



Overview

The Cisco Aironet 1560 Series Outdoor Access Point (hereafter called the *access point* or *AP*) is a wireless outdoor access point which is designed for use in a variety of network configurations. The access point supports wireless client access, bridging, and mesh wireless connectivity.



Note

Mesh and bridge modes are not supported in Cisco Wireless Release 8.3 software.

About the 1560 Access Point

The detailed up-to-date technical specifications for the Cisco Aironet 1560 Series Outdoor Access Points are available in the *Cisco Aironet 1560 Series Outdoor Access Point Data Sheet*, at the following URL:

<http://www.cisco.com/c/en/us/products/collateral/wireless/aironet-1560-series/datasheet-c78-737416.html>

The 1560 access point supports two radios (2.4-GHz and 5-GHz) and provides client access using the unlicensed RF Wi-Fi spectrum. The radios have 802.11ac Wave 2 capability.

The 5 GHz radios have 802.11ac Wave 2 capability. The 2.4 GHz or 5 GHz radio can be used for client access or can be used for both client access and backhaul traffic. Depending on the model, the access point can support up to 1.3 Gbps data rates.

The access point is a standalone unit that can be wall, pole 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 can be 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*, 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.

Access Point Models

The model numbers (or part numbers) and configuration for the Cisco Aironet 1560 Outdoor Access Points are described in [Table 1-1](#).

For a detailed description of the declarations of conformity and regulatory information for the 1560 access points refer to [Appendix B, “Declarations of Conformity and Regulatory Information.”](#)

Table 1-1 1560 Access Point Model Numbers and Descriptions

Model (or part number)	Configuration
AIR-AP1562I-x-K9	<p>The AP 1562I has integrated omni antennas and contains a 2.4 GHz and 5 GHz radio with an option to configure in centralized, Flexconnect, Mobility Express, or mesh mode.</p> <p>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.</p>
AIR-AP1562E-x-K9	<p>The AP 1562E has 4 external antenna ports and contains a 2.4 GHz and 5 GHz radio with an option to configure in centralized, Flexconnect, or mesh mode.</p> <p>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.</p>
AIR-AP1562D-x-K9	<p>The AP 1562 has integrated directional antennas and contains a 2.4 GHz and 5 GHz radio with an option to configure in centralized, Flexconnect, or mesh mode.</p> <p>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.</p>

Regulatory Domains

The “-x” in the 1560 model numbers represent the domain. For example, in AIR-AP1562I-x-K9, the -x represents a regulatory domain for a specific country. For specific regulatory domains supported by each 1560 access point model, refer to the Wireless LAN Compliance Status at the following URL:

<http://www.cisco.com/go/aironet/compliance>

Hardware Features

This section describes the hardware features of the 1560 access point models. The following hardware features are described in this section:

- [Ports and Connectors, page 1-3](#)
- [Internal Antenna Models, page 1-8](#)
- [External Antenna Model, page 1-17](#)
- [Power Sources, page 1-18](#)

Ports and Connectors

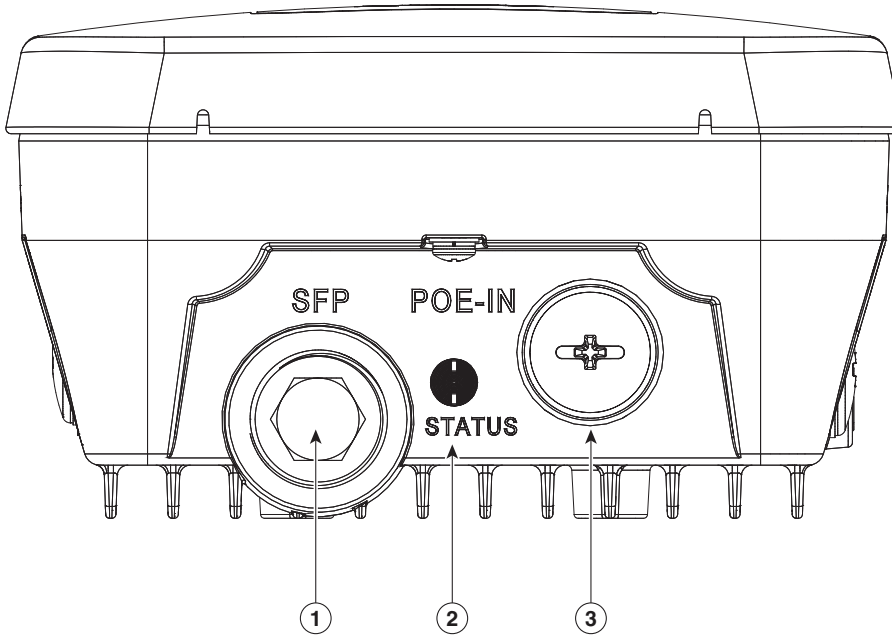
[Figure 1-4](#) and [Figure 1-5](#) show the access point connectors for all models. [Figure 1-1](#) shows the base connectors for internal antenna model, and [Figure 1-2](#) and [Figure 1-3](#) show the external antenna Type-N connectors.

**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.

Connectors on the Base

Figure 1-1 Access Point Models AP1562I and AP1562D Base Connectors

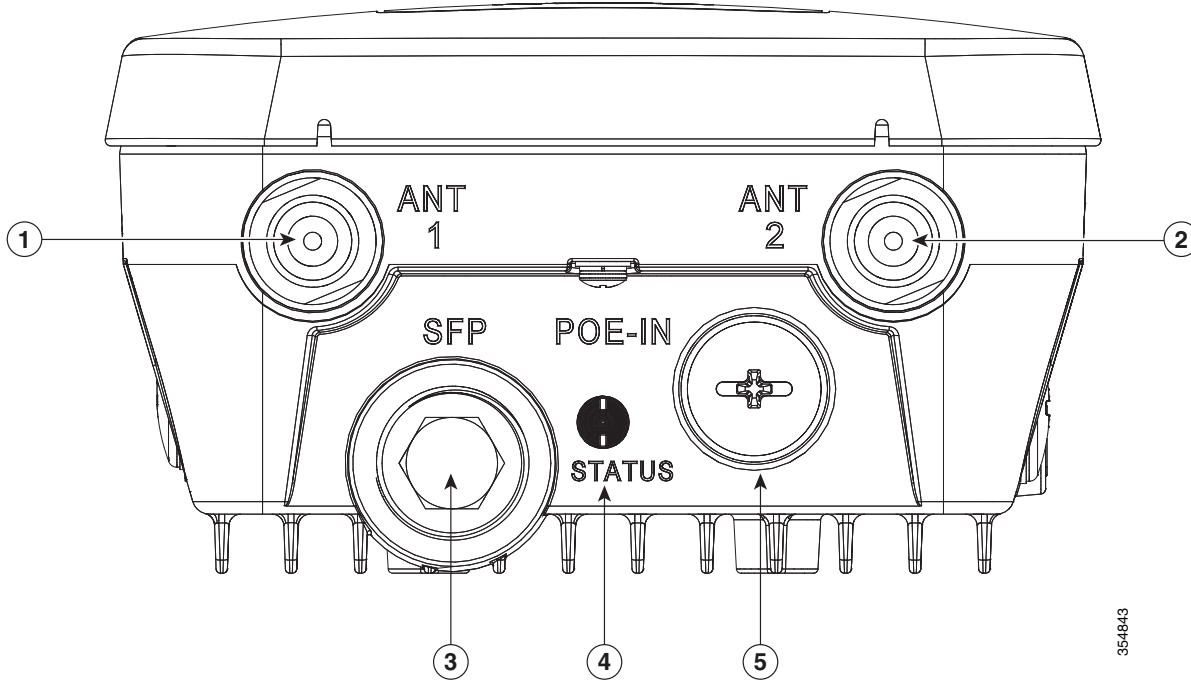


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<p>1 SFP port for uplink. If the port is not being used, then do not remove the covering plug. Otherwise, it may lead to water leaking into the access point. ¹</p>	<p>3 Gigabit Ethernet port for uplink or PoE-In. If the port is not in use, then the covering plug must be tightened to 12.5 lbf-in torque. Otherwise, it may lead to water leaking into the access point. ¹</p>
<p>2 Status LED</p>	

1. Either the SFP port or the Gigabit Ethernet port can be used as the uplink port, However, if the SFP port is in use, then the Ethernet port cannot be used as a local client port.

Figure 1-2 Access Point Model AP1562E Base Connectors



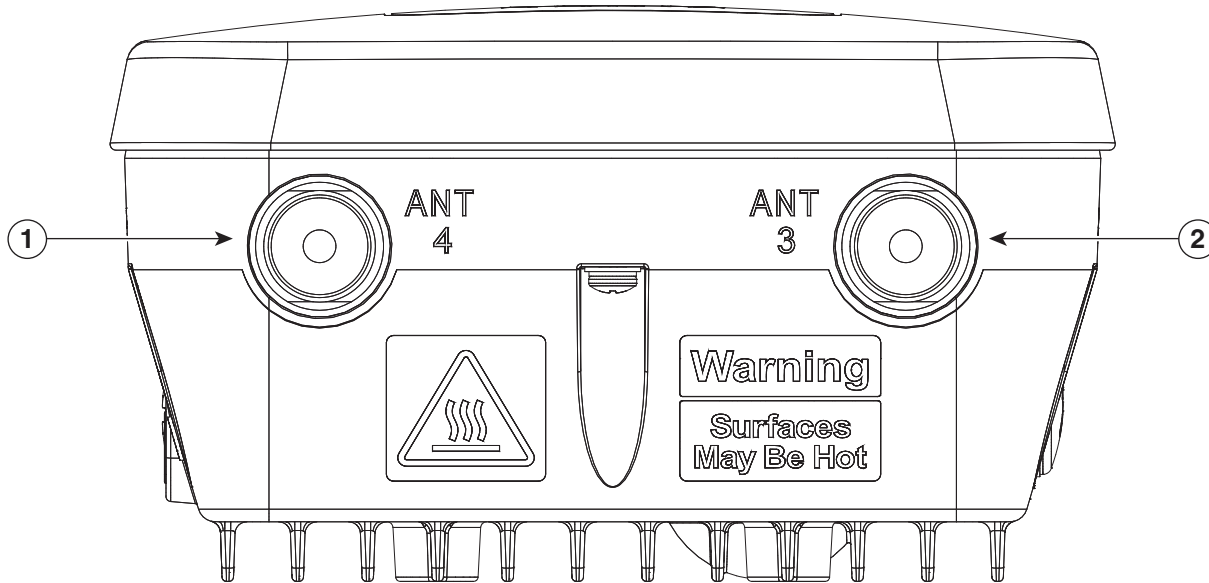
1	Antenna 1 port	4	Status LED
2	Antenna 2 port	5	Gigabit Ethernet/WAN and PoE-In port. If the port is not in use, then the covering plug must be tightened to 12.5 lbf-in torque. Otherwise, it may lead to water leaking into the access point.
3	SFP port If the port is not being used, then do not remove the covering plug. Otherwise, it may lead to water leaking into the access point.		

Connectors on the Head


Note

The AP1562I and AP1562D models do not have any connectors on the head of the AP.

Figure 1-3 Access Point Model AP1562E Head Connectors



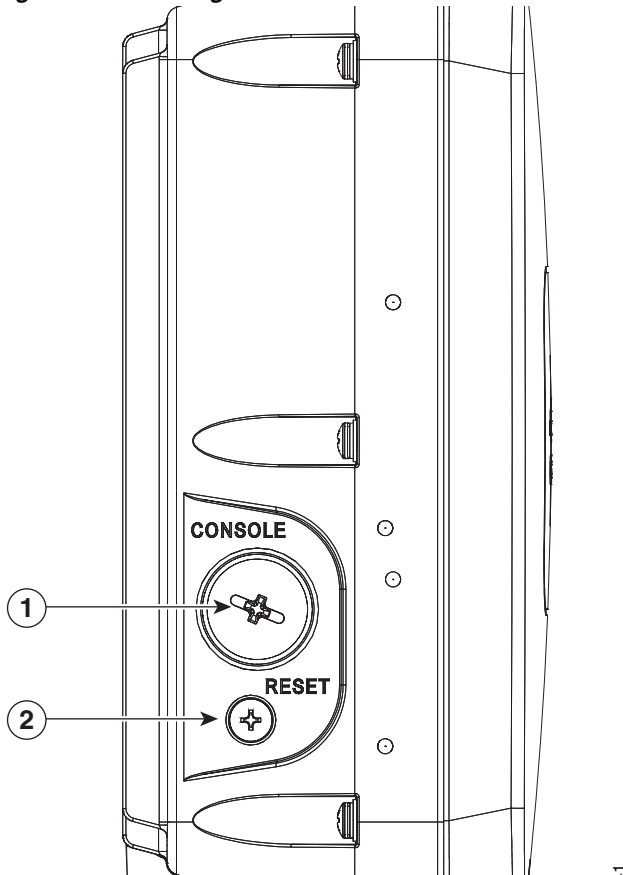
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1 Antenna port 4

2 Antenna port 3

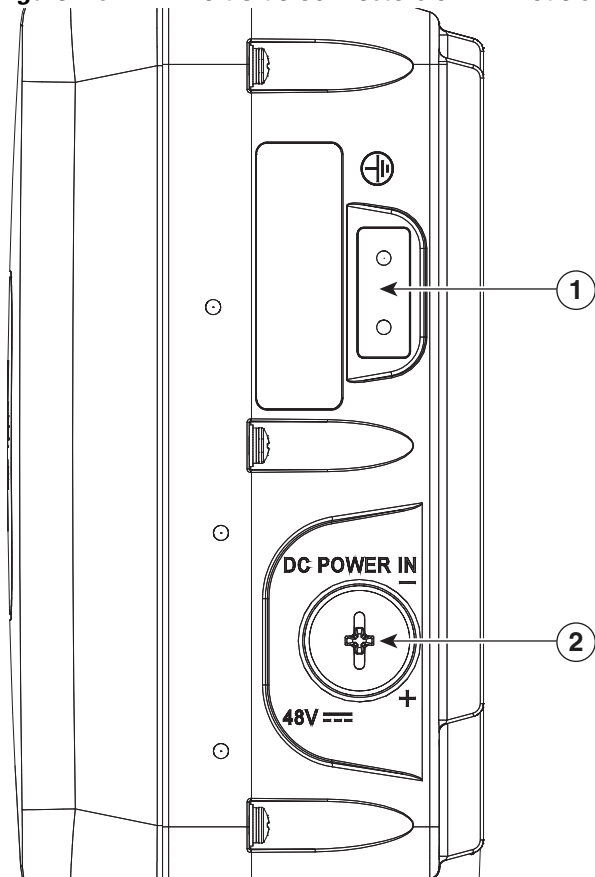
Connectors on the Sides

Figure 1-4 Right Side Connectors on all models



<p>1 Console port.</p> <p>The console port is under a covering plug. Inspect the seal of the plug and properly tighten it at the time of installation, and also every time the plug is removed and replaced. Tighten the plug to 12.5 lbf-in. If you do not tighten the plug properly, it will not meet IP67 criteria, and may lead to water leaking into the unit.</p>	<p>2 Reset button.</p> <p>The reset button is under a covering screw. Properly tighten it at the time of installation, and also every time it is removed and replaced. Tighten the screw to 24 lbf-in. If you do not tighten the screw properly, it will not meet IP67 criteria, and may lead to water leaking into the unit.</p>
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Figure 1-5 Left Side Connectors on All Models



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1 Ground Pad.	2 DC Power-In (covered) (42 V – 57 V). If the port is not in use, then the covering plug must be tightened to 12.5 lbf-in torque. Otherwise, it may lead to water leaking into the access point.
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Internal Antenna Models

AP1562I (Internal Antenna)

The AP1562I model has an internal omnidirectional antenna. The 1562I access point 802.11b/g/n radio is used primarily for local access and its 802.11a/n/ac radio for wireless backhaul in the Mesh.

The 2 GHz b/g/n radio operates in 2.4 GHz ISM band. It supports channels 1-11 in the US, 1-13 in Europe, and 1-13 in Japan. It has 3 transmitters with a maximum total output power of 29 dBm for 802.11b/g/n operation. Output power is configurable for 8 levels in 3 dB steps. It has three receivers that enable maximum-ratio combining (MRC).

The 5 GHz a/n radio operates in the UNII-1 band (5.15-5.25 GHz), UNII-2 band (5.25 - 5.35 GHz), UNII-2 Extended/ETSI band (5.47 - 5.725 GHz), and the upper ISM band (5.725 - 5.850 GHz). It has three transmitters with a maximum total output power of 29 dBm depending on the regulatory domain. Tx power settings will change depending on the regulatory domain. Output power is configurable in 3 dB steps. Its three receivers enable maximum-ratio combining (MRC).

The 1562I access point is equipped with three integrated dual-band antennas with 7 dBi gain at 2 GHz and 4 dBi gain at 5 GHz.

Figure 1-6 *Averaged 2.45 GHz azimuth plane radiation pattern*

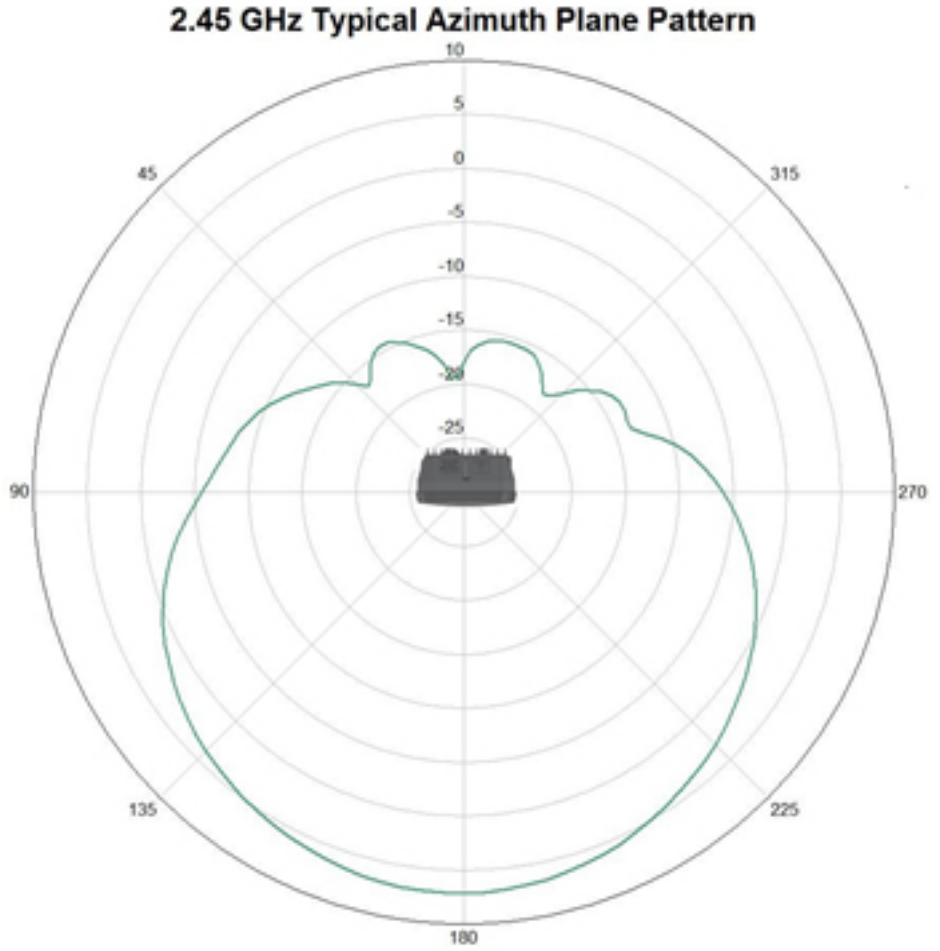


Figure 1-7 Averaged 2.45 GHz elevation plane radiation pattern

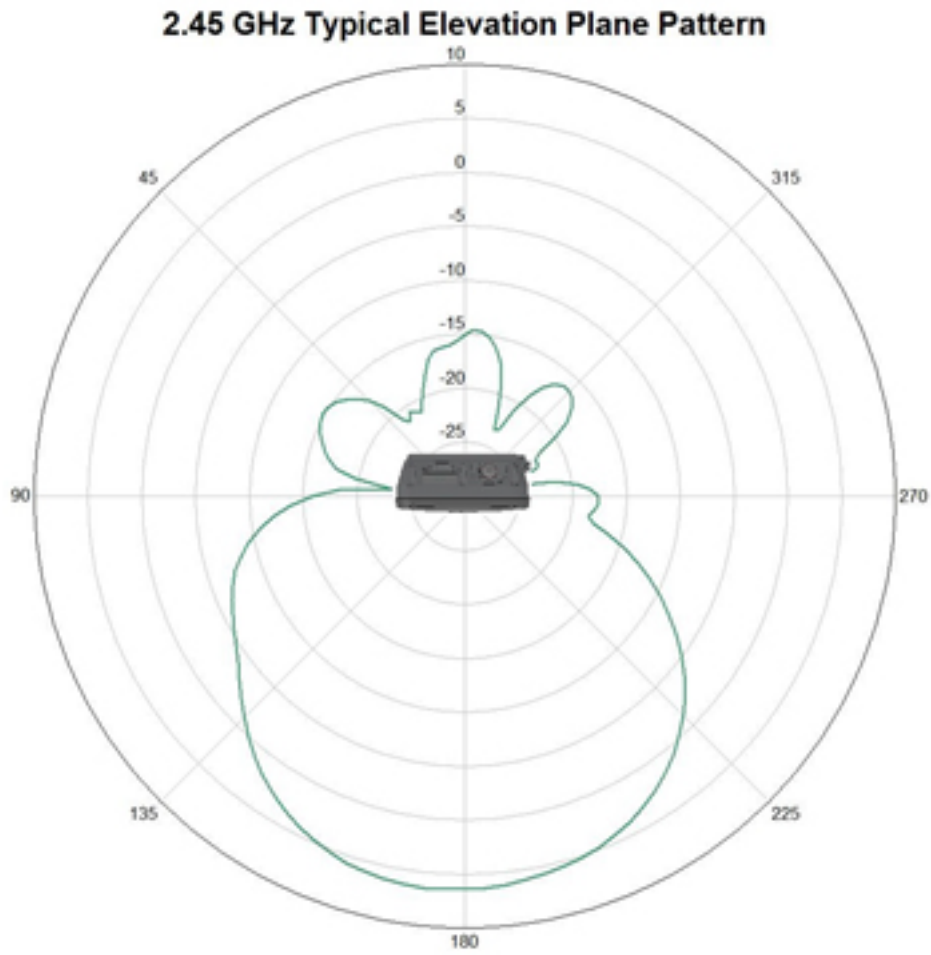


Figure 1-8 Averaged 5.5 GHz azimuth plane radiation pattern

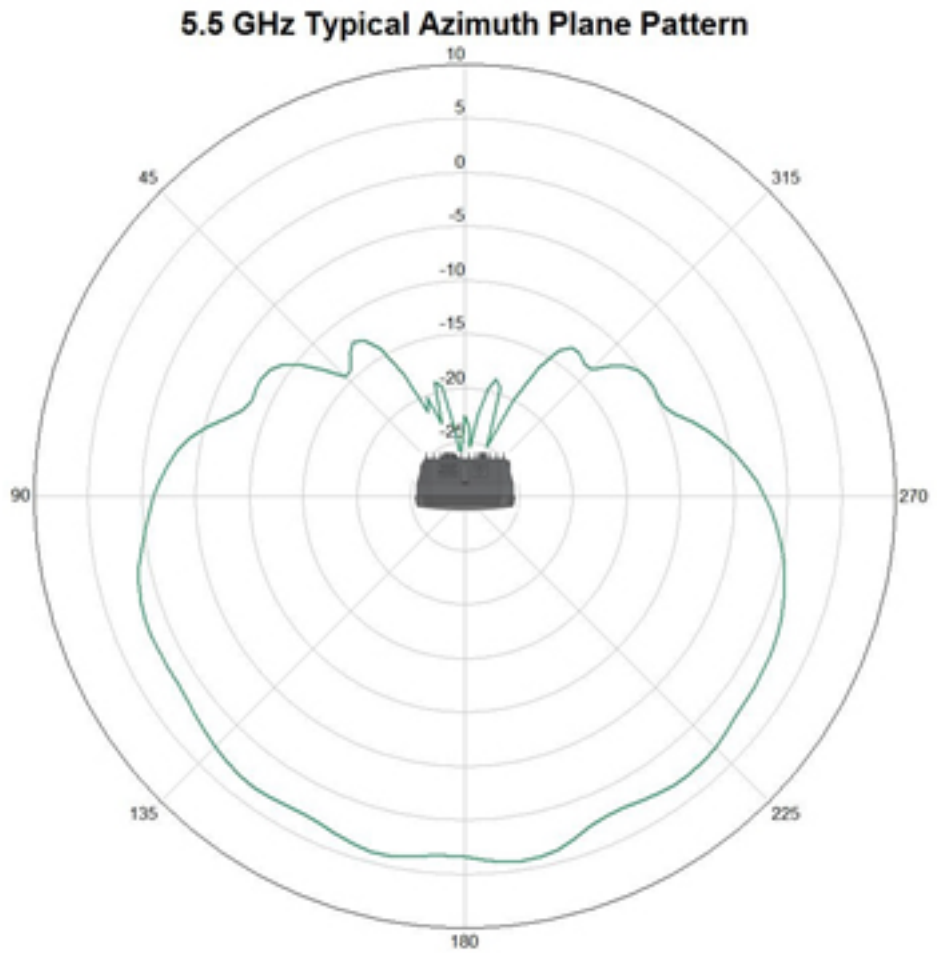
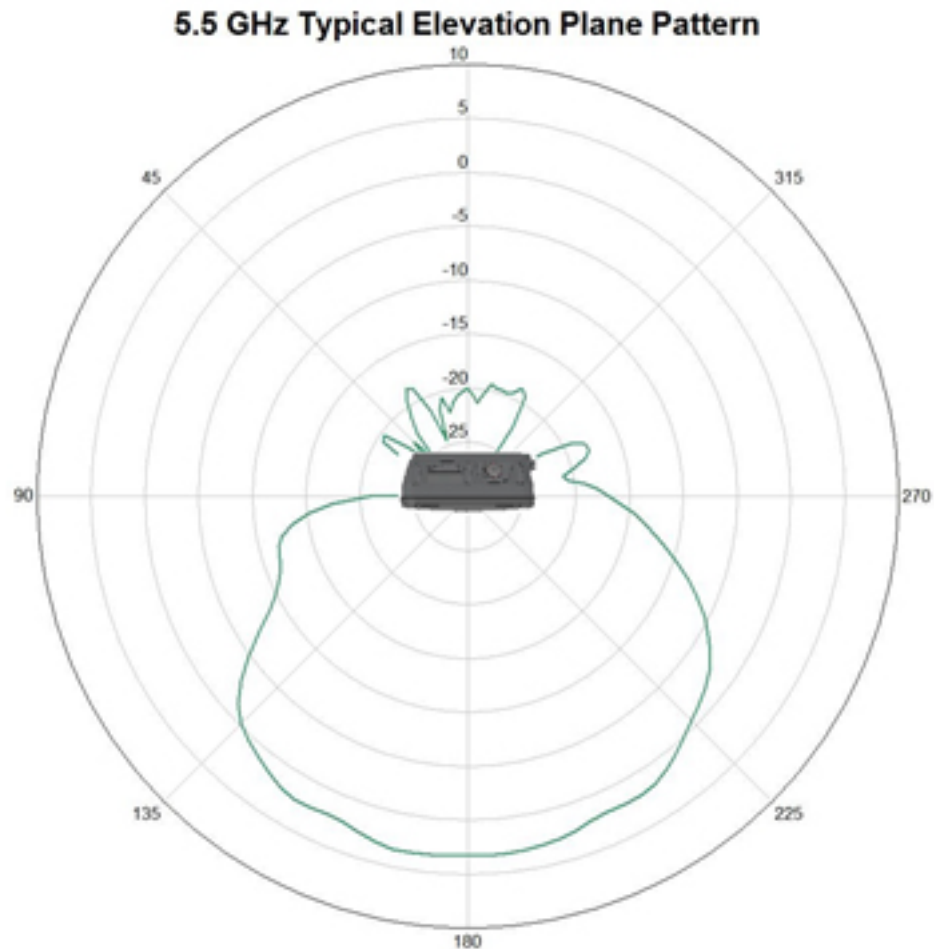


Figure 1-9 Averaged 5.5 GHz elevation plane radiation pattern



AP1562D (Internal Directional Antenna)

The 1562D access point 802.11b/g/n radio is used primarily for local access and its 802.11a/n/ac radio for wireless backhaul in the Mesh.

The 2 GHz b/g/n radio operates in 2.4 GHz ISM band. It supports channels 1-11 in the US, 1-13 in Europe, and 1-13 in Japan. It has 2 transmitters with a maximum total output power of 27 dBm for 802.11b/g/n operation. Output power is configurable for 8 levels in 3 dB steps. It has two receivers that enable maximum-ratio combining (MRC).

The 5 GHz a/n radio operates in the UNII-1 band (5.15-5.25 GHz), UNII-2 band (5.25 - 5.35 GHz), UNII-2 Extended/ETSI band (5.47 - 5.725 GHz), and the upper ISM band (5.725 - 5.850 GHz). It has two transmitters with a maximum total output power of 27 dBm depending on the regulatory domain. Tx power settings will change depending on the regulatory domain. Output power is configurable in 3 dB steps. Its two receivers enable maximum-ratio combining (MRC).

The 1562D access point is equipped with two integrated dual-band antennas with 9 dBi gain at 2 GHz and 10 dBi gain at 5 GHz.

Figure 1-10 Averaged 2.4 GHz radiation pattern - V-Pol Port

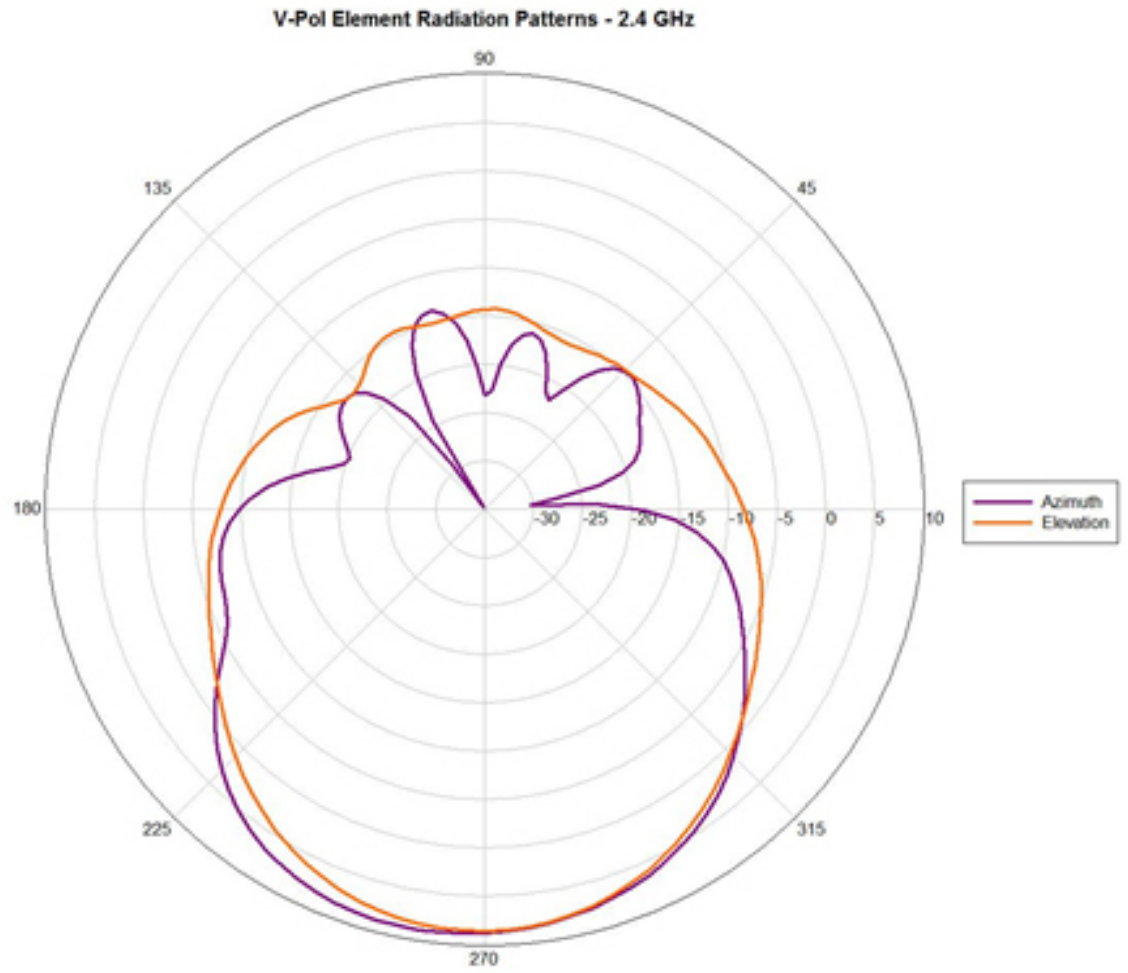


Figure 1-11 Averaged 5 GHz radiation pattern - V-Pol Port

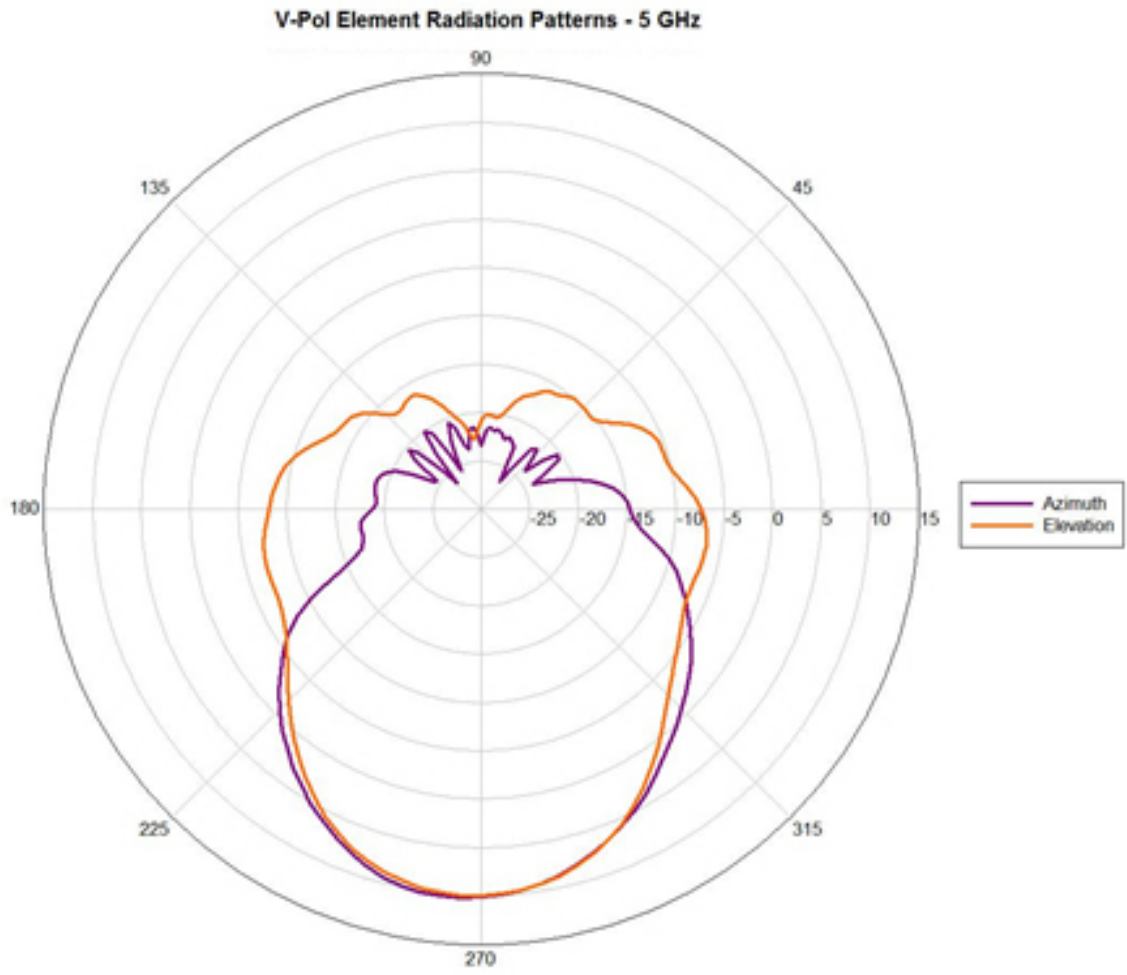


Figure 1-12 Averaged 2.4 GHz radiation pattern - H-Pol Port

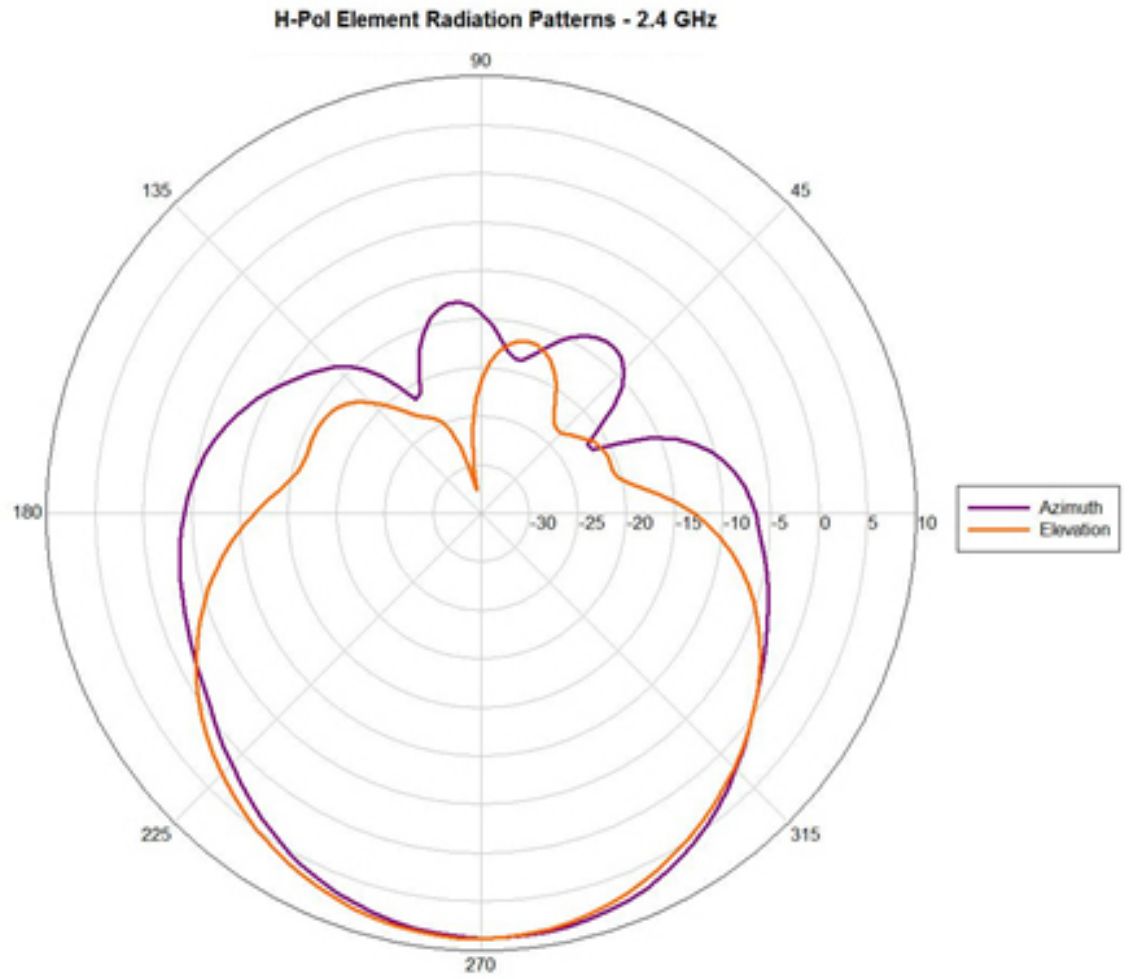
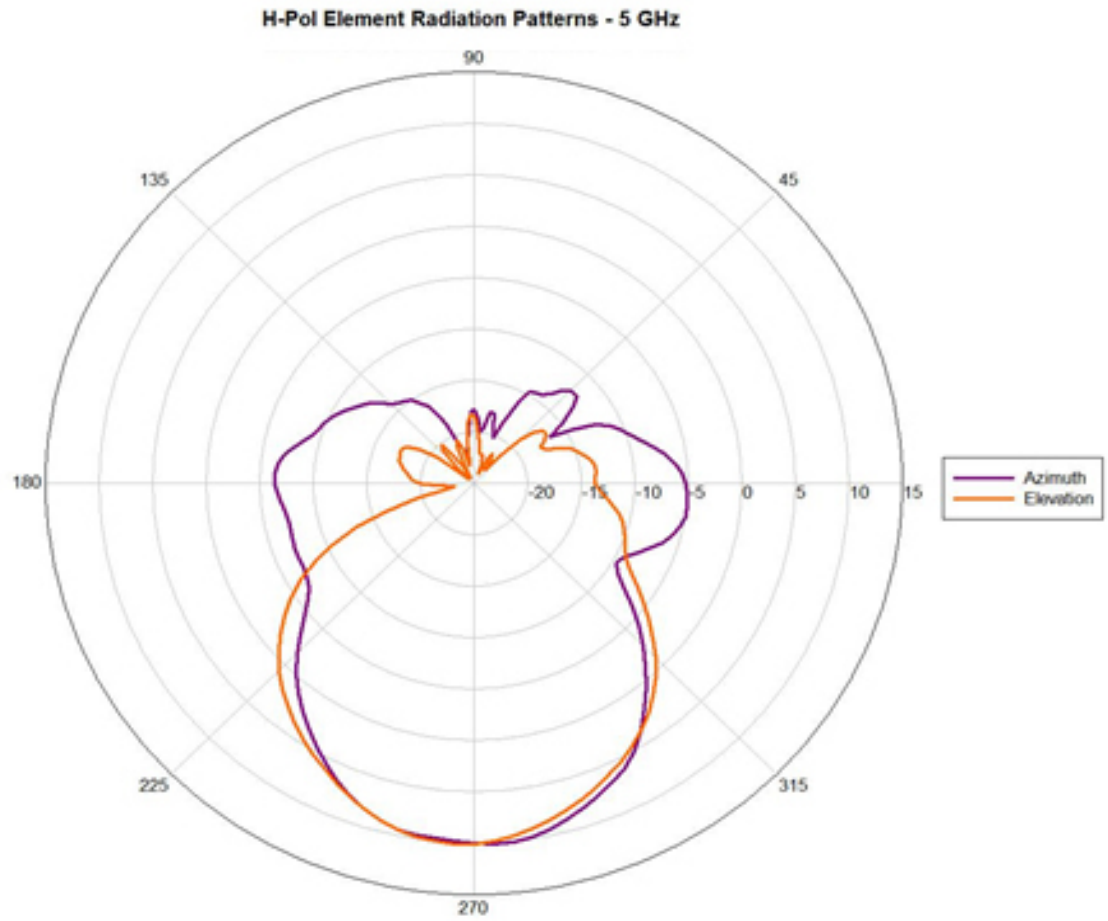


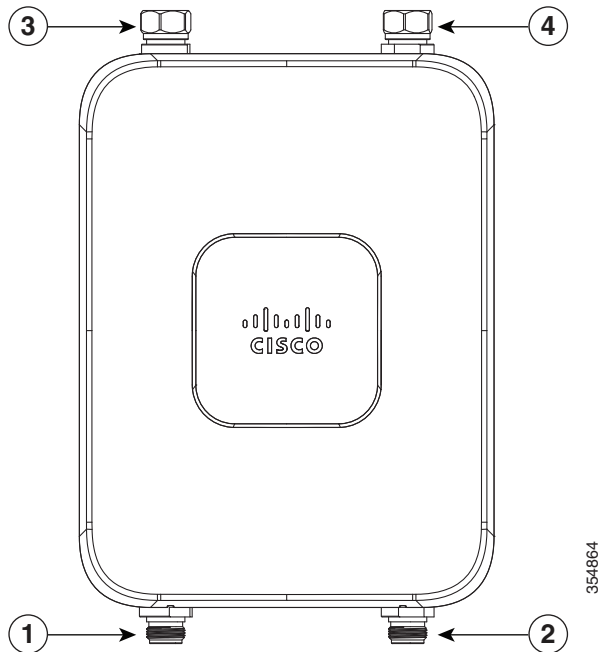
Figure 1-13 Averaged 5 GHz radiation pattern - H-Pol Port



External Antenna Model

Figure 1-14 shows the antenna port locations for model AP1562E. The ports used depend on the optional antennas ordered. For detailed information on these antennas, refer to [Installing External Antennas](#), page 2-31.

Figure 1-14 External Antenna Port Locations for Access Point Model AP1562E



1	Antenna port 1 – Type N connector	3	Antenna port 3– Type N connector (with cap)
2	Antenna port 2- Type N connector	4	Antenna port 4- Type N connector (with cap)

AP1562E (External Antenna)

The 1562E access points is equipped with four N-type RF connectors. The 1562E can be configured via software to support dual band or single band antennas. When configured for dual band antennas, antenna ports 1 and 2 on the base of the unit (Figure 1-2) are used to support multiple input/multiple output (MIMO) operation on both 2.4 and 5 GHz radios. When using the Cisco Aironet AIR-ANT2547V-N or AIR-ANT2547VG-N omnidirectional antennas, the antenna can be connected directly to the access point (Figure 2-17). If the antennas are remotely located, an appropriate low loss RF cable should be used



Note

Ensure that the antenna band mode is configured before the access point is installed.

When configured for single band antennas, antenna port 1 and antenna port 2 support MIMO operation for the 2.4 GHz radio, and antenna ports 3 and 4 (Figure 1-3) support MIMO on the 5 GHz radio. See the *Cisco Wireless LAN Controller Configuration Guide* for information on the software configuration.

The 2 GHz b/g/n radio operates in 2.4 GHz ISM band. It supports channels 1-11 in the US, 1-13 in Europe, and 1-13 in Japan. It has 2 transmitters with a maximum total output power of 27 dBm for 802.11b/g/n operation. Output power is configurable for 8 levels in 3 dB steps. It has two receivers that enable maximum-ratio combining (MRC).

The 5 GHz a/n radio operates in the UNII-1 band (5.15-5.25 GHz), UNII-2 band (5.25 - 5.35 GHz), UNII-2 Extended/ETSI band (5.47 - 5.725 GHz), and the upper ISM band (5.725 - 5.850 GHz). It has two transmitters with a maximum total output power of 27 dBm depending on the regulatory domain. Tx power settings will change depending on the regulatory domain. Output power is configurable in 3 dB steps. Its two receivers enable maximum-ratio combining (MRC).

Power Sources

The 1560 series access point supports these power sources:

- DC power – 42-57 VDC
- Power over Ethernet (PoE) – For more information, see [“Powering the Access Point” section on page 2-44](#).



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



Caution

Several forms of PoE are supported. See [Table 2-9](#) for the PoE options and their corresponding modes of operation.



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).

Power Injectors

The 1560 series access points support the following power injectors:

- AIR-PWRINJ-60RGD1
- AIR-PWRINJ-60RGD2



Warning

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



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).

Ethernet (PoE) Ports

The access point supports an Ethernet uplink port (also for PoE-In). The access point Ethernet uplink port uses an RJ-45 connector (with weatherproofing) to link the access point to the 10BASE-T, 100BASE-T or 1000BASE-T network. The Ethernet cable is used to send and receive Ethernet data and to optionally supply inline power from the power injector or a suitably powered switch port.

**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.

Network Deployment Examples



Note

Mesh and bridge modes are not supported in Cisco Wireless Release 8.3 software.

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.

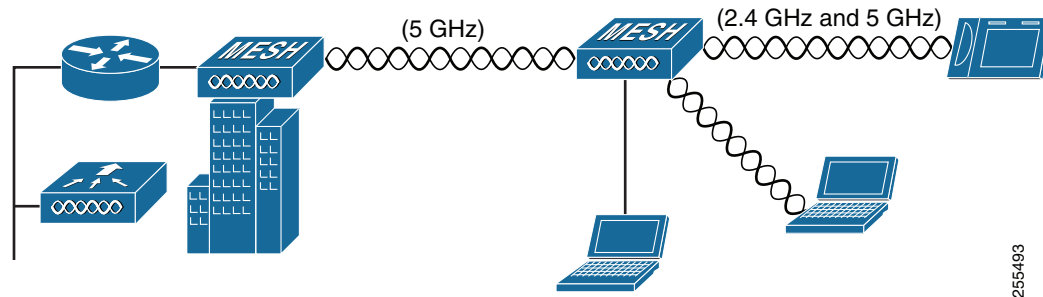
The access point plays two primary radio roles: a root access point (hereafter called a RAP) or a mesh (non-root) access point (hereafter called a MAP), which is the default role of all access points. When the access point has a fiber or wired Ethernet connection to the controller (through a switch), 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 connection to the controller (through a switch), 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 which has an Ethernet connection through a switch to the controller. MAPs may 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 1-15). 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 1-15 Access Point Backhaul Example



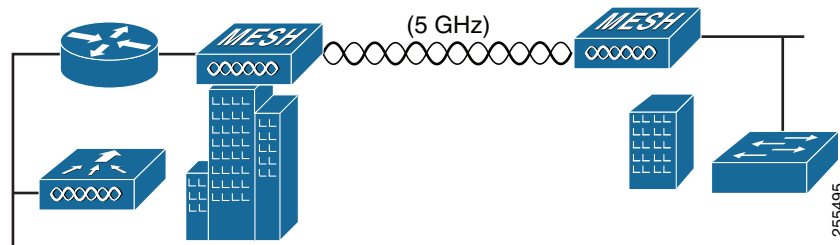
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Point-to-Point Bridging

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 1-16](#). 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.

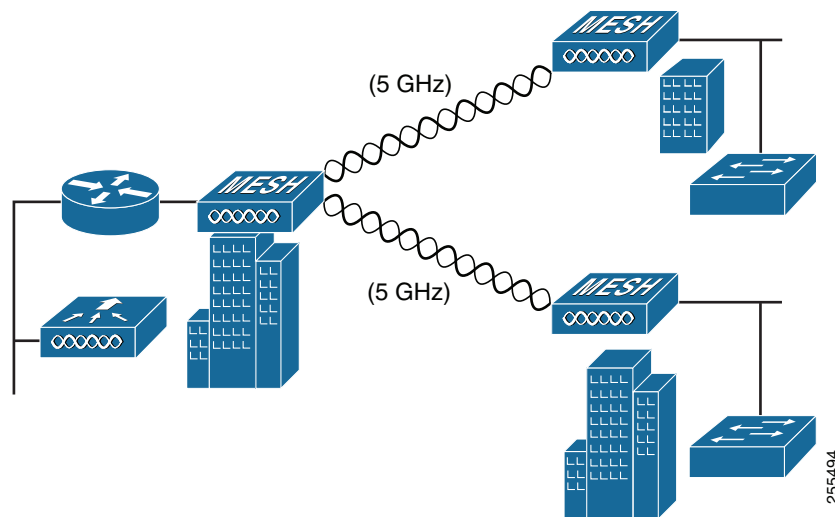
Figure 1-16 Access Point Point-to-Point Bridging Example



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 1-17](#) illustrates an example of access point-to-multipoint bridging.

Figure 1-17 Access Point to Multipoint Bridging Example



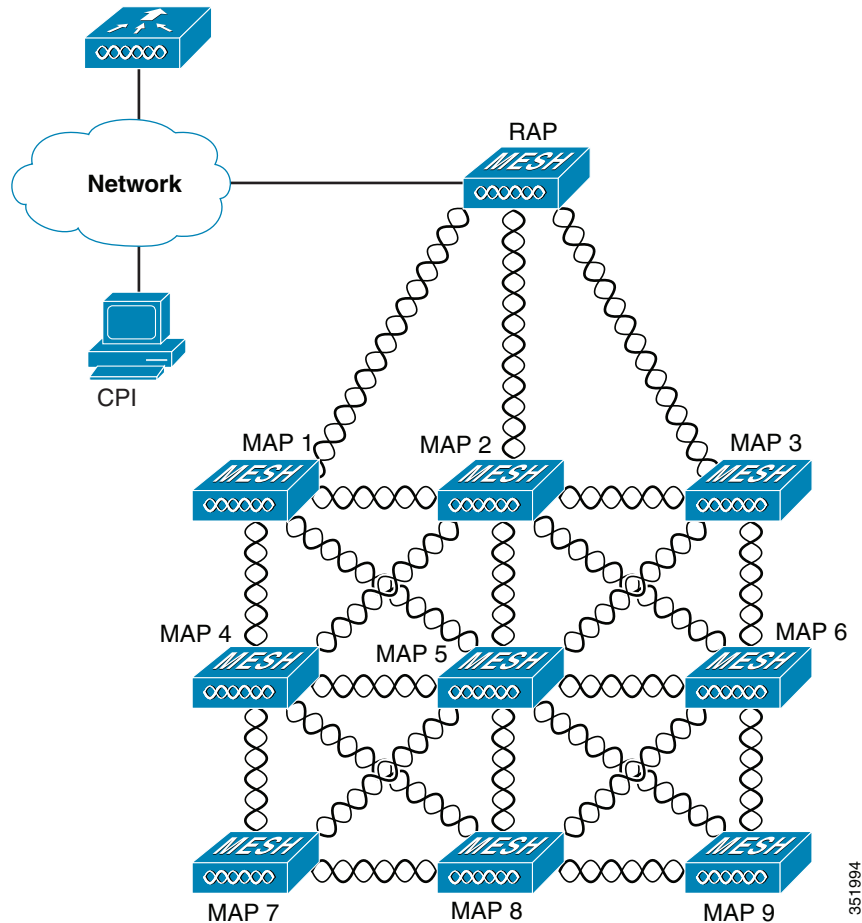
Point-to-Multipoint Mesh Network

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 1-18 illustrates a typical mesh configuration using MAPs and RAPs.

Figure 1-18 Typical Mesh Configuration Using Access Points



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 1-19 illustrates a typical Layer-3 wireless network configuration containing access points and a controller.

Figure 1-19 Typical Layer 3 Access Point Network Configuration Example

