REVIEW DRAFT - CISCO CONFIDENTIAL

Cisco Wireless 9172H Series Wi-Fi 7 Access Point Hardware Installation Guide

First Published: 2024-12-17

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

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

The following information is for FCC compliance of Class B devices: 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 the equipment causes interference to radio or television reception, which can be determined by turning the equipment off and on, users are encouraged to try to correct the interference by using one or more of the following measures:

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

Modifications to this product not authorized by Cisco could void the FCC approval and negate your authority to operate the product.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

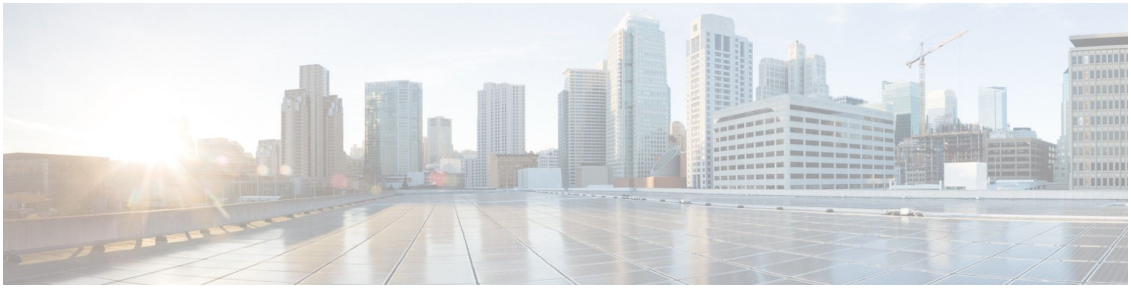
IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

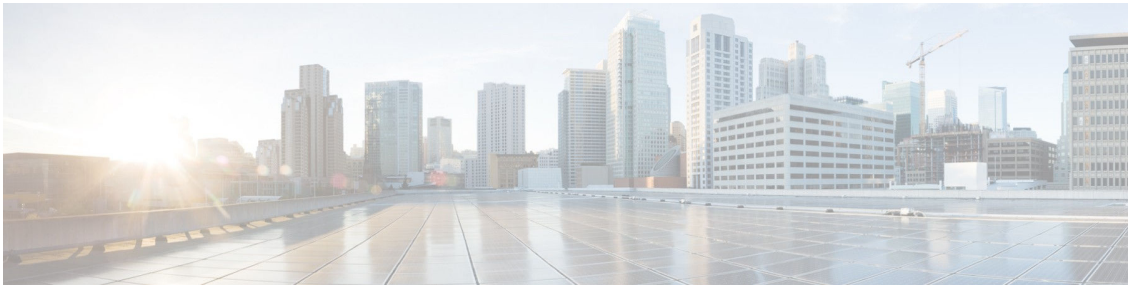
All printed copies and duplicate soft copies of this document are considered uncontrolled. See the current online version for the latest version.

Cisco has more than 200 offices worldwide. Addresses and phone numbers are listed on the Cisco website at www.cisco.com/go/offices.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: https://www.cisco.com/c/en/us/about/legal/trademarks.html. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1721R)



CONTENTS



Preface

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

It includes the following sections:

About this Guide

This guide provides instructions to install and mount your Cisco Wireless 9172H Wi-Fi 7 Series access point, also referred to as *access point* or *AP* in this document. This guide also contains troubleshooting information and links to resources that can help you configure the AP.

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 Wireless 9172H Wi-Fi 7 series access point is available at:

Draft comment: Add correct URL at FCS

https://www.cisco.com/c/en/us/support/wireless/wireless-9178-series-access-points/series.html

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

Draft comment: Add correct URLs at FCS

- Cisco Wireless 9172H Wi-Fi 7 Access Point Deployment Guide
- Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide
- Cisco Wireless Global Use Access Points Deployment Guide

Communications, Services, and Additional Information

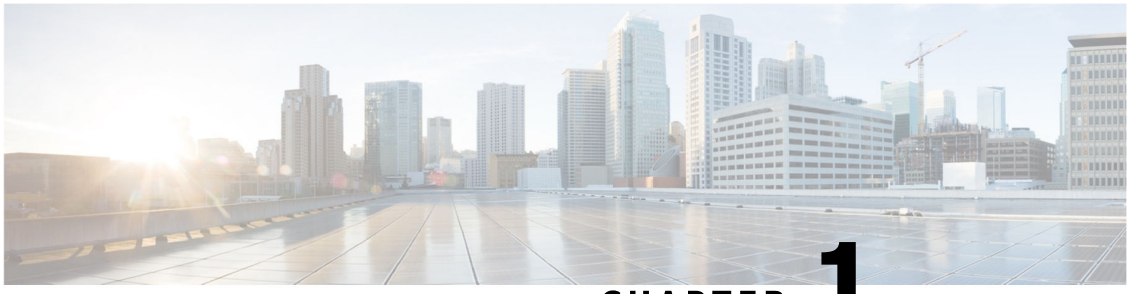
- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.
- To get the business impact you're looking for with the technologies that matter, visit Cisco Services.
- To submit a service request, visit Cisco Support.
- To discover and browse secure, validated enterprise-class apps, products, solutions, and services, visit Cisco DevNet.
- To obtain general networking, training, and certification titles, visit Cisco Press.
- To find warranty information for a specific product or product family, access Cisco Warranty Finder.

Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a gateway to the Cisco bug-tracking system, which maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. The BST provides you with detailed defect information about your products and software.

Documentation Feedback

To provide feedback about Cisco technical documentation, use the feedback form available in the right pane of every online document.



CHAPTER 1

About the Access Point

Introduction to Cisco Wireless 9172H Wi-Fi 7 Access Point

The Cisco Wireless 9172H Wi-Fi 7 series access point is an indoor-rated, wall-mounted AP. This AP has six integrated internal omnidirectional antennas and supports 2x2:2, 6SS with tri-band, tri-concurrent radios on 2.4 GHz, 5 GHz, and 6 GHz bands. The CW9172H AP supports full interoperability with leading 802.11be, 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 (formerly known as Cisco DNA Center) on-premises
- Cisco Catalyst stack
- Cisco Spaces
- Meraki cloud-based stack

A full listing of the AP's features and specifications is provided in the CW9172H Data Sheet, at:

Draft comment: Add correct URL at FCS

Cisco Catalyst 9172H Series Access Points Data Sheet

Cisco Wireless 9172H Wi-Fi 7 Access Point Features

The Cisco Wireless 9172H Wi-Fi 7 AP is designed to work in both a Cisco Catalyst 9800 Series Wireless Controller and a Meraki cloud-based deployment.

Some of the key features of the CW9172H AP include:

1. **Radios and wireless capabilities**

- Six integrated internal antennas that are omnidirectional in azimuth for the 2.4 GHz, 5 GHz, and 6 GHz bands
- Wi-Fi 7 enabled on the tri-band, tri-concurrent, client-serving radios supporting these 2x2:2 configurations:
  - 2.4GHz + 5GHz + 6GHz
  - 2.4GHz + 5GHz
  - 2.4GHz + 6GHz
  - 5GHz + 6GHz
- Dedicated 1x1 tri-band scanning (AUX) radio for real-time network monitoring and optimization, and
- 2.4 GHz IoT radio supporting Bluetooth 6.0+, BLE, Zigbee and Thread for smart device integration.
- Orthogonal Frequency Division Multiple Access (OFDMA) for efficient traffic scheduling and resource utilization
- BSS coloring and spatial reuse enable differentiation between multiple basic service sets for increased transmission efficiency

2. Power and Connectivity

- **Draft comment:** 5G & 10G speeds not mentioned in PRD. Are they supported?

  Dual 10G ethernet ports support these speeds: 100 Mbps, 1 Gbps, 2.5 Gbps, 5 Gbps, and 10 Gbps
- Power over Ethernet (PoE): Fully compliant with 802.3bt/4-pair PoE, enabling all device features.

  Includes dual PoE ports for redundancy, ensuring uninterrupted power supply for enhanced reliability.

Tip Ensure that the PoE injector or switch provides necessary power to the AP so that all features are enabled.

- Energy-Efficient Ethernet (EEE) is supported for port speeds of 100 Mbps, 1 Gbps, 2.5 Gbps, 5 Gbps, and 10 Gbps.

  Draft comment: We do not document upcoming feature support in the installation guide. Can this note about EEE be removed?

Note EEE functionality requires a future software update, including user configuration options.

- **Draft comment:** Review

  Ethernet Cable Requirements:
  - CAT6: Recommended for distances up to 55m.

- CAT6A: Required for distances up to 100m.

- Environmental Considerations:
  - Avoid routing cables near high-interference sources such as electrical panels or motors.
  - Ensure cable installations comply with local building and fire safety codes.

3. Intelligent Network Capabilities
   - **Target Wake Time (TWT)**: An energy-saving mode that allows battery-powered devices to stay asleep and wake up only at predefined intervals for data exchange, optimizing energy efficiency.
   - **CleanAir Pro Technology**:
     - Provides advanced spectrum intelligence for 2.4 GHz, 5 GHz, and 6 GHz bands.
     - Supports high-speed spectrum analysis across channel widths from 20 MHz to 320 MHz
     - Identifies and mitigates interference sources, optimizing network performance in real-time.
   - **Flexible Radio Assignment (FRA)**: Dynamically switches radios between 5 GHz and 6 GHz bands based on client demand and network load, improving resource utilization.
   - **Integrated Bluetooth Low Energy (BLE)**: Enables IoT applications, such as location tracking and wayfinding.

4. Operating modes: The CW9172H supports a variety of deployment and operational modes to meet diverse network requirements:
   - **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.
   - **SDA or fabric mode**: Supports Software-Defined Access (SD-Access) for advanced segmentation and policy enforcement.
   - **Site Survey mode**: The AP GUI is enabled and used for configuring the RF parameters for site survey investigation, simplifying network planning and installation. For information, see the Access Points Survey Mode section in the *Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide*.
   - **Sniffer mode**: In this mode, the AP sniffs the air (captures and forwards all client packets for remote analysis\ on a given channel to a remote machine that runs AiroPeek NX or Wireshark (packet analyzers for IEEE 802.11 wireless LANs). This includes metadata such as timestamp, signal strength, and packet size.

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

- **WGB (Workgroup Bridge) mode**: Provides bridge functionality for connecting wired devices to the wireless network.
- **Mesh Mode**: Extends network coverage in mesh environments, ensuring seamless connectivity across large or segmented areas.
- **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.

5. External Interfaces
   - One passthrough input port
   - One passthrough output port
   - One PoE-powered 2.5Gbps WAN uplink port supporting port speeds of 100 Mbps, 1 Gbps, and 2.5 Gbps
   - Three 1Gbps LAN ports for wired applications supporting port speeds of 10 Mbps, 100 Mbps, and 1 Gbps
     - LAN1: 802.3af POE-out port
   - One RJ45 console port.
6. Software Features
   - Intelligent Capture: Probes the network to provide deep diagnostic insights, enabling troubleshooting latency, interference, and other performance issues.
   - Cisco Catalyst Center integration to enable features such as:
     - Cisco Spaces for location services
     - Apple FastLane for optimized iOS device performance
     - Cisco Identity Services Engine (ISE) for advanced security and network access control
   - Optimized AP Roaming: Ensures client devices connect to the access point, providing the fastest data rates within their coverage range

AP Model Numbers and Regulatory Domains

AP Type	Product ID	Details
Access Point for indoor environments, with internal antennas	CW9172H	Wi-Fi 7 AP, tri-band, tri-concurrent 802.11be with internal omnidirectional antennas

With the new Wi-Fi 7 APs, Cisco now has one AP portfolio that can be used either with the Meraki cloud native network or Catalyst on-premise controller-based deployments. With the introduction of the one AP portfolio, it is essential to have a single product ID (PID) at manufacturing, to simplify logistics or operations. This AP model is designed for global use under a single PID. 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. Regulatory approvals are continually updated as they are obtained.

Antennas and Radios

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

- Two dual-band, Wi-Fi serving antennas with a dedicated 2.4-GHz radio and a 5-GHz radio
- Two single-band Wi-Fi serving antennas with a dedicated 6-GHz radio
- One internal single-band antenna with a dedicated 2.4-GHz IoT radio
- One tri-band antenna with a dedicated 2.4 GHz, 5-GHz, and 6-GHz AUX radio

Operating Frequency and Effective Isotropic Radiated Power

Draft comment: Review freq & power for EU & UK

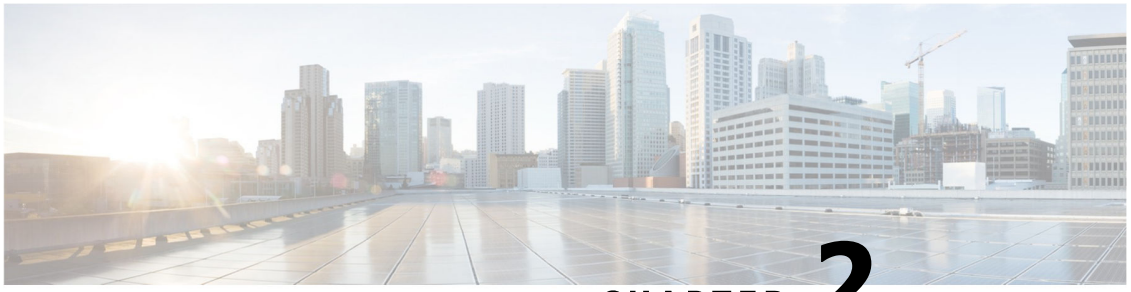
Table 1: CW9172H Values for European Union (CE) Region

Evaluation Mode	Frequency Range (MHz)	EIRP Power Limit (dBm)
2.4GHz WLAN	2400-2483.5	20
5GHz WLAN B1	5150-5250	23
5GHz WLAN B2	5250-5350	23
5GHz WLAN B3	5470-5725	30
5GHz WLAN B4 (EN 300 440 V2.2.1)	5725-5875	13.98

Evaluation Mode	Frequency Range (MHz)	EIRP Power Limit (dBm)
6GHz WLAN (ETSI EN 303 687 V1.1.1)	5945~6425	LPI：23
Bluetooth	2400-2483.5	9.96

Table 2: CW9172H Values for United Kingdom Region

Evaluation Mode	Frequency Range (MHz)	EIRP Power Limit (dBm)
2.4GHz WLAN	2400-2483.5	20
5GHz WLAN B1	5150-5250	23
5GHz WLAN B2	5250-5350	23
5GHz WLAN B3	5470-5725	30
5GHz WLAN B4 (IR 2030)	5725-5850	23
6G WLAN (IR 2030)	5925-6425	LPI：23.98
Bluetooth	2400-2483.5	9.96



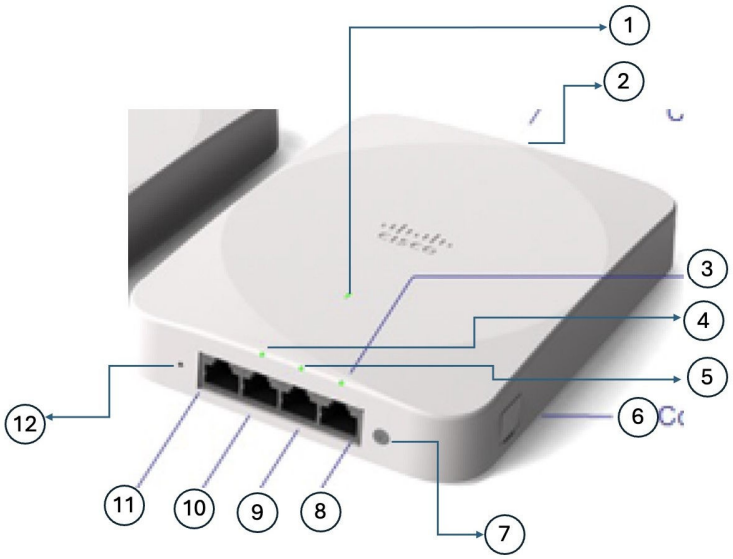
CHAPTER 2

Hardware Features

Connectors and Ports on the AP

This section contains figures showing the connectors, ports, and LEDs on the CW9172H.

Figure 1: CW9172H top view with LEDs and ports

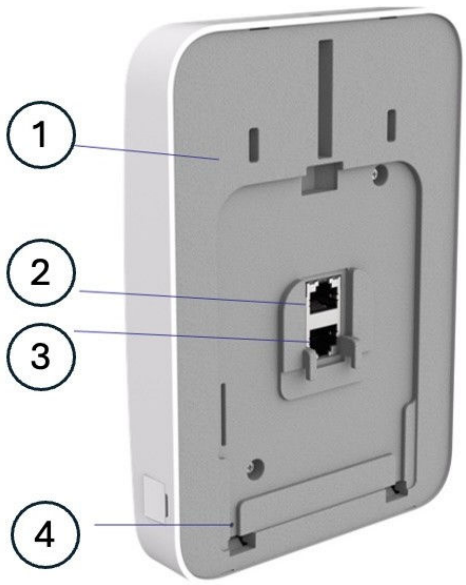


1	Status LED For more information, see Table 3: LED Status Indications, on page 17.	7	Mount bracket security screw hole 2 with cover
2	Mount bracket security screw hole 1 with cover	8	802.11be Ethernet port 3
3	LED 2	9	802.11be Ethernet port 2

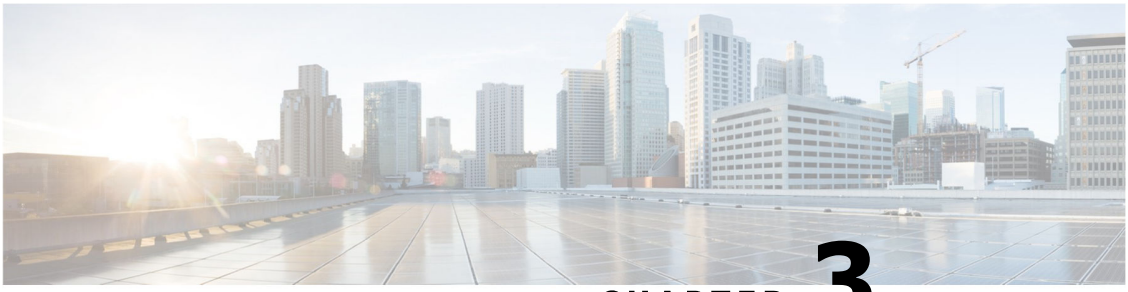
REVIEW DRAFT - CISCO CONFIDENTIAL

4	LED 1	10	802.11be PoE Ethernet port 1
5	LED 0	11	Passthrough Ethernet port (OUT or IN?) with cover **Draft comment:** Is it IN or OUT?
6	RJ-45 (2.5G/1G/100M) console port with cover Default baud rate is 115200	12	Mount bracket detent tool access hole

Figure 2: CW9172H Rear View



1	Bottom cover	3	Passthrough Ethernet port (OUT or IN?) with cover **Draft comment:** Is it IN or OUT?
2	2.5G WAN port	4	Reset button For information on how to use the reset button, see the Using the Reset Button section



CHAPTER 3

Installing the Access Point

Installing an AP involves these high-level tasks:

Unpacking the Package

Package Contents

Each AP package contains the following items:

- One CW9172H AP
- Orderable mounting brackets and accessories:
  - CW-MNT-H1
  - AIR-AP-BRACKET-1=
  - AIR-AP-BRACKET-W4
  - Spacer bracket
  - Port lock
  - Desk mount
- Torx security screw and mylar label to cover the screw
- Power injector (CW-INJ-8) when PoE is not available

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-T-RAIL-R=	Recessed ceiling grid clip
AIR-AP-T-RAIL-F=	Flush ceiling grid clip
AIR-CHNL-ADAPTER=	T-RAIL channel adapter

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

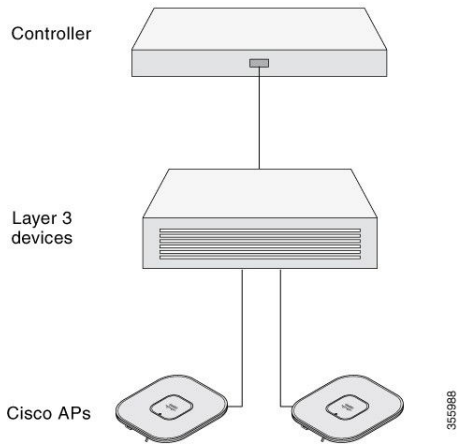
Power Supply	Description
CW-INJ-8	Meraki 802.3bt PoE injector Power Specifications: 60W, 10 Gbps Ethernet For more information, see power injector data sheet.
AIR-PWRINJ7=	Mid-span power injector AIR-PWRINJ7= when (PoE) is not available Power specifications: 50W, 56VDC For more information, see the power 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.

Performing a Preinstallation Configuration

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 a Wireless Network, on page 16.

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 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 21 for more information.

Note

- The AP requires a 10G Ethernet link to prevent the Ethernet port from becoming a bottleneck for traffic.

Procedure

Step 1 Power the AP using a supported power source.

See Powering the Access Point, on page 14.

- The AP checks for cloud connectivity and attempts to connect to the Meraki dashboard.
- If the AP is unable to find cloud connectivity, it uses fast offline migration to look for a Cisco Catalyst 9800 Controller. The AP uses DHCP, DNS, and L2 discovery mechanisms for the migration. For more information, see Global Use Access Points.

  Note
  The AP should not have cloud connectivity from its subnet if it intends to connect to a controller. If the AP joins a Meraki Dashboard, it can be later migrated to a controller.

Once the AP discovers the controller, it performs a firmware image download and reboots.

Step 2 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 3 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 14.

- 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. 1.25-0.93A, 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 Wi-Fi client serving radios and IoT radio are switched off.

- Operating temperature:
  - CW9178I: 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.

- 802.3bt: Radios scale to 2x2, both the ethernet ports links remains at 10G, and the USB remains enabled.
- 802.3at: Radios scale to 2x2, the ethernet port 0 link remains at 10G, ethernet port 1 is disabled, and the USB is disabled.

- 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

can be mounted in the following places:

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.

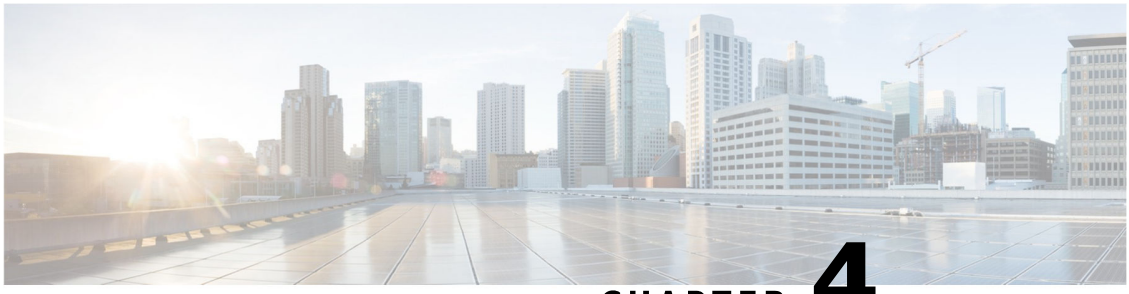
When mounting the AP in areas where there is a possibility of the AP being knocked off the mounting bracket, use the lock hasp at the back of the AP to lock it to the bracket.

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:

Power Source	2.4-GHz radio	5-GHz radio	6-GHz radio	Link speed	USB	Max POE power consumption
802.3bt (Class 6) (UPOE)	4x4	4x4(LB) + 4x4(HB)	4x4	2x 10G	Y (9W)	47W
802.3at (PoE+) (Quad Radio mode)	2x2	2x2 (LB) + 2x2 (HB)	2x2	2x 2.5 G	N	25.5W
802.3at (POE+)(Tri Radio Mode)	2x2	4x4 (FB)	2x2	2x 1G	-	25.5W
802.3af (PoE)	-	-	-	1x 1G	N	13.95W



CHAPTER 4

Configuring and Deploying the Access Point

This section describes subsequent discovery process for day 1 after the AP has successfully completed the initial discovery. For instructions on how to configure the AP, see the *Cisco Wireless Controller Configuration Guide* for the relevant release.

Note

- To configure a fresh out of the box AP to the Meraki Dashboard or Cisco Catalyst 9800 Controller, see Cisco Wireless Global Use AP Deployment Guide.
- If the organisation policy does not allow and the AP intends to join the controller, use fast offline migration technique.

The Controller Discovery Process

To support the CW9172H AP, the controller must be running or a later release. For more information, see .

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, on page 11.

- 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 21.
- 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 a Wireless Network

After you mount the access point, follow these steps to deploy it on a 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 16.

- 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. For more information, see Configuring DHCP Option 43, on page 21.

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 might 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

  Draft comment: Add correct URL at FCSCW9172H Installation Guide

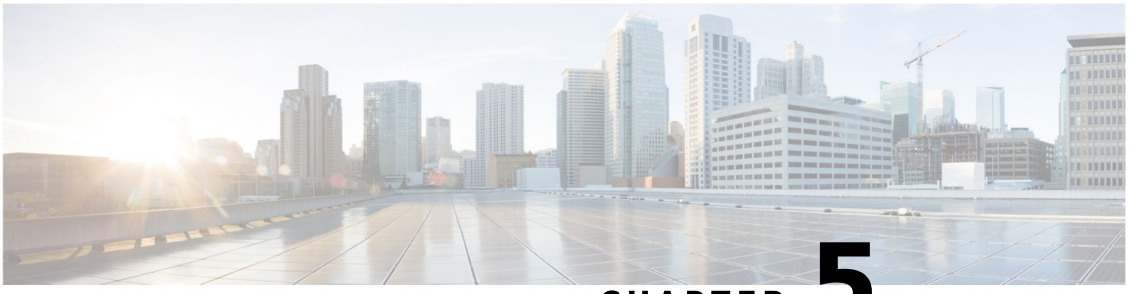
  .

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

Table 3: 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

Message Type	LED State	Message Meaning
Top right ethernet LED	Off 	Link speed is 10 Mb, 100 Mb, or disconnected
	Orange 	Link speed is 1000 Mb
	Green 	Link speed is 2.5 Gb, 5 Gb, or 10 Gb
Top left ethernet LED	Blinking Green 	Activity indicator for received signal or transmitted signal



CHAPTER 5

Troubleshooting

Using the Reset Button

Using the **Reset** button (see #unique_16 unique_16_Connect_42_ap_top_connectors), you can reset the AP to factory default.

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

1. Unplug the AP from the power source.
2. Hold the **Reset** button.
3. Power on the AP.

   Press, and continue to press the **Reset** button for the duration corresponding to your requirements listed in the table below:

0-5 seconds	Blinks green for Meraki mode, and blue for Catalyst mode.
> 10 seconds	The AP undergoes configuration wipe.
> 20 seconds	Ap resets completely and enters maintain management mode.
> 30 seconds	Configures FIPS in Catalyst mode.
> 60 seconds	The LED light turns solid pink, which indicates a factory reset.
> 90 seconds	LED turns off.

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 or a later release to support the Cisco 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.

If the CW9178I is in Meraki Management mode, it does 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 trace 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 AP sends 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** *syslog-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 APs:

- 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.

Note The default band rate is 115200.

- 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 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 access point is:

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:

Note The procedure describes configuration process for an AP that has completed the intial discovery process. For more information on day 0 workflow, see Global Use Access Points.

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 .

<*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.

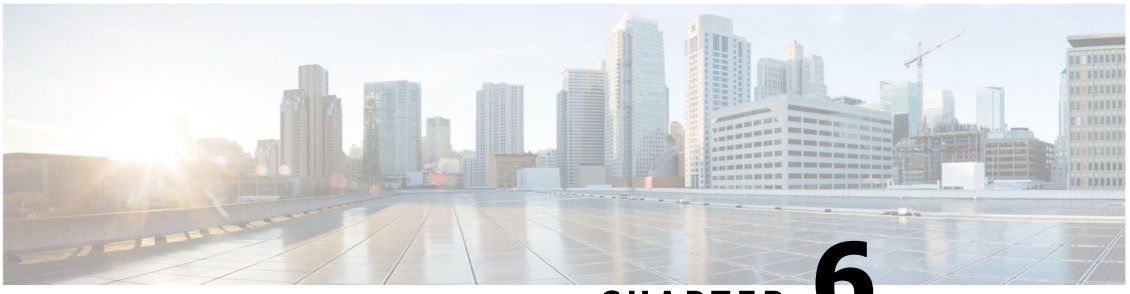
Step 3 Add the Option 43 line using the following syntax:

```
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

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 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

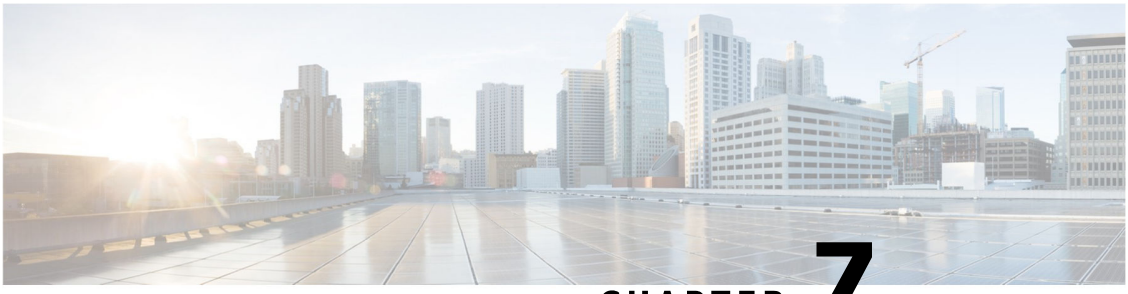
Warning This product relies on the building's installation for short-circuit (overcurrent) protection. To reduce risk of electric shock or fire, ensure that the protective device is rated not greater than: **20 A**

Warning 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 8.26 inches (21 cm) or more from the body of all persons.** Statement 332

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

Warning To reduce the risk of fire or bodily injury, do not operate the unit in an area that exceeds the maximum recommended ambient temperature of: 122°F (50°C)



CHAPTER 7

Declarations of Conformity and Regulatory Information

This section provides declarations of conformity and regulatory information for the . 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

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.

3. This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties.

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.

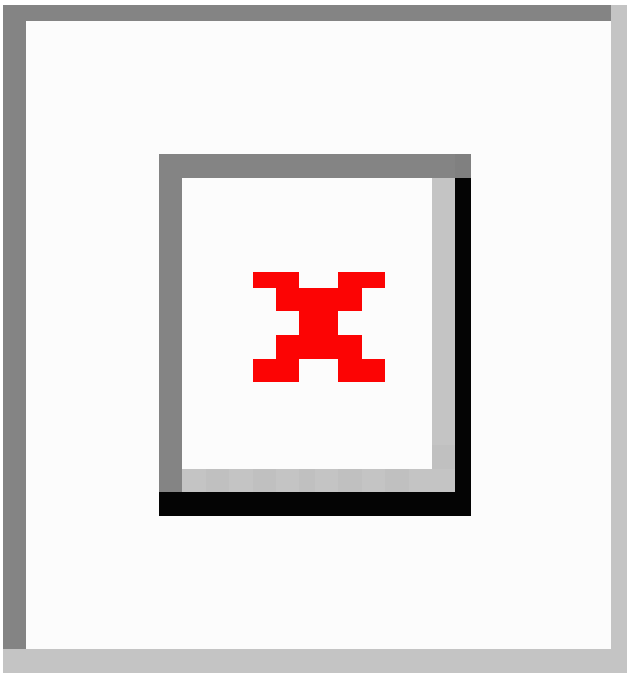
Caution Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

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.

	Warning 

Access Point Models:

Guidelines for Operating Cisco Catalyst Wireless 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（例えば、ノくーティションの設置など）についてご相談して下さい。
3. その他、この機器から移動体撒別用の特定，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

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.

RLAN devices shall include the following text in the user manual:

- Devices shall not be used for control of or communications with unmanned aircraft systems.
- Devices shall not be used on oil platforms.
- Devices shall not be used on aircraft, except for the low-power indoor access points, indoor subordinate devices, low-power client devices, and very low-power devices operating in the 5925-6425 MHz band, that may be used on large aircraft as defined in the *Canadian Aviation Regulations*, while flying above 3,048 metres (10,000 feet).

REVIEW DRAFT - CISCO CONFIDENTIAL

Except for very low-power devices, RLAN devices shall additionally include the following text in the user manual:

- Devices shall not be used on automobiles.
- Devices shall not be used on trains.
- Devices shall not be used on maritime vessels.

Le manuel d'utilisation des dispositifs RLAN doit comprendre le texte suivant :

- Les dispositifs ne doivent pas être utilisés pour commander des systèmes d'aéronef sans pilote ni pour communiquer avec de tels systèmes;
- Les dispositifs ne doivent pas être utilisés sur les plateformes de forage pétrolier;
- Les dispositifs ne doivent pas être utilisés dans les aéronefs, à l'exception des points d'accès intérieurs de faible puissance, des dispositifs subordonnés intérieurs, des dispositifs clients de faible puissance et des dispositifs de très faible puissance fonctionnant dans la bande de 5 925 à 6 425 MHz, qui peuvent être utilisés dans les gros aéronefs tel qu'il est défini dans le *Règlement de l'aviation canadien*, et ce, lorsqu'ils volent à une altitude supérieure à 3 048 mètres (10 000 pieds).

À l'exception des dispositifs de très faible puissance, les dispositifs RLAN doivent en outre inclure le texte suivant dans le manuel d'utilisation :

- Les dispositifs ne doivent pas être utilisés dans les automobiles;
- Les dispositifs ne doivent pas être utilisés dans les trains;
- Les dispositifs ne doivent pas être utilisés sur les navires maritimes.

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.

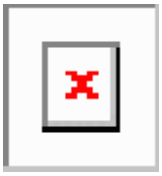
Pour les produits disponibles aux États-Unis / Canada du marché, seul le canal 1 à 11 peuvent être exploités. Sélection d'autres canaux n'est pas possible.

Industry Canada

Access Point Models:

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:

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:

Manufacturer:

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

Administrative Rules for Cisco Catalyst Wireless 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，❹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。

English Translation

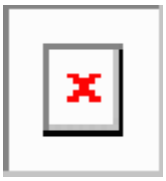
Without permission granted by the NCC, any company, enterprise, or user is not allowed to change frequency, enhance transmitting power or alter original characteristic as well as performance to a approved low power radio-frequency devices. The low power radio-frequency devices shall not influence aircraft 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.

The operations near the radar system shall not be influenced.

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

Operation of Cisco Catalyst Wireless Access Points in Brazil

Figure 3: 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 7

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 7 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.

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 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 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.

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.

Separation Distance
20 cm (7.87 inches)

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

The Cisco 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 4: Separation Distance

Frequency	Distance
2.4 GHz	20 cm (7.87 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 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 5: Distance d'éloignement

Fréquence	Distance
2.4 GHz	20 cm (7.87 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:

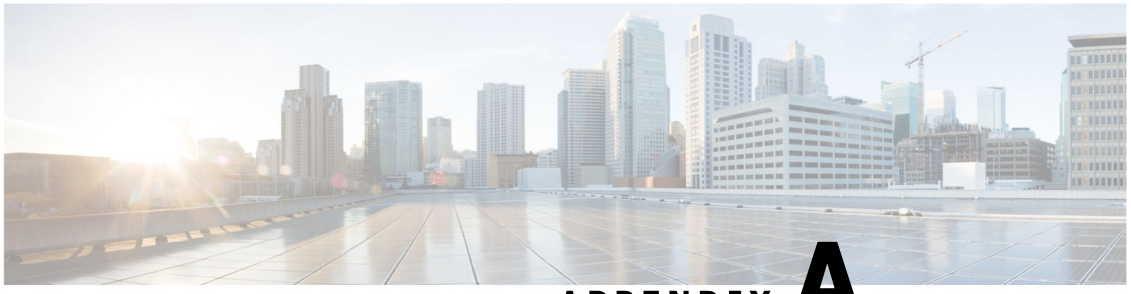
  https://www.ctia.org

- 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 6: 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

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)
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	–	–

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)
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	–	–

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)
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

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)
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	–	–

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)
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	–	–	–	–

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)
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	–	–	–	–