



# Meru Access Point and Radio Switch

## Installation Guide

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# About This Guide

This guide describes the features and provides installation instructions for the Meru Access Points, which includes the AP200 and AP150 models, and the Radio Switch RS4000. The term access point is used interchangeably throughout this document to apply to any model when there are no differences among the models.

## Audience

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This guide is intended for persons installing the Meru Wireless LAN System Access Point (AP) and Radio Switches.

## In This Guide

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This guide includes the following chapters:

- [Chapter 1, “Meru Access Points and Radio Switch”](#)
- [Chapter 2, “Installing the RS4000”](#)
- [Chapter 3, “Installing the AP200”](#)
- [Chapter 4, “Installing the AP150”](#)
- [Appendix A, “Specifications”](#)
- [Appendix B, “Regulatory Information”](#)
- [Appendix C, “Channels”](#)
- [Appendix D, “Mounting Bracket Stencils”](#)

# Other Sources of Information

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

## Meru Publications

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

## 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

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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

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

<http://www.merunetworks.com>

## 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](mailto:support@merunetworks.com).

Meru Networks, Inc. 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:

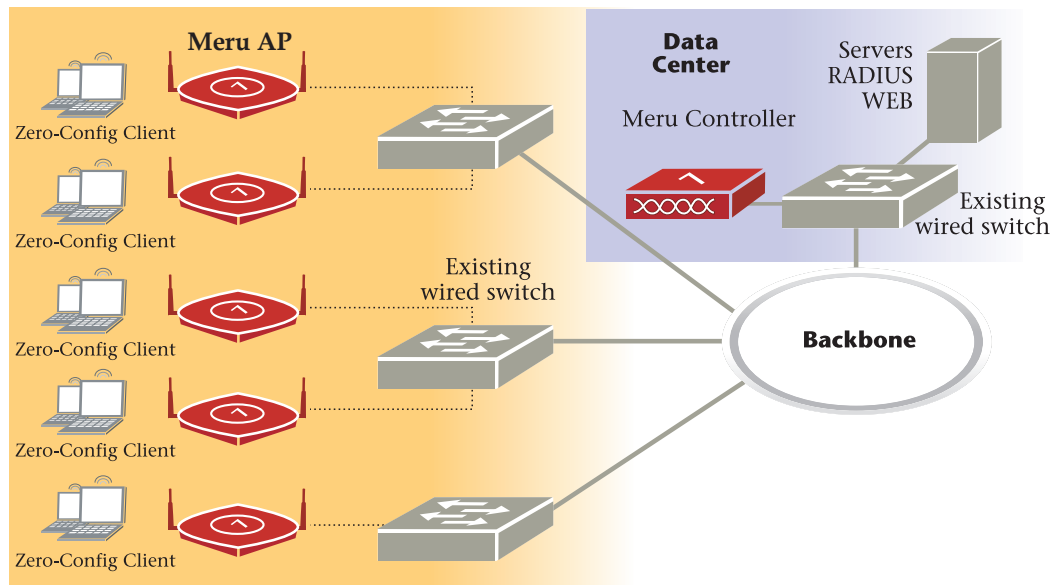
- Company and contact information
- Equipment model and serial numbers
- Meru software release and revision numbers (for example, 3.0.0-35)
- A description of the symptoms the problem is manifesting
- Network configuration



# Chapter 1

## Meru Access Points and Radio Switch

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



## Introducing the Radio Switch RS4000

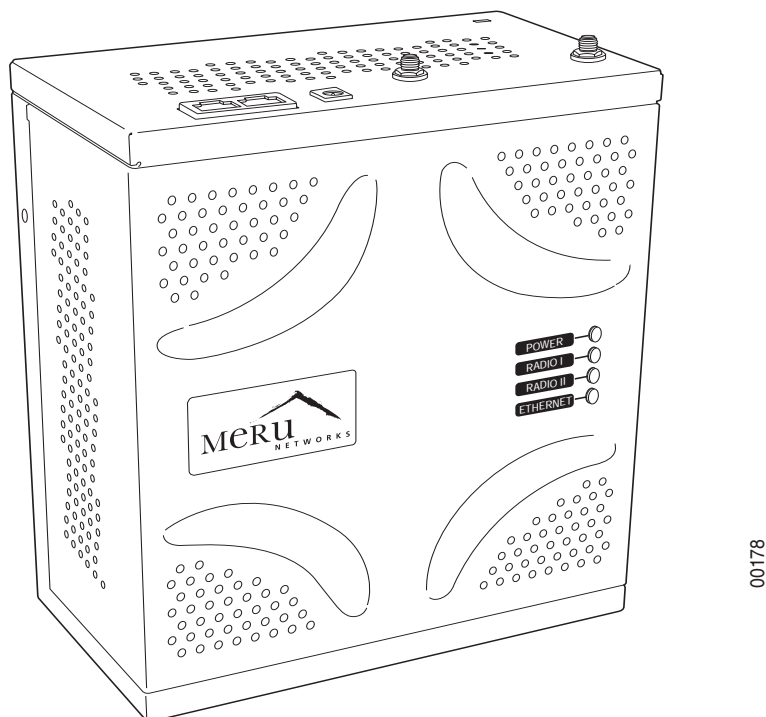
The Radio Switch RS4000 enables high-capacity enterprise-class wireless LAN connectivity with full support of standard 802.11 security and network management features. Each RS4000 contains four 802.11 radios (two 802.11b/g, two 802.11a) for high data and voice throughput - an essential requirement for high user-density environments with several simultaneous users. Classrooms and convention halls are typical deployment applications of the Radio Switch. Deploying the Radio Switch is

easy— as with wireless access points, the Radio Switch can be installed wherever wireless coverage is needed. For large buildings with multiple rooms and floors, more than one Radio Switch can be installed to cover the desired area. Wireless users can seamlessly roam from one Radio Switch to another, getting high-capacity WLAN access throughout the wireless enterprise enabled with multiple Radio Switches. The RS4000 also balances radio traffic across its RF channels and resolves contention within each RF channel such that users receive a switched wireless experience with dedicated bandwidth to execute a variety of applications ranging from web browsing and VoIP mobility to multimedia streaming.

The RS4000 ships with either a high-gain omni-directional indoor antenna or a 180-degree directional indoor antenna that aggregates and layers radio transmissions from each of the built-in radios. The antenna can broadcast every channel available to blanket the area around the Radio Switch, yet avoid interference and contention. This simplifies deployment efforts by eliminating the need for additional antennas for each radio. More importantly, RF channel planning efforts are greatly simplified.

Using the RS4000, wireless users experience the benefits of switching technology on Wi-Fi—dedicated bandwidth, traffic separation, and multi-service network support.

The RS4000 can be deployed with up to two 802.11b/g and two 802.11a channels active on the radio interfaces. The 802.11b/g channels must be separated by a minimum of 8 channels (for example, channels 1 and 9), so the recommended set is channels 1 and 11, typically. The 802.11a channels must be separated by a minimum of 80MHz/16 channels for best performance (for example, channels 36 and 52).



**Figure 1: Radio Switch RS4000**

## RS4000 Hardware Features and Specifications

The RS4000 has four 802.11 radios (two 802.11a and two 802.11bg) that transmit and receive simultaneously on four different channels to increase the total available wireless bandwidth at a given area. The RS4000 connects to the LAN using one 10/100 Mbps Ethernet connection for each radio pair. The RS4000 is powered using two IEEE 802.3af POE connections, each with 15W power.



**Note:** PoE must be provided on the first Ethernet connector (ETH1); the antenna cannot operate correctly without that power source. Power to the second Ethernet connector (ETH2 ) is optional; if not connected, two of the radios will not operate.

The RS4000 works in conjunction with a wideband RF combination omni directional (WRC/OD) indoor antenna or a 180-degree directional indoor antenna. Only one antenna is needed for simultaneous operation of all radios of an RS4000 in both the 2.4GHz and 5GHz bands. The antenna must be connected to the Radio Switch using any one of the low-loss antenna cables provided in the antenna packaging.

The following table lists the key hardware features of the RS4000.

**Table 1: RS4000 Hardware Features**

Feature	Description
802.11 Connectivity	Two 802.11b/g radios (2.4GHz) Two 802.11a radios (5 GHz)
Ethernet Connectivity	Two auto-sensing 10/100 Mbps ports, one for each radio pair
Power	Provided by two 802.3af POE connections, one for each radio pair (15W per connector)
LEDs	Power, Radio Activity, and Ethernet Activity LEDs per radio
Dimensions	9.5" x 8.5" x 3.875"

**Table 1: RS4000 Hardware Features**

Feature	Description
Mounting Options	RS4000 has mounting brackets available for: <ul style="list-style-type: none"><li>• Ceiling Mount</li><li>• Wall Mount</li><li>• Inside NEMA Enclosures (Hoffman, etc.)</li></ul>
Antenna	The RS4000 ships with either of these antennas: <ul style="list-style-type: none"><li>• Wideband RF Combination/Omni-Directional (WRC/OD) Antenna. 5dBi gain. Indoor use.</li><li>• 180-degree directional indoor antenna</li></ul>
Antenna Cables	3' low-loss cables (default option) 6' and plenum-rated cables (available option)



# Meru Access Point Features

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Meru Access Points provide the following features:

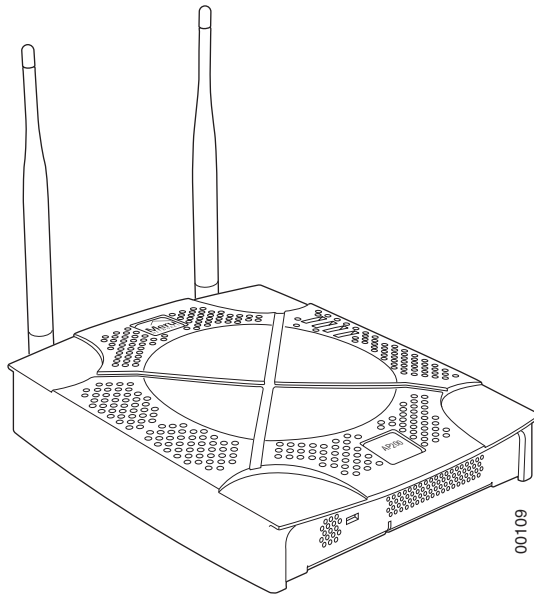
- **Wi-Fi Certified Tri-mode Access Point Delivers Exceptional Performance**  
A key component of the Meru Wireless LAN System, Meru Access Points deliver unsurpassed Wi-Fi performance in conjunction with Meru Controllers. Representing a shift to the fourth generation WLAN architecture using coordinated intelligent APs at the edge, the Meru Wireless LAN System delivers toll quality voice over Wi-Fi, a ten-fold increase in client density, intelligent load balancing, and lowest total cost of ownership.
- **The Only Solution to Deliver a Large Scale Voice and Data Wireless Access**  
Embedded Wi-Fi in laptops are almost ubiquitous and other mobile devices aren't far behind. In addition, with emerging dual mode Wi-Fi/cellular phones the number of clients in your enterprise is going to increase exponentially in only a few short years. Deploy a system that is designed to deal with high densities of voice and data clients, without sacrificing performance and that works with any standard Wi-Fi certified client.
- **Tri-mode Access Point Provides Investment Protection**  
Enterprise applications and user density continue to increase. Tri-mode 802.11a/b/g clients are now commonplace in laptops. Ensure your network supports the full breadth of wireless LAN clients with Meru Access Points.
  - Dual 802.11b/g and 802.11a software programmable radios
  - Simultaneously support 802.11b, 802.11g and 802.11a clients

## Introducing the Meru Access Point AP200

The Meru Access Point AP200 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. An AP200 works with most standard Wi-Fi 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 b/g 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 Meru Access Point AP200 (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.



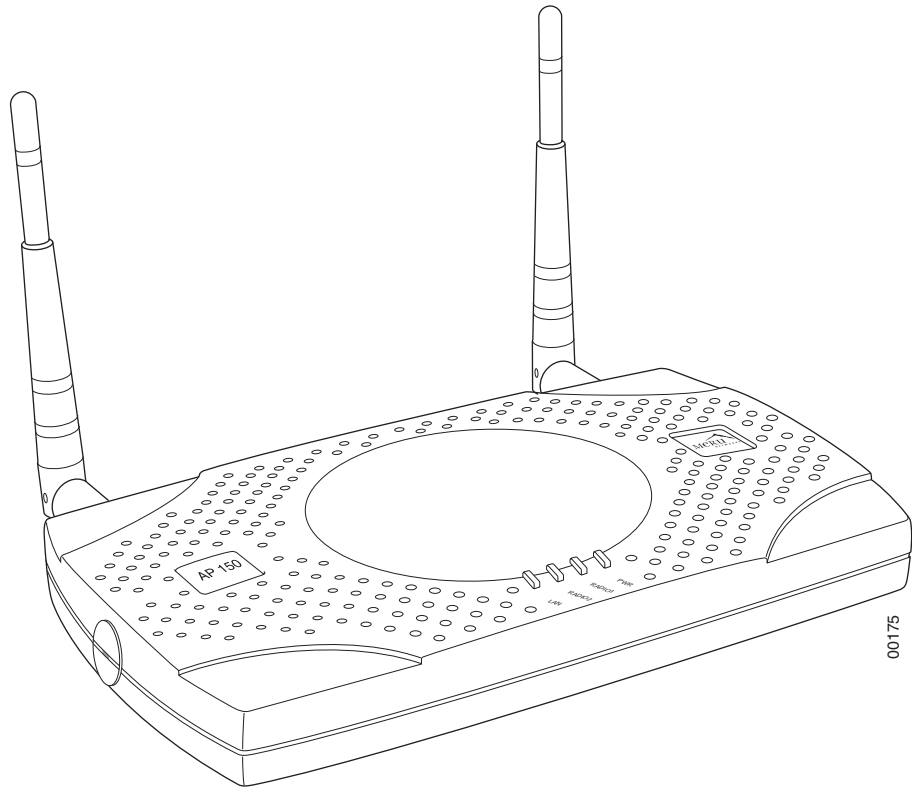
**Figure 2: Access Point AP200**

## Introducing the Meru Access Point AP150

The Meru Access Point AP150 has two 802.11 radios for simultaneous 802.11a and 802.11b/g WLAN access. It is an ideal option for enterprise-wide data-only WLAN implementations and small-sized converged data and voice WLAN implementations. The AP150 works in conjunction with Meru Controller products and can be easily integrated into existing Layer 2 and Layer 3 wired network environments to provide enterprise-grade Wi-Fi access with multi-layered security options, basic VoWLAN support, centralized configuration, troubleshooting tools, remote management and RF visualization capabilities.

The Meru Access Point AP150 supplies the following features:

- Dual 802.11b/g and 802.11a radios
- Simultaneously support for 802.11b, 802.11g, and 802.11a clients
- Contention Management for high density of data clients
- Basic VoWLAN QoS support for small density of voice clients
- Multiple ESSIDs with individual security policies to ensure separation of different user groups or dynamic VLAN assignment per user based on RADIUS credentials
- Zero configuration required at the access point; the installation procedure is a simple plug-n-play
- Automatic AP discovery, configuration
- Intelligent load balancing of clients
- Layer 2 or 3 connectivity for flexible deployment options
- Locking mechanism secures access point when mounted in public areas



**Figure 3: Access Point AP150**



# Chapter 2

## Installing the RS4000

This chapter describes how to physically install the Meru Radio Switch RS4000. It contains the following sections:

- [Safety Precautions](#)
- [Unpacking the RS4000](#)
- [Installation Requirements](#)
- [Installing the RS4000](#)
- [Where to Go From Here](#)
- [Checking LED Activity](#)

## Safety Precautions

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**IMPORTANT**—Read and follow the instructions in Appendix B, “Regulatory Information” on page 63 before installing and operating this product.

## Unpacking the RS4000

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Confirm that the RS4000 shipping package contains the following items:

- RS4000
- 180-degree directional antenna or omni-directional antenna
- Two 3-foot antenna cables
- One 3-inch mounting arm (includes wall mount base and ceiling rail base)
- Mounting bracket
- Additional options can be purchased, such as a NEMA box mounting bracket and 6-foot antenna cables

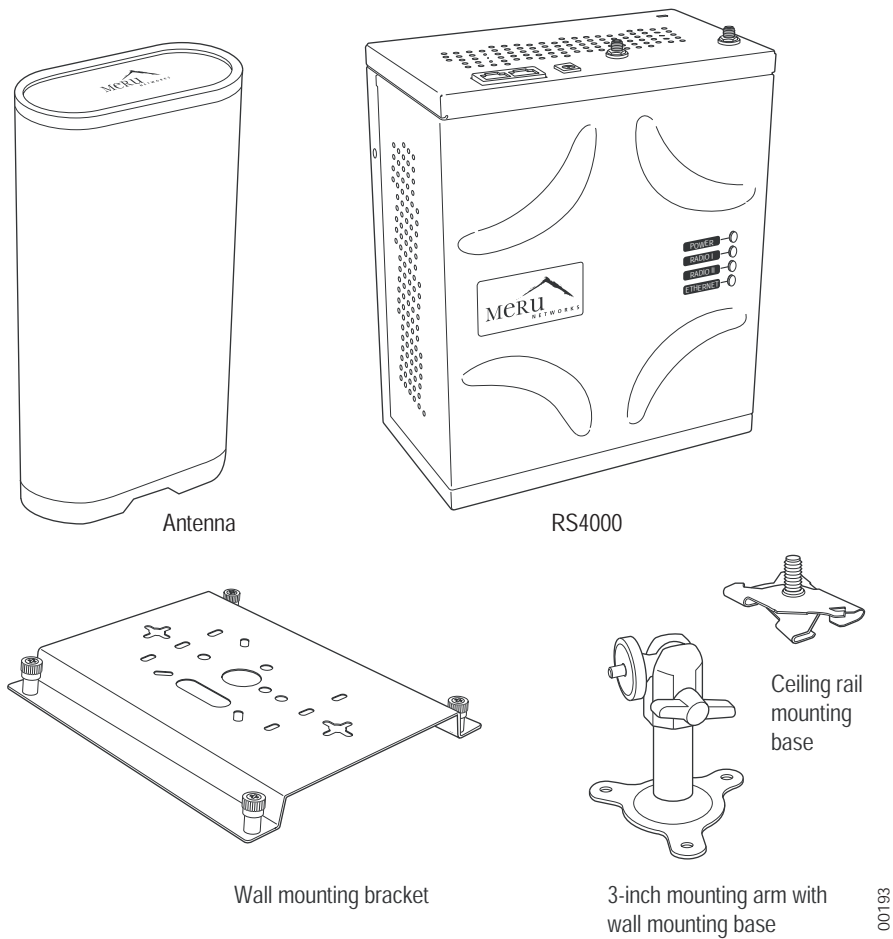


Figure 4: RS4000 Package Contents

## Installation Requirements

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The following prerequisites and system requirements must be met:

- 2 IEEE 802.3 PoE connections— one to each Ethernet port, yielding a maximum power specification of 11W per port, 22W total for the RS4000
- Network switch for connecting all networking components

The RS4000 requires a location that meets the following:

- A location to mount the antenna within 6’ of the RS4000 and with relatively unobstructed access to the client stations
- Power over Ethernet (PoE) connection to the network switch servicing the RS4000

The RS4000 obtains power from 802.3af standard Power over Ethernet (PoE)-compatible network switch or PoE power injector installed between the switch and the RS4000. At least one PoE connection must be connected.

Select a location with minimal physical obstructions between the RS4000 antenna and the wireless stations. In many cases, mounting the RS4000 antenna on the wall near the ceiling provides the least obstructed communications path.

Most installations receive the best coverage using the following guidelines:

- Do not install the antenna 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 antenna accordingly.

The RS4000 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.

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

**Table 2: RS4000 Installation Tools**

Installation Type	Tools Required
Vertical mounting over a wall stud	<ul style="list-style-type: none"> <li>• Drill</li> <li>• 1/8"drill bit</li> <li>• Screwdriver</li> <li>• (Optional) Pliers</li> </ul>
Vertical mounting on sheetrock	<ul style="list-style-type: none"> <li>• Drill</li> <li>• 3/16" drill bit</li> <li>• Screwdriver</li> <li>• (Optional) Pliers</li> </ul>
Horizontal mounting below a hanging ceiling	<ul style="list-style-type: none"> <li>• Two caddy fasteners</li> <li>• Two plastic spacers</li> <li>• Two keps nuts (with attached lock washer)</li> <li>• Mounting bracket</li> </ul>
Mounting above a ceiling tile	<ul style="list-style-type: none"> <li>• Two T-rail clips</li> <li>• One T-box hanger</li> <li>• One bracket mounting clip</li> <li>• Mounting bracket</li> </ul>

## About an Hoffman/NEMA Enclosure Installation

The recommended RS4000 installation is a wall mount, but if necessary the RS4000 can be housed inside a protective NEMA or Hoffman box that is manufactured with external corner tabs for standard wall mounting, above or below a ceiling. When installing in the Hoffman/NEMA box, the RS4000 attaches to an optional Hoffman/NEMA box mounting plate, which replaces the standard wall mount bracket.



**Caution!** This method of mounting has not been evaluated by Underwriters Laboratories.

Meru leaves the placement and orientation of the Hoffman/NEMA enclosure to the customer. It will be necessary to drill holes through the plastic NEMA enclosure with a Meru-provided template to enable the antenna and Ethernet cabling to exit the enclosure. Instructions for performing this task are provided in the section “Creating



Cable Pass-through Holes in the NEMA Enclosure” on page 25. To install in the Hoffman/NEMA Enclosure, see the section “Hoffman/NEMA Enclosure RS4000 Installation” on page 25.

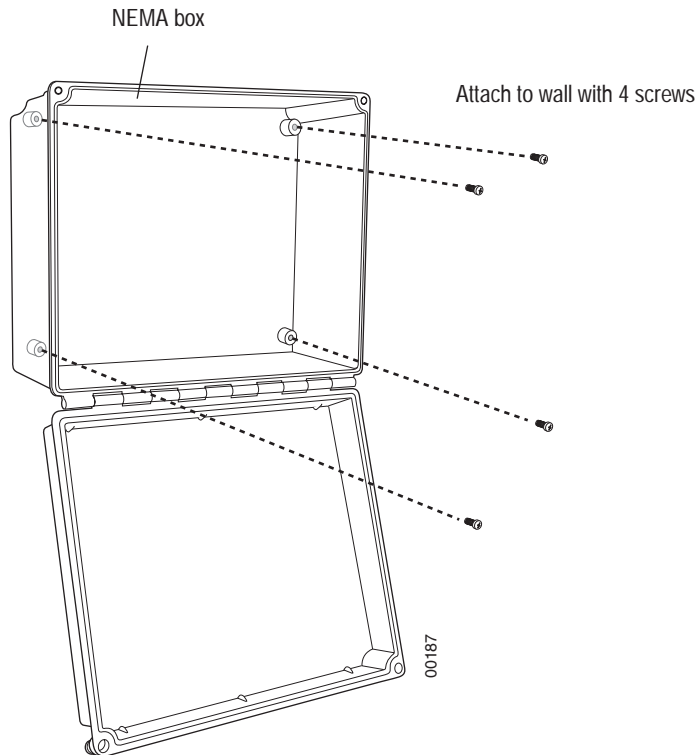


Figure 5: Open NEMA Box Showing Mounting Holes

## Optimum Antenna Positioning and Placement



**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.

# Installing the RS4000

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## Mounting the RS4000

You can mount the RS4000 in the following ways:

- [Wall Mounting the RS4000](#)
- [Mounting Below a Suspended Ceiling](#)
- [Mounting Above a Suspended Ceiling](#)
- [Placing and Positioning the Antenna](#)
- [Hoffman/NEMA Enclosure RS4000 Installation](#)

### Wall Mounting the RS4000

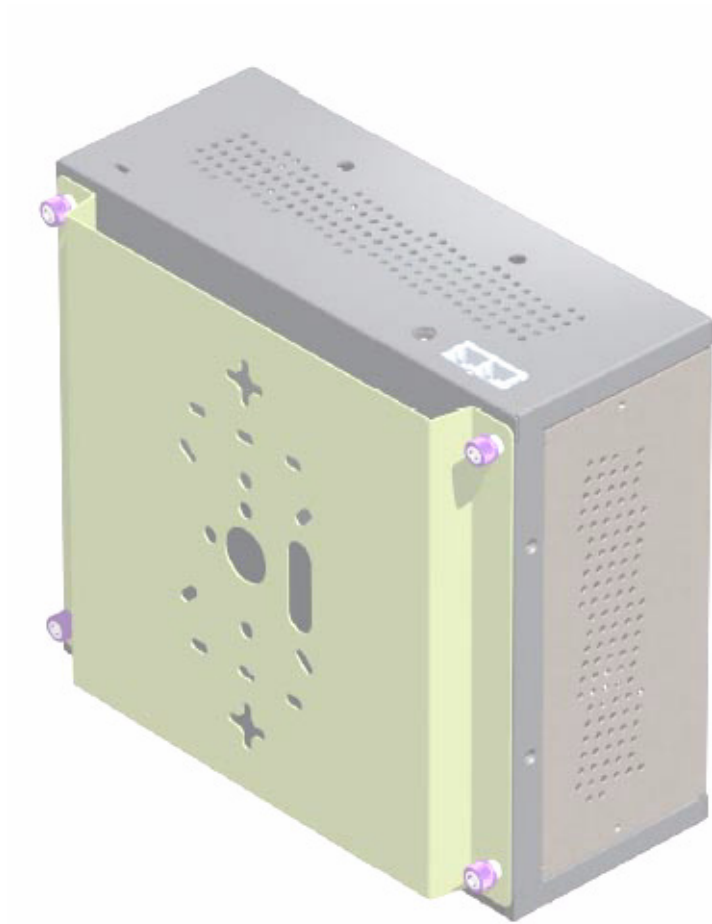
The RS4000 can be mounted to any type of solid wall (including ceiling walls) using the supplied wall mount bracket. The bracket also allows for junction box mounting.



**Note:** The RS4000 has a security cable slot so you can secure the RS4000 with a standard security cable (for example, Kensington cable locks), such as are used to secure laptop computers.

To wall mount an RS4000:

1. Remove the bracket from back side the RS4000, if it is attached, by unscrewing each of the 4 knurled thumbscrews (see [Figure 6](#)).



**Figure 6: Bracket Attached to RS4000**

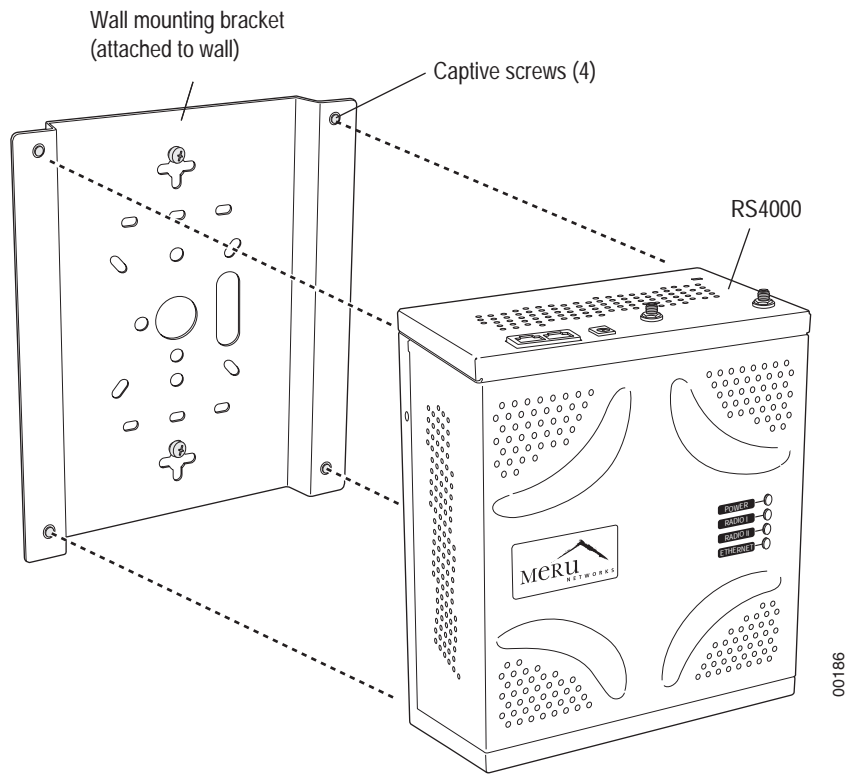
2. Choose the location on the wall where the RS4000 will be mounted. The RS4000 can be oriented in any direction, but it is probably more convenient if the SMA antenna mounts are at the top. This orientation is more convenient for reading LED status.
3. Using the bracket holes as a template, mark the location on the wall for the two RS4000 bracket mounting screws. They are placed  $5 \frac{25}{32}$ " (147mm) 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.



**Note:** The RS4000 mounting bracket provides holes to accommodate many types of common installations such as over a junction box, etc. This procedure describes only the standard wall mount.

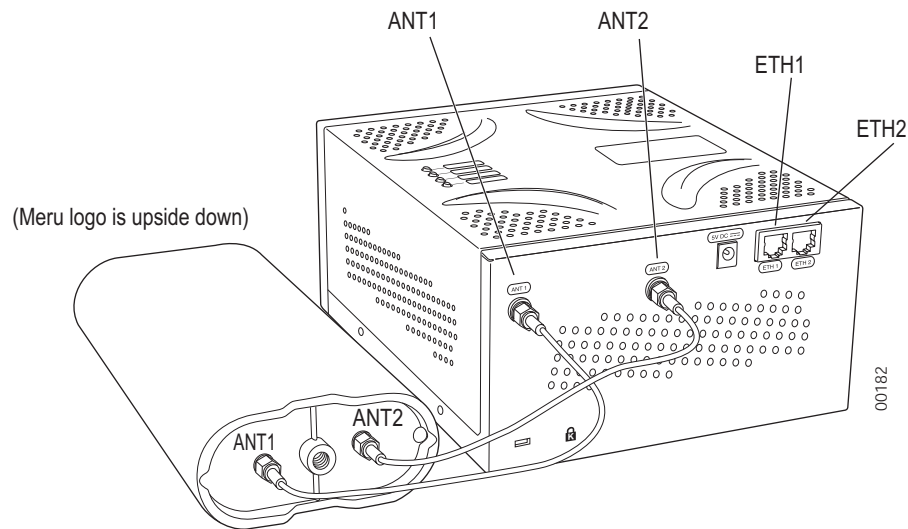
4. Drill holes at the locations you marked:
  - 3/16-inch holes if you are using plastic anchors
  - 1/8-inch holes if you are using only the screws
5. If you are using plastic anchors, install them in the holes.

6. Screw in the screws most of the way, so that the screw head is about 1/16 of an inch from the wall.
7. Mount the bracket on the screws, placing the circular portion of the keyhole mounts over the screw heads and sliding the bracket down.



**Figure 7: RS4000 Bracket Mounting**

8. Tighten the bracket captive screws to secure the RS4000 to the bracket.
9. On the RS4000, attach the two antenna cables to the SMA antenna connectors labeled **ANT1** and **ANT2** on the top panel of the RS4000 (see [Figure 8](#)) by turning the cable ends clockwise until tight.



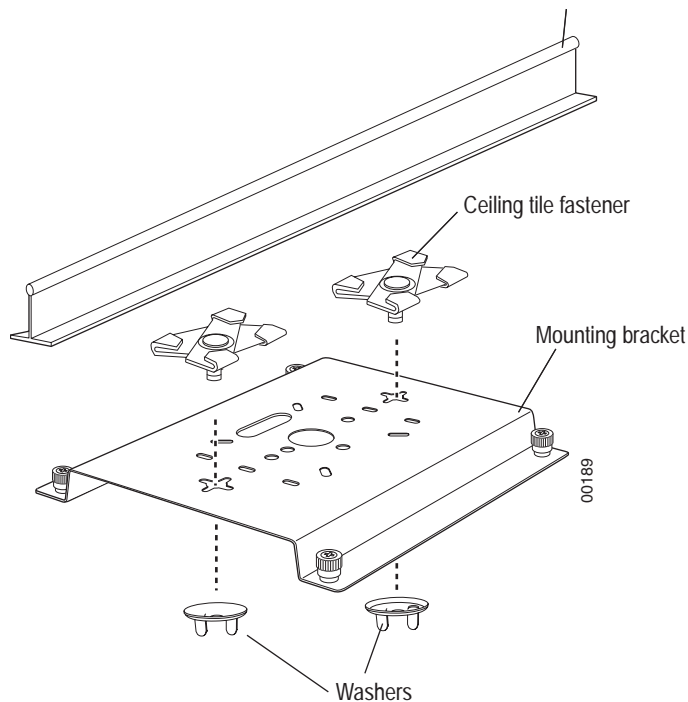
**Figure 8: RS4000 with Antenna Attached**

10. Attach at least one Ethernet cable to the Ethernet port labeled **ETH1** and optionally to **ETH2** on the top panel of the RS4000. If just ETH1 is connected, only two of the four radios will be active.
11. Align the RS4000 to the bracket (against the wall) and tighten the four knurled thumbscrews until secure. If necessary, apply extra tightening with pliers.
12. Attach the antenna cables to the antenna, as described in “Placing and Positioning the Antenna.”
13. Connect the two Ethernet cables to the PoE device.
14. Apply power to the PoE component and network switch to power up the RS4000.
15. Verify correct operating using the LEDs, as shown in “[Checking LED Activity.](#)”

## Mounting Below a Suspended Ceiling

The optional suspended ceiling mounting kit allows the RS4000 mounting bracket to attach to suspended ceiling T-rails (see [Figure 9](#)).

- ✓ **Note:** To comply with NEC code, attach a grounding wire to any of the screws used to attach the RS4000 to the mounting bracket.

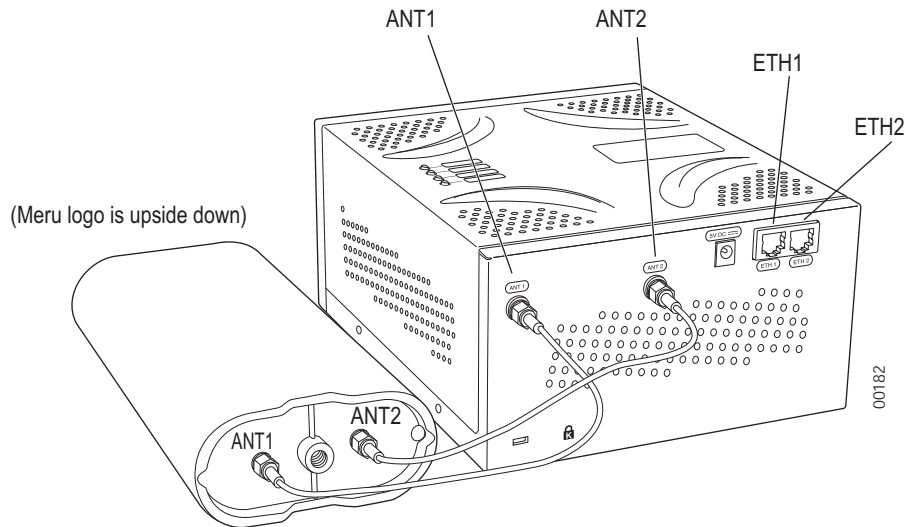


**Figure 9: Mounting the RS4000 Below a Suspended Ceiling Rail**

To mount an RS4000 below a suspended ceiling:

1. Determine the location on the ceiling rail where the RS4000 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 RS4000 to the narrow end of the hole.

7. Attach a keps nut to each caddy fastener stud and hand tighten. Do not overtighten.
8. On the RS4000, attach the two antenna cables to the SMA antenna connectors labeled **ANT1** and **ANT2** on the top panel of the RS4000 (see [Figure 8](#)) by turning the cable ends clockwise until tight.



**Figure 10: RS4000 with Antenna Attached**

9. Attach at least one Ethernet cable to the Ethernet port labeled **ETH1** and optionally to **ETH2** on the top panel of the RS4000. If just ETH1 is connected, only two of the four radios will be active.
10. Align the RS4000 to the bracket and tighten the four knurled thumbscrews until secure. If necessary, apply extra tightening with pliers.
11. Attach the antenna cables to the antenna, as described in “Placing and Positioning the Antenna.”
12. Connect the two Ethernet cables to the PoE device.
13. Apply power to the PoE component and network switch to power up the RS4000.
14. Verify correct operating using the LEDs, as shown in “[Checking LED Activity](#).”

## Mounting Above a Suspended Ceiling

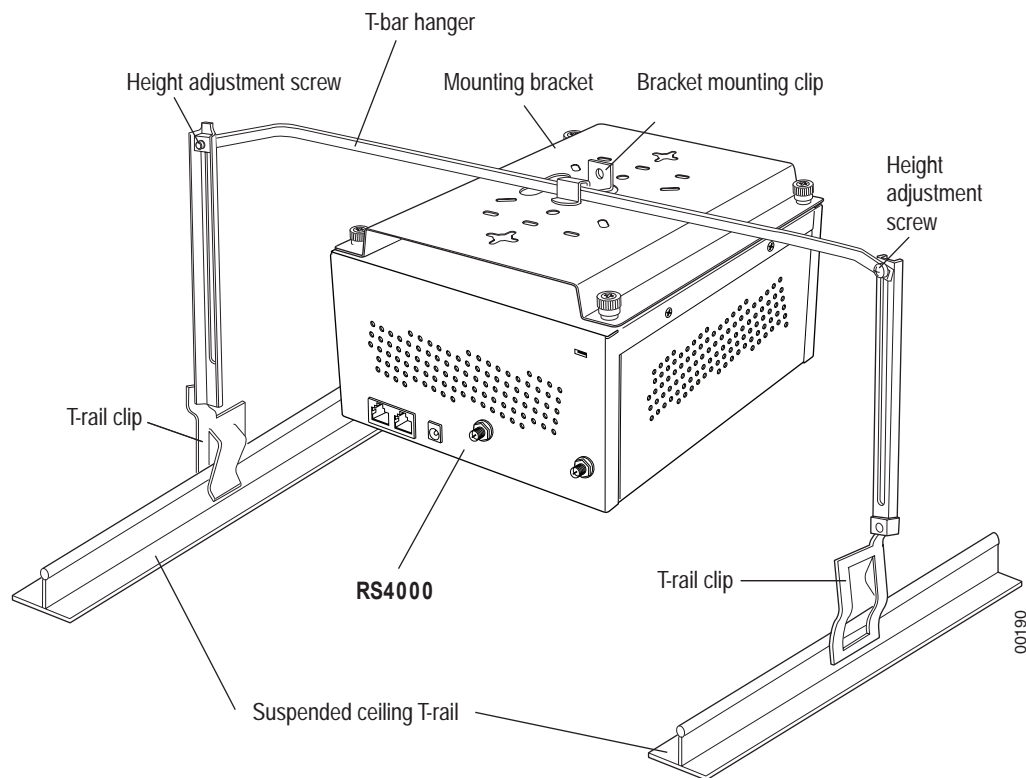
The optional T-bar box hanger mounting kit allows the RS4000 to be mounted above suspended ceiling T-rails (see [Figure 11](#)). The installation attaches the T-bar box hanger to the ceiling rails using clips. The RS4000 attaches to the mounting bracket that is attached to the T-bar box hanger.



**Note:** The RS4000 and its antenna meet 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.

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).



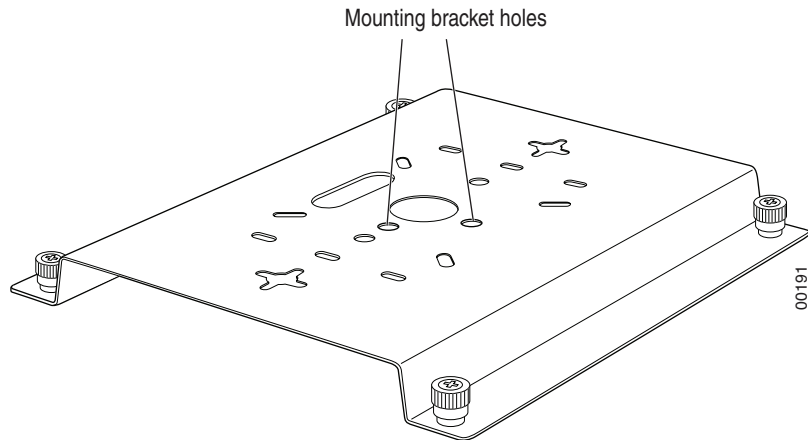
**Figure 11: Mounting the RS4000 Above a Suspended Ceiling**

To mount an RS4000 above suspended ceiling rails:

1. Determine the location on the ceiling rails where the RS4000 will be mounted and remove the ceiling tile.

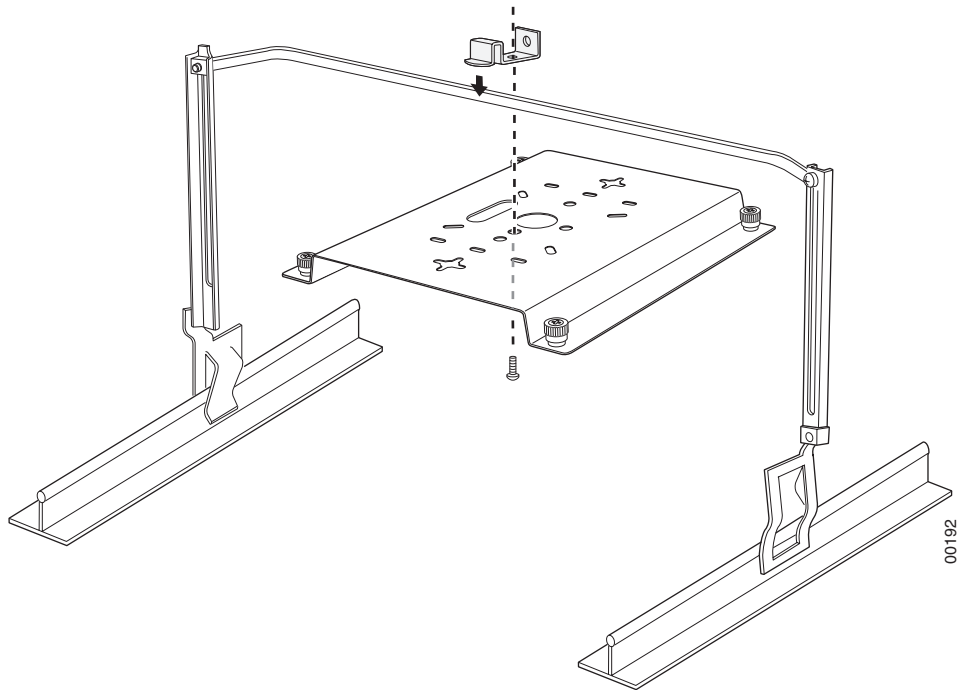


2. Unpack the T-bar hanger kit and unfold the legs of the T-bar hanger.
3. Locate the bracket mounting clip holes on the mounting bracket (see [Figure 12](#)). One hole attaches the bracket perpendicular to the box hanger. The other mounts the bracket parallel to the box hanger.



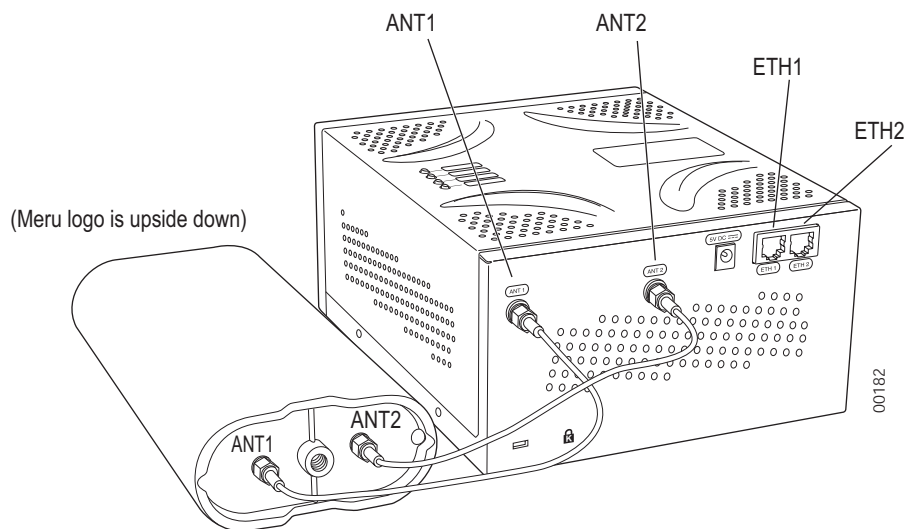
**Figure 12: Box Hanger Mounting Bracket Holes**

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 RS4000 next to the mounting bracket to estimate the height of the T-bar box hanger to provide enough clearance between the RS4000 and the ceiling.
7. Adjust the height of the box hanger using the height adjusting screws (see [Figure 13](#)).
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 hole provided in the bracket mounting clip. The U.S. National Electrical Safety Code requires this additional support.
10. Align the RS4000 to the bracket and tighten the four knurled thumbscrews until secure. If necessary, apply extra tightening with pliers.
11. On the RS4000, attach the two antenna cables to the SMA antenna connectors labeled **ANT1** and **ANT2** on the top panel of the RS4000 (see [Figure 8](#)) by turning the cable ends clockwise until tight.



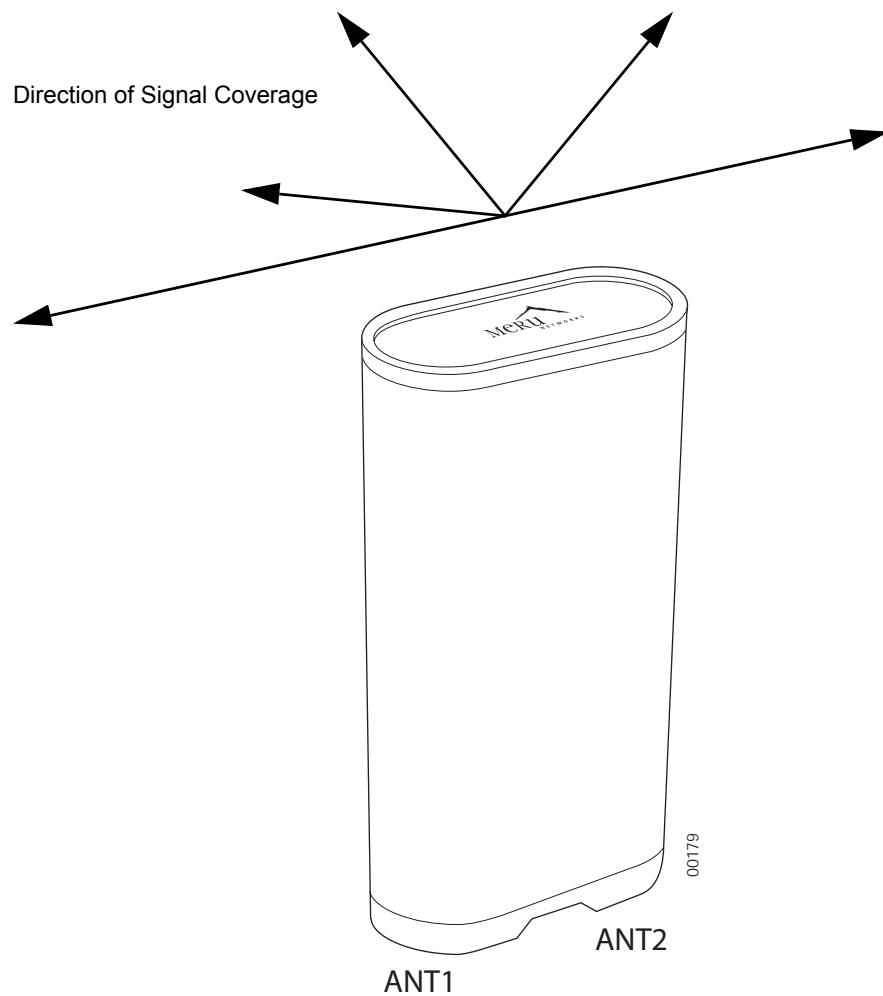
**Figure 14: RS4000 with Antenna Attached**

12. Attach at least one Ethernet cable to the Ethernet port labeled **ETH1** and optionally to **ETH2** on the top panel of the RS4000. If just ETH1 is connected, only two of the four radios will be active.
13. Attach the antenna cables to the antenna, as described in “Placing and Positioning the Antenna.” The antenna can also be mounted within the plenum space if need be.
14. Connect the Ethernet cables to the PoE device.
15. Apply power to the PoE component and network switch to power up the RS4000.

16. Check that the RS4000 is operating correctly before replacing the ceiling tile to the ceiling. Verify correct operating using the LEDs, as shown in “[Checking LED Activity](#).”

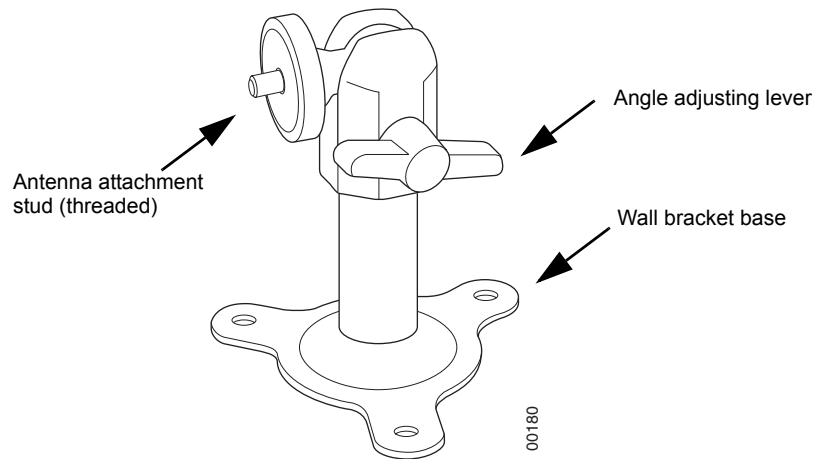
## Placing and Positioning the Antenna

The RS4000 antenna should be mounted to the wall using the 3" mounting arm within 3' of the RS4000 when using the supplied 3-foot cables or 6' when using the optional 6-foot cables.

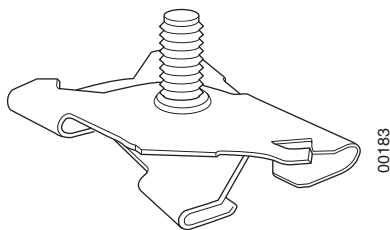


**Figure 15: RS4000 180° Directional Antenna**

The antenna mount arm includes two screw-in base types to accommodate either wall mounts ([Figure 16](#)) or ceiling tile rail mounts ([Figure 17](#)).



**Figure 16: Antenna Mounting Arm with Wall Bracket (shown attached)**



**Figure 17: Antenna Ceiling Tile Rail Base**

The RS4000 antenna uses two RF cables (3-foot cables are supplied) to connect to the SMA connectors on the top panel of the RS4000 (see [Figure 8](#)). The RF cables should be attached to the RS4000 as a result of the procedures described in one of the previous installation procedures.

Mount the antenna and connect the cables as described in the following:

1. Choose whether to hang the arm on a wall (including solid ceiling wall) or ceiling tile rail.
  - For wall or ceiling mount:
    - a. Using the screwholes in the mounting bracket as a template, mark and drill holes into the wall.
    - b. Attach the bracket securely with three 1/4" diameter fasteners or one 5/16" diameter and one 1/4" diameter fastener, if mounting to a wall stud (fasteners are not supplied).
  - For ceiling tile rail mount:
    - a. Pull apart the rail clamps so the ears can fit over the width of the ceiling rail.
    - b. Squeeze the rail clamp to attach to the ceiling rail.

- c. Attach the rail mount base to the antenna arm by screwing the base into the arm pole (you may have to unscrew and remove the wall mount base if it is attached to the arm).
2. Connect the RF antenna wires from the RS4000 to the SMA connectors on the top of the antenna, using [Figure 8](#) or [Figure 15](#) for orientation.
3. Attach the top of the antenna to the 1/4-20 threaded stud on the swivel head and tighten against the antenna.
4. For a 180° directional antenna, position the antenna such that the logo on the top of the antenna is pointing in the direction where reception is required.
5. Loosen the angle adjusting lever on the swivel assembly, if necessary, to adjust the hanging angle.
6. Position the antenna to maximize the reception and tighten the adjusting lever.

## Hoffman/NEMA Enclosure RS4000 Installation

Use the procedures in this section to mount the RS4000 within the Hoffman or NEMA enclosure. It will be necessary to modify the NEMA enclosure by drilling cable pass-through holes before installing the RS4000.



**Note:** The recommended Meru installation is a vertical wall mount, which allows for unimpeded air flow through the unit. The option to install the RS4000 within a Hoffman/NEMA enclosure is left to the customer's discretion, based on site-specific factors such as protection and accessibility, etc. Installation in the Hoffman enclosure requires drilling air vents and cable pass-through holes.

### Creating Cable Pass-through Holes in the NEMA Enclosure

To create cable pass-through holes in the NEMA enclosure, Meru supplies a template with markings that coincide with the placement of the Ethernet and antenna cable locations on the RS4000. Depending on the orientation of the RS4000 installation in the NEMA enclosure, the template is to be used on the side of the enclosure adjacent to the RS4000 top panel, where the cables connect.

1. Open the lid of the empty NEMA enclosure to provide unimpeded access to the enclosure sides.
2. On the outside of the empty NEMA enclosure, locate the top center of the side where the cables will exit.
3. Using the pattern on the supplied template, mark the center of the holes and drill a 1/2" to 1" hole at each of the three locations specified by the template.

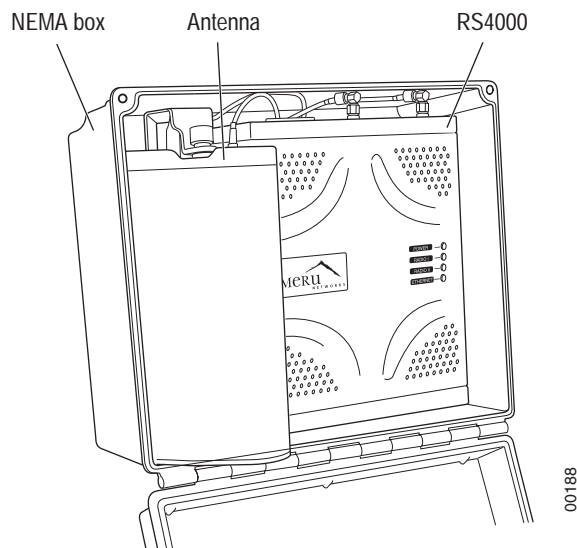
## Mounting the RS4000 in the Hoffman/NEMA Enclosure



**Caution!** This method of mounting has not been evaluated by Underwriters Laboratories.

To mount the RS4000 in the Hoffman/NEMA enclosure, it is necessary to use the optional mounting plate that is not supplied with the RS4000 packing items. This procedure assumes the Hoffman/NEMA enclosure is already mounted at the site.

1. Remove the wall bracket from back of the RS4000, if attached, by unscrewing each of the 4 knurled thumbscrews.
2. Attach the Hoffman/NEMA mounting plate to the back of the RS4000.
3. Attach the right-angle elbow joint to the antenna cable, if not already attached.
4. Attach the two antenna cables to the SMA antenna connectors labeled **ANT1** and **ANT2** on the top panel of the RS4000 (see [Figure 8](#)) by turning the cable ends clockwise until tight.
5. Attach two Ethernet cables to the Ethernet ports labeled **ETH1** and **ETH2** on the top panel of the RS4000.
6. Place the RS4000 into the Hoffman/NEMA enclosure, and align the plate screwholes with the holes in the Hoffman/NEMA enclosure.
7. Pass the Ethernet and antenna cables out of the Hoffman/NEMA enclosure through the cable pass-through holes.
8. Tighten the captive screws on the mounting plate to the Hoffman/NEMA enclosure.
9. Attach the antenna cables to the antenna (see [Figure 15](#)).
10. Position and align the bottom of the antenna over the threaded stud on the antenna mount arm and tighten the threaded stud to the antenna.



**Figure 18: RS4000 and Antenna Installed in NEMA Enclosure**

11. Connect the two Ethernet cables to the PoE device.
12. Apply power to the PoE component and network switch to power up the RS4000.
13. Test the reception for the antenna and then securely tighten the antenna.
14. Verify correct operating using the LEDs, as shown in “[Checking LED Activity](#).”
15. Close the lid to the Hoffman/NEMA enclosure.

## Where to Go From Here

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Now that the RS4000 is installed, go to the *Meru System Director Getting Started Guide* for instructions on initializing the controller and connecting the controller and RS4000 to the Ethernet switch to form the WLAN. Return to this chapter to check the status of the LEDs once the WLAN is operational.

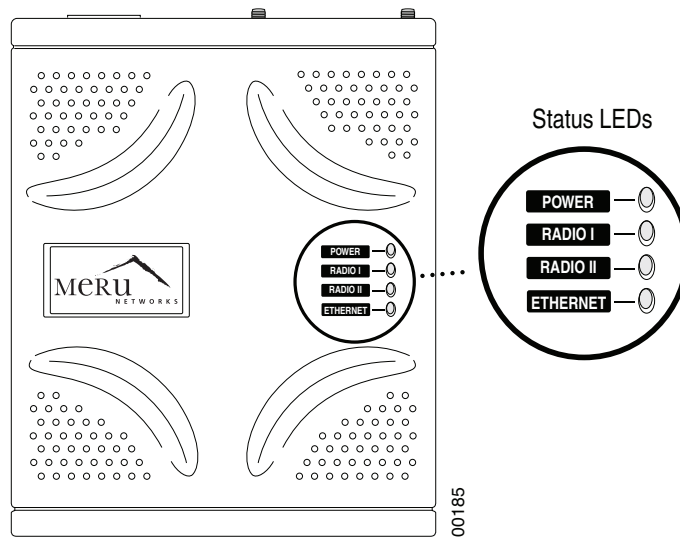
# Checking LED Activity

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Radio switch status LEDs are provided on the face of the RS4000.

## RS4000 Status LEDs

Status LEDs on the face of the RS4000 light, as shown in [Figure 19](#).



**Figure 19: RS4000 Status LEDs**

The RS4000 uses 4 LEDs. The functions of the status LEDs are described in [Table 3](#).



Table 3: RS4000 LED Descriptions

LED	Function
Power	<p>The Power status LED status is as follows:</p> <ul style="list-style-type: none"> <li>• off—power is off</li> <li>• solid red—when power is applied, system initializes for 40 seconds and then the LED turns amber; after discovering the controller the LED turns green. Otherwise, the system is in an abnormal state (notify Customer Support).</li> <li>• solid amber—at any time, if this LED state persists longer than 40 seconds, notify Customer Support</li> <li>• solid green—system is fully operational</li> </ul>
Radio I	<p>The Radio I LED is lit when radio packets are being transmitted and when the radio is beaconing.</p>
Radio II	<p>The Radio II LED is lit when radio packets are being transmitted and when the radio is beaconing.</p>
Ethernet	<p>The Ethernet LED status is as follows:</p> <ul style="list-style-type: none"> <li>• off—no link</li> <li>• solid green—100Mbps connection</li> <li>• blinking green—transmit or receive activity at 100Mbps</li> <li>• solid amber—10Mbps connection</li> <li>• blinking amber—transmit or receive activity at 10Mbps</li> </ul>

Checking LED Activity

# Chapter 3

## Installing the AP200

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

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

## Safety Precautions

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**IMPORTANT**—Read and follow the instructions in “Regulatory Information” on page 63 before installing and operating this product.

## Unpacking the AP200

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As you unpack the AP200, confirm that the AP200 shipping package contains the items listed on your packing list.

Shipments of the AP200 include 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 20](#)) allows 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.

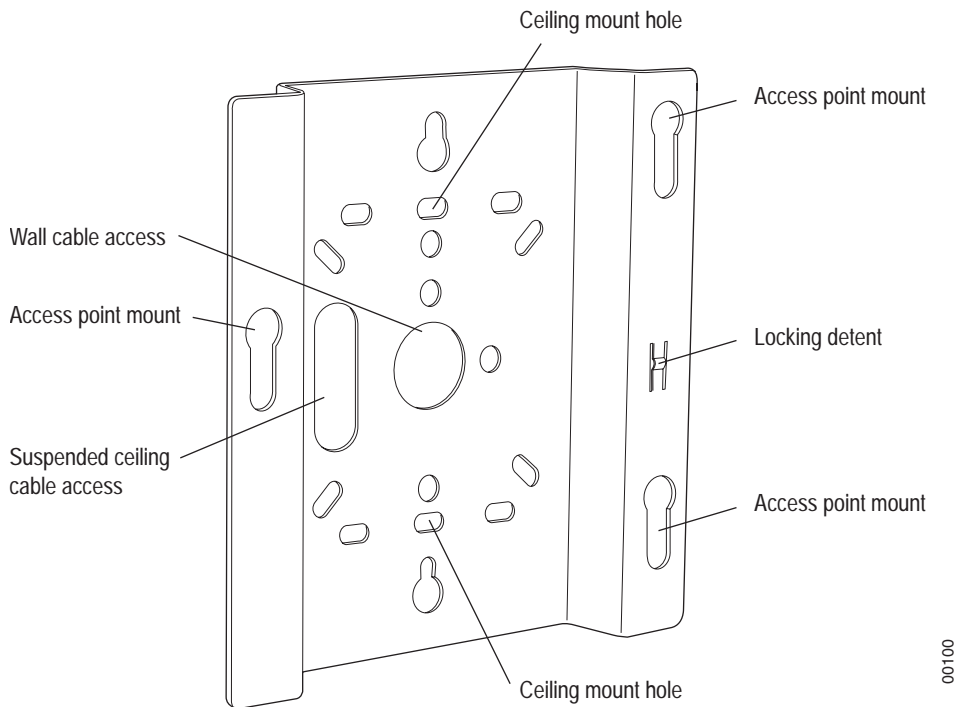


Figure 20: AP200 Mounting Bracket

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



**Warning!** With plastic covers removed, this product is 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 other countries, consult local authorities for regulations.

To complete this installation, you need the items listed in [Table 4](#).

**Table 4: AP200 Installation Items**

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

You need the tools listed in [Table 5](#).

**Table 5: AP200 Installation Tools**

Installation Type	Tools Required
Horizontal mounting	None
Vertical mounting over a wall stud	<ul style="list-style-type: none"> <li>• Drill</li> <li>• 1/8" drill bit</li> <li>• Screwdriver</li> </ul>
Vertical mounting on sheetrock	<ul style="list-style-type: none"> <li>• Drill</li> <li>• 3/16" drill bit</li> <li>• Screwdriver</li> </ul>
Horizontal mounting below a hanging ceiling	<ul style="list-style-type: none"> <li>• Screwdriver</li> <li>• Wrench or pliers</li> </ul>
Mounting above a hanging ceiling (AP200 metal enclosure only)	<ul style="list-style-type: none"> <li>• Wrench or pliers</li> <li>• Screwdriver</li> </ul>

## Installing the Access Points

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### 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)-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 21](#)). 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

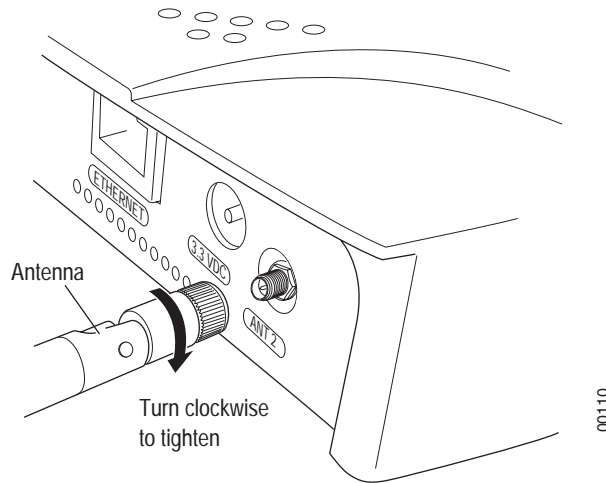
You can mount an AP200 in the following ways:

- 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 21](#)), point the antenna straight up, then retighten the ring.

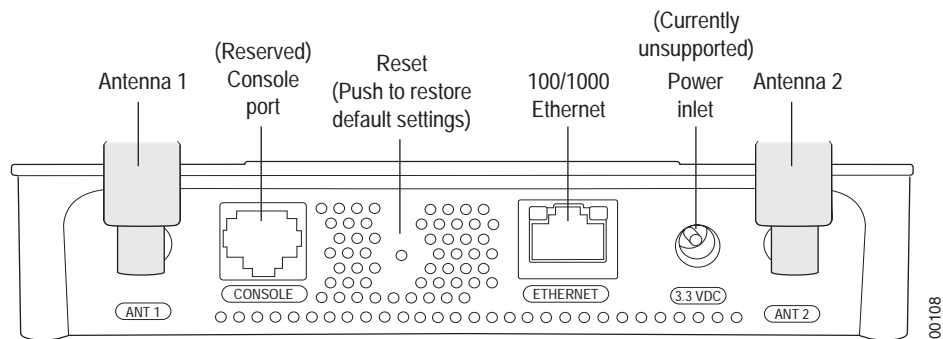


**Figure 21: AP200 Antenna Connection**

3. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 22](#).



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



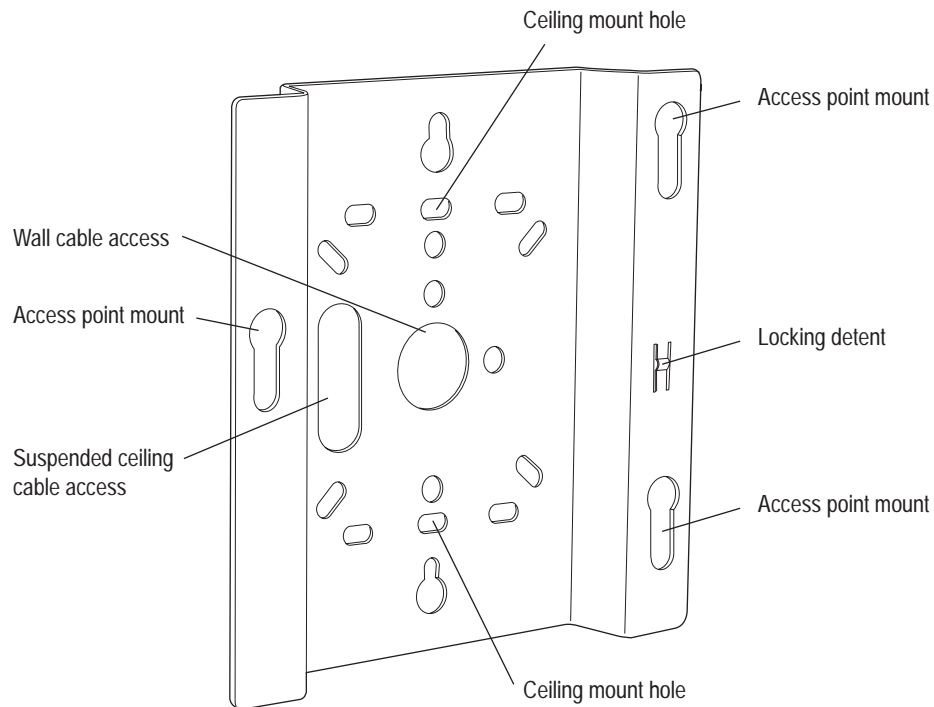
**Figure 22: AP200 Connector Panel**



## Vertical Mounting

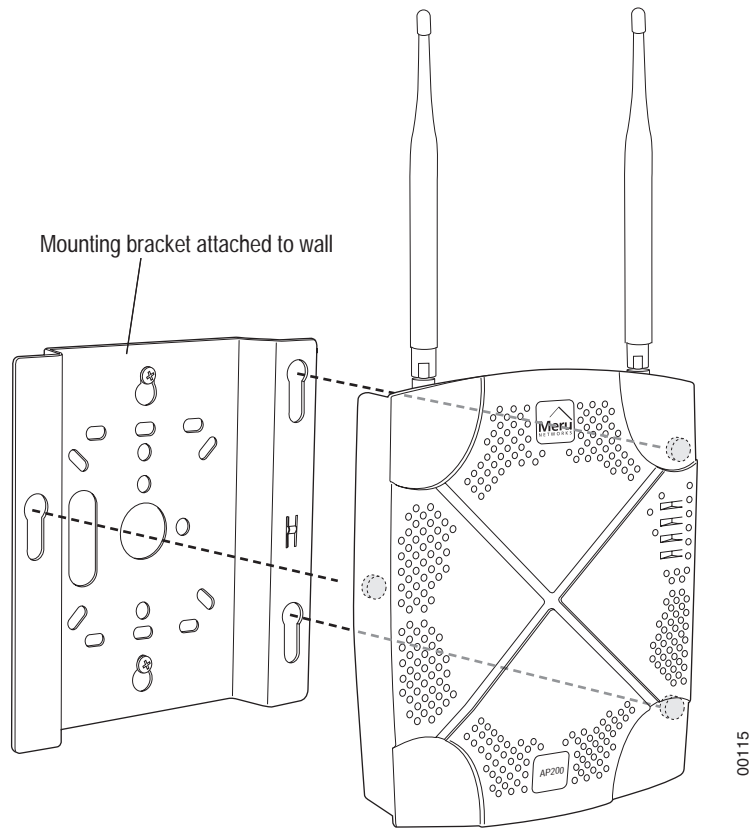
To vertically mount an AP:

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.

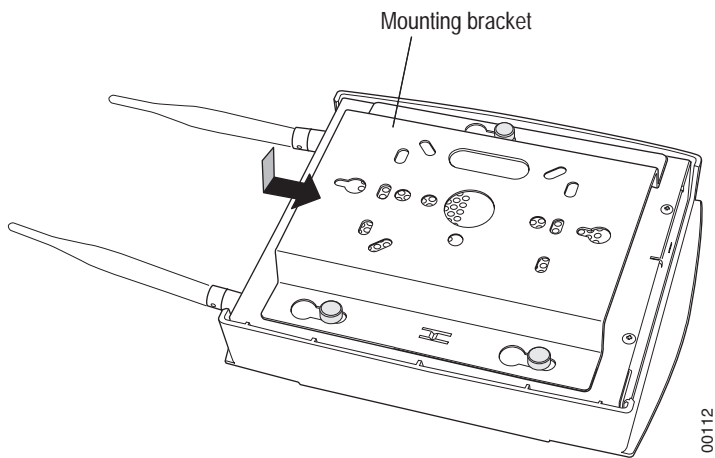


**Figure 23: AP200 Bracket**

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 24: Aligning the AP200 with the Bracket**



**Figure 25: Sliding the AP200 into the Bracket**

8. For external antennas, loosen the knurled ring at the base of each antenna (see [Figure 21](#)), 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 22](#).



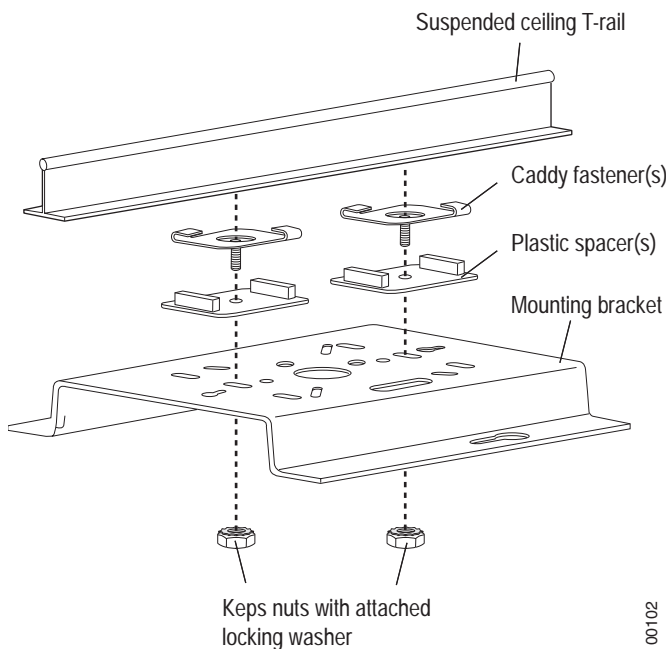
**Caution!** Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port.

## 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 26](#)).



**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 26: 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 25](#)). You should hear it snap in place.
9. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 21](#)), 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 22](#)).



**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 27](#)). 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.




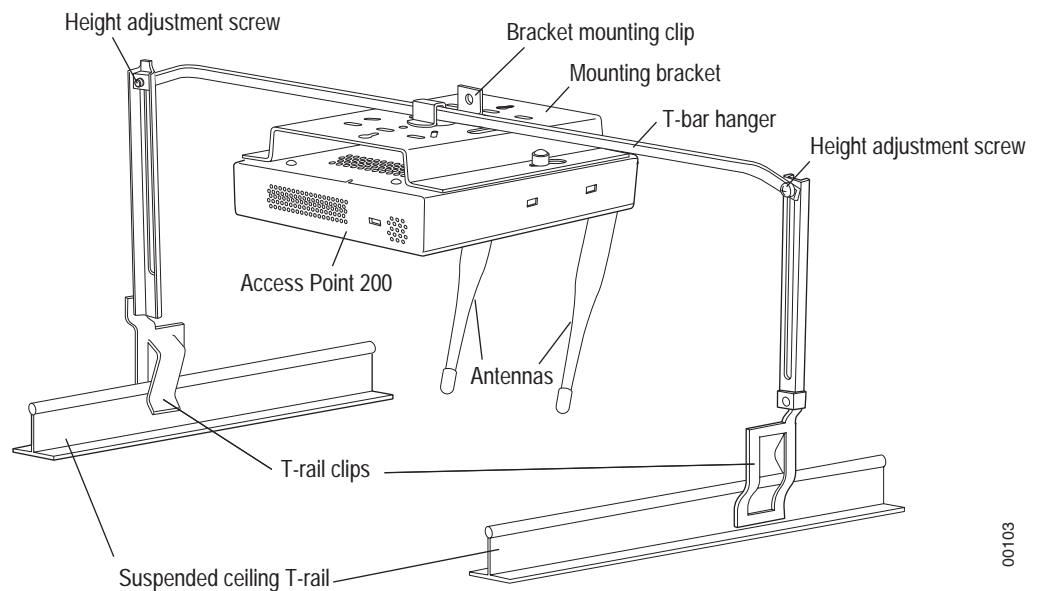
**Warning!** When installed in air-handling spaces, such as above a suspended ceiling, the AP200 is to be powered via PoE only (PoE is required).



**Warning!** 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 plenums and environmental air space (in accordance with Section 300-22(C) of the NEC).

 **Warning!** 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).

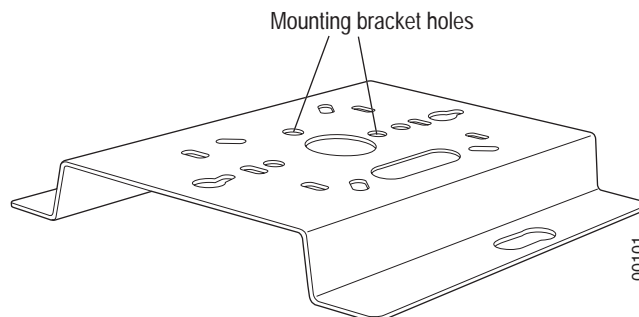


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**Figure 27: Mounting the AP200 Above a Suspended Ceiling**

To mount an AP200 above suspended ceiling rails:

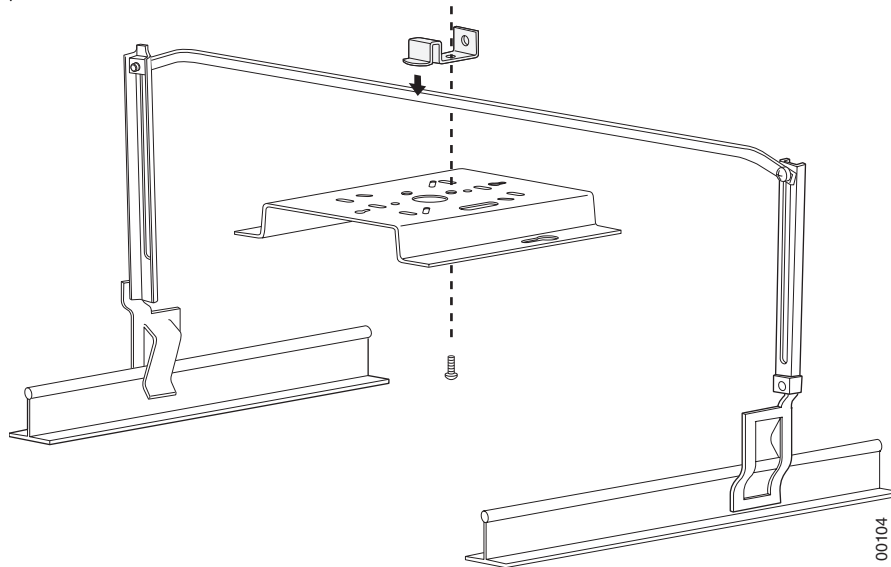
1. Determine the location on the ceiling rails where the AP will be mounted and remove the ceiling tile.
2. Unpack the T-bar hanger kit and unfold the legs of the T-bar hanger.
3. Locate the bracket mounting clip holes on the mounting bracket (see [Figure 28](#)). One hole attaches the bracket perpendicular to the box hanger; the other mounts the bracket parallel to the box hanger.



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**Figure 28: Box Hanger Mounting Bracket Holes**

4. Attach the U-joint of the clip to the T-bar and snap in place (see [Figure 29](#)).



**Figure 29: 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 29](#) 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 26](#)).
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 hole 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 25](#)), 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 21](#)), 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 22](#).



**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 [Checking LED Activity](#).

## Where to Go From Here

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Now that the AP200 is installed, go to the *Meru System Director 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 chapter to check the status of the LEDs once the WLAN is operational.

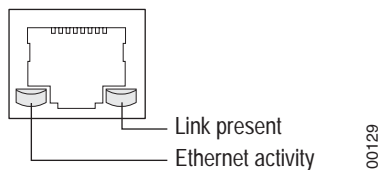
## Checking LED Activity

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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 30](#).

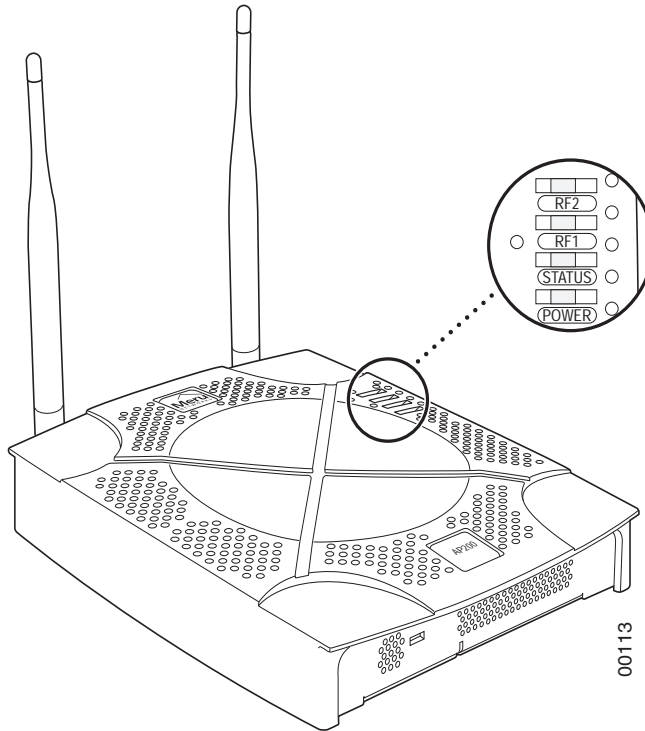


**Figure 30: RJ-45 LEDs**

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 31](#).



**Figure 31: AP200 Status LEDs**

The functions of the status LEDs are described in [Table 7](#).

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 31](#)) color reflects the various operating states ([Table 7](#)).



Table 6: AP200 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 <a href="#">Table 7</a> )
Power	green—presence of power

Table 7: 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 <sup>a</sup>

Checking LED Activity

State	Interpretation	AP200 LED Cycle
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
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 4

## Installing the AP150

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

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

## Safety Precautions

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**IMPORTANT**—Read and follow the instructions in Appendix B, “Regulatory Information” on page 63 before installing and operating this product.

This product is intended to be supplied by a UL Listed power supply, marked Class 2 or LPS, and rated minimum 5 Vdc, 3A.



**Caution!** The AP150 is not certified for plenum installations, and should not be installed in the plenum space.

## Unpacking the AP150

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Confirm that the AP150 shipping package contains the AP150 access point with attached mounting bracket

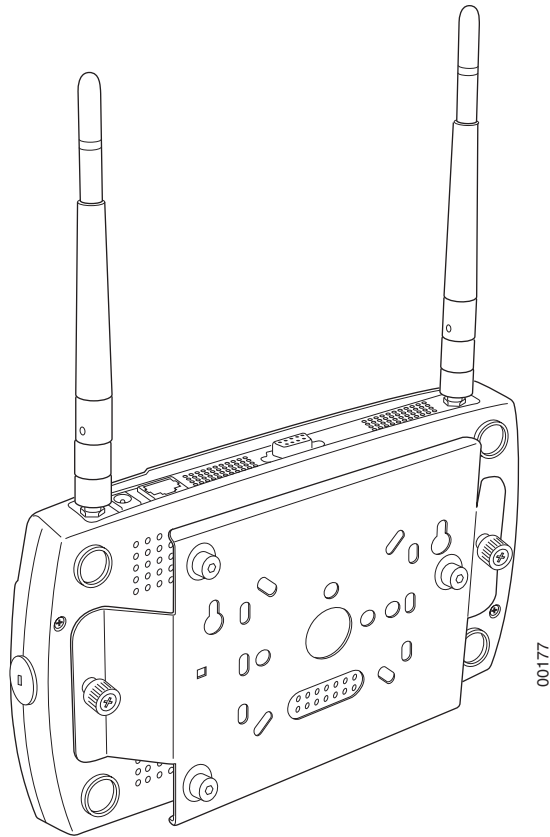


Figure 32: AP150 with Mounting Bracket

## Installation Requirements

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If you choose not to use the AP150 mounting bracket, the backside of the AP150 contains two keyholes to accommodate a simple wall mount.

A mounting bracket can be used for many wall mounting configurations. The AP150 bracket mounting studs are placed so they can be used with brackets supplied by other vendors or to replace an AP100. An array of holes on the mounting bracket (see [Figure 32](#)) 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.

Additional optional mounting kits are available for mounting the AP150 below a hanging ceiling, using the mounting bracket.



**Caution!** The AP150 is not certified for plenum installations, and should not be installed in the plenum space.



**Note:** The AP150 has two security cable slots (one on each side of the AP150) so you can secure the AP150 with a standard security cable, such as those used to secure laptop computers.

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

To complete this installation, you need the items listed in [Table 8](#).

**Table 8: AP150 Installation Items**

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

You need the tools listed in [Table 9](#).

**Table 9: AP150 Installation Tools**

Installation Type	Tools Required
Horizontal mounting	None
Vertical mounting over a wall stud	<ul style="list-style-type: none"><li>• Drill</li><li>• 1/8"drill bit</li><li>• Screwdriver</li><li>• 1/8"Allen wrench</li></ul>
Vertical mounting on sheetrock	<ul style="list-style-type: none"><li>• Drill</li><li>• 3/16" drill bit</li><li>• Screwdriver</li><li>• 1/8"Allen wrench</li></ul>
Horizontal mounting below a hanging ceiling	<ul style="list-style-type: none"><li>• Screwdriver</li><li>• Wrench or pliers</li><li>• 1/8"Allen wrench</li></ul>

# Installing the Access Points

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## 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)-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.

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 33](#)). 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

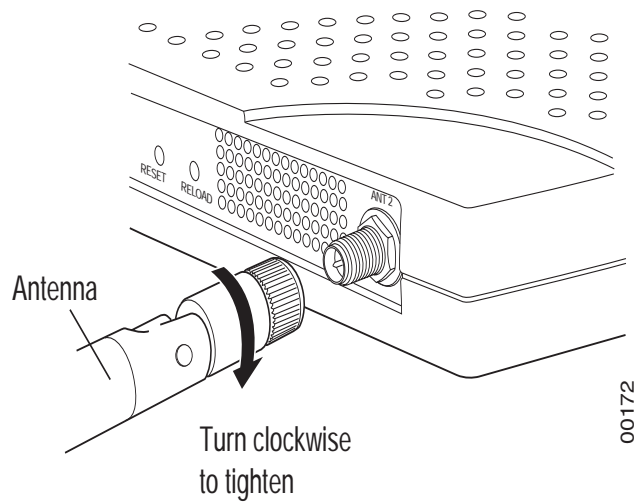
You can mount an AP150 in the following ways:

- Horizontally, as described in the “Horizontal Mounting” section.
- Vertically, as described in the “Vertical Mounting with the Mounting Bracket” section.
- Below a hanging ceiling, as described in the “Mounting Below a Suspended Ceiling” section.

### Horizontal Mounting

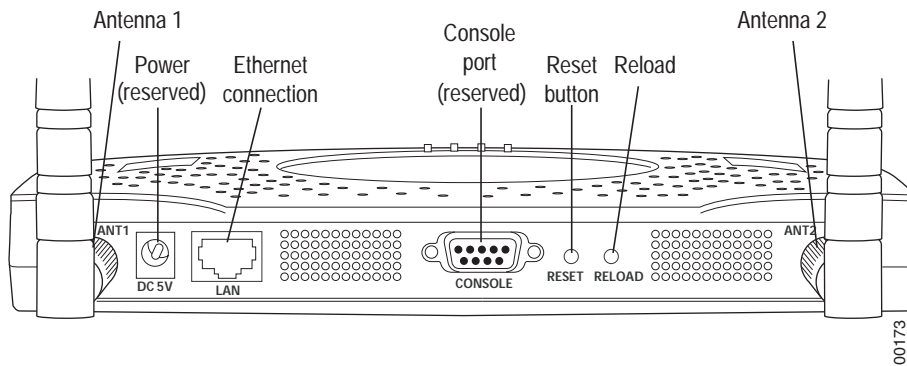
To horizontally mount an AP150:

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 33](#)), point the antenna straight up, then retighten the ring.



**Figure 33: AP150 Antenna Connection**

3. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 34](#).



**Figure 34: AP150 Connector Panel**

## Vertical Mounting the AP150

To perform a simple wall mount using the keyholes on the back of the AP150:

1. Remove the attached mounting bracket from the back of the AP150.
2. Mark the location on the wall for two mounting screws. They are placed 4.3" apart, center-to-center, or one above the other. If you are not using plastic wall anchors, you must either center the mounting screws on a wall stud or use plastic wall anchors.
3. 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



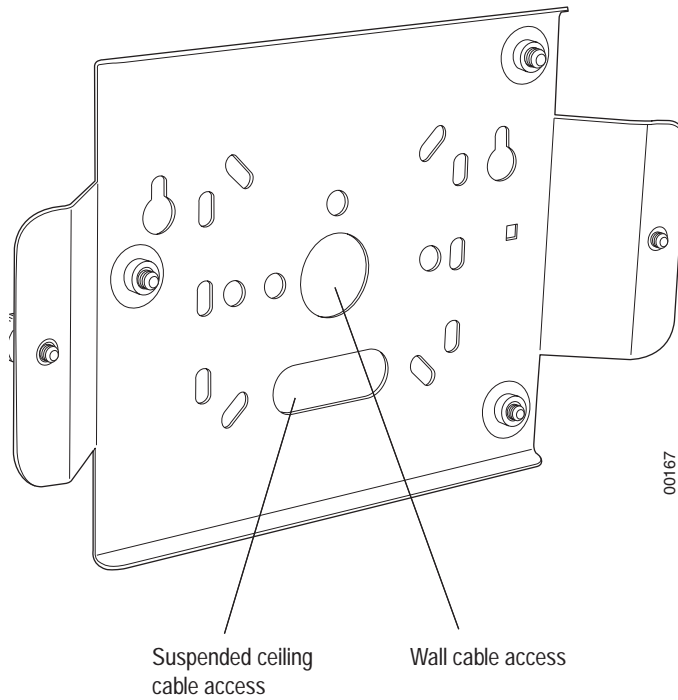
4. If you are using plastic anchors, install them in the holes.
5. Screw in the screws most of the way, so that the screw head is about 1/16 of an inch from the wall.
6. Align the AP150 keyholes over the mounting screws and slightly pull down (or across, if mounting sideways).
7. For external antennas, loosen the knurled ring at the base of each antenna (see [Figure 33](#)), point the antenna straight up, then retighten the ring.
8. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 34](#).

## Vertical Mounting with the Mounting Bracket

The AP150 uses thumbscrews to attach to the mounting bracket or mounting plate that allows the access point to be mounted on a vertical surface. Additionally, three shoulder screws may be installed on the mounting bracket to allow the AP150 and attached bracket to mount over a previously installed Cisco 1200 mounting bracket.

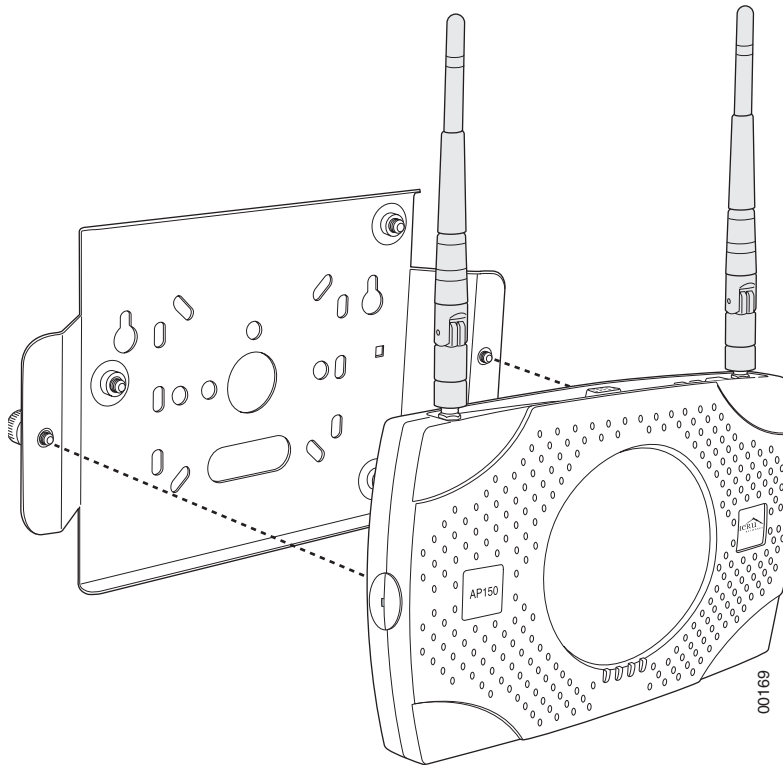
To vertically mount an AP:

1. If not mounting the AP150 to a previously installed third-party mounting bracket, use a 1/8" Allen wrench to remove the shoulder screws from the mounting bracket, if already attached.
2. Using the bracket holes as a template, remove the bracket from the AP150 (or use the stencil in Appendix D, "Mounting Bracket Stencils") to mark the location on the wall for the two AP bracket mounting screws. They are placed 4.3 inches apart, center-to-center. 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 35: AP150 Bracket**

3. 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
4. If you are using plastic anchors, install them in the holes.
5. Screw in the screws most of the way, so that the screw head is about 1/16 of an inch from the wall.
6. Mount the bracket on the screws, placing the circular portion of the keyhole mounts over the screw heads and sliding the bracket down.
7. Tighten the screws to secure the bracket.
8. Align the AP150 with the bracket thumbscrews (see [Figure 36](#)) and tighten the thumbscrews to attach the bracket.



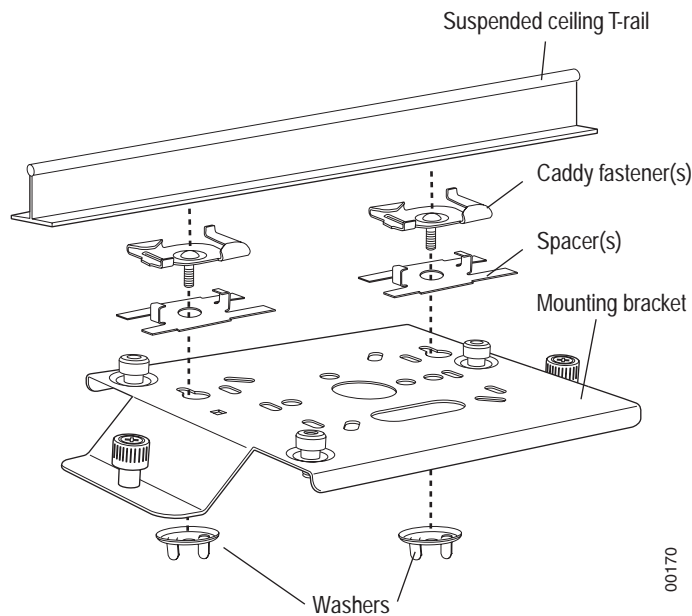
**Figure 36: Aligning the AP150 with the Bracket**

9. For external antennas, loosen the knurled ring at the base of each antenna (see [Figure 33](#)), point the antenna straight up, then retighten the ring.
10. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in [Figure 34](#).

## 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 37](#)).

- ✓ **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 37: Mounting the AP150 to a Suspended Ceiling Rail**

To mount an AP150 below a suspended ceiling:

1. Using a 1/8" Allen wrench, remove the shoulder screws from the mounting bracket, if already attached.
2. Determine the location on the ceiling rail where the AP will be mounted and remove the ceiling tiles.
3. Place each of the two caddy fasteners on the ceiling T-rail and twist to attach to the rail.
4. Adjust the distance between the caddy fasteners by using the mounting bracket holes as a guide.
5. Tighten the caddy fasteners in place using a standard screwdriver. Do not overtighten.
6. Place each spacer on the caddy fastener stud. The spacer legs should contact the ceiling T-rail.
7. Align the mounting bracket keyholes with the caddy fastener studs and slide the AP150 to the narrow end of the hole.

8. Attach a keps nut to each caddy fastener stud and hand tighten. Do not overtighten.
9. Align the AP150 with the bracket thumbscrews (see [Figure 36](#)) and tighten the thumbscrews to attach the bracket.
10. For each antenna, loosen the knurled ring at the base of the antenna (see [Figure 33](#)), point the antenna straight down, then retighten the ring.
11. Connect one end of the PoE 100BaseT Ethernet cable to the 100/1000 Ethernet connector, shown in (see [Figure 34](#)).

## Where to Go From Here

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Now that the AP150 is installed, go to the *Meru System Director 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 chapter to check the status of the LEDs once the WLAN is operational.

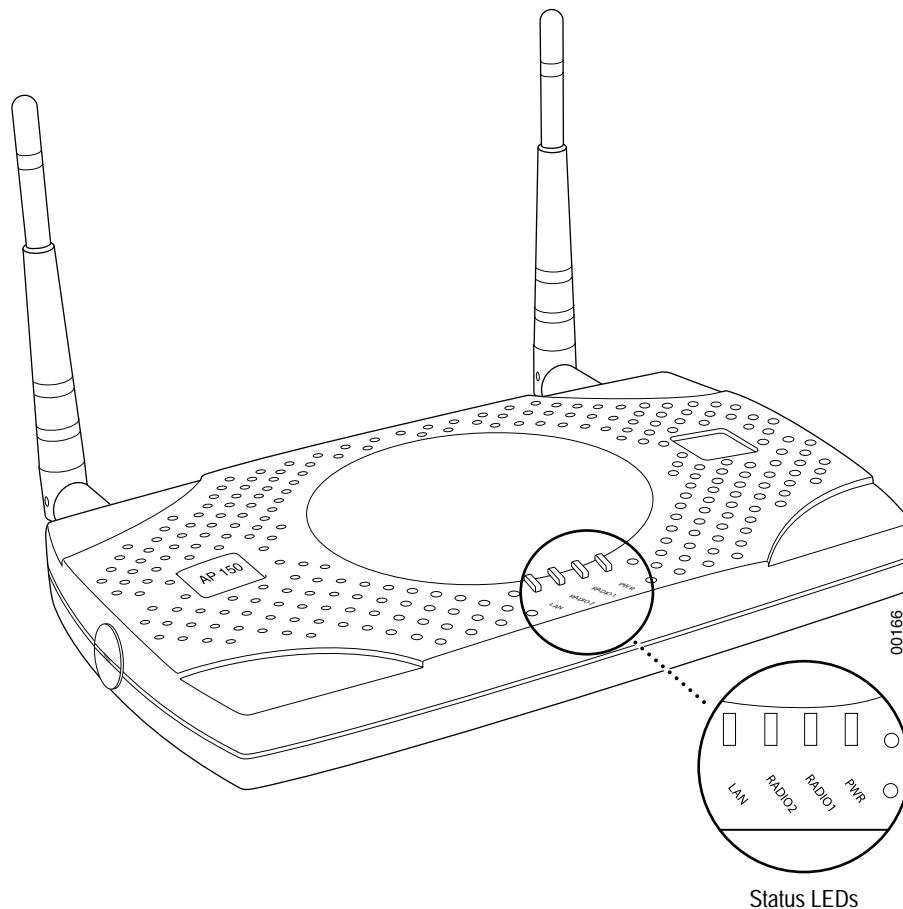
# Checking LED Activity

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

## AP150 Status LEDs

Four status LEDs on the *face* of the AP150 also light, as shown in [Figure 38](#).



**Figure 38: AP150 Status LEDs**

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. The Status LED (see [Figure 38](#)) color reflects the various operating states ([Table 10](#)).

Table 10: AP150 LED Descriptions

LED	Function
Power	<p>The Power status LED status is as follows:</p> <ul style="list-style-type: none"> <li>• off—power is off</li> <li>• solid red—when power is applied, system initializes for 40 seconds and then the LED turns amber; after discovering the controller the LED turns green. Otherwise, the system is in an abnormal state (notify Customer Support).</li> <li>• solid amber—at any time, if this LED state persists longer than 40 seconds, notify Customer Support</li> <li>• solid green—system is fully operational</li> </ul>
Radio I	<p>The Radio I LED is lit when radio packets are being transmitted and when the radio is beaconing.</p>
Radio II	<p>The Radio II LED is lit when radio packets are being transmitted and when the radio is beaconing.</p>
Ethernet	<p>The Ethernet LED status is as follows:</p> <ul style="list-style-type: none"> <li>• off—no link</li> <li>• solid green—100Mbps connection</li> <li>• blinking green—transmit or receive activity at 100Mbps</li> <li>• solid amber—10Mbps connection</li> <li>• blinking amber—transmit or receive activity at 10Mbps</li> </ul>

Checking LED Activity



# Appendix A

## Specifications

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

- [Wireless Interface](#)
- [Ethernet Interface](#)
- [Physical](#)

## Wireless Interface

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Table 11: Wireless Interface Specifications

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

# Ethernet Interface

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Feature	Detail
Wireline Standard	<ul style="list-style-type: none"><li>• One Ethernet (IEEE 802.3) interface, supporting half-duplex and full-duplex modes</li><li>• Supports the Power over Ethernet (PoE) IEEE 802.3af standard</li></ul>

## Physical

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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.

# Appendix B

## Regulatory Information

The Meru Access Points (APs) must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. For country-specific approvals, see below. Meru Networks, Inc. is not responsible for any radio or television interference caused by unauthorized modification of APs, or the substitution or attachment of connecting cables and equipment other than that specified by Meru Networks, Inc. The correction of interference caused by such unauthorized modification, substitution or attachment is the responsibility of the user. Meru Networks, Inc. and its authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from the user failing to comply with these guidelines.

## USA

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### Underwriters Laboratories

For the AP200 series and the RS4000, the following statement and notices are applicable:

Use only with Listed I.T.E. equipment.

#### Notices

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

Suitable for use in environmental air space in accordance with Section 300-22(c) of the National Electrical Code, and Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, C22.1.

## FCC Radiation Exposure Statement



**Caution!**

The radiated output power of the Meru Networks, Inc. devices is well below the FCC radio frequency exposure limits. However, the Meru Networks, Inc. Meru Access Points should be used in such a manner that the potential for human contact during normal operation is minimized. To avoid the possibility of exceeding the FCC radio frequency exposure limits, you should keep a distance of at least 20 cm between you (or any other person in the vicinity) and the Access Point antennas.

## Radio Frequency Interference Requirements

### Interference Statement



**Note:**

**Meru Access Point**

These devices are restricted to indoor use because they operate in the 5.15 to 5.25 GHz frequency range. The FCC requires such products to be used indoors for the frequency range 5.15 GHz to 5.25 GHz to reduce the potential for harmful interference to co-channel Mobile Satellite systems.

High-power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz bands. These radar stations can cause interference with or damage to these devices, or both.

These devices comply with Part 15 of the FCC Rules. Operation of the devices is subject to the following two conditions: (1) The devices may not cause harmful interference, and (2) The devices must accept any interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If the equipment is not installed and used in accordance with the instructions, the equipment may cause harmful interference to radio communications. There is no guarantee, however, that such 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 taking one or more of the following measures:

- Relocate this device.
- Increase the separation between the device and the receiver.
- Connect the device into an outlet on a circuit different from that of other electronics.

- Consult the dealer or an experienced radio technician for help.



**Note:**

The Meru Networks Meru Access Point must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. Any other installation or use may violate FCC Part 15 regulations. Modifications not expressly approved by Meru Networks, Inc. could void your authority to operate the equipment.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.

## Canada. Industry Canada (IC)

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These devices comply with RSS210, Issue 5 of Industry Canada.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.

L'utilisation de ce dispositif est autorisée seulement aux conditions suivantes: (1) il ne doit pas produire de brouillage et (2) l'utilisateur du dispositif doit être prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fonctionnement du dispositif.

The term "IC" before the equipment certification number only signifies that the Industry Canada technical specifications were met.

To reduce the potential radio interference to other users, the antenna type and gain should be chosen so that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

To prevent radio interference to the licensed service, this device is intended to be operated indoors and away from windows to provide maximum shielding. Equipment (or its transmit antenna) that is installed outdoors is subject to licensing.

Pour empêcher que cet appareil cause du brouillage au service faisant l'objet d'une licence, il doit être utilisé à l'intérieur et devrait être placé loin des fenêtres afin de fournir un écran de blindage maximal. Si le matériel (ou son antenne d'émission) est installé à l'extérieur, il doit faire l'objet d'une licence.



**Caution!** **Exposure to Radio Frequency Radiation.**  
 The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit an RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada’s website <http://www.hc-sc.gc.ca/rpb>.



**Note:** **Meru Access Points**  
 These devices are restricted to indoor use because they operate in the 5.15 to 5.25 GHz frequency range. Industry Canada requires such products to be used indoors for the frequency range 5.15 GHz to 5.25 GHz to reduce the potential for harmful interference to co-channel Mobile Satellite systems.  
 High-power radars are allocated as primary users of the 5.25 to 5.35 GHz and 5.65 to 5.85 GHz bands. These radar stations can cause interference with or damage to these devices, or both.

Access Points have been designed to operate with the antennas listed below. Antennas not included in this list are strictly prohibited for use with these devices. The required antenna impedance is 50 ohms.

AP Model	Antenna Type	Gain (2.4 GHz)	Gain (5 GHz)
AP200	Dual-Band Omni-Directional SAA04-220050	2 dBi	3 dBi
AP200	Dual-Band Omni-Directional TWX-614XRSXX	4 dBi	5 dBi
AP150	Dual-Band Omni-Directional MMO224580608	6 dBi	8 dBi
AP150	Single-Band Omni-Directional SAA04-050280	8 dBi	
AP150	Panel MP24013 XFPTNF	13 dBi	

AP150	Dual-Band Omni-Directional SAA04-220050	2 dBi	3 dBi
RS4000	Dual-Band Multi-Channel Omni-Directional MN-ACC-ANTRSO	4 dBi	4.5 dBi
RS4000	Dual-Band Multi-Channel 180° MN-ACC-ANTRSOH	5 dBi	5.5 dBi

To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

## Europe—EU Declaration of Conformity and Restrictions

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This equipment is marked with either the CE Mark, the alert symbol, and the notified body's number and can be used throughout the European Community. This mark indicates compliance with the R&TTE Directive 1999/5/EC and the relevant parts of the following technical specifications.

**EN 300 328.** Electromagnetic Compatibility and Radio Spectrum Matters (ERM). Wideband transmission systems, data transmission equipment operating in the 2.4 GHz ISM (Industrial, Scientific, and Medical frequency bands in the range of 902-928 MHz, 2.4-2.485 GHz, and 5.15-5.25 GHz) band and using spread spectrum modulation techniques, harmonized EN standards covering essential requirements under article 3.2 of the R&TTE directive.

**EN 301 893.** Broadband Radio Access Networks (BRAN). 5 GHz high-performance RLAN, harmonized EN standards covering essential requirements of article 3.2 of the R&TTE directive.

**EN 301 489-17.** Electromagnetic Compatibility and Radio Spectrum Matters (ERM). Electromagnetic Compatibility (EMC) Standard for Radio Equipment and Services, Part 17 Specific Conditions for Wideband Data and HIPERLAN Equipment.

**EN 60950-1.** Safety of Information Technology Equipment.



Marking by the alert symbol indicates that usage restrictions apply.

Meru Networks, Inc. declares that their Access Points comply with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Meru Networks, Inc. vakuuttaa täten että Access Points tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Hierbij verklaart Meru Networks, Inc. dat het toestel Access Points in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.

Bij deze verklaart Meru Networks, Inc. dat deze Access Points voldoet aan de essentiële eisen en aan de overige relevante bepalingen van Richtlijn 1999/5/EC.

Par la présente, Meru Networks, Inc. déclare que l'appareil Access Points est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

Par la présente, Meru Networks, Inc. déclare que ce Access Points est conforme aux exigences essentielles et aux autres dispositions de la directive 1999/5/CE qui lui sont applicables.

Härmed intygar Meru Networks, Inc. att denna Access Points står i överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Undertegnede Meru Networks, Inc. erklærer herved, at følgende udstyr Access Points overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.

Hiermit erklärt Meru Networks, Inc. dass sich dieser/diese/dieses Access Points in Übereinstimmung mit den grundlegenden Anforderungen und den anderen relevanten Vorschriften der Richtlinie 1999/5/EG befindet.

Hiermit erklärt Meru Networks, Inc. die Übereinstimmung des Gerätes Access Points mit den grundlegenden Anforderungen und den anderen relevanten Festlegungen der Richtlinie 1999/5/EG.

ΠΑΡΟΨΣΑ Meru Networks Inc. ΔΗΛΩΝΕΙ ΟΤΙ Access Points  
ῬΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ  
ΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.

Con la presente Meru Networks, Inc. dichiara che questo Access Points è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

Por medio de la presente Meru Networks, Inc. declara que el Access Points cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.



Meru Networks, Inc. declara que este Access Points está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

Hawnhekk, Meru Networks, Inc. jiddikjara li dan Access Points jikkonforma mal-htigijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.

Käesolevaga kinnitab Meru Networks, Inc. seadme Access Points vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

Alulírott, Meru Networks, Inc. nyilatkozom, hogy a Access Points megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.

Meru Networks, Inc. týmto vyhlasuje, e Access Points splna základné poiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.

Meru Networks, Inc. tímto prohlašuje, e tento Access Points je ve shode se základními poiadavky a dalšími příslušnými ustanoveními smernice 1999/5/ES.

Šiuo Meru Networks, Inc. deklaruojā, kad šis Access Points atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

Ar šo Meru Networks, Inc. deklare, ka Access Points atbilst Direktivas 1999/5/EK butiskajam prasibam un citiem ar to saistitajiem noteikumiem.

Niniejszym, Meru Networks, Inc., deklaruje, ze Access Points spelnia wymagania zasadnicze oraz stosowne postanowienia zawarte Dyrektywie 1999/5/EC.

These products are intended to be used in all countries of the European Economic Area with the following restrictions:

## IEEE 802.11a Restrictions

- These products are for indoor use only (5150-5250 MHz).
- To ensure compliance with local regulations, be sure to set your Access Point to the country in which you are using the Access Point.
- The Meru Networks, Inc. products can be used only indoors in the following countries: Austria, Belgium, Bulgaria, Czech Republic, Germany, Cyprus, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, The Netherlands, Norway, Portugal, Poland, Romania, Spain, Slovak Republic, Slovenia, Sweden, Switzerland, Turkey, and United Kingdom.

## EEE 802.11b/g Restrictions

- France—In all Metropolitan départements, wireless LAN frequencies can be used under the following conditions, either for public or private use:  
Indoor use: maximum power (EIRP) of 100 mW for the entire 2400-2483.5 MHz frequency band.

# Japan

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## Model 208



003NY06089 0000    003GZ06018 0000    003WY06035 0000

## Model 208 Rev 2 Module



003NY07014 0000    003GZ07002 0000    003WY07004 0000

## Model AP208 Rev 2



003NY07015 0000    003GZ07003 0000    003WY07005 0000

## Model 201



003NY06117 0000    003GZ06026 0000    003WY06043 0000

## Model AP201 Rev 2



003NY07015 0000    003GZ07003 0000    003WY07005 0000

## Model AP150



003NY06122 0000    003GZ06030 0000    003WY06046 0000

# Manufacturing Information

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The AP150 and AP200 are built in Taiwan. Factory information is provided under NDA and upon request.

# Appendix C

## Channels

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

This appendix contains the following section:

- [Channels](#)

## Channels

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### 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 12](#).



**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 12: IEEE 802.11a Channels

Channel Number	Frequency in MHz	Regulatory Domains	
		Americas	Japan
34	5170	-	X
36	5180	X	-

Table 12: IEEE 802.11a Channels (Continued)

Channel Number	Frequency in MHz	Regulatory Domains	
		Americas	Japan
38	5190	-	X
40	5200	X	-
42	5210	-	X
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 13](#).



**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 13: 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
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

Channels

**Table 13: IEEE 802.11b/g Channels (Continued)**

Channel Number	Frequency in MHz	Regulatory Domains				
		Americas	EMEA	Israel	China	Japan
12	2467	-	X	-	-	X
13	2472	-	X	-	-	X
14	2484	-	-	-	-	X (for 802.11b only)

# Appendix D

## Mounting Bracket Stencils

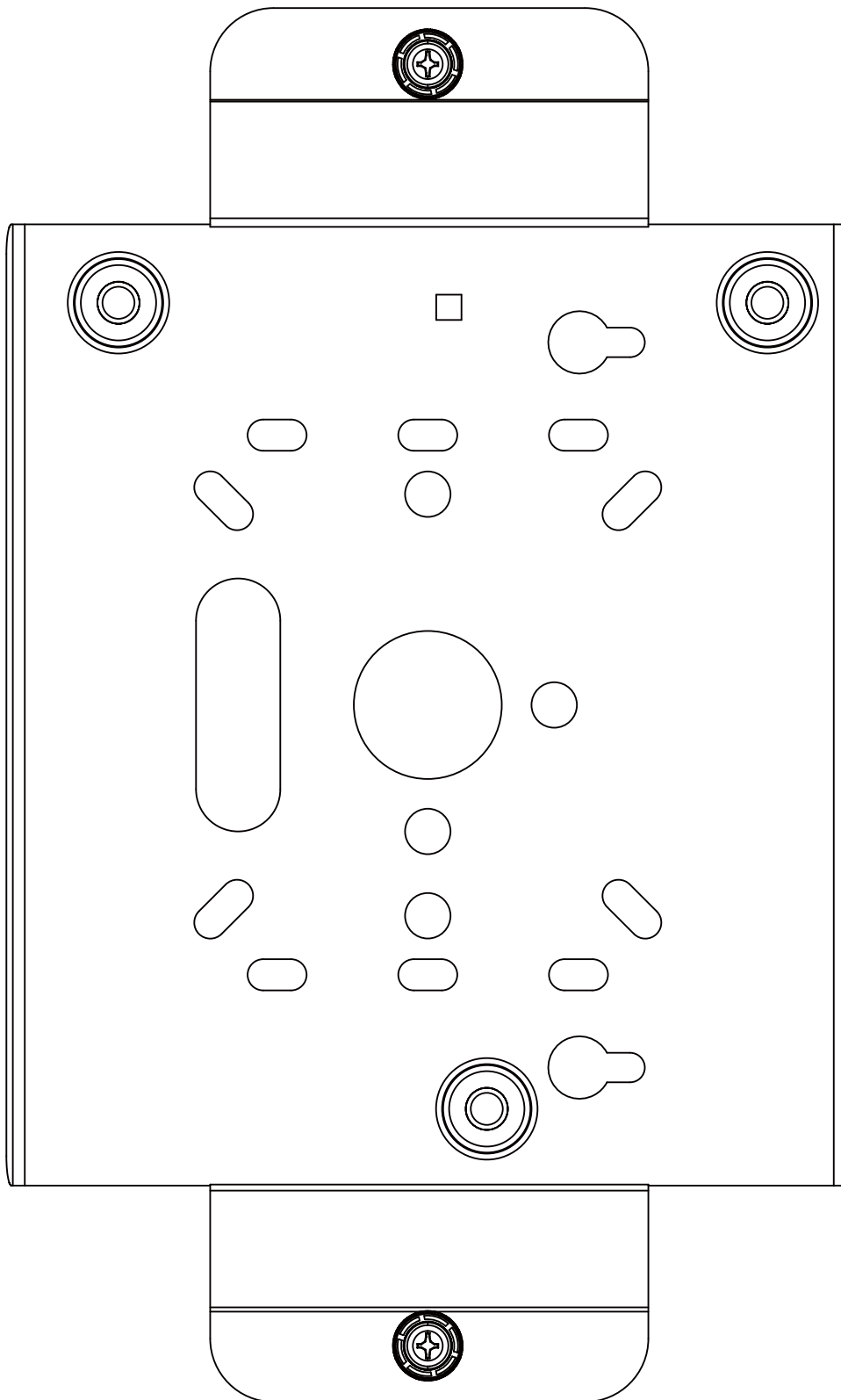
This appendix provides drawings of the AP mounting brackets.

### AP150 Mounting Bracket Stencil

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The following page contains the stencil of the AP150 mounting bracket. It should be printed at 100% scale to ensure correct dimensions.

AP150 Mounting Bracket Stencil





## **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.

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- 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.
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- 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.

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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](mailto: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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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:

Meru Networks Inc.,  
1309 South Mary Avenue, Sunnyvale, CA 94087, USA  
Tel: 408-215-5300  
Fax: 408-215-5301  
Email: [support@merunetworks.com](mailto:support@merunetworks.com)



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