RUiJie
Networks

RG-AP220-E(M) Series Access Point

Hardware Installation and Reference Guide V1.3

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Preface

Thank you for using our products. This manual will guide you through the installation of the access point.

Scope

It is intended for the users who have some experience in installing and maintaining network hardware. At the same time, it is assumed that the users are already familiar with the related terms and concepts.

Obtaining Technical Assistance

- Ruijie Networks website: http://www.ruijienetworks.com
- Online customer services: http://webchat.ruijie.com.cn
- Customer service center: http://www.ruijie.com.cn/service.aspx
- Customer services hotline: +86-4008-111-000
- BBS: http://support.ruijie.com.cn
- Customer services email: service@ruijie.com.cn

Related Documents

Documents	Description
Configuration Guide	Describes network protocols and related mechanisms that supported by the product, with configuration examples.
Command Reference	Describes the related configuration commands, including command modes, parameter descriptions, usage guides, and related examples.

Documentation Conventions

The symbols used in this document are described as below:

⚠️ Caution   This symbol brings your attention to some helpful suggestions and references.

✏️ Note   This symbol means that you must be extremely careful not to do some things that may damage the device or cause data loss.

Chapter 1 Product Overview

The RG-AP220-E(M) series wireless LAN access point is designed by Ruijie Networks for Ruijie i-share wireless solution. It is ideal for large-sized campuses and hospitals. The AP can serve as a Fit AP and operate in conjunction with a Ruijie WS series wireless controller; or it can serve as a standalone Fat AP and provide wireless access for mobile clients.

RG-AP220-E(M) V1.XX

Model	RG-AP220-E(M) V1.XX
Feature	Indoor dual band dual radio access point, supporting i-Share system.
Interfaces	One Gigabit combo port (one 10/100/1000M auto-sensing RJ45 port and one SFP port) One Console port
Antennas Connectors	Six SMA connectors
Power Adapter	Input: 90-264 V AC,50-60 Hz Output: 48 V DC, 0.4 A max.
PoE	IEEE 802.af PoE
Power Consumption	12.95 W
Operating Frequency	802.11b/g/n: 2.4 GHz to 2.4835 GHz
Transmit Power	100 mW, adjustable
Temperature	Operating: 0 to 50℃ (32 to 122 ℉)
	Storage: -40 to 70℃ (-40 to 158 ℉)
Humidity	Operating:10% to 95% noncondensing
	Storage: 5% to 95% noncondensing
Size (W x D x H)	24 cm x 22 cm x 4 cm 9.44 in. x 8.66 in. x 1.57 in.
Weight	1.6 kg (3.53 lbs)

RG-AP220-E(M) V2.XX

Model	RG-AP220-E(M) V2.XX
Feature	Indoor dual band dual radio access point, supporting i-Share system.
Interfaces	One Gigabit combo port (one 10/100/1000M auto-sensing RJ45 port and one SFP port) One Console port
Antennas Connectors	Six SMA connectors
Power Adapter	Input: 90-264 V AC,50-60 Hz Output: 48 V DC, 0.4 A max.
PoE	IEEE 802.af PoE

Power Consumption	12.95 W
Operating Frequency	802.11b/g/n: 2.4 GHz to 2.4835 GHz
Transmit Power	10 mW per antenna connector, adjustable
Temperature	Operating: 0 to 50℃ (32 to 122 ℉)
	Storage: -40 to 70℃ (-40 to 158 ℉)
Humidity	Operating:10% to 95% noncondensing
	Storage: 5% to 95% noncondensing
Size (W x D x H)	24 cm x 22 cm x 4 cm
	9.44 in. x 8.66 in. x 1.57 in.
Weight	1.6 kg (3.53 lbs)

RG-AP220-E(M)-V2

| Model	RG-AP220-E(M) V2
Feature	Indoor dual band dual radio access point, supporting i-Share system
Interfaces	One 10/100/1000BASE-T Ethernet port
	One RJ45 port
Antennas Connectors	Eight SMA connectors
Network Standards	802.11a/b/g/n
Operating Frequency	802.11b/g/n: 2.4 GHz to 2.4835 GHz
	802.11a/n: 5.15 GHz to 5.85 GHz
Power Adapter	Input: 100-240 V AC
	Output: 48 V DC
PoE	IEEE 802.af PoE
Power Consumption	12.95 W
Temperature	Operating: -10 to 55℃ (14 to 131 ℉)
	Storage: -40 to 70℃ (-40 to 158 ℉)
Humidity	Operating: 5% to 95% noncondensing
	Storage: 5% to 95% noncondensing
Transmit Power	20 mW per antenna connector, adjustable
Power Save Mode	Supported
Operating Channels	5.0 GHz: 12 channels (USA), 5 channels(China)
	2.4 GHz: 11 channels (USA), 13 channels (China and Europe)
Data Rates	802.11b: 11, 5.5, 2, and 1 Mbps
	802.11a/g: 54, 48, 36, 24, 18, 12, 9, and 6 Mbps
	802.11n: MCS0 through MCS15, maximum data rate 300 Mbps
Size (W x D x H)	20 cm x 19 cm x 3.5 cm
	7.87 in. x 7.48 in. x 1.38 in.
Weight	0.8 kg (1.76 lbs)
EMC Standards	GB9254-2008 CLASS B
Safety Standards	GB4943-2011

Product Image

The RG-AP220-E(M)-V2 provides one Console port, one 10/100/1000Base-T auto-sensing Ethernet port with PoE capability, one 48V DC power port on the front and eight antenna connectors on the three sides.

Figure 1-1 Product Image of RG-AP220-E(M)-V2

Front View

Figure 1-3 Front View of RG-AP220-V2
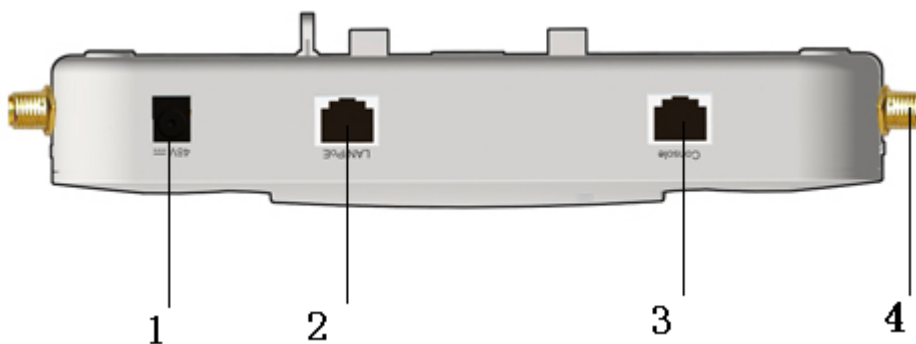
Note	1. Console port	3. Console port
	2. 10/100/1000 Base-T auto-sensing Ethernet port	4. Antenna

Top View

Figure 1-3 Top view of RG-AP220-E(M)

Note	1. Status LED	3. Radio 1 LED
	2. Ethernet LED	4. Radio 2 LED

Power Sources

The AP can be powered either with a 48V DC power adaptor or through Power over Ethernet (PoE).

Rated voltage: 48V DC

Rated current: 0.25A

☑ It is recommended that you use Ruijie PoE-capable switches, such as RG-S5750P-24GT/12SFP and RG-S3760E-24P, to power the AP. When you use PoE devices made by other companies as power sources, the devices may cause exceptions or damages to the AP.

Cooling Solution

The AP adopts fanless design. To ensure good heat dissipation, leave a minimum space of 10 cm from both sides and the rear of the AP, and avoid blocking the air vents on the AP.

LED Indicators

LED	State	Meaning
Status	Off	The AP is NOT receiving power.
	Blinking green	Initialization in progress.

		Continuous blinking indicates errors.
	Solid green	The AP is operational.
	Solid red	The AP is faulty.
Radio 1	Off	Radio1 is NOT operational.
	Solid green	Radio1 is operational.
	Blinking green	Radio1 is transceiving data.
Radio 2	Off	Radio 2 is NOT operational.
	Solid organge	Radio 2 is operational.
	Blinking orange	Radio 2 is transceiving data.
Ethernet	Off	The Ethernet port is NOT connected.
	Solid green	The Ethernet port is connected.
	Blinking green	The Ethernet port is transceiving data.

Chapter 2 Preparing the Installation

Note   To prevent device damage and bodily injury, please read carefully the safety recommendations described in this chapter. The recommendations do not cover all possible hazardous situations.

Preparing Installation Site

- Do not expose the AP to high temperature, dusts, or harmful gases.

- Do not install the AP in an inflammable or explosive environment.

- Keep the AP away from EMI sources such as large radar stations, radio stations, and substations.

- Do not subject the AP to unstable voltage, vibration, and noises.

- Keep the AP at least 500 meters away from the seaside and do not face it toward the wind from the sea.

- The installation site should be free from water flooding, seepage, dripping, or condensation.

- The installation site should be selected according to network planning and features of communications equipment, and considerations such as climate, hydrology, geology, earthquake, electric power, and transportation.

EMI

All interference sources, either from outside or inside of the device or application system, affect the device by capacitive coupling, inductive coupling, or electromagnetic waves.

Electromagnetic interference (EMI) occurs due to electromagnetic radiation or conduction, depending on the transmission path.

Radiation interference occurs when energy, usually radio frequency energy, is emitted from a device and propagated through space that disturbs other victims. The interference source can be part of disturbed system or a fully electrically isolated unit. Conduction interference occurs when interference is transferred from one unit to another unit through cables, which are usually electromagnetic wires or signal cables connected between the source and the victim. Conduction interference often affects the power supply of the device, and can be eliminated by using filters. Radiation interference can influence the path of any signal from the device, which is hard to be shielded.

- Take effective measures against interferences from the power grid.

- Keep the AP far away from the grounding or lightning protection devices of power equipment.

- Keep the AP away from high-power radio stations, radar stations, and high-frequency high-current devices.

- Take electrostatic shielding measures.

Ventilation

For proper ventilation, leave a minimum clearance of 10 cm (3.9 in.) from the rear and both sides of the AP. And bind your loose cables together or place them on a cable tray to avoid blocking the air inlets.

Temperature and Humidity

To ensure normal operation and service life of the device, maintain appropriate temperature and humidity levels in your equipment room. See Table-1 . Improper room temperature and humidity can cause damages to the device.

■ High relative humidity may affect insulation materials, resulting in poor insulation and even electrical leakage, and sometimes may lead to change of mechanical properties of materials and corrosion of metal parts.

■ Low relative humidity may dry and shrink insulation sheets and cause static electricity that can damage the circuitry inside the device.

■ High temperature greatly reduces reliability of the device and shortens its service life.

Table 2-1: Required Temperature and Humidity for the RG-AP220-E(C)

Temperature		Relative Humidity	
Long-term	Short-term	Long-term	Short-term
10ºC to 45ºC	-10ºC to 50ºC	40% to 65%	10% to 90%

Note The ambient temperature and humidity are measured at a point 1.5 meters (4.9 feet) above the ground and 0.4 meters (1.3 feet) before the device when there is no protective board in the front or back of the rack.

Note The "short-term" means at most 48 hours of continuous operation in less than 15 days each year.

Cleanness

Dust poses a serious threat to device operation. Dust that falls onto the surface of the device can be absorbed onto metal contact points by static electricity, resulting in poor contact. Electrostatic absorption of dust occurs more easily when the relative humidity is low, which may shorten the service life of the device and cause communication failures. Table 2-2 shows the maximum concentration and diameter of dust allowed in the equipment room.

Table 2-2 Maximum Concentration and Diameter of Dust Allowed

Maximum diameter (µm)	0.5	1	3	5
Maximum concentration (Particles/m^3)	1.4 x 10	7 x 10	2.4 x 10	1.3 x 10

Besides, the contents of salts, acids and sulfides in the air are also strictly limited for the equipment room. These substances can accelerate metal corrosion and the aging of some parts. Table 2-3 describes the limit of some hazardous gases such as SO_2, H_2S, NO_2 and Cl_2 in the equipment room.

Table 2-3 Limits of Hazardous Gases

Gas	Average (mg/m^3)	Maximum (mg/m^3)
SO$_2$	0.2	1.5
H$_2$S	0.006	0.03
NO$_2$	0.04	0.15
NH$_3$	0.05	0.15
Cl$_2$	0.01	0.3

Anti-Interference

The AP is susceptible to external interference by capacitive coupling, inductive coupling, electromagnetic waves, common impedance (ground) coupling, or conduction over power lines, signal lines and output lines. Note that:

- In a TN earthing system, use a 3-wire single-phase outlet that has a protective earth (PE) contact to allow the filter circuit in the device to eliminate interference from the power grid.

- Keep the AP away from high-power radio stations, radar stations, and high-frequency high-current devices.

- Use EMI shielding such as shielded interface cables to minimize interference when necessary.

- Route interface cables only indoors to prevent signal ports from getting damaged by overvoltage or overcurrent caused by lightning strikes.

Installation Tools

Common Tools	Phillips screwdriver, slotted screwdriver, related cables, bolts, diagonal pliers, cable ties
Special Tools	ESD tools

Note   The RG-AP220-E(M)-V2 also requires an electric drill, wall anchors and screws, and a multimeter.
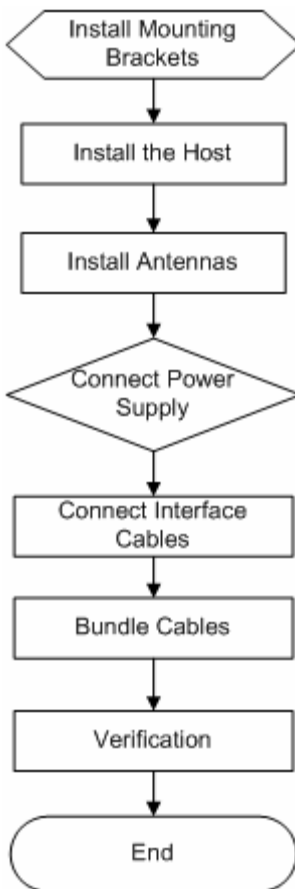
Note   The listed tools are customer supplied.

Chapter 3 Installing the Access Point

Installation Flowchart

Note   Seal the unused antenna connectors with 50-ohm plugs.

Before You Begin

Before you install the AP, verify that:

- The installation site meets temperature and humidity requirements.

- The installation site is equipped with proper power supply.

- Network cables are in place.

- The installation site meets all described requirements.

- The custom AP meets the customers' requirements.

- Install antennas at least 7.9 inch (20 cm) away from human bodies.

- Keep the AP away from microwave ovens that may cause signal interference.

- Do not install the AP outside the buildings.

Note   The AP must be connected to PoE IEEE 802.3af compliant power source or a CCC certified power source.

Precautions

To avoid damages to the AP, observe the following safety precautions:

- Install the device in a well-ventilated location.

- Do not subject the device to high temperatures.

- Keep away from high voltage cables.

- Install the device indoors.

- Do not expose the device in a thunderstorm or strong electric field.

- Keep the device clean and dust-free.

- Disconnect the device before cleaning it.

- Do not use a damp cloth or liquid for cleaning.

- Do not open the enclosure when the AP is working.

- Make sure the output voltage of the adapter matches the specifications.

- Fasten the device tightly.

- Make sure all antennas are connected before powering up the device.

- Verify the device is properly installed before powering the device either with a PoE switch or through a surge protector.

- Do not operate your wireless network device near unshielded blasting caps or in an explosive environment.

- Make sure all antennas are connected or not in a transmit state before powering up the AP.

- Before connecting an external power supply, make sure the power supply is compatible with the power module of the device.

- Before connecting a power cord, make sure the power switch is turned off.

- Select an appropriate and clean location and install the AP according to the installation steps described in Section 3.3. After installation, check the AP is properly installed and working. If you install the AP at a high place, make sure the AP is securely fastened to prevent it from shaking or falling off.

Caution   Before you power up the AP, make sure all antennas are connected or not in a transmit state. Otherwise, it may cause damages to the device.

Installing the AP220-E(M) V1.XX and V2.XX

Note   Disconnect the power supply while installing or moving the AP.

Note   Tighten all screws.

Note   Keep the LED light in sight.

Wall Anchors and Screws

- Reference sizes for wall anchors and screws:

Wall anchors: M7xϕ4.5x28 (mm)

Screws: 4*20PABC (mm)

Figure 3-1 Screws
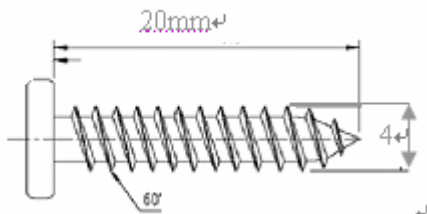
Figure 3-2 Wall Anchors
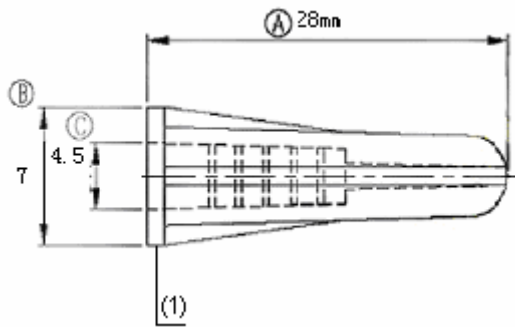
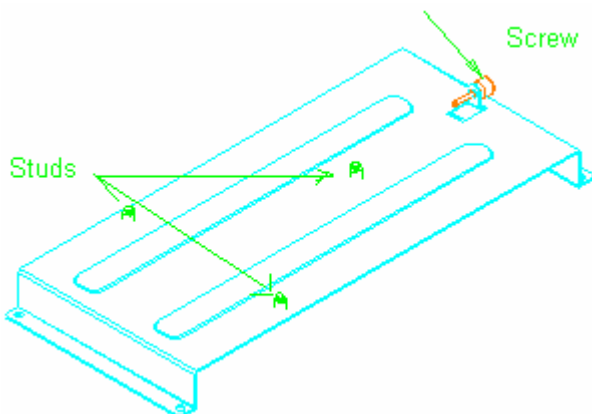## Installing the AP

Follow the steps below:

1) Drill four 5 mm holes on the wall at the four corners of a rectangle (120 mm x 275 mm).

2) Insert the anchors into the holes. The rim of the anchor should be flush with the wall.

3) Drive screws through the mounting bracket into the anchors and mount the AP on the wall or ceiling.

Figure 3-3

4) Attach the three holes on the rear of the AP onto the three studs on the bracket, and pull the AP 8 mm away from the screw direction (See Figure 3-3).

5) Tighten the screw on the bracket until it reaches the hole on the side of the AP.

Note The depth of the holes must fit the size of the wall anchors and screws used. Make sure that the wall anchors can be inserted into the holes, leaving the rim of the anchor outside the wall. As you drive the screws in, the anchors will expand to grip the wall tightly.

Note When installing the AP on a vertical surface, orient the mounting bracket with the screw side facing down.

Deploying i-Share Wireless Solution

The Ruijie i-share wireless solution involves antenna extension cables and antennas. The RG-AP220-E(M) can connect six antenna extension cables and six antennas, which can be deployed as required to extend wireless coverage to hard-to-reach areas. Figure 3-4 shows deployment of i-share wireless solution.

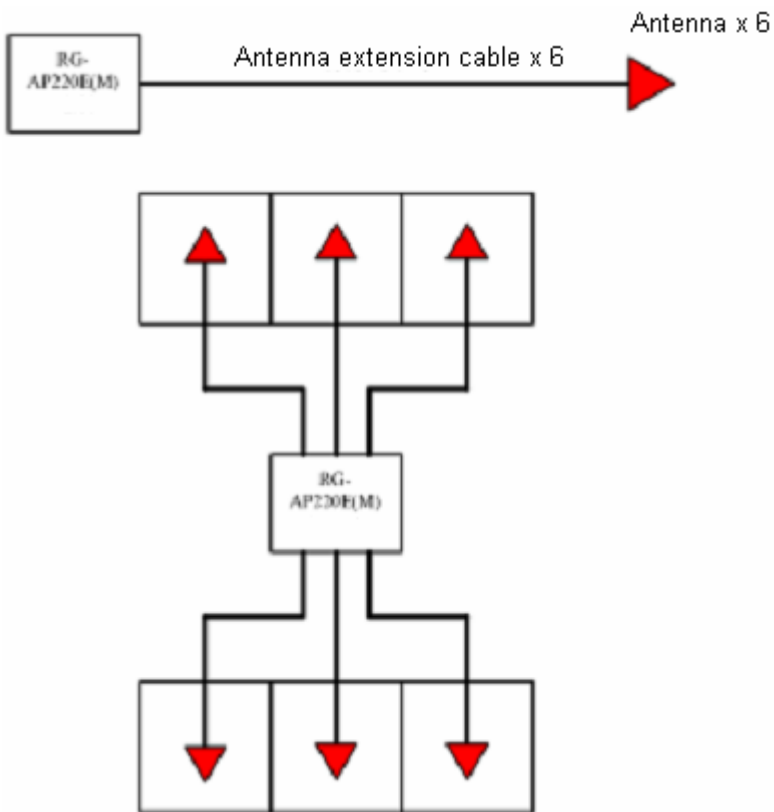Figure 3-4 Deployment of i-Share Wireless Solution

Figure 3-5 shows a real-world application of i-share solution in RG-AP220-E(M).

Figure 3-5 Real-World Application of i-Share Solution

Verifying the Power Supply

The AP can be powered either with a 48V DC power adapter or through Power over Ethernet (PoE).

PoE

When using PoE, verify that the power supply equipment is IEEE 802.11af PoE compliant, and the Ethernet cable is connected to the Ethernet port on the AP. Figure 3-6 shows the location of the Ethernet port on the AP.

Figure 3-6 Ethernet Port

Note	1.Reset button	4.10/100/1000Base-T auto-sensing Ethernet port
	2.Console port	5. Nameplate
	3.Copper port LED	6. Power port

Power Adapter

When using a power adapter, verify that it meets the recommended specifications, and the adapter is plugged in the power port.

Verifying the Operation

After the AP is powered on, observe the LED on the cover and front panels to verify its operation.

Figure 3-7 LED Indicators

Note	1.Radio1 LED	3.Radio2 LED
	2.Status LED	

LED	State	Meaning
Status	Off	The AP is NOT receiving power. Or the power supply is faulty.
	Blinking green	Initialization in progress. Continuous blinking indicates errors (see Section 3.5 Troubleshooting)
	Solid green	The AP is operational.
	Solid red	The AP is faulty.
Radio1/2	Off	The wireless card is turned off.
	Solid green	The wireless card is turned on and operates in the 2.4 GHz band.
	Blinking green	The wireless card operates in the 2.4 GHz band and is receiving or transmitting traffic.
C	Off	The Ethernet port is NOT connected.
	Solid green	The Ethernet port is connected at 1000 Mbps.
	Blinking green	The Ethernet port is receiving or transmitting traffic at 1000 Mbps.
	Solid orange	The Ethernet port is connected at 10/100 Mbps.
	Blinking orange	The Ethernet port is receiving and transmitting traffic at 10/100 Mbps.

Installing the AP220-E(M)-V2

Note   Disconnect the power supply while installing or moving the AP.

Wall Anchors and Screws

■   Reference sizes for wall anchors and screws:

Wall anchors: M7x ¢ 4.5x28 (mm)

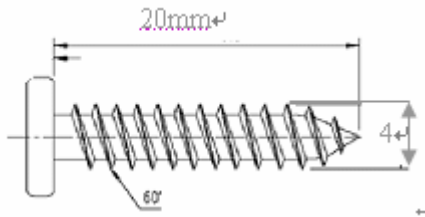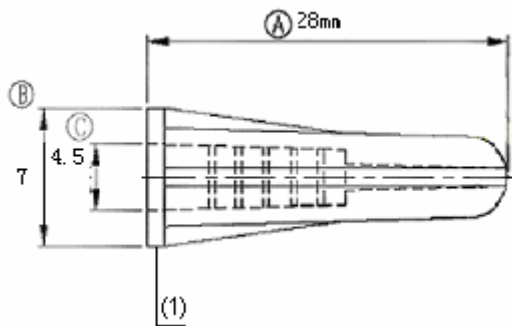Screws: 4*20PABC (mm)

Figure 3-8 Screws

Figure 3-9Wall Anchors

Installing the AP

Follow the steps below:

1)   Drill four 5 mm holes on the wall at the four corners of a rectangle (120 mm x 275 mm).

2)   Insert the anchors into the holes. The rim of the anchor should be flush with the wall.

3)   Drive screws through the mounting bracket into the anchors and mount the AP on the wall or ceiling.
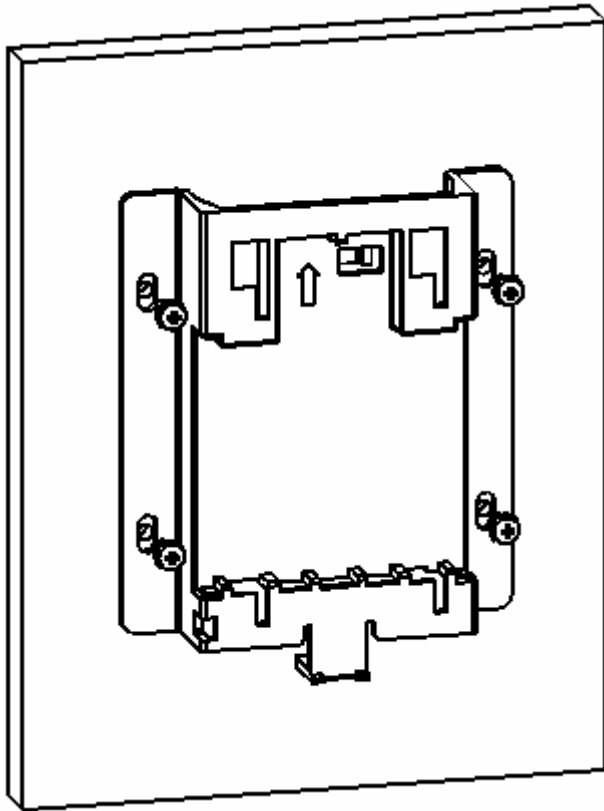
Figure 3-10
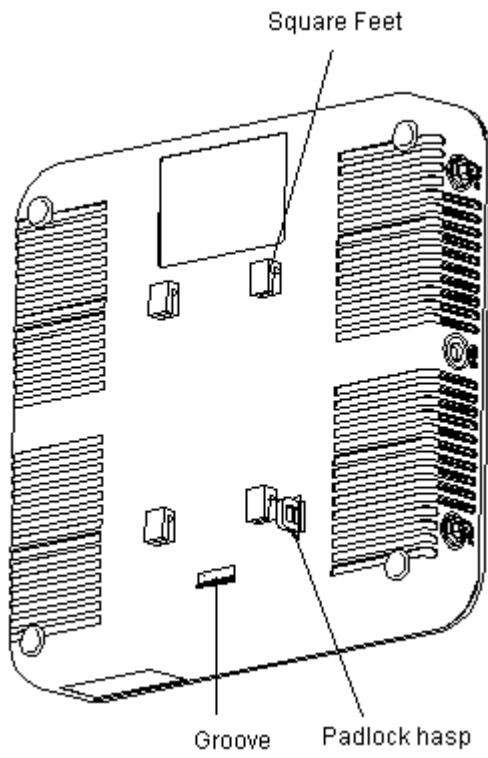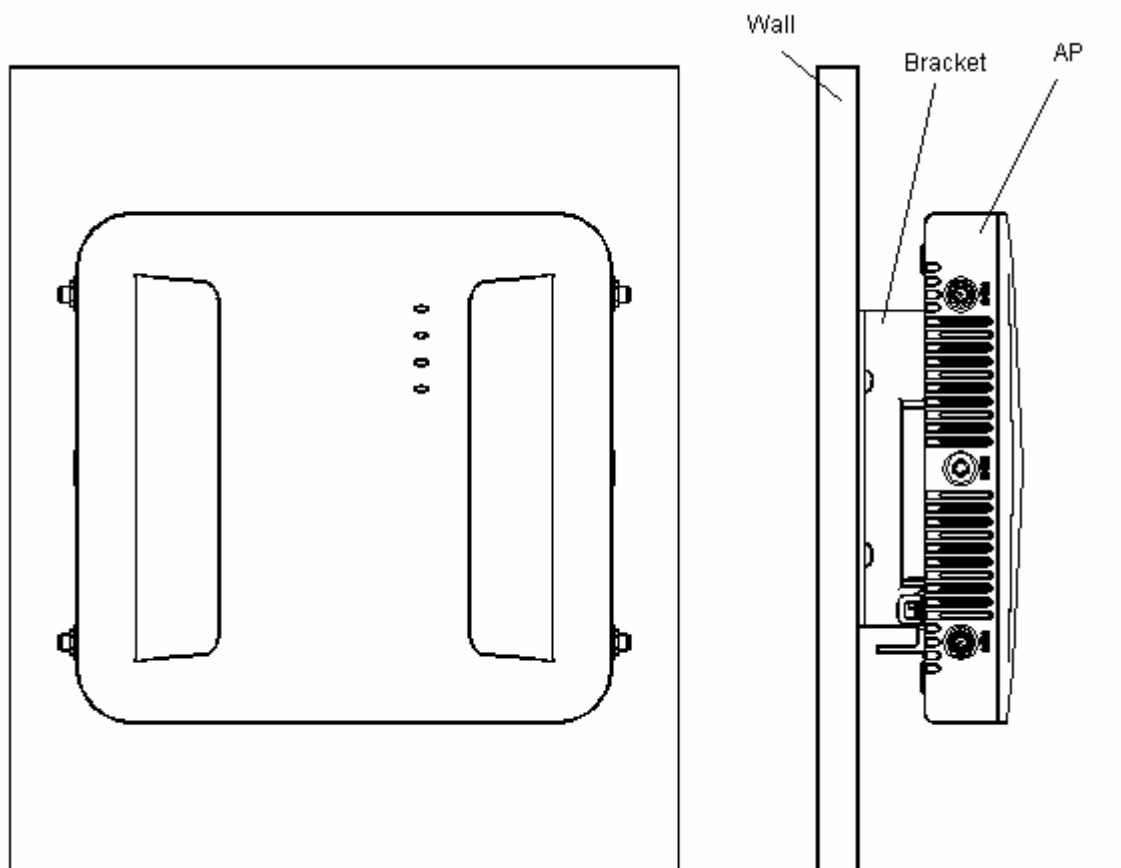
Figure 3-11

Square Feet

Groove   Padlock hasp

Figure 3-12

4) Align the square feet on the rear of the AP over the mounting holes on the bracket and slide the AP into the holes until it clicks into place (See Figure 3-5).

5) The padlock hasp is design for security needs. You can buy a padlock to lock the AP to the bracket.

Note   Note that the direction of the padlock hasp should be the same with that on the bracket.
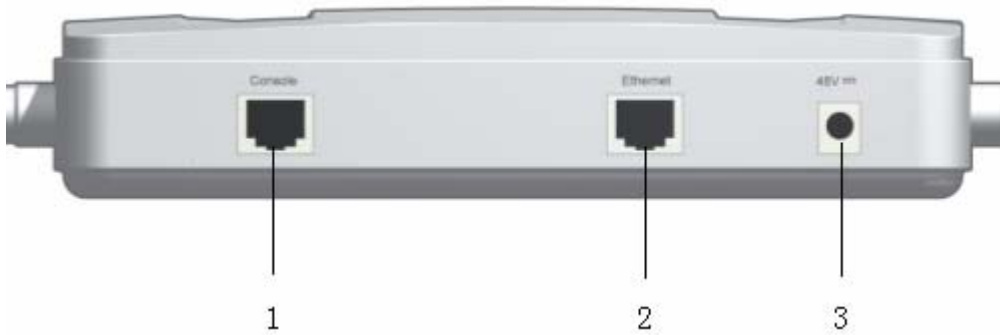
Verifying the Power Supply

The AP can be powered either with a 48V DC power adapter or through Power over Ethernet (PoE).

PoE

When using PoE, verify that the power supply equipment is IEEE 802.11af or 802.11at PoE compliant, and the Ethernet cable is connected to the Ethernet port on the AP.

Figure 3-13

Power Adapter

Use recommended power adapters to supply power for the AP.

Note   Keep the work bench stable.

Note   Leave a minimum clearance of 10 cm around the AP for proper ventilation.

Note   Do not place heavy things on top of the AP.

Verifying the Operation

After the AP is powered on, the Status LED will blink green and turn solid after initialization. Then the Radio1 and Radio2 LEDs light up, indicating the radio channels are in normal operation. If the AP is connected to the wired network, the Ethernet LED will light up, indicating the AP is operational.

Chapter 4 Troubleshooting

Status LED does not light up after the AP is powered on

- If you use PoE power supply, verify that the power source is IEEE 802.11af compliant, and then verify that the cable is connected properly.
- If you use a power adapter, verify that the power adapter is connected to an active power outlet, and then verify that the power adapter works properly.

Ethernet LED does not light up or blinks after the Ethernet port is connected

Verify that the device at the other end of the Ethernet cable is working properly. And then verify that the Ethernet cable is capable of providing the required data rate and is properly connected.

Wireless client cannot find the AP

1) Follow the abovementioned two steps.
2) Verify that the AP is configured correctly.
3) Adjust the angle of antennas.
4) Move the client device to adjust the distance between the client and the AP.

Status LED keeps blinking

Sometimes the AP performs firmware upgrade after power on. During this period, the Status LED keeps blinking and does not turn solid until the upgrade is completed. **Note**: Do not plug or unplug the power cord when the Status LED is blinking as firmware update takes time. If the blinking persists for an hour, it indicates the device initialization fails and the device is faulty.

Radio LED is abnormal

After the system starts and the Status LED turns solid, the Radio LED is off or solid green, probably because the AP has not established a proper CAPWAP connection with the AC. Verify the AC is operational and configured properly.