Taiwan. The rules for all access points are provided in both Chinese and English.

Chinese Translation**低功率電波輻射性電機管理辦法**

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

127048

English Translation**Administrative Rules for Low-power Radio-Frequency Devices****Article 12**

For those low-power radio-frequency devices that have already received a type-approval, companies, business units or users should not change its frequencies, increase its power or change its original features and functions.

Article 14

The operation of the low-power radio-frequency devices is subject to the conditions that no harmful interference is caused to aviation safety and authorized radio station; and if interference is caused, the user must stop operating the device immediately and can't re-operate it until the harmful interference is clear.

The authorized radio station means a radio-communication service operating in accordance with the Communication Act.

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The operation of the low-power radio-frequency devices is subject to the interference caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.

Chinese Translation**低功率射頻電機技術規範****4.7 無線資訊傳輸設備**

4.7.5 在 5.25-5.35 兆赫頻帶內操作之無線資訊傳輸設備，限於室內使用。

4.7.6 無線資訊傳輸設備須忍受合法通信之干擾且不得干擾合法通信；如造成干擾，應立即停用，俟無干擾之虞，始得繼續使用。

4.7.7 無線資訊傳輸設備的製造廠商應確保頻率穩定性，如依製造廠商使用手冊上所述正常操作，發射的信號應維持於操作頻帶中。

2025391

English Translation**Low-power Radio-frequency Devices Technical Specifications**

4.7	Unlicensed National Information Infrastructure
4.7.5	Within the 5.25-5.35 GHz band, U-NII devices will be restricted to indoor operations to reduce any potential for harmful interference to co-channel MSS operations.
4.7.6	The U-NII devices shall accept any interference from legal communications and shall not interfere the legal communications. If interference is caused, the user must stop operating the device immediately and can't re-operate it until the harmful interference is clear.
4.7.7	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user manual.

Operation of Cisco Catalyst Access Points in Brazil

This section contains special information for operation of Cisco Catalyst APs in Brazil.

Access Point Models	Certification Number
C9124AXI-A	XXXXX-XXXXXXXXXX
C9124AXD-A	XXXXX-XXXXXXXXXX

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Access Point Models	Certification Number
C9124AXE-A	XXXXX-XXXXXXXXXX

Figure 87: Brazil Regulatory Information**Portuguese Translation**

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.

English Translation

This equipment is not entitled to the protection from harmful interference and may not cause interference with duly authorized systems.

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 Cisco Catalyst 9124AX Series Outdoor AP 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)

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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.

Table 15: Separation Distance

MPE	Distance	Limit
0.35 mW/cm ²	35 cm (14 inches)	1.00 mW/cm ²

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 the antennas at a greater separation distance than recommended.

This Device Meets FCC Guidelines for Exposure to Radio Waves

The Cisco Catalyst 9124AX Series Outdoor AP 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.

Table 16: Separation Distance

MPE	Distance	Limit
0.35 mW/cm ²	35 cm (14 inches)	1.00 mW/cm ²

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 than recommended or lowering the transmitter power output.

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

The Cisco Catalyst 9124AX Series Outdoor AP 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.

Table 17: Separation Distance

Frequency	MPE	Distance	Limit
2.4–GHz	2.07 W/m ²	35 cm (14 inches)	5.4 W/m ²
5–GHz	3.52 W/m ²	35 cm (14 inches)	9.76 W/m ²

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 Cisco Catalyst 9124AX 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.

Table 18: Distance d'éloignement

Fréquence	MPE	Distance	Limite
2.4–GHz	2.07 W/m ²	35 cm (14 inches)	5.4 W/m ²
5–GHz	3.52 W/m ²	35 cm (14 inches)	9.76 W/m ²

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.

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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 International 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.mmfa.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/pdtncc/#/>

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