



voice. Data. wireless. *Become one.*

Meru Access Point

Installation Guide

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About This Guide

This guide describes the features of the Meru Access Point family, which includes the AP200 and AP100 models. This guide also includes the hardware installation for both access points. The term access point is used interchangeably throughout this document to apply to either model when there are no differences between the models.

Audience

This guide is intended for persons installing the Meru Access Point (AP).

In This Guide

This guide includes the following chapters:

- [Chapter 1, “About Meru Access Points”](#)
- [Chapter 2, “Installing the AP100”](#)
- [Chapter 2, “Installing the AP200”](#)

Other Sources of Information

Additional information is available in the following Meru publications and external references.

Meru Publications

- *Meru Wireless LAN System Release Notes*
- *Meru Wireless LAN System Getting Started Guide*
- *Meru Controller Installation Guide*
- *Meru Wireless LAN System Configuration Guide*
- *Meru Wireless LAN System Command Reference*

External References

- Stevens, W. R. 1994. *TCP/IP Illustrated, Volume 1, The Protocols*. Addison-Wesley, Reading, Mass.
- Gast, M.S. 2002. *802.11 Wireless Networks, The Definitive Guide*. O'Reilly and Associates, Sebastopol, Calif.

Typographic Conventions

This document uses the following typographic conventions to help you locate and identify information:



Note: Provides extra information, tips, and hints regarding the topic.



Caution! Identifies important information about actions that could result in damage to or loss of data, or could cause the application to behave in unexpected ways.



Warning! Identifies critical information about actions that could result in equipment failure or bodily harm.

Contacting Meru

You can visit Meru Networks on the Internet at this URL:

<http://www.merunetworks.com>

Click the Support menu button to view Meru Customer Services and Support information.

Customer Services and Support

For assistance, contact Meru Customer Services and Support 24 hours a day at 1-888-637-8952 (1-888-Meru-WLA(N)) or 1-408-215-5305. Email can be sent to support@merunetworks.com.

Meru Customer Services and Support provide end users and channel partners with the following:

- Telephone technical support
- Software update support
- Spare parts and repair service

RMA Procedures

Contact Meru Customer Services and Support for a Return Material Authorization (RMA) for any Meru equipment.

Please have the following available when making a call:

- Company and contact information
- Equipment model and serial numbers
- Meru software release and revision numbers (for example, 3.0.0-35)
- A description of the symptoms the problem is manifesting
- Network configuration

FCC Compliance

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.



Caution! Changes or modifications to the Meru Access Point that are not expressly approved by Meru Networks will void your warranty and could void your authority to operate this equipment.

Declaration of Conformity

The AP150 complies with the requirements of the *Low Voltage Directive 73/23/EEC* and the *EMC Directive 89/336/EEC* by conforming to the following standards:

- Safety: EN 60950:1992 + A1, A2
- EMC: EN 55022, EN 50082-1

The AP200 complies the with following standards:

- Radio: EN 301.893
- EMC: EN 301.489-1, EN 489-17
- Safety: EN 60950

The following CE mark is affixed to the AP100 802.11b with 100 mW radios:



FCC Compliance

- ✓ **Note:** This equipment can 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 Meru Networks.
- ✓ **Note:** Combinations of power levels and antennas resulting in a radiated power level above 100 mW equivalent isotropic radiated power (EIRP) are considered as not compliant with the above mentioned directive and are not allowed for use with the European community and other countries that have adopted the European R&TTE directive 1999/5/EC or the CEPT recommendation Rec 70.03 or both.

The following CE mark is affixed to the AP200 802.11a with 40 mW radios:



Chapter 1

About Meru Access Points

The Meru Access Point radio devices communicate with the Meru Controller and form the Wireless LAN (WLAN). The Meru Controller and Access Points connect to the site's wired LAN through wired switches. Wireless clients associate with the Access Points as they roam throughout the WLAN. As such, the Meru WLAN is an extension of the wired LAN, providing the wireless benefits of client mobility, enhanced access, and dynamic network configuration.

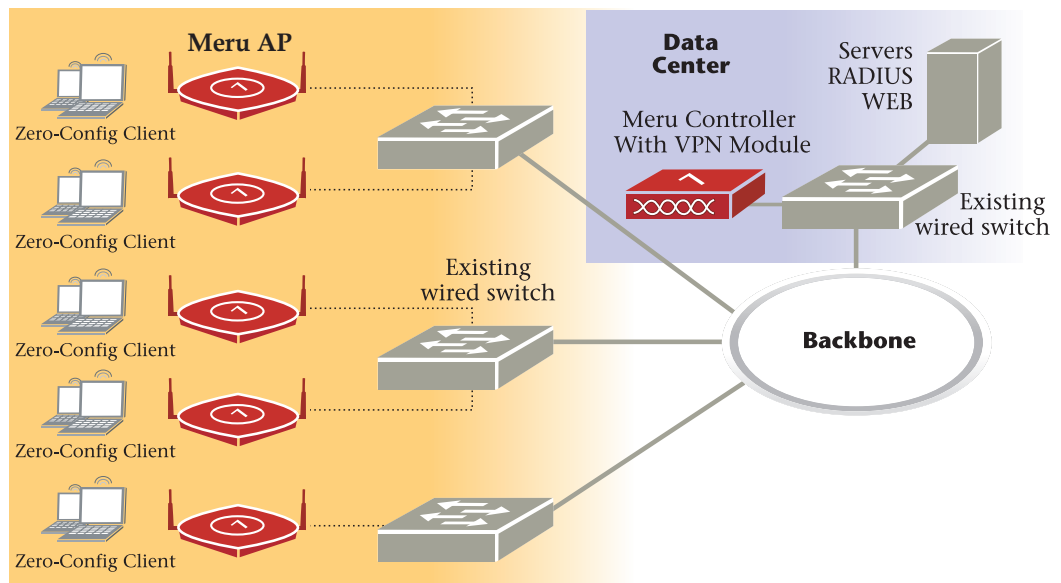


Figure 1: Meru Wireless LAN (WLAN)

Meru Access Point Features

All Meru Access Points provide the following features:

- Five times more voice calls per Access Point
Meru Access Points use Over-The-Air QoS to provide fine-grained quality of service on a per-application, per-user, and per-flow basis providing a robust platform for enterprise-quality voice, plus streaming media and data applications. It provides both uplink and downlink QoS between the client and the access point, which is then integrated into the wired QoS mechanisms to provide

end-to-end QoS. Meru Access points deliver a 5-fold increase in voice carrying capacity from the current 5-8 calls per access point to over 30 calls per Meru Access Point with no change to the 802.11 client.

- Over five times the scalability of alternate Access Points
Meru Access Points are unique in their ability to dramatically increase performance over alternate APs, even as client density increases. Meru Access Points, can serve over 100 standard 802.11 active data and voice clients per access point, whereas today's systems are limited to about 10-15 data-only clients. This scalability allows corporations to plan for a wireless usage growth without forklift upgrades to the WLAN infrastructure.
- Zero-loss handoff means applications are not interrupted
Multiple Access Points can be aggregated into a Virtual AP, creating a single wireless network with a wide coverage area that can encompass the entire enterprise campus and provide unparalleled performance and manageability. This breakthrough technology works with any standard 802.11 client device and enables application and security policy persistence while roaming, without requiring the user to re-login or re-authenticate throughout the network coverage area.
- Embedded RF monitor for enhanced security
Traditional approaches to wireless security involve separate devices to monitor the air or legacy APs, or access points that periodically become air monitors. Meru Access Points provide continuous RF monitoring, as well as capture information about all devices that the AP can hear, including clients associated with the access point. Meru WLAN Radar—a third generation rogue AP detection software, provides rogue detection and suppression continuously and without any interruption to the VPN sessions and time-sensitive voice applications that operate on the converged wireless LAN in an enterprise. This constant monitoring enables enhanced security with rogue device detection and prevention that is less disruptive and more cost effective than traditional approaches.

Meru Access Point Models

The Meru Radio Access Point is available in two model families: the Access Point 200 and the Access Point 100.

AP200

The Meru Dual Radio Access Point 200 family provides two models that conform to the specifications provided by the IEEE 802.11a and 802.11g protocols and provide backward compatibility for the 802.11b protocol. A Meru AP200 works with most standard WiFi clients.

- The AP201 houses a single 802.11a/b/g radio device
- The AP208 supports a maximum of two radio devices that can simultaneously run two protocols (802.11b, g or bg on interface 1 and 802.11a on interface 2). Alternately the second radio can be configured to run as an RF monitor to the Meru controller, providing real-time status of RF activity to optimize the wireless network.

The Access Point 200 (referred hereafter as the AP200, unless specifically referring to the AP201 or AP208) is housed in a metal case with a plastic removable cover. As such, it can be used for plenum installations when the plastic cover is removed.

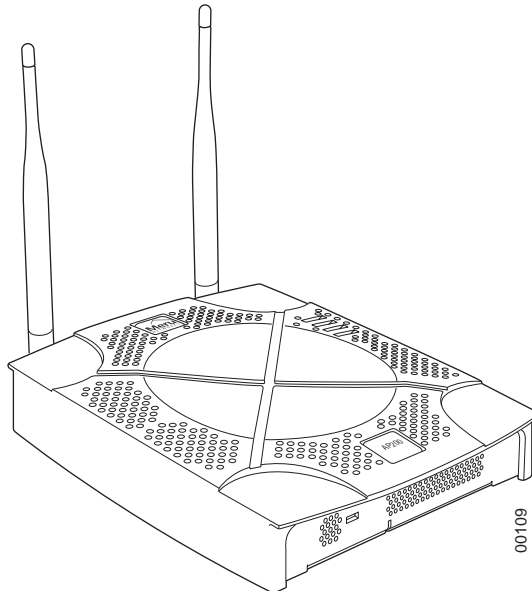


Figure 2: AP200

AP150

The Meru Access Point 150 family (referred to hereafter as the AP150, unless specifically referring to the AP150-P) consists of the non-plenum AP150 and plenum-rated AP150-P. Both models that conform to the specifications provided by the IEEE 802.11b protocol and work with all standard WiFi clients. The AP150 also serves as an RF monitor to the Meru controller and provides real-time status of RF activity to optimize the wireless network.

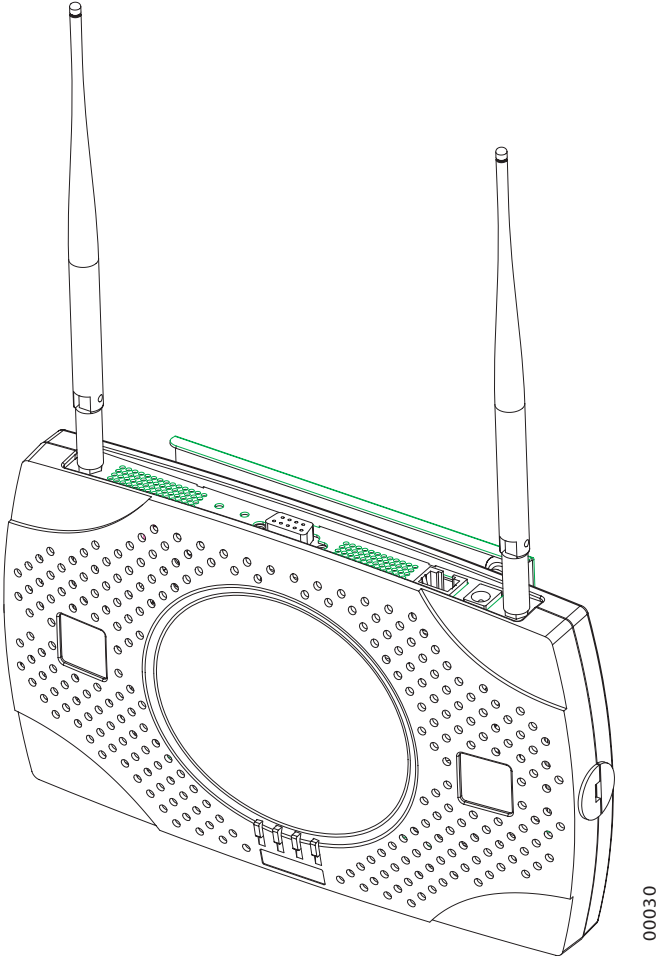


Figure 3: AP150

Chapter 2

Installing the AP200

This chapter describes how to physically install the Meru AP200. It contains the following sections:

- [Safety Precautions](#)
- [Unpacking the AP200](#)
- [Installation Requirements](#)
- [Installing the Access Point](#)
- [Where to Go From Here](#)
- [Checking LED Activity](#)

Safety Precautions

Follow the guidelines in this section to ensure proper operation and safe use of the access point.

FCC Safety Compliance Statement

The FCC with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. When used with approved Meru access point antennas, Meru AP200 products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper installation of this radio according to the instructions found in this manual will result in user exposure that is substantially below the FCC recommended limits.

General Safety Guidelines

- Do not touch or move antenna(s) while the unit is transmitting or receiving.
- Do not hold any component containing a radio so that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- The use of wireless devices in hazardous locations is limited to the constraints posed by the local codes, the national codes, and the safety directors of such environments.

Warnings

Translated versions of the following safety warnings are provided in Appendix C.



Warning! In order to comply with FCC radio frequency (RF) exposure limits, dipole antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons.



Warning! Do not operate your wireless network device near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use.



Warning! Do not work on the system or connect or disconnect cables during periods of lightning activity.



Warning! Read the installation instructions before you connect the system to its power source.



Warning! This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).



Warning! Inside antennas must be positioned to observe minimum separation of 20 cm. (~ 8 in.) from all users and bystanders. For the protection of personnel working in the vicinity of inside (downlink) antennas, the following guidelines for minimum distances between the human body and the antenna must be observed.

The installation of the indoor antenna must be such that, under normal conditions, all personnel cannot come within 20 cm. (~ 8.0 in.) from any inside antenna. Exceeding this minimum separation will ensure that the employee or bystander does not receive RF-exposure beyond the Maximum Permissible Exposure according to FCC CFR 47, section 1.1310 i.e. limits for General Population/Uncontrolled Exposure.

Unpacking the AP200

The AP200 ships with a mounting bracket and mounting hardware for standard wall mounting. Optional mounting kits are available for mounting the AP200 above or below a hanging ceiling. The AP200 mounting studs are placed so they can be used with brackets supplied by other vendors or to replace an AP100.



Note: The AP200 has a security cable slot so you can secure the AP200 with a standard security cable, such as those used to secure laptop computers.

An array of holes on the mounting bracket (see [Figure 4](#)) allow it to be mounted on the wall and over junction boxes or molly bolts. There are also holes for passing the PoE Ethernet or external power supply cable through the bracket if the bracket is mounted on a junction box or over the ceiling T-bar box hanger.

Confirm that the AP200 shipping package contains the following items:

- Access point
- Mounting bracket with two mounting screws
- CD-ROM of Meru Wireless LAN System documentation
- Optional suspended ceiling mounting hardware kit
- Optional T-bar box hanger hardware kit for mounting above a suspended ceiling

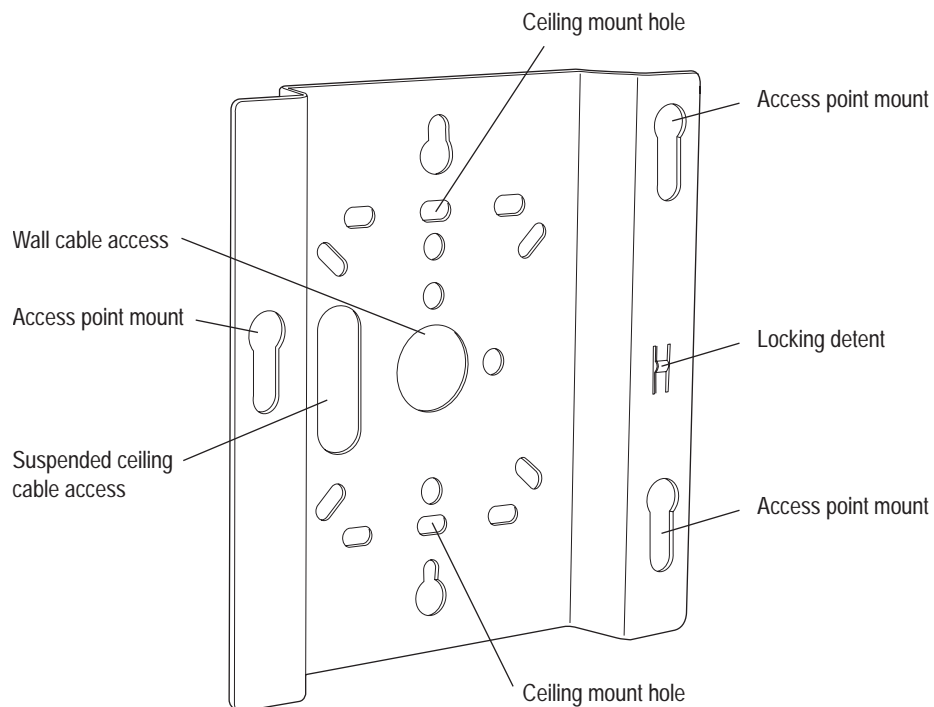


Figure 4: AP200 Mounting Bracket

Installation Requirements

The following recommended mounting locations provide the best reception for the AP200:

- On a horizontal surface, such as a table or a desk
- On a vertical surface, usually a wall
- Below a hanging ceiling

Installation Requirements

- Above a hanging ceiling tiles (this installation is supported only for the AP200 with the plastic enclosure removed)

Suitable for use in environmental air space in accordance with the Section 300-22(c) of the National Electric Code and Sections 2- 128.12 - 010 (3) and 12 - 100 of the Canadian Electrical Code. Part 1. C22. 1. (For AP200 with plastic enclosure removed.)

To complete this installation, you need the items listed in [Table 1](#).

Table 1: AP200 Installation Items

Installation Type	Consumable Items Required
Horizontal mounting	None
Vertical mounting over a wall stud	<ul style="list-style-type: none"> • Two #6 x 2" wood screws for a wood stud; or • Two #6 x 1½" metal screws for a metal stud • Mounting bracket
Vertical mounting on sheetrock	<ul style="list-style-type: none"> • Two #6 x 1" screws • Two #4-6 x 7/8" ribbed plastic wall anchors • Mounting bracket
Horizontal mounting below a hanging ceiling	<ul style="list-style-type: none"> • Two caddy fasteners • Two plastic spacers • Two keps nuts (with attached lock washer) • Mounting bracket
Mounting above a ceiling tile (AP200 metal enclosure only)	<ul style="list-style-type: none"> • Two T-rail clips • One T-box hanger • One bracket mounting clip • Mounting bracket

You need the tools listed in [Table 2](#).

Table 2: AP200 Installation Tools

Installation Type	Tools Required
Horizontal mounting	None
Vertical mounting over a wall stud	<ul style="list-style-type: none"> • Drill • 1/8" drill bit • Screwdriver
Vertical mounting on sheetrock	<ul style="list-style-type: none"> • Drill • 3/16" drill bit • Screwdriver

Installation Type	Tools Required
Horizontal mounting below a hanging ceiling	<ul style="list-style-type: none">• Screwdriver• Wrench or pliers
Mounting above a hanging ceiling (AP200 metal enclosure only)	<ul style="list-style-type: none">• Wrench or pliers• Screwdriver

Installing the Access Point

Selecting a Location

The AP200 requires a location that meets the following:

- Relatively unobstructed access to the stations the AP serves
- Power over Ethernet (PoE) connection to the network switch servicing the controller.

APs can obtain their power from 802.3af standard Power over Ethernet (PoE) or external power supply. If an external power supply is utilized to power the AP200, ensure that it is a Listed power supply, marked "Class 2" or "LPS" (Limited Power Source), and rated a minimum of 3.3 V, 4 A. For PoE, the power can be supplied by a PoE-compatible network switch or PoE power injector installed between the switch and the AP200.

Select a location with minimal physical obstructions between the AP and the wireless stations. In an office with cubicles, mounting the APs below a hanging ceiling or the wall near the ceiling provides the least obstructed communications path. For an external power supply connection, ensure the power source is near to where the AP200 will be mounted.

Most installations receive the best coverage using the following guidelines:

Install APs toward the center of the building.

- Do not install APs near metal objects, such as heating ducts, metal doors, or electric service panels.
- Relative to the ground, orient the antenna up or down, not sideways.



Note: The previous guidelines are general guidelines. Each site has its own unique environment. Place access points accordingly.

The AP200 is only intended for installation in Environment A as defined in IEEE 802.3af. All interconnected equipment must be contained within the same building, including the interconnected equipment's associated LAN connection.

Attaching the AP200 Antennas

The AP200 is provided with external antenna ports. Make sure that all external antennas and their associated wiring are located entirely indoors. The external antennas are not suitable for outside use.

If the AP200 does not have external antennas, attach the antennas to the connectors on the AP200 (see [Figure 5](#)). Rotate the knurled ring at the base of the antenna clockwise to attach the antenna. The ring should be finger-tight.



Caution! When changing the orientation of the antennas, be sure to slightly loosen the knurled ring before moving the antenna. Retighten the ring afterward. Otherwise, you might damage the internal cabling in the AP.

Mounting the Access Point

You can mount an AP200 in the following ways:

- Horizontally, as described in the [“Horizontal Mounting”](#) section.
- Vertically, as described in the [“Vertical Mounting”](#) section.
- Below a hanging ceiling, as described in the [“Mounting Below a Suspended Ceiling”](#) section.
- Above a tiled hanging ceiling, as described in the [“Mounting Above a Suspended Ceiling”](#) section.

Horizontal Mounting

To horizontally mount an AP200:

1. Place the AP200 flat on the horizontal surface.
2. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 5](#)), point the antenna straight up, then retighten the ring.

Access Point 200

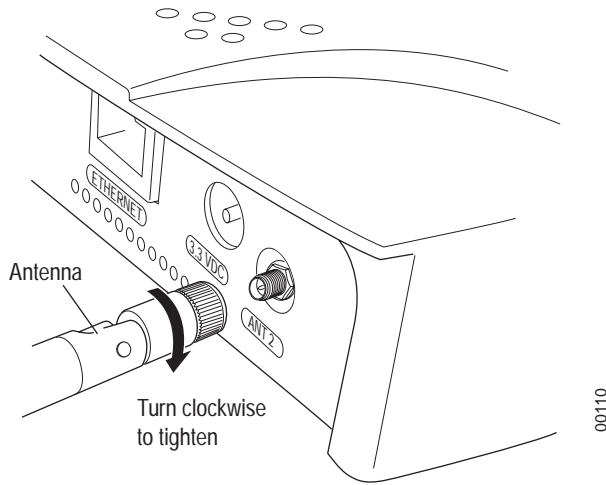


Figure 5: AP200 Antenna Connection

3. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 6](#).



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

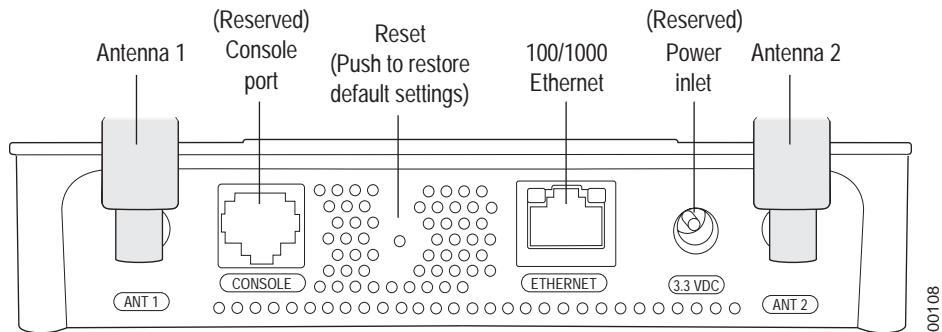


Figure 6: AP200 Connector Panel

Vertical Mounting

To vertically mount an AP:

1. Using the bracket holes as a template, mark the location on the wall for the two AP bracket mounting screws. They are placed 4 ½ inches apart, center-to-center, one above the other. If you are not using plastic wall anchors, you must center the mounting screws on a wall stud. If you do not center the mounting screws on a wall stud, you must use plastic wall anchors.

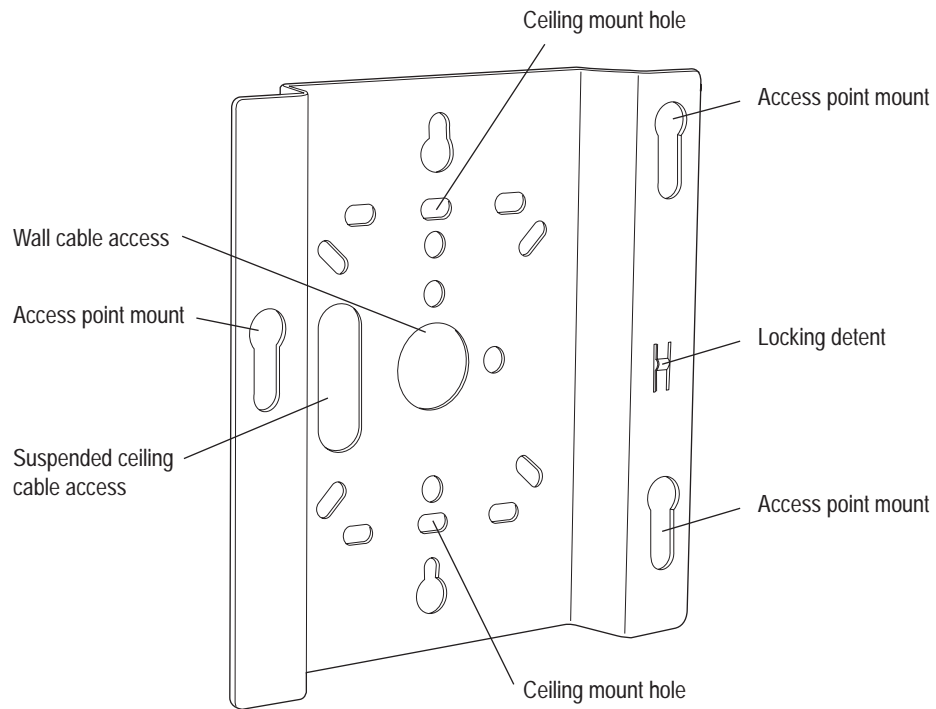


Figure 7: AP200 Bracket

2. Drill holes at the locations you marked:
 - 3/16-inch holes if you are using plastic anchors
 - 1/8-inch holes if you are using only the screws
3. If you are using plastic anchors, install them in the holes.
4. Screw in the screws most of the way, so that the screw head is about 1/16 of an inch from the wall.
5. Mount the bracket on the screws, placing the circular portion of the keyhole mounts over the screw heads and sliding the bracket down.
6. Tighten the screws to secure the bracket.
7. Align the AP200 mounting posts over the circular portion of the keyhole mounts, push the AP in and slide the AP down until it engages with the locking detents. You should hear it snap in place.

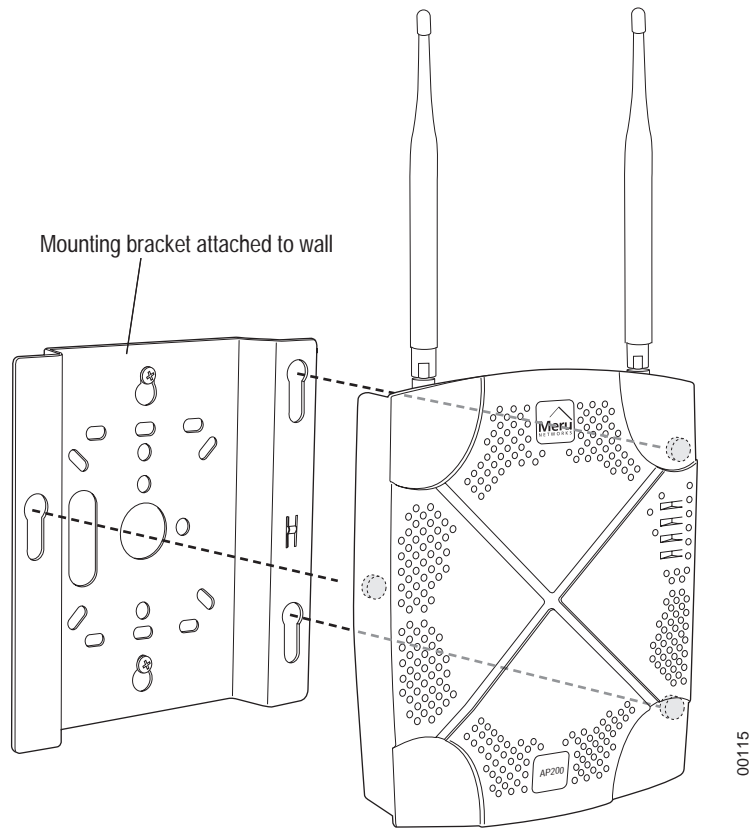


Figure 8: Aligning the AP200 with the Bracket

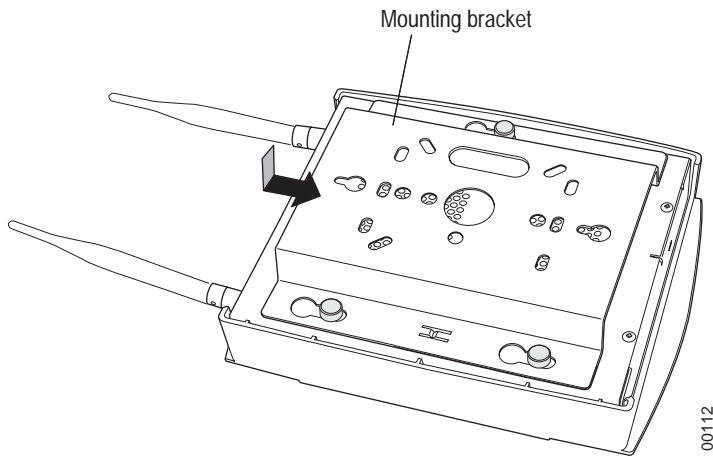


Figure 9: Sliding the AP200 into the Bracket

8. For external antennas, loosen the knurled ring at the base of each antenna (see [Figure 5](#)), point the antenna straight up, then retighten the ring.

9. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 6](#).



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

Mounting Below a Suspended Ceiling

The optional suspended ceiling mounting kit allows the AP200 mounting bracket to attach to suspended ceiling T-rails (see [Figure 10](#)).



Note: To comply with NEC code, attach a grounding wire to any of the screws used to attach the AP200 to the mounting bracket.

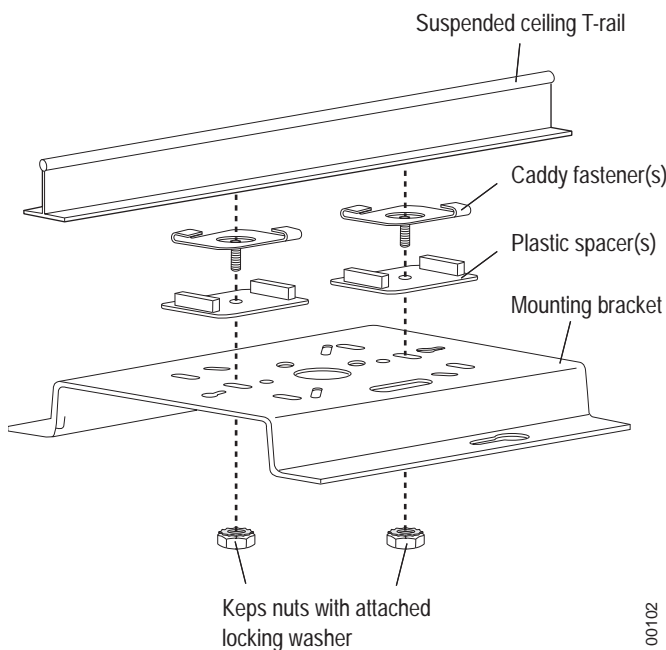


Figure 10: Mounting the AP200 to a Suspended Ceiling Rail

To mount an AP200 below a suspended ceiling:

1. Determine the location on the ceiling rail where the AP will be mounted and remove the ceiling tiles.
2. Place each of the two caddy fasteners on the ceiling T-rail and twist to attach to the rail.
3. Adjust the distance between the caddy fasteners by using the mounting bracket holes as a guide.
4. Tighten the caddy fasteners in place using a standard screwdriver. Do not overtighten.
5. Place each spacer on the caddy fastener stud. The spacer legs should contact the ceiling T-rail.
6. Align the mounting bracket keyholes with the caddy fastener studs and slide the AP200 to the narrow end of the hole.

7. Attach a keps nut to each caddy fastener stud and hand tighten. Do not overtighten.
8. Align the AP200 mounting posts over the circular portion of the keyhole mounts, push the AP in and slide the AP down until it engages with the locking detents (see [Figure 9](#)). You should hear it snap in place.
9. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 5](#)), point the antenna straight down, then retighten the ring.
10. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in (see [Figure 6](#)).



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

Mounting Above a Suspended Ceiling

The optional T-bar box hanger mounting kit allows the AP200 to be mounted above suspended ceiling T-rails (see [Figure 11](#)). The installation attaches the T-bar box hanger to the ceiling rails using clips. The AP200 attaches to the mounting bracket that is attached to the T-bar box hanger.

The AP200 antennas should point straight down for this type of installation. You may need to modify thicker tiles to support this installation.



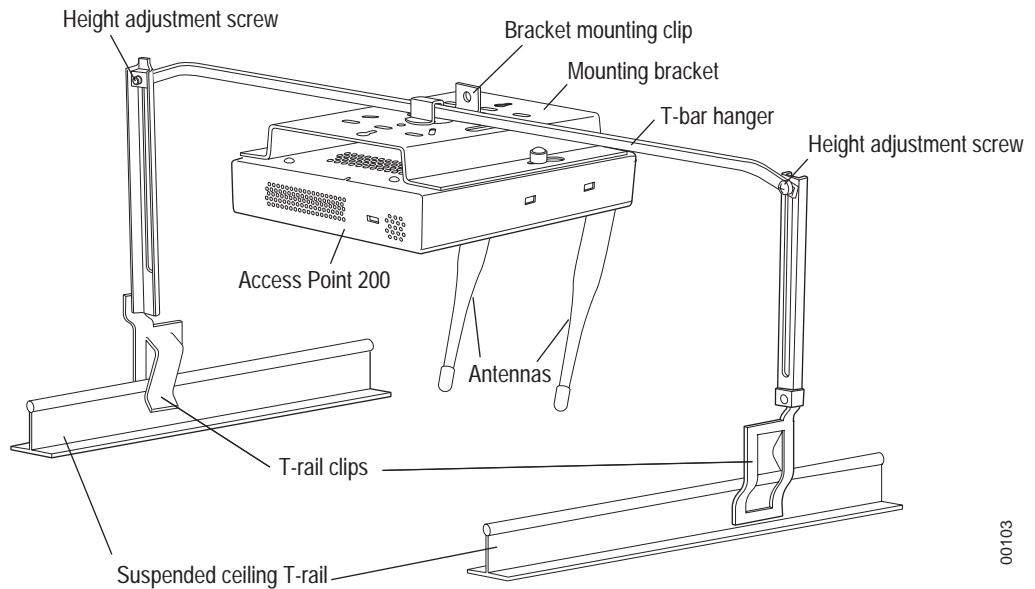
Note: When installed in air-handling spaces, such as above a suspended ceiling, the AP200 is to be powered via PoE only (PoE is required).



Note: The AP200 with the metal enclosure exposed meets the requirements for fire resistance and low smoke-generating characteristics required by Section 300-22(C) of the National Electrical Code (NEC) for installation in a building's environmental air space. You must remove the plastic enclosure to reveal the plenum-rated AP200 metal case for installations above a suspended ceiling.

Additionally, you must use Ethernet cable that meets the requirements for operating in environmental air space (in accordance with Section 300-22(C) of the NEC).

Any Fast Ethernet (FE) cables installed in air-handling spaces should be suitable under NEC Article 800.50 and marked accordingly for use in plenums and air-handling spaces with regard to smoke propagation, such as CL2-P, CL3-P, MPP (Multi Purpose Plenum), or CMP (Communications Plenum).

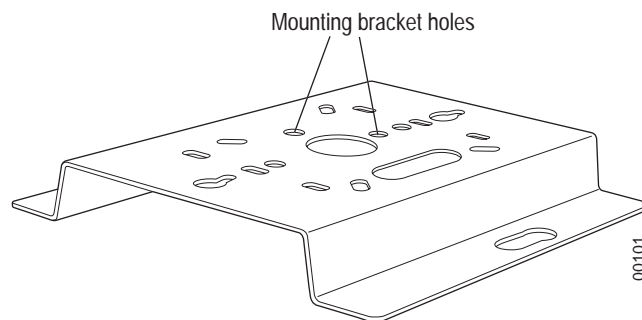


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Figure 11: Mounting the AP200 Above a Suspended Ceiling

To mount an AP200 above suspended ceiling rails:

1. Determine the location on the ceiling rails where the AP will be mounted and remove the ceiling tile.
2. Unpack the T-bar hanger kit and unfold the legs of the T-bar hanger.
3. Locate the bracket mounting clip holes on the mounting bracket (see [Figure 12](#)). One hole attaches the bracket perpendicular to the box hanger. The other mounts the bracket parallel to the box hanger.



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Figure 12: Box Hanger Mounting Bracket Holes

4. Attach the U-joint of the clip to the T-bar and snap in place (see [Figure 13](#)).

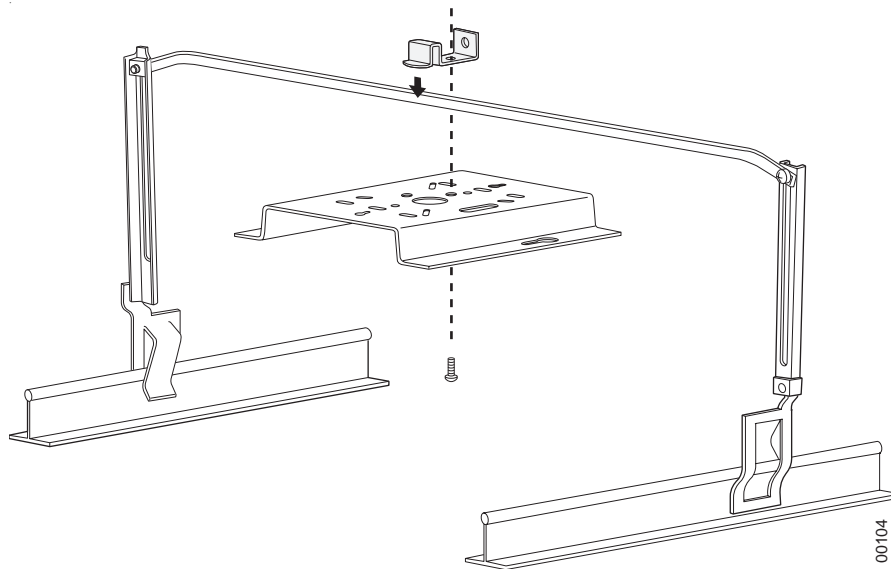


Figure 13: Attaching the Mounting Bracket to the Box Hanger

5. Pass the long end clip through the large center hole to the underside of the the mounting bracket clip and then attach the bracket to the clip using the supplied screw (see [Figure 13](#) for orientation).
6. Hold the AP200 next to the mounting bracket to estimate the height of the T-bar box hanger to provide enough clearance for the external antennas, which should be pointing down.
7. Adjust the height of the box hanger using the height adjusting screws (see [Figure 10](#)).
8. Clip the box hanger T-rail clips to the ceiling rails, making sure they are securely attached.
9. Connect a drop wire to a building structural element and through the hold provided in the bracket mounting clip. The U.S. National Electrical Safety Code requires this additional support.
10. Connect the posts of the AP200 to the three keyholes of the mounting bracket and slide into the keyhole (see [Figure 9](#)), ensuring the locking detent is engaged. You will hear a click.
11. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 5](#)), point the antenna down, then retighten the ring.
12. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 6](#).



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

13. Check that the AP200 is operating correctly before replacing the ceiling tile to the ceiling. Verify correct operating using the LEDs, as shown in the next section.

Where to Go From Here

Now that the AP200 is installed, go to the *Meru Wireless LAN Getting Started Guide* for instructions on initializing the controller and connecting the controller and APs to the Ethernet switch to form the WLAN. Return to this section to check the status of the LEDs once the WLAN is operational.

Checking LED Activity

Access point status LEDs are provided on the Ethernet connector and on the face of the AP200.

Ethernet Connector LEDs

After the AP200 is connected, the LEDs near the RJ-45 connector should light, as shown in [Figure 14](#).

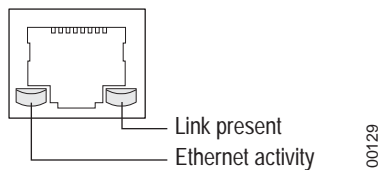


Figure 14: RJ-45 LEDs

The green LED on the left blinks if any Ethernet activity is taking place. If there is no Ethernet activity, the LED is off. The LED on the right is solid green if an Ethernet link is present. If no Ethernet link is present or connectivity is lost, the LED is off.

AP200 Status LEDs

Four status LEDs on the *face* of the AP200 also light, as shown in [Figure 15](#).

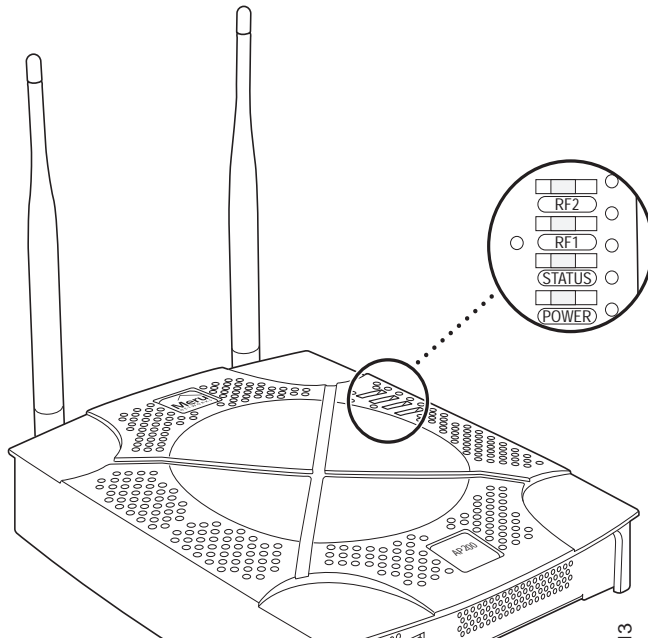


Figure 15: AP200 Status LEDs

The functions of the status LEDs are described in [Table 4](#).

When the AP200 is first connected to the controller and any time the access point is rebooted thereafter, the AP initializes with and then is programmed by the controller. When the AP is first powered up, all LEDs are green. Thereafter, the Status LED (see [Figure 15](#)) color reflects the various operating states ([Table 4](#)).

Table 3: AP200 LED Descriptions

LED	Function
RF 2	The status LED for Radio 2 is as follows: off—no radio present yellow—radio initializing red—radio failure solid green—radio OK blinking green—radio activity
RF 1	The status LED for Radio 1 is as follows: off—no radio present yellow—radio initializing red—radio failure solid green—radio OK blinking green—radio activity
Status	AP-Controller operational status (see Table 4)
Power	green—presence of power

Table 4: AP200-Controller Status Information

State	Interpretation	AP200 LED Cycle
Attempting to discover Controller	In the process of discovering the controller. The AP is connected but not associated with the controller. If the AP does not associate with the controller after a period of time, verify that the connection between the AP and the switch or the switch and the controller is unbroken.	Green/Red/Blue/Red
Connected	Normal operation without security.	Blue/Blue/Blue/Red Blue/Blue/Blue/Red, for 2 seconds.
Authenticated	Normal operation with security.	Blue blink ^a
Disconnected	Access point was once connected to a controller and configured by the controller, but can no longer find that controller	Green/Purple/ Green/Purple
Standalone	Access point is operating in a standalone mode	Purple blink

Checking LED Activity

State	Interpretation	AP200 LED Cycle
Downloading	Downloading image or configuration from the controller	Green/Blue Green/Blue
Error State	Access point is in an error state. Call Meru technical support	Red (blinking or solid)

- a. The AP200 LEDs cycle from bright to dim for each “blink.”

Chapter 3

Installing the AP150

This chapter describes how to physically install the Meru AP150. It contains the following sections:

- [Safety Precautions](#)
- [Unpacking the AP150](#)
- [Installation Requirements](#)
- [Installing the Access Point](#)
- [Where to Go From Here](#)
- [Checking LED Activity](#)

Safety Precautions

Follow the guidelines in this section to ensure proper operation and safe use of the access point.

FCC Safety Compliance Statement

The FCC with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. When used with approved Meru access point antennas, Meru AP150 products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper installation of this radio according to the instructions found in this manual will result in user exposure that is substantially below the FCC recommended limits.

General Safety Guidelines

- Do not touch or move antenna(s) while the unit is transmitting or receiving.
- Do not hold any component containing a radio so that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- The use of wireless devices in hazardous locations is limited to the constraints posed by the local codes, the national codes, and the safety directors of such environments.

Warnings

Translated versions of the following safety warnings are provided in Appendix C.



Warning! In order to comply with FCC radio frequency (RF) exposure limits, dipole antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons.



Warning! Do not operate your wireless network device near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use.



Warning! Do not work on the system or connect or disconnect cables during periods of lightning activity.



Warning! Read the installation instructions before you connect the system to its power source.



Warning! This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).



Warning! Inside antennas must be positioned to observe minimum separation of 20 cm. (~ 8 in.) from all users and bystanders. For the protection of personnel working in the vicinity of inside (downlink) antennas, the following guidelines for minimum distances between the human body and the antenna must be observed.

The installation of the indoor antenna must be such that, under normal conditions, all personnel cannot come within 20 cm. (~ 8.0 in.) from any inside antenna. Exceeding this minimum separation will ensure that the employee or bystander does not receive RF-exposure beyond the Maximum Permissible Exposure according to FCC CFR 47, section 1.1310 i.e. limits for General Population/Uncontrolled Exposure.

Unpacking the AP150

The AP150 ships with a mounting bracket and mounting hardware for standard wall mounting. Optional mounting kits are available for mounting the AP150 above or below a hanging ceiling. The AP150 mounting studs are placed so they can be used with brackets supplied by other vendors or to replace an AP100.



Note: The AP150 has a security cable slot so you can secure the AP150 with a standard security cable, such as those used to secure laptop computers.

An array of holes on the mounting bracket (see [Figure 16](#)) allow it to be mounted on the wall and over junction boxes or molly bolts. There are also holes for passing the PoE Ethernet or external power supply cable through the bracket if the bracket is mounted on a junction box or over the ceiling T-bar box hanger.

Confirm that the AP150 shipping package contains the following items:

- Access point
- Mounting bracket with two mounting screws
- CD-ROM of Meru Wireless LAN System documentation
- Optional suspended ceiling mounting hardware kit
- Optional T-bar box hanger hardware kit for mounting above a suspended ceiling

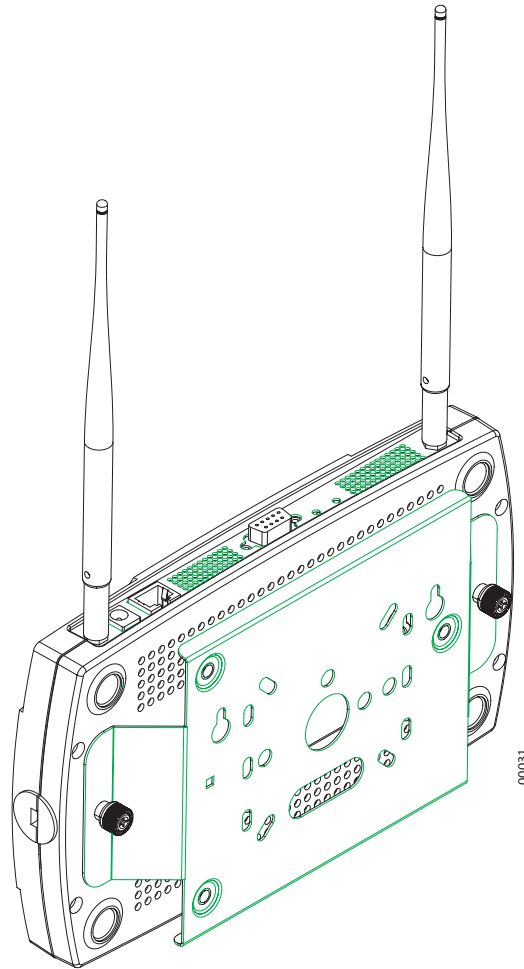


Figure 16: AP150 with Mounting Bracket

Installation Requirements

The following recommended mounting locations provide the best reception for the AP150:

- On a horizontal surface, such as a table or a desk
- On a vertical surface, usually a wall
- Below a hanging ceiling
- Above a hanging ceiling tiles (this installation is supported only for the AP150 with the plastic enclosure removed)

Suitable for use in environmental air space in accordance with the Section 300-22(c) of the National Electric Code and Sections 2- 128.12 - 010 (3) and 12 - 100 of the Canadian Electrical Code. Part 1. C22. 1. (For AP150 with plastic enclosure removed.)

To complete this installation, you need the items listed in [Table 5](#).

Table 5: AP150 Installation Items

Installation Type	Consumable Items Required
Horizontal mounting	None
Vertical mounting over a wall stud	<ul style="list-style-type: none"> ● Two #6 x 2" wood screws for a wood stud; or ● Two #6 x 1½" metal screws for a metal stud ● Mounting bracket
Vertical mounting on sheetrock	<ul style="list-style-type: none"> ● Two #6 x 1" screws ● Two #4-6 x 7/8" ribbed plastic wall anchors ● Mounting bracket
Horizontal mounting below a hanging ceiling	<ul style="list-style-type: none"> ● Two caddy fasteners ● Two plastic spacers ● Two keps nuts (with attached lock washer) ● Mounting bracket
Mounting above a ceiling tile (AP150 metal enclosure only)	<ul style="list-style-type: none"> ● Two T-rail clips ● One T-box hanger ● One bracket mounting clip ● Mounting bracket

You need the tools listed in [Table 6](#).

Table 6: AP150 Installation Tools

Installation Type	Tools Required
Horizontal mounting	None
Vertical mounting over a wall stud	<ul style="list-style-type: none"> ● Drill ● 1/8" drill bit ● Screwdriver
Vertical mounting on sheetrock	<ul style="list-style-type: none"> ● Drill ● 3/16" drill bit ● Screwdriver

Installation Type	Tools Required
Horizontal mounting below a hanging ceiling	<ul style="list-style-type: none"> • Screwdriver • Wrench or pliers
Mounting above a hanging ceiling (AP150 metal enclosure only)	<ul style="list-style-type: none"> • Wrench or pliers • Screwdriver

Installing the Access Point

Selecting a Location

The AP150 requires a location that meets the following:

- Relatively unobstructed access to the stations the AP serves
- Power over Ethernet (PoE) connection to the network switch servicing the controller.

APs can obtain their power from 802.3af standard Power over Ethernet (PoE) or external power supply. If an external power supply is utilized to power the AP150, ensure that it is a Listed power supply, marked "Class 2" or "LPS" (Limited Power Source), and rated a minimum of 3.3 V, 4 A. For PoE, the power can be supplied by a PoE-compatible network switch or PoE power injector installed between the switch and the AP150.

Select a location with minimal physical obstructions between the AP and the wireless stations. In an office with cubicles, mounting the APs below a hanging ceiling or the wall near the ceiling provides the least obstructed communications path. For an external power supply connection, ensure the power source is near to where the AP150 will be mounted.

Most installations receive the best coverage using the following guidelines:

Install APs toward the center of the building.

- Do not install APs near metal objects, such as heating ducts, metal doors, or electric service panels.
- Relative to the ground, orient the antenna up or down, not sideways.



Note: The previous guidelines are general guidelines. Each site has its own unique environment. Place access points accordingly.

The AP150 is only intended for installation in Environment A as defined in IEEE 802.3af. All interconnected equipment must be contained within the same building, including the interconnected equipment's associated LAN connection.

Attaching the AP150 Antennas

The AP150 is provided with external antenna ports. Make sure that all external antennas and their associated wiring are located entirely indoors. The external antennas are not suitable for outside use.

If the AP150 does not have external antennas, attach the antennas to the connectors on the AP150 (see [Figure 17](#)). Rotate the knurled ring at the base of the antenna clockwise to attach the antenna. The ring should be finger-tight.



Caution! When changing the orientation of the antennas, be sure to slightly loosen the knurled ring before moving the antenna. Retighten the ring afterward. Otherwise, you might damage the internal cabling in the AP.

Mounting the Access Point

You can mount an AP150 in the following ways:

- Horizontally, as described in the [“Horizontal Mounting”](#) section.
- Vertically, as described in the [“Vertical Mounting”](#) section.
- Below a hanging ceiling, as described in the [“Mounting Below a Suspended Ceiling”](#) section.
- Above a tiled hanging ceiling, as described in the [“Mounting Above a Suspended Ceiling”](#) section.

Horizontal Mounting

To horizontally mount an AP150:

1. Place the AP150 flat on the horizontal surface.
2. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 17](#)), point the antenna straight up, then retighten the ring.

Access Point 200

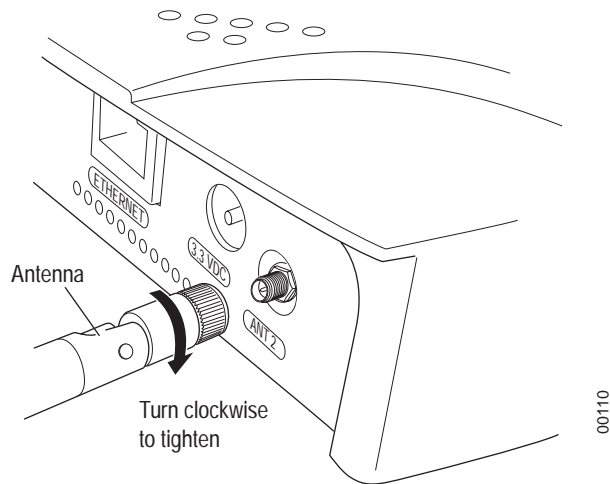


Figure 17: AP150 Antenna Connection

3. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in Figure 18.



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

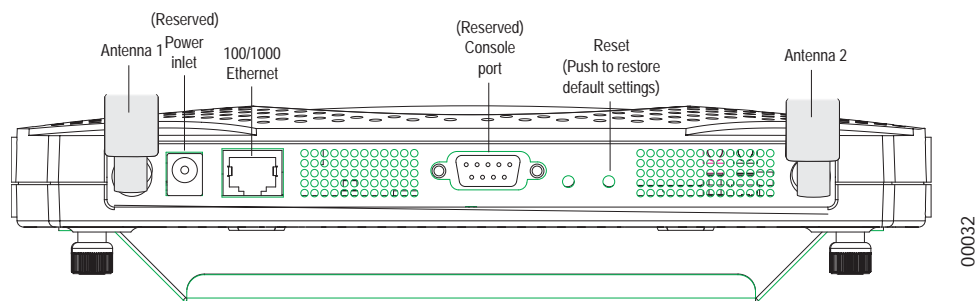


Figure 18: AP150 Connector Panel

Vertical Mounting

To vertically mount an AP:

1. Using the bracket holes as a template, mark the location on the wall for the two AP bracket mounting screws. They are placed 4 ½ inches apart, center-to-center, one above the other. If you are not using plastic wall anchors, you must center the mounting screws on a wall stud. If you do not center the mounting screws on a wall stud, you must use plastic wall anchors.

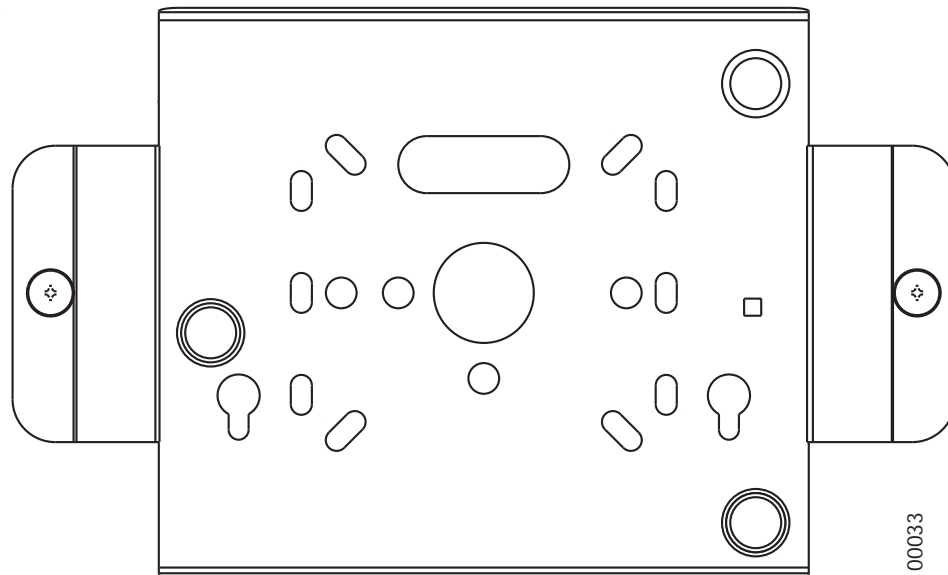


Figure 19: AP150 Bracket

2. Drill holes at the locations you marked:
 - 3/16-inch holes if you are using plastic anchors
 - 1/8-inch holes if you are using only the screws
3. If you are using plastic anchors, install them in the holes.
4. Screw in the screws most of the way, so that the screw head is about 1/16 of an inch from the wall.
5. Mount the bracket on the screws, placing the circular portion of the keyhole mounts over the screw heads and sliding the bracket down.
6. Tighten the screws to secure the bracket.
7. Align the AP150 mounting posts over the circular portion of the keyhole mounts, push the AP in and slide the AP down until it engages with the locking detents. You should hear it snap in place.

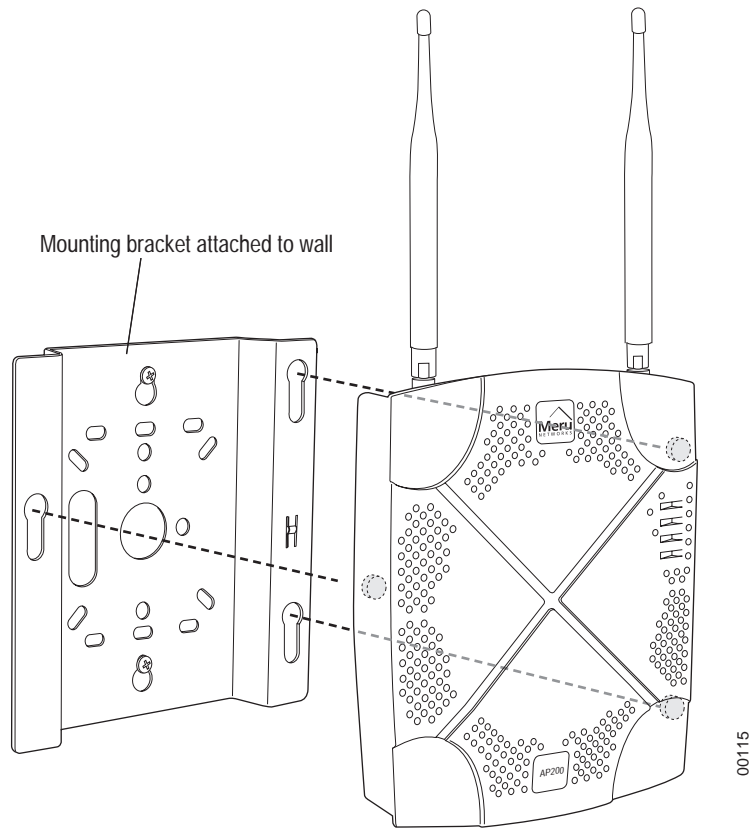


Figure 20: Aligning the AP150 with the Bracket

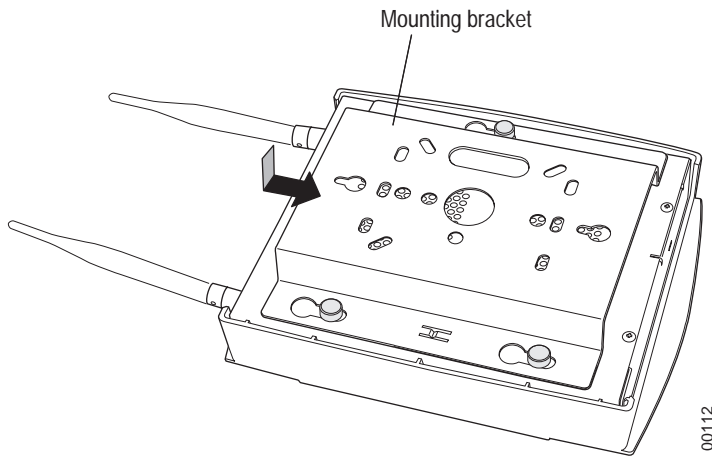


Figure 21: Sliding the AP150 into the Bracket

8. For external antennas, loosen the knurled ring at the base of each antenna (see [Figure 17](#)), point the antenna straight up, then retighten the ring.

9. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 18](#).



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

Mounting Below a Suspended Ceiling

The optional suspended ceiling mounting kit allows the AP150 mounting bracket to attach to suspended ceiling T-rails (see [Figure 22](#)).



Note: To comply with NEC code, attach a grounding wire to any of the screws used to attach the AP150 to the mounting bracket.

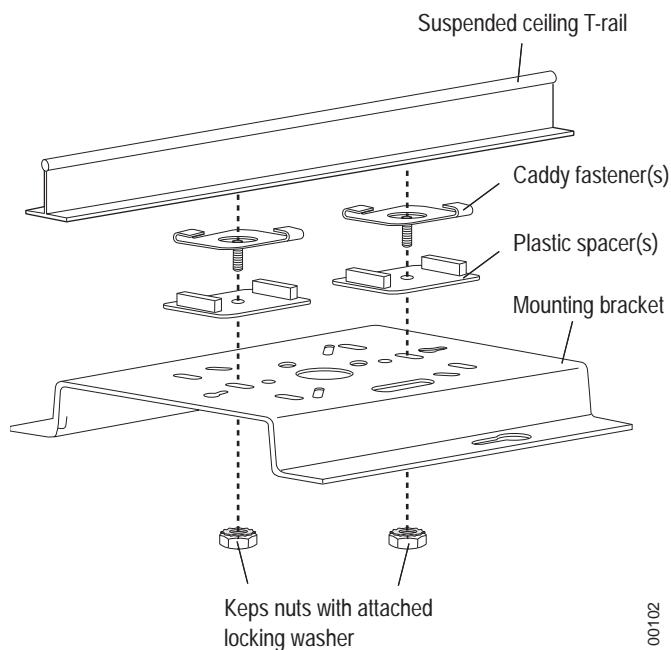


Figure 22: Mounting the AP150 to a Suspended Ceiling Rail

To mount an AP150 below a suspended ceiling:

1. Determine the location on the ceiling rail where the AP will be mounted and remove the ceiling tiles.
2. Place each of the two caddy fasteners on the ceiling T-rail and twist to attach to the rail.
3. Adjust the distance between the caddy fasteners by using the mounting bracket holes as a guide.
4. Tighten the caddy fasteners in place using a standard screwdriver. Do not overtighten.
5. Place each spacer on the caddy fastener stud. The spacer legs should contact the ceiling T-rail.
6. Align the mounting bracket keyholes with the caddy fastener studs and slide the AP150 to the narrow end of the hole.

7. Attach a keps nut to each caddy fastener stud and hand tighten. Do not overtighten.
8. Align the AP150 mounting posts over the circular portion of the keyhole mounts, push the AP in and slide the AP down until it engages with the locking detents (see [Figure 21](#)). You should hear it snap in place.
9. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 17](#)), point the antenna straight down, then retighten the ring.
10. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in (see [Figure 18](#)).



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

Mounting Above a Suspended Ceiling

The optional T-bar box hanger mounting kit allows the AP150 to be mounted above suspended ceiling T-rails (see [Figure 23](#)). The installation attaches the T-bar box hanger to the ceiling rails using clips. The AP150 attaches to the mounting bracket that is attached to the T-bar box hanger.

The AP150 antennas should point straight down for this type of installation. You may need to modify thicker tiles to support this installation.



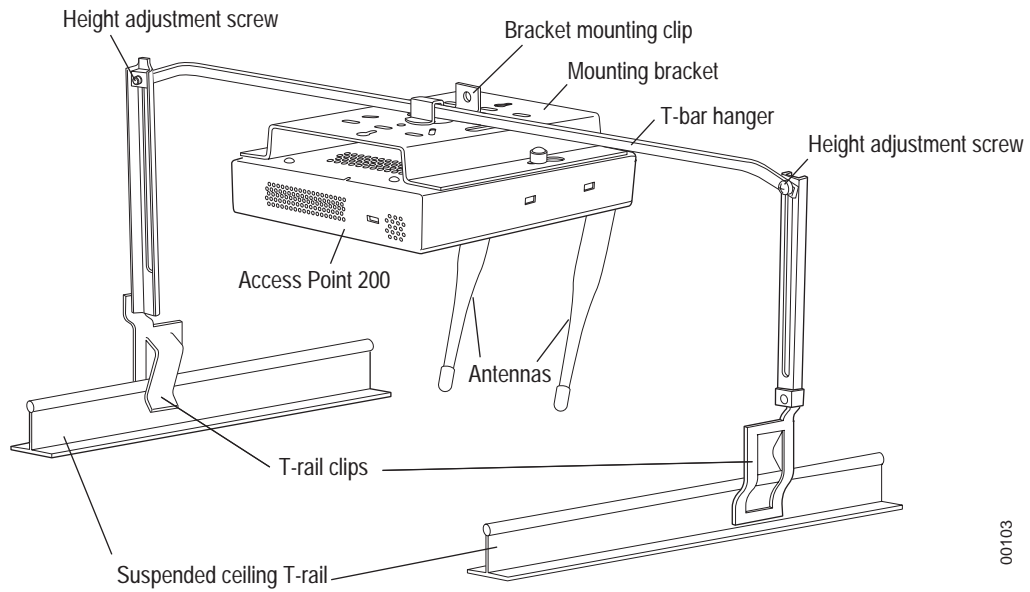
Note: When installed in air-handling spaces, such as above a suspended ceiling, the AP150 is to be powered via PoE only (PoE is required).



Note: The AP150 with the metal enclosure exposed meets the requirements for fire resistance and low smoke-generating characteristics required by Section 300-22(C) of the National Electrical Code (NEC) for installation in a building's environmental air space. You must remove the plastic enclosure to reveal the plenum-rated AP150 metal case for installations above a suspended ceiling.

Additionally, you must use Ethernet cable that meets the requirements for operating in environmental air space (in accordance with Section 300-22(C) of the NEC).

Any Fast Ethernet (FE) cables installed in air-handling spaces should be suitable under NEC Article 800.50 and marked accordingly for use in plenums and air-handling spaces with regard to smoke propagation, such as CL2-P, CL3-P, MPP (Multi Purpose Plenum), or CMP (Communications Plenum).

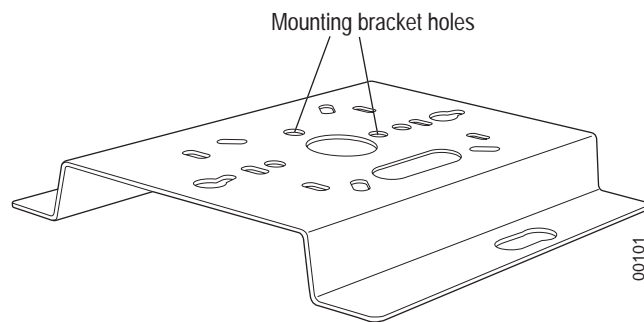


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Figure 23: Mounting the AP150 Above a Suspended Ceiling

To mount an AP150 above suspended ceiling rails:

1. Determine the location on the ceiling rails where the AP will be mounted and remove the ceiling tile.
2. Unpack the T-bar hanger kit and unfold the legs of the T-bar hanger.
3. Locate the bracket mounting clip holes on the mounting bracket (see [Figure 24](#)). One hole attaches the bracket perpendicular to the box hanger. The other mounts the bracket parallel to the box hanger.



00101

Figure 24: Box Hanger Mounting Bracket Holes

4. Attach the U-joint of the clip to the T-bar and snap in place (see [Figure 25](#)).

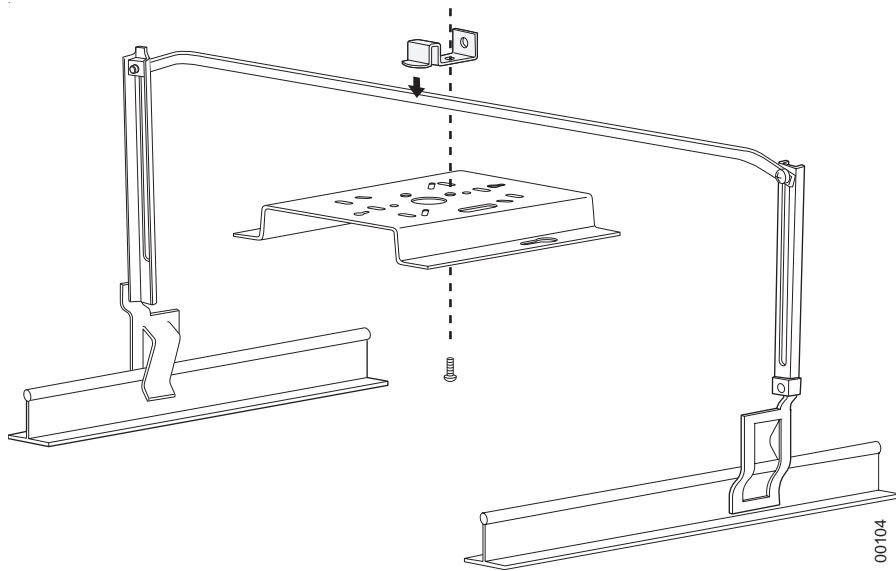


Figure 25: Attaching the Mounting Bracket to the Box Hanger

5. Pass the long end clip through the large center hole to the underside of the the mounting bracket clip and then attach the bracket to the clip using the supplied screw (see [Figure 25](#) for orientation).
6. Hold the AP150 next to the mounting bracket to estimate the height of the T-bar box hanger to provide enough clearance for the external antennas, which should be pointing down.
7. Adjust the height of the box hanger using the height adjusting screws (see [Figure 22](#)).
8. Clip the box hanger T-rail clips to the ceiling rails, making sure they are securely attached.
9. Connect a drop wire to a building structural element and through the hold provided in the bracket mounting clip. The U.S. National Electrical Safety Code requires this additional support.
10. Connect the posts of the AP150 to the three keyholes of the mounting bracket and slide into the keyhole (see [Figure 21](#)), ensuring the locking detent is engaged. You will hear a click.
11. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 17](#)), point the antenna down, then retighten the ring.
12. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 18](#).



Caution! Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

13. Check that the AP150 is operating correctly before replacing the ceiling tile to the ceiling. Verify correct operating using the LEDs, as shown in the next section.

Where to Go From Here

Now that the AP150 is installed, go to the *Meru Wireless LAN Getting Started Guide* for instructions on initializing the controller and connecting the controller and APs to the Ethernet switch to form the WLAN. Return to this section to check the status of the LEDs once the WLAN is operational.

Checking LED Activity

Access point status LEDs are provided on the Ethernet connector and on the face of the AP150.

Ethernet Connector LEDs

After the AP150 is connected, the LEDs near the RJ-45 connector should light, as shown in [Figure 26](#).

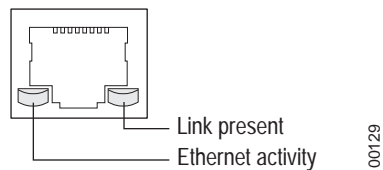


Figure 26: RJ-45 LEDs

The green LED on the left blinks if any Ethernet activity is taking place. If there is no Ethernet activity, the LED is off. The LED on the right is solid green if an Ethernet link is present. If no Ethernet link is present or connectivity is lost, the LED is off.

AP150 Status LEDs

Four status LEDs on the *face* of the AP150 also light, as shown in [Figure 27](#).

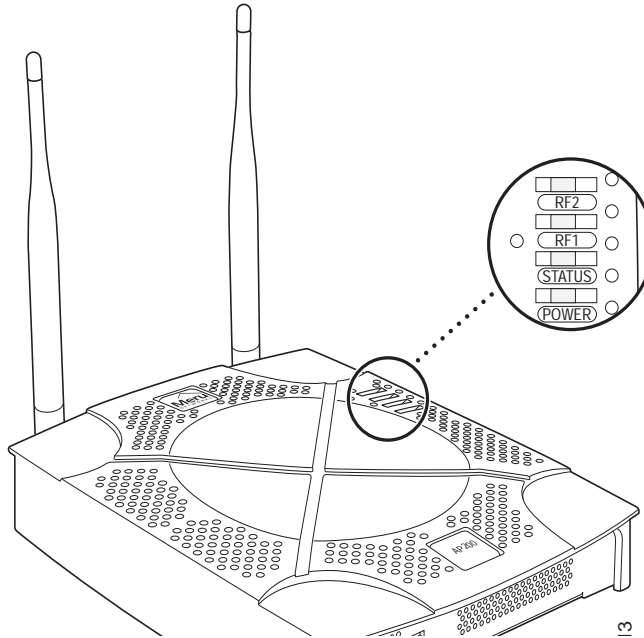


Figure 27: AP150 Status LEDs

The functions of the status LEDs are described in [Table 8](#).

When the AP150 is first connected to the controller and any time the access point is rebooted thereafter, the AP initializes with and then is programmed by the controller. When the AP is first powered up, all LEDs are green. Thereafter, the Status LED (see [Figure 27](#)) color reflects the various operating states ([Table 8](#)).

Table 7: AP150 LED Descriptions

LED	Function
RF 2	The status LED for Radio 2 is a follows: off—no radio present yellow—radio initializing red—radio failure solid green—radio OK blinking green—radio activity
RF 1	The status LED for Radio 1 is a follows: off—no radio present yellow—radio initializing red—radio failure solid green—radio OK blinking green—radio activity
Status	AP-Controller operational status (see Table 8)
Power	green—presence of power

Table 8: AP150-Controller Status Information

State	Interpretation	AP150 LED Cycle
Attempting to discover Controller	In the process of discovering the controller. The AP is connected but not associated with the controller. If the AP does not associate with the controller after a period of time, verify that the connection between the AP and the switch or the switch and the controller is unbroken.	Green/Red/Blue/Red
Connected	Normal operation without security.	Blue/Blue/Blue/Red Blue/Blue/Blue/Red, for 2 seconds.
Authenticated	Normal operation with security.	Blue blink ^a
Disconnected	Access point was once connected to a controller and configured by the controller, but can no longer find that controller	Green/Purple/ Green/Purple
Standalone	Access point is operating in a standalone mode	Purple blink

State	Interpretation	AP150 LED Cycle
Downloading	Downloading image or configuration from the controller	Green/Blue Green/Blue
Error State	Access point is in an error state. Call Meru technical support	Red (blinking or solid)

a. The AP150 LEDs cycle from bright to dim for each “blink.”

Checking LED Activity

Appendix A

Specifications

This chapter provides specifications for the Meru Access Points and contains the following sections:

- FCC Compliance
- Wireless Interface
- Ethernet Interface
- Physical

FCC Compliance

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.



Caution! Changes or modifications to the Meru Access Point that are not expressly approved by Meru Networks will void your warranty and could void your authority to operate this equipment.

Wireless Interface

Table 9: AP100 Wireless Interface Specifications

Feature	Details
Wireless Standards	<ul style="list-style-type: none"> • 802.11b
Antennas	<ul style="list-style-type: none"> • Two external antennas. Omnidirectional and directional antennas for specific coverage requirements
Wireless Medium Access	<ul style="list-style-type: none"> • WiFi Compliant 802.11 MAC standard
Power Management	<ul style="list-style-type: none"> • Power-save mode for clients in both QoS mode and non-QoS mode
Frame Size	<ul style="list-style-type: none"> • Peak frame size of > 2346 bytes • Fragmentation and reassembly of 802.11/Ethernet frames
Client Activities Supported	<ul style="list-style-type: none"> • Active scanning and passive scanning • Pre-authentication • Power-save mode supported

Table 10: AP200 Wireless Interface Specifications

Feature	Details
Wireless Standards	<ul style="list-style-type: none"> • 802.11a, 802.11b, 802.11g
Antennas	<ul style="list-style-type: none"> • Two external antennas. Omnidirectional and directional antennas for specific coverage requirements
Wireless Medium Access	<ul style="list-style-type: none"> • WiFi Compliant 802.11 MAC standard
Power Management	<ul style="list-style-type: none"> • Power-save mode for clients in both QoS mode and non-QoS mode
Frame Size	<ul style="list-style-type: none"> • Peak frame size of > 2346 bytes • Fragmentation and reassembly of 802.11/Ethernet frames
Client Activities Supported	<ul style="list-style-type: none"> • Active scanning and passive scanning • Pre-authentication • Power-save mode supported

Ethernet Interface

Feature	Detail
Wireline Standard	<ul style="list-style-type: none"><li data-bbox="721 365 1292 426">• One 10/100 Mbps Ethernet (IEEE 802.3) interface, supporting half-duplex and full-duplex modes<li data-bbox="721 443 1333 501">• Supports the Power over Ethernet (PoE) IEEE 802.3af standard

Physical

Physical specifications for Meru Access Points are provided in the access point Data Sheet. Contact your Meru sales engineer for a copy of the document.

Physical

Appendix B

Regulatory Information

This appendix has important regulatory compliance information for the following products:

- Wireless Access Point AP200, models AP202 and AP209

Please read this appendix first before installing and operating your product, and follow all instructions provided in the installation chapter. Periodic updates to this document will be posted at www.merunetworks.com.

This appendix contains the following sections:

- Safety Section
- Federal Communications Commission (FCC) Declaration of Conformity (DoC) & Instructions
- List of Regulatory Compliance Certifications Summary by Country

Safety Section



USA and Canada



European Union

The products listed in this appendix have been evaluated to, and comply with, the U.S. and Canadian (Bi National) Standard for Safety of Information Technology Equipment, including Electrical Business Equipment, CAN CSA C22.2, No. 60950-00 * UL 60950 3rd edition, and IEC60950:1999, the Standard for the Safety of Information Technology Equipment.

Your product is intended to be installed, operated, serviced, and maintained by experienced personnel only. When using this device, basic safety precautions should always be followed to reduce the risk of fire, electrical shock, and injury to persons.

Note the following:

- These products have been evaluated for indoor use only. ?
- Installation and use should be in strict accordance with the instructions described in this manual and any supporting documentation.
- End use installation must conform to local regulations and codes.
- These products are powered by Power Over Ethernet (PoE) only, refer to the installation section for more information.
- No user serviceable parts inside. All repairs and service must be performed by trained personnel only. Do not open or disassemble your product. By opening or removing any covers, you may expose yourself to energized parts. Incorrect reassembly of these products can cause a malfunction and/or electric shock when the units are subsequently used.
- Do not insert any objects of any shape or size inside the units. Objects may contact energized parts that could result in a risk of fire or personal injury.
- Do not remove, alter, or cover the marking label provided.
- To avoid the risk of electric shock from lightning, do not operate your unit during an electrical storm.
- When using external antenna, refer to the manufacturer’s installation documentation provided with the antenna system, and follow all instructions promptly. Installation must also conform to local regulations and codes.

Federal Communications Commission (FCC) Declaration of Conformity (DoC) & Instructions

Declaration of Conformity

This device is in conformance with Part 15 of the FCC Rules and Regulations for Information Technology Equipment. Operation of this product 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.

Company Information	
Trade Name	Meru
Product Description	Wireless Access Point AP200 Rev. 2
Model Nos.	AP202 & AP209
Responsible Party	Meru Networks Inc.

Company Information	
Address	1309 S. Mary Ave. Sunnyvale, CA 94087
Contact Person/Title	Mohammad Sa-id Senior Regulatory Compliance Manager Phone - (408) 215-5300 Fax - (408) 215-5301

EUT Certification Summary	
Equipment Class	Class B
Report References	[TBD] Issue Date [TBD] Tested by Bay Area Compliance Lab

We, the responsible party, Meru Networks Inc., declare that the above-listed product, **Wireless Access Point AP200 Rev. 2 Model Nos. 202 & 209**, was tested to conform to the applicable FCC Rules and regulations. The method of testing was in accordance to the most accurate measurement standards possible, and that all necessary steps have been enforced to assure that all production units of the same equipment will continue to comply with the Federal Communications Commission's requirements.

Issue Date: [TBD]

Srinath Sarang
VP, Product Management

Instructions

Warnings

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, these products 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 and correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the distance between the equipment and the receiver.
3. Connect the equipment to an AC outlet on a circuit different from that to which the receiver is connected.
4. Consult the dealer or an experienced radio/TV technician for help.

In some situations or environments, the use of wireless devices may be restricted by the proprietor of the building or responsible representatives of the organization. These situations may, for example, include the use of wireless equipment on board airplanes, or in any other environment where the risk of interference to other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies on the use of wireless equipment in a specific organization or environment (such as airports), you are encouraged to ask for authorization to use this device prior to turning on the equipment.

Cautions

Exposure to radio frequency radiation

To comply with the FCC radio frequency exposure requirements, the following antenna installation and device operating configurations must be satisfied:

- For client devices using an integral antenna, the separation distance between the antenna(s) and any person's body (including hands, wrists, feet and ankles) must be at least 2.5 cm (1 inch).
- For Base Stations and configurations using an approved external antenna, the separation distance between the antenna and any person's body (including hands, wrists, feet and ankles) must be at least 20 cm (8 inch).
- The transmitter shall not be collocated with other transmitters or antennas.

Modifications

The FCC requires the user to be notified that any changes or modifications to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. The correction of interference caused by unauthorized modification, substitution or attachment will be the responsibility of the user. The manufacturer and its authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from failing to comply with these guidelines.

List of Regulatory Compliance Certifications Summary by Country

EU	In progress
Japan	In progress
Safety approvals—US & Canada	UL file no. E239453
USA/FCC ID	RE7-AP200R2

List of Regulatory Compliance Certifications Summary by Country

List of Regulatory Compliance Certifications Summary by Country

Appendix C

Translated Safety Warnings

This appendix provides translations of the safety warnings that appear in this publication. These translated warnings apply to other documents in which they appear in English. The following safety warnings appear in this appendix:

- Dipole Antenna Installation Warning
- Explosive Device Proximity Warning
- Installation Warning
- Circuit Breaker (15A) Warning

Dipole Antenna Installation Warning



Warning! In order to comply with FCC radio frequency (RF) exposure limits, dipole antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons.

Waarschuwing	Om te voldoen aan de FCC radiofrequentie (RF) blootstellingslimieten dienen dipoolantennes zich minstens 20 cm of meer van de lichamen van alle personen bevinden.
Varoitus	FCC:n antamien radiotaajuuksille altistumista koskevien rajoitusten mukaan dipoliantennien on sijaettava vähintään 20 cm:n päässä kaikista henkilöistä.
Attention	Pour se conformer aux limites d'exposition à la fréquence radio préconisées par la FCC (Federal Communications Commission), les antennes dipôles doivent se situer à un minimum de 20 cm de toute personne.
Warnung	Um die in den FCC-Richtlinien festgelegten Expositionshöchstgrenzen für Radiofrequenzen (RF) nicht zu überschreiten, sollten Dipolantennen mindestens 20 cm (7,9 Zoll) vom Körper aller Person entfernt aufgestellt werden.
Avvertenza	Per conformarsi ai limiti FCC di esposizione a radiofrequenza (RF), le antenne a dipolo devono stare ad una distanza minima di 20 cm dal corpo di ogni persona.
Advarsel	I henhold til eksponeringsgrensene for radiofrekvenser (RF), skal dipole antenner befinne seg på en avstand av minst 20 cm eller mer fra mennesker.
Aviso	Para estar de acordo com as normas FCC de limites de exposição para frequência de rádio (RF), as antenas dipolo devem estar distantes no mínimo 20 cm (7,9 pol) do corpo de qualquer pessoa.
¡Advertencia!	Para cumplir con los límites de exposición de radio frecuencia (RF) de la Comisión Federal de Comunicaciones (FCC) es preciso ubicar las antenas dipolo a un mínimo de 20 cm (7,9 pulgadas) o más del cuerpo de las personas.
Warning!	För att följa FCC-exponeringsgränserna för radiofrekvens (RF), bör dipolantennerna placeras på minst 20 cm avstånd från alla människor.

Explosive Device Proximity Warning



Warning! Do not operate your wireless network device near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use.

Waarschuwing	Gebruik dit draadloos netwerkapparaat alleen in de buurt van onbeschermd ontstekers of in een omgeving met explosieven indien het apparaat speciaal is aangepast om aan de eisen voor een dergelijk gebruik te voldoen.
Varoitus	Älä käytä johdotonta verkkolaitetta suojaamattomien räjäytysnallien läheisyydessä tai räjäytysalueella, jos laitetta ei ole erityisesti muunnettu sopivaksi sellaiseen käyttöön.
Attention	Ne jamais utiliser un équipement de réseau sans fil à proximité d'un détonateur non blindé ou dans un lieu présentant des risques d'explosion, sauf si l'équipement a été modifié à cet effet.
Warnung	Benutzen Sie Ihr drahtloses Netzwerkgerät nicht in der Nähe ungeschützter Sprengkapseln oder anderer explosiver Stoffe, es sei denn, Ihr Gerät wurde eigens für diesen Gebrauch modifiziert und bestimmt.
Avvertenza	Non utilizzare la periferica di rete senza fili in prossimità di un detonatore non protetto o di esplosivi a meno che la periferica non sia stata modificata a tale proposito.
Advarsel	Ikke bruk den trådløse nettverksenheten nært inntil uisolerte fenghetter eller i et eksplosivt miljø med mindre enheten er modifisert slik at den tåler slik bruk.
Aviso	Não opere o dispositivo de rede sem fios perto de cápsulas explosivas não protegidas ou num ambiente explosivo, a não ser que o dispositivo tenha sido modificado para se qualificar especialmente para essa utilização.
¡Advertencia!	No utilizar un aparato de la red sin cable cerca de un detonador que no esté protegido ni tampoco en un entorno explosivo a menos que el aparato haya sido modificado con ese fin.
Varning!	Använd inte den trådlösa nätverksenheten i närheten av oskyddade tändhattar eller i en explosiv miljö om inte enheten modifierats för att kunna användas i sådana sammanhang.

Installation Warning



Warning! Read the installation instructions before you connect the system to its power source.

Waarschuwing	Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.
Varoitus	Lue asennusohjeet ennen järjestelmän yhdistämistä virtälähteeseen.
Attention	Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.
Warnung	Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.
Avvertenza	Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.
Advarsel	Les installasjonsinstruksjonene før systemet kobles til strømkilden.
Aviso	Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.
¡Advertencia!	Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.
Varning!	Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.

Circuit Breaker (15A) Warning



Warning! This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all current-carrying conductors).

Waarschuwing	Dit produkt is afhankelijk van de installatie van het gebouw voor kortsluit- (overstroom)beveiliging. Controleer of er een zekering of stroomverbreker van niet meer dan 120 Volt wisselstroom, 15 A voor de V.S. (240 Volt wisselstroom, 10 A internationaal) gebruikt wordt op de fasegeleiders (alle geleiders die stroom voeren).
Varoitus	Tämä tuote on riippuvainen rakennukseen asennetusta oikosulkusuojuuksesta (ylivirtasuojauksesta). Varmista, että vaihevirtajohtimissa (kaikissa virroitetuissa johtimissa) käytetään Yhdysvalloissa alle 120 voltin, 15 ampeerin ja monissa muissa maissa 240 voltin, 10 ampeerin sulaketta tai suojakytintä.
Attention	Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifier qu'un fusible ou qu'un disjoncteur de 120 V alt., 15 A U.S. maximum (240 V alt., 10 A international) est utilisé sur les conducteurs de phase (conducteurs de charge).
Warnung	Dieses Produkt ist darauf angewiesen, daß im Gebäude ein Kurzschluß- bzw. Überstromschutz installiert ist. Stellen Sie sicher, daß eine Sicherung oder ein Unterbrecher von nicht mehr als 240 V Wechselstrom, 10 A (bzw. in den USA 120 V Wechselstrom, 15 A) an den Phasenleitern (allen stromführenden Leitern) verwendet wird.
Avvertenza	Questo prodotto dipende dall'installazione dell'edificio per quanto riguarda la protezione contro cortocircuiti (sovracorrente). Verificare che un fusibile o interruttore automatico, non superiore a 120 VCA, 15 A U.S. (240 VCA, 10 A internazionale) sia stato usato nei fili di fase (tutti i conduttori portatori di corrente).
Advarsel	Dette produktet er avhengig av bygningens installasjoner av kortslutningsbeskyttelse (overstrøm). Kontroller at det brukes en sikring eller strømbryter som ikke er større enn 120 VAC, 15 A (USA) (240 VAC, 10 A internasjonalt) på faselederne (alle strømførende ledere).
Aviso	Este produto depende das instalações existentes para protecção contra curto-circuito (sobrecarga). Assegure-se de que um fusível ou disjuntor não superior a 240 VAC, 10A é utilizado nos condutores de fase (todos os condutores de transporte de corrente).
¡Advertencia!	Este equipo utiliza el sistema de protección contra cortocircuitos (o sobrecorrientes) del propio edificio. Asegurarse de que se utiliza un fusible o interruptor automático de no más de 240 voltios en corriente alterna (VAC), 10 amperios del estándar internacional (120 VAC, 15 amperios del estándar USA) en los hilos de fase (todos aquellos portadores de corriente).
Varning!	Denna produkt är beroende av i byggnaden installerat kortslutningsskydd (överströmsskydd). Kontrollera att säkring eller överspänningsskydd används på fasledarna (samtliga strömförande ledare) för internationellt bruk max. 240 V växelström, 10 A (i USA max. 120 V växelström, 15 A).

Circuit Breaker (15A) Warning

Appendix D

Channels

This appendix provides the access point radio channels supported by the world's regulatory domains. This appendix contains the following section:

- Channels

Channels

IEEE 802.11a

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11a 20-MHz-wide channel are listed in Table 11.



Note: All channel sets are restricted to indoor usage except the Americas, which allow for indoor and outdoor use on channels 52 through 64 in the United States.

Table 11: IEEE 802.11a Channels

Channel Number	Frequency in MHz	Regulatory Domains	
		Americas	Japan
34	5170	-	X
36	5180	X	-
38	5190	-	X
40	5200	X	-
42	5210	-	X

Table 11: IEEE 802.11a Channels (Continued)

Channel Number	Frequency in MHz	Regulatory Domains	
		Americas	Japan
44	5220	X	-
46	5230	-	X
48	5240	X	-
52	5260	X	-
56	5280	X	-
60	5300	X	-
64	5320	X	-
149	5745	X	-
153	5765	X	-
157	5785	X	-
161	5805	X	-
165	5825	X	-

IEEE 802.11b/g

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11b/g 22-MHz-wide channel are listed in Table 12.



Note:

Mexico is included in the Americas regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 11 can be used indoors and outdoors. Users are responsible for ensuring that the channel set configuration complies with the regulatory standards of Mexico.

Table 12: IEEE 802.11b/g Channels

Channel Number	Frequency in MHz	Regulatory Domains				
		Americas	EMEA	Israel	China	Japan
1	2412	X	X	-	X	X
2	2417	X	X	-	X	X

Table 12: IEEE 802.11b/g Channels (Continued)

Channel Number	Frequency in MHz	Regulatory Domains				
		Americas	EMEA	Israel	China	Japan
3	2422	X	X	X	X	X
4	2427	X	X	X	X	X
5	2432	X	X	X	X	X
6	2437	X	X	X	X	X
7	2442	X	X	X	X	X
8	2447	X	X	X	X	X
9	2452	X	X	X	X	X
10	2457	X	X	-	X	X
11	2462	X	X	-	X	X
12	2467	-	X	-	-	X
13	2472	-	X	-	-	X
14	2484	-	-	-	-	X (for 802.11b only)

Channels



MERU NETWORKS, INC.

Limited Product Warranty

This Limited Product Warranty applies to the original end-user customer of the Meru product which you purchased for your own use, and not for resale (“Product”), from Meru Networks, Inc. (“Meru”) or its authorized reseller (“Reseller”).

Limited Warranties

- One-year limited hardware warranty: Meru warrants to you that Meru hardware (other than Third Party Products as described below) will be free from defects in materials and workmanship for a one-year period after the date of delivery of the applicable product to you from Meru or its Reseller (the “Hardware Warranty Period”). If Meru receives written notice from you of such defects during the Hardware Warranty Period, Meru will, at its option, either repair or replace Meru hardware that Meru determines to be defective. Replacement products may be remanufactured units, and will be warranted for the remainder of the original Hardware Warranty Period, or if greater, for thirty days from delivery of such replacement. Should Meru be unable to repair or replace the Meru hardware, Meru (or its Reseller, as applicable) will refund to you the purchase price of the Product.
- 90-Day Limited Software Warranty: Meru warrants to you that, for a 90-day period after the date of delivery of the applicable product to you from Meru or its Reseller (the “Software Warranty Period”), when properly installed and used, (a) the media on which the Meru software is provided will be free from defects in materials or workmanship; and (b) the Meru software will substantially conform to the functional specifications in the applicable documentation. If Meru receives written notice from you of a breach of this warranty during the Software Warranty Period and is able to reproduce the defect, Meru will, at its option, either repair or replace the defective Meru software. Should Meru be unable to repair or replace the Meru software, Meru (or its Reseller, as applicable) will refund to you the purchase price of the Product.

Exclusions

The warranty on the Product shall not apply to defects resulting from the following:

- Alteration or modification of the Product in any way, including without limitation configuration with software or components other than those supplied by Meru or integration with parts other than those supplied by Meru.
- Abuse, damage or otherwise being subjected to problems caused by negligence or misapplication (including without limitation improper or inadequate maintenance or calibration), relocation of the products (including without limitation damage caused by use of other than Meru shipping containers), or use of the products other than as specified in the applicable Meru product documentation (including without limitation incompatible operating environments and systems), or improper site preparation or maintenance.
- Damage as a result of accidents, extreme power surge, extreme electromagnetic field, acts of nature or other causes beyond the control of Meru.
- Use of the Product with software, interfacing, parts or supplies not supplied by Meru.

The warranty on the Product does not apply if the Product is sold, or in the case of software, licensed, for free for evaluation or demonstration purposes.

Meru expressly disclaims any warranty or obligation to support the Product for all operating environments – for example, as illustration and not limitation, Meru does not warrant or ensure interoperability of the Product with future telecommunication systems or other future software or hardware.

You understand and acknowledge that the Products may generate, use or radiate radio frequency energy and may interfere with radio communications and/or radio and television receptions if is not used and/or installed in accordance with the documentation for such products. WHILE MERU USES COMMERCIALY REASONABLE EFFORTS TO ENSURE COMPLIANCE OF THE PRODUCTS WITH APPLICABLE UNITED STATES FEDERAL COMMUNICATIONS

COMMISSION AND PROTECT AGAINST HARMFUL INTERFERENCES, YOU ACKNOWLEDGE AND AGREE THAT INTERFERENCES WITH RADIO COMMUNICATIONS AND/OR RADIO AND TELEVISION RECEPTIONS MAY OCCUR AND THAT MERU WILL NOT BE LIABLE FOR ANY DAMAGES OR INCONVENIENCE BASED ON SUCH INTERFERENCES.

Third Party Products - The above Limited Warranties are exclusive of products manufactured by third parties (“Third Party Products”). If such third party manufacturer provides a separate warranty with respect to the Third Party Product, Meru will include such warranty in the packaging of the Meru Product.

Return procedures

To obtain warranty service you must: (a) obtain a return materials authorization number (“RMA#”) from Meru by contacting support@merunetworks.com, and (b) deliver the Product, in accordance with the instructions provided by Meru, along with proof of purchase in the form of a copy of the bill of sale including the Product’s serial number, contact information, RMA# and detailed description of the defect, in either its original package or packaging providing the Product with a degree of protection equivalent to that of the original packaging, to Meru at the address below. You agree to obtain adequate insurance to cover loss or damage to the Product during shipment.

If you obtain an RMA# and return the defective Product as described above, Meru will pay the cost of returning the Product to Meru. Otherwise, you agree to bear such cost, and prior to receipt by Meru, you assume risk of any loss or damage to the Product. Meru is responsible for the cost of return shipment to you if the Meru Product is defective.

Returned products which are found by Meru to be not defective, returned out-of-warranty or otherwise ineligible for warranty service will be repaired or replaced at Meru’s standard charges and shipped back to you at your expense.

At Meru’s sole option, Meru may perform repair service on the Product at your facility, and you agree to provide Meru with all reasonable access to such facility and the Product, as required by Meru. On-site repair service may be available and is governed by the specific terms of your purchase.

All replaced parts, whether under warranty or not, are the property of Meru.

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The jurisdiction applicable to you may not allow the limitations of liability or damages set forth above, in which case such limitation shall only apply to you to the extent permitted in such jurisdiction.

Additional Information

This Limited Product Warranty shall be governed by and construed in accordance with the laws of the State of California, U.S.A., exclusive of its conflict of laws principles. The U.N. Convention on Contracts for the International Sale of Goods shall not apply.

This Limited Product Warranty is the entire and exclusive agreement between you and Meru with respect to its subject matter, and any modification or waiver of any provision of this statement is not effective unless expressly set forth in writing by an authorized representative of Meru.

All inquiries or claims made under this Limited Product Warranty must be sent to Meru at the following address:

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Email: support@merunetworks.com



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