Ruijie Reyee RG-RAP2200(E) Access Point

Installation Guide

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Preface

Intended Audience

This document is intended for:

- Network engineers
- Technical support and servicing engineers
- Network administrators

Technical Support

- Ruijie Reyee website: https://reyee.ruijie.com
- Online support center: https://reyee.ruijie.com/en-global/support
- Case portal: https://www.ruijie.com/support/caseportal
- Community: https://community.ruijie.com
- Email support: service_rj@ruijie.com
- Live chat: https://reyee.ruijie.com/en-global/rita

Conventions

1. Signs

The signs used in this document are described as follows:

Danger

An alert that calls attention to safety instruction that if not understood or followed can result in personal injury.

Warning

An alert that calls attention to important rules and information that if not understood or followed can result in data loss or equipment damage.

Caution

An alert that calls attention to essential information that if not understood or followed can result in function failure or performance degradation.

Note

An alert that contains additional or supplementary information that if not understood or followed will not lead to serious consequences.

Specification

An alert that contains a description of product or version support.

2. Notes

This manual provides installation steps, troubleshooting, technical specifications, and usage guidelines for cables and connectors. It is intended for users who want to understand the above and have extensive experience in network deployment and management, and assume that users are familiar with related terms and concepts.

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1 Product Overview

Compliant with the IEEE 802.11a/b/g/n/ac Wave1/Wave2 standards, the RG-RAP2200(E) supports four spatial streams and MIMO, and delivers up to 400 Mbps in 2.4 GHz and 866 Mbps in 5 GHz. The overall dual-radio dual-band performance speeds up to 1266 Mbps per device, totally eliminating Gigabit wireless bottlenecks. RG-RAP2200(E) adopts either local power supply or PoE power supply, and can be ceiling-mounted in indoor Wi-Fi coverage scenarios with large areas. RG-RAP2200(E) provides two Gigabit Ethernet ports, making it possible connect a camera or switch device to adapt to challenges in a wide variety of deployment scenarios.

1.1 Package Contents

Table 1-1 Package Contents

No.	Item	Quantity
1	RG-RAP2200(E) access point	1
2	Mounting bracket	1
3	Cross pan head screws (ST4.2 x 20 mm)	2
4	Plastic expansion anchors (φ9 x 25.4 mm)	2
5	User Manual	1
6	Warranty Card	1

Note

The package contents generally contain the preceding items. The actual delivery is subject to the order contract. Please check your goods carefully against the order contract. If you have any questions, please contact the distributor.

1.2 Technical Specifications

Table 1-2 RG-RAP2200(E) Technical Specifications

System Specifications	Flash memory	16 MB
	RAM	128 MB CPU built-in DDR3
Wi-Fi Radio	5 GHz Wi-Fi	Wi-Fi 4 (IEEE 802.11a/n) Wi-Fi 5 (IEEE 802.11ac)
	2.4 GHz Wi-Fi	Wi-Fi 4 (IEEE 802.11b/g/n)

	Operating band	IEEE 802.11b/g/n, 2.400 GHz to 2.4835 GHz IEEE 802.11a/n/ac, 5.150 GHz to 5.350 GHz, 5.470 GHz to 5.725 GHz, 5.725 GHz to 5.850 GHz Note: Available bands vary with countries and regions. To use the preceding frequency bands, ensure that your country or region supports these frequency bands.
	Radio design	Dual-radio 4 spatial streams ● 2.4 GHz: 2 x 2, MIMO ● 5 GHz: 2 x 2, MIMO
	5 GHz channel width	Auto/20/40/80 MHz
	2.4 GHz channel width	Auto/20/40 MHz
	Maximum wireless data rate	1266 Mbps
	5 GHz wireless data rate	866 Mbps
	2.4 GHz wireless data rate	400 Mbps
	Maximum transmit power (5 GHz)	Combined power: 26 dBm (single-stream power: 23 dBm) Note: The transmit power varies according to regulations in different countries and regions.
	Maximum transmit power (2.4 GHz)	Combined power: 25 dBm (single-stream power: 22 dBm) Note: The transmit power varies according to regulations in different countries and regions.
	Maximum transmit power	Frequency bands and maximum Effective Isotropic Radiated Power (EIRP): Note: Country specific restrictions apply. ● European Union & United Kingdom: ○ 2400–2483.5 MHz, EIRP ≤ 20 dBm ○ 5150–5350 MHz, EIRP ≤ 23 dBm ○ 5470–5725 MHz, EIRP ≤ 30 dBm ● United States: ○ 2400–2483.5 MHz, max output power ≤ 30 dBm & EIRP ≤ 36 dBm

		○ 5150–5250 MHz, max output power ≤ 30 dBm & EIRP ≤ 36 dBm ○ 5250–5350 MHz, max output power < 24 dBm & EIRP ≤ 30 dBm ○ 5470–5725 MHz, max output power < 24 dBm & EIRP ≤ 30 dBm ○ 5725–5850 MHz, max output power ≤ 30 dBm & EIRP ≤ 36 dBm ● Myanmar: ○ 2400–2483.5 MHz, EIRP ≤ 23 dBm ○ 5725–5825 MHz, EIRP ≤ 30 dBm ● Thailand: ○ 2400–2483.5 MHz, EIRP ≤ 20 dBm ○ 5150–5350 MHz, EIRP ≤ 23 dBm ○ 5470–5725 MHz, EIRP ≤ 30 dBm ○ 5725–5825 MHz, EIRP ≤ 30 dBm ● Indonesia: ○ 2400–2483.5 MHz, EIRP ≤ 27 dBm ○ 5150–5350 MHz, EIRP ≤ 23 dBm ○ 5725–5825 MHz, EIRP ≤ 23 dBm ● Egypt: ○ 2400–2483.5 MHz, EIRP ≤ 20 dBm ○ 5150–5350 MHz, EIRP ≤ 23 dBm
	Coverage range	115 ㎡ (1237.85 square ft.) Note: The data is obtained in an ideal environment without obstruction. The signal coverage radius depends on client performance and environmental interference.
	Modulation	OFDM: BPSK @ 6/9 Mbps, QPSK @ 12/18 Mbps, 16-QAM @ 24 Mbps, 64-QAM @ 48/54 Mbps DSSS: DBPSK @ 1 Mbps, DQPSK @ 2 Mbps, and CCK @ 5.5/11 Mbps MIMO-OFDM: BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM
	Receive sensitivity	11b: –91 dBm (1 Mbps), –88 dBm (5.5 Mbps), –85 dBm (11 Mbps)

		11a/g: –89 dBm (6 Mbps), –80 dBm (24 Mbps), –76 dBm (36 Mbps), –71 dBm (54 Mbps) 11n: –83 dBm (MCS0), –65 dBm (MCS7), –83 dBm (MCS8), –65 dBm (MCS15) 11ac: 20 MHz: –83 dBm (MCS0), –57 dBm (MCS9) 11ac: 40 MHz: –79 dBm (MCS0), –57 dBm (MCS9) 11ac: 80 MHz: –76 dBm (MCS0), –51 dBm (MCS9)
Antenna	Antenna	2.4 GHz: 2 built-in omnidirectional antennas 5 GHz: 2 built-in omnidirectional antennas
	Antenna gain (5 GHz)	2.00 dBi
	Antenna gain (2.4 GHz)	2.00 dBi
Port Specifications	Number of 10/100/1000BASE-T ports	2
	Maximum rate of the LAN port	1000 Mbps
	Reset button	1
	LEDs	1 x system status LED
Power Supply and Consumption	Power supply	● DC power adapter ● PoE/PoE+ Note: If both the DC power adapter and PoE/PoE+ are available for power supply, the DC power adapter is preferred.
	Local power supply	Yes, one DC power connector (12 V, 1.5 A)
	Dimensions of the DC connector	Outer diameter: 5.5 mm (0.22 in.) Inner diameter: 2.1 mm (0.08 in.) Depth: 10 mm (0.39 in.)
	PoE In standard	● IEEE 802.3af (PoE) ● IEEE 802.3at (PoE+)
	Maximum power consumption	12.95 W
Dimensions and Weight	Product dimensions (W x D x H)	194 mm x 194 mm x 35 mm (7.64 in. x 7.64 in. x 1.38 in.) (excluding the mounting bracket)

	Package dimensions (W x D x H)	219 mm x 217 mm x 67 mm (8.62 in. x 8.54 in. x 2.64 in.)
	Color	White
	Weight	≤ 0.45 kg (0.99 lbs.) (without packaging materials)
	Shipping weight	≤ 0.69 kg (1.52 lbs.)
Environment and Reliability	Operating temperature	0°C to 40°C (32°F to 104°F)
	Storage temperature	–40°C to +70°C (–40°F to +158°F)
	Operating humidity	5% RH to 95% RH (non-condensing)
	Storage humidity	5% RH to 95% RH (non-condensing)
	Mounting options	Ceiling/Wall
	Surge protection	Ethernet port: ±2 kV for common mode
	MTBF	400,000 hours
Certification and Regulatory Compliance	RoHS	Yes
	Certification	CE, FCC, CB, ISED, cTUVus

Note

Weight refers to the weight of host.

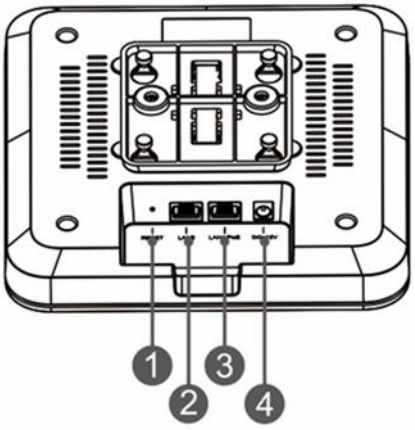
1.3 Product Image

The AP provides two 10/100/1000Base-T Ethernet ports (LAN1 port is PoE-capable), one power port for an external power supply and one reset button. The label is located on the bottom of the device.

Figure 1-1 Appearance of RG-RAP2200(E)



Figure 1-2 Bottom View of RG-RAP2200(E)



Note:	**①Reset Button**	**②LAN2 Port**
	③LAN1/PoE Port	④DC-12V Power Port

1.4 LED Indicator and Button

LED Indicator and Button	State	Frequency	Meaning
LED Indicator	Off	N/A	The AP is NOT receiving power.
	Blinking	0.5Hz	Normal operation, but the AP is not connected to Ruijie Cloud.

LED Indicator and Button	State	Frequency	Meaning
	Fast blinking	10Hz	Possible cases: (1) Restoring the factory default settings (2) Upgrading the firmware (3) Restoring the image file (4) Initializing the device
	Solid green	N/A	Normal operation.
Reset Button	Pressed for less than 2 seconds		Restarts the device.
	Pressed for more than 5 seconds		Restores the factory default settings.

1.5 Power Sources

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

Note

- Use DC power adapters with specifications recommended by Ruijie.
- The power adapter is customer-supplied.
- To use a PoE device, make sure that it supports the IEEE 802.3at/802.3af standard.

1.6 Cooling Solution

The AP features a fanless design.

Note

Leave sufficient space surrounding the AP when installing the AP to permit proper airflow for ventilation.

2 Preparing for Installation

Note

- To prevent device damage and physical injury, please read the safety recommendations carefully as described in this chapter.
- Recommendations do not cover all possible hazardous situations.

2.1 Installation

The AP must be installed indoors. To ensure normal operation, the installation site must meet the following requirements.

- Install the AP in a well-ventilated environment. If it is installed in a closed room, make sure there is a good cooling system.
- Make sure the site is sturdy enough to support the AP and its accessories.
- Make sure the site has enough space for installing the AP and leave sufficient room around the AP for ventilation.
- Do not expose the AP to high temperature, dust, or harmful gases.
- Do not install the AP in an area prone to fire or explosions.
- 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 ocean and do not face it towards the sea breeze.
- The installation site should be free from water including possible flooding, seepage, dripping, or condensation.
- The installation site should be selected according to network planning and communications equipment features, and considerations such as climate, hydrology, geology, earthquake, electrical power, and transportation.

Caution

Please follow the correct method described in the installation guide to install and remove the device.

2.2 Movement

- Avoid frequently moving the device.
- Turn off all power supplies and unplug all power cables before you remove the device.

2.3 EMI

- Please observe local regulations and specifications when performing electrical operations. Relevant operators must be qualified.
- Carefully check for any potential hazards in the working area such as damp/wet ground or floors.

- Find the location of the emergency power supply switch in the room before installation. Cut off the power supply first in case of an accident.
- Be sure to make a careful check before shutting down the power supply.
- Do not place the device in a damp/wet location. Do not let any liquid enter the chassis.
- Keep the AP far away from grounding or lightning protection devices for power equipment.
- Keep the AP away from radio stations, radar stations, high-frequency high-current devices, and microwave ovens.

Caution

- Any nonstandard and inaccurate electrical operation can cause an accident such as fire or electric shock, thus causing severe even fatal damages to humans and devices.
- Direct or indirect contact with a wet object (or your finger) on the high voltage and power line can be fatal.

2.4 Ventilation

For proper ventilation, leave sufficient space around the AP.

2.5 Temperature and Humidity

To ensure the normal operation and equipment service life, maintain appropriate temperature and humidity levels in the equipment room. See Table 2-1. Improper room temperature and humidity can cause damage to the device.

- High relative humidity may affect insulation materials, resulting in poor insulation and even electrical leakage. Sometimes it may lead to changes in the mechanical properties of materials and corrosion of metal parts.
- Low relative humidity can dry and shrink insulation sheets and cause static electricity that can damage the circuitry.
- High temperatures greatly reduce device reliability and shorten service life.

Table 2-1 Required Temperature and Humidity for the RG-RAP2200(E)

Temperature	Relative Humidity
0°C to 40°C (32°F to 104°F)	5% to 95%

2.6 Cleanness

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

Table 2-2 Requirements for Dust

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

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

Table 2-3 Requirements for 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

2.7 Power Supply

- DC power adapter:

  Input voltage: 12 V.

  Rated current: 1.5 A.

- PoE+ injector:

  IEEE 802.3af/802.3at compliant.

  Technical Specifications of the DC Connector.

Inner Diameter	Outer Diameter	Insertion Depth	Conductor Impedance	Voltage-endurance Impedance	Voltage-endurance (Insulator and Conductor)	Polarity
2.1 mm (0.08 in.)	5.5 mm (0.22 in.)	10 mm (0.39 in.)	5Ω	100MΩ	1000V	Inner pole: positive Outer pole: negative

Note

- The DC input power should be greater than the power actually consumed by the system.
- Use DC power adapters with specifications recommended by Ruijie.

Caution

Please use Ruijie certified PoE injectors.

2.8 Installation Tools

Common Tools	Phillips (crosshead) screwdriver, copper and fiber cables, bolts, diagonal pliers, cable ties
Special Tools	Wire stripper, crimping pliers, RJ-45 crimping pliers, punch down tool
Meter	Multimeter, bit error rate tester (BERT)

Note

The tools listed above are customer supplied.

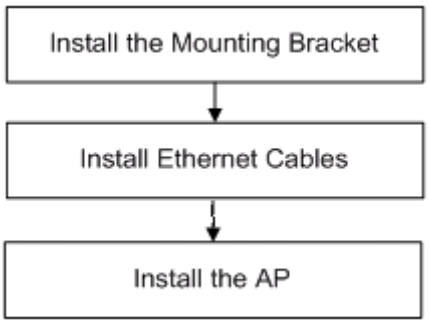
3 Installing the Access Point

The RG-RAP2200(E) series must be fixed and installed indoors.

Note

Before installing the AP, make sure you have carefully read the requirements described in Chapter 2.

3.1 Installation Flowchart



3.2 Before You Begin

Before installing the AP, verify that:

- The installation site provides sufficient ventilation for the AP.
- The installation site meets temperature and humidity requirements.
- The installation site is equipped with a proper power supply.
- Network cables are in place.
- The installation site meets all described requirements.
- The custom AP meets customer requirements.

3.3 Precautions

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

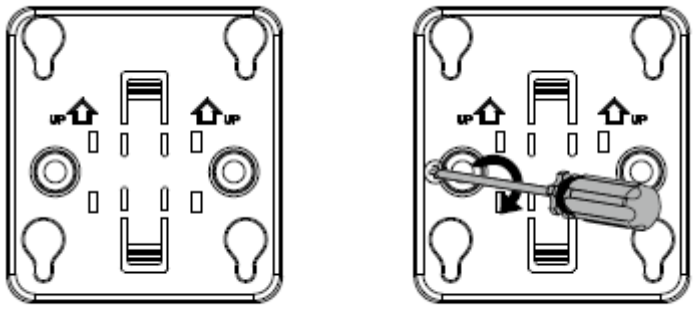
- Do not power on the device during installation.
- Install the device in a well-ventilated location.
- Do not subject the device to high temperatures.
- Keep away from high voltage cables.
- Install the device indoors.
- Do not expose the device in a thunderstorm or strong electric field.
- Keep the 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.

3.4 Installing the Access Point

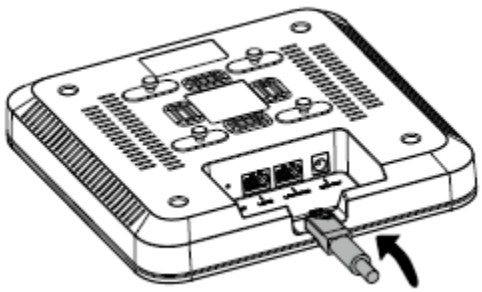
(1) Attach the mounting bracket on the ceiling or wall, as shown in Figure 3-1.

Figure 3-1 Attaching the Mounting Bracket on the Ceiling/Wall



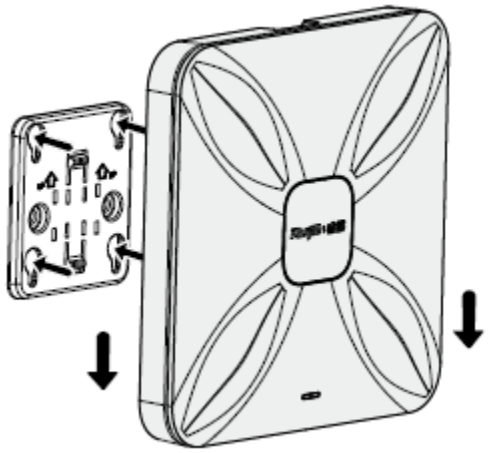
(2) Connect the Ethernet cable to the LAN1 port. See Figure 3-2.

Figure 3-2 Connecting the Ethernet Cable to the LAN1 Port



(3) Align the square feet on the rear of the AP over the mounting holes on the bracket. Slide the AP into the holes until it clicks into place, as shown in Figure 3-3.

Figure 3-3 Fastening the AP



Caution

- Install the Ethernet cables before mounting the AP on the bracket.
- The AP can be installed in any of four directions on the mounting bracket depending on how you route the Ethernet cable.
- The square feet should fit easily into the mounting slots. Do not forcibly push the AP into the slots.
- After installation, verify that the AP is securely fastened.

3.5 Removing the Access Point

Hold the AP in your hands and push it upward and away from the bracket in the arrow direction, as shown in Figure 3-1.

3.6 Connecting Cables

Connect the UTP/STP to the LAN1/PoE port on the AP. See Appendix A for the supported wiring for twisted pairs.

Caution

- Avoid bending the cable in a small radius close to the connector.
- Ruijie recommends that you do not use Ethernet cables with protective sleeves as they could make installation of Ethernet cables more difficult.

3.7 Bundling Cables

Precautions

- Make sure the cable bundles are neat and orderly.
- Bend twisted pairs naturally or in a large radius close to the connector.
- Do not over tighten a cable bundle as it may reduce cable life and performance.

Bundling Steps

(1) Bundle the drop UTP/STP cables and route them to the LAN1/PoE port.

(2) Attach the cables in the cable tray of the rack.

(3) Extend the cables under the AP and run in a straight line.

3.8 Checking after Installation

Checking the Cabinet

- Make sure the external power supply matches the patch panel specifications for the cabinet.
- After installation, make sure that the front and rear cabinet doors easily close.
- Make sure the cabinet is stable and level.
- Make sure the device and all cables are securely fastened in the rack.

Checking Cable Connection

- Make sure the UTP/STP cable matches the interface type.
- Make sure cables are properly bundled.

Checking the Power Supply

- Make sure all power cables are properly connected and safe.
- Make sure the AP is operational after powering on.

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.

5 Monitoring and Maintenance

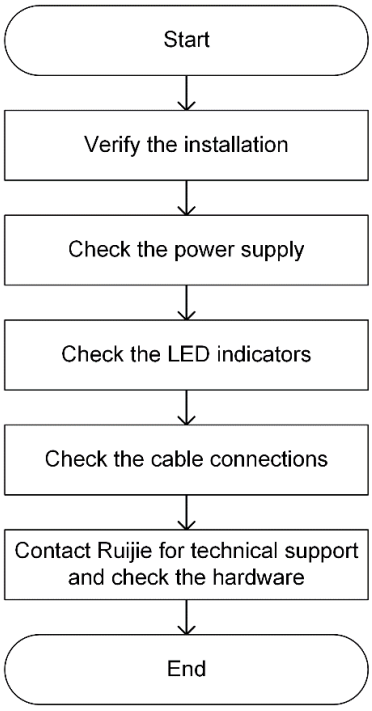
5.1 Monitoring

5.1.1 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

(1) If you use PoE power supply, verify that the power source is IEEE 802.2af compliant; then verify that the cable is properly connected.

(2) If you use a power adapter, verify that the power adapter is connected to an active power outlet; then verify that the power adapter works properly.

Ethernet port is not working 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) First, follow the two steps above.

(2) Verify that the AP is correctly configured.

(3) Adjust the angle of the antennas.

(4) Move the client device to adjust the distance between the client and the AP.

7 Appendix

7.1 Connectors and Media

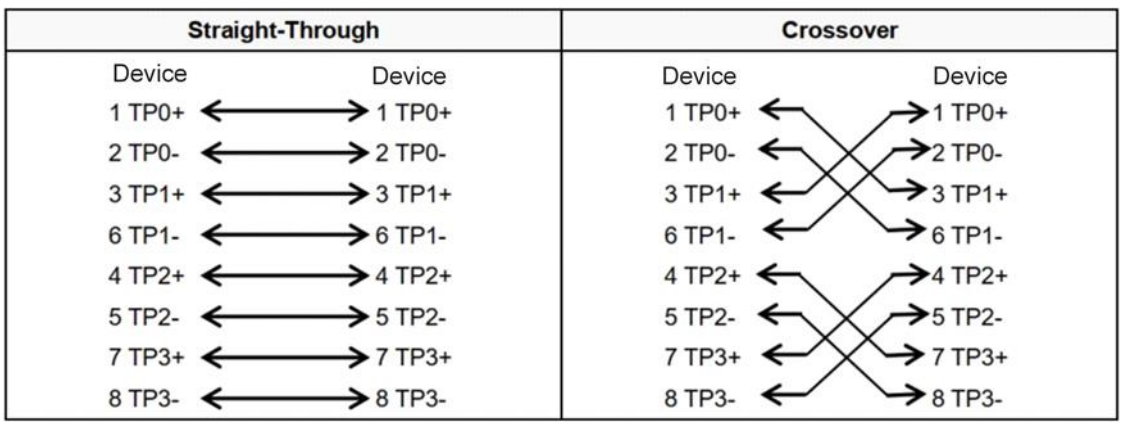
1000BASE-T/100BASE-TX/10BASE-T

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 7-1.

Figure 7-1 1000BASE-T Connection



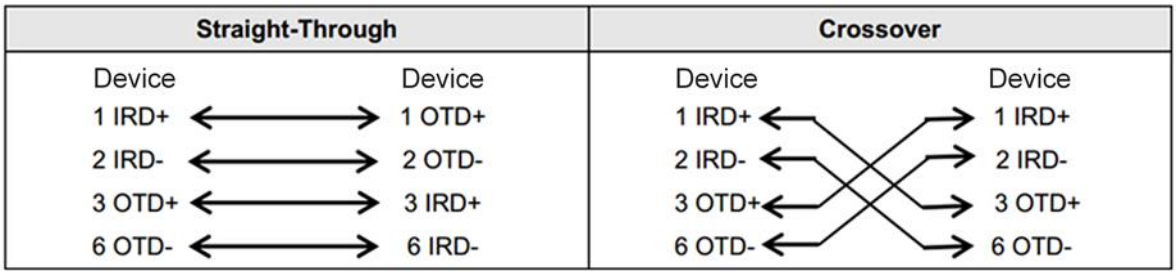
10BASE-T uses Category 3, 4, 5 100-ohm UTP/STP and 1000BASE-T uses Category 5 100-ohm UTP/STP for connections. Both support a maximum length of 100 meters. Table 7-1 shows 100BASE-TX/10BASE-T pin assignments.

Table 7-1 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 7-2 shows wiring of straight-through and crossover cables for 100BASE-TX/10BASE-T.

Figure 7-2 100BASE-TX/10BASE-T Connection



7.2 Cabling Recommendations

When installing the device, route the cables through the cable management brackets. Top cabling or bottom cabling is adopted according to the actual situation in the equipment room. All adapted connectors should be placed at the bottom of the rack in an orderly manner instead of outside the rack that is easy to touch. Power cords are routed beside the rack. Top cabling or bottom cabling is adopted according to the actual situation in the equipment room, such as the positions of the DC power distribution box, AC socket, or lightning protection box.

Required Minimum Cable Bend Radius

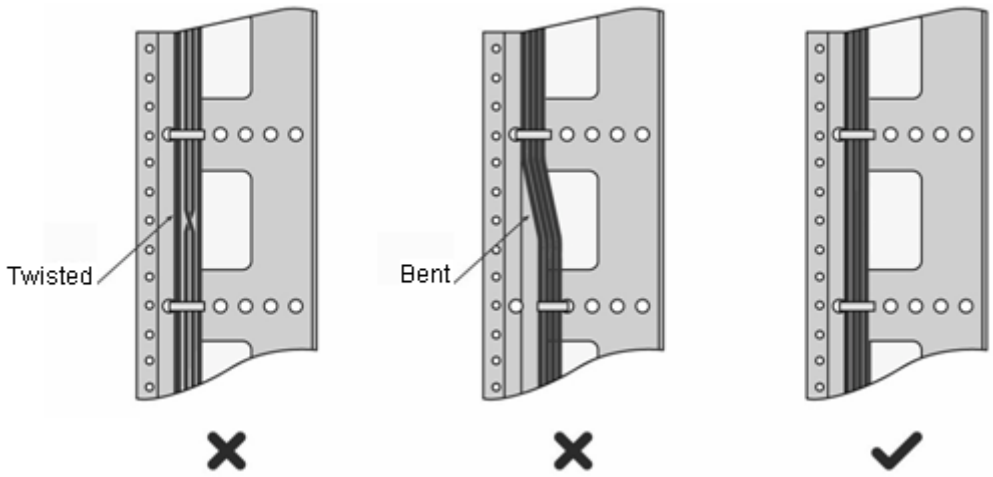
- The minimum bend radius of a power, communication or flat cable should be 5 times the overall diameter of the cable. If the cable is constantly bent, plugged or unplugged, the bend radius should be 7 times the overall diameter.
- The minimum bend radius of a coaxial cable should be 7 times the overall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

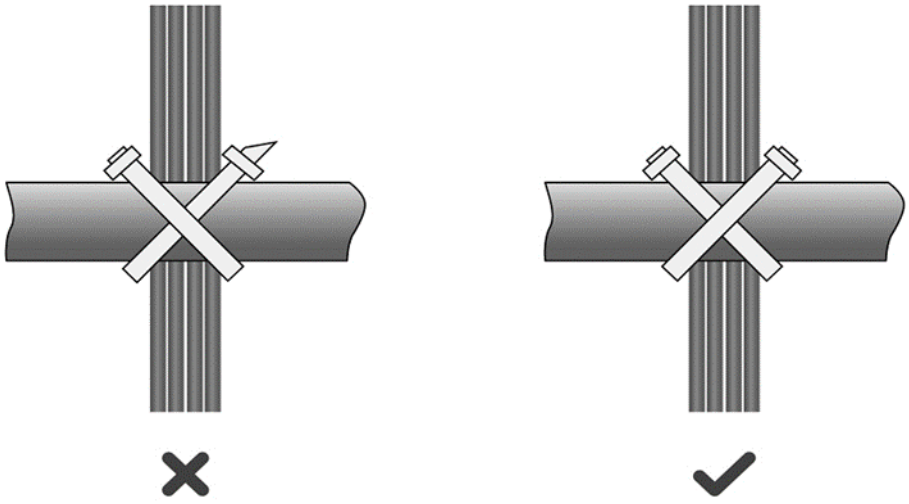
- Before bundling cables, correctly mark labels and stick the labels to cables where appropriate.
- Cables should be neatly and properly bundled, as shown in Figure 7-3.

Figure 7-3 Bundling Cables



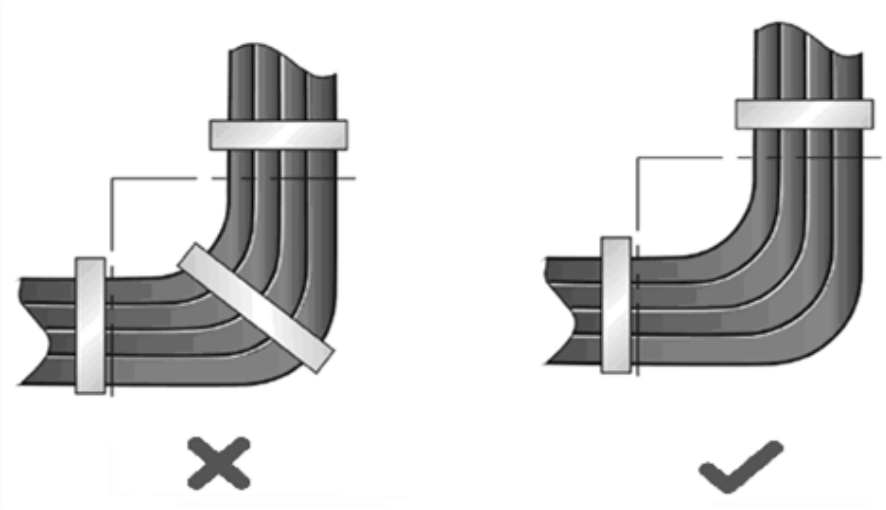
- Route and bundle power, signal, ground cables separately. When the cables are close to each other, cross them. When power cables run parallel to signal cables, the distance between them must be greater than 30 mm.
- All cable trays and their accessories shall be smooth and free from sharp edges.
- 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 7-4.

Figure 7-4 Cutting off Excess Cable Tie



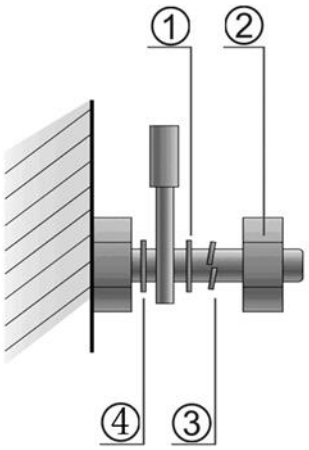
- If cables are to be bent, bind them first but do not tie cable ties within the bend to avoid stress on the cables, which may otherwise cause the wires inside to break, as shown in Figure 7-5.

Figure 7-5 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 7-6.

Figure 7-6 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.