



# Overview

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The Cisco Aironet 1550 Series Outdoor Mesh Access Point (hereafter called the *access point* or *AP*) is a modularized wireless outdoor access point designed for use in a mesh network. The access point also supports wireless client access, point-to-point bridging, point-to-multipoint bridging, and point-to-multipoint mesh wireless connectivity.

## About the 1552 Access Point

The 1552 access point supports two radios (2.4-GHz and 5-GHz) and provides client access without the need for a license. The 5-GHz radios are primarily used for backhaul operations to reach a wired network and the 2.4-GHz radio is used for wireless clients. Depending on the radio, the access point can support 1 to 300 Mb/s data rates (for specific data rates, refer to [Appendix D, “Access Point Specifications”](#)).

The 1552 access point supports the modularity of the 1520 series and allows flexibility in radio configuration. In addition to full interoperability with 802.11n clients, the 1552 access point interoperates with legacy clients and offers enhanced backhaul performance. The 1552 access point can also be configured with an integrated DOCSIS 3.0/Euro DOCSIS 3.0 cable modem.

The access point is a standalone unit that can be cable strand or tower mounted. The access point can also operate as a relay node for other access points not directly connected to a wired network. Intelligent wireless routing is provided by the patented Adaptive Wireless Path Protocol (AWPP). This enables each access point to identify its neighbors and intelligently choose the optimal path to the wired network by calculating the cost of each path in terms of signal strength and the number of hops required to get to a controller.

The access point is configured, monitored, and operated through a Cisco wireless LAN controller (hereafter called a *controller*) as described in the *Cisco Wireless LAN Controller Configuration Guide*. The *Cisco Wireless Mesh Access Points, Design and Deployment Guide, Release 7.3* describes how to plan and initially configure the Cisco mesh network, which supports wireless point-to-point, point-to-multipoint, and mesh deployments. The controllers use a browser-based management system, a command-line interface (CLI), or the Cisco Prime Infrastructure (PI) network management system to manage the controller and the associated access points. The access point supports hardware-based advanced encryption standard (AES) encryption between wireless nodes to provide end-to-end security.

This chapter provides information on the following topics:

- [Hardware Models, page 1-2](#)
- [Hardware Features, page 1-5](#)
- [Network Deployment Examples, page 1-25](#)

# Hardware Models

The model numbers (or part numbers) and configuration for the Cisco Aironet 1552 Outdoor Mesh Access Points are described in [Table 1-1](#). A detailed list of components supported by each 1552 access point model is shown in [Table 1-2](#).

The Cisco Aironet 1552 Series access points includes two additional models, 1552S and 1552H, that are specifically intended for deployment in hazardous locations. For information on these models, refer to the *Cisco Aironet 1550 Series for Hazardous Locations Installation Guide*.

For a detailed description of the declarations of conformity and regulatory information for the 1552 access points refer to [Appendix B, “Declarations of Conformity and Regulatory Information.”](#)

**Table 1-1 1552 Access Point Model Numbers and Descriptions**

Model (or part number)	Configuration
AIR-CAP1552E-x-K9	Two-radio (2.4 GHz and 5 GHz) modular version. This model supports three (3) external dual-band antenna ports. An optional Battery Backup Unit (BBU) and Small Form Factor Pluggable (SFP) fiber module can be ordered with the AP. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.  For specific regulatory domains supported by this model, refer to the product data sheet at:  <a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a>
AIR-CAP1552EU-x-K9	Two-radio (2.4 GHz and 5 GHz) modular version. This model supports three (3) 2.4 GHz antenna ports and three (3) 5 GHz antenna ports. An optional Battery Backup Unit (BBU) and Small Form Factor Pluggable (SFP) fiber module can be ordered with the AP. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.  For specific regulatory domains supported by this model, refer to the product data sheet at:  <a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a>

**Table 1-1 1552 Access Point Model Numbers and Descriptions (continued)**

Model (or part number)	Configuration
AIR-CAP1552C- <i>x</i> -K9	<p>Two-radio (2.4 GHz and 5 GHz) version with DOCSIS 3.0 or Euro-DOCSIS 3.0 Cable Modem. This is a lightweight, low-profile AP. It supports cable modem backhaul and beamforming, and has an integrated 3-element array antenna. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.</p> <p>For specific regulatory domains supported by this model, refer to the product data sheet at:</p> <p><a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a></p>
AIR-CAP1552CU- <i>x</i> -K9	<p>Two-radio (2.4 GHz and 5 GHz) version with DOCSIS 3.0 or Euro-DOCSIS 3.0 Cable Modem. This model supports three (3) 2.4 GHz antenna ports and three (3) 5 GHz antenna ports. This is a lightweight, low-profile AP. It supports cable modem backhaul and beamforming, and has an integrated 3-element array antenna. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.</p> <p>For specific regulatory domains supported by this model, refer to the product data sheet at:</p> <p><a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a></p>
AIR-CAP1552I- <i>x</i> -K9	<p>Two-radio (2.4 GHz and 5 GHz) lightweight, low-profile version. This version consists of 1 AC power supply, Ethernet backhaul, and an integrated 3-element array antenna. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.</p> <p>For specific regulatory domains supported by this model, refer to the product data sheet at:</p> <p><a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a></p>

**Table 1-2**      **Components of Each 1552 Access Point Model**

	<b>1552E</b>	<b>1552EU</b>	<b>1552C</b>	<b>1552CU</b>	<b>1552I</b>
<b>Antennas</b>	External	External	Integrated	External	Integrated
<b>Fiber SFP</b>	Yes	Yes	-	-	-
<b>PoE-Out Port<sup>1</sup></b> <b>802.3af</b> (for example, video)	Yes	Yes	-	-	-
<b>Cable Modem</b> DOCSIS 3.0 Euro DOCSIS 3.0	-	-	Yes	Yes	-
<b>Battery Backup Option</b>	Yes	Yes	-	-	-
<b>Power Options</b>	AC, DC, PoE <sup>2</sup>	AC, DC, PoE <sup>2</sup>	40 to 90 VAC Power over Cable, 12 VDC	40 to 90 VAC Power over Cable, 12 VDC	AC, DC

1. When a 1552E/EU is powered with PoE, the PoE-Out port is not active.

2. PoE-In is not 802.3af; it does not work with a PoE 802.3af-capable Ethernet switch. It requires the dedicated Power Injector (AIR-PWRINJ1500-2=).

## Regulatory Domains

The “-x” in the 1552 model numbers represent the domain. For example, in AIR-CAP1552C-x-K9, the -x represents a regulatory domain for a specific country.

For specific regulatory domains supported by each 1552 access point model, refer to the Wireless LAN Compliance Status at:

[http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product\\_data\\_sheet0900aecd80537b6a.html](http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html)

To locate the 1552 access point models, click on **802.11abgn Mesh Access Points**.

# Hardware Features

This section describes the hardware features of the 1552 access point models. The following hardware features are described in this section:

- [Connectors, page 1-5](#)
- [Antenna Port Locations, page 1-11](#)
- [Multiple Radio Operation, page 1-12](#)
- [Antenna Configurations, page 1-13](#)
- [Multiple Power Sources, page 1-21](#)
- [Cable Modem \(POC\), page 1-22](#)
- [Ethernet \(PoE\) Ports, page 1-22](#)
- [Fiber Option, page 1-23](#)
- [Metal Enclosure, page 1-24](#)
- [Optional Hardware, page 1-24](#)

## Connectors

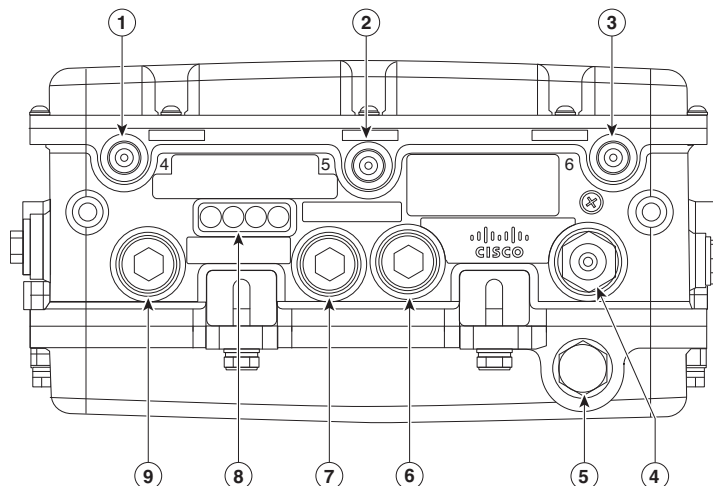
[Figure 1-1](#) through [Figure 1-9](#) show the access point connectors for all models. [Figure 1-10](#) and [Figure 1-11](#) show the external antenna Type-N connectors.

**Note**

The illustrations in this document show all available connections for the access point. Unused connections are capped with a connector plug to ensure the watertight integrity of the access point. Liquid-tight adapters are provided for connector openings, which can be installed before or after deploying the access point.

## 1552E/1552EU Connectors

**Figure 1-1** Access Point Models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9 Bottom Connectors



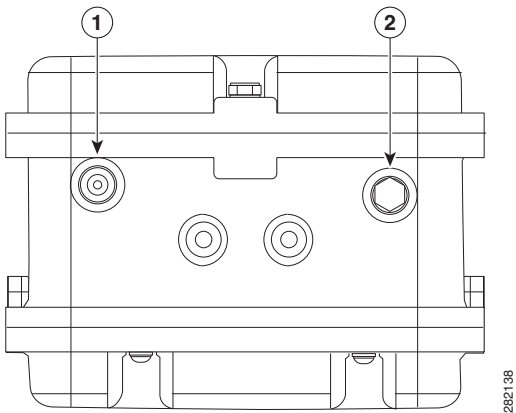
<b>1</b>	Antenna port 4	<b>6</b>	Fiber port
<b>2</b>	Antenna port 5	<b>7</b>	PoE-out port
<b>3</b>	Antenna port 6	<b>8</b>	LEDs (Status, Up Link, RF1, RF2)
<b>4</b>	Auxiliary cable gland entry (1/2-NPT) for data cable (outdoor cat 5 STP cable)	<b>9</b>	PoE-in port
<b>5</b>	AC power entry port for model AIR-CAP1552E/EU-x-K9 only		



### Note

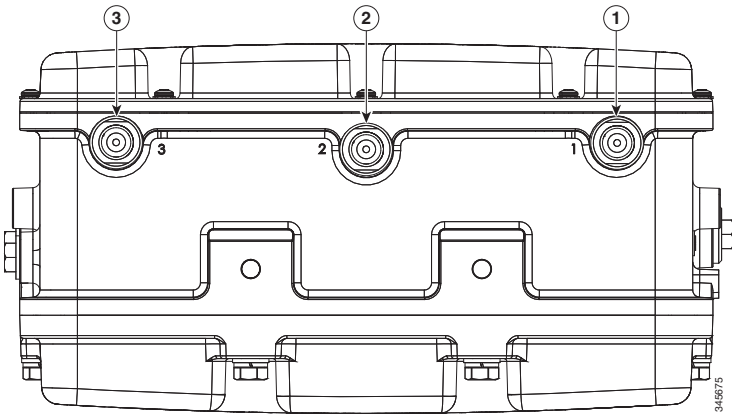
Antenna ports 1, 2, and 3 are not shown in [Figure 1-1](#). These ports are located on the top of the access point.

Figure 1-2 Console Port for Access Point Models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9



1	Console port	2	Not used
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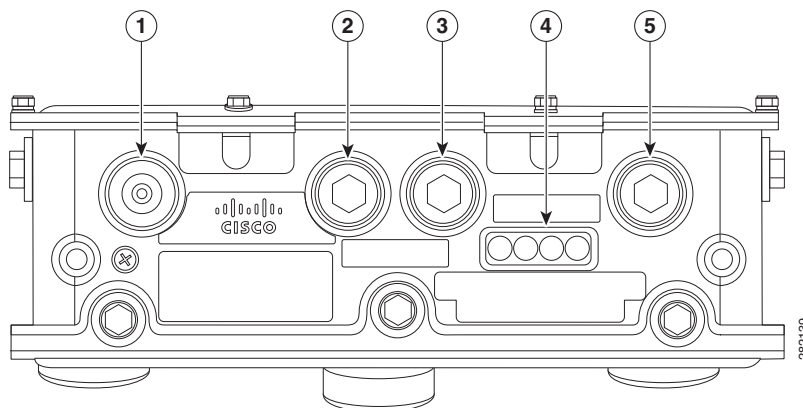
Figure 1-3 Access Point Model AIR-CAP1552EU-x-K9 Top Connectors



1	Antenna port 1	3	Antenna port 3
2	Antenna port 2		

## 1552I Connectors

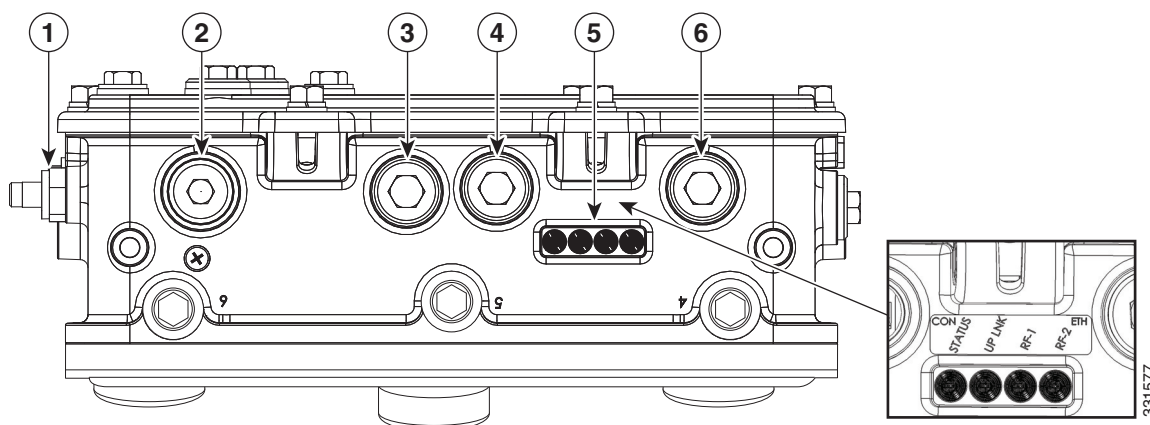
**Figure 1-4** Access Point Model AIR-CAP1552I-x-K9 Bottom Connectors



<b>1</b>	AC Connector	<b>4</b>	LEDs (Status, Up Link, RF1, RF2)
<b>2</b>	Not used	<b>5</b>	Ethernet backhaul connector
<b>3</b>	Console port		

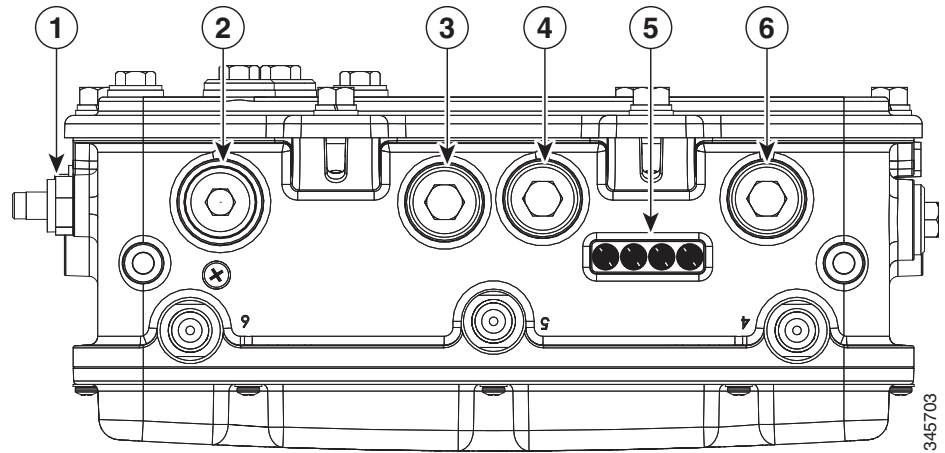
## 1552C/1552CU Connectors

**Figure 1-5** Access Point Model AIR-CAP1552C-x-K9 Bottom/Side Connectors

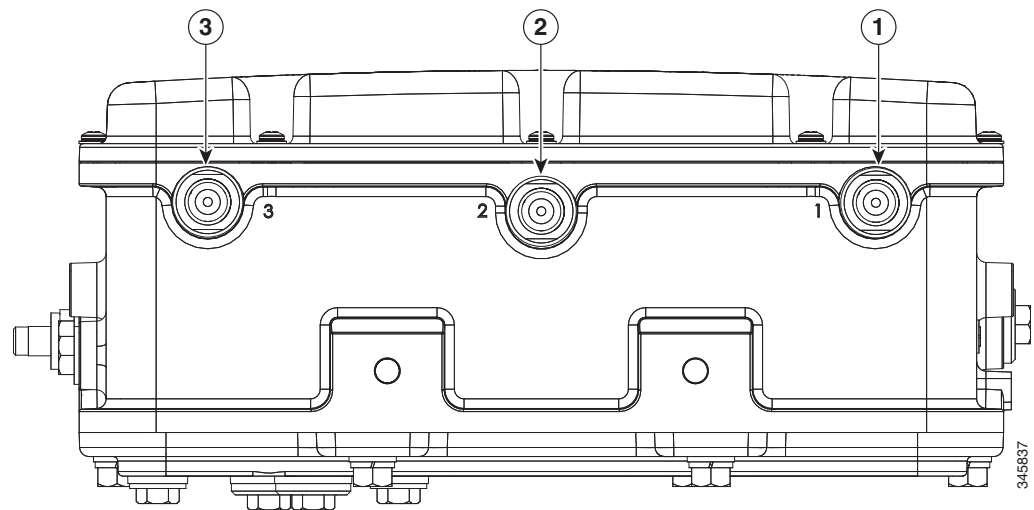


<b>1</b>	F-Connector adapter (splitter) for cable POC (optional)	<b>4</b>	Console port
<b>2</b>	AC power connector (Not used)	<b>5</b>	LEDs (Status, Up Link, RF1, RF2)
<b>3</b>	Not used	<b>6</b>	Not used



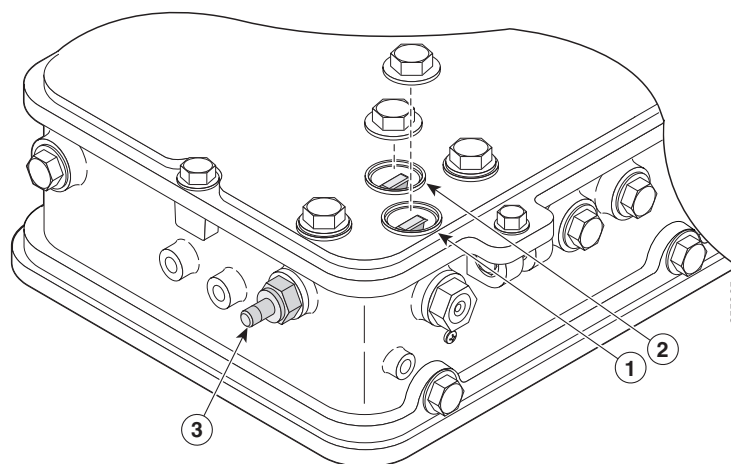
**Figure 1-6 Access Point Model AIR-CAP-1552CU-x-K9 Bottom/Side Connectors**

1	F-Connector adapter (splitter) for cable POC (optional)	4	Console port
2	AC power connector (Not used)	5	LEDs (Status, Up Link, RF1, RF2)
3	Not used	6	Not used

**Figure 1-7 Access Point Model AIR-CAP1552CU-x-K9 Top Connectors**

1	Antenna port 1	3	Antenna port 3
2	Antenna port 2		

**Figure 1-8 F-Connector Adapter (Splitter) Components (AIR-CAP1552C-x-K9 and AIR-CAP1552CU-x-K9)**

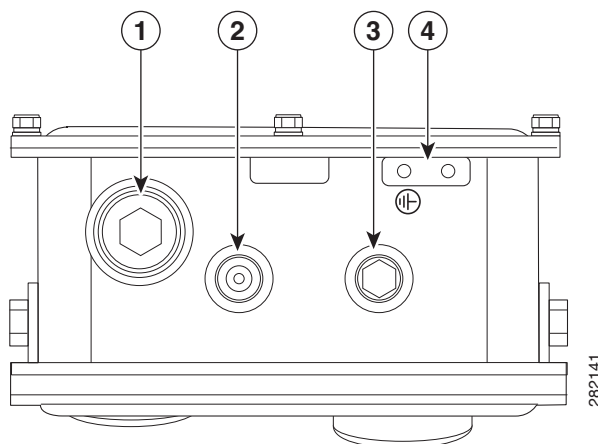


<b>1</b>	RF splitter attenuator (ATTN)	<b>3</b>	F-Connector adapter (splitter) for cable POC (optional)
<b>2</b>	RF splitter shunt (SHUNT) <sup>1</sup>		

<sup>1</sup> Shunt is a 20 amp fuse.

## Connectors for All Models

**Figure 1-9 Access Point DC Power Connector and Ground Lug (All Models)**

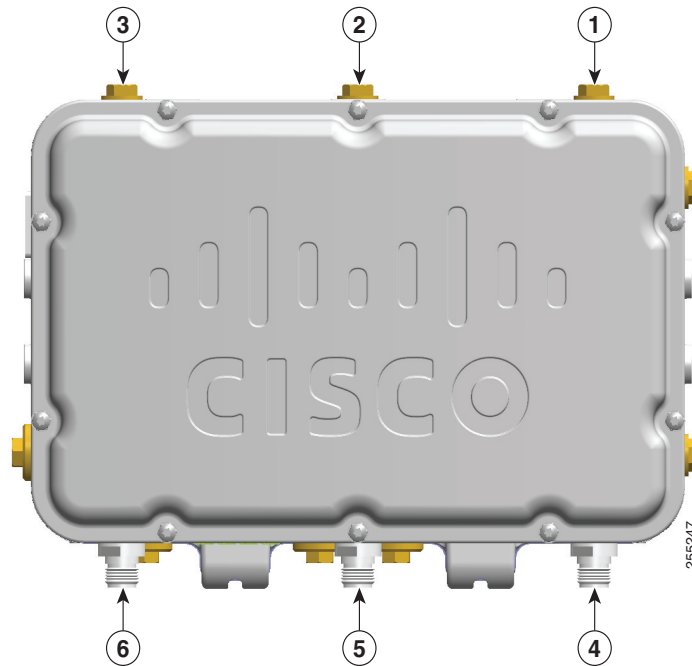


<b>1</b>	DC power port	<b>3</b>	Bracket mounting nut
<b>2</b>	Bracket mounting hole	<b>4</b>	Ground lug location (connection for earth grounding (minimum VD 16 mm, 6 AWG))

## Antenna Port Locations

Figure 1-10 shows the antenna port locations for model AIR-CAP1552E-x-K9. The ports used depend on the optional antennas ordered.

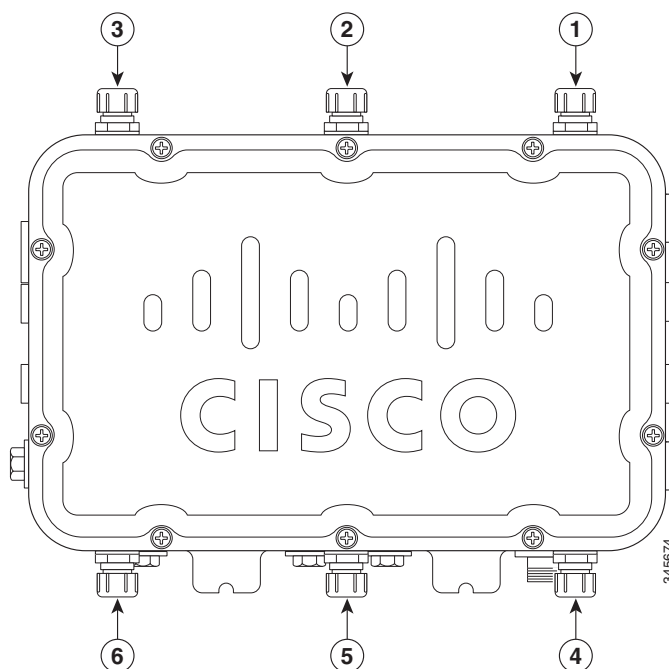
**Figure 1-10** External Antenna Port Locations for Access Point Models AIR-CAP1552E-x-K9



<b>1</b>	Not used	<b>4</b>	Antenna port 4 - Type N connector (with cap)
<b>2</b>	Not used	<b>5</b>	Antenna port 5 - Type N connector (with cap)
<b>3</b>	Not used	<b>6</b>	Antenna port 6 - Type N connector (with cap)

Figure 1-11 shows the antenna port locations for models AIR-CAP1552CU-x-K9 and AIR-CAP1552EU-x-K9. The ports used depend on the optional antennas ordered.

**Figure 1-11** External Antenna Port Locations for Access Point Models AIR-CAP1552CU-x-K9 and AIR-CAP1552EU-x-K9



<b>1</b>	Antenna port 3 - Type N connector (with cap)	<b>4</b>	Antenna port 6 - Type N connector (with cap)
<b>2</b>	Antenna port 2 - Type N connector (with cap)	<b>5</b>	Antenna port 5 - Type N connector (with cap)
<b>3</b>	Antenna port 1 - Type N connector (with cap)	<b>6</b>	Antenna port 4 - Type N connector (with cap)

## Multiple Radio Operation

The 1552 access point supports simultaneous dual-radio operation using a 2.4-GHz 802.11b/g/n multiple input/multiple output (MIMO) radio and a 5-GHz 802.11a/n MIMO radio. The 2.4 GHz radio supports channels 1 to 11 in US, 1 to 13 in Europe, and 1 to 13 in Japan. It has two transmitters with a maximum total output power of 25 dBm for 802.11b/g/n operation. Output power is configurable to 5 levels. It has three receivers that enable maximum-ratio combining (MRC).

The 5-GHz radio operates in the UNII-2 band (5.25 – 5.35 GHz), UNII-2 Extended/ETSI band (5.47 – 5.725 GHz), upper ISM band (5.725 – 5.850 GHz), and the Extended India Band (5.85 – 5.875 GHz). It has two transmitters with a maximum total output power of 26 dBm for UNII-2 and Extended/ETSI bands. The total maximum output power for the upper ISM band is 28 dBm. Output power is configurable for 5 power levels in 3 dB steps. The three receivers enables maximum-ratio combining (MRC).

## Antenna Configurations

The 1552 access point supports a variety of antennas designed for outdoor use with radios operating in the 2.4-GHz and 5-GHz frequency bands. In addition to an integrated antenna array, the 1552 supports the external antennas listed in the following sections.

Two mounting configurations are available, the cable strand mount and the pole mount (refer to [“Mounting the Access Point” section on page 2-14.](#))

Using an optional antenna mounting bracket kit, the directional antennas AIR-ANT2413P2M-N and AIR-ANT5114P2M-N can be mounted directly on an access point in a strand mount or pole mount environment. The antenna bracket kit contains four bracket sections and fasteners that you can assemble in multiple configurations to position and aim the directional antenna in a range of positions. For more information on mounting the antenna with the optional mounting bracket, refer to *Installing Directional-Antenna Mounting Kits on Cisco 1550 Series Outdoor Mesh Access Points*.

The AIR-CAP1552E-x-K9 model must always be operated with the three external antennas attached. [Figure 1-10](#) shows the antenna port locations for model 1552E.

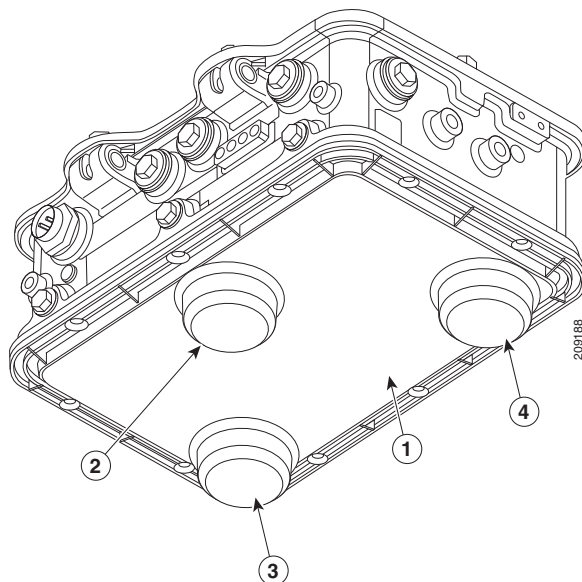
### Low Profile Dual-Band 2.4/5-GHz Omni Antenna Array

The Low Profile Dual-Band 2.4/5 GHz Omni Antenna Array has the following basic features:

- Contains an array of three dual-band omni antennas—The three omni antennas are contained within this single radome, which greatly reduces the antenna’s visual footprint and reduces the possibility of snagging the antenna on the cable bundle, the RF cable, or test cables.
- Operates over both 2.4 GHz and 5 GHz bands—Each of the three omni antennas is a dual-band antenna, covering both the 2.4–2.5 GHz band, and the 5.2–5.9 GHz bands.
- Gain of about 2 dBi at 2.4 GHz, 4 dBi at 5 GHz.
- Cisco Light Gray weatherproof radome for outdoor operation.

[Figure 1-12](#) shows an integrated low-profile dual-band (2.4 GHz and 5 GHz) 3-element array antenna built-in only on models AIR-CAP1552I-x-K9 and AIR-CAP1552C-x-K9.

**Figure 1-12** Cisco Aironet Low Profile Dual-Band 2.4/5 GHz Omni Antenna Array- Built-in Only on Models AIR-CAP1552I-x-K9 and AIR-CAP1552C-x-K9



1	Integrated Low Profile Dual-Band 2.4/5 GHz Omni Antenna Array Unit	3	Antenna element (TX/RX)
2	Antenna element (RX only)	4	Antenna element (TX/RX)

## Cisco Aironet Dual-Band Omnidirectional Antenna (AIR-ANT2547V-N)

The Dual-Band Omnidirectional Antenna, referred to as a “stick” antenna, is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz and 5-GHz frequency bands (Figure 1-13). Basic operating features of the antenna are:

- Omnidirectional colinear array
- Operates in the 2.4 GHz and 5 GHz frequency bands
- Gain:
  - 2400–2483 MHz — 4-dBi
  - 5250–5875 MHz — 7-dBi

The antenna is designed to create an omnidirectional broadcast pattern. To achieve this pattern, mount the access point clear of any obstructions to the sides of the radiating element.

For detailed information on this antenna, refer to the *Cisco Aironet Dual-Band Omnidirectional Antenna (AIR-ANT2547V-N)* document. Follow all safety precautions when installing the antennas. For information on safety, refer to “[Safety Precautions](#)” section on page 2-42.

**Figure 1-13** Cisco Aironet Dual-Band Omnidirectional Antenna - Installed Only on Model AIR-CAP1552E-x-K9



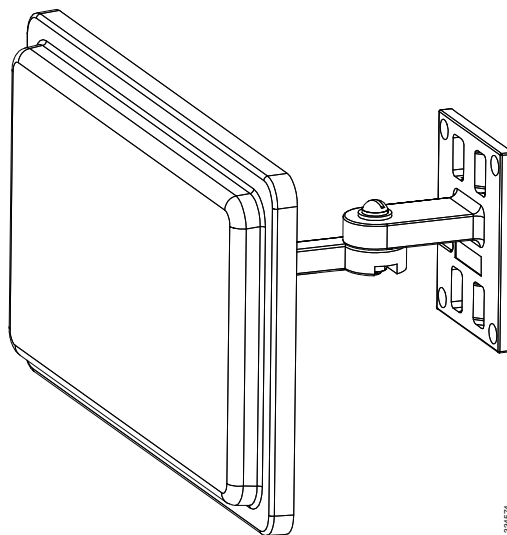
<b>1</b>	Antenna connected to antenna port 4 (Type-N connector) (TX/RX)	<b>3</b>	Antenna connected to antenna port 6 (Type-N connector) (TX/RX)
<b>2</b>	Antenna connected to antenna port 5 (Type-N connector) (RX only)		

## Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna (AIR-ANT2588P3M-N)

The Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in both the 2.4-GHz and 5-GHz frequency bands. This antenna has 8-dBi gain in both bands.

For detailed information on this antenna, refer to the *Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna (AIR-ANT2588P3M-N)* document. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).

**Figure 1-14** Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna - Installed Only on Model AIR-CAP1552E-x-K9



## Cisco Aironet 5-GHz 14-dBi 2-Port Directional Antenna (AIR-ANT5114P2M-N)

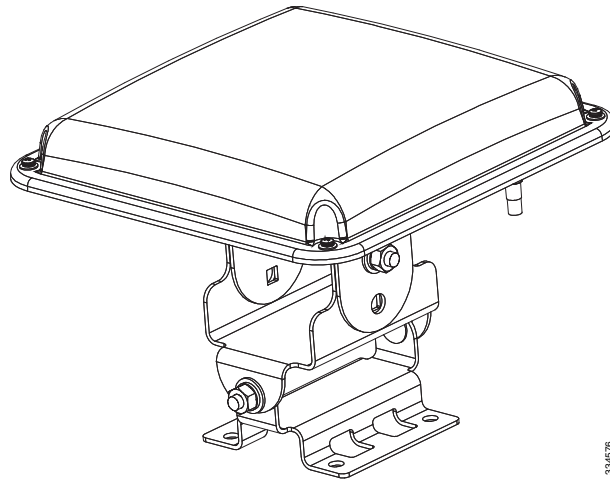
The Cisco Aironet 5-GHz 14-dBi 2-Port Directional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 5-GHz frequency band. This antenna has 14-dBi in the 5-GHz band.

This antenna can be installed using the optional directional-antenna mounting kit AIR-CCAMK-1, which allows the antenna to be mounted on the access point and positioned in multiple configurations. For more information, refer to *Installing Directional-Antenna Mounting Kits on Cisco 1550 Series Outdoor Mesh Access Points*.

For detailed information on this antenna, refer to the *Cisco Aironet 5-GHz 14-dBi Directional Antenna (AIR-ANT5114P2M-N)* document. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).



**Figure 1-15** *Cisco Aironet 5-GHz 14-dBi Directional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9*



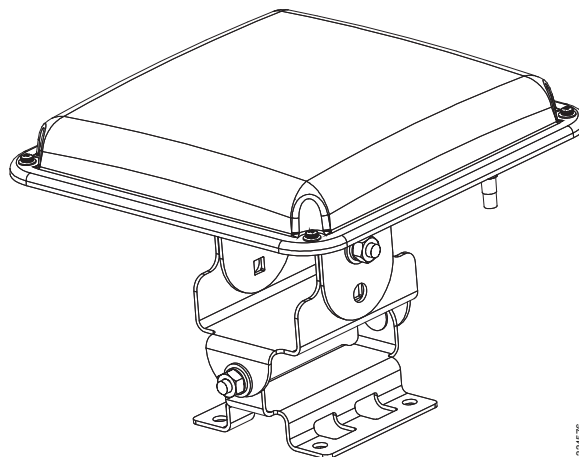
## Cisco Aironet 2.4-GHz 13-dBi 2-Port Directional Antenna (AIR-ANT2413P2M-N)

The Cisco Aironet 2.4-GHz 13-dBi 2-Port Directional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. This antenna has 13-dBi gain in the 2.4-GHz frequency band.

This antenna can be installed using the optional directional-antenna mounting kit AIR-CCAMK-1, which allows the antenna to be mounted on the access point and positioned in multiple configurations. For more information, refer to *Installing Directional-Antenna Mounting Kits on Cisco 1550 Series Outdoor Mesh Access Points*.

For detailed information on this antenna, refer to the *Cisco Aironet 2.4-GHz 13-dBi Directional Antenna (AIR-ANT2413P2M-N)* document. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).

**Figure 1-16** *Cisco Aironet 2.4-GHz 13-dBi Directional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9*



## Cisco Aironet 2.4-GHz 2-dBi Omnidirectional Antenna (AIR-ANT2420V-N)

The Cisco Aironet 2.4-GHz 2-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. Basic operating features of the antenna are:

- Operates in the 2.4-GHz frequency band
- Gain: 2 dBi
- Right-angle antenna primarily intended for strand (side) mounting

Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).

**Figure 1-17** *Cisco Aironet 2.4-GHz 2-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9*



## Cisco Aironet 2.4-GHz 5-dBi Omnidirectional Antenna (AIR-ANT2450V-N)

The Cisco Aironet 2.4-GHz 5-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. This antenna has 5-dBi gain in the 2.4-GHz frequency band.

For detailed information on this antenna, refer to the bilingual document *Cisco Aironet 5-dBi Omnidirectional Antenna (AIR-ANT2450V-N)-French*. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).

**Figure 1-18** Cisco Aironet 2.4-GHz 5-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9

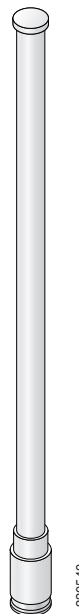


## Cisco Aironet 2.4-GHz 8-dBi Omnidirectional Antenna (AIR-ANT2480V-N)

The Cisco Aironet 2.4-GHz 8-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. This antenna has 8-dBi gain in the 2.4-GHz frequency band.

For detailed information on this antenna, refer to the document *Cisco Aironet 8-dBi Omnidirectional Antenna (AIR-ANT2480V-N)*. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).

**Figure 1-19** Cisco Aironet 2.4-GHz 8-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9



## Cisco Aironet 5-GHz 4-dBi Omnidirectional Antenna (AIR-ANT5140V-N)

The Cisco Aironet 5-GHz 4-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 5-GHz frequency band. Basic operating features of the antenna are:

- Operates in the 5-GHz frequency band
- Gain: 4 dBi
- Right-angle antenna primarily intended for strand (side) mounting

Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).

**Figure 1-20** *Cisco Aironet 5-GHz 4-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9*

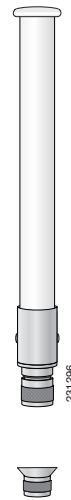


## Cisco Aironet 5-GHz 8-dBi Omnidirectional Antenna (AIR-ANT5180V-N)

The Cisco Aironet 5-GHz 8-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 5-GHz frequency band. This antenna has 8-dBi gain in the 5-GHz frequency band.

For detailed information on this antenna, refer to the document *Cisco Aironet 8-dBi Omnidirectional Antenna (AIR-ANT5180V-N)*. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-42](#).

**Figure 1-21** *Cisco Aironet 5-GHz 8-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9*



## Multiple Power Sources

The 1550 series access point supports these power sources:

- AC power—100 to 480 VAC, models 1552E and 1552EU access points, pole-mount configuration
- AC power—100 to 277 VAC, model 1552I access point
- Power-over-Cable (POC)—40 to 90 VAC, quasi-square wave AC, models 1552C and 1552CU (standard power source for the cable modem configuration)
- External 12 VDC
- Power-over-Ethernet (PoE)—56 VDC power injector (AIR-PWRINJ1500-2=), only on models 1552E and 1552EU access points
- Internal 6 ampere-hour battery backup—only for the 1552E and 1552EU access point



**Warning**

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

The 1552 access point can be connected to more than one power source. The access point detects the available power sources and switches to the preferred power source using the following default prioritization:

- AC power or POC power
- External 12-VDC power
- Power injector PoE power
- Internal battery power



**Warning**

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

**Warning**

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

**Caution**

To provide inline PoE, you must use the 1500 power injector (AIR-PWRINJ1500-2=). Other power injectors, PoE switches, and 802.3af power sources cannot provide adequate power, which can cause the access point to malfunction and cause over-current conditions at the power source.

**Caution**

The 1500 power injector (AIR-PWRINJ1500-2=) must be used in an indoor environment only.

**Caution**

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

**Note**

In the cable configuration, the cable modem is activated only when the access point is powered by POC or external 12 VDC power. When using only PoE power, the cable modem is deactivated.

The following AC power cord options are available:

- 40-ft (12.2-m) power cord for light pole installations in the US and Canada. One end of the power cord is terminated with an access point AC power connector and the other end is terminated with an AC plug (AIR-CORD-R3P-40NA=).
- 40-ft (12.2-m) power cord for use outside the US and Canada. One end of the power cord is terminated with an access point AC power connector and the other end is unterminated. (AIR-CORD-R3P-40UE=).
- 4-ft (1.2-m) streetlight power tap adapter for light pole installations in the US and Canada (AIR-PWR-ST-LT-R3P=).

## Cable Modem (POC)

The access point POC cable modem configuration contains an internal cable modem for connection to the cable network from the pole-mounted cable lines. The access point can be powered using the 40-to 90-VAC (quasi-square wave AC) power provided by the cable network.

The cable modem supports these main features:

- Data Over Cable Service Interface Specifications (DOCSIS)3.0
- Backward compatibility with existing DOCSIS 1.1 and 1.0 networks

## Ethernet (PoE) Ports

The access point supports an Ethernet uplink port (POE-In) and a downlink port (POE-Out). The access point PoE-in port uses an RJ-45 connector (with a liquid tight adapter) to link the access point to the 10/100/1000BASE-T network. The Ethernet cable is used to send and receive Ethernet data and to optionally supply inline 56-VDC power from the power injector.

**Note**

When a 1552E or 1552EU access point is powered by PoE, the PoE-Out port is not active.

The access point PoE-out (10/100/1000BASE-T) port uses an RJ-45 connector to provide LAN connectivity and IEEE 802.3af power to a single peripheral customer device, such as a camera or sensor gateway. The PoE-out port should not be connected to a switch or hub. The Ethernet MAC addresses are printed on the bottom of the access point under the LEDs.

**Note**

The PoE-out port is disabled when the access point is powered by the power injector.

**Tip**

The access point senses the Ethernet and power signals and automatically switches internal circuitry to match the cable connections.

**Warning**

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

The Ethernet cable must be a shielded outdoor rated Category 5e (CAT5e) or better cable. The access point senses the Ethernet and power signals and automatically switches internal circuitry to match the cable connections.

**Caution**

To provide inline PoE, you must use the 1500 power injector (AIR-PWRINJ1500-2=). Other power injectors, PoE switches, and 802.3af power sources cannot provide adequate power, which may cause the access point to malfunction and cause possible over-current conditions at the power source.

## Fiber Option

**Warning**

**Class 1 laser product.** Statement 1008

The factory-orderable fiber option provides a fiber input and output capability. Fiber data is transmitted and received over a single-strand fiber cable, which is connected to the access point using these SFP modules:

- 100BASE-BX10-U fiber Rugged small-form factor pluggable (SFP) module
- 1000BASELX single-mode Rugged SFP module
- 1000BASESX multimode Rugged SFP module
- EPON ONU Rugged SFP module

**Note**

SFP modules are not hot-swappable.

The access point has one fiber connection, located on the bottom of the unit (shown on [Figure 1-1](#)). Client data is passed to the network controller through the fiber connection via a fiber-capable switch. Configuration information can be found in the controller configuration guide of the controller you are using.

## GPS Option

A GPS module is required to accurately track the location of the AP and report it to the controller. to provide location information for Cisco's AIR-CAP 1552I/C/CU/E/EU/H product line.

For information on routing and securing the cable for the GPS antenna, refer to the *1550 Series GPS Hardware Mounting Guide*.

## Metal Enclosure

The access point uses a metal enclosure that can accommodate both indoor or outdoor operating environments and an industrial temperature operating range of –40 to 131°F (–40 to 55°C). The access point complies with NEMA 4 and IP67 requirements.

## Optional Hardware

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

- External antennas, depending on which ones you purchased
- Strand mount kit (AIR-ACCSMK1550=)
- Pole mount kit (AIR-ACCPMK1550=)
- Band installation tool for pole mount kit (AIR-BAND-INS-TL=)
- AC power cord, 40 ft. (12.2 m) with North American plug (AIR-CORD-R3P-40NA=)
- AC power cord, 40 ft. (12.2 m) with European unterminated end (AIR-CORD-R3P-40UE=)
- Street light power tap (AIR-PWR-ST-LT-R3P=)
- Power injector (AIR-PWRINJ1500-2=)
- 1000BASELX single-mode Rugged SFP (GLC-LX-SM-RGD=)
- 1000BASESX multimode Rugged SFP (GLC-SX-MM-RGD=)
- EPON ONU Rugged SFP module
- Battery, 6 amp hour (AIR-1520-BATT-6AH)
- FIPS kit (AIRLAP-FIPSKIT=)
- Optional directional-antenna mounting kit (AIR-ACCAMK-1)
- Lightning Arrestor kit (AIR-ACC245LA-N=)
- Third-party lightning arrestors as required by local authorities



# Network Deployment Examples

The access point is a wireless device designed for wireless client access and point-to-point bridging, point-to-multipoint bridging, and point-to-multipoint mesh wireless connectivity. The access point provides 5-GHz backhaul capability to link with another access point to reach a wired network connection or to provide repeater operations for other access points.

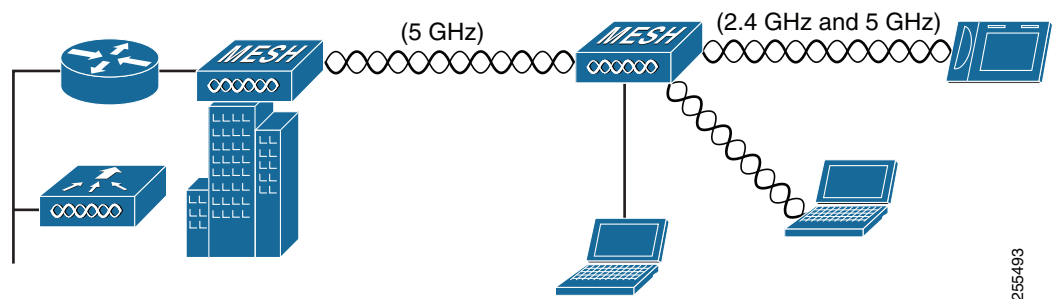
The access point plays two primary radio roles: a root access point (RAP) or a mesh (non-root) access point (MAP), which is the default role of all access points. When the access point has a fiber or wired Ethernet or cable connector connection to the controller (through a switch), the radio role is called a RAP. In order to be considered a RAP, the access point must be configured as a RAP. A RAP is a parent node to any bridging or mesh network. A controller can support one or more RAPs, each one parenting the same or different wireless networks. There can be more than one RAP for the same mesh network for redundancy. RAPs and MAPs can support wireless clients on the 2.4-GHz and 5-GHz band. Client access on 5-GHz is called universal client access.

When the access point does not have a wired Ethernet, fiber-optic, or cable connection to the controller, the radio role is called a MAP. The MAPs have a wireless connection (through the backhaul interface) to other MAPs and finally to a RAP with an Ethernet or cable connection through a switch to the controller. MAPs can also have a wired Ethernet connection to a local LAN and serve as a bridge endpoint for that LAN (using a point-to-point or point-to-multipoint bridge connection).

## Wireless Backhaul

The access point supports wireless backhaul capability using the 5 GHz radio to bridge to another access point to reach a wired network connection to a controller (see [Figure 1-22](#)). The access point connected to the wired network is considered a RAP in this configuration. The remote access point is considered a MAP and transfers wireless client traffic to the RAP for transfer to the wired network. Control And Provisioning of Wireless Access Points (CAPWAP) control traffic is also transferred over this bridged link.

**Figure 1-22 Access Point Backhaul Example**



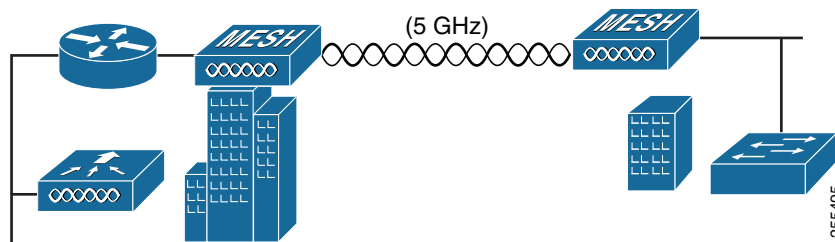
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## Point-to-Point Bridging

The access points can be used to extend a remote network by using the 5 GHz backhaul radio to bridge the two network segments as shown in [Figure 1-23](#). To support Ethernet bridging, you must enable bridging on the controller for each access point. By default this capability is turned-off for all access points.

Wireless client access is supported; however, if bridging between tall buildings, the 2.4-GHz wireless coverage area may be limited and possibly not suitable for direct wireless client access.

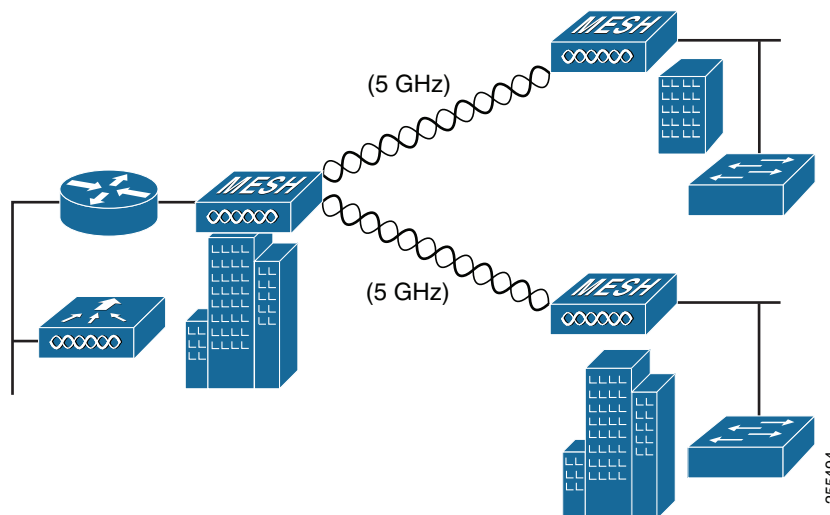
**Figure 1-23 Access Point Point-to-Point Bridging Example**



## Point-to-Multipoint Bridging

The access points can be used as a RAP to connect multiple remote MAPs with their associated wired networks. By default this capability is turned-off for all access points. To support Ethernet bridging, you must enable bridging on the controller for each access point. Wireless client access can be provided over the bridging link; however, if bridging between tall buildings, the 2.4-GHz wireless coverage area may be limited and possibly not suitable for direct wireless client access. [Figure 1-24](#) illustrates an example of access point-to-multipoint bridging.

**Figure 1-24 Access Point to Multipoint Bridging Example**



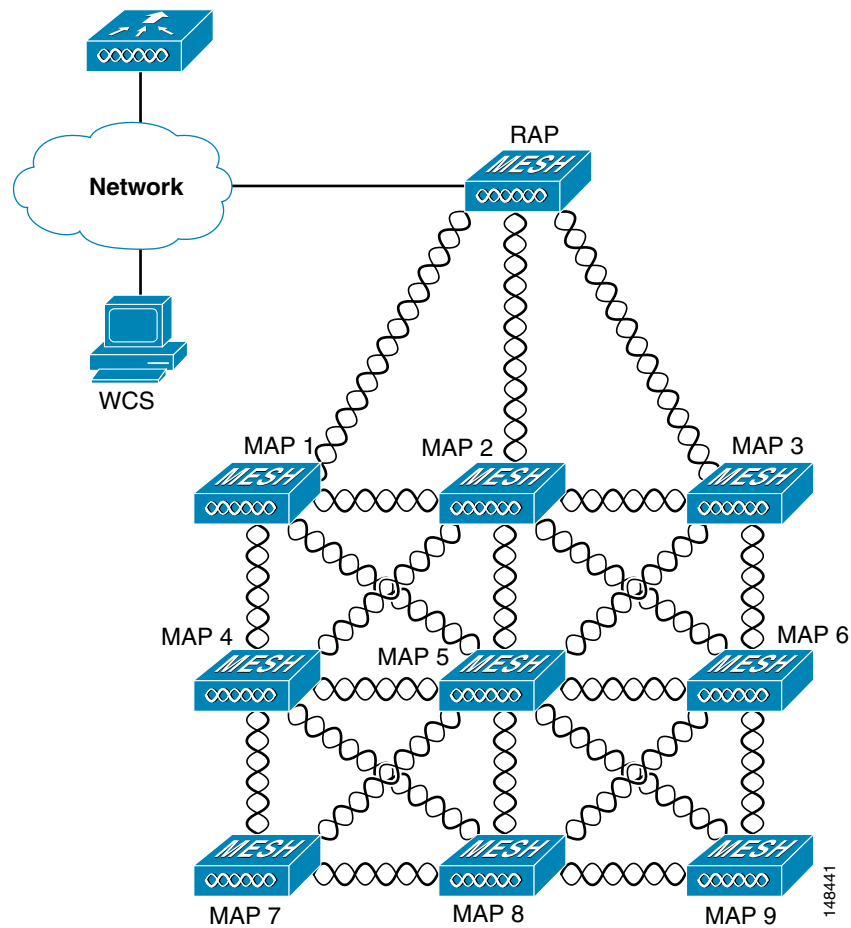
## Point-to-Multipoint Mesh Network

The access point is typically deployed in a mesh network configuration. In a typical mesh deployment, one or more RAPs have a wired network connection through a switch to a controller. Other remote MAPs without wired network connections use the backhaul feature to optimally link to a RAP that is connected to the wired network. In the mesh network, the links between the access points are referred to as the *backhaul links*.

Intelligent wireless routing is provided by the Adaptive Wireless Path protocol (AWPP). This enables each MAP to identify its neighbors and intelligently choose the optimal path to the RAP with the wired network connection by calculating the cost of each path in terms of signal strength and the number of hops required to get to a controller with signal strength given priority since signal strength determines the data rate available for backhaul.

Figure 1-25 illustrates a typical mesh configuration using MAPs and RAPs.

**Figure 1-25** Typical Mesh Configuration Using Access Points



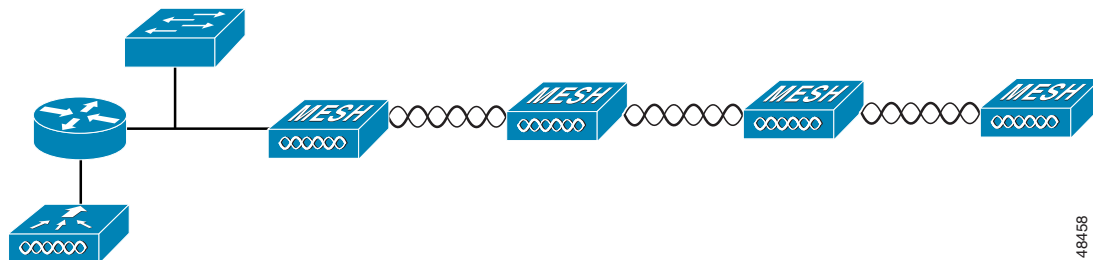
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## Layer 3 Network Operation

The access points support Layer 3 network operation. Access points and controllers in Layer 3 configurations use IP addresses and UDP packets, which can be routed through large networks. Layer 3 operation is scalable and recommended by Cisco.

Figure 1-26 illustrates a typical Layer-3 wireless network configuration containing access points and a controller.

**Figure 1-26** Typical Layer 3 Access Point Network Configuration Example



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