Fortinet AP433

Installation Guide

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Support

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1 About this Guide

This guide provides installation instructions for the Fortinet AP433 Series Access Points. The term “access point” is used interchangeably throughout this document to apply to any model when there are no differences among the models.

Audience

This guide is intended for anyone installing Fortinet Wireless LAN System Access Points (APs).

Other Sources of Information

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

Fortinet Publications

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

Website Resources

For the first 90 days after you buy a Fortinet controller, you have access to online support. If you have a support contract, you have access for the length of the contract. See web site http:://support.merunetworks.com for information such as:

- Fortinet System Director Release Notes

- Knowledge Base (Q&A)
- Customer Discussion Forum (URL:http:://support.merunetworks.com)
- Fortinet System Director Getting Started Guide
- Fortinet Controller Installation Guide
- Fortinet System Director Configuration Guide
- Fortinet System Director Command Reference

External Reference

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

Typographic Conventions

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

	Provides extra information, tips, and hints regarding the topic
	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.
	Dentifies critical information about actions that could result in equipment failure or bodily harm.

Contacting Fortinet

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

http://www.merunetworks.com

Customer Services and Support

For assistance, contact Fortinet Customer Services and Support 24 hours a day at +1-888-637-8952) or +1-408-215-5305. Email can be sent to csm@fortinet.com.

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

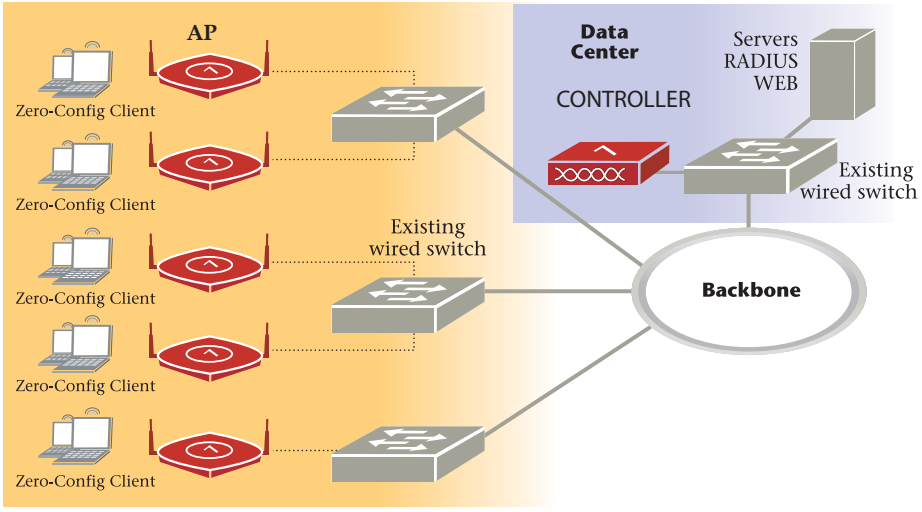
Please have the following available when making a call:

- Company and contact information
- Equipment model and serial numbers
- Software release and revision numbers (for example, SD 6.0SR2)
- A description of the symptoms the problem is manifesting
- Network configuration

2 AP433 Series

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

Figure 1: *Wireless LAN Connected to Network*



The AP400 Access Point series delivers high performance, full-speed, Wi-Fi certified 802.11n connectivity while simultaneously supporting legacy 802.11a/b/g devices. It is particularly suited to deployments that make use of voice or video wireless applications. The AP400 is available in the configurations shown below.

AP433 Series Configurations

TABLE 1: *AP433 Series Configuration Table*

Model	Configuration
AP433e	Three dual-band IEEE Std 802.11n radios with 3x3:3SS MIMO and external antennas
AP433i	Three dual-band IEEE Std 802.11n radios with 3x3:3SS MIMO and internal antennas
AP433is	Two dual-band IEEE Std 802.11n radios with 3x3:3SS MIMO and a spectrum radio with internal antennas
OAP433e	Three dual-band IEEE Std 802.11n radios (two with 3x3:3SS MIMO, one with 2x2:2SS MIMO) and external antennas (purchased separately)

Features for AP433 Series

Features for the AP433 Series include

- Up to three IEEE Std 802.11n-capable wireless radios with no licensing requirement
- IEEE Std 802.11n support with channel bonding in both 2.4GHz and 5 GHz frequency bands' channel bonding combines two 20MHz channels into a single-wide 40MHz channel for increased throughput
- Plug and Play deployment using centralized controller platforms.
- Multi-layered security including standard WPA2, IEEE Std 802.11i security (such as automatic traffic inspection)
- Each of these Access points may be powered by a standard IEEE Std 802.3af or IEEE Std 802.3at PoE device. However, in order to utilize all three radios in 3x3:3SS operation, IEEE Std 802.3at-complied PoE sources are required
- Air Traffic Control technology for IEEE Std 802.11n devices and legacy a/b/g devices
- Support for 3x3 MIMO with 3 transmits and 3 receives. Delivering three spatial streams
- Channel span architecture which requires no channel planning or configuration

Figure 2: *AP433e*

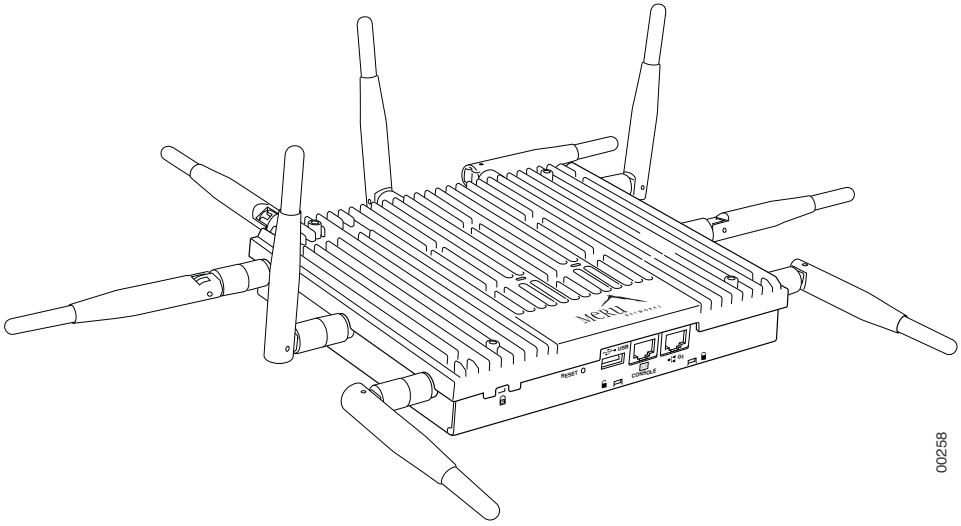


Figure 3: *AP433i/is*

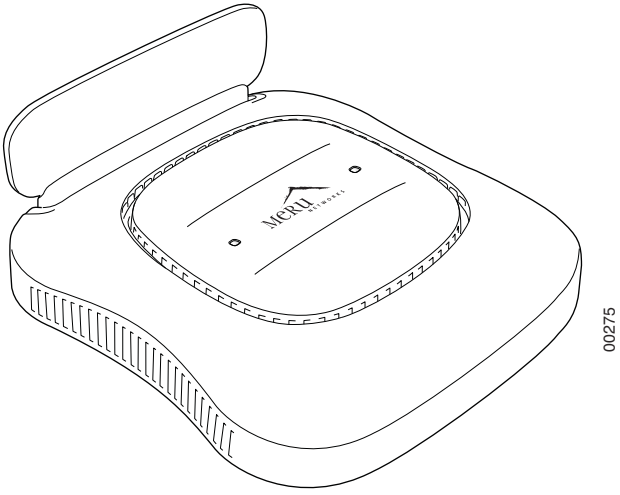
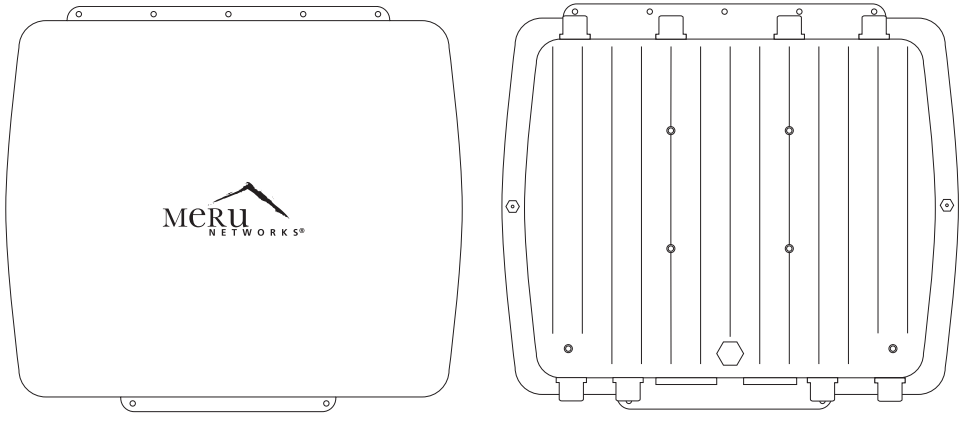


Figure 4: *OAP433e Outdoor Access Point (top and bottom)*



3 Installing AP433i

AP433i is supported by System Director versions 5.1 and greater. This chapter describes how to install and configure an AP433i or AP433is. It contains the following sections:

This document depicts installation procedures for the AP433i and 433is models. Since both devices are externally identical, the same procedures can be used for either device.

Safety Precautions

IMPORTANT—Read and follow the regulatory instructions in Appendix G before installing and operating this product.

If an optional power supply is used, it must be one supplied by Fortinet.

The AP433i 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.

Unpack the AP433i

Confirm that the shipping box contains the following:

- AP433i
- Plastic attachment (used when paddle antenna is disconnected)
- Wall mounting bracket
- Rubber feet
- Locking pin
- Two mounting screws

Determine Power Requirements

Power requirements vary, depending on which AP433i radios are deployed and what MIMO mode is used. See the chart below for supported power sources for different radio configurations.

Power Source	Radios Supported
802.3af	Radios 0 and 1
802.3at	Radios 0, 1, and 2

802.3af PoE Usage

When using System Director 5.0 (or later) and 802.3af PoE, Fortinet only supports two radios (radio 0 and 1). This is because three radios using an 802.3af switch may not have enough power to operate properly. When using an 802.af PoE, Fortinet supports single or dual radios utilizing up to 3 antennas each.

802.3at PoE Usage

When using System Director 5.0 (or later) and 802.3at, all possible configurations are supported (all three radios utilizing up to 3 antennas each). For a list of supported PoEs, see the appendix *"Supported Power Over Ethernet Devices for APs"* ***on page 103***.

Installation Requirements

An array of holes on the mounting bracket allows the AP433i to be mounted on the wall and over junction boxes or molly bolts. There are holes for passing the PoE Ethernet or external power supply cable through the bracket if the bracket is mounted on a junction box.

The AP433i has a security cable slot so you can lock the AP433i with a standard security cable, such as those used to secure laptop computers.

Purchase optional mounting kits to mount the AP433i either from the ceiling or inside an enclosure:

- Above Suspended Ceiling Mounting Kit (T-Bar Hanger): MNT-SCRMKIT-01

To complete AP433i installation, you need the items listed below.

Installation Type	Items Required
Horizontal mounting	None
Vertical mounting over a wall stud	• Four #6 x 2" wood screws for a wood stud; or • Four #6 x 1½" metal screws for a metal stud • Mounting bracket
Vertical mounting on sheetrock	• Four #6 x 1" screws • Four #4-6 x 7/8" ribbed plastic wall anchors • Mounting bracket
Horizontal mounting below a hanging ceiling	None
Mounting above a ceiling tile	Mounting bracket MNT-SCRMKIT-01

Additional Equipment

A power source is needed to power the AP433i. See *"Determine Power Requirements"* ***on page 20***.

Installing AP433i

Select a Location

All AP433i interconnected equipment must be contained within the same building, including the interconnected equipment's associated LAN connection. Ceiling mounting is recommended but wall mounting is also supported. In addition, the AP433i should be mounted in a location that meets the following conditions:

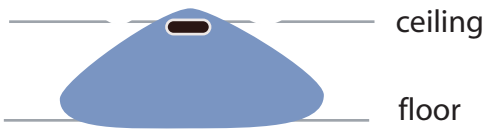
- Relatively unobstructed access to the stations the AP serves. Select a location with minimal physical obstructions between the AP and the wireless stations. In an office with cubicles, mounting the APs below a hanging ceiling (plenum is supported) or the wall near the ceiling

provides the least obstructed communications path. On a wall, orient the AP433i horizontally so that you can read the Fortinet logo without tilting your head at 90 degrees - this orientation provides optimum MIMO performance.

- We recommend planning for about 50 clients per radio (or per interference region) if you plan to use Virtual Port and plan to have phones as clients. For a data-only installation, plan up to 128 clients per radio, meaning 384 for AP433i. Refer to the Fortinet Deployment Guides on the support site for more information.
- Access to wall outlet or a to a Power over Ethernet (PoE) connection to the network switch servicing the controller.

AP433i is designed to provide 180 degree omni-directional coverage as illustrated below. Plan placement with this pattern in mind.

Figure 5: *Coverage Pattern for AP433i When Ceiling Mounted*



Most installations receive the best coverage using the following guidelines:

- Install APs toward the center of the building.
- Place APs about 80 feet apart.
- Do not install APs near metal objects, such as heating ducts, metal doors, or electric service panels.

AP433is Operating Band Configuration

Due to the spectrum scanning capability implemented in the AP433is models, users must ensure that the three radios provided by the AP are configured to specific bands and channels for optimal operation.

Install the Access Point

AP433i ships with a mounting bracket included in the box. This bracket is intended for installation as a wall-mount; for mounting on a ceiling, no bracket is typically required. See the following sections for more specific details.

Mount AP433i in any of the following ways:

- *"Mount AP433i Horizontally on a Shelf"* ***on page 23***
- *"Mount AP433i Vertically on a Wall"* ***on page 23***

- *"Mount AP433i Below a Suspended Ceiling"* ***on page 26***
- *"Mount AP433i Above a Suspended Ceiling"* ***on page 28***

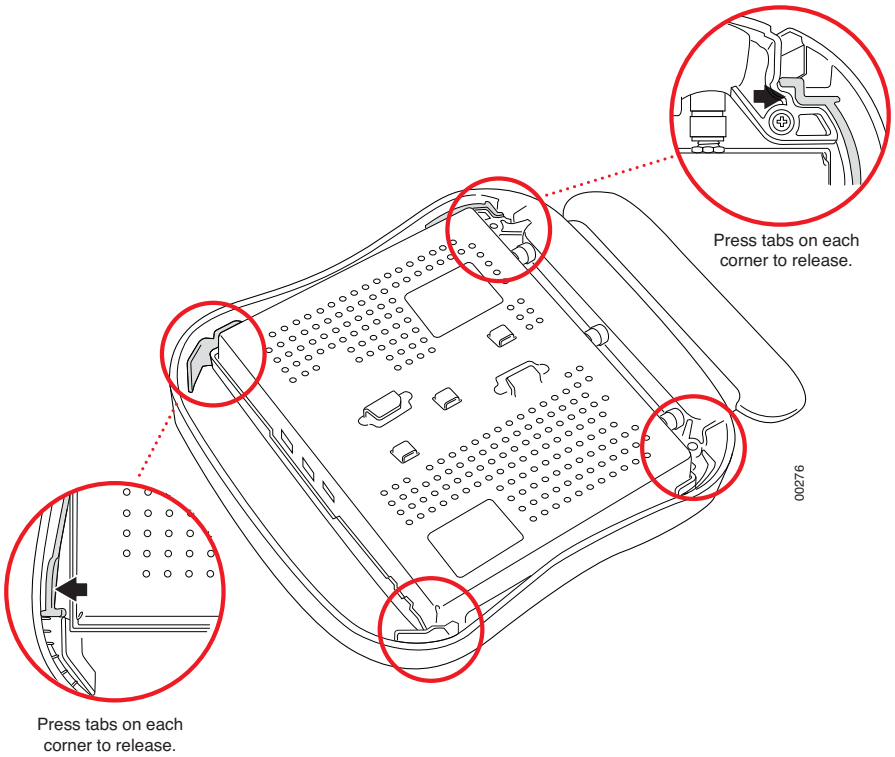
Mount AP433i Horizontally on a Shelf

When mounting an AP433i horizontally, no mounting bracket is required. Be sure to position the paddle antenna vertically when an AP433i sits on a surface. In order to ensure that the AP433i does not shift much, attach the rubber feet provided in the box to the bottom of the AP.

Mount AP433i Vertically on a Wall

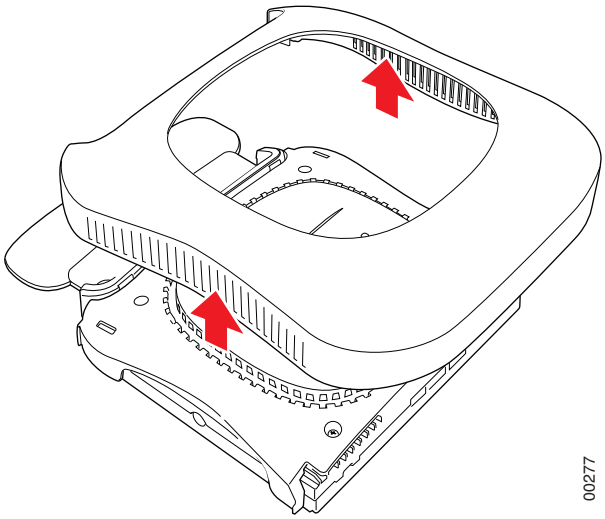
Prior to installing the mounting bracket, it is recommended that users remove the protective plastic shell from the AP. This makes it easier to properly lock the device in place once it is mounted. To remove the shell, flip the AP upside-down and release the four locking clips from the AP itself, as indicated in *Figure 6 on* ***page 23***.

Figure 6: *AP433i Shell Clip Locations*



After unclipping the shell, it is a simple matter to lift it off of the main AP. See *Figure 7 on **page 24***.

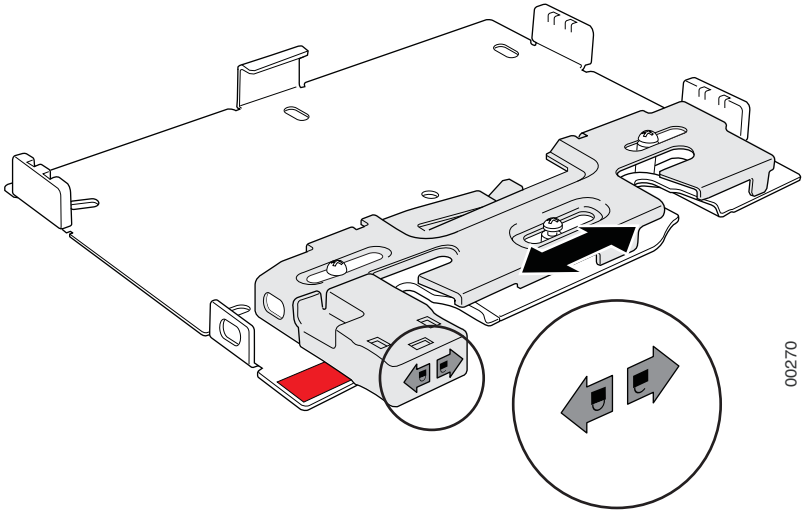
Figure 7: *Removing the AP433i Shell*



You are now ready to proceed with the wall mounting procedure.

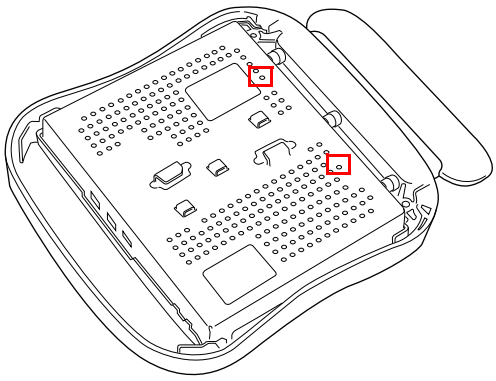
To mount an AP433i on a wall, use the provided mounting bracket, as shown in *Figure 8 on **page 24***.

Figure 8: *AP433i Wall Mounting Bracket*



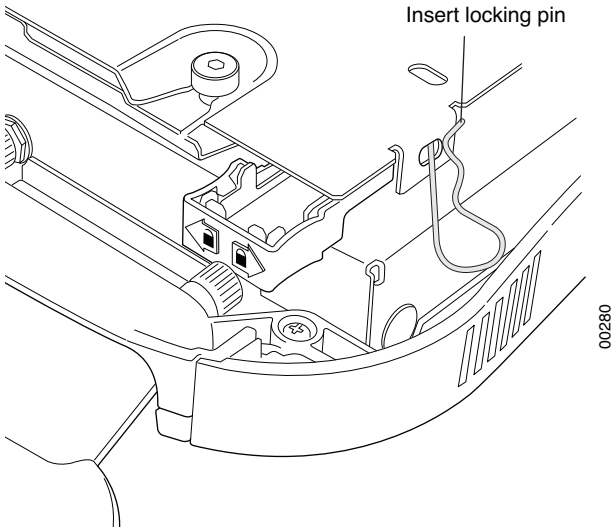
1. Place the mounting bracket against the wall with the sliding lock mechanism facing upwards. The Quick Reference Installation instructions on the bracket should be visible.
2. Using the holes on the mounting bracket itself as a guide, mark the location on the wall for the AP bracket mounting screws. If possible, center the mounting screws on a wall stud. (If mounting on a wall stud is impossible, use plastic wall anchors on the remaining screws.)
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. Line the bracket up with the holes and screw in the screws.
6. Attach the mounting screws to the underside of the AP433i in the holes provided (indicated in *Figure 9 on* ***page 25***).

Figure 9: *AP Mounting Screw Holes*



7. Orient the AP433i horizontally so that you can read the Fortinet logo and the Console and network ports are pointed downwards - this orientation provides optimum MIMO performance.
8. Align the mounting screws on the back of the AP433i with the corresponding holes on the mounting bracket.
9. Slide the AP433i downwards until the screws click into the holes. They should seat fairly firmly.
10. Slide the mounting bracket's locking bar to the right, locking the AP in place.
11. If desired, use the provided clip to lock the bracket shut by sliding it through the aligned holes on the right-hand side of the bracket.

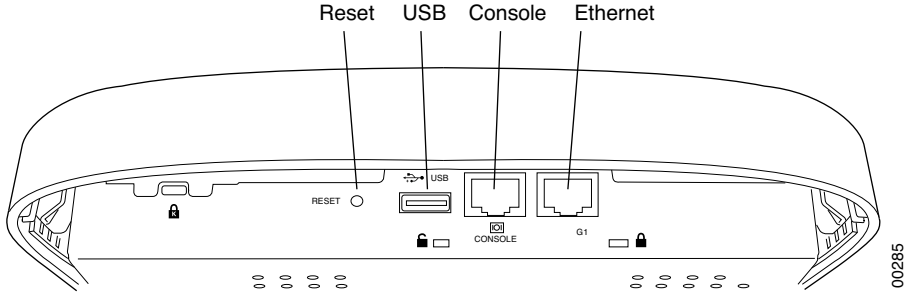
Figure 10: *Locking the AP in Place*



12. Connect one end of the Ethernet cable to the switch and the other end to the AP433i Ethernet port.

⚠	Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this, the AP won't power up.

Figure 11: *Ports for the AP433i*

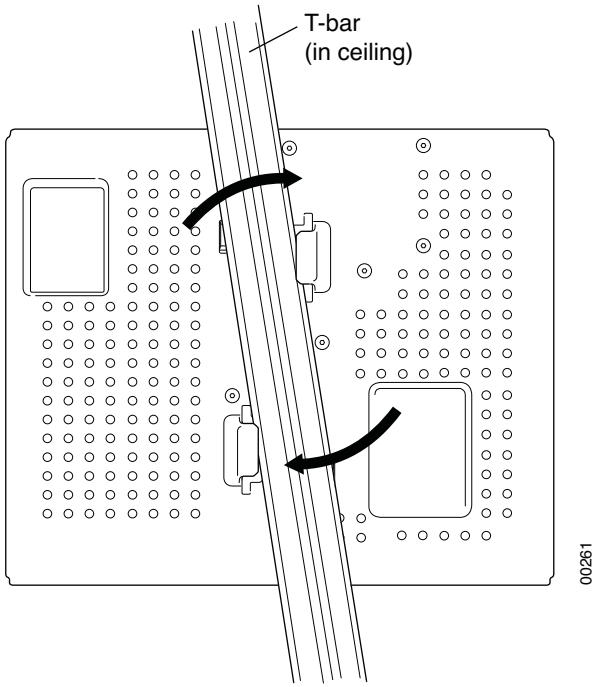


Mount AP433i Below a Suspended Ceiling

The brackets on the bottom of the AP433i allow it to be mounted directly to a ceiling T-bar (see *Figure 12 on* ***page 27***). Note that the AP lock must be **disabled** by sliding the locking key (pro-

vided in the box) into the **unlock** hole on the side of the AP shown in *Figure 11 on* ***page 26*** in order to clip the AP in place.

Figure 12: *Mounting AP433i to a Suspended Ceiling Rail*

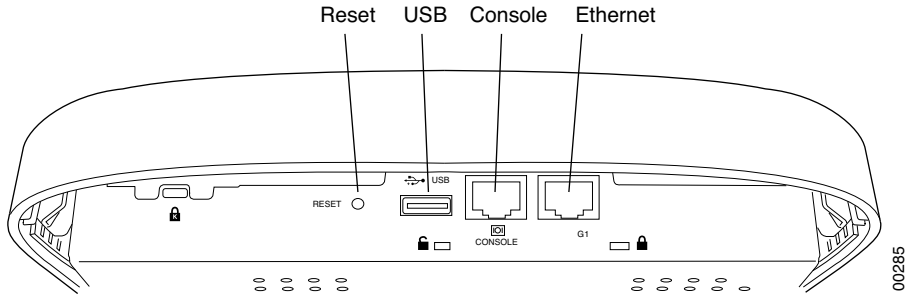


To mount an AP433i below a suspended ceiling:

1. Determine the location on the ceiling rail where the AP will be mounted and remove the ceiling tiles.
2. Verify that the AP is **unlocked** using the locking key on the unlock mechanism (on the same side as the Ethernet ports).
3. Press the AP433i against the T-bar at a slight angle and then rotate into place, as indicated in *Figure 12 on* ***page 27***. You should hear it snap in place.
4. Connect one end of the PoE Ethernet cable to the AP's Ethernet port (see *Figure 13 on* ***page 28***).

⚠	Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this. the AP won't power up.

Figure 13: *Ports for the AP433i*



Mount AP433i Above a Suspended Ceiling

Use the optional T-bar box hanger mounting kit to mount the AP433i above suspended ceiling T-rails (see *Figure 15 on* ***page 29***). The installation attaches the T-bar box hanger to the ceiling rails and then the AP433i attaches to the T-bar box hanger. Note that an AP433i mounted above the ceiling has about 2-3 dBm less RF coverage than an AP433i mounted under the ceiling.

You may need to modify thicker tiles to support this installation.

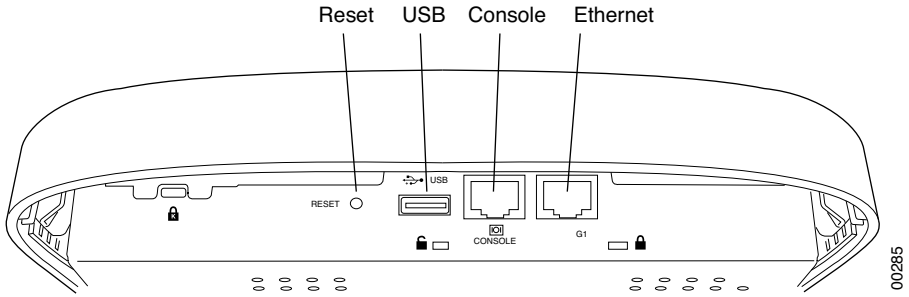
	The AP433i is not plenum rated and as such should only be installed in non-plenum airspace.

	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). 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.

To mount an AP433i above the ceiling with the optional T-bar kit, follow these steps:

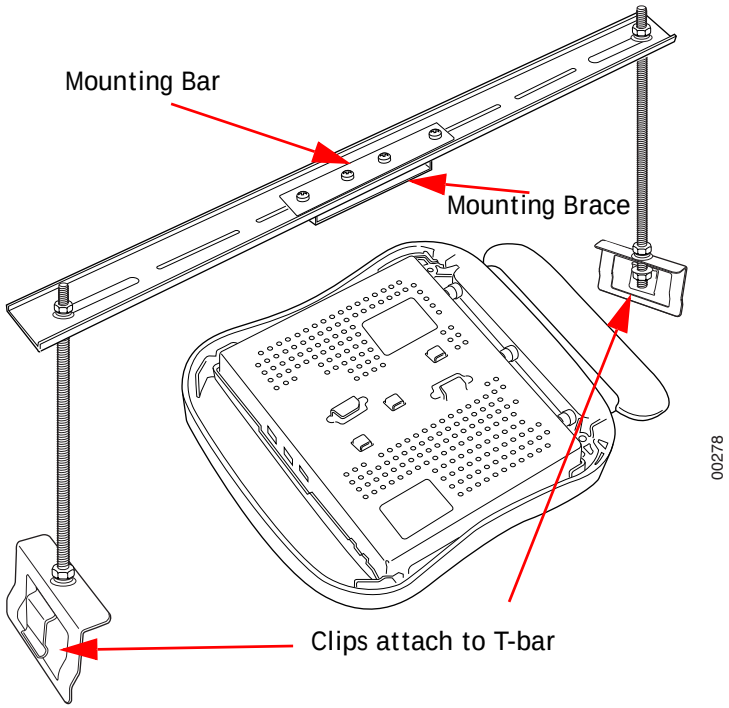
1. Determine the location on the ceiling rails where the AP will be mounted and remove the ceiling tile.
2. Unpack the T-bar hanger kit.
3. Unlock the AP by sliding the locking key into the small hole with an unlocked image above it.

Figure 14: *Ports for the AP433i*



4. Attach the square bracket to the underside of the main support bar using the screws provided, as shown in *Figure 15 on* ***page 29***.

Figure 15: *AP433i Mounted Above a Suspended Ceiling Face Down*



5. Brace your hand against the back of the main support bar and press the AP433i against the square bracket in a similar manner to that indicated in *Figure 12 on* ***page 27***.
6. Twist until the AP433i clicks into place. If desired, you can now lock the AP using the locking key.
7. Attach the two legs of the mounting bracket to the T-bars on which the AP is to be mounted by sliding the clips onto the bars.

8. Align the antenna in a vertical position, so that it is perpendicular to the AP itself.
9. Remove a nut from each leg and slide the crossbar (with the AP attached) in place on top of the legs.
10. Replace the two nuts, locking the bar in place.
11. Connect one end of the PoE Ethernet cable to the Ethernet connector.

	Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this. the AP won't power up.

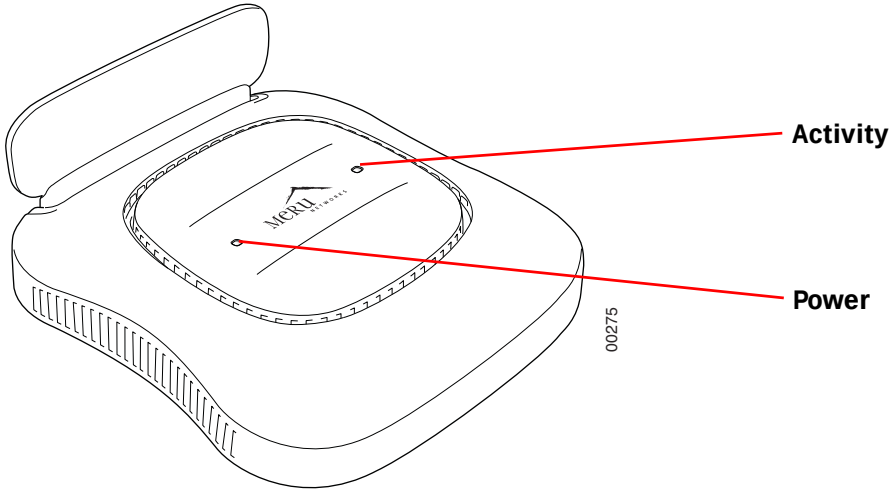
	Use a shielded Cat 5e (or greater) Ethernet cable in order to comply with international electromagnetic emissions limits.

12. Check that the AP433i is operating correctly before replacing the ceiling tile. Verify correct operating using the LEDs, as shown in *"Check AP433i LED Activity"* ***on page 30***.

Check AP433i LED Activity

When AP433i first connects to the controller (and any time the access point is rebooted), the AP initializes and then is programmed by the controller. When the AP first powers up, all LEDs are green. Thereafter, the Status LED color reflects the various operating states.

Figure 16: *AP433i Status LEDs*



After the AP433i is connected, check the status of the LEDs. The functions of the LEDs are described below.

AP433i LED Descriptions

LED	Function	Troubleshooting
Power	off—no power green—presence of power	
Status	off—no power green—booting stage 1 blinking green and off—booting stage 2 blinking green and white—discovering the controller blinking green and blue—downloading a configuration from the controller blinking blue and off—AP is online and enabled, working state blinking red and yellow—failure; consult controller for alarm state	If the status LED is blinking red and yellow, there is an alarm on the AP. Determine what the alarm is by clicking **Monitor > Dashboard > Alarms** and looking at the AP alarms. You can also use the CLI commands **show alarm** and **show log**.

Change LED Appearance

If you want to change the appearance of the LEDS, follow these steps:

1. From the controller, click **Configuration > Devices > AP**, and then select the AP.
2. Select one of these settings for the LED Mode setting:
   - **Normal:** LEDs are as described above
   - **Blink:** Sets all LEDs flashing; this is useful to locate an AP
   - **Dark:** Turns off all LEDs
3. Click **OK**.

Where to Go From Here

Now that the AP433i is installed, go to the ***Meru System Director Getting Started Guide*** for instructions on initializing the hardware. Return to this chapter to check the status of the LEDs once the WLAN is operational.

4 Installing AP433e

This chapter describes how to install and configure an AP433e, which is supported on System Director versions 6.0-SR1 and later. It contains the following sections:

Safety Precautions

IMPORTANT—Read and follow the regulatory instructions in Appendix G before installing and operating this product.

The AP433e is intended only for installation in Environment A as defined in IEEE 802.3af and 802.3at. All interconnected equipments must be contained within the same building, including the interconnected equipment's associated LAN connection.

Unpack the AP433e

Confirm that the AP433e shipping package contains these items:

- AP433e
- Nine (9) external antennas
- Wall mounting bracket
- Rubber feet
- Locking pin

- Two mounting screws

Determine Power Requirements

Power requirements vary, depending on which AP433e radios are deployed and what MIMO mode is used. See the chart below for supported power sources for different radio configurations.

TABLE 2: *Power Source & Radio Supported in AP433*

Power Source	Radios Supported
802.3af	Radio 1 and Radio 2
802.3at	Radios 1, 2 and 3

802.3af PoE Usage

When using System Director V6.0 SR2 (or earlier Version) and an IEEE Std 802.3af PoE power source, Fortinet only supports two radios (radio 1 and 2).

This is because three radios using an IEEE Std 802.3af switch/PoE injector may not have enough power to operate properly. When using an 802.af PoE, Fortinet supports single or dual radios utilizing up to 3 antennas each.

802.3at PoE Usage

When using System Director V6.0 SR2 (or earlier version) and an IEEE Std 802.3at, all possible configurations are supported (all three radios utilizing up to 3 antennas each).

Installation Requirements

An array of holes on the mounting bracket allows the AP433e to be mounted on the wall and over junction boxes or molly bolts. There are holes for passing the PoE Ethernet or external power supply cable through the bracket if the bracket is mounted on a junction box.

The AP433e has a security cable slot so you can lock the AP433e with a standard security cable, such as those used to secure laptop computers.

Purchase optional mounting kits to mount the AP433e either from the ceiling or inside an enclosure:

- Above Suspended Ceiling Mounting Kit (T-Bar Hanger): MNT-SCRMKIT-01
- Above hanging ceiling tiles. 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.

To complete AP433e installation, you need the items listed below.

TABLE 3: *AP433e Installation Requirements:*

Installation Type	Items Required
Horizontal mounting	None
Vertical mounting over a wall stud	• Four #6 x 2" wood screws for a wood stud; or • Four #6 x 1½" metal screws for a metal stud • Mounting bracket
Vertical mounting on sheetrock	• Four #6 x 1" screws • Four #4-6 x 7/8" ribbed plastic wall anchors • Mounting bracket
Horizontal mounting below a hanging ceiling	None
Mounting above a ceiling tile	Mounting bracket MNT-SCRMKIT

Additional Equipment

A power source is needed to power the AP433e. See *"Determine Power Requirements"* ***on page 34***.

Install the AP433e

This section describes how to install an AP433e, which is supported on System Director Version 6.0-SR1 and later. It contains the following subjects,

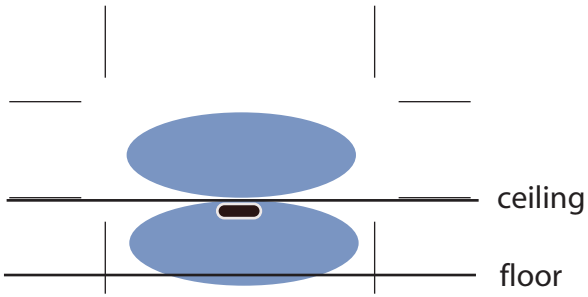
Select a Location

All AP433e interconnected equipment, including the associated LAN connection, must be contained within the same building. In addition, the AP433e location should meet the following conditions:

- Relatively unobstructed access to the stations the AP serves. 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 (plenum is supported) or the wall near the ceiling provides the least obstructed communications path. On a wall, orient the AP433e horizontally so that you can read the Fortinet logo without tilting your head at 90 degrees - this orientation provides optimum MIMO performance.
- Fortinet recommends planning for about 50 clients per radio (or per interference region) if you plan to use Virtual Port and plan to have phones as clients. Refer to the Fortinet Deployment Guides on the support site for more information.

AP433e is designed to provide 360 degree omni-directional coverage as illustrated below. Plan placement with this pattern in mind.

Figure 17: *Coverage Pattern for AP433e When Ceiling Mounted*



Most installations receive the best coverage using the following guidelines:

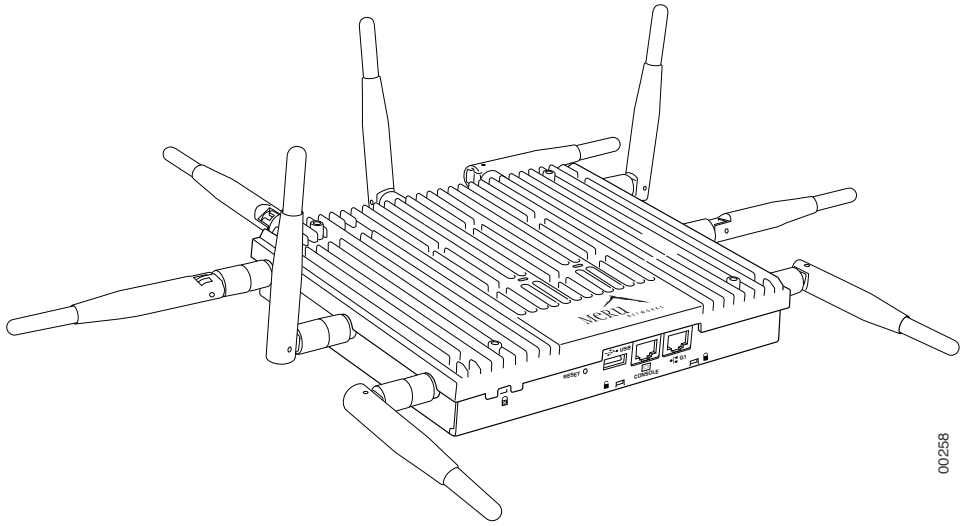
- Install APs toward the center of the building.
- Place APs about 80 feet apart.
- Do not install APs near metal objects, such as heating ducts, metal doors, or electric service panels.
- For best coverage, orient antennas as shown in *Figure 18 on* ***page 37***.

Attach the Provided Antennas

All AP433es have nine external antenna ports, labeled A1 - A9. These units operate with nine antennas attached, even though some configurations don't use all nine. Instead of attaching an antenna, you can cap unused antenna connectors with 50 ohm Reverse Polarity SMA ter-

minators. (For a list of approved terminators, see http://support.merunetworks.com/.) Fortinet - supplied antennas are suitable only for indoor use. To achieve the best performance in a high density environment, position the antennas at a 90 degree angles relative to each other as shown in Figure 6, AP433e Antennas in Ceiling and Wall-mount Configuration. (The antennas do not have to be oriented exactly as shown in the figure, but it is important to maintain the relative angles.) If for some reason you are unable to maintain those angles, the network will still operate, but you may experience up to a 20% drop in throughput depending on the antenna orientation.

Figure 18: *AP433e Antennas in Ceiling and Wall Mount Configuration*



Do not leave any antenna connectors opened. All connectors on the AP must be terminated with antennas or with 50 ohm Reverse Polarity SMA terminators.

The attached antennas must be the same model; if you replace one antenna with a different type, replace them all.

AP433e Antenna Port-Radio Mapping

TABLE 4: *AP433e Antenna Port-Radio Mapping*

Antenna	Radio (Stream ID)
A1	Radio 1 (first stream)
A2	Radio 1 (second stream)
A3	Radio 1 (third stream)
A4	Radio 2 (first stream)
A5	Radio 2 (second stream)
A6	Radio 2 (third stream)
A7	Radio 3 (first stream)
A8	Radio 3 (second stream)
A9	Radio 3 (third stream)

Install the Access Point AP433e

AP433e ships with a mounting bracket included in the box. This bracket is intended for installation as a wall-mount; for mounting on a ceiling, no mount is typically required. See the following subjects for more specific details.

- *"Mount AP433e Horizontally on a Shelf"* ***on page 38***
- *"Mount AP433e Vertically on a Wall"* ***on page 38***
- *"Mount AP433e Below a Suspended Ceiling"* ***on page 41***
- *"Mount AP433e Above a Suspended Ceiling (Plenum)"* ***on page 42***

Mount AP433e Horizontally on a Shelf

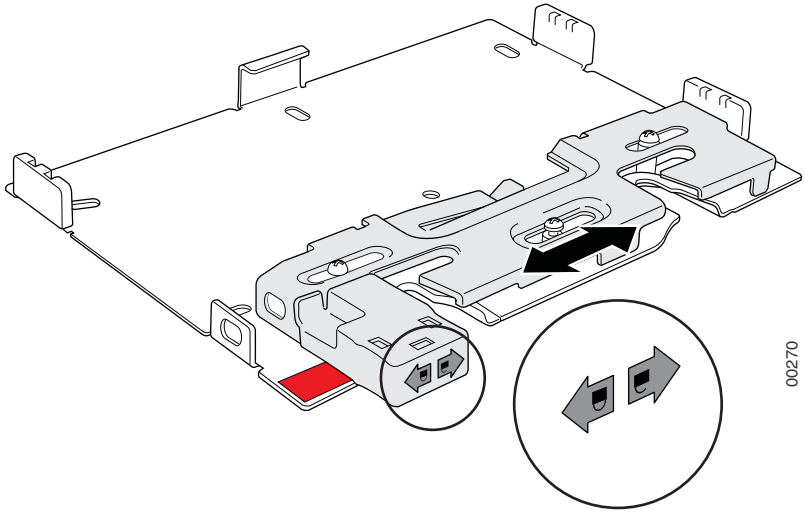
When mounting an AP433e horizontally, no mounting bracket is required. Be sure to position the antennas vertically when an AP433e sits on a surface. In order to ensure that the AP433e does not shift much, attach the rubber feet provided in the box to the bottom of the AP.

Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this, the AP won't power up.

Mount AP433e Vertically on a Wall

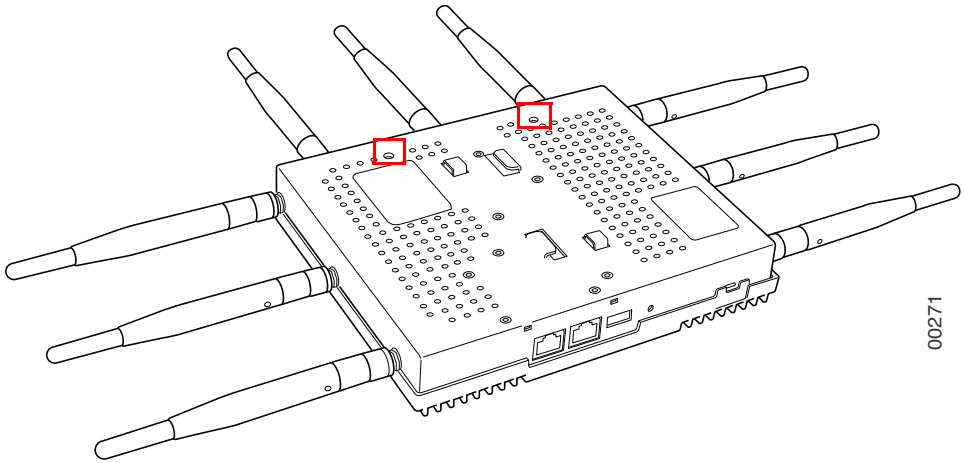
To mount an AP433e on a wall, use the provided mounting bracket, as shown in *Figure 19 on* ***page 39***.

Figure 19: *AP433e Wall Mounting Bracket*



1. Place the mounting bracket against the wall with the sliding lock mechanism facing upwards. The Quick Reference Installation instructions on the bracket should be visible.
2. Using the holes on the mounting bracket itself as a guide, mark the location on the wall for the AP bracket mounting screws. If possible, center the mounting screws on a wall stud. (If mounting on a wall stud is impossible, use plastic wall anchors on the remaining screws.)
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. Line the bracket up with the holes and screw in the screws.
6. Attach the mounting screws to the underside of the AP433e in the holes provided (indicated in *Figure 20 on* ***page 40***).

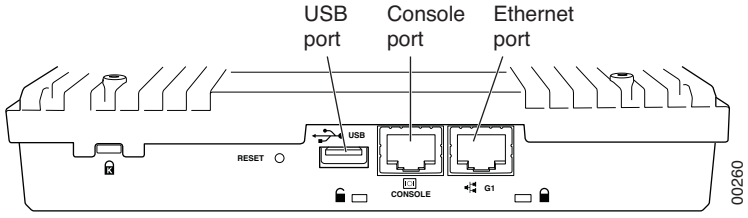
Figure 20: *AP Mounting Screw Holes*



7. Orient the AP433e horizontally so that you can read the Fortinet logo and the Console and network ports are pointed downwards - this orientation provides optimum MIMO performance.
8. Align the mounting screws on the back of the AP433e with the corresponding holes on the mounting bracket.
9. Slide the AP433e downwards until the screws click into the holes. They should seat fairly firmly.
10. Slide the mounting bracket's locking bar to the right, locking the AP in place.
11. If desired, use the provided clip to lock the bracket shut by sliding it through the aligned holes on the right-hand side of the bracket.
12. Attach the antennas to the AP.
13. Connect one end of the Ethernet cable to the switch and the other end to the AP433e Ethernet port. See *Figure 21 on* ***page 40***.

Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this, the AP won't power up.

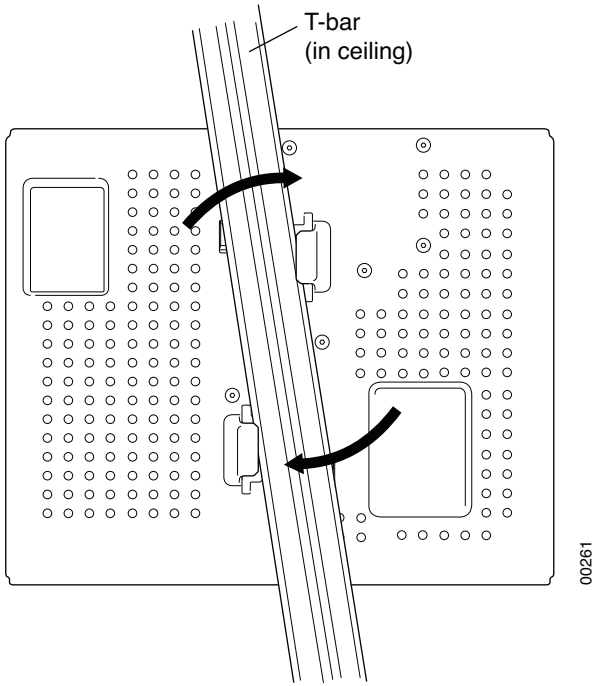
Figure 21: *IO Port of AP433e*



Mount AP433e Below a Suspended Ceiling

The brackets on the bottom of the AP433e allow it to be mounted directly to a ceiling T-bar (see *Figure 22 on* ***page 41***). Note that the AP lock must be **disabled** by sliding the locking key (provided in the box) into the **unlock** hole on the side of the AP shown in *Figure 21 on* ***page 40*** in order to clip the AP in place.

Figure 22: *Mounting AP433e to a Suspended Ceiling Rail*



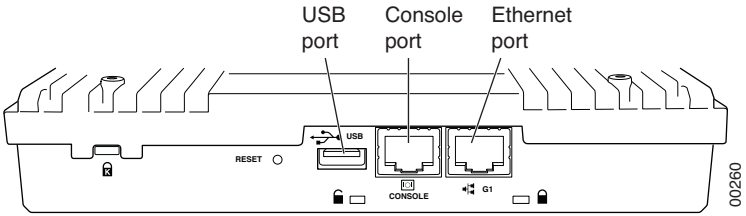
To mount an AP433e below a suspended ceiling:

1. Determine the location on the ceiling rail where the AP will be mounted and remove the ceiling tiles.
2. Verify that the AP is **unlocked** using the locking key on the unlock mechanism (on the same side as the Ethernet ports). **See Figure 11, Unlock.**
3. Press the AP433e against the T-bar at a slight angle and then rotate into place, as indicated in *Figure 22 on* ***page 41***. You should hear it snap in place.
4. For each antenna, loosen the knurled ring at the base of the antenna, orient the antenna and then retighten the ring.

5. Connect one end of the Ethernet cable to the switch and the other end to the AP433e Ethernet port (see *Figure 23 on* ***page 42***).

Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this. the AP won't power up.

Figure 23: *Unlock*



Mount AP433e Above a Suspended Ceiling (Plenum)

Use the optional T-bar box hanger mounting kit to mount the AP433e above suspended ceiling T-rails (see *Figure 24 on* ***page 43***). The installation attaches the T-bar box hanger to the ceiling rails and then the AP433e attaches to the T-bar box hanger. Note that an AP433e mounted above the ceiling has about 2-3 dBm less RF coverage than an AP433e mounted under the ceiling.

The AP433e 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.

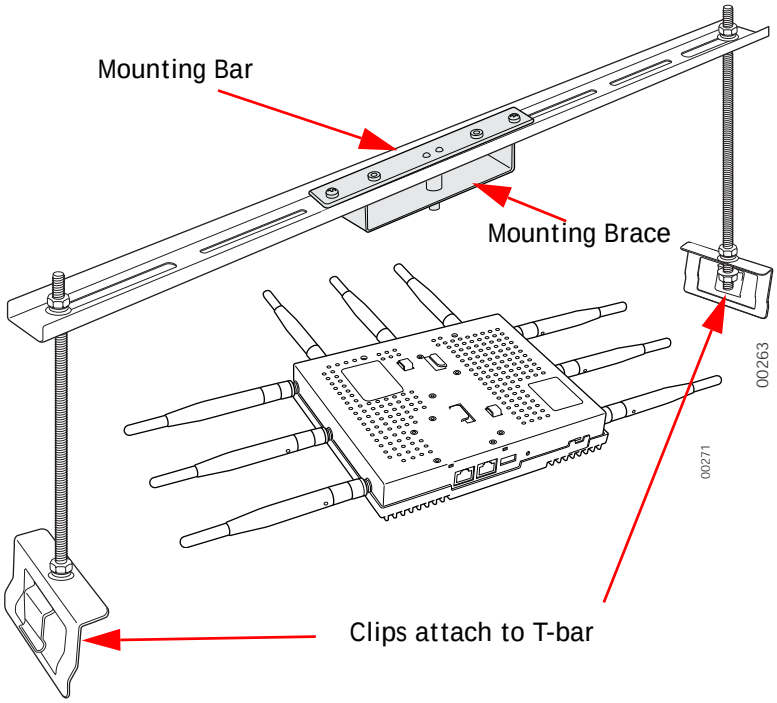
You may need to modify thicker tiles to support this installation.

Any Ethernet 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). 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.

To mount an AP433e above the ceiling with the optional T-bar kit, follow these steps:

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.
3. Unlock the AP by sliding the locking key into the small hole with an unlocked image above it. See *Figure 23 on* ***page 42***.
4. Attach the square bracket to the underside of the main support bar using the screws provided, as shown in *Figure 24 on* ***page 43***.

Figure 24: *AP433e Mounted Above a Suspended Ceiling Face Down*



5. Brace your hand against the back of the main support bar and press the AP433e against the square bracket in a similar manner to that indicated in *Figure 22 on* ***page 41***.
6. Twist until the AP433e clicks into place. If desired, you can now lock the AP using the locking key.
7. Attach the two legs of the mounting bracket to the T-bars on which the AP is to be mounted by sliding the clips onto the bars.
8. For each antenna, loosen the knurled ring at the base of the antenna, point the antenna down, then retighten the ring (or attach the antennas, if not already done).
9. Remove a nut from each leg and slide the crossbar (with the AP attached) in place on top of the legs.
10. Replace the two nuts, locking the bar in place.
11. Connect one end of the PoE Ethernet cable to the Ethernet connector.

⚠	Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this. the AP won't power up.

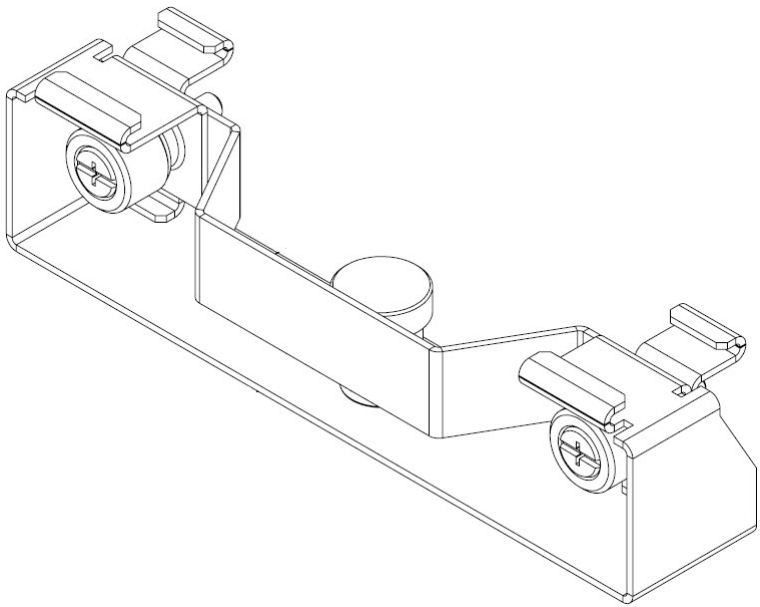
Use a shielded Cat 5 Ethernet cable in order to comply with international electromagnetic emissions limits.

12. Check that the AP433e is operating correctly before replacing the ceiling tile. Verify correct operating using the LEDs, as shown in *"Check AP433e LED Activity"* ***on page 46***.

Mount AP433e on a Dropped Ceiling Bevel Tile

The mounting procedure for a ceiling that has recessed supports and lowered tiles is similar to that of mounting on a suspended ceiling. However, this procedure requires a specialized mounting bracket (MNT-SCRMKIT-03), as shown in *Figure 25 on* ***page 44***.

Figure 25: *Dropped Bevel Tile Mounting Adapter (MNT - SCRMKIT - 03)*



1. Remove the ceiling tile alongside which the AP will be mounted.
2. Be sure that AP433e is not locked by inserting the locking key into the Unlock mechanism as shown in *Figure 23 on* ***page 42***.
3. Align the mounting bracket with the AP433e slots used for the ceiling t-bar in *"Mount AP433e Below a Suspended Ceiling"* ***on page 41***.
4. Press down on the tab indicated on the underside of the AP and twist the AP into place.
5. Push down on the thumbscrews provided on the mounting bracket and clip it to the ceiling bar that will support the AP.
6. Tighten the screws to ensure that the mechanism stays locked in place.

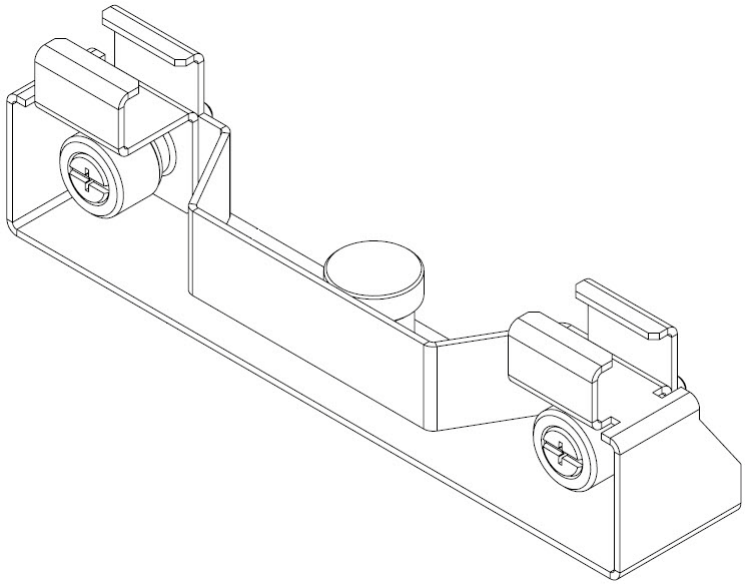
7. Connect one end of the CAT5 (or greater) Ethernet cable with PoE to the Ethernet connector shown in *Figure 2 on* ***page 44*** above.

⚠	Be sure to connect the Ethernet cable to the Ethernet port. The cable can mistakenly be plugged into the Console port; if you do this, the AP won't power up.

Mount AP433e on an Interlude T-Bar

The mounting procedure for a ceiling that has interlude T-Bar supports is similar to that of mounting on a suspended ceiling. However, this procedure requires a specialized mounting bracket (MNT-SCRMKIT-04), as depicted in *Figure 26 on* ***page 45***.

Figure 26: *T-Bar Mounting Adapter (MNT - SCRMKIT - 04)*



1. Remove the ceiling tile alongside which the AP will be mounted.
2. Be sure that AP433e is not locked by inserting the locking key into the Unlock mechanism as shown in *Figure 23 on* ***page 42***.
3. Align the mounting bracket with the AP433e slots used for the ceiling t-bar in *"Mount AP433e Below a Suspended Ceiling"* ***on page 41***.
4. Press down on the tab indicated on the underside of the AP and twist the AP into place.
5. Push down on the thumbscrews provided on the mounting bracket and clip it to the ceiling bar that will support the AP.
6. Tighten the screws to ensure that the mechanism stays locked in place.

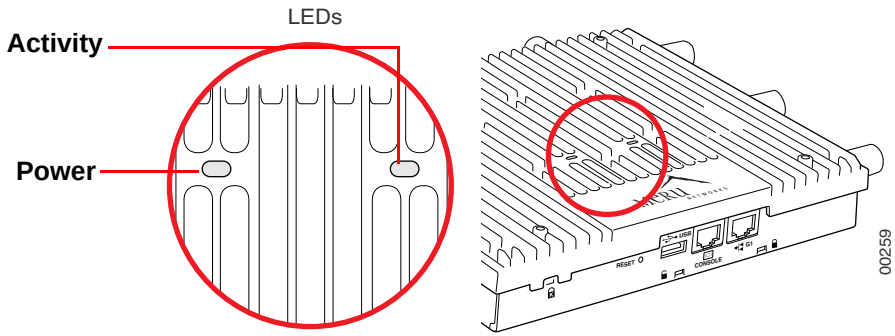
7. Connect one end of the CAT5 (or greater) Ethernet cable with PoE to the Ethernet connector shown in *Figure 23 on* ***page 42***.

⚠	Be sure to connect the Ethernet cable to the Ethernet port. The cable can mistakenly be plugged into the Console port; if you do this, the AP won't power up.

Check AP433e LED Activity

When AP433e first connects to the controller (and any time the access point is rebooted), the AP initializes and is then programmed by the controller. When the AP first powers up, all LEDs are green as in *Figure 27 on* ***page 46***.

Figure 27: *AP433e Status LEDs*



After the AP433e is connected, check the status of the LEDs. The functions of the LEDs are described below.

AP433e LED Descriptions

LED	Function	Troubleshooting
Power	off—no power green—presence of power	
Activity	off—no power green—booting stage 1 blinking green and off—booting stage 2 blinking green and white—discovering the controller blinking green and blue—downloading a configuration from the controller blinking blue and off—AP is online and enabled, working state blinking red and yellow—failure; consult controller for alarm state	If the status LED is blinking red and yellow, there is an alarm on the AP. Determine what the alarm is by clicking **Monitor > Dashboard > Alarms** and looking at the AP alarms. You can also use the CLI commands **show alarm** and **show log**.

Change LED Appearance

If you want to change the appearance of the LEDS, follow these steps:

1. From the controller, click **Configuration > Devices > AP**, and then select the AP.
2. Select one of these settings for the LED Mode setting:
   - **Normal:** LEDs are as described above
   - **Blink:** Sets all LEDs flashing; this is useful to locate an AP
   - **Dark:** Turns off all LEDs
3. Click **OK**.

Approved Antennas for AP433e

Only approved antennas may be used in conjunction with AP433e access points. 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.

Fortinet Part Number	Gain @ 2.4 GHz	Gain @ 5.x GHz	Description
ANT-ABGN23O-W	2.0	3.0	Default Antenna. Dual band Omni directional dipole antenna
ANT-6ABGN-24	2.5	4.0	Dual band ceiling mount Omni-directional 6-lead antenna
ANT-ABGN-0406-W	4.0	6.0	Dual band Omni-directional dipole antenna
ANT-ABGN-23	3.0	4.0	Dual band ceiling mount Omni directional 3-lead antenna
ANT-ABGN470	4.7	4.7	Dual band dipole Omni directional antenna
ANT-I3ABGN-0304-O	3.0	4.0	Dual band ceiling mount Omni directional 3-lead antenna
ANT-O6ABGN-0606-O	6.0	6.0	Dual band Omni directional 6-lead antenna
ANT-O6ABGN-0607-PT	6.0	7.0	Dual band wall mount patch 6-lead antenna

To deployment ANT-O6ABGN-0607-PT in MESH mode (point to point or point-to-multiple-points), user will need to decrease radio transmit power 0.3 dBm (TX) to meet regulatory requirements in 5 GHz band.

To deployment ANT-O6ABGN-0607-PT in a non-MESH mode (neither point to point nor point-to-multiple-points), user will need to decrease radio transmit power 0.3 dBm (TX) to meet regulatory requirements in 5 GHz band

Where to Go From Here

Now that the AP433e is installed, refer to the *System Director Getting Started Guide* for instructions on initializing the hardware. Return to this chapter to check the status of the LEDs once the WLAN is operational.

5 Installing OAP433e

This chapter describes how to physically install an OAP433e, which is supported on System Director Versions 6.0 SR2 and later. It contains the following sections:

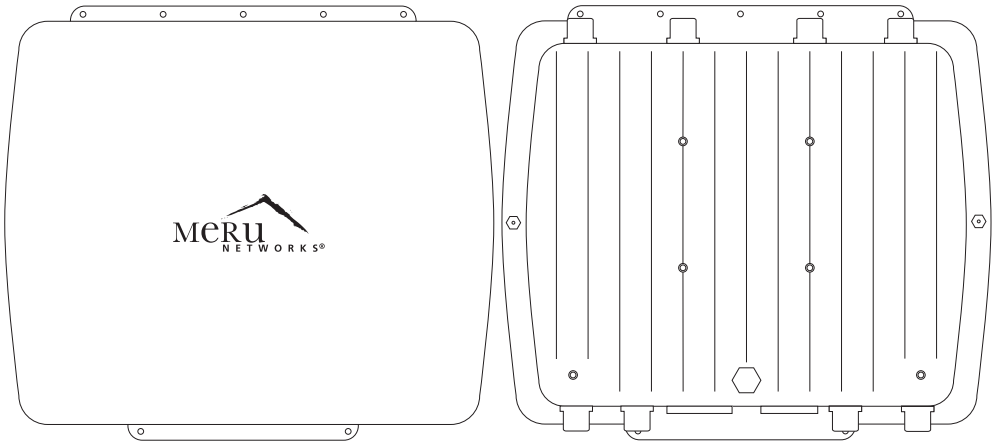
Please use the OAP433 series only with Listed ITE or equivalently-rated equipment.

Package Contents

Confirm that the OAP433e shipping boxes contain the following items:

- OAP433e Outdoor Access Point
- Water barrier for the Ethernet connection (when shipped, this is not connected to the AP)
- Wall/Pole Mount Hardware Kit for mounting OAP433e to a 2" to 3" diameter steel pole or tube or as part of a radio or tower structure (3 pieces)
- Screws and bolts for assembling the mounting bracket
- Drywall screws (for wall-mounted installation)
- Ground wire

Figure 28: *OAP433e Outdoor Access Point (top and bottom)*



Installation Requirements

In addition to the hardware supplied by Meru Networks, you need the following:

- Antennas (sold separately)
- RF coaxial cable to connect the antennas to the OAP433e
- Drill (if wall-mounting)
- Crescent wrench
- Outdoor CAT5 Ethernet cable—Cable type CMX
  - Size 22 (American Wire Gauge) with a 3.8mm gap
  - Size 24 (AWG) with a 3mm gap

The Ethernet cable must be run through the OAP433e's water-tight input port, which is provided in the package. This will ensure a waterproof seal around the connection. Follow the instructions listed later in this chapter to properly install the cable.

Power Requirements

The OAP433e does not ship with a power adapter, and as such, must be powered by a PoE device. In order to ensure that all three radios on the AP are active, it must be plugged into an 802.3at power source. If an 802.3af source is used, the third radio will be disabled due to insufficient power.

Assembling the Waterproof Ethernet Connector

The OAP433 ships with a separate Ethernet connector that must be disassembled in order to run a cable through it. Once tightened and connected to the AP itself, this connector will ensure a waterproof seal for the AP.

To run an Ethernet cable through the waterproof connector:

1. Unscrew the two main components of the connector.
2. Remove the insert from the larger portion of the connector. This should be a rubber casing surrounded by a plastic shell. Both the plastic shell and the rubber casing should have a slit along one side, allowing them to be opened up in order to insert the cable.
3. Prior to attaching the rubber casing to the cable, run the cable through the smaller portion of the original two-part enclosure. Be sure to run the cable through the smaller opening (at the top of the plastic component) so that the head of the cable goes towards the AP. (Note that this step can be done after the rest of the connector has been assembled, but it can be difficult to do so when deploying long cables, so it's best to do it here instead.)
4. Run the Ethernet cable through the slit in the rubber casing and ensure that the casing wraps firmly around the cable. The Ethernet connector at the end of the cable should be on the larger side of the rubber casing.
5. Replace the larger plastic component (the one that has threading on both ends) such that it fits around the rubber casing with the plastic shell. The portion of the component with a large rubber washer should be facing the end of the Ethernet cable (which will be connected to the AP).
6. Connect the Ethernet cable to the port on the AP and screw the plastic threading in place. This should be tightened firmly, but should not require excessive force.
7. Finally, screw the last plastic portion to the top of the threading. Again, tighten this firmly, but not excessively. The gap between the top cap and the base of the threading component should be 3mm when using a 24AWG cable or 3.8mm when using a 22AWG cable.

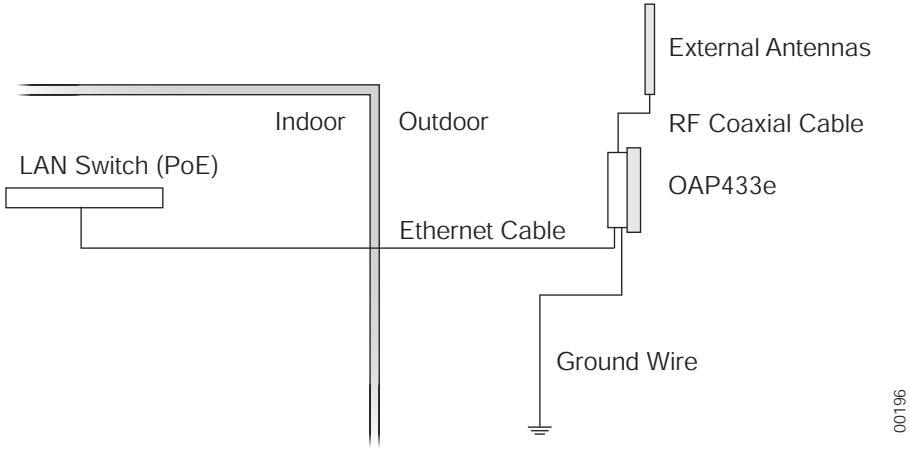
Now that the Ethernet cable connection has been fully assembled, the AP is ready to be deployed.

Installing the Access Point

Selecting a Location

When you plan the OAP433e physical configuration, include the elements shown in *Figure 29 on **page 52***

Figure 29: *Sample Physical Layout*



Radio Position Planning

Never construct a radio mast, pole, or tower near overhead power lines. In addition, local regulations may limit or prevent construction of a high radio mast or tower. If your OAP433e link requires a high radio mast or tower, consult a professional contractor for advice. Once the required antenna height has been determined, other factors affecting the precise position of the OAP433e must be considered.

- Be sure there are no other radio antennas within 2 m (6 ft.) of the OAP433e.
- Place the OAP433e away from power and telephone lines.
- Avoid placing the OAP433e too close to any metallic, reflective surfaces, such as roof-installed air-conditioning equipment, tinted windows, wire fences, or water pipes.

Radio Interference

Avoiding radio interference is an important part of wireless planning. Interference is caused by other radio transmissions using the same or an adjacent channel frequency. You should first scan your proposed site using a spectrum analyzer to determine if there are any strong radio signals using the 2.4 or 5 GHz spectrums. Always use a channel frequency that is furthest away from another signal on the spectrum.

Weather Conditions

Take into account any extreme weather conditions that are known to affect your location. Consider these factors:

- Temperature - The OAP433e is tested for normal operation in temperatures from - 40°F to 140°F. Operating in temperatures outside of this range may cause the unit to fail.
- Wind Velocity - The OAP433e can operate in winds up to 44 m/s and survive higher wind speeds up to 66 m/s. You must consider the known maximum wind velocity and direction at the site and be sure that any supporting structure, such as a pole, mast, or tower, is built to withstand this force.
- Lightning - You should make sure that the unit, any supporting structure, and cables are all properly grounded. Additional protection using lightning rods, lightning arrestors, or surge suppressors may also be employed in order to protect against lightning strikes on the antennas. Contact Fortinet Sales for more information regarding this equipment.
- Rain - The OAP433e is weatherproofed against rain. Also, prolonged heavy rain has no significant effect on the radio signal. However, it is recommended to apply weatherproof sealing tape around the Ethernet port and antenna connectors for extra protection. If moisture enters a connector, it may cause a degradation in performance or even a complete failure of the link.
- Snow and Ice - Falling snow, like rain, has no significant effect on the radio signal. However, a build up of snow or ice on antennas may cause the link to fail.In this case, the snow or ice has to be cleared from the antennas to restore operation of the link.

Ethernet Cabling

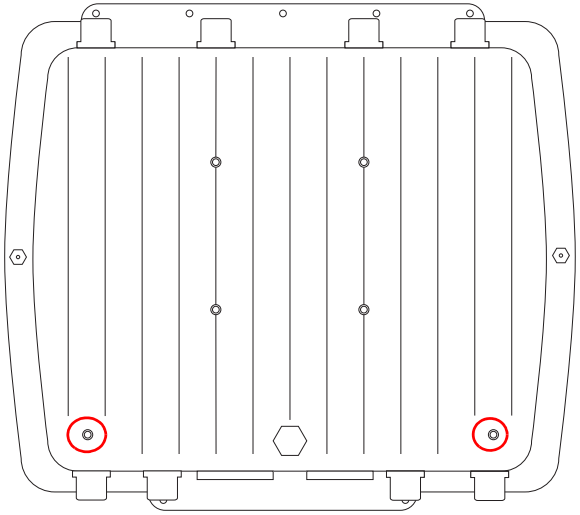
When a suitable antenna location has been determined, plan a cable route from the OAP433e outdoors to the PoE-enabled controller indoors. Consider these points:

- The Ethernet cable length should never be longer than 100 ft.
- Determine a building entry point for the cable.
- Determine if conduits, bracing, or other structures are required for safety or protection of the cable.
- For lightning protection at the controller end of the cable, consider using a lightning arrestor immediately before the cable enters the building.
- The shield of the Ethernet cable needs to be grounded at the lightning arrestor. If, by design, the lightning arrestor cannot provide this ground, the shield of the Ethernet cable will need to be grounded by the installer.

Grounding

It is important that the OAP433e, cables, and any supporting structures are properly grounded. The OAP433e unit includes a grounding screw to attach a ground wire. See *Figure 30 on* ***page 54*** for grounding screw locations. Be sure that grounding is available and that it meets local and national electrical codes.

Figure 30: *OAP433e Grounding Holes*



Test Basic Link Operation

Prior to deploying the AP, it is recommended that users connect it to an existing Fortinet deployment in order to ensure basic functionality. This can be done indoors in a controlled setting, prior to going through the trouble of mounting it externally. To do so, simply connect the AP to an existing controller and verify that the controller recognizes it. If so, proceed with the following section in order to deploy the AP.

Mounting the Access Point

The OAP433e can be mounted on the following (brackets are included):

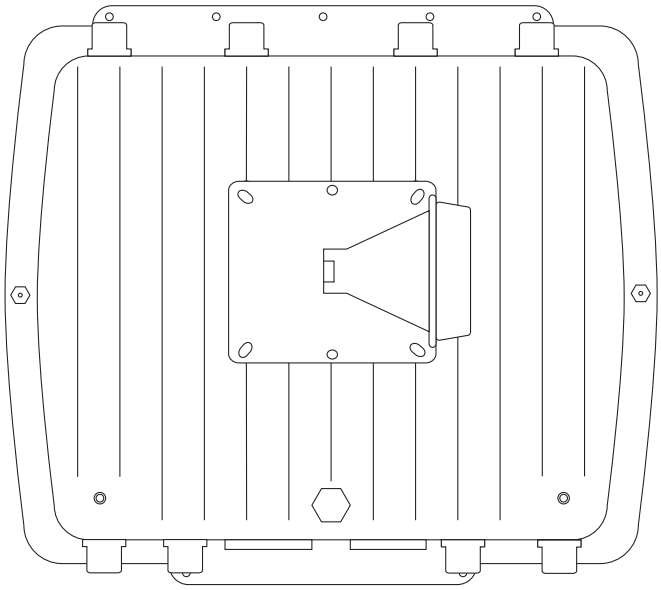
- 2 to 3 inch diameter pole
- Wall

Mounting OAP433e with the Pole-Mounting Bracket

Be sure to attach antennas (see *"Connecting Antennas and Ground Wire to OAP433e"* ***on page 59***) before mounting an OAP433e on a pole. Follow these steps to mount the unit to a 2 to 3 inch diameter steel pole or tube using the mounting bracket:

1. Attach the OAP433e to the square portion of the mounting bracket by placing the bracket flat against the bottom of the AP and inserting screws into the corners of the bracket portion. The holes on the bracket should correspond to the holes on the bottom of the AP (see *Figure 31 on* ***page 55***).

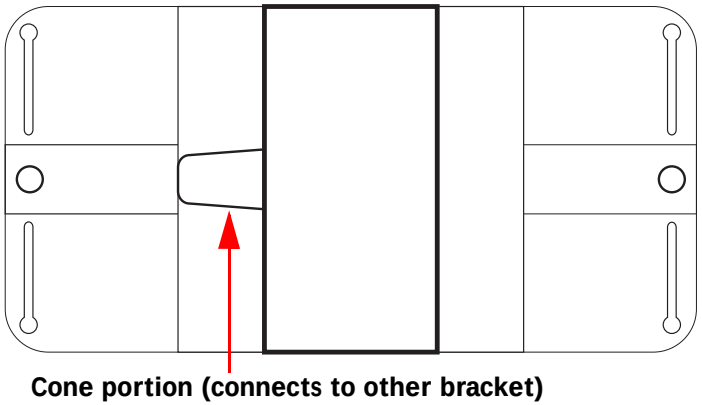
Figure 31: *Square Mounting Bracket Attaches to Bottom of OAP433e*



The circular portion of the bracket should be facing to the side of the AP (the AP's sides are the faces that do not have antennas or other attachments). This is to ensure that the AP is properly oriented when the bracket is fully assembled.

2. Next, identify the portion of the bracket assembly that inserts into the circular opening on the portion currently attached to the AP. The correct component has a corresponding circular section with a hollow cone protruding from one face of it. See *Figure 32 on* ***page 55***.

Figure 32: *Second Bracket Attachment*



3. Insert the cone into the circular portion of the bracket attached to the AP. The two should fit somewhat snugly, although a screw assembly will be required to hold them in place.
4. Run one of the long screws provided in the package down through the hole that runs through both portions of the bracket. The head of the screw should fit into the hexagonal slot on the top of the bracket assembly.
5. On the other end of the screw (i.e., the one that doesn't have the hexagonal head), slide a flat washer and then a lock washer into place. The flat washer should be against the base of the mounting assembly.
6. Screw one of the hexagonal nuts into place on top of the two washers. Once tightened, the nut should force the lock washer into place and the two bracket components should be locked together.
7. At this point, locate the third portion of the bracket. It should be shaped like a small, wide 'v'. This part will be used to brace against the backside of the pole.
8. Place the opening of the 'v' bracket against the pole and hold the OAP433e (with attached bracket assembly) up opposite it. The holes on either end of the 'v' bracket should align with the two middle holes on the 'v' portion of the bracket attached to the AP.
9. Slide the two remaining long screws from the package contents into the corresponding holes. The hexagonal head of each screw should be on the bracket end that faces the AP (i.e., on the end that is already attached to the AP itself).
10. Again, slide a flat washer followed by a lock washer and a hexagonal nut onto the bottom of each screw.
11. Tighten the securing nuts just enough to hold the bracket to the pole. (The bracket may need to be rotated around the pole during the alignment process.)
12. Rotate/orient the AP as desired, then tighten the nuts securely in place.
13. Connect the Ethernet cable to the controller inside the building and verify that all antennas are securely connected.

When fully deployed, the Fortinet logo on the top of the AP should be right-side up. This will ensure that the Ethernet cable is oriented downwards when the entire bracket is assembled. Make sure that the AP is properly oriented before tightening everything in place on the pole.

Mounting OAP433e with the Wall-Mounting Bracket

Attach the bracket to a wall with the flat side flush against the wall. Follow these steps to mount the unit to a wall using the wall-mounting bracket:

1. Prior to attaching the bracket to the AP, it is important to drill the required holes in the wall and insert the sheetrock anchors provided in the AP package. One of the three included bracket components consists of a circular portion (with a hollow cone in the center) connected to a wide 'v'-shaped portion. Use the 'v'-shaped portion as a guide.

2. Place the 'v' component against the wall at the desired location and mark the four holes (one at each corner of the bracket) on the wall.

The bracket must be oriented such that the wider portions of the bracket are its top and bottom when placed against the wall. This will ensure that the fully deployed AP will be oriented properly (with the Ethernet cable leading downwards).

3. Remove the bracket and drill the corresponding holes. When finished, insert the plastic sheetrock anchor inserts into each hole drilled.
4. Place the bracket against the wall again and use the screws provided with the plastic anchors to attach it to the wall.
5. Using the portion of the bracket assembly that has a flat component attached to another circular portion (see *Figure 33 on* ***page 57***), attach the OAP433e to the square portion of the mounting bracket by placing the bracket flat against the bottom of the AP and inserting screws into the corners of the bracket portion. The holes on the bracket should correspond to the holes on the bottom of the AP. See *Figure 34 on* ***page 58***.

Figure 33: *Square Mounting Bracket*

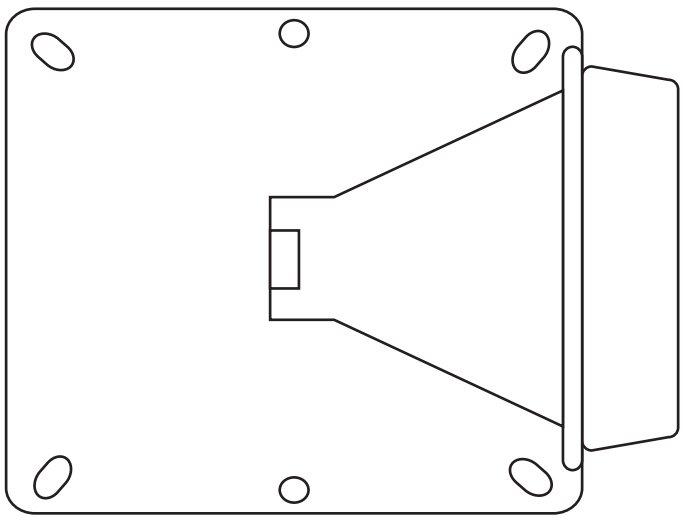
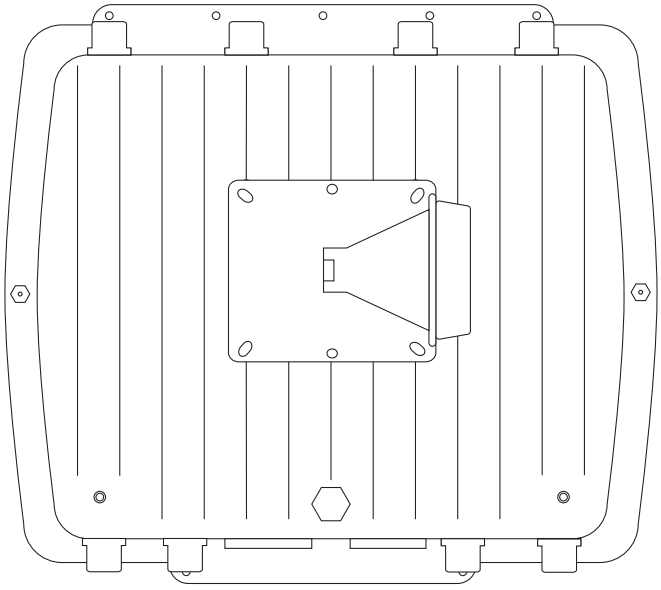


Figure 34: *Square Mounting Bracket Attaches to Bottom of OAP433e*



The circular portion of the bracket should be facing to the side of the AP (the AP's sides are the faces that do not have antennas or other attachments). This is to ensure that the AP is properly oriented when the bracket is fully assembled.

6. Insert the circular portion of the bracket attached to the AP into the hollow cone portion of the bracket on the wall. The two should fit somewhat snugly, although a screw assembly will be required to hold them in place.
7. Run one of the long screws provided in the package down through the hole that runs through both portions of the bracket. The head of the screw should fit into the hexagonal slot on the top of the bracket assembly.
8. On the other end of the screw (i.e., the one that doesn't have the hexagonal head), slide a flat washer and then a lock washer into place. The flat washer should be against the base of the mounting assembly.
9. Screw one of the hexagonal nuts into place on top of the two washers. Once tightened, the nut should force the lock washer into place and the two bracket components should be locked together.
10. Connect the Ethernet cable to the controller and verify that all antennas are securely connected.

Connecting Antennas and Ground Wire to OAP433e

OAP433e does not ship with any antenna by default. Since customers have different outdoor applications, we suggest that you choose from the various antenna options offered by Fortinet .

The OAP433e works both with antennas that attach directly to the unit and remote antennas. When using antennas that attach to the unit, attach the antennas before installing the unit. When deploying an OAP433e with remote antennas, first mount remote antennas and then connect them to the AP. If you aren't planning on using some of the antennas, be sure to terminate the connections with antenna terminators in order to prevent excess transmissions from unused connectors.

Although there are three radios in the OAP433e, space constraints allow for only eight antennas to be connected to the AP. Consequently, Radio 1 only supports two antennas. See *Figure 35 on* ***page 59*** and *Figure 36 on* ***page 60*** for details on which antennas correspond to each radio.

Figure 35: *Antenna/Radio Associations for OAP433e*

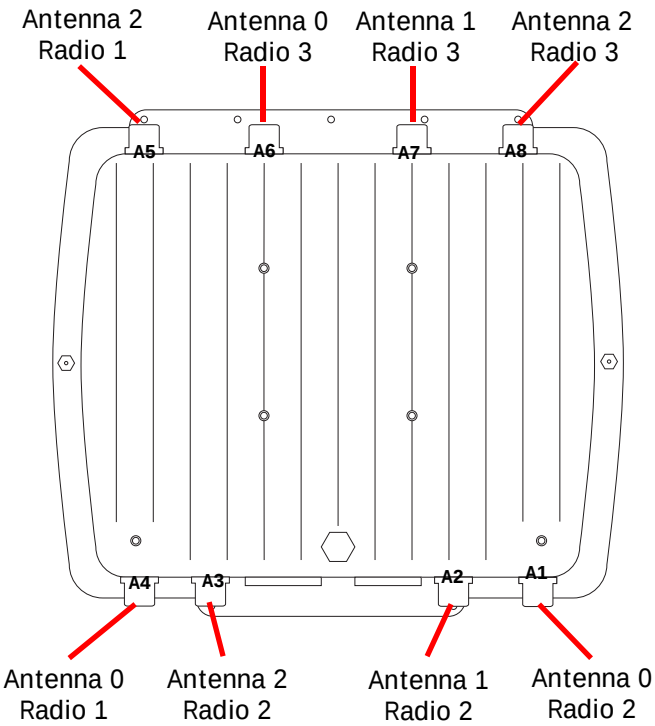
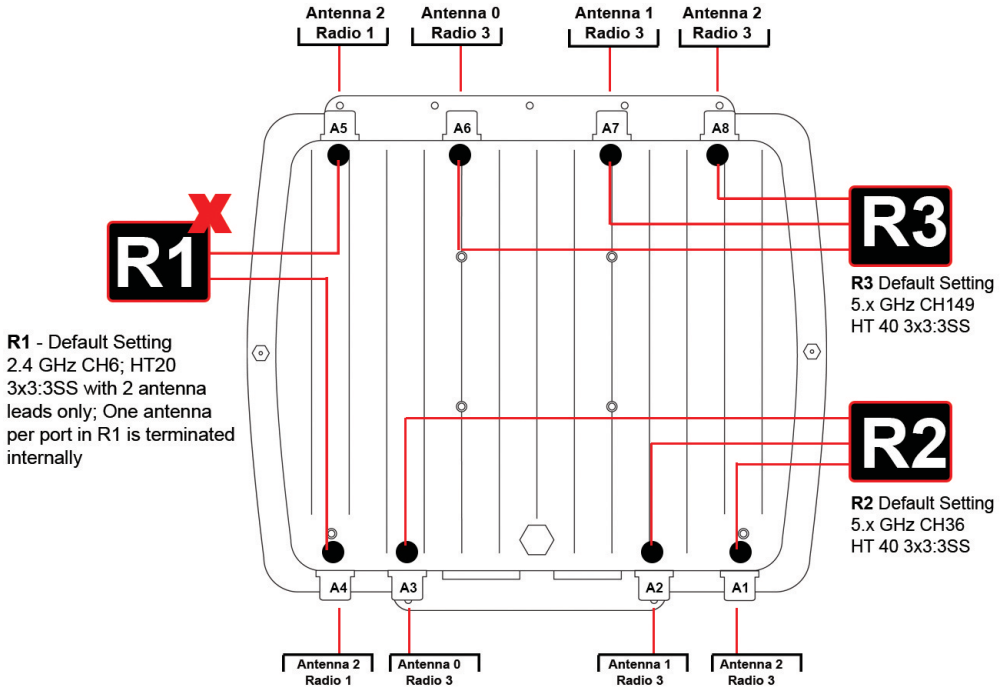


Figure 36: *Antenna-Radio Mapping & Radio Setting*



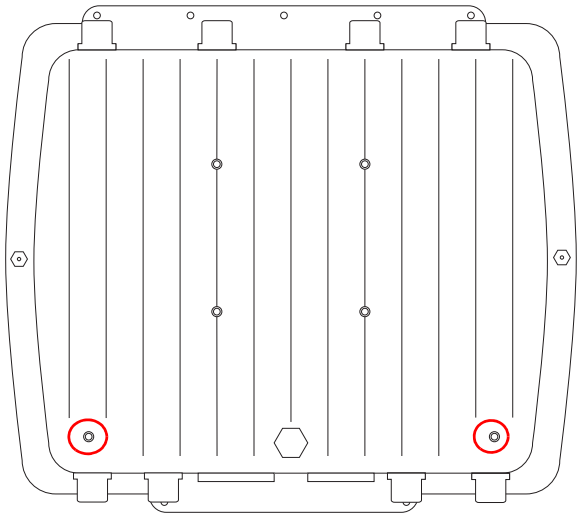
Follow these steps to connect antennas:

1. Remove the protective dust caps from the antenna connectors.
2. Mount the external antenna on the same supporting structure as you did the OAP433e, within 3 m (10 ft.) of it, using the bracket supplied in the antenna package.
3. Connect the antenna to the OAP433e's N-type connector (5G-1 and 2.4G-1) using the RF coaxial cable provided in the antenna box.
4. Apply weatherproofing tape to the antenna connectors to help prevent water entering the connectors.

Follow these steps to attach the ground wire:

1. A grounding screw and cable are both provided in the product packaging. The OAP433e has two grounding holes, in the corners on the underside of the AP. See *Figure 37 on **page 61***.
2. Connect the screw to either of the holes and attach the provided grounding wire.
3. Attach the other end of the grounding wire to an appropriate grounding source.

Figure 37: *Grounding Holes*



When not using antenna connectors on the OAP433e, keep the covers securely attached for weather protection. Once the AP is deployed, these unused connectors must be properly terminated.

Equipment shall be installed in accordance with the National Electrical Code ANSI/NFPA 70 and the Canadian Electrical Code, Part 1, and when applicable, the National Electrical Safety Code, IEEE C2.

Equipment shall be properly grounded according to Chapter 8 of ANSI/NFPA 70, the National Electrical Code (NEC) and the Cable distribution system should be grounded (earthed) in accordance with ANSI/NFPA 70, the National Electrical Code (NEC), in particular Section 820.93, Grounding of the Outer Conductive Shield of a Coaxial Cable.

The separate protective earthing terminal provided on this product shall be permanently connected to earth.

Approved Antennas for OAP433e

Only approved antennas may be used in conjunction with OAP433e access points. 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.

Fortinet Part Number	Gain @ 2.4 GHz	Gain @ 5.x GHz	Description
ANT-A08O-NM-1	NA	8.0 (5150~5350 MHz)	Omnidirectional antenna, 5150 - 5350 MHz (US, Non-DFS band UNII-1), N-type connector
ANT-A08O-NM-2	NA	8.0 (5470~5875 MHz)	Omnidirectional antenna, 5470 - 5875 MHz (US, EMEA, Others, DFS band UNII-2 & UNII-2e), N-type connector
ANT-BG08O-NM	8.0	NA	Omnidirectional antenna, 2400 - 2500 MHz World-wide, N-type connector
ANT-O4ABGN-0606-O-N	6.0	6.0	Dual band wall-mask mount omnidirectional outdoor, N-type connec-tor with 4 RG58 coaxial cable leads
ANT-O4ABGN-0607-PT-N	6.0	7.0	Dual band wall-mask mount directional patch outdoor, N-type connec-tor with 4 RG58 coaxial cable leads

Installation with ANT-O4ABGN-0606-O-N

The following diagram show the installation with Installation with ANT-O4ABGN-0606-O-N antenna. See *Figure 38 on* ***page 63*** and *Figure 39 on* ***page 64***.

Figure 38: *OAP433e deployment with ANT-O4ABGN-0606-O-N antenna in ETSI*

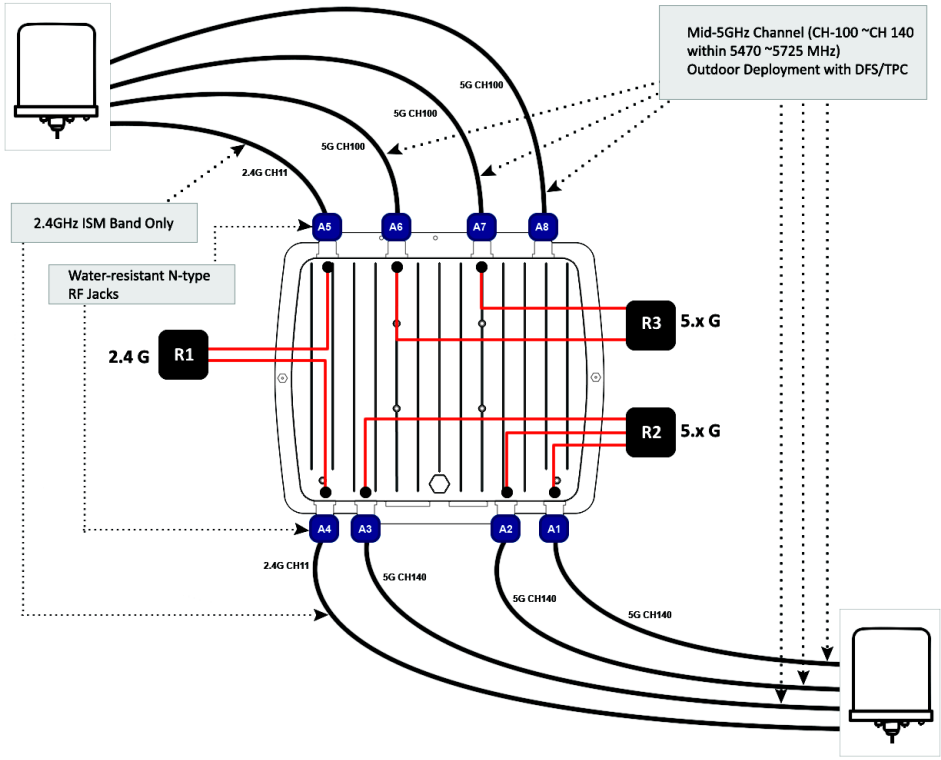


Figure 39: *OAP433e deployment with ANT-O4ABGN-0606-O-N antennas in FCC/IC (**A**)*

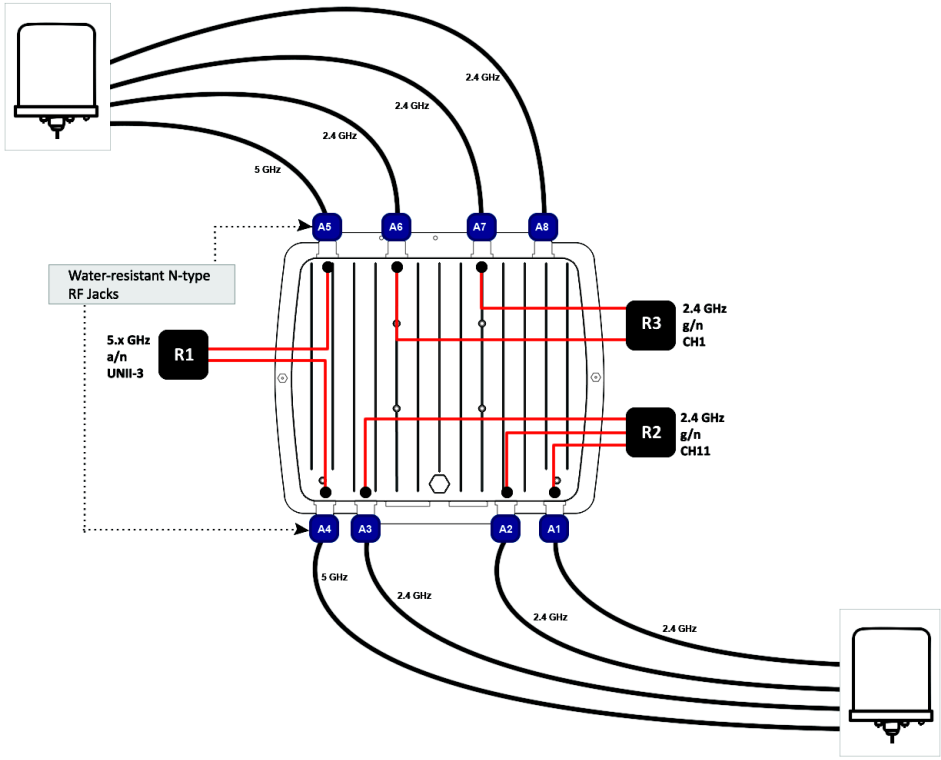
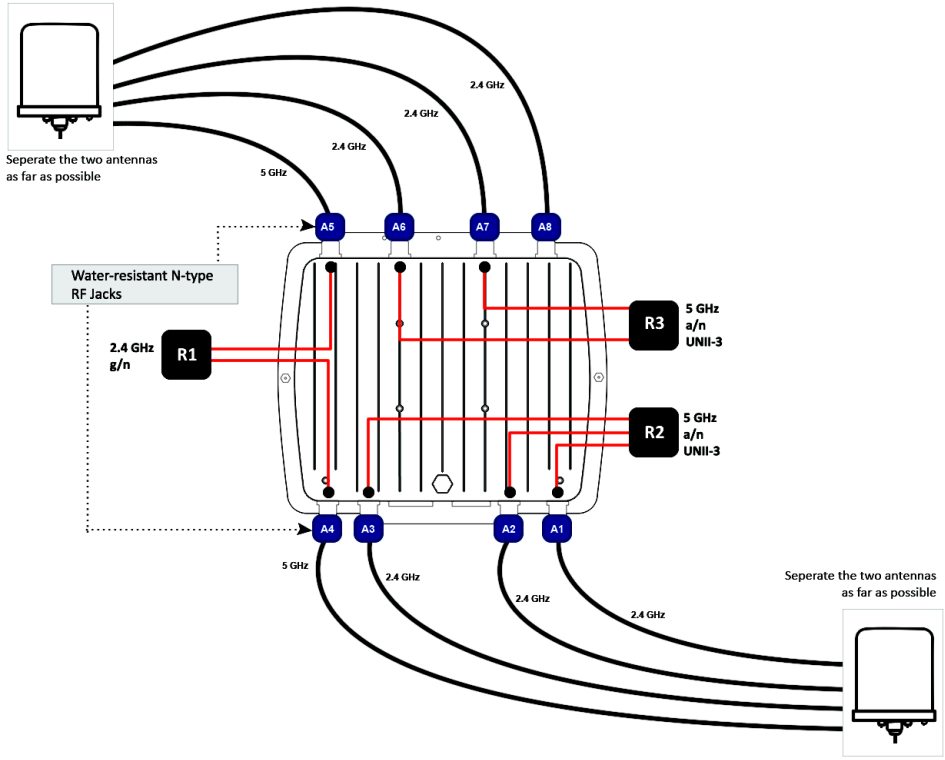


Figure 40: *OAP433e deployment with ANT-O4ABGN-0606-O-N antennas in FCC/IC (**B**)*



Installation with ANT-O4ABGN-0607-PT-N

The following diagram show the installation with Installation with ANT-O4ABGN-0607-PT-N antenna. See *Figure 41 on* ***page 66*** and *Figure 42 on* ***page 67***.

Figure 41: *OAP433e deployment with ANT-O4ABGN-0607-PT-N antenna in FCC/IC*

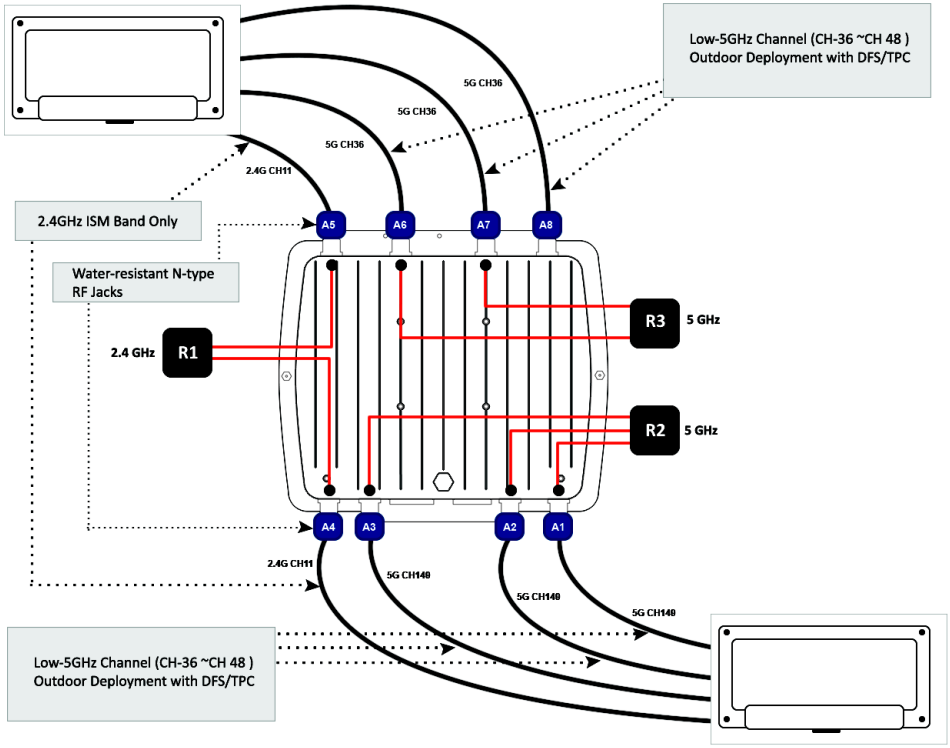


Figure 42: *OAP433e deployment with ANT-O4ABGN-0607-PT-N antenna-(**A**)*

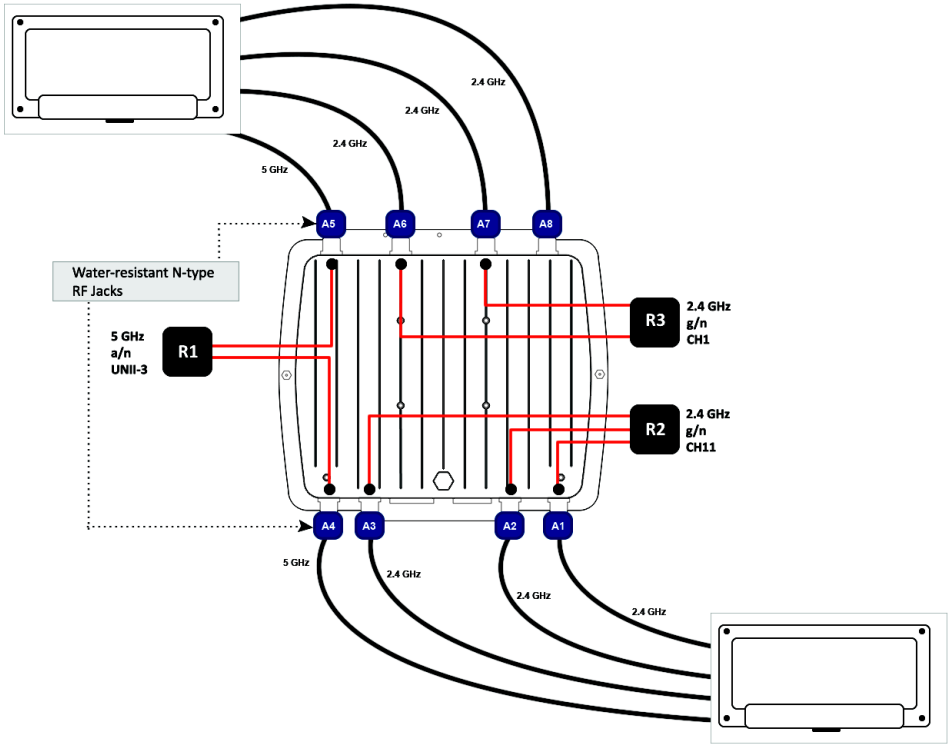
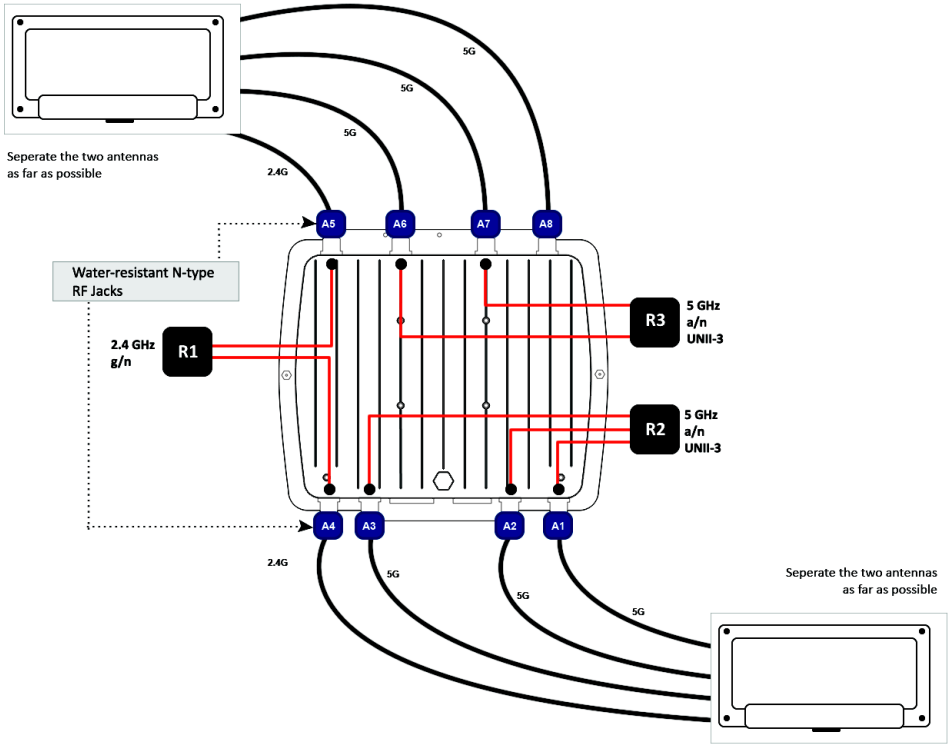


Figure 43: *OAP433e deployment with ANT-O4ABGN-0607-PT-N antenna-(**B**)*



To deployment ANT-O4ABGN-0607-PT-N antenna in MESH mode (point to point or point-to-multiple-points), user will need to decrease radio transmit power 0.3 dBm (TX) to meet regulatory requirements in 5 GHz band.

To deployment ANT-O4ABGN-0607-PT-N antenna in non-MESH mode (neither point to point nor point-to-multiple-points), user will need to decrease radio transmit power 1.0 dBm (TX) to meet regulatory requirements in 5 GHz band.

Installation with ANT-A08O-NM-1/2 & BG08O-NM

The following diagram show the installation with Installation with ANT-A08O-NM-1, ANT-A080-NM-2, and ANT-BG08O-NM with OAP433e. See

Figure 44: *OAP433e deployment with ANT-A08O-NM-1 or 2 & BG08O-NM antenna in FCC/ IC*

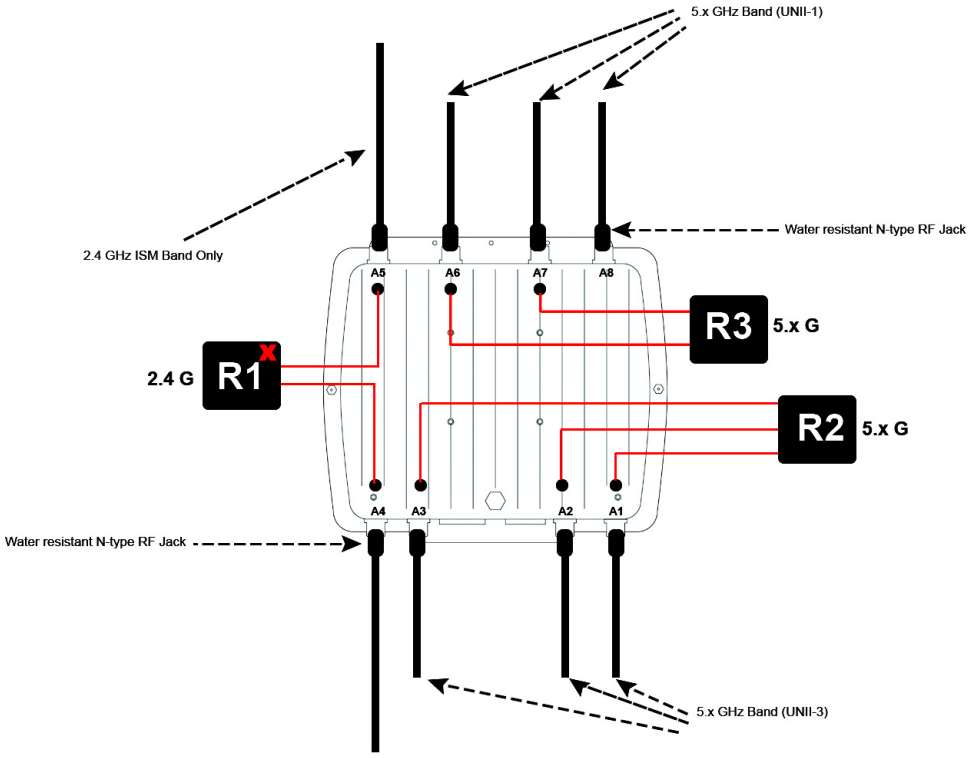
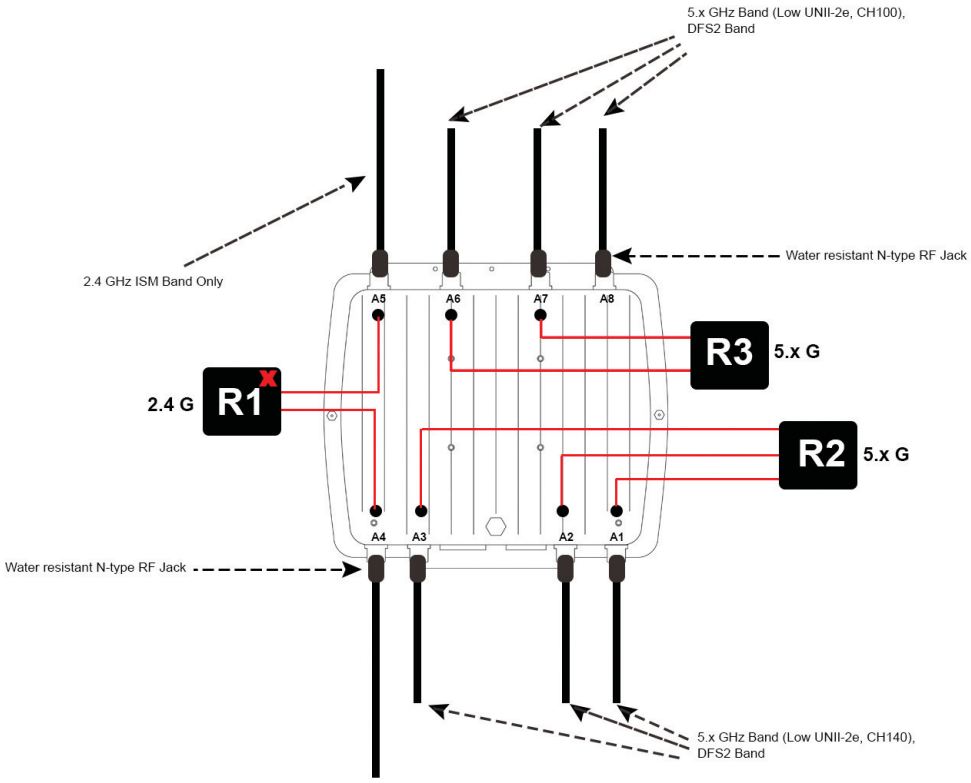


Figure 45: *OAP433e deployment with ANT-A080-NM-1 or 2 & BG-080-NM antenna in ETSI*



To deployment ANT-A080-NM-1 or 2 & ANT-BG080-NM in MESH mode (point to point or point-to-multiple-points), user will need to decrease radio transmit power 0.6 dBm (TX) to meet regulatory requirements in both 5 GHz band & 2.4 GHz band.

To deployment ANT-A080-NM-1 or 2 & ANT-BG080-NM in a non-MESH mode (neither point to point nor point-to-multiple-points), user will need to decrease radio transmit power 2 dBm (TX) to meet regulatory requirements in both 5 GHz band & 2.4 GHz band.

Where to Go From Here

Now that the OAP433e is installed, go to the ***Meru System Director Getting Started Guide*** for instructions on initializing the hardware. Return to this chapter to check the status of the LEDs once the WLAN is operational.

As well, check the AP chapter in the System Director Configuration Guide for instructions on configuring radio band, dual radio, and external antenna operation.

6 Installing AP433i and AP433is

This chapter describes how to install and configure an AP433i & 433is, which is supported on System Director Version 6.0-SR1 and later. It contains the following sections:

This document depicts installation procedures for the AP433i and 433is models. Since both devices are externally identical, the same procedures can be used for either device.

Safety Precautions

IMPORTANT—Read and follow the regulatory instructions in Appendix G before installing and operating this product.

The AP433i & 433is is intended only for installation in Environment A as defined in IEEE Std 802.3af and 802.3at. All interconnected equipments must be contained within the same building, including the interconnected equipment's associated LAN connection.

Package Contents

Confirm that the AP433i & 433is shipping package contains these items:

- AP433i and AP433is

- Plastic attachment (used when paddle antenna is disconnected)
- Wall mounting bracket
- Rubber feet
- Locking pin
- Two mounting screws

Determine Power Requirements

Power requirements vary, depending on which AP433i and AP433is radios are deployed and what MIMO mode is used. See the chart below for supported power sources for different radio configurations.

Power Source	Radios Supported
IEEE Std 802.3af	Radios 1 and 2
IEEE Std 802.3at	Radios 1, 2, and 3

IEEE Std 802.3af PoE Usage

When using System Director V6.0 SR2 (or earlier Version) and an IEEE Std 802.3af PoE power source, Fortinet only supports two radios (radio 0 and 1).

This is because three radios using an IEEE Std 802.3af switch/PoE injector may not have enough power to operate properly. When using an 802.af PoE, Fortinet supports single or dual radios utilizing up to 3 antennas each.

IEEE Std 802.3at PoE Usage

When using System Director V6.0 SR2 (or earlier version) and an IEEE Std 802.3at, all possible configurations are supported (all three radios utilizing up to 3 antennas each).

Installation Requirements

An array of holes on the mounting bracket allows the AP433i & 433is to be mounted on the wall and over junction boxes or molly bolts. There are holes for passing the PoE Ethernet or external power supply cable through the bracket if the bracket is mounted on a junction box.

The AP433i & 433is has a security cable slot so you can lock the AP433i & 433is with a standard security cable, such as those used to secure laptop computers.

Purchase optional mounting kits to mount the AP433i & 433is either from the ceiling or inside an enclosure:

- Above Suspended Ceiling Mounting Kit (T-Bar Hanger): MNT-SCRMKIT-01

To complete AP433i & 433is installation, you need the items listed below.

Table 5: AP433i & 433is Installation Requirements

Installation Type	Items Required
Horizontal mounting	None
Vertical mounting over a wall stud	• Four #6 x 2” wood screws for a wood stud; or • Four #6 x 1½” metal screws for a metal stud • Mounting bracket
Vertical mounting on sheetrock	• Four #6 x 1” screws • Four #4-6 x 7/8” ribbed plastic wall anchors • Mounting bracket
Horizontal mounting below a hanging ceiling	None
Mounting above a ceiling tile	Mounting bracket MNT-SCRMKIT

Additional Equipment

A power source is needed to power the AP433i and AP433is. See *“Determine Power Requirements”* ***on page 74***.

Installing AP433i and AP433is

This section describes how to install an AP433i & 433is, which is supported on System Director Version 6.0-SR2 and later. It contains the following sections:

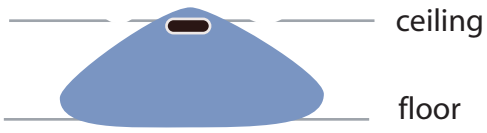
Select a Location

All AP433i interconnected equipment must be contained within the same building, including the interconnected equipment's associated LAN connection. Ceiling mounting is recommended but wall mounting is also supported. In addition, the AP433i should be mounted in a location that meets the following conditions:

- Relatively unobstructed access to the stations the AP serves. 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 (plenum is supported) or the wall near the ceiling provides the least obstructed communications path. On a wall, orient the AP433i horizontally so that you can read the Fortinet logo without tilting your head at 90 degrees - this orientation provides optimum MIMO performance.
- We recommend planning for about 50 clients per radio (or per interference region) if you plan to use Virtual Port and plan to have phones as clients. There are three radios in AP433i for data access and two radio in AP433is (3rd radio in AP433is is for spectrum sensor). Refer to the Fortinet Deployment Guides on the support site for more information.
- Access to wall outlet or a to a Power over Ethernet (PoE) connection to the network switch servicing the controller. AP433i is designed to provide 180 degree omni-directional coverage as illustrated below. Plan placement with this pattern in mind.

AP433i is designed to provide 180 degree omni-directional coverage as illustrated below. Plan placement with this pattern in mind.

Figure 46: *Coverage Pattern for AP433i and 433is When Ceiling Mounted*



Most installations receive the best coverage using the following guidelines:

- Install APs toward the center of the building.
- Place APs about 80 feet apart.
- Do not install APs near metal objects, such as heating ducts, metal doors, or electric service panels.

Install the Access Point

AP433i & 433is ships with a mounting bracket included in the box. This bracket is intended for installation as a wall-mount; for mounting on a ceiling, no mount is typically required. See the following sections for more specific details:

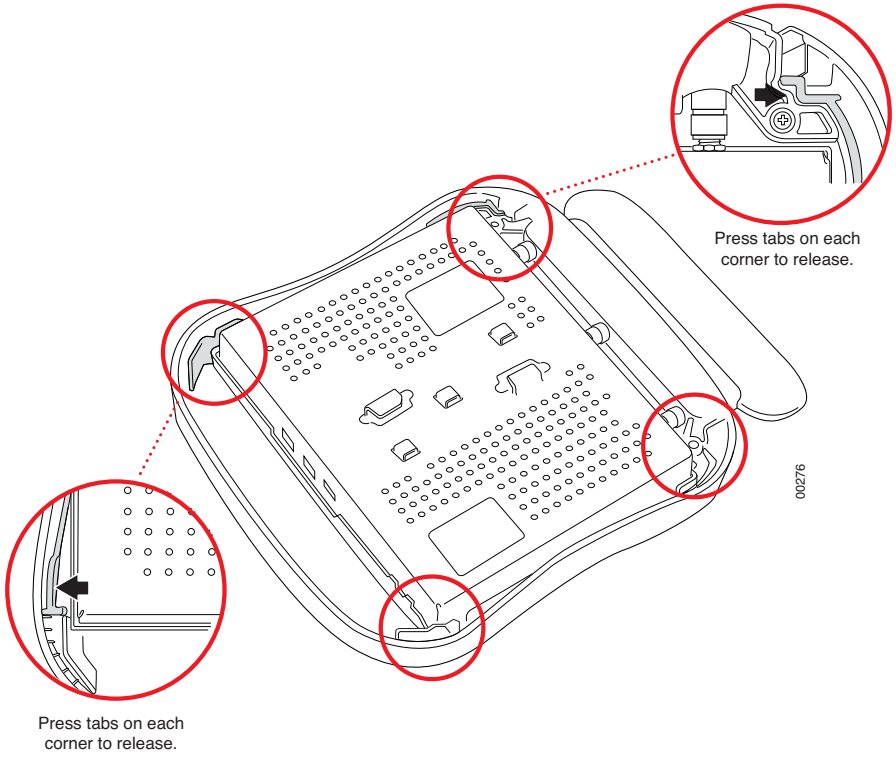
Mount AP433i and 433is Horizontally on a Shelf

When mounting an AP433i horizontally, no mounting bracket is required. Be sure to position the paddle antenna vertically when an AP433i sits on a surface. In order to ensure that the AP433i does not shift much, attach the rubber feet provided in the box to the bottom of the AP.

Mount AP433i and 433is Vertically on a Wall

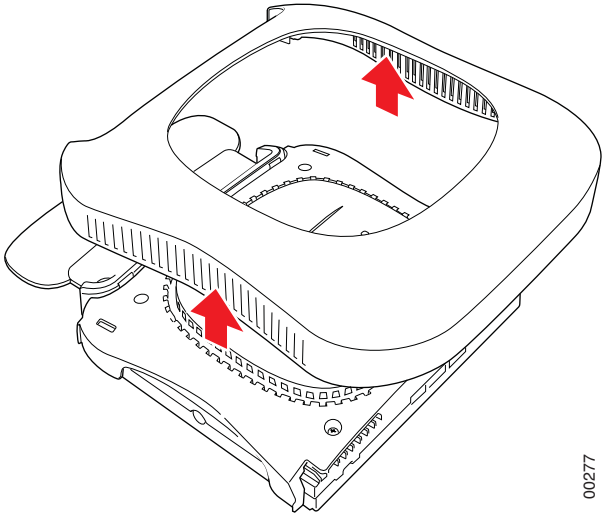
Prior to installing the mounting bracket, it is recommended that users remove the protective plastic shell from the AP. This makes it easier to properly lock the device in place once it is mounted. To remove the shell, flip the AP upside-down and release the four locking clips from the AP itself, as indicated in *Figure 47 on* ***page 78***.

Figure 47: *AP433i and 433is Shell Clip Locations*



After unclipping the shell, it is a simple matter to lift it off of the main AP. See *Figure 48 on **page 79***.

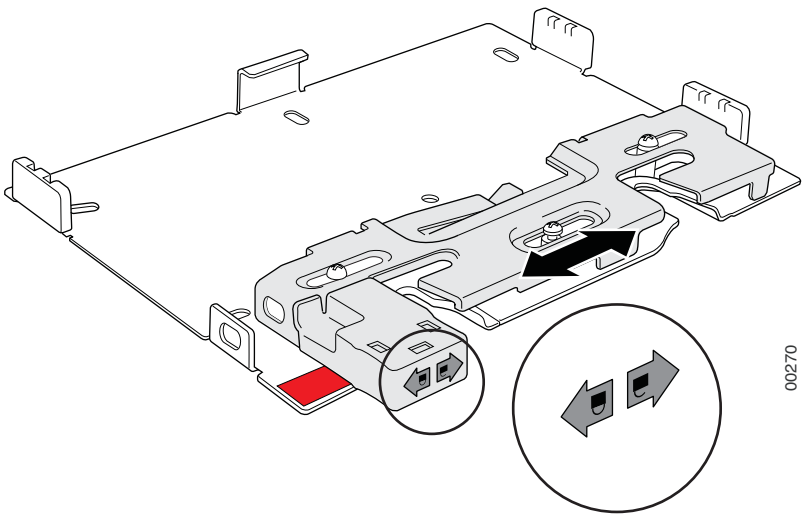
Figure 48: *Removing the AP433i and 433is Shell*



You are now ready to proceed with the wall mounting procedure.

To mount an AP433i on a wall, use the provided mounting bracket, as shown in *Figure 49 on **page 79***.

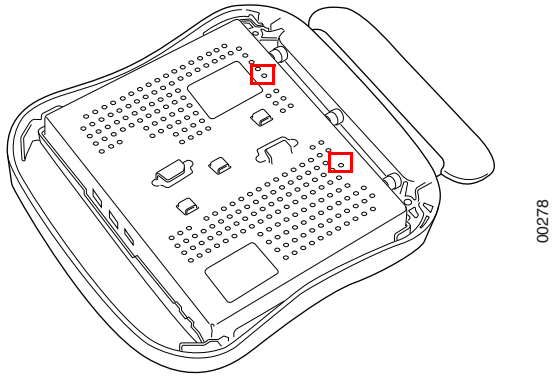
Figure 49: *AP433i and 433is Wall Mounting Bracket*



1. Place the mounting bracket against the wall with the sliding lock mechanism facing upwards. The Quick Reference Installation instructions on the bracket should be visible.

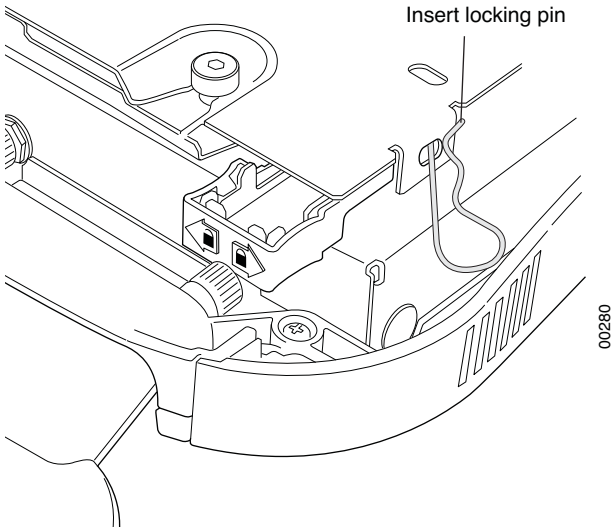
2. Using the holes on the mounting bracket itself as a guide, mark the location on the wall for the AP bracket mounting screws. If possible, center the mounting screws on a wall stud. (If mounting on a wall stud is impossible, use plastic wall anchors on the remaining screws.)
3. Drill holes at the locations 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. Line the bracket up with the holes and screw in the screws.
6. Attach the mounting screws to the underside of the AP433i in the holes provided (indicated in *Figure 50 on* ***page 80***).

Figure 50: *AP433i and 433is Mounting Screw Holes*



7. Orient the AP433i horizontally so that you can read the Fortinet logo and the Console and network ports are pointed downwards - this orientation provides optimum MIMO performance.
8. Align the mounting screws on the back of the AP433i with the corresponding holes on the mounting bracket.
9. Slide the AP433i downwards until the screws click into the holes. They should seat fairly firmly.
10. Slide the mounting bracket's locking bar to the right, locking the AP in place.
11. If desired, use the provided clip to lock the bracket shut by sliding it through the aligned holes on the right-hand side of the bracket. See *Figure 51 on* ***page 81***

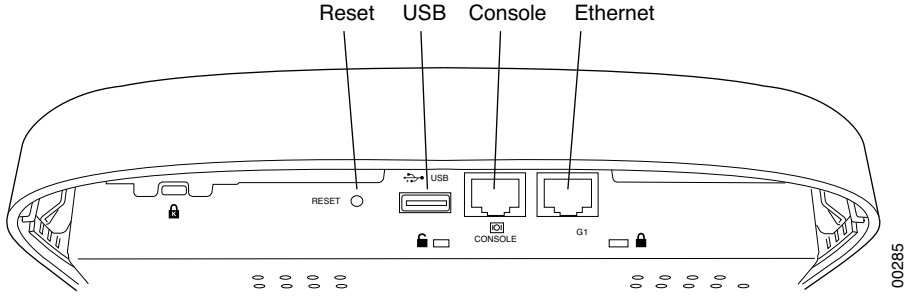
Figure 51: *Locking the AP433i and 433is in Place*



12. Connect one end of the Ethernet cable to the switch and the other end to the AP433i Ethernet port.

⚠	Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this, the AP won't power up.

Figure 52: *Ports for the AP433i and 433is*

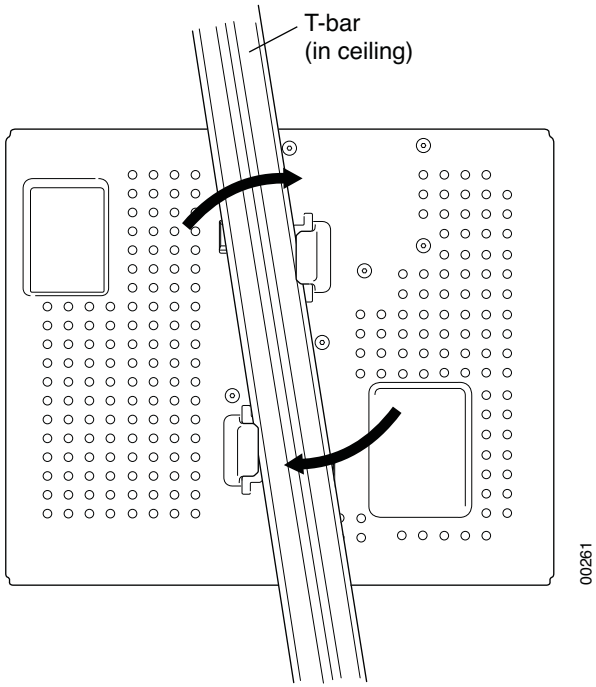


Mount AP433i and 433is Below a Suspended Ceiling

The brackets on the bottom of the AP433i allow it to be mounted directly to a ceiling T-bar (see *Figure 53 on* ***page 82***). Note that the AP lock must be disabled by sliding the locking key (pro-

vided in the box) into the unlock hole on the side of the AP shown in *Figure 52 on* ***page 81*** in order to clip the AP in place.

Figure 53: *Mounting AP433i and 433is to a Suspended Ceiling Rail*

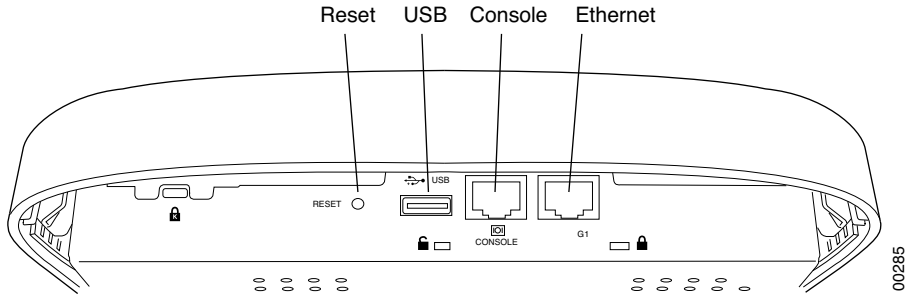


To mount an AP433i below a suspended ceiling:

1. Determine the location on the ceiling rail where the AP will be mounted and remove the ceiling tiles.
2. Verify that the AP is unlocked using the locking key on the unlock mechanism (on the same side as the Ethernet ports).
3. Press the AP433i against the T-bar at a slight angle and then rotate into place, as indicated in *Figure 53 on* ***page 82***. You should hear it snap in place.
4. Connect one end of the PoE Ethernet cable to the AP's Ethernet port (see *Figure 54 on* ***page 83***).

⚠	Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this. the AP won't power up.

Figure 54: *Ports for the AP433i*



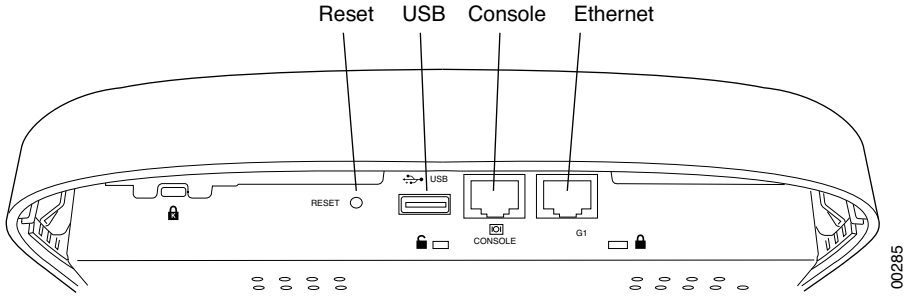
The AP433i is not plenum rated and as such should only be installed in non-plenum airspace.

Any Ethernet 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). 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.

To mount an AP433i above the ceiling with the optional T-bar kit, follow these steps:

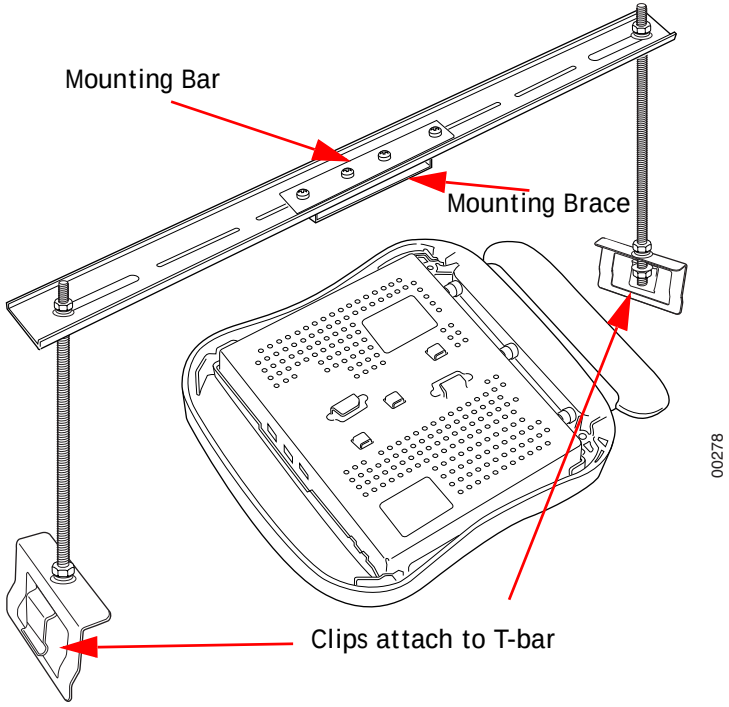
1. Determine the location on the ceiling rails where the AP will be mounted and remove the ceiling tile.
2. Unpack the T-bar hanger kit.
3. Unlock the AP by sliding the locking key into the small hole with an unlocked image above it.

Figure 55: *Ports for the AP433i*



4. Attach the square bracket to the underside of the main support bar using the screws provided, as shown in *Figure 56 on* ***page 84***.

Figure 56: *AP433i Mounted Above a Suspended Ceiling Face Down*



5. Brace your hand against the back of the main support bar and press the AP433i against the square bracket in a similar manner to that indicated in *Figure 53 on* ***page 82***.
6. Twist until the AP433i clicks into place. If desired, you can now lock the AP using the locking key.
7. Attach the two legs of the mounting bracket to the T-bars on which the AP is to be mounted by sliding the clips onto the bars.
8. Align the antenna in a vertical position, so that it is perpendicular to the AP itself.
9. Remove a nut from each leg and slide the crossbar (with the AP attached) in place on top of the legs.
10. Replace the two nuts, locking the bar in place.
11. Connect one end of the PoE Ethernet cable to the Ethernet connector.

⚠	Be sure to connect the Ethernet cable to the Ethernet port; the cable can mistakenly be plugged into the Console port. If you do this. the AP won't power up.

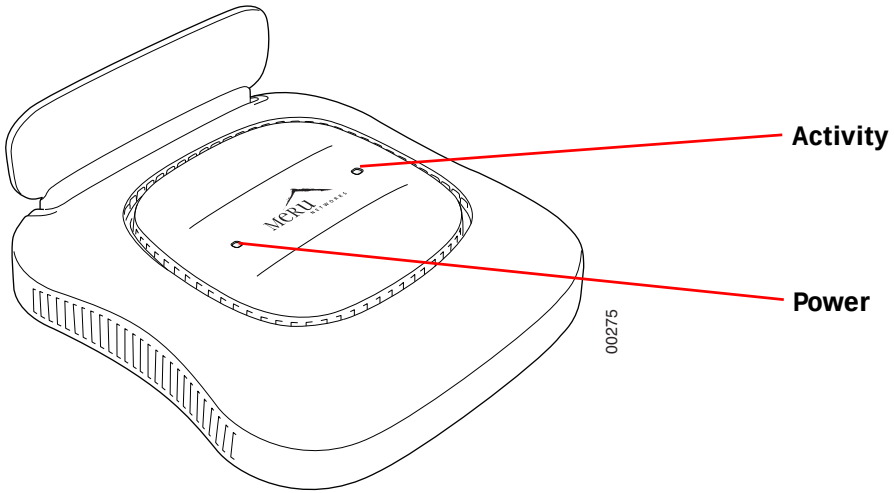
Use a shielded Cat 5e (or greater) Ethernet cable in order to comply with international electromagnetic emissions limits.

12. Check that the AP433i is operating correctly before replacing the ceiling tile. Verify correct operating using the LEDs, as shown in *"Check AP433i and 433is LED Activity"* ***on page 85***.

Check AP433i and 433is LED Activity

When AP433i and 433is first connects to the controller (and any time the access point is rebooted), the AP initializes and then is programmed by the controller. When the AP first powers up, all LEDs are green.

Figure 57: *AP433i and 433is Status LEDs*



After the AP433i and 433is is connected, check the status of the LEDs. The functions of the LEDs are described below.

AP433i and 433is LED Descriptions

LED	Function	Troubleshooting
Power	off—no power green—presence of power	
Status	off—no power green—booting stage 1 blinking green and off—booting stage 2 blinking green and white—discovering the controller blinking green and blue—downloading a configuration from the controller blinking blue and off—AP is online and enabled, working state blinking red and yellow—failure; consult controller for alarm state	If the status LED is blinking red and yellow, there is an alarm on the AP. Determine what the alarm is by clicking **Monitor > Dashboard > Alarms** and looking at the AP alarms. You can also use the CLI commands **show alarm** and **show log**.

Change LED Appearance

If you want to change the appearance of the LEDS, follow these steps:

1. From the controller, click **Configuration > Devices > AP**, and then select the AP.
2. Select one of these settings for the LED Mode setting:
   - **Normal:** LEDs are as described above
   - **Blink:** Sets all LEDs flashing; this is useful to locate an AP
   - **Dark:** Turns off all LEDs
3. Click **OK**.

Where to Go From Here

Now that the AP433i and 433is is installed, go to the ***Meru System Director Getting Started Guide*** for instructions on initializing the hardware. Return to this chapter to check the status of the LEDs once the WLAN is operational.

Regulatory Information

The access point (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. Fortinet. 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 Fortinet. The correction of interference caused by such unauthorized modification, substitution or attachment is the responsibility of the user. Fortinet. 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.

Regulatory Specifications

Category	Items
Safety	UL 60950-1 CSA C22.2 EN 60950-1 IEC 60950-1
Unintentional Radiation Compliance	FCC Part 15.107 - 47CFR15.107 FCC Part 15.109 - 47CFR15.109 ICES-003 EN 301 489-1 EN 301 489-17 EN55022 EN55024/AS/NZS CISPR 24
Intentional Radiation Compliance	FCC Part 15.247 - 47 CFR Ch. I FCC Part 15.407 - 47 CFR15.407 RSS-210 EN 300 328 EN 301 893

Declaration of Conformity, Federal Communication Commission

Manufacturer Information

Fortinet
894 Ross Drive, Sunnyvale, CA 94089, USA

Declaration of Conformity

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

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

Device Name	FCC ID Number
AP433e	RE7-AP433E
AP433i	RE7-AP433I
AP433is	RE7-AP433IS
OAP433e	RE7-OAP433E

This product is FCC marked according to the provisions of FCC Part 15.

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

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

The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency when using the integrated antennas. Any changes or modification to the product not expressly approved by Fortinet could void the user's authority to operate this device.

Declaration of Conformity, Industry Canada

This equipment is in compliance with the essential requirements of other relevant provisions of Directive.

Manufacturer Information

Fortinet
894 Ross Drive, Sunnyvale, CA 94089, USA

Declaration of Conformity

The Class A digital portion of this apparatus complies with Canadian standard ICES-003. These devices comply with RSS210 of Industry Canada.

La partie numérique de Classe B de cet appareil est conforme à la norme ICES-003 canadien. Ces appareils sont conformes à la norme RSS 210 d'Industrie Canada..

Per RSS 210 A9.5 point 7:

The device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems (The device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems)

The maximum antenna gain permitted (for devices in the bands 5250-5350 MHz and 5470-5725 MHz) to comply with the EIRP limit; and the maximum antenna gain permitted (for devices in the band 5725-5825 MHz) to comply with the EIRP limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3) (The maximum antenna gain permitted (for devices in the bands 5250-5350 MHz and 5470-5725 MHz) to comply with the EIRP limit; and the maximum antenna gain permitted (for devices in the band 5725-5825 MHz) to comply with the EIRP limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3).

In addition, users should also be cautioned to take note that high-power radars are allocated as primary users (meaning they have priority) of the bands 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to WLAN devices (En outre, les utilisateurs doivent également être avertis de prendre note que les radars à haute puissance sont désignés comme utilisateurs principaux (ils ont la priorité) des bandes 5250-5350 MHz et 5650-5850 MHz et ces radars pourraient cause des interférences et / ou endommager aux appareils WLAN.

These devices are not permitted to operate in the 5600 - 5650 MHz band (Ces appareils ne sont pas autorisés à opérer dans le 5600 - bande 5650 MHz.)

For products available in the Canadian markets, only channels 1 through 11 can be operated. Selection of other channels is not authorized. 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.

Pour les produits disponibles sur les marchés canadiens, seuls les canaux 1 à 11 peuvent être utilisés. La sélection d'autres canaux n'est pas autorisée. Son fonctionnement est soumis aux deux conditions suivantes: (1) cet appareil ne doit pas provoquer d'interférences et (2) cet appareil doit accepter toute interférence, y compris celles pouvant causer un mauvais fonctionnement de ce dispositif

This device and its listed antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter

Cet appareil et son antenne énuméré (s) ne doivent pas être situés ou exploités conjointement avec une autre antenne ou transmetteur

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

Le terme “IC” avant le numéro de certification de l'équipement signifie seulement que les spécifications techniques d'Industrie Ca-nada ont été atteints

To reduce the potential radio interference to other users, the antenna type and gain should be chosen so that the equivalent isotropic radiated power (EIRP) is not more than that required for successful communication. This device complies with Class A Limits of Industry Canada. Operation is subject to the following two conditions:

Pour réduire le risque d'interférence avec d'autres utilisateurs, le type d'antenne et le gain doivent être choisis de telle sorte que la puissance isotrope rayonnée équivalente ne soit pas supérieure à celle requise pour une communication réussie. Cet appareil est conforme aux limites de Classe B d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes

This device may not cause harmful interference, and

Cet appareil ne doit pas provoquer d'interférences nuisibles, et

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

Cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant entraîner un fonctionnement indésirable.

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 empecher que cet appareil cause du brouillage au service faisant l'objet d'une licence, il doit etre utilze a l'interieur et devrait etre place lin des fenetres afin de Fournier un ecram de blindage maximal. Si le matriel (ou son antenne d'emission) est installe a l'exterieur, il doit faire l'objet d'une licence.

Device Name (Nom de l'appareil)	Industry Canada ID Number (Industrie Canada Numéro d'identification)
AP433e	6749A-AP433E
AP433i	6749A-AP433I
AP433is	6749A-AP433IS
OAP433e	6749A-OAP433E

Declaration of Conformity, R&TTE Directive 1999/5/EC

This equipment is in compliance with the essential requirements of other relevant provisions of Directive.

Manufacturer Information

Fortinet
894 Ross Drive, Sunnyvale, CA 94089 USA

Declaration of Conformity

The following standards were applied:

EMC-EN 301.489-1 Article 3.1 (b) of R&TTE Directive; EN 301.489-17 Article 3.1 (b) of R&TTE Directive

Health & Safety-EN60950-1

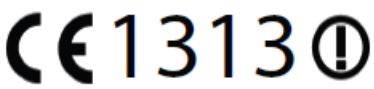
Radio-EN 300 328 Article 3.1 (b) of R&TTE Directive; EN 301.893 Article 3.1 (b) of R&TTE Directive

The conformity assessment procedure referred to in Article 10.4 and Annex III of Directive 1999/5/EC has been followed.

This product is CE marked according to the provisions of the R&TTE Directive (1999/5/EC). Fortinet, hereby declares that this 433 SERIES AP models are in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Language	Content of Declaration
Български (Bulgarian)	това оборудване е в съответствие със съществените изисквания и другите приложими разпоредби на Директива 1999/5/ЕО
Česka (Czech)	Toto zařízení je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES
Dansk (Danish)	Dette udstyr er i overensstemmelse med de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF
Deutsch (German)	Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i direktiv 1999/5/EF
Esti (Estonian)	See seade on vastavuses oluliste Krav ja muude asjaomaste komisjoni direktiivi 1999/5/EÜ
English (English)	This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC
Español (Spanish)	Este equipo cumple con el krav esenciales y otras comisiones pertinentes de la Directiva 1999/5/CE
Ελληνικά (Greek)	Αυτή η συσκευή είναι σύμφωνη με τις βασικές Krav και άλλα αρμόδια επιτροπή της οδηγίας 1999/5/ΕΚ
Français (French)	Cet appareil est en conformité avec le krav essentielles et aux autres commissions pertinentes de la directive 1999/5/CE
Isendska (Icelandic)	Þessi búnaður er í samræmi við nauðsynleg krav og aðrar viðeigandi þóknun tilskipunar 1999/5/EB
Italiano (Italian)	Questa apparecchiatura è conforme con il krav essenziali e altri servizi della Commissione, della direttiva 1999/5/CE
Latviešu (Latvian)	Šis aprīkojums ir saskaņā ar būtiskajām Krav un citiem attiecīgajiem Komisijas Direktīvas 1999/5/EK
Lietuvių (Lithuanian)	Ši įranga atitinka esminius Krav ir kitomis atitinkamomis Komisijos direktyvos 1999/5/EB
Nederlands (Dutch)	Deze apparatuur voldoet aan de essentiële krav en andere relevante provisies van Richtlijn 1999/5/EG
Malti (Maltese)	Dan it-tagħmir huwa konformi mal-Krav essenzjali u kummissjoni rilevanti oħra tad-Direttiva 1999/5/KE
Magyar (Hungarian)	Ez a berendezés megfelel a vonatkozó alapvető Krav és egyéb releváns bizottsági irányelv 1999/5/EK
Norsk (Norwegian)	Dette utstyret er i samsvar med de grunnleggende krav og andre relevante oppdrag i direktiv 1999/5/EF
Polski (Polish)	Ten sprzęt jest zgodny z zasadniczymi KRAV oraz innych właściwych komisji dyrektywy 1999/5/WE
Portugues (Portuguese)	Este equipamento está em conformidade com o krav essencial e outra comissão pertinente da Directiva 1999/5/CE
Română Romanian	Acest echipament este în conformitate cu Krav esențiale și alte Comisie relevante ale Directivei 1999/5/CE
Slovensko (Slovenian)	Ta oprema je v skladu z bistvenimi Krav in druge ustrezne provizije Direktive 1999/5/ES
Slovensky (Slovak)	Toto zariadenie je v súlade so základnými kráv a ostatnými príslušnými útvarmi Komisie smernice 1999/5/ES
Suomi (Finnish)	Tämä laite on yhdenmukainen olennaisten krav ja muiden asiaan liittyvien komission direktiivin 1999/5/EY
Svenska (Swedish)	Denna utrustning är i överensstämmelse med de grundläggande krav och andra relevanta uppdrag av direktiv 1999/5/EG

This device is intended to be used in all EU and EFTA Countries.



General Information of RF Exposure

International Guidelines

This Device Meets International Guidelines for Exposure to Radio Waves

The 433 SERIES AP device includes radio transmitters and receivers. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) recommended by international guidelines. The guidelines were developed by an independent scientific organization (ICNIRP) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

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

TABLE 6: *International guideline for minimum safe distance in MPE exhibit*

Device Name	Minimum safe distance in MPE exhibit
AP433e	20 cm
AP433i	40 cm
AP433is	30 cm
OAP433e	51 cm

The World Health Organization has stated that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing he antennas at a greater separation distance then recommended.

FCC Guidelines

This device meets FCC guidelines for exposure to radio waves

The 433 SERIES AP include radio transmitters and receivers. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in FCC Part 1.1310. The guidelines are based on IEEE ANSI C 95.1 (92) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

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

The device has been tested and found compliant with the applicable regulations as part of the radio certification process.

The FCC recommends that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing the antennas at a greater separation distance then recommended or lowering the transmitter power output.

TABLE 7: *FCC guideline for minimum safe distance in MPE exhibit*

Device Name	Minimum safe distance in MPE exhibit
AP433e	20 cm
AP433i	40 cm
AP433is	30 cm
OAP433e	51 cm

Industry Canada Guidelines

This device meets the Industry Canada guidelines for exposure to radio aaves

The 433 SERIES AP include radio transmitters and receivers. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in Health Canada Safety Code 6. The guidelines include a substantial safety margin designed into the limit to ensure the safety of all persons, regardless of age and health.

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

Health Canada states that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure you can easily do so by reorienting antennas away

from the user, placing the antennas at a greater separation distance than recommended, or lowering the transmitter power output.

TABLE 8: *Industry Canada guideline for minimum safe distance in MPE exhibit*

Device Name	Minimum safe distance in MPE exhibit
AP433e	20 cm
AP433i	40 cm
AP433is	30 cm
OAP433e	51 cm

C Cautions and Warnings

The cautions and warnings that appear in this manual are listed below in English, German, French, and Spanish. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Cautions

A Caution calls your attention to a possible hazard that can damage equipment.

"Vorsicht" weist auf die Gefahr einer möglichen Beschädigung des Gerätes in.

Une mise en garde attire votre attention sur un risque possible d'endommagement de l'équipement. Ci-dessous, vous trouverez les mises en garde utilisées dans ce manuel.

Un mensaje de precaución le advierte sobre un posible peligro que pueda dañar el equipo. Las siguientes son precauciones utilizadas en este manual.

	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. Bei einer Neuausrichtung der Antennen muss vor Bewegung der Antenne der Rändelring leicht gelockert werden. Anschließend den Ring wieder festziehen. Anderenfalls können die internen Kabel im AP beschädigt werden. En cas de modification d'orientation des antennes, veiller à desserrer légèrement la bague moletée avant de réorienter l'antenne. Resserrer ensuite la bague, faute de quoi le câblage interne du point d'accès pourrait être endommagé.. Al cambiar la orientación de las antenas, asegúrese de aflojar ligeramente el anillo estriado antes de mover la antena. Luego vuelva a apretar el anillo. De otro modo, podría dañar el cableado interno del punto de acceso.

	The radiated output power of the access points is well below the radio frequency exposure limits. However, the access point 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 radio frequency expo- sure limits, you should keep a distance of at least 20 cm between you (or any other person in the vicin- ity) and the Access Point antennas. Die abgestrahlte Ausgangsleistung von Geräten von Fortinet. liegt weit unter den Hochfre- quenz-Expositionsgrenzwerten der. Die access point Zugangspunkte von Fortinet. sollten jedoch so verwendet werden, dass das Potenzial für Kontakt mit Menschen während des nor- malen Betriebs auf ein Mindestmaß beschränkt wird. Um die Möglichkeit einer Überschreitung der - Hochfrequenz-Expositionsgrenzwerte zu vermeiden, ist ein Abstand von mindestens 20 cm zwischen Ihnen (bzw. einer anderen Person in der Nähe) und den Zugangspunkt-Antennen zu wahren. La puissance de rayonnement émise par les équipements Fortinet. est très inférieure aux limites d'exposition aux fréquences radio définies par la. Toutefois, les points d'accès de la série access point de Fortinet. doivent être utilisés de façon à éliminer tout risque de contact humain en fonctionnement normal. Pour éviter de dépasser les limites d'exposition aux fréquences radio définies par la , il est impératif de préserver en permanence une distance supérieure ou égale à 20 cm entre l'utilisateur (ou toute personne se trouvant à proximité) et les antennes du point d'accès. La potencia de radiación de los dispositivos de Fortinet. está muy por debajo de los límites de exposición a radiofrecuencia estipulados por la. No obstante, los puntos de acceso de la serie access point de Fortinet. deben usarse de tal manera que se minimice la posibilidad de contacto para el usuario durante la operación normal. Para evitar la posibilidad de exceder los límites de exposición a radiofrecuencia establecidos por la, el usuario (o cualquier otra persona en torno) debe mantenerse a una distancia de al menos 20 cm respecto a las antenas del punto de acceso.

	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. Exposition aux rayonnements à fréquence radioélectrique L'installateur de cet équipement radio doit veiller à positionner et orienter l'antenne de telle sorte qu'elle n'émette pas un champ radioélectrique supérieur aux limites définies par Santé Canada pour la population générale. Consulter le Code de sécurité n° 6, disponible sur le site Web de Santé Canada à l'adresse http://www.hc-sc.gc.ca/rpb. Exposición a la radiación de radiofrecuencia. El instalador de este equipo de radio debe cerciorarse de que la antena está localizada u orientada de tal manera que no emita un campo de radiofrecuencia superior a los límites estipulados por Health Canada para la población; consulte el Código de Seguridad 6 que podrá encontrar en el página web de Health Canada, http://www.hc-sc.gc.ca/rpb.

Warnings

A warning calls your attention to a possible hazard that can cause injury or death. The following are the warnings used in this manual.

"Achtung" weist auf eine mögliche Gefährdung hin, die zu Verletzungen oder Tod führen können. Sie finden die folgenden Warnhinweise in diesem Handbuch:

Un avertissement attire votre attention sur un risque possible de blessure ou de décès. Ci-dessous, vous trouverez les avertissements utilisés dans ce manuel.

Una advertencia le llama la atención sobre cualquier posible peligro que pueda ocasionar daños personales o la muerte. A continuación se dan las advertencias utilizadas en este manual.

	Only AP433e is suitable for use in environmental air handling 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 authori- ties for regulations. Nur AP433e ist für den Einsatz in der Umweltlüftungsraum in Übereinstimmung mit dem Abschnitt 300-22 (c) des National Electric Code und den Abschnitten 2 - 128,12 bis 010 (3) und 12-100 des Canadian Electrical Code. Teil 1. C22. 1. Für andere Länder wenden die lokalen Behörden für Verordnungen. Seulement AP433e est adapté pour une utilisation dans l'environnement d'espace de traitement d'air, conformément à la section 300-22 (c) du Code national de l'électricité et des sections 2 - de 128,12 à 010 (3) et 12 - 100 de Code canadien de l'électricité. Partie 1. C22. Une. Pour les autres pays, consulter les autorités locales pour les règlements. Sólo AP433e es adecuado para su uso en el espacio de gestión de aire del medio ambiente de acuerdo con la Sección 300-22 (c) del Código Eléctrico Nacional y las Secciones 2 - 128,12 a 010 (3) y 12 a 100 del Código Eléctrico Canadiense. Parte 1. C22. 1. Para otros países, consulte a las autoridades locales para la reglamentación.
	Any Ethernet 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). Alle Ethernet Kabel, die in Lüftungsräumen installiert werden, sollten gemäß NEC Artikel 800.50 geeignet sein und entsprechend zur Verwendung in Hohlräumen (Plenum) und Lüftungsräumen im Hinblick auf Rauchausbreitung gekennzeichnet sein, z.B. CL2-P, CL3-P, MPP (Multi Purpose Plenum) oder CMP (Communications Plenum). Les câbles Ethernet installés dans un vide d'air doivent correspondre aux critères de l'article 800.50 du code NEC et identifiés en conséquence comme adaptés à une utilisation dans les vides de construction des bâtiments en matière de propagation de la fumée (marquages CL2-P, CL3-P, MPP (Multi Purpose Plenum) ou CMP (Communications Plenum)). Todos los cables Ethernet instalados en espacios aéreos deben cumplir con el artículo 800.50 del NEC y estar marcados adecuadamente para su uso en espacios aéreos y plenums en lo concerniente a la propagación de humo, tales como CL2-P, CL3-P, MPP (Plenum multifuncional), o CMP (Plenum de comunicaciones)..

	Inside antennas must be positioned to observe minimum separation of 51 cm. (~ 20 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 51 cm. (~ 20 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 Expo- sure according to local country regulatory approval. Innenantennen müssen so positioniert werden, dass ein Mindestabstand von 20 cm (ca. 8 Zoll) zu allen Benutzern und anderen Personen gewahrt wird. Zum Schutz von Personal, das in der Nähe von Innenantennen (Downlink) arbeitet, sind die folgenden Richtlinien für Mindestabstand zwischen dem menschlichen Körper und der Antenne zu beachten. Die Innenantenne muss so installiert werden, dass sich unter normalen Bedingungen kein Personal bis auf weniger als 51 cm. (~ 20 Zollin.) an eine Innenantenne annähern kann. Durch Überschreitung dieses Mindestabstands wird sichergestellt, dass Mitarbeiter oder andere Personen keiner RF-Exposition über die maximal zulässige Exposition (MPE; Maximum Permissible Exposure) gemäß FCC CFR 47, Abschnitt 1.1310 (Grenzwerte für die allgemeine Bevölkerung/unkontrollierte Exposition) ausgesetzt werden. Les antennes intérieures doivent être positionnées de façon à respecter une distance minimum de 51 cm par rapport aux utilisateurs et aux tiers. Pour la protection du personnel travaillant à proximité des antennes intérieures (liaison descendante), respecter les directives suivantes pour assurer des distances minimales entre les êtres humains et les antennes. Toute antenne intérieure doit être installée de telle sorte que, dans des conditions normales, le personnel ne puisse s'en approcher à moins de 51 cm. Cette distance minimale est destinée à garantir qu'un employé ou un tiers ne sera pas exposé à un rayonnement radioélectrique supérieur à la valeur maximale autorisée, telle qu'elle est définie dans les limites d'exposition non contrôlées pour la population par la réglementation de la FCC CFR 47, section 1.1310.

Supported PoEs

Supported Power Over Ethernet Devices for APs

PoE	Description
POE-AT-1AC	Mid-Span High Power pre-802.3at PoE injector (1 Port, 110V/220V AC input). Ideal for AP300, AP300i, or AP1000; backward compatible with 802.3af, also works with AP150.
POE-AT-12AC	Mid-Span 802.3af+ High Power PoE injector (12 Port, 110V/220V AC input), 19" rack mountable, remote management capable. Ideal for AP300, AP300i, or AP1000.
POE1-24AC	Mid-Span 802.3af PoE injector (24 Port, 110V/220V AC input) - Ideal for AP300, AP300i, or AP1000.
POE1-24ACDC	Mid-Span 802.3af PoE injector (24 Port, 110V/220V AC or 48V DC input) - Note only supports 20 access points?? Ideal for AP300, AP300i, or AP1000.

B Remarks

Maximum EIRP

The transmit EIRP is the sum of the conductive transmit power, IEEE Std 802.11n multiple stream effect, and the antenna gain. By default, Fortinet 433 SERIES AP EIRP is set lower than the regulatory limit with the default antenna.

Dual Concurrent Same Band Operation

With grant of additional regulatory approval and FCC Permit-but-Ask, users may configure two radios in 433 SERIES AP on the same band (i.e., two or three radios are on the 5.x CHz but in the different or same channels).

However, user shall expect performance deterioration due to RF collision and collocation interference. It is important that users adopt external antennas, with extended coaxial pigtail cables, with 433 SERIES AP in such use case. User shall place antennas far apart to reduce interference.

Meanwhile, user shall also reduce 433 SERIES APe transmit power, for each radio, by at-least 3 dBm from its default setting.

Manufacturing Information

The 433 SERIES AP models are built in China. Contact with Fortinet for manufacturing related information.

Distributed Antenna Systems (DAS)

Fortinet does not certify or endorse any specific Distributed Antenna System (DAS) vendors. Fortinet will provide support to Fortinet Wi-Fi customers that use distributed antennas within

the terms and conditions of the FortinetAssure Terms of Service and in accor- dance with the customer's support agreement. Fortinet Customer Support will support Fortinet software and hardware, and will work jointly with DAS vendors to identify and troubleshoot issues, but any support related to RF issues, including RF coverage, shall be the responsibility of the DAS vendor.

Fortinet recommends that customers use only a DAS that has been tested to work with Forti- net hardware and software. Fortinet does not provide any site surveys, design or imple- menta- tion of Wi-Fi over DAS. Fortinet recommends that customers obtain such services from a trained and qualified systems integrator or from their DAS vendor.

Air Handling Space Requirements

When installing APs in an air-handling space, as described in Article 300.22(C) of the National Electric Code® (2008 edition, pages 70-135 and 70-136), the unit should only be powered by the Ethernet port (PoE), not by the AC-powered power supply.

Only AP433e can be applied in air-handling space.

When the product is installed in air-handling spaces, the cables employed should be suitable under NEC Articles 300.22 and 725 and marked accordingly, for use in plenums and air-han- dling spaces with regard to smoke propagation, such as CL2-P, CL3-P, MPP or CMP.

The products should be installed in accordance with all applicable, local regulations and prac- tices. Compliance applies only when the plastic facade is removed from the AP.

Frequencies Blocked for Regulatory Compliance

AP433e, AP433i, & AP433is are for indoor use only , in U-NII-1 and/or U-NII-3 band when Dynamic Frequency Selection, DFS, from 5.25-5.35 GHz and 5.47-5.725 GHz, is disabled in some regions. With DFS approval from System Director V 6.0 SR2, AP433e, AP433i, & AP433is can be operate in U-NII-2 or U-NII-2e in some regions

OAP433e is for outdoor use only , in U-NII-1 and/or U-NII-3 band when Dynamic Frequency Selection, DFS, from 5.25-5.35 GHz (U-NII-2) and 5.47-5.725 GHz (UNII-2e), is disabled for some regions. With DFS approval from System Director V6.0 SR2, OAP433e can be operated in U-NII-2 or U-NII-2e in some regions

To ensure compliance with local regulations, be sure to set your Access Point to the country in which you are using the Access Point.

Restriction of Hazardous Substances

European Community

This device complies the Restriction of Hazardous Substances Directive (RoHS) for its restriction of the use of certain hazardous substances in electrical and electronic equipment for European Union.

China

This device complies Administrative Measure on the Control of Pollution Caused by Electronic Information Products or China RoHS. 433 SERIES APe may contain hazardous substances are marked with the EIP logo including an Environment Friendly Use Period (EFUP) value in 10 years as Figure 43, China toxic & hazardous substances label

Figure 58: *China toxic & hazardous substances label*

AP433	Toxic and Hazardous Substances or Elements					10
Component with toxic and hazardous substances	Pb (Lead)	Hg (Mercury)	Cd (Cadmium)	Cr(VI) (Hexavalent Chrome)	PBB (Polybrominated biphenyl)	PBDE (Polybrominated diphenyl ether)
Circuit Modules	X	O	O	O	O	O
Metal Parts	O	O	O	O	O	O
Plastic and Polymeric Parts	O	O	O	O	O	O

O: Indicates that the content of the toxic and hazardous substance in all the homogenous materials of the part is below the concentration limit requirement for RoHS compliance.
X: Indicates that the content of the toxic and hazardous substance in at least one homogeneous material of the part exceeds the concentration limit requirement for RoHS compliance

Underwriters Laboratories

Use only listed e information technology equipment (ITE) I.T.E. equipment.

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

Only AP433e is 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.