

Cisco Catalyst Wireless 9166I Series Wi-Fi 6E Access Point Hardware Installation Guide

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Preface

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

It includes the following sections:

- About this Guide, 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.

Note that the Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point is referred to as *access point* or *AP* in this document.

Conventions

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

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

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

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

Related Documentation

All user documentation for the Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point is available at:

https://www.cisco.com/c/en/us/support/wireless/catalyst-9166i-access-point/model.html

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

Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide

Communications, Services, and Additional Information

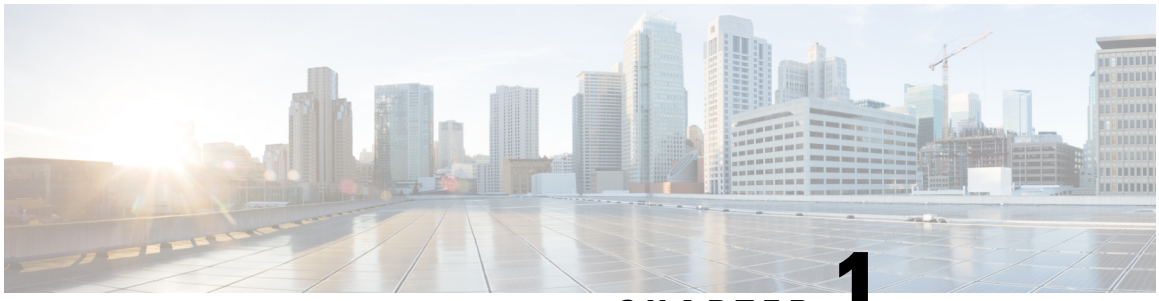
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CHAPTER 1

About the Access Point

- Introduction to Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point, on page 1
- Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point Features, on page 1
- AP Model Numbers and Regulatory Domains, on page 4
- Antennas and Radios, on page 4

Introduction to Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point

The Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point is an enterprise-class tri-band (2.4 GHz, 5 GHz, 6 GHz) access point. The AP supports full interoperability with leading 802.11ax and 802.11ac clients and a hybrid deployment with other APs and controllers.

The AP hardware is supported on the following platforms:

- Cisco Catalyst Center (earlier known as Cisco DNA Center) on-premises
- Cisco Catalyst stack
- Meraki cloud-based stack

A full listing of the AP's features and specifications is provided in the Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point Data Sheet, at:

Cisco Catalyst 9166 Series Access Points Data Sheet

Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point Features

The CW9166I AP is a tri-band Wi-Fi 6E enterprise indoor access point designed to work with the Cisco Catalyst 9800 Series Wireless Controller. The AP includes the following hardware and supporting features:

- Five radios:
  - A 4x4:4 5-GHz or 6-GHz XOR radio
  - A 4x4:4 5-GHz radio
  - A 4x4:4 2.4-GHz radio

- A tri-band scanning radio for Cisco CleanAir Pro
- A 2.4-GHz IoT (BLE) radio

- Environmental Sensors:
  - Ambient temperature sensor
  - Air quality sensor (Total Volatile Organic Compound [TVOC])
  - Relative humidity sensor

Note The environment sensors are configurable on Cisco Spaces platform.

For more information on how to configure the AP sensor in Cisco Spaces, see the AP as a Sensor section in the *Cisco Spaces: IoT Services Configuration Guide*.

- Integrated internal antennas that are omnidirectional in azimuth for the 2.4-GHz, 5-GHz, and 6-GHz bands.
- Scanning radio uses two 2.4-GHz, 5-GHz, and 6-GHz antennas.
- Multiuser Multiple-Input Multiple-Output (MU-MIMO) technology for uplink and downlink.
- Orthogonal Frequency Division Multiple Access-based (OFDMA-based) scheduling for both uplink and downlink.
- The following hardware external interfaces:
  - 1x100/1000/2500/5000 Multigigabit Ethernet (RJ-45)
  - RS-232 Console Interface through RJ-45
  - Recovery push button (enables partial or full system configuration recovery)
  - USB 2.0 port, type-A connector
  - DC 54V power jack
  - One multicolor LED
- Integrated Bluetooth Low Energy (BLE) radio to enable IoT use cases such as location tracking and wayfinding.
- Intelligent Capture probes the network and provides Cisco Catalyst Center (earlier known as Cisco DNA Center) with deep analysis.
- Spatial Reuse (also known as Basic Service Set [BSS] coloring) that allows APs and their clients to differentiate between multiple BSS, thus permitting more simultaneous transmissions.
- Power savings mode called Target Wake Time (TWT), which allows clients to stay asleep and wake up only at prescheduled (target) times to exchange data with the AP. This provides significant energy savings for battery-operated devices.
- Cisco Catalyst Center support to enable Cisco Spaces, Apple FastLane, and Cisco Identity Services Engine (ISE).

- Optimized AP Roaming to ensure that client devices associate with the AP in the coverage range that offers the fastest data rate available.
- Cisco CleanAir Pro technology supports 2.4-GHz, 5-GHz, and 6-GHz bands. CleanAir Pro delivers proactive, high-speed spectrum intelligence across 20, 40, and 80, and 160-MHz-wide channels to combat performance problems arising from wireless interference.
- Flexibile Radio Assignment (FRA), switches the XOR radio between 5-GHz or 6-GHz dynamically depending on the client type and load on the AP.
- Cisco Software-Defined Access (SD-Access) deployment is supported.

The AP supports lightweight deployments (using Catalyst 9800 Controllers). The AP also supports the following operating modes:

- **Local mode:** This is the default mode for the AP. In this mode, the AP serves clients. 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 where it is then routed.
- **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 can continue to function even if connection to the controller is lost.
- **Monitor mode:** In this mode, specified Cisco APs can exclude themselves from handling data traffic between clients and the infrastructure. These APs act as dedicated sensors for location-based services (LBS), rogue AP detection, and intrusion detection system (IDS).When APs are in monitor mode, they actively monitor the airwaves and typically, do not serve clients.
- **Sniffer mode:** In this mode, the AP starts sniffing the air on a given channel. It captures and forwards all the packets from the clients on that channel to a remote machine that runs AiroPeek NX or Wireshark (packet analyzers for IEEE 802.11 wireless LANs). This includes information on timestamp, signal strength, packet size, and so on.



Note In the sniffer mode, the server to which the data is sent should be on the same VLAN as the wireless controller management VLAN. Otherwise, an error is displayed.

- **Site Survey mode:** The AP GUI is enabled and is used for configuring the RF parameters for site survey investigation. For information, see the Access Points Survey Mode section in the *Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide*.

AP Model Numbers and Regulatory Domains

AP Type	Product ID	Details
Access Point for indoor environments, with internal antennas	CW9166I-A CW9166I-B CW9166I-E CW9166I-F CW9166I-Q CW9166I-R CW9166I-Z CW9166I-ROW CW9166I-MR	Wi-Fi 6E AP, tri-band, 802.11ax with internal

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, see https://www.cisco.com/c/dam/assets/prod/wireless/wireless-compliance-tool/index.html. Not all regulatory domains have been approved. As and when they are approved, this compliance list is updated.

Note The *x* in the model numbers represents the regulatory domain.

Antennas and Radios

The following sections provide detailed information about the AP's antennas and radios.

Internal Antennas

The Cisco Catalyst Wireless 9166I AP (CW9166I-x) has the following list of internal antennas:

- Four internal dual-band antennas with a dedicated 2.4-GHz radio and a 5-GHz radio
- Four internal dual-band antennas with a dedicated 6-GHz radio and a 5-GHz radio
- One internal single-band antenna with a dedicated 2.4-GHz IoT radio
- Two tri-band antennas with a dedicated 2.4 GHz, 5-GHz, and 6-GHz Aux radio

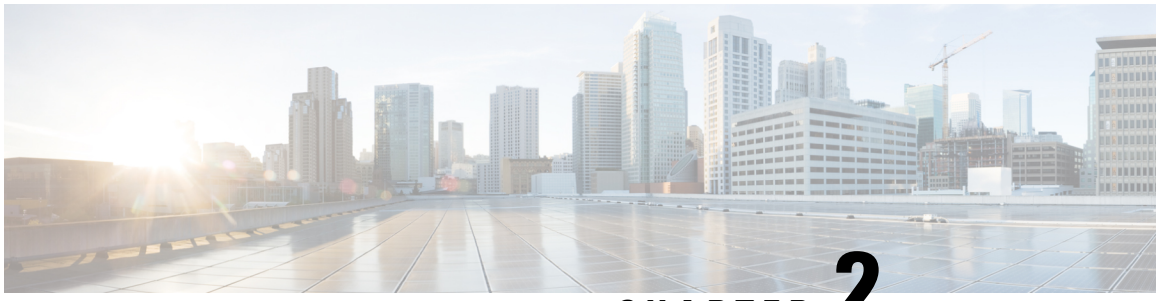
Operating Frequency and Effective Isotropic Radiated Power

Table 1: Cisco CW9166I AP Values for European Union (CE) Region

Radio	Frequency Bands	Maximum Total EIRP Power Level (dBm)
Wi-Fi	2400–2483.5 MHz	20 (4x4)
	5150–5250 MHz	23 (4x4)
	5250–5350 MHz	23 (4x4)
	5470–5725 MHz	30 (4x4)
	5945–6425 MHz	23 (4x4)
Bluetooth Low Energy (BLE)	2400–2483.5 MHz	9.31

Table 2: Cisco CW9166I AP Values for United Kingdom Region

Radio	Frequency Bands	Maximum Total EIRP Power Level (dBm)
Wi-Fi	2400–2483.5 MHz	20 (4x4)
	5150–5250 MHz	23 (4x4)
	5250–5350 MHz	23 (4x4)
	5470–5725 MHz	30 (4x4)
	5725–5850 MHz	23 (4x4)
	5925–6425 MHz	23.98 (4x4)
Bluetooth Low Energy (BLE)	2400–2483.5 MHz	9.31



CHAPTER 2

Hardware Features

This chapter describes the hardware features of Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point and contains the following sections:

- Access Point Views, Ports, and Connectors, on page 7
- CW9166I (Internal Antenna) Radiation Patterns, on page 9

Access Point Views, Ports, and Connectors

Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point has multiple options that you can use to power the AP. For information about connectors and ports for the AP models, see Connectors and Ports on the AP, on page 7.

Environment Sensors

The AP has inbuilt environment sensors that work with Cisco Spaces. There are two visible vents at the top of the AP. The sensors measure the following environment parameters:

- Ambient air temperature sensor
- Air quality sensor (Total Volatile Organic Compounds [TVOC])
- Relative humidity sensor

Note For more information on how to configure the AP sensor in Cisco Spaces, see the AP as a Sensor section of the *Cisco Spaces: IoT Services Configuration Guide*.

Connectors and Ports on the AP

The following figures show the available ports on the AP:

CW9166I Face View

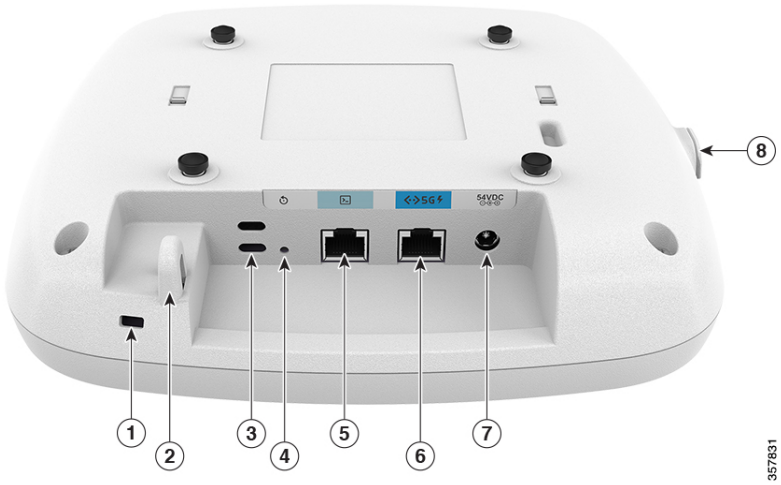
Figure 1: CW9166I Face View



1	Location of the ports and connectors on the head of the AP.
2	USB 2.0 port
3	Status LED For information on the LEDs status, see Table 5: LED Status Indications.

CW9166I Top View

Figure 2: CW9166I Top View with Connectors and Ports



1	Kensington lock slot	5	RJ-45 console port Default baud rate is 115200.
2	Security hasp for padlocking AP to mounting bracket	6	5GbE port
3	Environment Sensor vents	7	DC 54V power input port
4	Mode button For information on how to use the Mode button, see the Using the Mode Button section	8	USB 2.0 port

CW9166I (Internal Antenna) Radiation Patterns

The following illustrations show the CW9166I model with internal antenna radiation patterns:

Table 3: Cisco Catalyst 9166I AP Radiation Patterns

Figure 3: CW9166I - Client-Serving Normalized Radiation Pattern (2.4-GHz Azimuth)

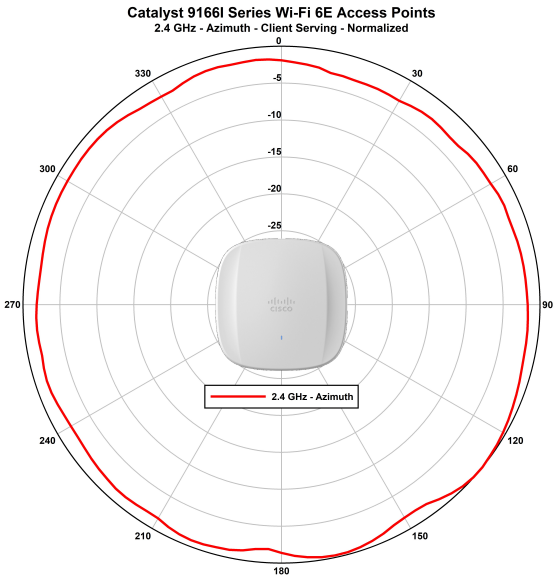


Figure 4: CW9166I - Client-Serving Normalized Radiation Pattern (2.4-GHz Elevation)

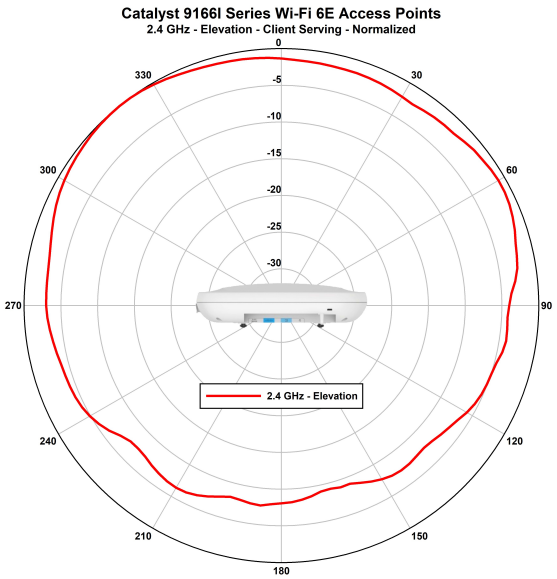


Figure 5: CW9166I - Client-Serving Normalized Radiation Pattern (5-GHz Azimuth)

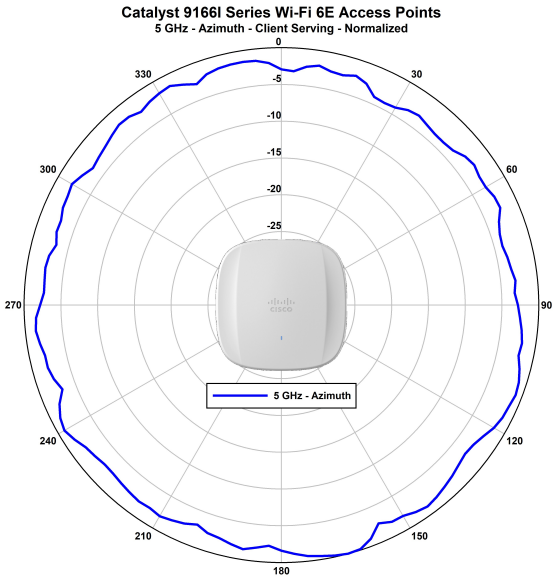


Figure 6: CW9166I - Client-Serving Normalized Radiation Pattern (5-GHz Elevation)

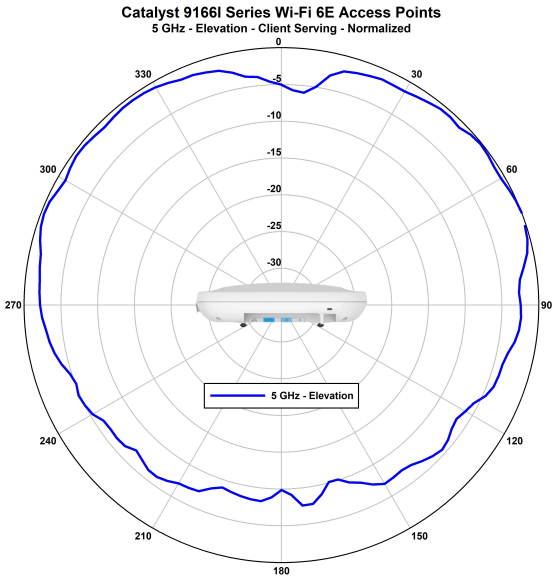


Figure 7: CW9166I - Client-Serving Normalized Radiation Pattern (6-GHz Azimuth)

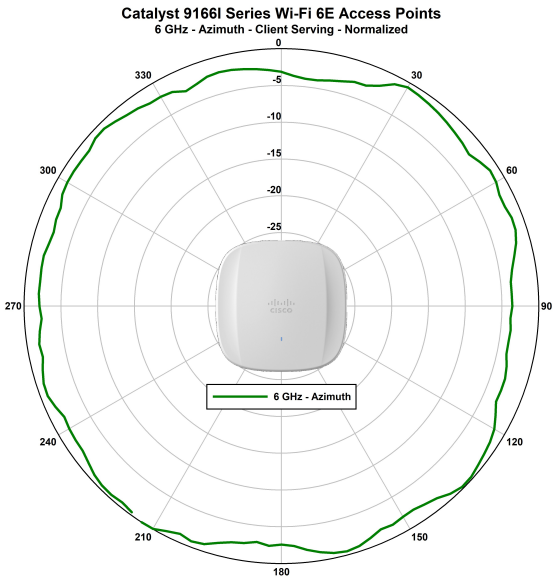


Figure 8: CW9166I - Client-Serving Normalized Radiation Pattern (6-GHz Elevation)

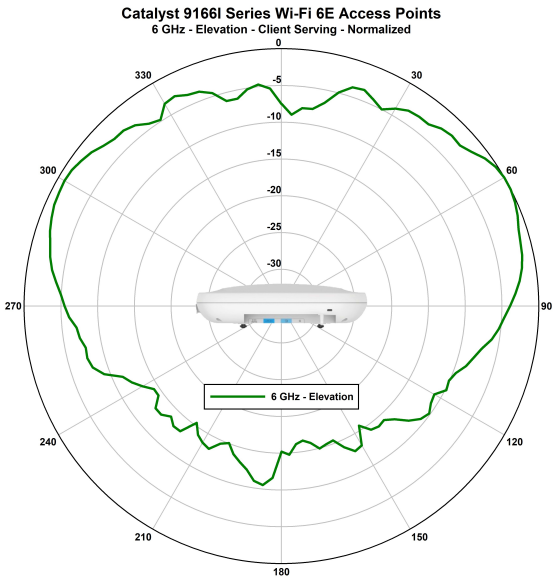


Figure 9: CW9166I - XOR Normalized Radiation Pattern (5-GHz Azimuth)

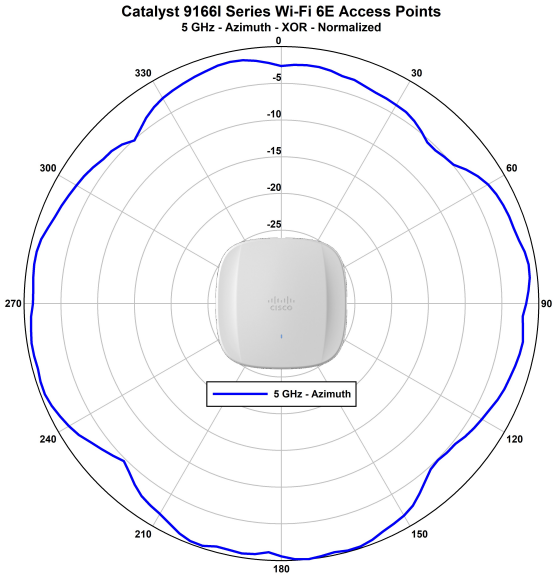


Figure 10: CW9166I - XOR Normalized Radiation Pattern (5-GHz Elevation)

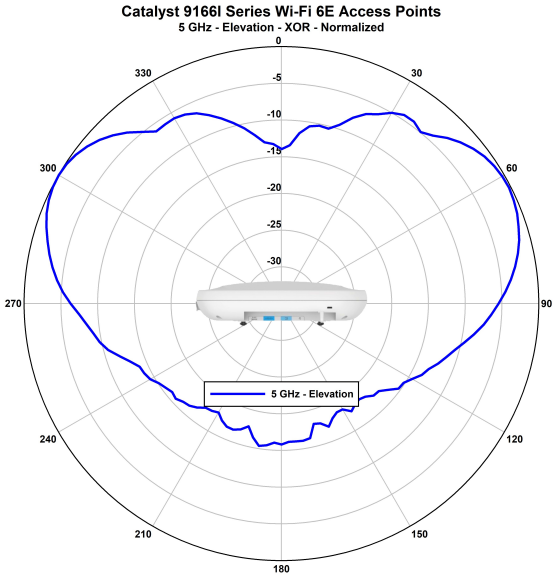


Figure 11: CW9166I - Scanning Radio-Normalized Radiation Pattern (2.4-GHz Azimuth)

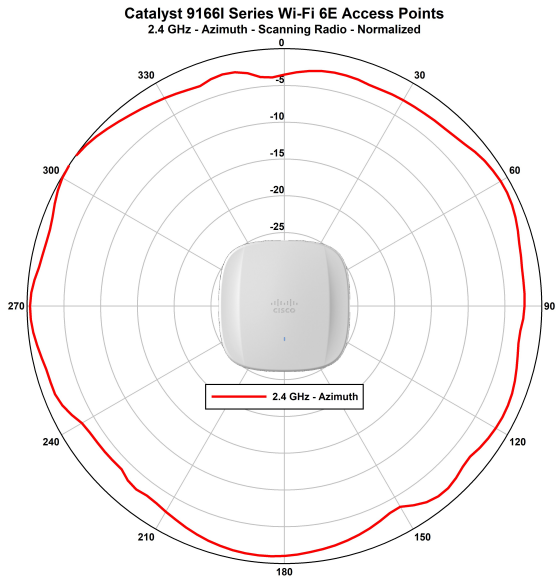


Figure 12: CW9166I - Scanning Radio-Normalized Radiation Pattern (2.4-GHz Elevation)

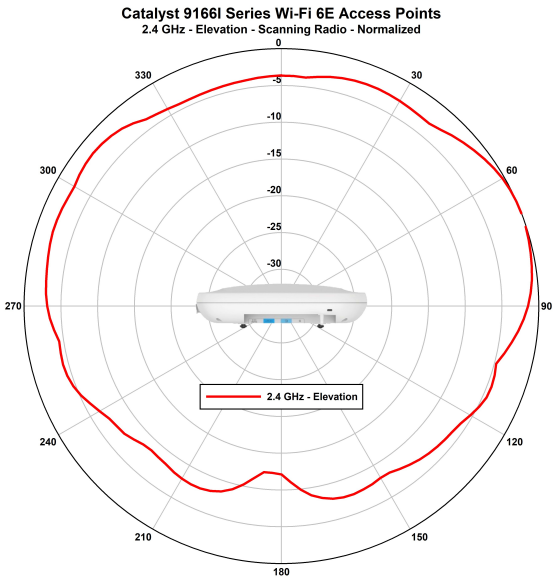


Figure 13: CW9166I - Scanning Radio-Normalized Radiation Pattern (5-GHz Azimuth)

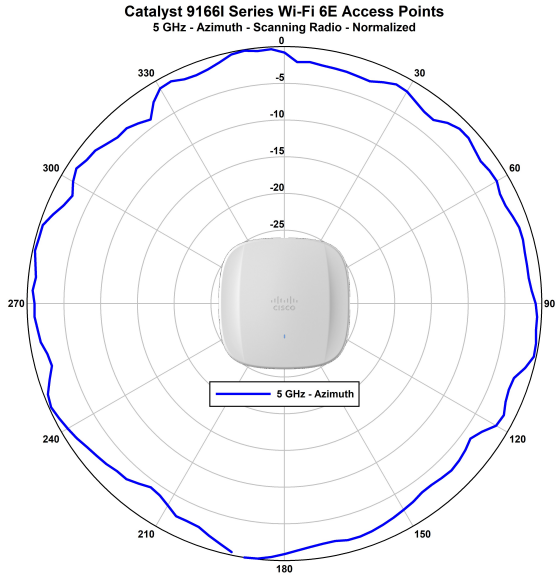


Figure 14: CW9166I - Scanning Radio-Normalized Radiation Pattern (5-GHz Elevation)

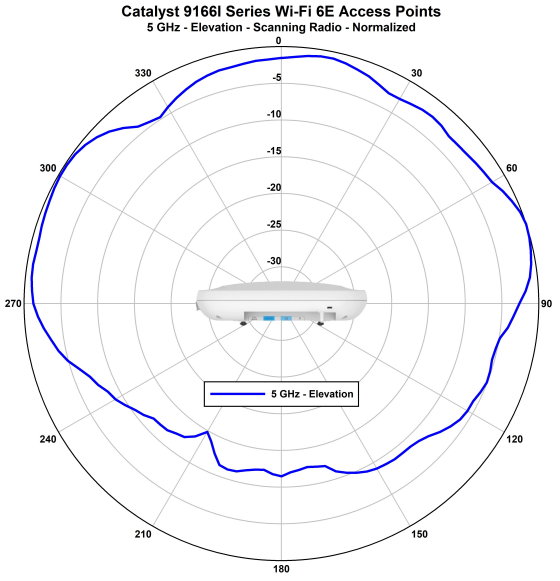


Figure 15: CW9166I - Scanning Radio-Normalized Radiation Pattern (6-GHz Azimuth)

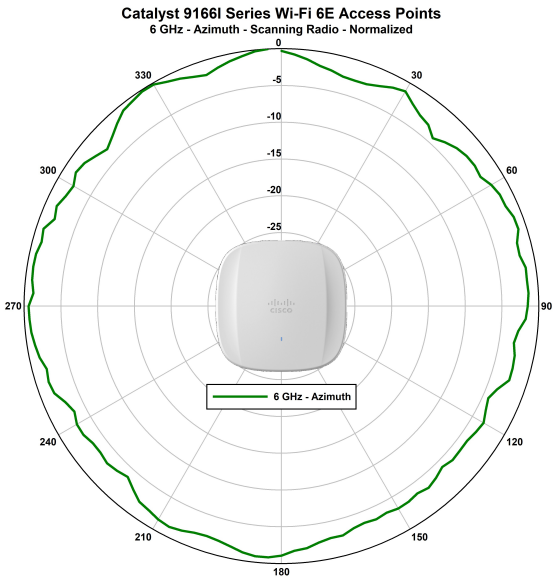


Figure 16: CW9166I - Scanning Radio-Normalized Radiation Pattern (6-GHz Elevation)

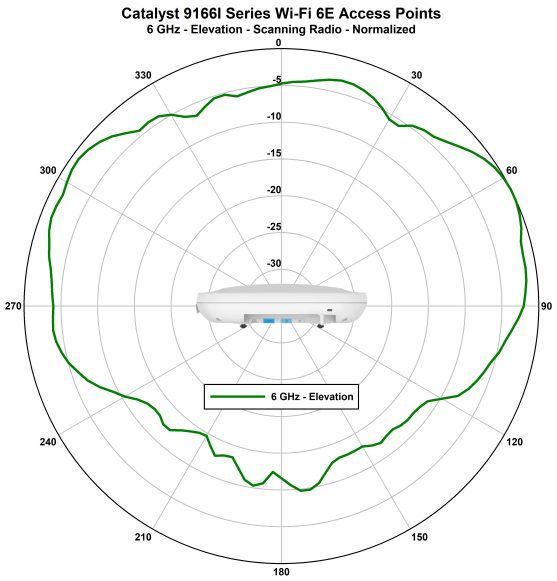


Figure 17: CW9166I - IoT (BLE) Antenna-Normalized Radiation Pattern (2.4-GHz Azimuth)

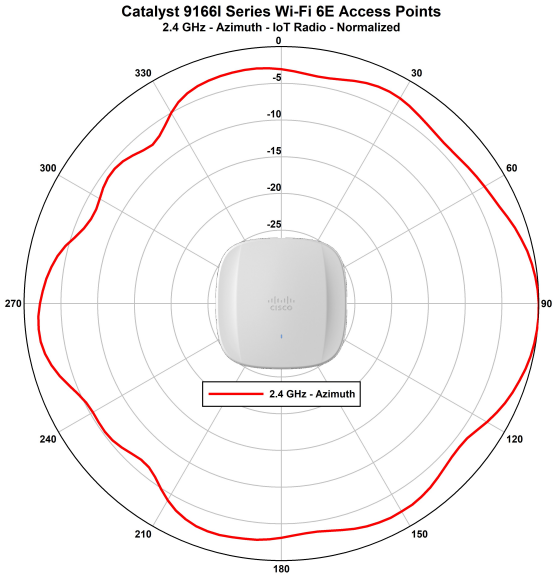
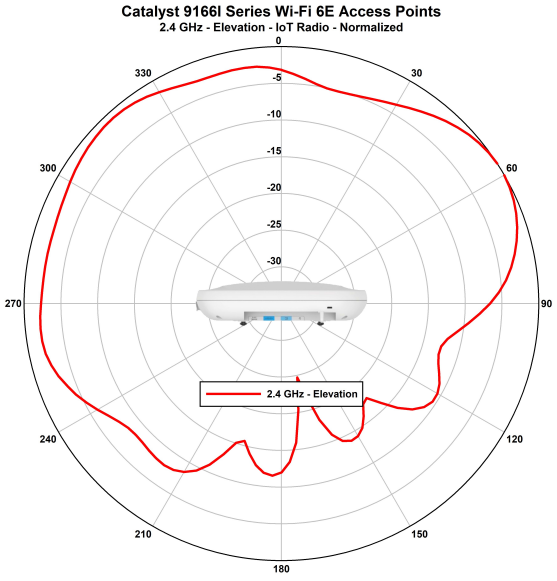
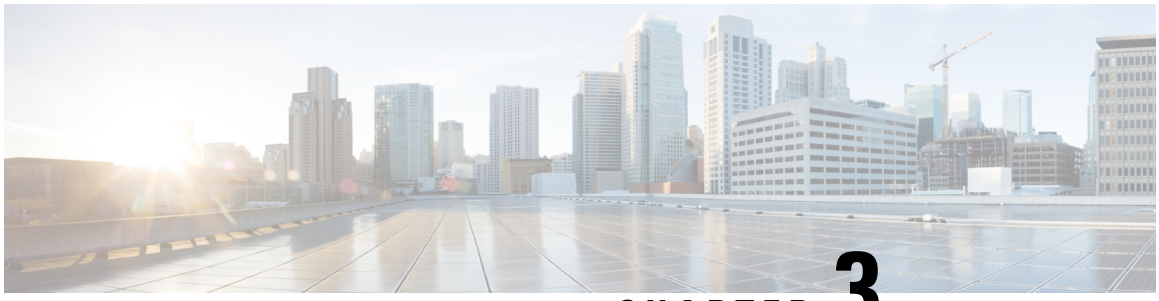


Figure 18: CW9166I - IoT (BLE) Antenna-Normalized Radiation Pattern (2.4-GHz Elevation)





CHAPTER 3

Installing the Access Point

Installing an AP involves the following high-level tasks.

- Unpacking the Package, on page 15
- Preinstallation Checks and Installation Guidelines, on page 19
- Mounting the Access Point, on page 20
- Powering the Access Point, on page 21

Unpacking the Package

Package Contents

Each AP package contains the following items:

- One CW9166I AP
- Default mounting brackets: Adjustable ceiling-rail clips AIR-AP-T-RAIL-R and AIR-AP-BRACKET-1=
- Orderable optional mounting brackets: AIR-AP-T-RAIL-F, and AIR-AP-BRACKET-2=
- Cisco product documentation and pointer card

Note When Cisco CW9166I-MR AP is ordered, mounting bracket AIR-AP-BRACKET-2= is included by default.

Unpacking the Access Point

Procedure

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

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

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

Cisco Orderable Accessories

You can order the following accessories separately, from Cisco:

- AP-mounting brackets to mount the AP

Mounting Brackets	Description
AIR-AP-BRACKET-1=	For low-profile non-pivoting installations
AIR-AP-BRACKET-2=	For electrical or network boxes above ceiling mounts
AIR-AP-T-RAIL-F=	Flush ceiling grid clip
AIR-AP-T-RAIL-R=	Recessed ceiling grid clip
AIR-CHNL-ADAPTER=	T-RAIL channel adapter

- Power injectors when Power over Ethernet (PoE) is not available

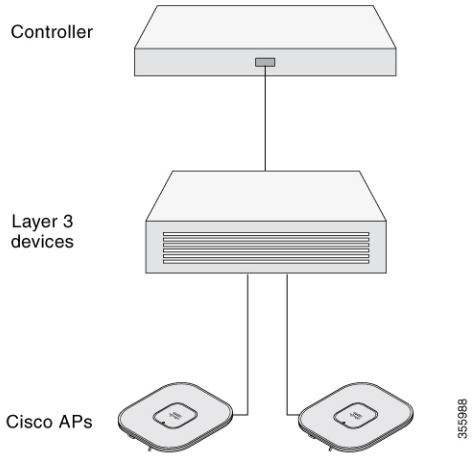
Power Supply	Description
AIR-PWRINJ7=	Mid-span power injector AIR-PWRINJ7= when (PoE) is not available Power specifications: 50W, 56VDC For more information, see the power injector data sheet.
AIR-PWRINJ6=	A 802.3at power injector when PoE is not available Power Specifications: 30W, 55VDC For more information, see the power injector data sheet.
MA-INJ-6-x	Meraki 802.3bt PoE injector Power Specifications: 60W, 55VDC For more information, see the power injector data sheet.
MA-PWR-50WAC	DC power adapter Power Specifications: 50W, 54VDC

Performing a Preinstallation Configuration (Optional)

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

Note Performing a preinstallation configuration is an optional procedure. If your network controller is properly configured, you can install your AP in its final location and connect it to the network from there. For more information, see Deploying the Access Point on the Wireless Network, on page 24.

The following illustration shows the preinstallation configuration setup:



Perform the following steps:

Before you begin

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

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

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

- CAPWAP UDP ports must not be blocked in the network.
- The AP must be able to find the IP address of the controller. This can be accomplished using DHCP, DNS, or IP subnet broadcast. This guide describes the DHCP method to convey the controller IP address. For other methods, see the product documentation. See also Configuring DHCP Option 43, on page 29 for more information.

Note

- The AP requires a multigigabit Ethernet (5 Gbps) link to prevent the Ethernet port from becoming a bottleneck for traffic.
- The Cisco CW9166I-MR AP does not join the Catalyst 9800 controller. For the AP to join the controller, contact the Meraki support team to migrate the AP.

Procedure

Step 1 Power the AP using a supported power source.

See Powering the Access Point, on page 21.

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

  Note If the AP remains in this mode for more than five minutes, it means the AP cannot find the primary Catalyst 9800 controller. Check the connection between the AP and the Catalyst 9800 controller and ensure that they are on the same subnet.

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

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

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

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

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

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

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

Preinstallation Checks and Installation Guidelines

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

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

- Access point locations
- Access point mounting options:
  - Below a suspended ceiling
  - on a flat horizontal surface
  - on top of a desk

Note You can mount the access point above a suspended ceiling, but you must purchase additional mounting hardware. For more information, see Mounting the Access Point, on page 20.

- Access point power options: Use either of the following options to power the AP:
  - Cisco-approved power injector
  - PoE with a supporting switch

Note

- The Underwriter Laboratories (UL)-approved Listed Power Adapter must meet the following minimum specifications: Rated output of 42.5 to 57 Vdc, min. 1.11A, Tma of 50°C minimum, altitude of 3048m minimum.
- If 802.3af is used, all the radios get switched off. Ethernet gets downgraded to 1 GbE. The USB port is also off.

- Operating temperature:
  - CW9166I: 32°F to 122°F (0°C to 50°C)

Note When installing the AP in an environment where the ambient temperature is in the range of 104°and 122°F (>40° and 50°C), the access point configuration changes from 4x4 on the 5-GHz radios, and the uplink Ethernet will downgrade to 1 GbE. However, the USB port remains enabled.

- Console access using the console port

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

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

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

Mounting the Access Point

Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point can be mounted in the following places:

- Suspended ceiling
- Hard ceiling
- Wall
- Electrical or network box
- Above a suspended ceiling
- Desk mount

For detailed instructions on mounting the AP, see the *Access Point Mounting Instructions* document at:

http://www.cisco.com/c/en/us/td/docs/wireless/access_point/mounting/guide/apmount.html.

The standard mounting hardware supported by the AP are listed in the following table.

Table 4: Brackets and Clips to Mount the AP

Mounting Type	Part Number	Description
Brackets[1][2][3]	AIR-AP-BRACKET-1	Low-profile bracket: Used for ceiling-mount installations. (This is the default option.)
	AIR-AP-BRACKET-2	Universal bracket: Used for wall or electrical box installations.
Clips	AIR-AP-T-RAIL-R	Ceiling grid clip (recessed mounting). (This is the default option.)
	AIR-AP-T-RAIL-F	Ceiling grid clip (flush mounting).
	AIR-CHNL-ADAPTER	Optional adapter for channel-rail ceiling grid profile.
Desk mount	—	Desk mount rubber feet using screw size 8-32x.28”

1 Mount the AP using no less than four screw holes on a bracket.
2 AIR-AP-BRACKET-3 is not compatible for use with Cisco CW9166I access points.

[3] You can also use the *in-tile* mounting options available from third parties. For more information, see the access point data sheet.

When mounting the AP in areas where there is a possibility of the AP being knocked off the mounting bracket, use the lock hasp at the back of the AP to lock it to the bracket.

Powering the Access Point

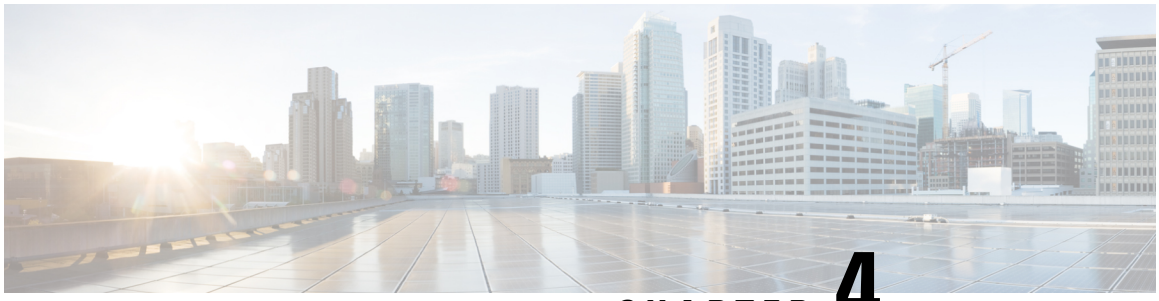
Caution Ensure that the AP is powered using a Underwriters' Laboratories-compliant (UL-compliant) PoE power source. You must connect the unit only to the PoE network, without routing to the outside plant.

The AP can be powered only through PoE using the following:

- 802.3bt: Any 802.3bt-compliant switch port or supported Cisco Power Injector
- Cisco Universal PoE (Cisco UPoE)
- 802.3at (PoE+): Any 802.3at-compliant (30.0 W) switch port
- 802.3af: Any 802.3af-compliant (15.4 W) switch port

Note If 802.3af is used, all the radios get switched off, the Ethernet port is downgraded to 1 GbE, and the USB port is shut off.

- DC power jack



CHAPTER 4

Configuring and Deploying the Access Point

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

- The Controller Discovery Process, on page 23
- Deploying the Access Point on the Wireless Network, on page 24
- Checking the Access Point LEDs, on page 24

The Controller Discovery Process

To support the CW9166I AP, the controller must be running Cisco IOS XE Cupertino 17.9.1 or a later release. For more information, see the Cisco Catalyst 9166 Series Access Points Data Sheet.

Guidelines and Limitations

- It is not possible to edit or query an access point using the controller CLI if the name of the access point 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 access point might not join the controller because its certificate may not be valid for that time.

The AP must discover the controller 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 access point was previously joined to a controller, the IP addresses of the primary, secondary, and tertiary controllers are stored in the access point's nonvolatile memory. This process of storing controller IP addresses on an access point for later deployment is called priming the access point. For more information about priming, see Performing a Preinstallation Configuration (Optional), on page 16.
- DHCP server discovery: This feature uses DHCP Option 43 to provide controller IP addresses to the access points. 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 29.
- DNS discovery: The access point can discover controllers through your domain name server (DNS). For the access point to do so, you must configure your DNS to return controller IP addresses in response to CISCO-CAPWAP-CONTROLLER.localdomain, where localdomain is the access point domain name. Configuring the CISCO-CAPWAP-CONTROLLER provides backwards compatibility in an existing

customer deployment. When an access point 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 access point sends discovery requests to these controllers.

Deploying the Access Point on the Wireless Network

After you mount the access point, follow these steps to deploy it on the wireless network:

Procedure

Step 1 Connect and power up the access point.

Step 2 Observe the access point LED.

For LED status descriptions, see Checking the Access Point LEDs, on page 24.

- When you power up the access point, it begins a power-up sequence that you can verify by observing the access point LED. If the power-up sequence is successful, the discovery and join process begins. During this process, the LED blinks green, red, and off sequentially. When the access point joins a controller, the LED is green if no clients are associated, or blue if one or more clients are associated.
- If the LED is not on, it is most likely that the access point is not receiving power.
- If the LED blinks sequentially for more than five minutes, the access point is unable to find its primary, secondary, and tertiary controller. Check the connection between the access point and the Cisco Wireless Controller, and be sure that the access point and the Cisco Wireless Controller are either on the same subnet or that the access point has a route back to its primary, secondary, and tertiary Cisco Wireless Controller. Also, if the access point is not on the same subnet as the Cisco Wireless Controller, ensure that there is a properly configured DHCP server on the same subnet as the access point.

Checking the Access Point LEDs

The location of the access point status LED is shown in Connectors and Ports on the AP, on page 7.

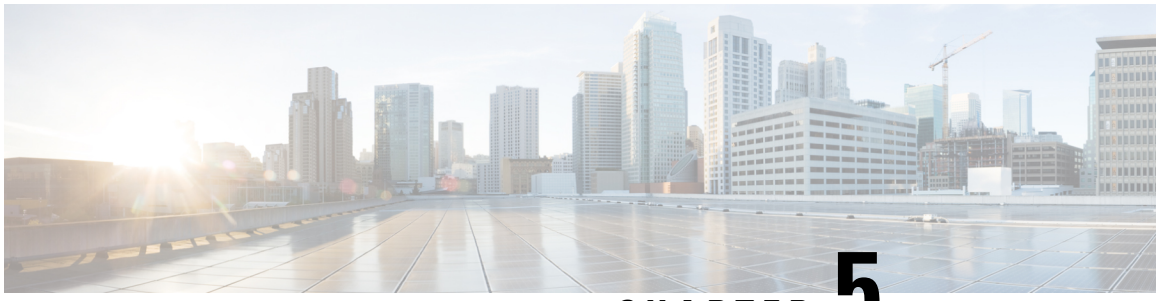
Note

- 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.
- When the AP is in Meraki management mode, the LED status indicators convey the status differently from the Cisco APs. For more information, see the *Meraki CW9166 Installation Guide*.

The access point status LED indicates various conditions, which are described in the following table.

Table 5: LED Status Indications

Message Type	LED State	Message Meaning
Association status	Green 	Normal operating condition, but no wireless client is associated
	Blue 	Normal operating condition, at least one wireless client is associated
Boot loader status	Green 	Executing boot loader
Boot loader error	Blinking Green 	Boot loader signing verification failure
Operating status	Blinking Blue 	Software upgrade in progress
	Alternating between Green and Red 	Discovery or join process in progress
Access point operating system errors	Cycling through Red-Off-Green-Off-Blue-Off 	General warning; insufficient inline power



CHAPTER 5

Troubleshooting

- Using the Mode Button, on page 27
- Troubleshooting the Access Point to Cisco Controller Join Process, on page 28
- Important Information for Controller-Based Deployments, on page 29
- Configuring DHCP Option 43, on page 29

Using the Mode Button

Using the **Mode** button (see Figure 2: CW9166I Top View with Connectors and Ports, on page 9), you can reset the AP to factory default or clear the AP's internal storage.

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

1. Press, and continue to press the **Mode** button on the access point during the AP boot cycle.
2. Press until the AP console shows a seconds counter.

   When the counter indicates the number of seconds for which the **Mode** button is pressed, the AP status LED changes to blinking red.
3. Press the **Mode** button for less than 20 seconds to reset the AP to the default factory-shipped configuration.

The AP configuration files are cleared.

To clear the AP's internal storage, including all the configuration files, perform the following steps:

1. Press, and continue to press the **Mode** button on the access point during the AP boot cycle.
2. Press until the AP console shows a seconds counter.

   When the counter indicates the number of seconds for which the **Mode** button is pressed, the AP status LED changes to blinking red.
3. Press the **Mode** button for more than 20 seconds, but less than 60 seconds to clear the AP internal storage, including all the configuration files.

This resets all the configuration settings to factory defaults, including passwords, the IP address, and the SSID.

Note

- If the **Mode** button is pressed for more than 30 seconds, but less than 60 seconds, the FIPS mode flag is also cleared during the full factory reset of the AP. If the FIPS flag is set, the console access is disabled.
- The AP status LED changes from blue to red, and all the files in the AP storage directory are cleared.
- If you keep the **Mode** button pressed for more than 60 seconds, the button is assumed as being faulty and no changes are made.

Troubleshooting the Access Point to Cisco Controller Join Process

Note As specified in the Cisco Wireless Solutions Software Compatibility Matrix, ensure that your controller is running Cisco IOS XE Cupertino 17.9.1 or a later release to support the Cisco CW9166I AP.

Access points can fail to join a controller for many reasons—a RADIUS authorization is pending, self-signed certificates are not enabled on the controller, the access point and the controller regulatory domains do not match, and so on.

Controller software enables you to configure the access points to send all CAPWAP-related errors to a syslog server. All the CAPWAP error messages can be viewed from the syslog server itself.

When the ordered AP is a CW9166I-MR model, or the AP is in Meraki Management mode, it will not attempt to join the Cisco 9800 Wireless Controller. Contact the Meraki support team to perform the migration procedure on the AP.

The state of the access point is not maintained on the controller. It can be difficult to determine why the discovery request from a certain access point was rejected. In order to troubleshoot such joining problems, we recommend that you run traces commands on the Cisco Catalyst 9800 Wireless Controller.

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

When the controller is maintaining join-related information for the maximum number of access points, it does not collect information for any more access points.

An access point sends all the syslog messages to the IP address 255.255.255.255 by default.

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

When the access point 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 access point.

The access point send all the syslog messages to this IP address until it is overridden by the following configuration:

- The access point is still connected to the same controller, and the global syslog server IP address configuration on the controller has been changed using the **syslog host** <*ip address*> command. In this case, the controller sends the new global syslog server IP address to the access point.

  To configure the global syslog server IP address, run these commands:

  1. **configure terminal**
  2. **ap profile** *ap-profile-name*
  3. **syslog host** *syslog IP address*
  4. **exit**

- The access point is disconnected from the controller and joins another controller. In this case, the new controller sends its global syslog server IP address to the access point.
- Whenever a new syslog server IP address overrides the existing syslog server IP address, the old address is erased from persistent storage, and the new address is stored in its place. The access point also starts sending all the syslog messages to the new IP address, provided the access point can reach the syslog server IP address.

Note You can configure the syslog server for access points and view the access point join information only from the controller CLI.

Important Information for Controller-Based Deployments

Keep these guidelines in mind when you use Cisco CW9166I APs:

- The AP can only communicate with Cisco wireless 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 debug purposes.
- All the 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 access points, enabling them to find and join a controller.

The following is a DHCP Option 43 configuration example on a Windows 2003 Enterprise DHCP server for use with Cisco Catalyst lightweight access points. For other DHCP server implementations, see the product documentation for configuring DHCP Option 43. In Option 43, you should use the IP address of the controller management interface.

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

The Cisco CW9166I access point uses the type-length-value (TLV) format for DHCP Option 43. DHCP servers must be programmed to return the option based on the access point DHCP Vendor Class Identifier (VCI) string (DHCP Option 43). The VCI string for the Cisco CW9166I access point is:

Cisco AP CW9166

The following is the format of the TLV block:

- Type: 0xf1 (decimal 241)
- Length: Number of controller IP addresses x 4
- Value: IP addresses of the wireless controller management interfaces listed sequentially in Hex code.

To configure DHCP Option 43 in the embedded Cisco IOS DHCP server, follow these steps:

Procedure

Step 1 Enter the configuration mode

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

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

Here:

<*pool name*> is the name of the DHCP pool, such as AP9166I.

<*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:

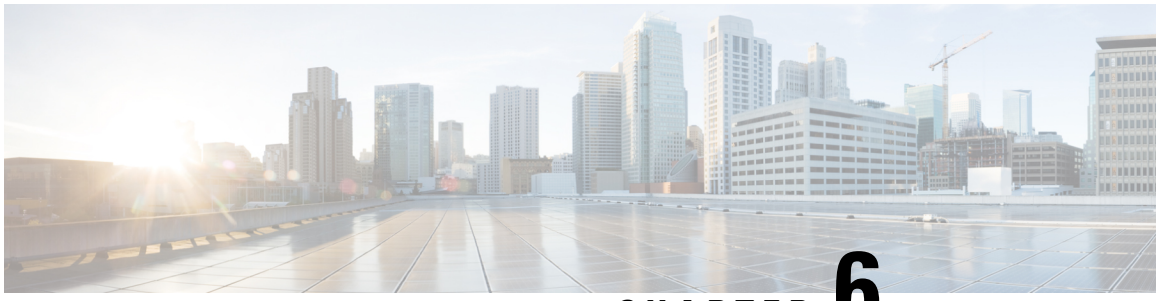
```
option 43 hex <hex string>
```

The hex string is assembled by concatenating the following TLV values:

Type + Length + Value

For example, if 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), and the IP addresses translate to 0a7e7e02

and 0a7f7f02. Assembling the string then yields f1080a7e7e020a7f7f02. The resulting Cisco IOS command added to the DHCP scope is **option 43 hex f1080a7e7e020a7f7f02**.



CHAPTER 6

Safety Guidelines and Warnings

- Safety Instructions, on page 33

Safety Instructions

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

Warning **Statement 1071**—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS



Warning **Statement 1005**—Circuit Breaker

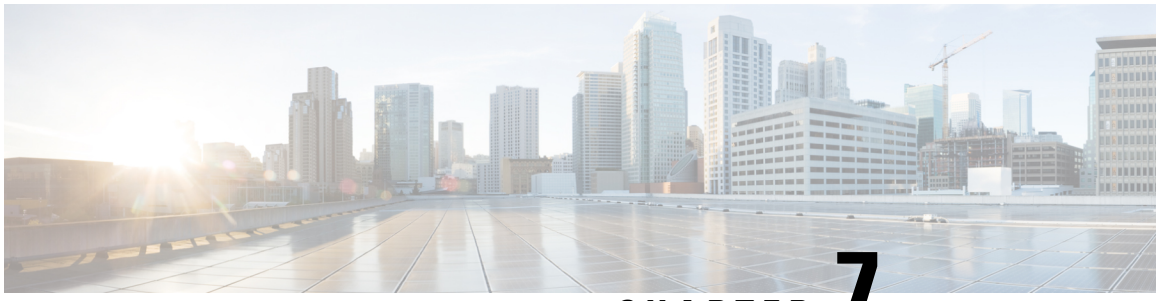
This product relies on the building's installation for short-circuit (overcurrent) protection. To reduce risk of electric shock or fire, ensure that the protective device is rated not greater than: **20 A**

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

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



Danger **In order to comply with FCC radio frequency (RF) exposure limits, antennas should be located at a minimum of 16.14 inches (41 cm) or more from the body of all persons.** Statement 332



CHAPTER 7

Declarations of Conformity and Regulatory Information

This section provides declarations of conformity and regulatory information for the Cisco Catalyst Wireless 9166I Wi-Fi 6E Access Point. You can find additional information at: https://www.cisco.com/c/dam/assets/prod/wireless/wireless-compliance-tool/index.html.

- Manufacturers Federal Communication Commission Declaration of Conformity Statement, on page 35
- VCCI Statement for Japan, on page 36
- Canadian Compliance Statement, on page 38
- European Community, Switzerland, Norway, Iceland, and Liechtenstein Compliance, on page 39
- United Kingdom Compliance, on page 39
- Administrative Rules for Cisco Catalyst Access Points in Taiwan, on page 40
- Operation of Cisco Catalyst Access Points in Brazil, on page 41
- Declaration of Conformity for RF Exposure, on page 41
- Declaration of Conformity Statements, on page 44

Manufacturers Federal Communication Commission Declaration of Conformity Statement

Access Point Models	Certification Number
Cisco CW9166I-B	LDK-9160S2578

Manufacturer:

Cisco Systems, Inc.170 West Tasman Drive San Jose, CA 95134-1706 USA

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

1. This device may not cause harmful interference.

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

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try 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
- Professional Installation is recommended

⚠

Caution Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter. For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.FCC regulations restrict the operation of this device to indoor use only. The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft, except that operation of this device is permitted in large aircraft while flying above 10,000 feet.Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

VCCI Statement for Japan

Warning	**Warning**	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	**Warning**	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

Access Point Models:

CW9166I-Q

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・医療用機器のほかエ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、近くで移動体臓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（例えぱ、ノくーティションの設置など **}** I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撒別用の特定，ト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**

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 contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s license-exempt RSS(s). Operation is subject to the following two conditions:

- This device may not cause interference.
- This device must accept any interference, including interference that may cause undesired operation of the device.

L’émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L’exploitation est autorisée aux deux conditions suivantes:

- L’appareil ne doit pas produire de brouillage.
- L’appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d’en compromettre le fonctionnement.

Wi-Fi 6E Device

- Operation shall be limited to indoor use only.
- Devices shall not be used for control of or communications with unmanned aircraft systems.
- Operation on oil platforms, automobiles, trains, maritime vessels and aircraft shall be prohibited except for on large aircraft flying above 3,048 m (10,000 ft).

appareil Wi-Fi 6E

- Utilisation limitée à l’intérieur seulement.
- Les appareils ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.
- L'exploitation sur les plates-formes pétrolières, les automobiles, les trains, les navires maritimes et les aéronefs est interdite, sauf sur les gros aéronefs volant au-dessus de 3,048 m (10,000 pi).

The device for 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.

Les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l’intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

The transmitter module may not be co-located with any other transmitter or antenna.

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.

Industry Canada

Access Point Models:

CW9166I-A

Access Point Model	Certification Number
CW9166I-A V01	2461N-9160S2578
CW9166I-A V02	

European Community, Switzerland, Norway, Iceland, and Liechtenstein Compliance

The product carries the CE Mark:



The device is restricted to indoor use only when operating between 5150 MHz and 5350 MHz, 5945 MHz and 6425 MHz frequency range.

This equipment complies with EU radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm (7.87 inches) between the radiator & your body.



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.

Access Point Models:

CW9166I-E

Manufacturer:

Cisco Systems, Inc.125 West Tasman Drive San Jose, CA 95134-1706 USA

United Kingdom Compliance

The device is restricted to indoor use only when operating between 5150 MHz and 5350 MHz, 5925 MHz and 6425 MHz frequency range. This equipment should be installed and operated with minimum distance 20 cm (7.87 inches) between the radiator & your body.

Access Point Models:

CW9166I-ROW

Manufacturer:

Cisco Systems, Inc.125 West Tasman Drive San Jose, CA 95134-1706 USA

Administrative Rules for Cisco Catalyst Access Points in Taiwan

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

Simplified Chinese Translation

【低功率射頻器材技術規範】取得審驗證明之低功率射頻器材，非經核准，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。低功率射頻器材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。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材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。應避免影響附近雷達系統之操作。

Note 6E 頻段在台灣尚未開放使用，故本器材在台灣暫不支援6E。

English Translation

Without permission granted by the NCC, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power or alter original characteristic as well as performance to a approved low power radio-frequency devices. The low power radio-frequency devices shall not influence aircraft security and interfere legal communications; If found, the user shall cease operating immediately until no interference is achieved. The said legal communications means radio communications is operated in compliance with the Telecommunications Management Act. The low power radio-frequency devices must be susceptible with the interference from legal communications or ISM radio wave radiated devices.

Note This device does not support Wi-Fi 6E frequency bands in Taiwan.

The operations near the radar system shall not be influenced.

This section contains special information for operation of Cisco Catalyst access points in Taiwan.

Access Point Models	Certification Number
CW9166I-ROW	CCAF22LP1380T5

Operation of Cisco Catalyst Access Points in Brazil

Figure 19: Brazil Regulatory Information



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

Portuguese

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

English

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

equipamento Wi-Fi 6E

O uso deste equipamento é restrito a ambientes fechados e proibido em plataformas petrolíferas, carros, trens, embarcações e no interior de aeronaves abaixo de 3.048 m (10.000 pés).

Wi-Fi 6E Device

Indoor use only. Operation on oil platforms, cars, trains, boats and aircraft shall be prohibited except for on large aircraft flying above 10,000 ft.

Access Point Models	Certification Number
CW9166I-ROW	xxxxx-xx-xxxxx

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 CW9166I device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) recommended by international guidelines. The guidelines were developed by an independent scientific organization (ICNIRP) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

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

Separation Distance
20 cm (7.87 inches)

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 then recommended.

This Device Meets FCC Guidelines for Exposure to Radio Waves

The Cisco CW9166I 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.

Separation Distance
41 cm (16.14 inches)

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

placing the antennas at a greater separation distance then recommended or lowering the transmitter power output.

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

The Cisco CW9166I 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 6: Separation Distance

Frequency	Distance
2.4 GHz	21 cm (8.26 inches)
5 GHz	
6 GHz	

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 CW9166I 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 7: Distance d'éloignement

Fréquence	Distance
2.4 GHz	21 cm (8.26 inches)
5 GHz	
6 GHz	

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

Additional Information on RF Exposure

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

- Cisco Systems Spread Spectrum Radios and RF Safety white paper at this URL:

  http://www.cisco.com/warp/public/cc/pd/witc/ao340ap/prodlit/rfhr_wi.htm

- FCC Bulletin 56: Questions and Answers about Biological Effects and Potential Hazards of Radio Frequency Electromagnetic Fields
- FCC Bulletin 65: Evaluating Compliance with the FCC guidelines for Human Exposure to Radio Frequency Electromagnetic Fields

You can obtain additional information from the following organizations:

- World Health Organization Internal Commission on Non-Ionizing Radiation Protection
- United Kingdom, National Radiological Protection Board
- Cellular Telecommunications Association at this URL:

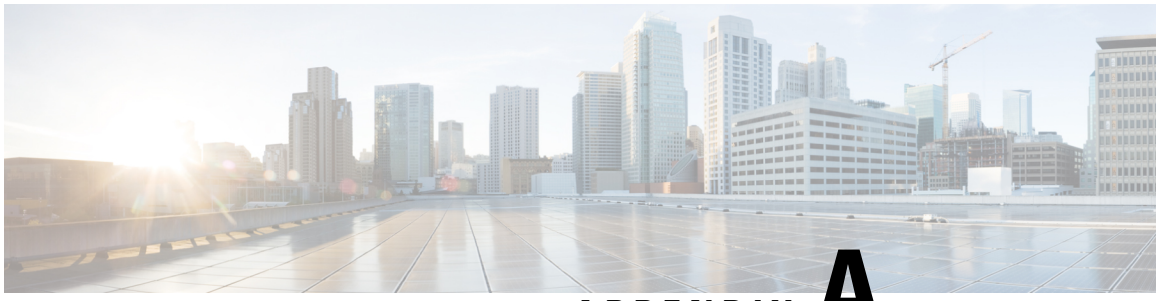
  https://www.ctia.org

- The Mobile & Wireless Forum at this URL:

  https://www.mwfai.org

Declaration of Conformity Statements

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



APPENDIX A

Transmit Power and Receive Sensitivity Values

Table 8: Transmit Power and Receive Sensitivity Values

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
802.11/11b										
1 Mbps	1	4	–	–	–	–	–	–	23	-103
11 Mbps	1	4	–	–	–	–	–	–	23	-95
802.11a/g										
6 Mbps	1	4	–	–	23	-99	23	-94	23	-98
24 Mbps	1	4	–	–	23	-90	22	-87	22	-90
54 Mbps	1	4	–	–	21	-82	20	-76	20	-82
802.11n HT20										
MCS0	1	4	–	–	23	-98	23	-94	23	-98
MCS4	1	4	–	–	22	-88	21	-84	21	-88
MCS7	1	4	–	–	20	-80	19	-77	19	-81
MCS8	2	4	–	–	23	-97	23	-92	23	-96
MCS12	2	4	–	–	22	-85	21	-81	21	-85
MCS15	2	4	–	–	20	-78	19	-75	19	-78
MCS16	3	4	–	–	23	-95	23	-91	23	-95
MCS20	3	4	–	–	22	-84	21	-80	21	-84
MCS23	3	4	–	–	20	-76	19	-73	19	-77

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS24	4	4	–	–	23	-94	23	-90	23	-94
MCS28	4	4	–	–	22	-82	21	-79	21	-82
MCS31	4	4	–	–	20	-75	19	-72	19	-75
802.11n HT40										
MCS0	1	4	–	–	23	-95	23	-92	–	–
MCS4	1	4	–	–	22	-85	22	-82	–	–
MCS7	1	4	–	–	20	-78	19	-75	–	–
MCS8	2	4	–	–	23	-93	23	-91	–	–
MCS12	2	4	–	–	22	-82	22	-79	–	–
MCS15	2	4	–	–	20	-75	19	-73	–	–
MCS16	3	4	–	–	23	-92	23	-89	–	–
MCS20	3	4	–	–	22	-81	22	-78	–	–
MCS23	3	4	–	–	20	-74	19	-71	–	–
MCS24	4	4	–	–	23	-91	23	-88	–	–
MCS28	4	4	–	–	22	-78	22	-77	–	–
MCS31	4	4	–	–	20	-72	19	-70	–	–
802.11ac VHT20										
MCS0	1	4	–	–	23	-98	23	-94	–	–
MCS4	1	4	–	–	22	-89	21	-85	–	–
MCS7	1	4	–	–	20	-82	19	-78	–	–
MCS8	1	4	–	–	19	-77	18	-73	–	–
MCS9	1	4	–	–	–	–	–	–	–	–
MCS0	2	4	–	–	23	-96	23	-92	–	–
MCS4	2	4	–	–	22	-85	21	-81	–	–
MCS7	2	4	–	–	20	-78	19	-74	–	–
MCS8	2	4	–	–	19	-74	18	-71	–	–

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS9	2	4	–	–	–	–	–	–	–	–
MCS0	3	4	–	–	23	-94	23	-91	–	–
MCS4	3	4	–	–	22	-84	21	-80	–	–
MCS7	3	4	–	–	20	-77	19	-73	–	–
MCS8	3	4	–	–	19	-73	18	-69	–	–
MCS9	3	4	–	–	–	–	–	–	–	–
MCS0	4	4	–	–	23	-93	23	-90	–	–
MCS4	4	4	–	–	22	-82	21	-79	–	–
MCS7	4	4	–	–	20	-75	19	-72	–	–
MCS8	4	4	–	–	19	-71	18	-68	–	–
MCS9	4	4	–	–	–	–	–	–	–	–
802.11ac VHT40										
MCS0	1	4	–	–	23	-95	23	-92	–	–
MCS4	1	4	–	–	22	-86	22	-82	–	–
MCS7	1	4	–	–	20	-79	19	-75	–	–
MCS8	1	4	–	–	19	-74	18	-71	–	–
MCS9	1	4	–	–	19	-73	18	-70	–	–
MCS0	2	4	–	–	23	-93	23	-90	–	–
MCS4	2	4	–	–	22	-82	22	-79	–	–
MCS7	2	4	–	–	20	-75	19	-72	–	–
MCS8	2	4	–	–	19	-72	18	-69	–	–
MCS9	2	4	–	–	19	-70	18	-67	–	–
MCS0	3	4	–	–	23	-91	23	-89	–	–
MCS4	3	4	–	–	22	-80	22	-77	–	–
MCS7	3	4	–	–	20	-73	19	-71	–	–
MCS8	3	4	–	–	19	-70	18	-67	–	–

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS9	3	4	–	–	19	-68	18	-65	–	–
MCS0	4	4	–	–	23	-90	23	-88	–	–
MCS4	4	4	–	–	22	-79	22	-76	–	–
MCS7	4	4	–	–	20	-73	19	-70	–	–
MCS8	4	4	–	–	19	-69	18	-66	–	–
MCS9	4	4	–	–	19	-67	18	-63	–	–
802.11ac VHT80										
MCS0	1	4	–	–	23	-92	23	-89	–	–
MCS4	1	4	–	–	22	-82	22	-80	–	–
MCS7	1	4	–	–	20	-75	19	-72	–	–
MCS8	1	4	–	–	19	-71	18	-67	–	–
MCS9	1	4	–	–	19	-69	18	-66	–	–
MCS0	2	4	–	–	23	-90	23	-87	–	–
MCS4	2	4	–	–	22	-79	22	-76	–	–
MCS7	2	4	–	–	20	-71	19	-69	–	–
MCS8	2	4	–	–	19	-68	18	-65	–	–
MCS9	2	4	–	–	19	-66	18	-63	–	–
MCS0	3	4	–	–	23	-88	23	-86	–	–
MCS4	3	4	–	–	22	-77	22	-74	–	–
MCS7	3	4	–	–	20	-70	19	-67	–	–
MCS8	3	4	–	–	19	-67	18	-63	–	–
MCS9	3	4	–	–	19	-65	18	-61	–	–
MCS0	4	4	–	–	23	-87	23	-85	–	–
MCS4	4	4	–	–	22	-76	22	-73	–	–
MCS7	4	4	–	–	20	-69	19	-66	–	–
MCS8	4	4	–	–	19	-66	18	-62	–	–

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS9	4	4	–	–	19	-64	18	-60	–	–
802.11ac VHT160										
MCS0	1	4	–	–	23	-88	20	-82	–	–
MCS4	1	4	–	–	22	-79	19	-71	–	–
MCS7	1	4	–	–	20	-72	16	-63	–	–
MCS8	1	4	–	–	19	-68	15	-59	–	–
MCS9	1	4	–	–	19	-66	15	-57	–	–
MCS0	2	4	–	–	23	-87	20	-82	–	–
MCS4	2	4	–	–	22	-75	19	-70	–	–
MCS7	2	4	–	–	20	-68	16	-63	–	–
MCS8	2	4	–	–	19	-65	15	-60	–	–
MCS9	2	4	–	–	19	-63	15	-57	–	–
MCS0	3	4	–	–	23	-85	–	–	–	–
MCS4	3	4	–	–	22	-74	–	–	–	–
MCS7	3	4	–	–	20	-67	–	–	–	–
MCS8	3	4	–	–	19	-63	–	–	–	–
MCS9	3	4	–	–	19	-62	–	–	–	–
MCS0	4	4	–	–	23	-84	–	–	–	–
MCS4	4	4	–	–	22	-73	–	–	–	–
MCS7	4	4	–	–	20	-66	–	–	–	–
MCS8	4	4	–	–	19	-62	–	–	–	–
MCS9	4	4	–	–	19	-60	–	–	–	–
802.11ax HE20										
MCS0	1	4	23	-96	23	-98	23	-95	23	-98
MCS4	1	4	22	-87	22	-89	21	-85	21	-88
MCS7	1	4	19	-80	20	-81	19	-78	19	-81

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS8	1	4	18	-77	19	-77	18	-73	18	-77
MCS9	1	4	18	-75	19	-76	17	-72	18	-75
MCS10	1	4	17	-71	18	-73	17	-68	17	-71
MCS11	1	4	17	-70	18	-71	17	-66	17	-70
MCS0	2	4	23	-95	23	-96	23	-93	23	-96
MCS4	2	4	22	-84	22	-85	21	-81	21	-85
MCS7	2	4	19	-77	20	-78	19	-74	19	-78
MCS8	2	4	18	-74	19	-75	18	-71	18	-74
MCS9	2	4	18	-72	19	-73	17	-69	18	-73
MCS10	2	4	17	-69	18	-70	17	-66	17	-69
MCS11	2	4	17	-67	18	-68	17	-60	17	-67
MCS0	3	4	23	-94	23	-95	23	-92	23	-95
MCS4	3	4	22	-82	22	-83	21	-80	21	-83
MCS7	3	4	19	-75	20	-77	19	-73	19	-76
MCS8	3	4	18	-72	19	-74	18	-69	18	-73
MCS9	3	4	18	-70	19	-72	17	-65	18	-71
MCS10	3	4	17	-67	18	-68	17	-62	17	-67
MCS11	3	4	17	-65	18	-66	17	-59	17	-65
MCS0	4	4	23	-93	23	-94	23	-91	23	-94
MCS4	4	4	22	-81	22	-83	21	-79	21	-82
MCS7	4	4	19	-75	20	-77	19	-72	19	-75
MCS8	4	4	18	-71	19	-73	18	-68	18	-71
MCS9	4	4	18	-69	19	-70	17	-65	18	-69
MCS10	4	4	17	-67	18	-68	17	-63	17	-67
MCS11	4	4	17	-64	18	-66	17	-60	17	-65
802.11ax HE40										

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS0	1	4	23	-93	23	-94	23	-92	–	–
MCS4	1	4	22	-84	22	-86	22	-83	–	–
MCS7	1	4	19	-77	20	-78	19	-75	–	–
MCS8	1	4	18	-73	19	-75	18	-71	–	–
MCS9	1	4	18	-72	19	-73	18	-70	–	–
MCS10	1	4	17	-69	18	-70	17	-66	–	–
MCS11	1	4	17	-66	18	-67	17	-62	–	–
MCS0	2	4	23	-92	23	-94	23	-91	–	–
MCS4	2	4	22	-81	22	-82	22	-79	–	–
MCS7	2	4	19	-74	20	-76	19	-73	–	–
MCS8	2	4	18	-71	19	-72	18	-69	–	–
MCS9	2	4	18	-69	19	-70	18	-67	–	–
MCS10	2	4	17	-66	18	-67	17	-62	–	–
MCS11	2	4	17	-64	18	-65	17	-60	–	–
MCS0	3	4	23	-91	23	-92	23	-89	–	–
MCS4	3	4	22	-79	22	-81	22	-78	–	–
MCS7	3	4	19	-72	20	-73	19	-70	–	–
MCS8	3	4	18	-69	19	-70	18	-67	–	–
MCS9	3	4	18	-67	19	-68	18	-60	–	–
MCS10	3	4	17	-64	18	-65	17	-60	–	–
MCS11	3	4	17	-61	18	-63	17	-56	–	–
MCS0	4	4	23	-90	23	-91	23	-88	–	–
MCS4	4	4	22	-78	22	-79	22	-76	–	–
MCS7	4	4	19	-71	20	-72	19	-69	–	–
MCS8	4	4	18	-68	19	-69	18	-66	–	–
MCS9	4	4	18	-66	19	-67	18	-63	–	–

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS10	4	4	17	-63	18	-64	17	-57	–	–
MCS11	4	4	17	-60	18	-62	17	-54	–	–
802.11ax HE80										
MCS0	1	4	23	-90	23	-91	23	-89	–	–
MCS4	1	4	22	-82	22	-83	22	-80	–	–
MCS7	1	4	19	-74	20	-75	19	-73	–	–
MCS8	1	4	18	-71	19	-72	18	-69	–	–
MCS9	1	4	18	-69	19	-70	18	-67	–	–
MCS10	1	4	17	-66	18	-67	17	-64	–	–
MCS11	1	4	17	-64	18	-65	17	-61	–	–
MCS0	2	4	23	-89	23	-91	23	-88	–	–
MCS4	2	4	22	-79	22	-80	22	-77	–	–
MCS7	2	4	19	-72	20	-73	19	-70	–	–
MCS8	2	4	18	-68	19	-69	18	-65	–	–
MCS9	2	4	18	-66	19	-67	18	-64	–	–
MCS10	2	4	17	-63	18	-64	17	-60	–	–
MCS11	2	4	17	-61	18	-62	17	-58	–	–
MCS0	3	4	23	-88	23	-89	23	-86	–	–
MCS4	3	4	22	-77	22	-78	22	-75	–	–
MCS7	3	4	19	-70	20	-71	19	-67	–	–
MCS8	3	4	18	-66	19	-67	18	-64	–	–
MCS9	3	4	18	-64	19	-65	18	-62	–	–
MCS10	3	4	17	-61	18	-62	17	-59	–	–
MCS11	3	4	17	-59	18	-60	17	-56	–	–
MCS0	4	4	23	-87	23	-88	23	-85	–	–
MCS4	4	4	22	-75	22	-76	22	-73	–	–

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS7	4	4	19	-69	20	-70	19	-66	–	–
MCS8	4	4	18	-65	19	-66	18	-63	–	–
MCS9	4	4	18	-63	19	-64	18	-61	–	–
MCS10	4	4	17	-60	18	-61	17	-57	–	–
MCS11	4	4	17	-58	18	-59	17	-55	–	–
802.11ax HE160										
MCS0	1	4	23	-88	23	-88	20	-83	–	–
MCS4	1	4	22	-79	22	-80	19	-71	–	–
MCS7	1	4	19	-72	20	-73	16	-64	–	–
MCS8	1	4	18	-68	19	-69	15	-61	–	–
MCS9	1	4	18	-66	19	-67	15	-59	–	–
MCS10	1	4	17	-63	18	-63	14	-55	–	–
MCS11	1	4	17	-61	18	-61	14	-53	–	–
MCS0	2	4	23	-87	23	-88	20	-83	–	–
MCS4	2	4	22	-77	22	-77	19	-72	–	–
MCS7	2	4	19	-69	20	-70	16	-764	–	–
MCS8	2	4	18	-65	19	-66	15	-61	–	–
MCS9	2	4	18	-63	19	-64	15	-59	–	–
MCS10	2	4	17	-60	18	-60	14	-55	–	–
MCS11	2	4	17	-57	18	-58	14	-53	–	–
MCS0	3	4	23	-85	23	-86	–	–	–	–
MCS4	3	4	22	-74	22	-75	–	–	–	–
MCS7	3	4	19	-67	20	-67	–	–	–	–
MCS8	3	4	18	-64	19	-64	–	–	–	–
MCS9	3	4	18	-62	19	-62	–	–	–	–
MCS10	3	4	17	-58	18	-59	–	–	–	–

			6-GHz Radio		5-GHz XOR Radio		5-GHz Radio		2.4-GHz Radio	
	Spatial Streams	Number of Active Antennas	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)	Total Tx Power (dBm)	Rx Sensitivity (dBm)
MCS11	3	4	17	-56	18	-56	–	–	–	–
MCS0	4	4	23	-84	23	-85	–	–	–	–
MCS4	4	4	22	-73	22	-74	–	–	–	–
MCS7	4	4	19	-66	20	-66	–	–	–	–
MCS8	4	4	18	-62	19	-63	–	–	–	–
MCS9	4	4	18	-61	19	-61	–	–	–	–
MCS10	4	4	17	-56	18	-57	–	–	–	–
MCS11	4	4	17	-54	18	-55	–	–	–	–