RG-AP530-I Series Access Point

Hardware Installation and Reference Guide V1.1

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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-AP530-I wireless LAN access point is designed by Ruijie Networks for the next-generation high-speed wireless Internet. By using the latest 802.11ac standard, the AP delivers an access rate of up to 1300 Mbps from each radio. A single AP can delivers 1900 Mbps access rate in total. With full consideration of wireless network security, radio frequency (RF) control, mobile access, QoS, and seamless roaming, the AP works with the Ruijie WS series wireless controller to enable wireless data forwarding, security, and access control.

802.11ac-compliant and designed with dual-band dual-radio, the AP can work in both 802.11a/n/ac and 802.11b/g/n/ac modes. The AP provides two 10/100/1000Base-T Ethernet ports for uplink connection.

The RG-AP530-I adopts industry-leading high-power RF bidirectional amplifier that increases output power to 100 mW in 2.4 GHz and 5 GHz bands. The AP can be equipped with external antennas to bring users with full-signal-coverage experience in demanding environments. Besides, the RG-AP530-I features:

- Guaranteed radio transmission within line of sight and non line of sight (NIOS)
- Enhanced abilities to penetrate obstructions
- Improved receiver sensitivity with low noise figure
- Greater coverage
- Built-in high-speed encryption engine, with support for TKIP and AES with no performance degradation

In the X-sense smart antenna matrix architecture, the RG-AP530-I with 24 built-in array antennas can dynamically select up to 16.77 million different antenna combinations which solves the weakness of coverage holes of traditional antennas. Regardless of the location of a mobile intelligent terminal, the X-sense smart antenna can customize an antenna path most suitable for the current location of the terminal to achieve full coverage. The X-sense smart antenna can reach 300 signal path switchover operations for the terminal within 1 millisecond. Even if a user is running fast, the X-sense smart antenna can still ensure that the terminal of the user is always followed by the best signal.

Technical Specifications

Table 1-1 Technical Specifications of the RG-AP530-I

Model	RG-AP530-I
Radio	
Transmission Protocol	802.11b/g/n, 2.4 GHz; 802.11a/n/ac, 5.8 GHz
RRM	Dynamic channel assignment (DCA) Transmit power control (TPC) Blind spot detection and repair
Operating Channels	802.11a, 802.11n, 802.11ac (compatible with 802.11a mode): 24 channels 802.11b, 802.11g, 802.11n, 802.11ac (compatible with 802.11b/g mode): 13 channels
Access Rates	802.11a: 54/48/36/24/18/12/9/6 Mbps 802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/11/9/6/5.5/2/1 Mbps 802.11n (20 MHz bandwidth mode):

|	144/130/117/115.6/104/86.7/78/72.2/65/58.5/57.8/52/43.3/39/28.9/26/21.7/19.5/14.4/13/7.2/6.5 Mbps
	802.11n (40 MHz bandwidth mode):
	300/270/243/240/216/180/162/150/120/135/121.5/120/108/90/81/60/54/45/40.5/30/27/15/13.5 Mbps
	802.11ac: max rate1.3 Gbps (NSS3, VHT80)
Service	
Virtual Service	The device supports up to 16 SSIDs. Each SSID can be configured with individual authentication method, encryption mechanism and VLAN attributes.
Switchover	Supports fast inter-AP switchover
Air-time Fairness	Supported
WDS	Supported
IP Address	Static IP address Dynamic IP address via DHCP
Routing Protocol	Static routes
ACL	Supported
Bandwidth Limit	Supported
Local Forwarding	Supported
IEEE 802.1p	Supported
IEEE 802.1Q	Supported
Security	
SSID Hiding	Supported
User Isolation	Supports isolation of wireless users on layer-2 forwarding
Radius	Supported
Frame Filtering	White list Static blacklist Dynamic blacklist
Authentication	Web authentication PSK authentication 802.1x authentication
Encryption	Supports WPA (TKIP), WPA2 (AES), WPA-PSK, WEP (64/128 bits)
WIDS	Supported
GSN	Supported
CPU Protection Policy (CPP)	Supported
Network Foundation Protection Policy (NFPP)	Supported
Management	
Network Manager	Supports SNMP v1/v2C/v3; Supports management via Telnet, SSH, TFTP, FTP.
Log	Supports local logs and log host.

Alarm	Supported
Fault Detection	Supported
Statistics	Supported
Fat/fit Mode Switching	When the AP works in the fit mode, the working mode can be switched to the fat mode through a WS series wireless controller. When the AP works in the fat mode, the working mode can be switched to the fit mode through the local console port or Telnet.
Physical	
Dimensions (W x D x H)	220 mm x 220 mm x 58 mm
Weight	1.55 kg (with the bracket and the device carton)
Installation	Wall-mount Ceiling-mount
Service Port	Two 10/100/1000Base-T Ethernet ports for uplink connection. (LAN 1 port supports PoE+)
Management Port	One console port
Radio Port	Built-in smart antennas
Power Supply	Supports 802.3at PoE and 802.3af PoE (When using 802.3af PoE, each radio is degraded to 1x3 MIMO)
Operating Frequency	802.11a/n/ac : 5.725 GHz to 5.850 GHz (China) 802.11b/g/n : 2.4 GHz to 2.4835 GHz (China)
Modulation Technique	OFDM: BPSK@6/9Mbps, QPSK@12/18Mbps, 16-QAM@24Mbps, 64-QAM@48/54Mbps DSSS: DBPSK@1Mbps, DQPSK@2Mbps, and CCK@5.5/11Mbps MIMO-OFDM: BPSK, QPSK, 16QAM , 64QAM and 256QAM
Transmit Power	802.11b: 20 dBm 802.11g: 20 dBm (6 Mbps), 20 dBm (54 Mbps) 802.11a: 20 dBm (6 Mbps), 20 dBm (54 Mbps) 802.11ng: 20 dBm (MCS0), 20 dBm (MCS7) 802.11na: 20 dBm (MCS0), 20 dBm (MCS7) 802.11ac: 20 dBm (MCS0), 20 dBm (MCS3)
Receiver Sensitivity	802.11b: -96 dBm (1 Mbps), -89 dBm (11 Mbps) 802.11g: -91 dBm (6 Mbps), -74 dBm (54 Mbps) 802.11a: -91 dBm (6Mbps), -74 dBm (54 Mbps) 802.11ng: -90 dBm (MCS0), -70 dBm (MCS7) 802.11na: -90 dBm (MCS0), -70 dBm (MCS7) 802.11ac VHT20: -88 dBm (MCS0), -63 dBm (MCS9) 802.11ac VHT40: -85 dBm (MCS0), -60 dBm (MCS9) 802.11ac VHT80: -82 dBm (MCS0), -57 dBm (MCS9)
Environment	IP40-certified (waterproof and dustproof) Operating temperature: -10 ºC to 55 ºC Storage temperature: -40 ºC to 70 ºC Operating humidity: 5% to 95%(non-condensing) Storage humidity: 0% to 100% (non-condensing)
Maximum Power Consumption	19W

| Safety	GB4943, EN/IEC 60950-1
EMC Compliance	GB9254, EN301 489
Health	EN 62311
Radio Approvals	China Radio Transmission Equipment Type Approval Certificate EN300 328 EN301 893

Product Image

The AP provides two radio ports and two Ethernet ports.
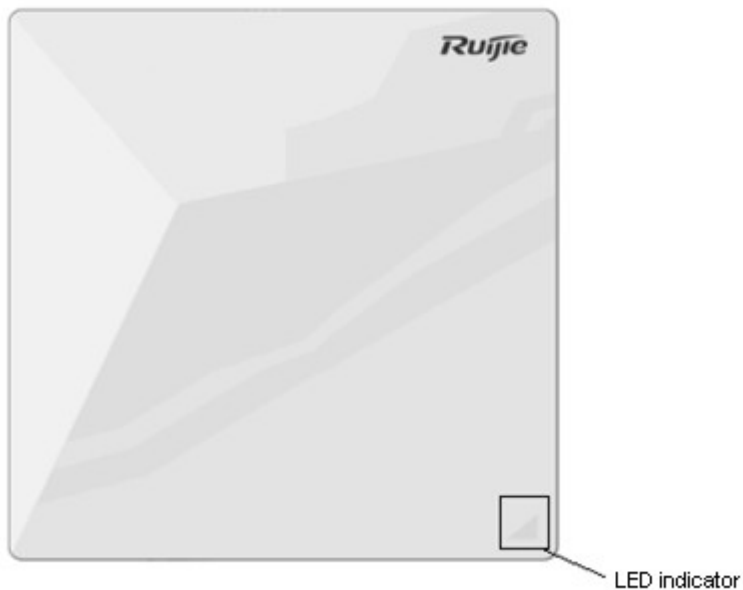
Figure 1-1 Bottom View of the RG-AP530-I
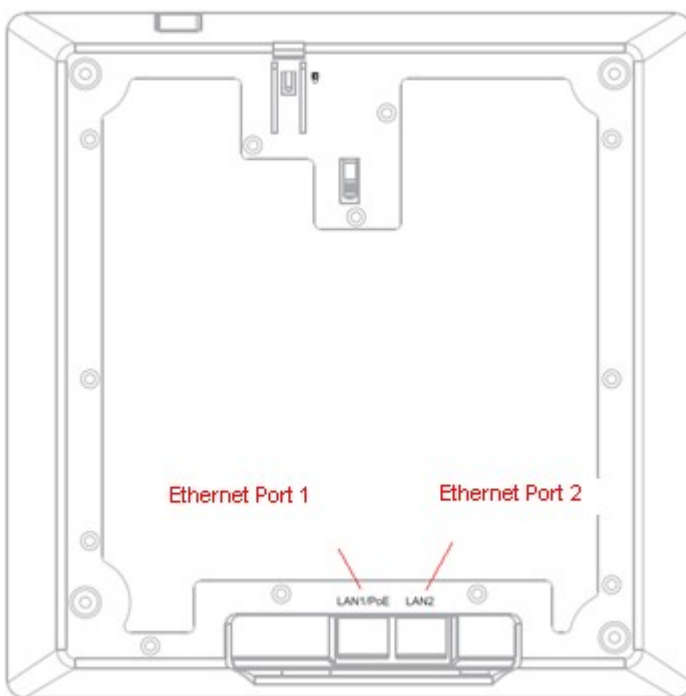
In Figure 1-1, the two ports are 10/100/1000Base-T auto-sensing Ethernet ports. Ethernet port 1 is PoE-capable.

Figure 1-2 Side View of the RG-AP530-I
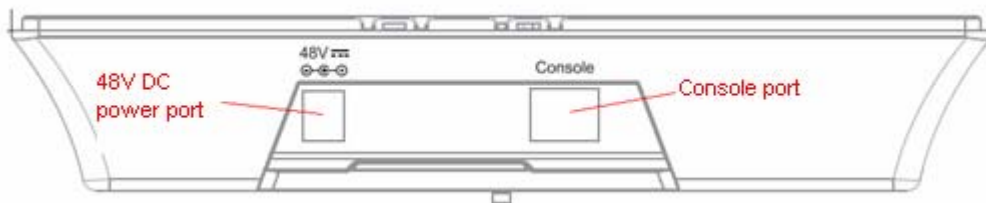
In Figure 1-2, the port on the left side is the 48V DC power port, and the port on the right side is the console port.

Figure 1-3 LED on the Top of the RG-AP530-I

LED indicator

LED Indicators

LED State	Blinking Frequency	Meaning
Off	N/A	The AP is NOT receiving power.
Blinking green	3 Hz	Initialization in progress.
Blinking red	3 Hz	Initialization is complete, but no Ethernet activity.
Blinking blue	3 Hz	Initialization is complete, and the AP is establishing a CAPWAP connection with an AC.
Blinking orange	3 Hz	Firmware upgrade in progress. Do not power off.
Solid blue	N/A	The AP is operational and the CAPWAP connection is established, but the wireless port is shut down.
Breathing blue	Alternating on and off, 16 cycles per minute	The AP is operational, the CAPWAP connection is established, and the wireless port is working.
Double blinking red	3 Hz, blinking for 2 cycles and off for 2 cycles	Locate AP

Power Sources

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

The AP requires Ruijie power adapters (If needed, you can buy them from Ruijie). To use a PoE device, make sure it supports the IEEE 802.3af/at PoE standard.

- Input voltage range: 44-57 V
- Rated current: 0.52 A

⚠ **Caution** It is recommended that you use Ruijie PoE+ capable switches, such as RG-S2924G-12P, RG-S2924G-24P and RG-S3760E-24P V2.X, to power the AP. When you use 803.3af PoE devices as power sources, each radio of the devices is degraded to 1x3 MIMO.

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.

Chapter 2 Preparing for Installation

Precautions

Install the RG-AP530-I indoor. To guarantee the device operation and service life, make sure the following requirements are met.

For the avoidance of bodily injuries and device damages, observe the following precautions before installing the device.

⚠️ Caution   The following recommendations do not cover all possible hazardous situations.

Installation Safety

■ 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 in a dry location 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 communication devices, and considerations such as climate, hydrology, geology, earthquake, electric power, and transportation.

Temperature and Humidity

The operating temperature and humidity are as the following:

■ Standard operating temperature: -10ºC to 55ºC
■ Storage temperature: -40ºC to 70ºC
■ Operating humidity(non-condensing): 10% to 95%

Cleanness

Dust poses a serious threat to device operation. Dust that falls on the surface of the device can be absorbed 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 2-1 shows the maximum concentration and diameter of dust allowed in the equipment room.

Table 2-1 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 in the equipment room. These substances can accelerate metal corrosion and the aging of some parts. Table 2-2 describes the limit of some hazardous gases such as SO_2, H_2S, NO_2 and Cl_2 in the equipment room.

Table 2-2 Limits of Hazardous Gases

Gas	Average (mg/m^3)	Maximum (mg/m^3)
SO_2	0.2	1.5
H_2S	0.006	0.03
NO_2	0.04	0.15
NH_3	0.05	0.15
Cl_2	0.01	0.3

EMI

All interference sources, either from outside or inside of the device or the 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, which 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.

Installation Tools

Common Tools	Phillips screwdriver, slotted screwdriver, related cables, bolts, diagonal pliers, cable ties, wall anchors, and screws.
Special Tools	ESD tools
Meters	Multimeter

⚠

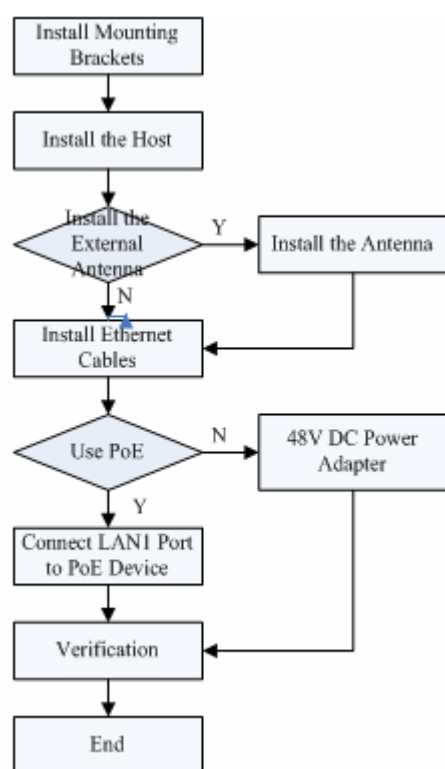Caution   Wall anchors and screws are supplied only with the RG-AP530-I or later. Other tools are customer supplied.

Chapter 3 Installing the Access Point

> ✎
> **Note**   Before installing the AP, make sure you have carefully read the requirements described in Chapter 2, and the requirements are met.

Installation Flowchart

Figure 3-1 Installation Flowchart of the RG-AP530-I

Before You Begin

To guarantee the device operation and service life, verify that:

- The installation site provides sufficient ventilation for the device.

- Avoid sites in high temperature, lightning and high field environments.

- Keep the device away from high voltage cable.

- Install the device indoor.

- Keep the device clean and away from dusts.

- Remove the power source before cleaning the device.

- Do not wipe the device with wet cloth, and do not clean the device with liquid.

- Do not open the chassis when the device is still operating.

- Make sure the power supply match the voltage requirement.

- Install the device firmly.

Installing the Access Point

⚠️
Caution   Remove the power supply when you install or remove the device.
Make sure the mounting screw is firmly fixed.
Guarantee easy observation of the LED indicator when you choosing the installation site.

Wall Anchors and Screws

Use screws and wall anchors of the recommended size. Please see the reference sizes below.

- Wall anchors: φ9 x 25.4mm
- Screws: 4.2 mm x 20 mm

Figure 3-1 Wall Anchor
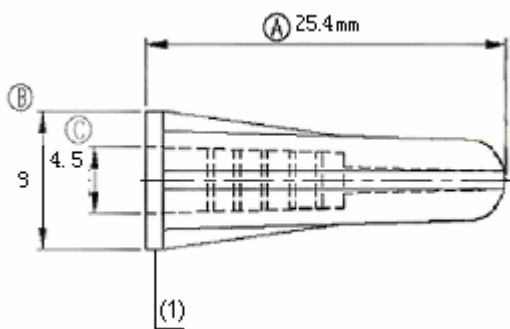
Figure 3-2 Screw
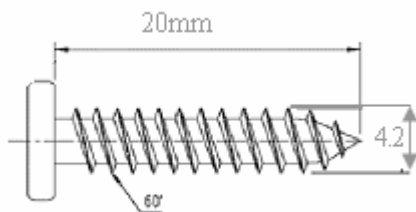
Installation Steps

RG-AP530 Wireless Access Point Quick Install Guide

Method 1: Wall Mounting
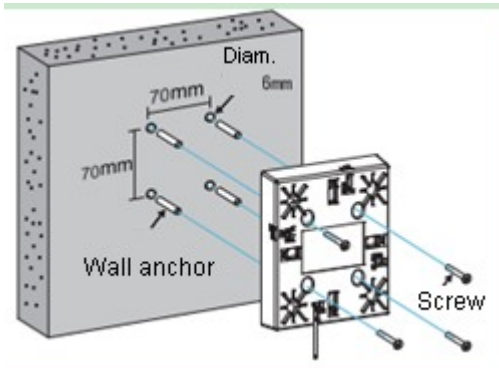
Drill four holes on the wall, insert the anchors into the holes, and attach the mounting bracket to the wall using the screws.
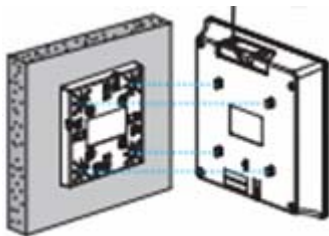
Align the square feet on the rear of the AP over the mounting holes on the bracket.

⚠️ **Caution**   Install the Ethernet cable first before you mount the AP onto the brackets.
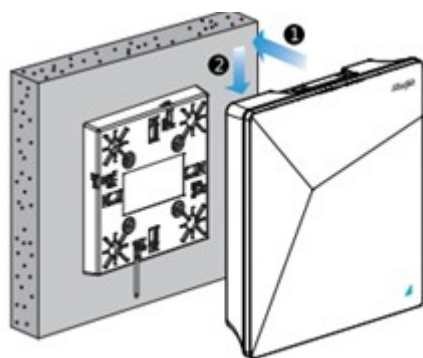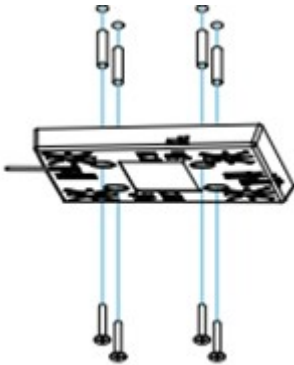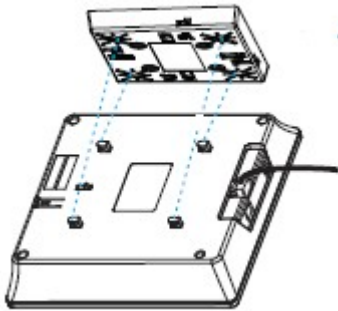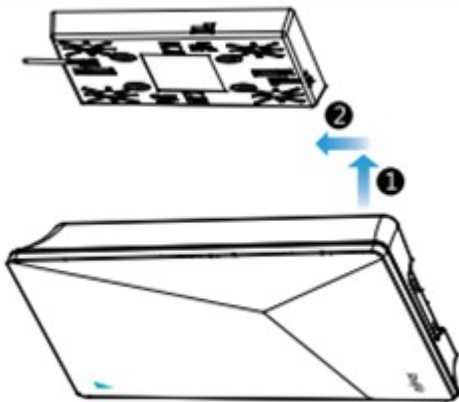

Slide the AP onto the bracket until it clicks into place.

⚠️ **Caution**   Keep the logo of Ruijie upward.

Method 2: Ceiling Mounting

Drill four holes on the ceiling, tap the wall anchors into the holes, and attach the mounting bracket to the wall using the screws.

Align the square feet on the rear of the AP over the mounting holes on the bracket.

⚠
Caution   Install the Ethernet cable first before you mount the AP onto the brackets.

Slide the AP onto the bracket until it clicks into place.

(Optional) Installing Security Lock
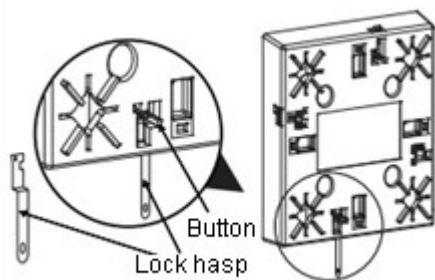
Insert the lock hasp into the lock slot on the back of the bracket.
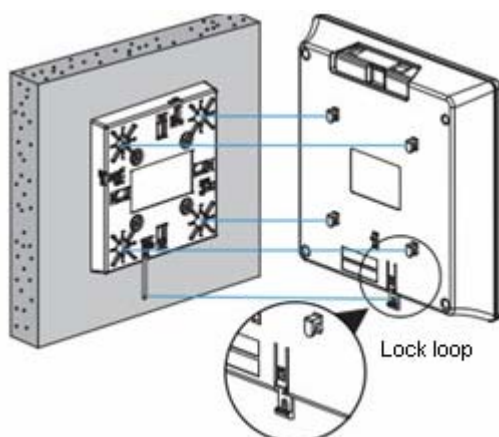
Align the lock loop protruding from the AP with the lock hasp hole.
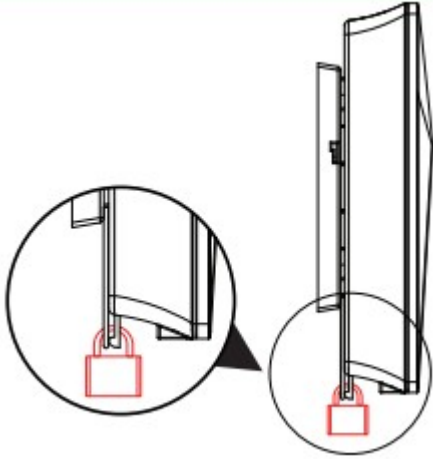
Install the padlock.
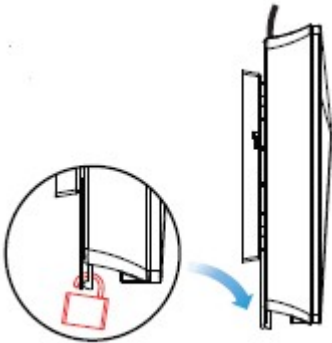
Removing the AP

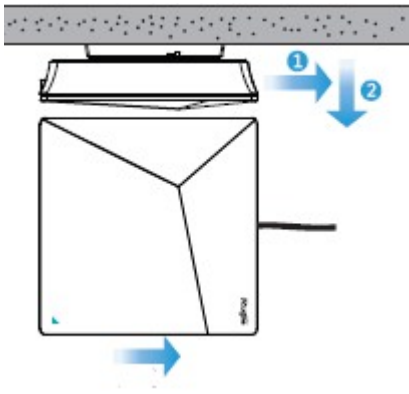Unlock the padlock.

Removing the Wall-Mount AP:
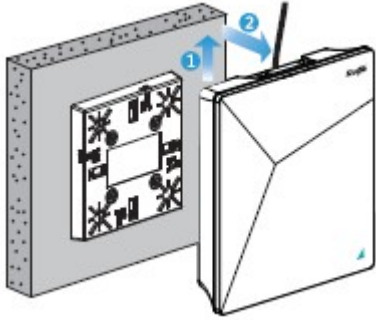
Hold the AP in your hands and push it upward in the LAN port direction.

Removing the Ceiling-Mount AP:

Hold the AP in your hands and push it sideward in the LAN port direction. The square feet should fit easily into the mounting slots. Do not forcibly push the AP onto the bracket. After installation, verify that the AP is securely fastened

Installing Security Lock

The unit adopts built-in lock design. The lock loop on the AP is reserved for your security needs. You can purchase a padlock to secure the AP. When you install the padlock, verify that the lock loop protruding from the bottom of the AP aligns with the lock hasp hole.
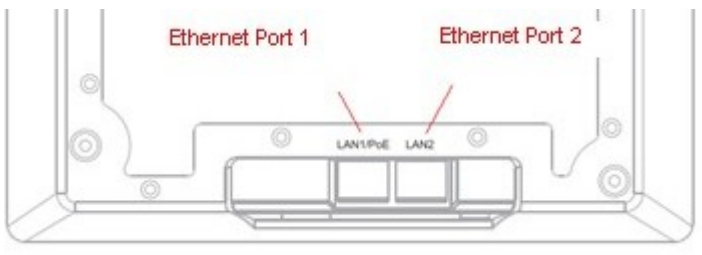
Chapter 4 System Debugging

Setting up a Debugging Environment

Use a 48 V DC power adapter or PoE to power the AP.

Using PoE to Power up the AP

Use an Ethernet cable to connect the Ethernet Port 1 (LAN 1) of the AP to an 802.11at PoE-compliant power source.

Figure 4-1 Ethernet Ports

Using a Power Adapter

It is recommended to use Ruijie power adapter to power up the device.

Powering up the AP

Checking before power-up

Verify that the input voltage matches the specification of the AP.

Checking after power-up

After the power-up, it is recommended that you check the state of the LED indicator to ensure normal operation of the AP. If the AP is operational, the LED indicator first blinks green and then blinks red after 30 seconds. If the LED indicator turns blue and blinks on and off, it means the AP is working in normal state.

Figure 4-2 LED Indicator on the Top Cover of the AP

LED indicator

Chapter 5 Monitoring and Maintenance

Monitoring

You can observe the LED to monitor the AP in operation. For descriptions of the LED indicator, see the "LED Indicator" in Chapter 1.

Remote Maintenance

If the AP operates as a Fit AP, you can use a wireless controller to centrally manage and maintain the AP.

Removing the Access Point

To remove the access point, follow the steps described in the "RG-AP530-I Quick Install Guide" in Chapter 3. Before you remove the AP, verify that:

1)   The AP is powered off.
2)   The padlock is removed.
3)   The AP should be removed in the correct direction to avoid damages to the AP.
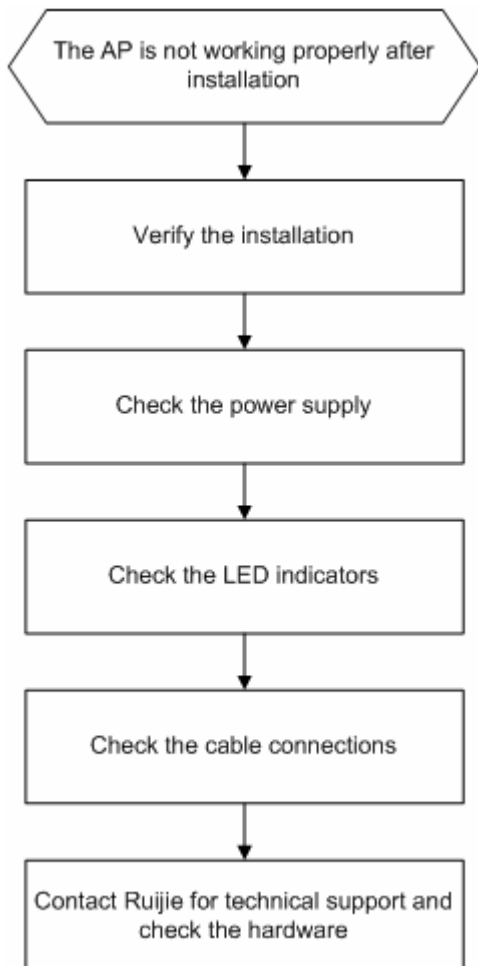
⚠️ Caution   The rear of the AP is the main dissipation part of the device, and the temperature is relatively high.

Do not touch the rear of the AP when the AP is operating.

Do not touch the rear instantly when you power off the device.

Chapter 6 Troubleshooting

Troubleshooting Flowchart

Troubleshooting

1. LED does not light up after the AP is powered up

- 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.

2. The LED indicator is blinking red 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.

3. 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.

Note Above installation descriptions are based on the RG-AP530-I. Refer to the actual devices if any discrepancy occurs.


Appendix A Connectors and Media

1000BASE-T/100BASE-TX/10BASE-T

The 1000BASE-T/100BASE-TX/10BASE-T is a 10/100/1000 Mbps auto-negotiation port that supports auto MDI/MDIX.

Compliant with IEEE 802.3ab, 1000BASE-T requires Category 5e 100-ohm UTP or STP (STP is recommended) with a maximum distance of 100 meters (328 feet).

1000BASE-T requires all four pairs of wires be connected for data transmission, as shown in Figure A-1.

Figure A-1 1000BASE-T Connection
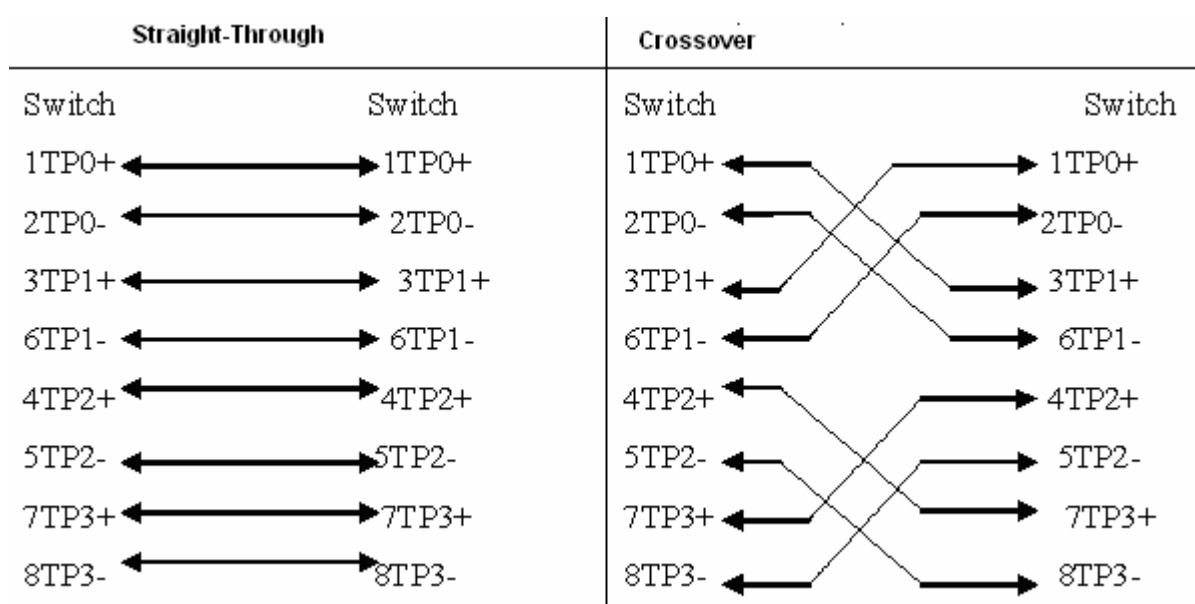
10BASE-T uses Category 3, 4, 5 100-ohm UTP/STP and 1000BASE-T uses Category 5 100-ohm UTP/STP for connections. Both support a maximum length of 100 meters. Table A-1 shows100BASE-TX/10BASE-T pin assignments.

Table A-1 100BASE-TX/10BASE-T Pin Assignments.

Pin	Socket	Plug
1	Input Receive Data+	Output Transmit Data+
2	Input Receive Data-	Output Transmit Data-
3	Output Transmit Data+	Input Receive Data+
6	Output Transmit Data-	Input Receive Data-
4,5,7,8	Not Used	Not Used

Figure A-2 shows wiring of straight-through and crossover cables for 100BASE-TX/10BASE-T.

Figure A-2 100BASE-TX/10BASE-T Connection

Straight-Through	Crossover
(Switch) (Switch)	(Switch) (Switch)
1 IRD+ ————— 1 OTD+ 2 IRD− ————— 2 OTD− 3 OTD+ ————— 3 IRD+ 6 OTD− ————— 6 IRD−	1 IRD+ ⎯⎯╳⎯⎯ 1 IRD+ 2 IRD− ⎯⎯╳⎯⎯ 2 IRD− 3 OTD+ ⎯⎯╳⎯⎯ 3 OTD+ 6 OTD− ⎯⎯╳⎯⎯ 6 OTD−

Appendix B: Cabling Recommendations

During installation, route cable bundles upward or downward along the sides of the rack depending on the actual situation in the equipment room. All cable connectors should be placed at the bottom of the cabinet rather than be exposed outside of the cabinet. Power cords should be routed upward or downward beside the cabinet close to the location of the DC power distribution cabinet, AC power outlet, or lightning protection box.

Required Minimum Cable Bend Radius

■ The minimum bend radius of a power, communication or flat cable should be 5 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 7 times the overall diameter.

■ The minimum bend radius of a coaxial cable should be 7 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 10 times the overall diameter.

■ The minimum bend radius of a high-speed cable, such as an SFP+ cable should be 5 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 10 times the overall diameter.

Precautions for Cable Bundling

■ Before bundling cables, correctly mark labels and stick the labels to cables where appropriate.

■ Cables should be neatly and properly bundled, as shown in Figure B-1.

Figure B-1 Bundling Cables
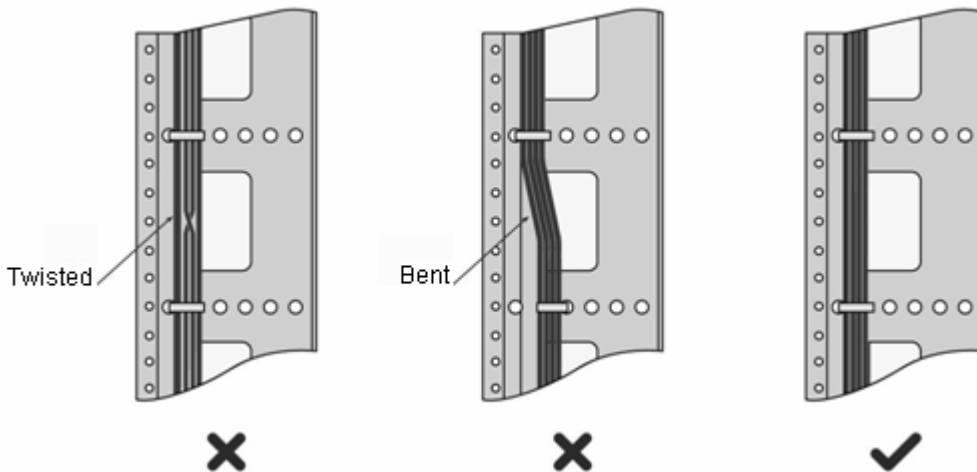
■ Route and bundle power, signal, ground cables separately. When the cables are close to each other, cross them. When power cables run parallel to signal cables, the distance between them must be greater than 30 mm.

■ All cable trays and their accessories shall be smooth and free from sharp edges.

■ Holes in metal, through which cables pass shall have smooth, well-rounded surfaces or be protected with insulating bushings.

■ Use proper cable ties to bind cables together. Do not tie two or more cable ties to bind cables.
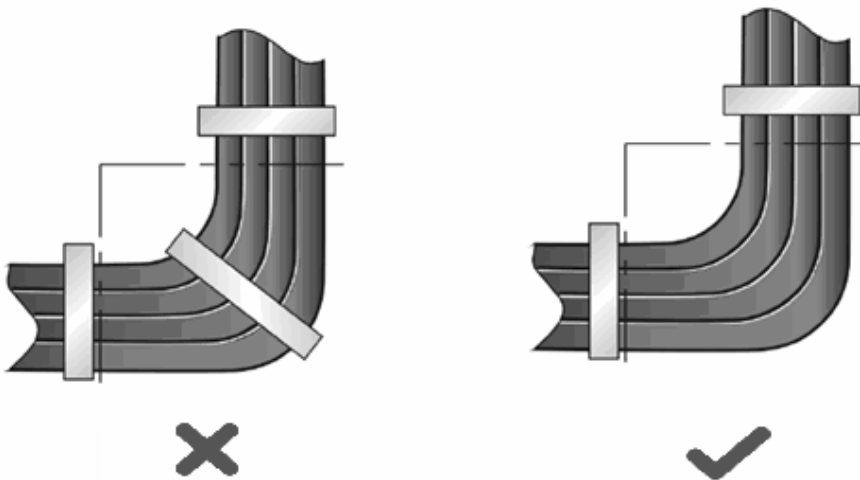
■ Cut off excess cable tie cleanly with no sharp edges after bundling cables, as shown in Figure B-2.

Figure B-2 Cutting off Excess Cable Tie
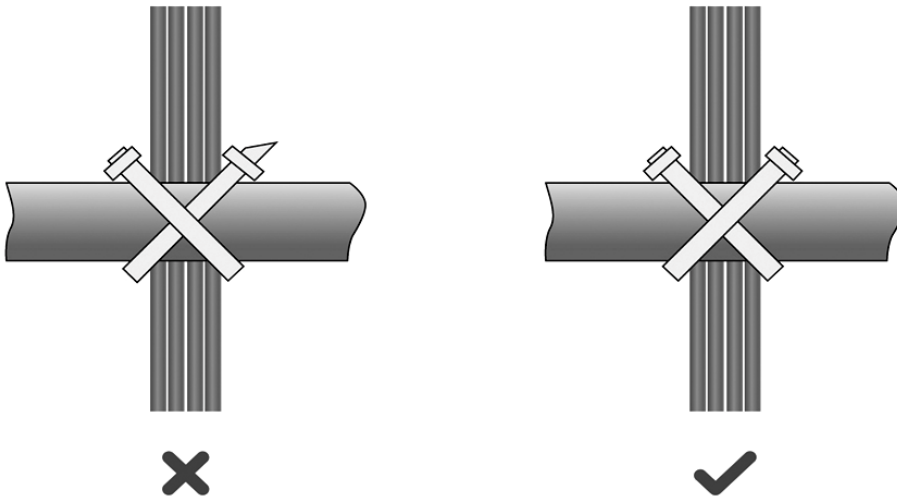
■ If cables are to be bent, bind them first but do not tie cable ties within the bend to avoid stress on the cables, which may otherwise cause the wires inside to break, as shown in Figure B-3.

Figure B-3 Do Not Tie Cable Ties within the Bend

■ Wrap up unnecessary or excess cables and bind them to the appropriate rack position, where device operation is not affected and no damages occur to the device and cables during debugging.

■ Do not bind power cords to the rails for moving parts.

■ Leave a certain length of the cable connecting moving parts, such as the ground wire of the cabinet door, to avoid stress on the cable; when moving parts are in place, ensure the excess cable length shall not contact heat sources, sharp corners or edges. If heat sources are unavoidable, use high-temperature cables instead.

■ When using screws to fasten cable lugs, the bolts or nuts shall be tightened and prevented from loosening, as shown in Figure B-4.

Figure B-4 Fastening Cable Lugs
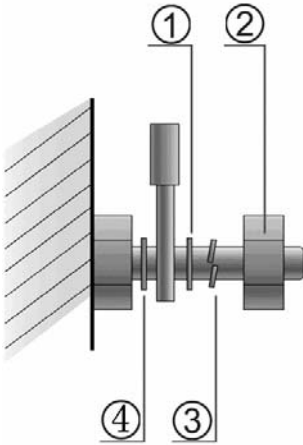
| Note | 1. Flat washer | 3. Spring washer |
| | 2. Nut | 4. Flat washer |

- When using a stiff cable, fix it near the cable lug to avoid stress on the lug and cable.

- Do not use self-tapping screws to fasten terminals.

- Bundle cables of the same type and running in the same direction into groups. Keep cables clean and straight.

- Cables shall be tied according to the following table.

Diameter of Cable Bundle (mm)	Space between Bundles (mm)
10	80 to 150
10 to 30	150 to 200
30	200 to 300

- Do not tie knots for cables or cable bundles.

- The metal parts of the cold-pressed terminal blocks, such as air circuit breakers, shall not be exposed outside of the blocks.