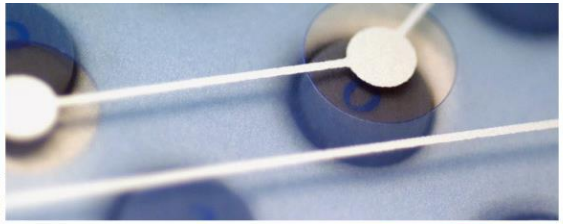
Outdoor AP630 (IDA&IODA) Training

www.ruijie.com.cn



Background

Market demand

To address the expanding market of outdoor deployment projects, Ruijie Networks develops the RG-AP630 (IDA&IODA), which is a next-generation high-speed wireless access product with enhanced signal coverage, bridge networking, performance, product form and cost efficiency compared with its predecessor AP620.

Ruijie RG-AP630 Outdoor AP Series is a family of top-class 802.11ac wireless access points for next-gen outdoor network applications, offering access rates of up to 1.75Gbps.

The series consists of two models – RG-AP630(IDA) and RG-AP630(IODA) – and takes full care of security, RF control, mobile access, QoS, seamless roaming and other Wi-Fi aspects. Teaming up with Ruijie RG-WS Wireless Controller Series/Cloud AC, the APs offer Wi-Fi user data forwarding,

advanced security and access control with ease.

Outdoor AP630 (IDA&IODA) Training

Preface

Audience

Ruijie business partners and customers who are responsible for configuring and maintaining Ruijie wireless devices.

Revision Record

Release Date	Change Contents	Reviser
2016.06	Initial publication V1.0	TAC Oversea

Note :

For more detail configuration , see configuration guide for each product . you can download configuration guide at http://www.ruijienetworks.com

For more technical enquiry , you can visit Ruijie Service portal at http://case.ruijienetworks.com . You need to sign up before submit a case.

Outdoor AP630 (IDA&IODA) Training

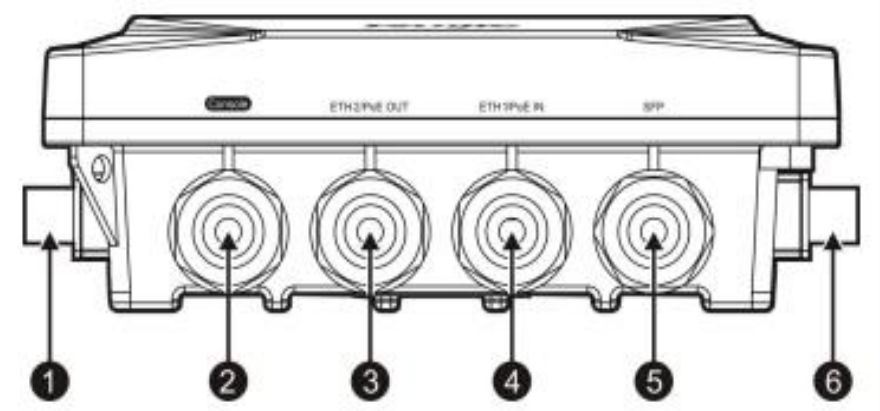
Overview

RG-AP630 (IDA&IODA)

- ✓ The RG-AP630(IDA) is built-in with a directional antenna while the RG-AP630(IODA) is built-in with an omnidirectional antenna. The two product forms have the same appearance and are identified as RG-AP630(IDA) and RG-AP630(IODA), which are indicated on product labels and nameplates. Starting from the B8 version, AP630(IDA)(802.11a/n/ac and 802.11b/g/n, Integrated Directional-Antenna) and AP630(IODA)(802.11a/n/ac and 802.11b/g/n, Integrated OmniDirectional-Antenna) are named in software.
- ✓ The AP630 (IDA&IODA) is built-in with an antenna used to provide wireless network coverage in many outdoor scenarios. The product supports switching between built-in and external antennas when it needs to provide coverage as a bridge AP or when it is connected to another bridge AP over a long distance.
- ✓ The product has a built-in surge protection module offering protection to network ports and feeder interfaces, Thereby removing the need to install an external surge protector.
- ✓ The AP630 does not have a DC power supply module and requires Power over Ethernet (PoE) as a power supply. Even if customers deploy optical fibers, they need to configure the PoE+ module as a power source or install an optical-to-electrical converter.
- ✓ The AP630 supports the use of power sourcing equipment (PSE) and has the PoE OUT interface receiving power from an external PoE+ device (in this case, a 60 W PoE adapter module is required).

Interfaces

Interfaces on the



(1) 2.4 GHz feeder interface

(2) Console interface (RJ-45 interface)

(3) 10/100/1000Base-T adaptive Ethernet interface (ETH2)/PoE OUT interface (RJ-45 interface)

(4) 10/100/1000Base-T adaptive Ethernet interface (ETH1)/PoE IN interface (RJ-45 interface)

(5) SFP optical interface multiplexed with the ETH1 interface

(6) 5 GHz feeder interface

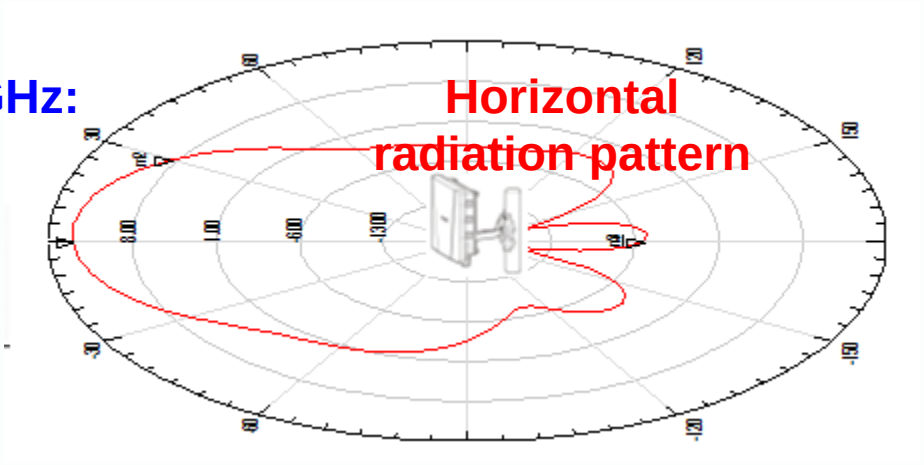
- The AP630 has three 2.4 GHz feeder interfaces on one side and three 5 GHz feeder interfaces on the other side, which can be used to connect to an external antenna.
- A 2.4 GHz or 5 GHz external antenna that supports **triple spatial streams** can be directly connected to the corresponding interfaces in a random sequence.
- A 2.4 GHz or 5 GHz external antenna that supports **dual spatial streams** must be connected to Interface 1 and Interface 2 of 2.4 GHz or 5 GHz (set the receive/transmit value to 3 and adjust the modulation and coding scheme [MCS] to dual spatial streams mode, 11n 15 and 11ac 19).
- A 2.4 GHz or 5 GHz external antenna that supports **a single spatial stream** must be connected to Interface 1 of 2.4 GHz or 5 GHz (set the receive/transmit value to 1 and adjust the MCS to single spatial stream mode, 11n 7 and 11ac 9).

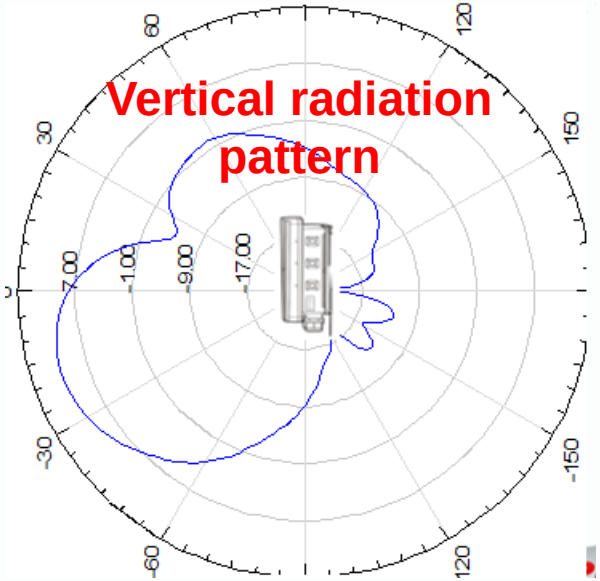
Specifications

Product model	RG-AP630 (IDA)	RG-AP630 (IODA)
Dimensions (L x W x H)	276 mm x 246 mm x 90 mm	
Maximum transmission rate	1.75 Gbps	
Operating band	802.11b/g/n: 2.4–2.483 GHz; 802.11ac/a/n: 5.15–5.85 GHz	
Maximum transmit power	27 dBm	
Antenna type	Built-in directional antenna (support internal/external antenna switching)	Built-in omnidirectional antenna
Antenna gain	2.4 GHz: 10 dBi; 5 GHz: 10 dBi	2.4 GHz: 4 dBi; 5 GHz: 4 dBi
Antenna lobe bandwidth	2.4 GHz: E:45?H:60?5G: E:25?H:60?	2.4 GHz: E:30?H:360?5G: E:30?H:360?
Service interface	One 10/100/1000 Base-T uplink Ethernet interface One uplink SFP optical interface multiplexed with the Ethernet interface One 10/100/1000Base-T downlink external PoE port	
Status indicator	Power indicator and WDS received signal strength indicators (RSSIs)	
PoE power supply	802.3af/802.3at power supply and PSE	
Overall power consumption	< 25 W	
Operating temperature	–40℃ to +65℃	
Operating humidity	0–100% (non-condensing)	
IP rating	IP67	
Weight (not including various supports)	< 2.5 kg	
Security regulation compliance	GB4943, EN60601-1-2 (medical), UL/CSA 60950-1, EN/IEC 60950-1, and EN/IEC 60950-22	
Electromagnetic compatibility (EMC)	GB9254-2008, EN301 489, EN55022, FCC Part15, and RSS-210	

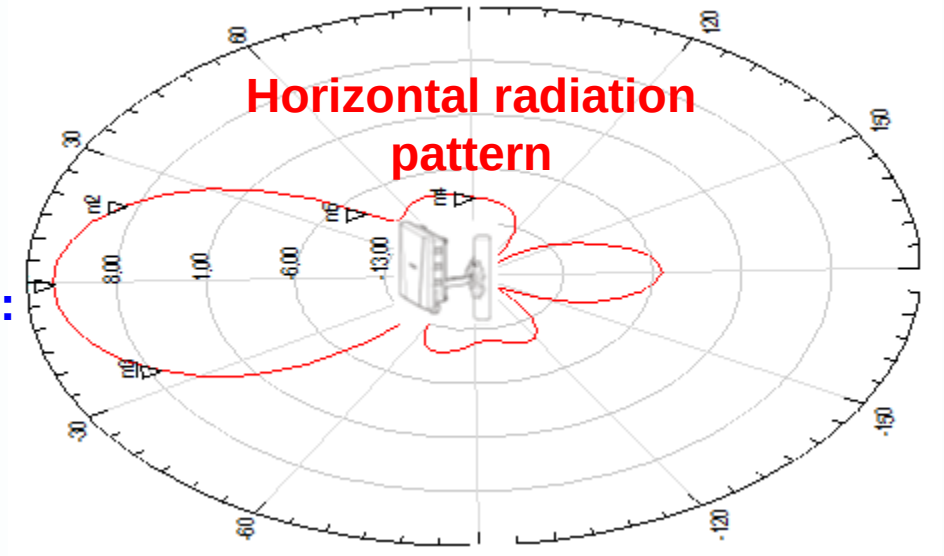
Radiation Pattern of the Built-in Directional Antenna

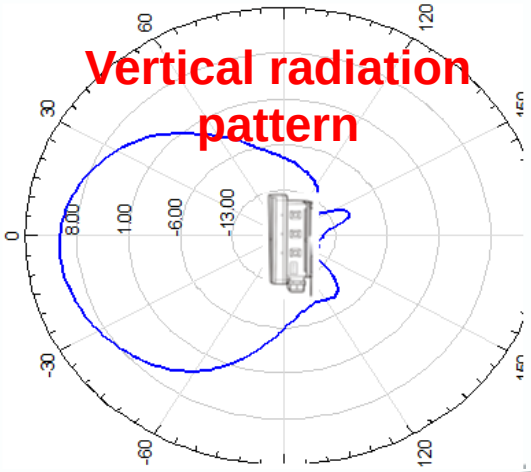
2.4 GHz:





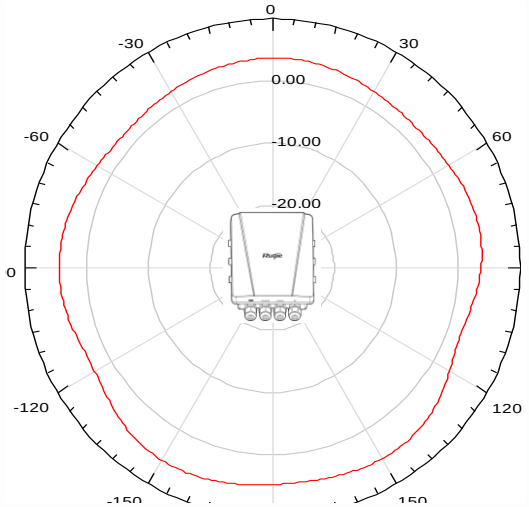
5 GHz:

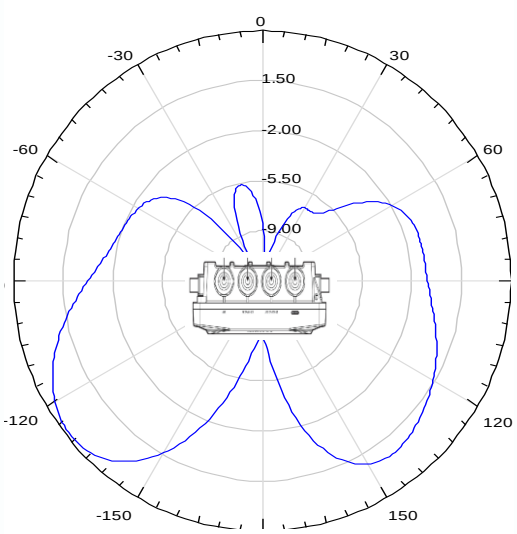




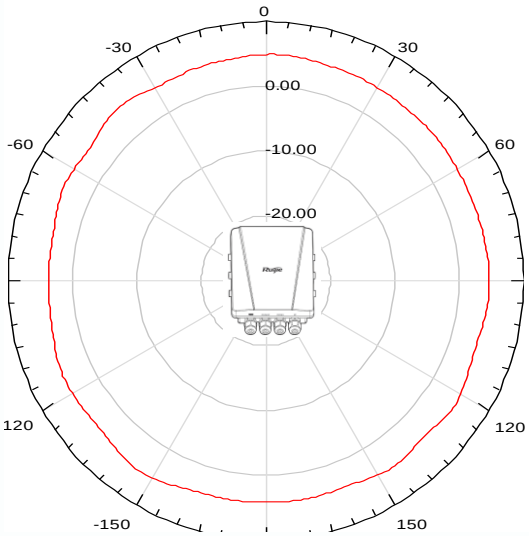
Radiation Pattern of the Built-in OmniDirectional Antenna

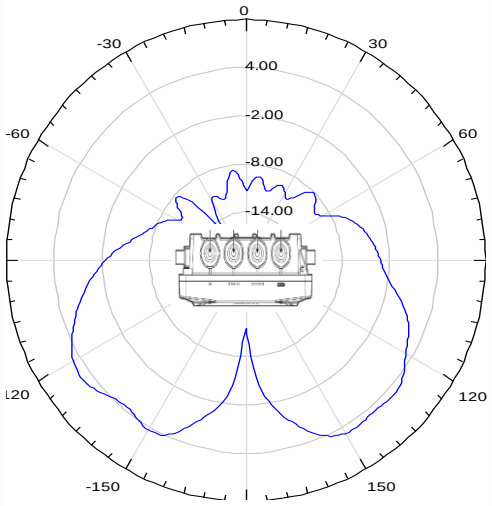
2.4 GHz:





5 GHz:

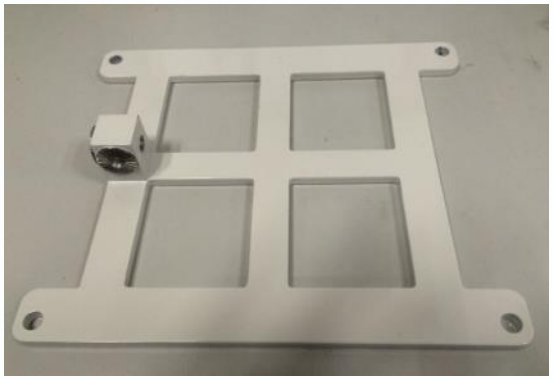




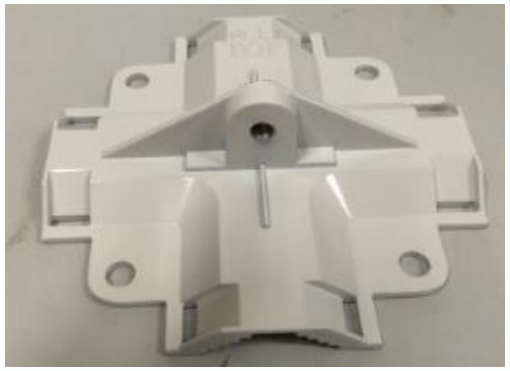
Horizontal radiation pattern

Vertical radiation pattern

Main Accessories



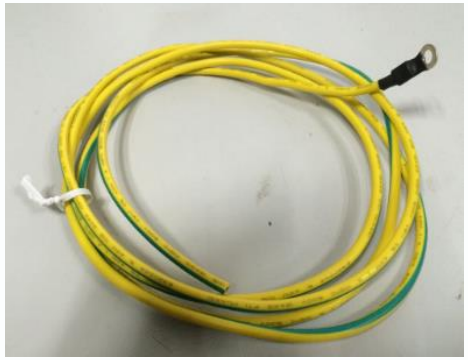
Product support



Wall mounting support

Horizontal support

Cross recessed hexagon machine screws M8X20 and M8X40

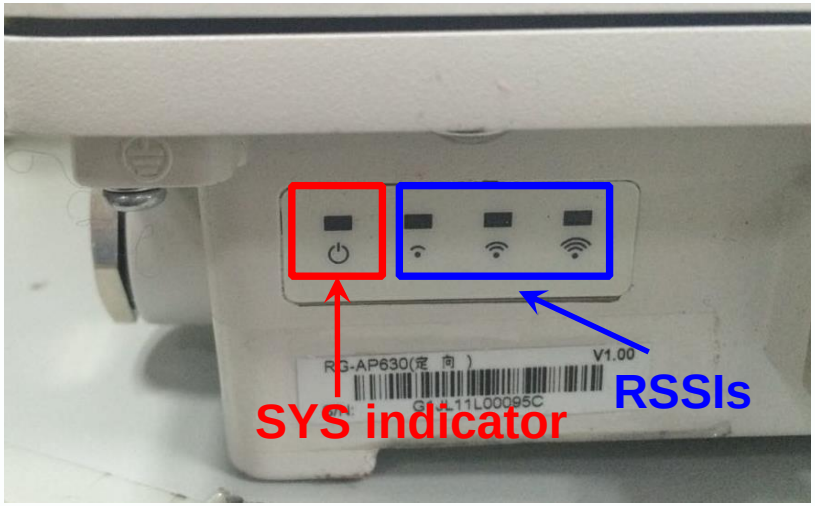


Yellow and green ground cable

Clamp (78–101 mm)

NOTE: If the clamp delivered with the product does not fit the pole, the customer needs to use other clamp with the proper dimensions.

Status Indicators



The RG-AP630 (IDA&IODA) has a SYS indicator and three RSSIs, with the latter being used only when the AP works in bridge mode (in a point-to-multipoint bridge network, the RSSIs on other bridge APs than the root bridge AP are used as reference).

- The following table lists the meanings of the indicators:

Indicator	State	Meaning
SYS indicator	Blinking green	The AP is being started.
	Blinking red and green alternately	The AP works normally, but CAPWAP is not set up.
	Steady on in green	The AP works normally.
	Steady on in red	A fault alarm is generated.
Three RSSIs (used only when the AP works in bridge mode)	One RSSI On	RSSI smaller than -70 dBm
	Two RSSIs On	RSSI between -70 dBm and -50 dBm
	Three RSSIs On	RSSI greater than -50 dBm

New Product Planning

RG-AP630 (CD&CA&CE)

- ✓ The following three products will be launched after the AP630:

  AP630 (CD): is built-in with a directional antenna and supports dual spatial streams, but does not support an external antenna.

  AP630 (CA): is built-in with an omnidirectional antenna and supports dual spatial streams, but does not support an external antenna.

  AP630 (CE): supports an external antenna and dual spatial streams, but is not built-in with an antenna.

  The following information is displayed in software:

  AP630(CD)(802.11a/n/ac and 802.11b/g/n, Directional-Antenna)

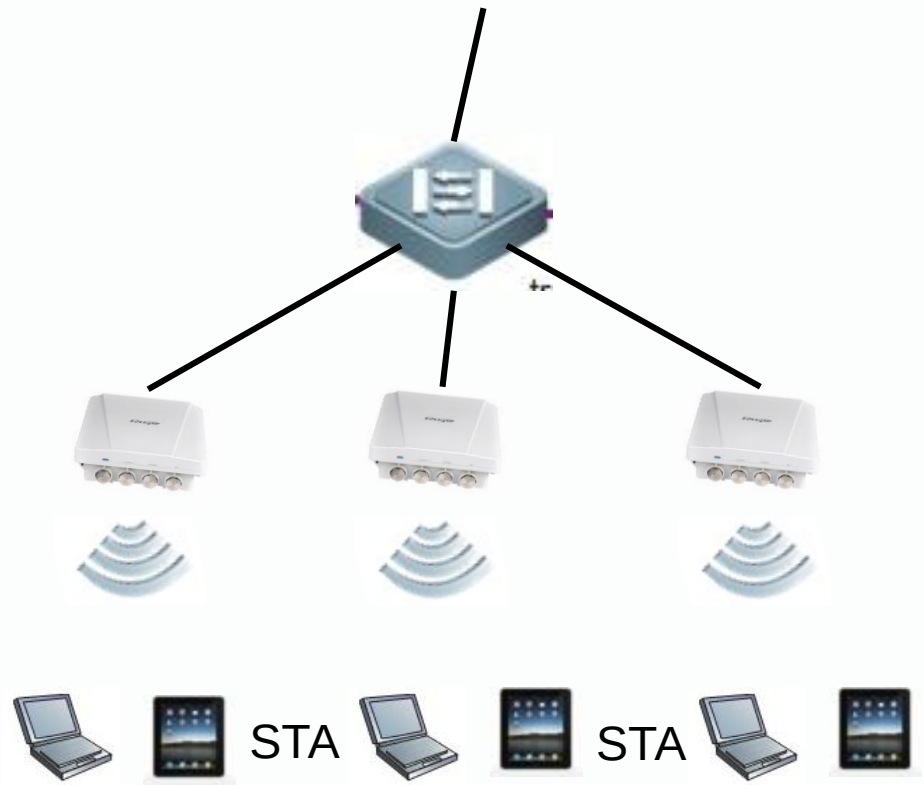
  AP630(CA)(802.11a/n/ac and 802.11b/g/n, OmniDirectional-Antenna)

  AP630(CE)(802.11a/n/ac and 802.11b/g/n, External-Antenna)

- ✓ The preceding products adopt PoE as a power supply.

Outdoor AP630 (IDA and IODA) Training

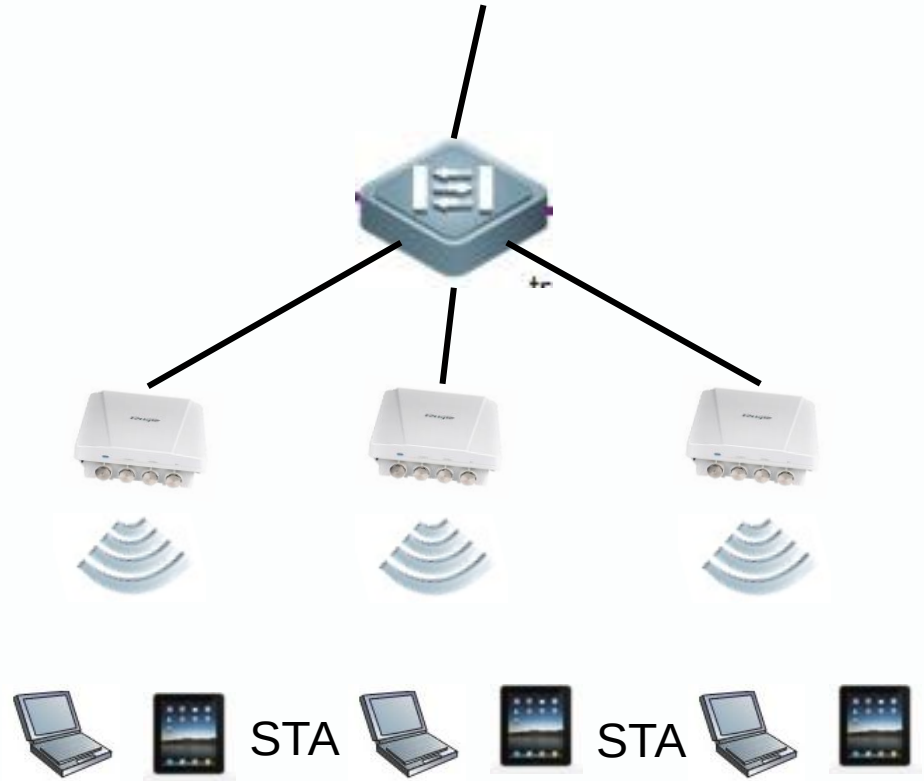
Wired Direct Connection Topology – Coverage (IDA)



Network features:

- ✓ In a wired direct connection topology, access points (APs) are directly connected to a switch or an access controller (AC) via cables. APs are mainly used to provide wireless network coverage.
- ✓ The built-in antenna of an AP can provide wireless network coverage in many outdoor scenarios. The choice of a built-in directional antenna or a built-in omnidirectional antenna depends on the actual condition (a built-in omnidirectional antenna is not recommended because its installation height is limited and it is vulnerable to interference).
- ✓ In a spacious environment, a built-in directional antenna can provide 2.4 GHz, 250 m (or 5 GHz, 200 m) coverage. The coverage distance will be slightly reduced in actual deployment, depending on the AP installation height and angle and the presence of obstructions.
- ✓ Application scenarios: outdoor environments such as streets, schools, enterprises, and squares
- ✓ Disadvantage: Each AP must be connected to a network via a network cable or optical fiber.

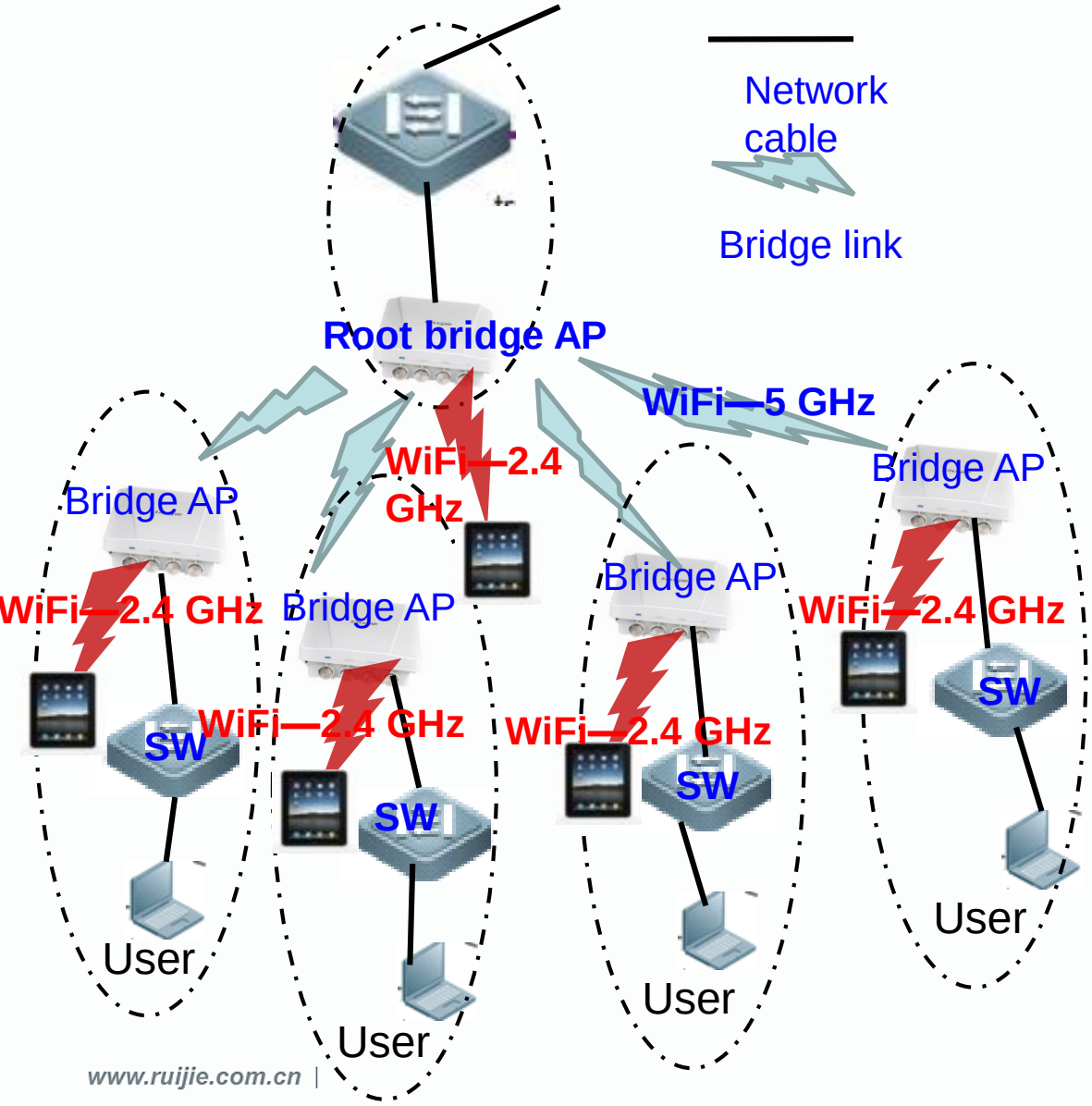
Wired Direct Connection Topology – Coverage (IODA)



Network features:

- ✓ In a wired direct connection topology, APs are directly connected to a switch or an AC via cables. APs are mainly used to provide wireless network coverage.
- ✓ The built-in omnidirectional antenna of an AP can provide coverage in a spacious environment such as a square. The recommended **installation height is 3–5 m**. If the AP is installed too high or too low, the coverage effect and user experience will be affected.
- ✓ In a spacious environment, a built-in omnidirectional antenna can provide 2.4 GHz, 150 m (or 5 GHz, 100 m) coverage. The coverage distance will be slightly reduced in actual deployment, depending on the AP installation height and angle and the presence of obstructions.
- ✓ Application scenarios: outdoor environments such as streets, schools, enterprises, and squares
- ✓ Disadvantage: Each AP must be connected to a switch via an optical fiber or network cable.

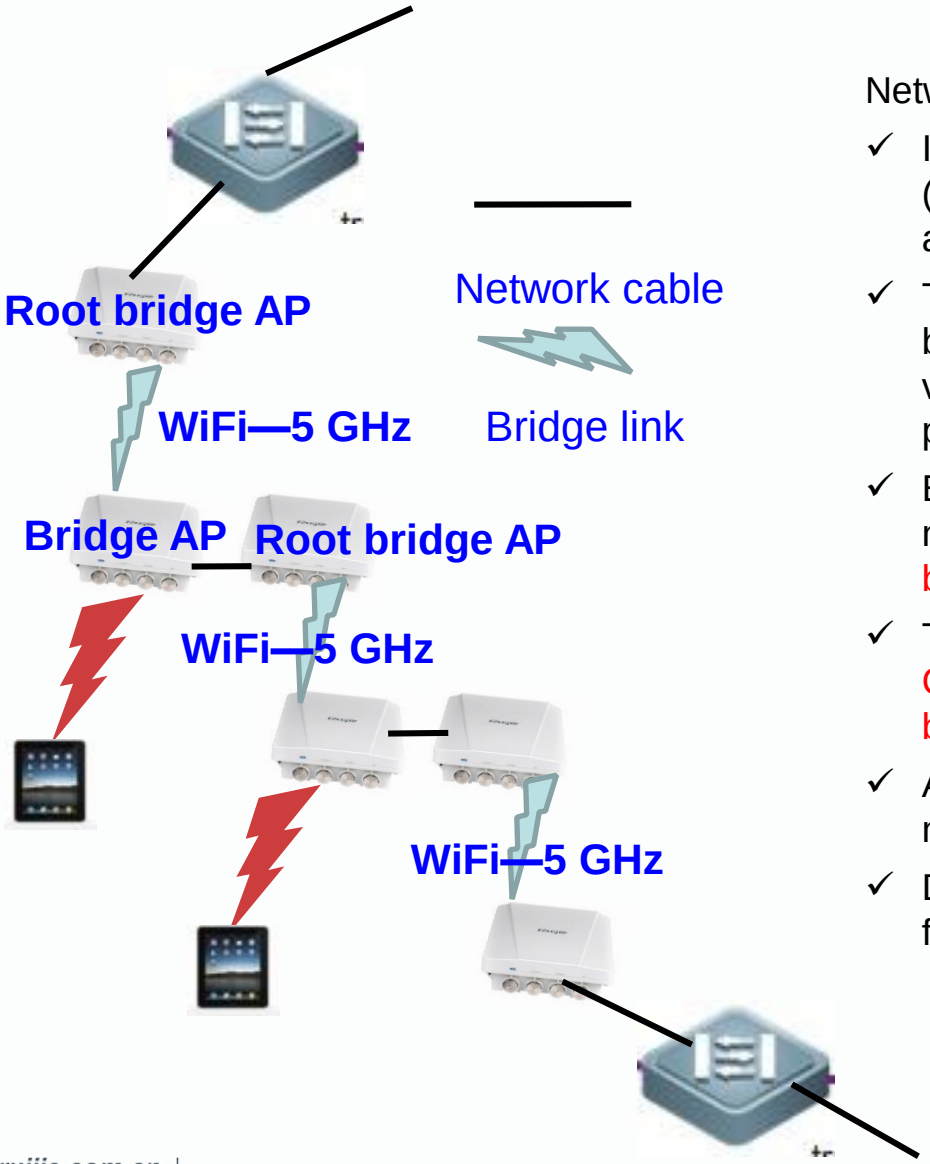
Non-Wired Direct Connection Topology – Point-to-Multipoint WDS Bridging (IDA)



Network features:

- ✓ APs are connected in wireless mode. That is, two or more fixed local area networks (LANs) are interconnected through bridge APs.
- ✓ In a WDS bridge network, one root bridge can be connected to four non-root bridges at most.
- ✓ The root bridge AP and other bridge APs must have the same model.
- ✓ A radio frequency (RF) card operates either in bridge mode or coverage mode. If a bridge AP also needs to provide coverage, it is recommended that its 5 GHz external antenna be used for bridging whereas its 2.4 GHz built-in antenna be used to provide coverage (in this case, the AP performance will be reduced).
- ✓ Disadvantage: In a point-to- multipoint bridge network, the performance of the root bridge is evenly shared by other bridges, resulting in reduced performance.

Non-Wired Direct Connection Topology – Multihop WDS Bridging (IDA)



Network features:

- ✓ In a multihop bridge network, each node (hop) forwards data through two APs (which are connected by a network cable).
- ✓ The 5 GHz RF card is recommended for bridging because the 2.4 GHz RF card is vulnerable to interference and has low performance.
- ✓ Bridge APs in a point-to- multipoint bridge network can also provide wireless coverage, but the AP performance will be reduced.
- ✓ The network has six APs forming three hops. Currently, the AP630 supports up to five bridge hops formed by 10 APs.
- ✓ Advantage: Engineering is convenient and no cables are required.
- ✓ Disadvantage: If an AP in a multihop network fails, the whole network will crash.

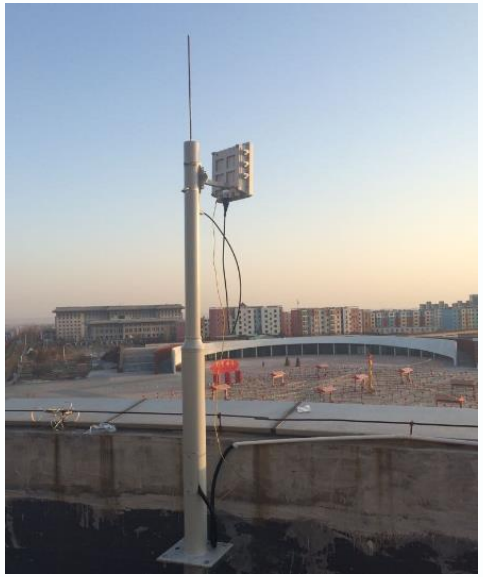
Outdoor AP630 (IDA&IODA) Training

Wired Direct Connection Scenario – Coverage (IDA)

Application scenarios: outdoor squares, beaches, downtown areas, and stadiums

Installation conditions:

- ✓ It is recommended that APs be installed on poles (with a diameter of 80–100 mm).
- ✓ The installation height of a built-in directional antenna can be adjusted based on the actual condition. It is recommended that the antenna installation height be not smaller than 4 m in order to deliver good coverage effect and meet security and antitheft requirements.
- ✓ When a built-in directional antenna is installed on a pole 4–5 m high (vertical relative to the ground), adjust the angle between the antenna and pole to 0–5°. When the antenna is installed on a pole with 5–7 m high, adjust the angle between the antenna and pole to 5–10°. When the antenna is installed on the roof of a three- to four-storied building, adjust the angle between the antenna and pole to 10–15°. When the antenna is installed on a pole attached to a high building to provide downward coverage, adjust the angle between the antenna and pole based on the coverage area and distance. For example, if the building is 50 m high, it is recommended that the angle between the antenna and pole is 30–40° (the recommended angle is for reference only and subject to changes based on the actual condition).
- ✓ Note: Avoid upward antenna coverage in outdoor scenarios, and do not use outdoor APs to provide indoor coverage.

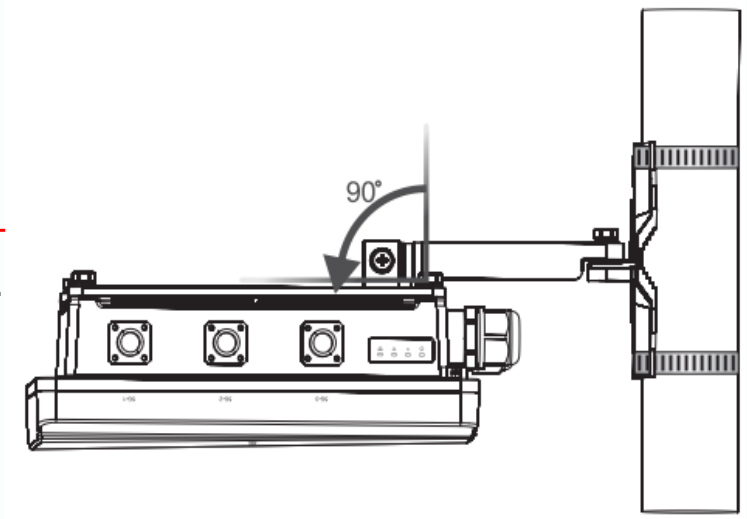


Wired Direct Connection Scenario – Coverage (IODA)

Application scenarios: schools, parks, and squares

Installation conditions:

- ✓ It is recommended that APs be installed on poles (with a diameter of 80–100 mm).
- ✓ The recommended installation height of a built-in omnidirectional antenna is 3–5 m.
- ✓ When a built-in directional antenna is installed on a pole 3–5 m high, adjust the angle between the AP and pole to 90°. See the right figure.
- ✓ (The recommended angle is for reference only and subject to changes based on the actual condition.)



- ✓ Note: Avoid upward coverage in outdoor scenarios, and do not use outdoor APs to provide indoor coverage.

Non-Wired Direct Connection Scenario – Point-to-Multipoint WDS Bridging and Multihop WDS Bridging (IDA)

Application scenarios: parks, energy plants, mines, and scenarios with data backhaul

Installation conditions:

- ✓ It is recommended that APs be installed on poles (with a diameter of 80–100 mm).
- ✓ In a point-to- multipoint WDS bridge network, one root bridge can be connected to four non-root bridges at most. In a multihop WDS bridge network, up to five hops are supported. The 5 GHz RF card is recommended for bridging because the 2.4 GHz RF card is vulnerable to interference.
- ✓ When coverage needs to be extended in a WDS bridge network, it is recommended that the external 5 GHz antenna be used for bridging and the built-in 2.4 GHz antenna be used to provide coverage in many scenarios.
- ✓ The antennas of two bridged APs should be aligned with each other to deliver optimal bridge effect. You can adjust the RSSI based on the APs ' signal indicators.

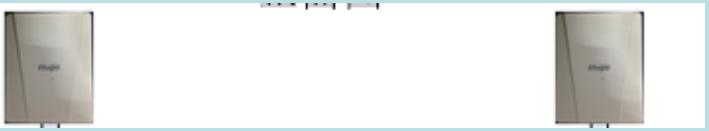
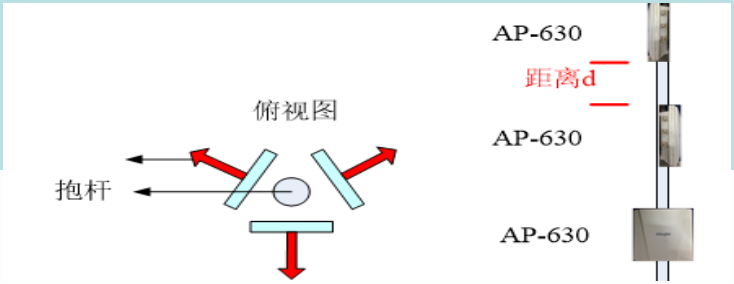
Design Principles for Outdoor Wireless Deployment

- It is recommended that APs be installed on poles with a diameter of 80–100 mm. If the pole diameter exceeds this range, clamps of different models are required.
- The maximum coverage distance of a single AP is as follows:

  IDA: 250 m for 2.4 GHz (200 m for 5 GHz); IODA: 150 m for 2.4 GHz (100 m for 5 GHz)
- If a bridge AP also needs to provide coverage, it is recommended that its 5 GHz external antenna be used for bridging whereas its 2.4 GHz built-in antenna be used to provide coverage.
- Avoid back-to-back antenna installation between different APs; otherwise, interference will occur.
- By default, the built-in antenna of an AP is used. If you need to use the external antenna, configure the corresponding RF card using the built-in antenna by default.

AP630 (IDA) Deployment Distance Suggestion

- The following table lists the optimal distances between adjacent AP630s (IDA) based on different installation methods (optimal distances are the distances at which the power of APs is maximized and interference does not exist):

Installation Method	Distance Between Channel 1 and Channel 11	Distance Between Channel 1 (or 11) and Channel 6
Horizontal installation in the same direction 	4 m	20 m
Horizontal, separate installation at 90° 	1.5 m	6 m
Horizontal, rear-facing installation 	0.8 m	2 m
Vertical, separate installation at 120° 	0.5 m	4 m

Outdoor AP630 (IDA&IODA) Training

Configuring the Switching Between Built-in and External Antennas

1. Configure the external antenna (the built-in antenna is used by default).

Fat AP: interface Dot11radio 1/0
external-antenna enable

Thin AP: ap-config xxx
external-antenna enable radio 1

2. Configure the built-in antenna.

Fat AP: interface Dot11radio 1/0
no external-antenna enable
Thin AP: ap-config xxx
no external-antenna enable radio 1

```
interface Dot11radio 1/0
 external-antenna enable
 chan-width 20
 country-code CN
 radio-type 802.11b
 channel 1
 rate-set 11b mandatory 1 2 5 11
 rate-set 11g mandatory 1 2 5 11
 rate-set 11g support 6 9 12 18 24 36 48 54
 rate-set 11n mcs-support 23
 no ampdu-rts
 station-role root-ap
```

```
!
ap-config ap630-123
 ap-mac 5869.6c1a.296b
 ap-group ap630
 location 19#4F_3bu(2)_fangjian
 country US  radio 2
 external-antenna enable radio 1
 external-antenna enable radio 2
 chan-width 80 radio 2
 antenna receive 3 radio 1
 antenna receive 3 radio 2
 antenna transmit 3 radio 1
 antenna transmit 3 radio 2
!
```

Bridge Configuration

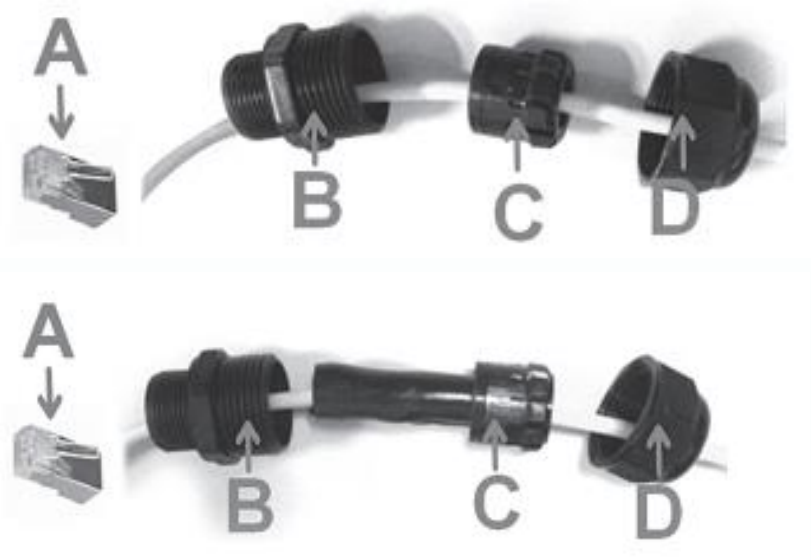
Outdoor AP630 (IDA&IODA) Training

Connecting Cables

- (Mandatory) Connecting a ground cable

  The ground cable needs to be installed at the installation site. A yellow and green ground cable is delivered with each AP. Connect one end of the ground cable through an OT terminal to the ground hole on the AP, and connect the other end through another OT terminal to the ground. The cable can be cut to make it shorter based on the actual condition.

- Connecting a network cable



1. Cut a network cable with proper length according to the distance between the AP and power supply.
2. Pass the network cable with an unprocessed RJ-45 connector through waterproof PG connectors.
3. Process the RJ-45 connector and wind two to three layers of waterproof material (sealant) around the portion between Point B and Point C.
4. Insert the RJ-45 connector into the PoE IN interface, fasten the PG connectors in the B -> C -> D sequence, and check that no gap that will cause water leakage exists.

Important Notes of Engineering

- Outdoor APs are generally install at height. Therefore, each cable must be labeled at both ends and recorded to facilitate subsequent commissioning, maintenance, and inspection.
- When you install an AP, fasten the screws on various supports properly and check that the AP does not shake when being gently shaked.
- When you install an AP with an omnidirectional antenna, ensure that no metal or obstructions exist within a range of 30 cm around the antenna in the horizontal direction; otherwise, coverage effect and performance will be reduced.
- The AP630 (IDA&IODA) is built-in with a 6 KV surge protection module used to release the lightning energy that enters the feeder interfaces and data interfaces through the cable between the AP's enclosure and ground. Proper grounding is required to achieve the surge protection effect.
- If necessary, install antitheft locks in accordance with the Hardware Installation Manual.
- Take waterproof measures for outdoor APs. (For details, see the Hardware Installation Manual or product installation video.)

Important Notes of Acceptance

To reduce the cost of secondary engineering or rectification, pay attention to the following important notes of acceptance during the installation and commissioning processes:

- **Installation acceptance:**
  - ✓ The installation height and angle of APs comply with the specifications in an engineering scheme.
  - ✓ APs are firmly installed.
  - ✓ Waterproof measures are taken based on requirements.
  - ✓ The terminals of the ground cable are welded or firmly crimped.
  - ✓ The ground cables of APs and the building's ground cable used for surge protection are connected to the same earth electrode system.
  - ✓ The labels and records of cables are correct and clear.
- **RSSI acceptance**: The power of APs is consistent with the design power, and the RSSI in all coverage areas meets customer requirements.
- **Channel acceptance**: The channel settings of APs are consistent with the design settings. Channel spacing is kept for closely located APs to avoid interference. (For details, see the "AP630 (IDA) Deployment Distance Suggestion" section.)

Outdoor AP630 (IDA&IODA) Training

Troubleshooting

- Symptom:

  Power-on fails.

- Possible causes:

  The power supply of the power box is abnormal.

  The power cable of the AP is abnormal.

  The power module of the AP is abnormal.

- Handling procedure:

  1. Check whether the power supply of the power box is normal.
  2. Check whether the power cable is correctly prepared and properly connected, and the link is not blocked.
  3. Check whether the power module is faulty. You can replace the module with a normal power adapter module to verify the cause.

Troubleshooting

- Symptom:

  A link cannot be set up between optical interfaces.

- Possible causes:

  The optical fiber or link is abnormal.

  The optical module is abnormal.

- Handling procedure:

  1. Replace the original optical fiber or optical module with a normal one to verify the cause.
  2. Check whether the optical module is certified by Ruijie Networks and has normal attributes (rate, distance, and wavelength).

THANKS

Ruijie Networks Co., Ltd.
Address: 11th Floor, East Wing, ZhongYiPengAo Plaza, No.29 Fuxing Road, Haidian District, Beijing 100036
Office Tel: 010-51718888 Mobile Tel: 13888888888 Fax: 010-51718888
www.ruijie.com.cn E-Mail: xxx@ruijie.com.cn