# Ruijie RG-AP180 Series Access Points

# Hardware Installation and Reference Guide V1.00

## Copyright statement



## Exemption statement

## 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: https://www.ruijienetworks.com/
- Technical Support Website: https://ruijienetworks.com/support
- Case Portal: https://caseportal.ruijienetworks.com
- Community: https://community.ruijienetworks.com
- Technical Support Email: service_rj@ruijienetworks.com
- Skype: service_rj@ruijienetworks.com

## 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:

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

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

# 1 Product Overview

Ruijie RG-AP180 AP is designed for indoor scenarios in campuses, hotels, offices and residential buildings. Featuring a concise design and easy deployment, the AP enables zero disruption to the interior finishes and offers the best solution for scenarios with delicate interior design.

The dual-radio, dual-band AP supports the latest 802.11ax. And it delivers data rates of up to 574Mbps at 2.4G and 1.2Gbps at 5G with the maximum delivery rate totaling 1.77Gbps. The Wall AP provides four 10/100/1000Base-T LAN ports and one 10/100/1000Base-T WAN port, delivering optimal wireless network coverage. RG-AP180 supports security, radio frequency (RF) control, mobile access, Quality of Service (QoS) and seamless roaming. Plus, two power supply modes are provided, so you can choose to power up the AP either by local or PoE power supply.

Teaming up with Ruijie RG-WS Wireless Controller Series, wireless data forwarding, high performance security and access control can be accomplished with ease.

## 1.1 Technical Specifications

Table 1-1 Technical Specifications of RG-AP180

| **Hardware Specifications** | |
|---|---|
| **Radio** | 2.4G: 2 x 2MIMO<br>5G: 2 x 2MIMO |
| **Transmission Protocol** | 2.4G : 802.11b/g/n/ac/ax<br>5G: 802.11a/n/ac/ax<br>Support concurrent operation of 802.11ax and 802.11a/b/g/n/ac. |
| **Operating Bands** | 802.11b/g/n/ac/ax: 2.4 GHz to 2.483 GHz<br>802.11a/n/ac/ax: 5G: 5.150 GHz to 5.350 GHz, 5.47 GHz to 5.725 GHz, 5.725 GHz to 5.85GHz (Country-specific) |
| **Antenna** | Built-in antenna |
| **Spatial Streams** | 4 streams |
| **Max Throughput** | 2.4G: up to 574Mbps<br>5G: up to 1.2Gbps<br>Up to 1.77Gbps per AP |
| **Modulation** | DSSS: DBPSK@1Mbps, DQPSK@2Mbps, and CCK@5.5/11Mbps<br>OFDM: BPSK@6/9Mbps, QPSK@12/18Mbps, 16-QAM@24Mbps, 64-QAM@48/54Mbps<br>MIMO-OFDM: QPSK, 16QAM, 64QAM, 256QAM and1024QAM |
| **Receive Sensitivity** | 11a: -91dBm(1Mbps), -90dBm(5Mbps), -87dBm(11Mbps)<br>11b/g: -89dBm(6Mbps), -82dBm(24Mbps), -78dBm(36Mbps), -72dBm(54Mbps)<br>11n: -85dBm@MCS0, -67dBm@MCS7, -67dBm@MCS7<br>11ac: VHT20: -85dBm(MCS0), -62dBm(MCS8)<br>11ac: VHT40: -82dBm(MCS0), -57dBm(MCS9)<br>11ac: VHT80: -79dBm(MCS0), -53dBm(MCS9) |

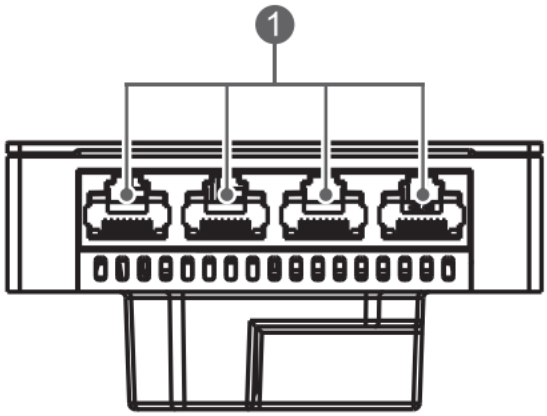
| | |
|---|---|
| | 11ax: HE80: -79dBm(MCS0), -53dBm(MCS9),-52dBm(MCS11) |
| **Max Transmit Power** | ≤ 100mw (20dBm)<br>(Depending on the country of use, laws and regulations.) |
| **Transmit Power Adjustment** | 1 dBm |
| **Dimensions (W x D x H)** | 86mm x 116mm x 40mm |
| **Weight** | ≤ 0.3kg |
| **Service Ports** | Four 10/100/1000Base-T LAN ports<br>One 10/100/1000Base-T WAN port (PoE and PoE+ capable) |
| **Management Ports** | One Micro USB port for console management |
| **LED Indicators** | One indicator |
| **Power Supply** | Local power supply: DC 12V/1A<br>PoE: IEEE 802.3af/802.3at-compliant (compatible). |
| **Power Consumption** | < 10W |
| **Bluetooth** | Bluetooth 4.0<br>iBeacon |
| **Temperature** | Operating: -10°C to 45°C (14°F to 113°F) |
| | Storage: -40°C to 70°C (-40°F to 158°F) |
| **Humidity** | Operating: 5% to 95% RH (non-condensing) |
| | Storage: 5% to 95% RH (non-condensing) |
| **Installation** | Wall mount |
| **IP Rating** | IP41 |
| **Safety Standards** | GB4943<br>EN/IEC 60950-1 |
| **EMC Standards** | GB9254<br>EN301489<br>EN50121<br>EN50155 |
| **Radio** | China Radio Transmission Equipment Type Approval Certificate<br>EN300 328<br>EN301 893 |
| **MTBF** | > 250,000H |

## 1.2 Product Image

The AP provides two radio ports, one 10/100/1000Base-T Ethernet WAN port, and four 10/100/1000Base-T Ethernet LAN ports.

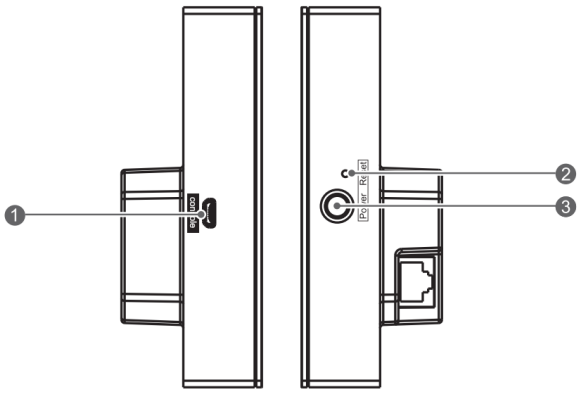
Figure 1-1 Image of RG-AP180


Figure 1-2 Bottom View of RG-AP180



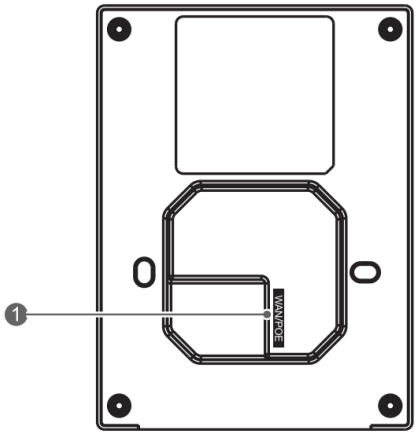

| | |
|---|---|
| **Note** | 1. Four 10/100/1000Base-T LAN ports |

Figure 1-3 Side View of RG-AP180




| | |
|---|---|
| **Note** | 1. Micro USB management port (Console)<br>2. Reset button<br>3. Port for local power supply |

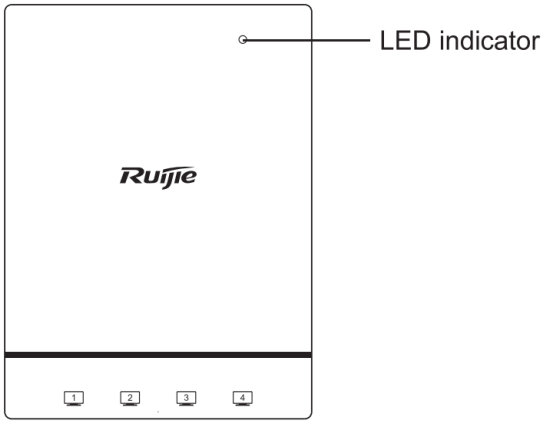
Figure 1-4 Rear View of RG-AP180




| Note | 1. 10/100/1000Base-T Ethernet WAN port |
|---|---|

## 1.3 LED Indicators

Figure 1-5 Indicator on the AP




**Fat AP Mode**

| State | Frequency | Meaning |
|---|---|---|
| Off | N/A | The AP is powered off. Or the AP is in Silent mode, which can be disabled via software. |
| Fast blinking green before solid green | 2.5Hz (fast blinking green) | Initialization is in progress. The AP is operational. |
| Fast blinking red | 2.5Hz | Firmware upgrade in progress. Do not power off the AP. |
| Blinking orange | 1Hz | AP is operational. |

**Fit AP Mode**

| State | Frequency | Meaning |
|---|---|---|
| Off | N/A | The AP is powered off. Or the AP is in Silent mode, which can be disabled via |

| | | |
|---|---|---|
| | | software. |
| Fast blinking green before solid green | 2.5Hz (fast blinking green) | Initialization is in progress. The AP is operational. |
| Fast blinking red | 2.5Hz | Firmware upgrade in progress. Do not power off the AP. |
| Blinking orange | 1Hz | AP is operational and Ethernet link is down. |
| Blinking green | 1Hz | AP is operational and Ethernet link is up. CAPWAP error. |
| Slow blinking green | 0.4Hz | AP is operational and CAPWAP connection is established. At least one client is associated. |

## 1.4 Reset Button

To reset the AP, you need to keep the reset button pressed for 2s or less.

To restore default settings, you need to keep the reset button pressed for 3s or more.

## 1.5 Power Sources

RG-AP180 supports two power supply modes: PoE and DC power supply.

PoE power supply:

- Input voltage range: 44-57V
- Rated current: 0.3A

When adopting PoE power supply, make sure the peer end also supports 802.3af/802.3at.

DC power supply:

- Input voltage range: 12V
- Rated current: 1A

## 1.6 Cooling Solution

The AP adopts fanless design. Keep enough space around the device to guarantee airflow for proper ventilation.

# 2 Preparing for Installation

## 2.1 Safety Suggestions

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.

## 2.2 Installation

- 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 installation site dry. Installing the device near sea is not recommended.
- 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 shall be selected according to network planning and features of communications equipment, and considerations such as climate, hydrology, geology, earthquake, electric power, and transportation.

## 2.3 Temperature and Humidity

Required temperature and humidity are as follows:

- Operating temperature: -10°C to 45°C (14°F to 113°F)
- Operating humidity: 5% to 95% RH (non-condensing)

## 2.4 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 2-1

| **Maximum diameter (μm)** | 0.5 | 1 | 3 | 5 |
|---|---|---|---|---|
| **Maximum concentration (Particles/m$^3$)** | $1.4\times10^7$ | $7\times10^5$ | $2.4\times10^5$ | $1.3\times10^5$ |

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 2-2

| 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 |

## 2.5 Power Supply

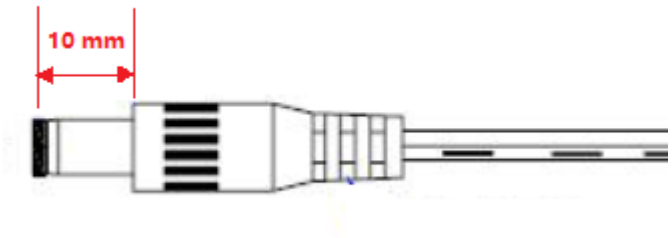
- PoE injector: IEEE 802.3at/af compliant
- DC power adapter:

  Input voltage: 12V

  Rated current: 1.0A

Technical Specifications of the DC Connector

| Inner Diameter | Outer Diameter | Insertion Depth | Polarity |
|---|---|---|---|
| 2.1mm | 5.5mm | 10mm | Inner pole: positive<br>Outer pole: negative |




The DC input power should be greater than the power actually consumed by the system. The input power for the RG-AP180 should not be lower than 10W.

Use DC power adapters with specifications recommended by Ruijie.

Please use Ruijie certified PoE injectors.

## 2.6 EMI Consideration

Various interference sources, from either outside or inside the equipment or application system, affect the system in the conductive ways such as capacitive coupling, inductive coupling, and electromagnetic radiation. There are two types of electromagnetic interferences: radiated interference and conducted interference, depending on the type of the propagation path. When the energy, often RF energy, from a component arrives at a sensitive component via the space,

the energy is known as radiated interference. The interference source can be both a part of the interfered system and a completely electrically isolated unit. Conducted interference results from the electromagnetic wire or signal cable connection between the source and the sensitive component, along the cable the interference conducts from one unit to another. Conducted interference often affects the power supply of the equipment, but can be controlled by a filter. Radiated interference may affect any signal path in the equipment, and is difficult to shield.

- Effective measures should be taken for the power system to prevent the interference from the electric grid.
- The working ground of the routers should be properly separated and kept as far as possible from the grounding device of the power equipment or the anti-lightning grounding device.
- Keep the equipment away from high-power radio transmitter, radar transmitting station, and high-frequency large-current device.
- Measures must be taken to isolate static electricity.

## 2.7 Installation Tools

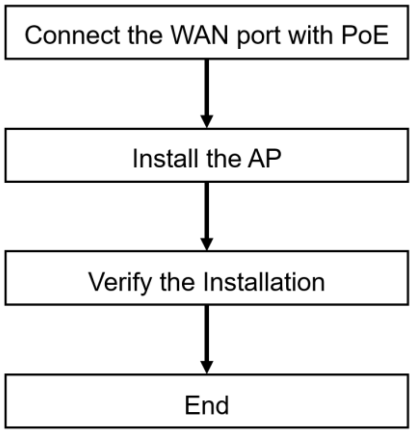
| | |
|---|---|
| **Common Tools** | Phillips (crosshead) screwdriver, copper and fiber cables, bolts, diagonal pliers, cable ties straight screwdriver (for the removal of the cover) |
| **Special Tools** | Wire stripper, crimping pliers, RJ-45 crimping pliers, punch down tool, anti-static tools |
| **Meter** | Multimeter, bit error rate tester (BERT) |

The listed tools, apart from bolts, are customer supplied.

# 3 Installing the Access Point

Make sure you have carefully read Chapter 2, and be sure that the requirements set forth in Chapter 2 have been met.

## 3.1 Installation Flowchart




## 3.2 Before You Begin

To ensure normal operation and a prolonged useful life of the equipment, 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 wipe the device with a damp cloth.
- Do not wash the device with liquid.
- Do not open the enclosure when the AP is working.
- Fasten the device tightly.

## 3.3 Installing the Access Point

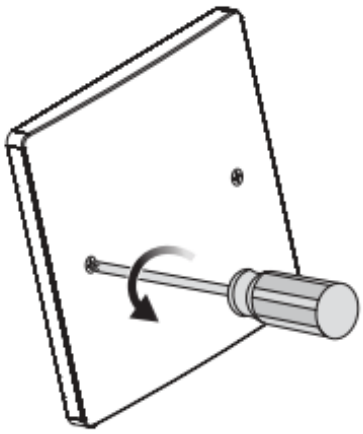
Disconnect the device before installing or moving it.

Make sure that the screws are of fine quality.

Be sure that the equipment is installed in a place where it is easy to be observed.

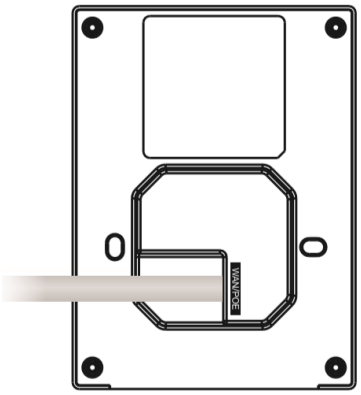
1) Loosen screws on the 86-type faceplate that is mounted on the wall. (Skip this step if the faceplate has not been mounted.)

Figure 3-1 Loosen Screws on the Faceplate



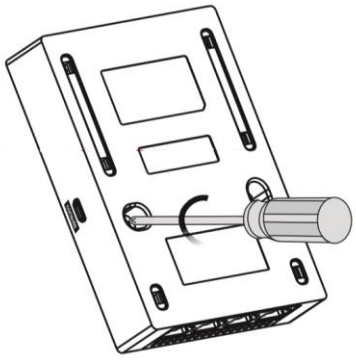
2) Connect the uplink cable to the UpLNK port.

Figure 3-2 Connect Cables to Ports



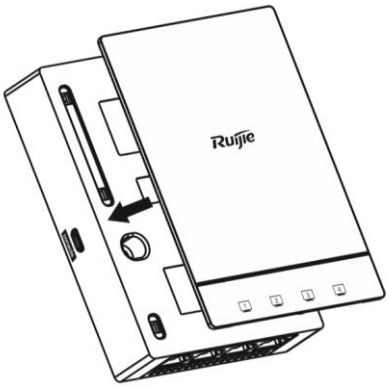

3) Align screw holes on both sides of the device over those on the faceplate. And then tighten screws with a screwdriver.

Figure 3-3 Tighten Screws with a Screwdriver



4) Install the plate cover in the way as shown in the following figure.

Figure 3-4 Install the Cover



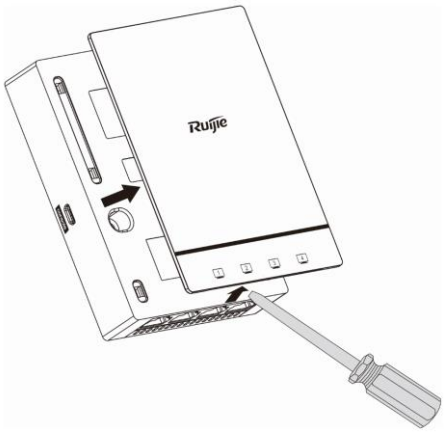

5) Compete the installation.

Figure 3-5 Cover for RG-AP180


## 3.4 Removing the Plate Cover

You can use a straight screwdriver to remove the plate cover as constructed in the following figure.

Figure 3-6 Removing the Plate Cover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# 4 System Debugging

## 4.1 Setting up a Debugging Environment

Use a power adapter or PoE to power the AP.

**Setting up the Environment**

- Verify that the AP is properly connected to the power source.
- Connect the AP to a wireless controller through a twisted pair cable.
- When the AP is connected to a PC for debugging, verify that the PC and PoE switch are properly grounded.

## 4.2 Powering Up the AP

### 4.2.1 Checking before power-up

- Verify that the power supply is properly connected.
- Verify that the input voltage matches the specification of the AP.

### 4.2.2 Checking after power-up (recommended)

After powering up, it is recommended that you check the following to ensure normal operation of the AP.

- Check if any message is displayed on the Web-based configuration interface for the wireless controller.
- Check if the LED works normally.

## 4.3 Reset/Restore Default Settings

The reset button is hidden in a hole and used by technical support personnel. To avoid abnormal operation, do not use this button without consultation with technical support personnel.

### 4.3.1 System Reset

Remove the cover. Insert an iron stick, 1mm or less in diameter, into the hole, and slightly press it. After hearing a click, keep the stick in the same position for 2s. The system reset is complete.

### 4.3.2 Restore Default Settings

Remove the cover. Insert an iron stick, 1mm or less in diameter, into the hole, and slightly press it. After hearing a click, keep the stick in the same position for 3s. Default settings are restored.

# 5 Monitoring and Maintenance

## 5.1 Monitoring

You can observe the LED to monitor the AP in operation.

- Fast blinking green followed by solid green: The AP is being initialized and is operational.
- Blinking red: The AP is upgrading programs firmware. Do not power off the AP.
- Blinking orange: The AP is operational. The Ethernet link is down.
- Blinking green (1Hz): The AP is operational, and the Ethernet link is up. But the CAPWAP connection is faulty.
- Blinking green (0.4Hz): The AP is operational. The CAPWAP connection is OK. At least one client is associated with the AP.
- Blinking green (one flash every 4 seconds): The AP is operational. No clients are associated with the AP. The system is in the low consumption mode.

## 5.2 Remote Maintenance

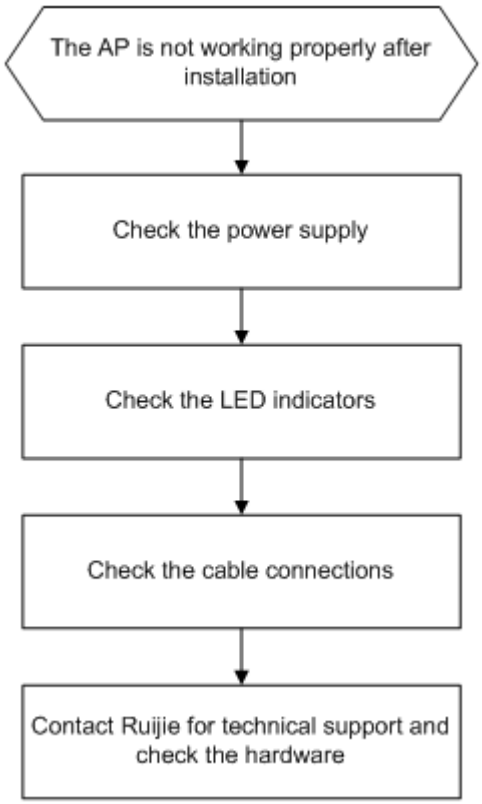
- If the AP operates as a Fat AP, you can login in to the AP remotely for maintenance.
- If the AP operates as a Fit AP, you can use the wireless controller to centrally manage and maintain the AP.

## 5.3 Hardware Maintenance

- If the hardware is faulty, please contact our Technical Assistance Center (TAC) for help.

# 6 Troubleshooting

## 6.1 Troubleshooting Flowchart




## 6.2 Troubleshooting

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

Verify that the power source is IEEE 802.11af compliant. And then verify that the cable is connected properly.

### Orange LED blinks after the Ethernet cable 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 above-mentioned two steps.
2) Verify that the AP is configured correctly.
3) Adjust the transmit power.
4) Move the client device to adjust the distance between the client and the AP.

The installation instruction above is based on RG-AP180. The actual product prevails.

# Appendix A Connectors and Media

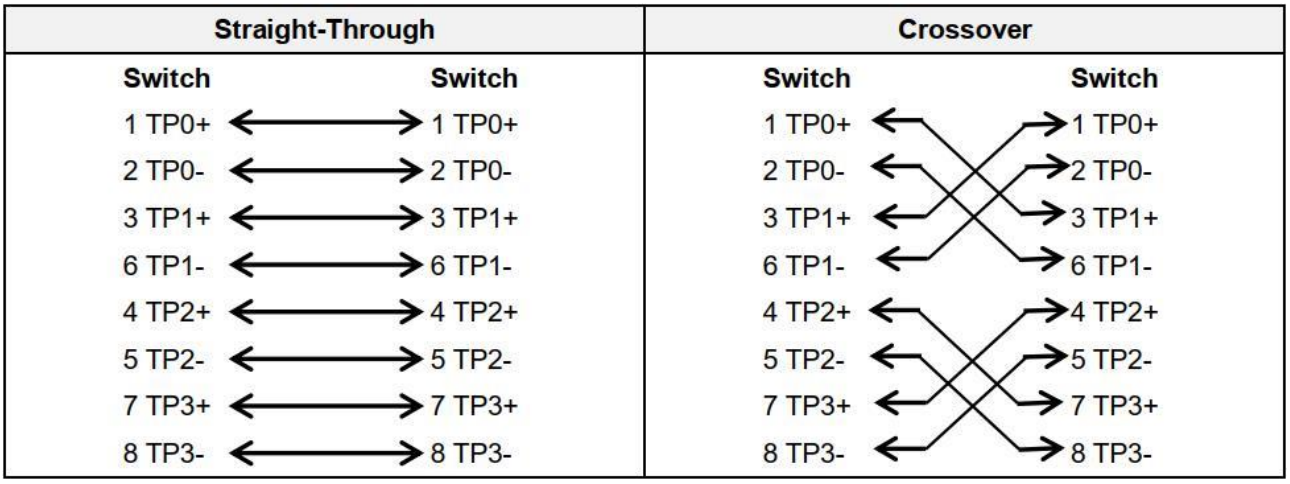
## 1000BASE-T/100BASE-TX/10BASE-T

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 shows 100BASE-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