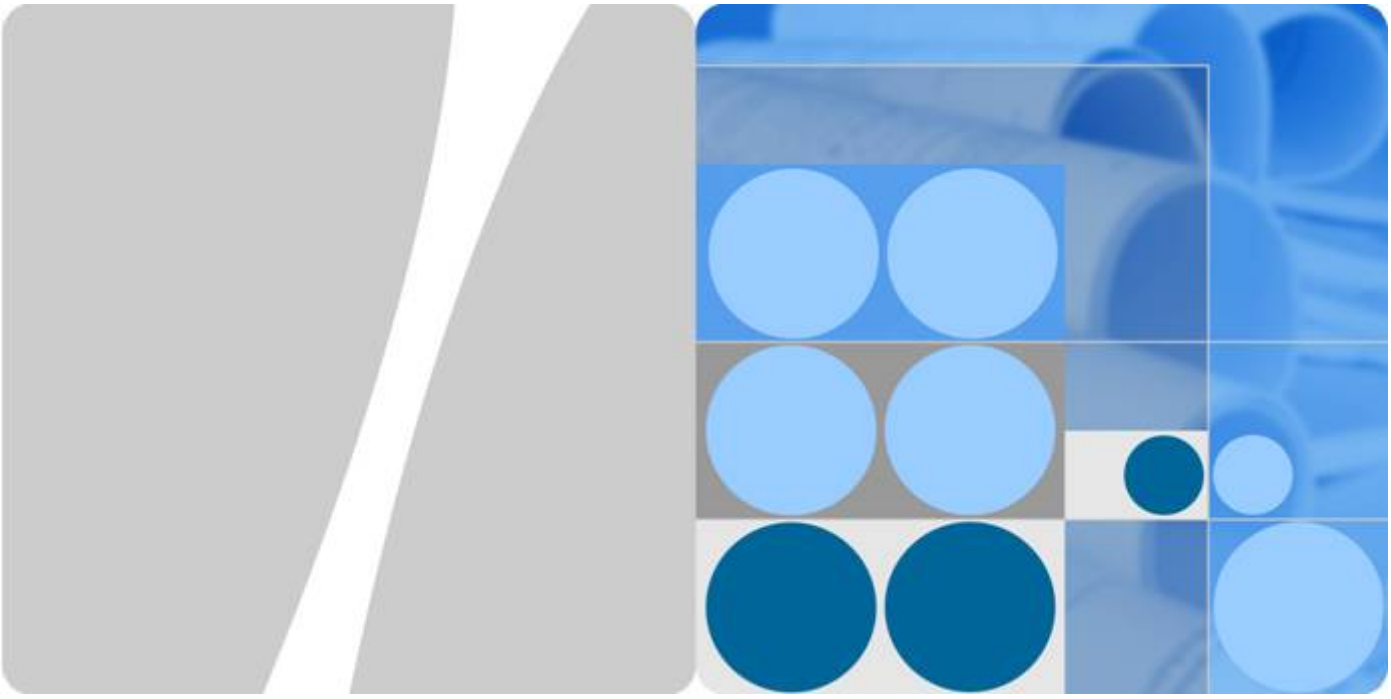

NetEngine AR

Hardware Installation and Maintenance Guide

Issue 20

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Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: https://e.huawei.com

About This Document

Intended Audience

This document provides detailed installation information about routers, including the methods for installing and connecting routers.

This document is intended for network engineers responsible for installing and maintaining routers. You should have experience in network device installation and maintenance.

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Declaration

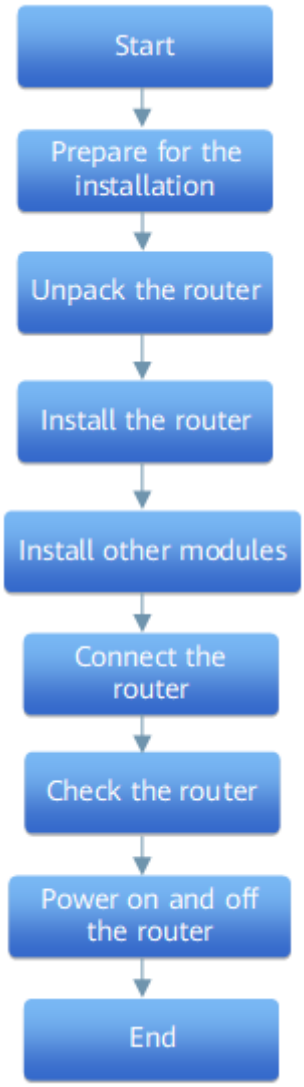
- This manual is only a reference for you to configure your devices. The contents in the manual, such as web pages, command line syntax, and command outputs, are based on the device conditions in the lab. The manual provides instructions for general scenarios, but do not cover all usage scenarios of all product models. The contents in the manual may be different from your actual device situations due to the differences in software versions, models, and configuration files. The manual will not list every possible difference. You should configure your devices according to actual situations.
- The specifications provided in this manual are tested in lab environment (for example, the tested device has been installed with a certain type of boards or only one protocol is run on the device). Results may differ from the listed specifications when you attempt to obtain the maximum values with multiple functions enabled on the device.
- In this document, public IP addresses may be used in feature introduction and configuration examples and are for reference only unless otherwise specified.
- In this document, NetEngine access routers include AR300&AR600&AR700&AR6100&AR6200&AR6300 Series.

Contents

1 Installation Overview

Figure 1-1 shows the sequence of tasks involved in installing a router.

Figure 1-1 Installation flowchart



2 Preparing for Installation

2.1 Reading Carefully the Safety Cautions

Read and follow all the safety cautions and instructions on the chassis or described in this document to protect personal and equipment safety during installation, operation, and maintenance.

WARNING, CAUTION, and DANGER items in this document do not cover all the safety cautions and are only supplementary to the safety cautions.

Installation and maintenance personnel must be trained to perform operations correctly and safely.

General Safety Guidelines

DANGER

In case of fire, immediately leave the building or equipment deployment site and press the fire alarm button or call the fire department. Never enter the building on fire again in any situation.

CAUTION

- Before performing any operation on a router, wear ESD clothing and ESD gloves or an ESD wrist strap. Remove conductive objects like jewelry and watches.
- After installing the router on a cabinet/rack, connect the ground cable to the chassis before any operations on the chassis and remove the ground cable only after you remove all the other components and cables from the chassis.

Environmental Safety

DANGER

Do not place or operate the router in an environment with flammable or explosive gases or smoke.

NOTE

- Keep the router away from water or damp to prevent damages to circuits.
- The router heats during operation. The installation site must be well ventilated to ensure normal operation of the router.

Electric Safety

DANGER

- Direct contact with a high-voltage power source or indirect contact through damp objects can be fatal. Misoperations on high-voltage facilities may result in fire, electric shock, or other accident.
- Never install or remove the router or power cables while the power is on. The electric arc or spark generated between a power cable and conductor may cause a fire or eye damage.
- To protect personal and equipment safety, ground the router before powering it on.

Laser Safety

CAUTION

- Invisible laser beams will cause eye damage. Do not look into bores of optical modules or connectors of optical fibers without eye protection.
- After unplugging an optical fiber, cover the fiber connectors with dust caps.

Mechanical Safety

CAUTION

- Before carrying a heavy object, use appropriate tools to protect yourself from bruise or sprain.
- Before pulling the chassis out of the cabinet, check whether there are any unstable or heavy objects on the cabinet. Be careful not to make the objects fall, which may cause body injuries.
- Do not drill holes on a cabinet without permission. Unqualified holes on a cabinet affect the electromagnetic filter performance of the cabinet and cause damages to the cables in the cabinet. In addition, metal scraps may fall into the cabinet when you are drilling holes, causing short circuit on printed circuit boards (PCBs).

2.2 Checking Installation Environment

AR routers must be used in indoor equipment rooms. Before installing a router, check whether the installation environment meets requirements. The router can work normally only when the environment meets requirements.

Table 2-1 lists requirements for the installation environment.

Table 2-1 Requirements for the installation environment

Check Item	Requirement
Heat dissipation	Leave at least 50 mm of clearance around the router for heat dissipation. **CAUTION** The equipment heats during operation. The installation site must be well ventilated to ensure normal operation of the equipment. • Do not install the equipment near a heat source, for example, a stove or heater. • The installation site must be well ventilated. • Air vents of the equipment must not be blocked.
Temperature and humidity	• Operating temperature: 0°C to 45°C • Operating relative humidity: 5% RH to 95% RH (noncondensing) **NOTE** If the relative humidity exceeds 70%, use dehumidifiers or air conditioners with dehumidification features.

Check Item	Requirement
Damp Proofing	The equipment must operate in an environment free from water and moisture. **CAUTION** Water or moisture may damage circuits of the equipment. • When the equipment is installed indoors, the router must be installed in a clean, dry, well ventilated site where temperature is controlled within a proper range. • The installation site must be free from leaking or dripping water, heavy dew, and humidity. If the relative humidity is high, use dehumidifiers or air conditioners with dehumidification features. • Do not install the equipment downstream or near a water source such as a sink or laundry room, or in an area with a high humidity. • Do not touch the equipment with wet hands.
ESD	• The router must be reliably grounded according to grounding requirements. • Wear an ESD wrist strap to prevent ESD damages to the router. • Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.
Corrosive gases	There must be no acidic, alkaline, or other corrosive gases in the installation site.
Surge protection	• Signal cables must be routed against walls indoors. Do not deploy signal cables overhead outdoors. • Keep signal cables away from power cables and surge protection devices.
Electromagnetic radiation	Comply with **11.1.7 Electromagnetism Requirements for the Equipment Room**.

2.3 Checking the Installation Site

Before installing the router, check the installation site according to the requirements listed in **Table 2-2**.

Table 2-2 Installation sites

Installation Site	Description	Example
Indoor controlled environment	Sealed indoor environment in which the temperature and humidity are controlled	Central equipment rooms, IDC equipment rooms, sealed shelters with air conditioners, and inside of outdoor air conditioning cabinets and heat exchange cabinets
Indoor partially controlled environment	Non-sealed environment that is more than 3.7 km away from the seaside. Such environments can be indoor or semi-indoor and the temperature and humidity are partially controlled.	Simple equipment rooms, ordinary houses, garages, corridors, direct ventilation cabinets, houses without walls, railway station platforms, and stadiums

If the router is installed at a site listed in **Table 2-3**, reliability issues may occur after long-term running.

Table 2-3 Installation sites

Installation Site	Description	Example
Indoor uncontrolled environment	Non-sealed environment that is 0–3.7 km away from the seaside. Such environments can be indoor or semi-indoor and the temperature and humidity are uncontrolled.	Seaside simple equipment rooms, ordinary houses, garages, corridors, direct ventilation cabinets, houses without walls, railway station platforms, stadiums, marine museums, or harbors
Outdoor environment far away from the seaside	Outdoor environment that is more than 0.5 km away from the seaside	Outdoor environment that is more than 0.5 km away from the seaside
Outdoor environment near the seaside	Outdoor environment that is 0.5 km or less away from the seaside or the environment over the sea	Portal crane or ships
Special environments	Special environments such as buried, underwater, or undersea environments and manhole	Buried, underwater, or undersea environments and manhole

2.4 Checking the Cabinet

Before installing a router, check whether the cabinet meets requirements according to **Table 2-4**.

Table 2-4 Cabinet requirements

Check Item	Requirement
Width	19-inch standard cabinet
Installation space	There must be at least 3 U of vertical space in the cabinet, and the depth of the cabinet must be at least 600 mm.
Grounding	There is reliable ground point on the cabinet to connect the router to ground.
Heat dissipation	• Sufficient space must be reserved around the cabinet. • If a router is placed in a closed cabinet, the cabinet must have air vents to ensure good ventilation.
Guide rail	The cabinet must be equipped with L-shaped guide rails in the following conditions: • A 2 U/3 U router needs to be installed in the cabinet. • The distance between the front and rear mounting rails does not meet the requirement for router installation.

2.5 Checking the Power Supply System

Table 2-5 lists power supply requirements of different router models.

Table 2-5 Power supply requirements

Check Item	Requirement
Preparation	Ensure that the external power supply system is ready before the installation.
Voltage	The operating voltage of the router must be within the normal range. For the operating voltage range of a router, see the *Hardware Description* of the product.

Check Item	Requirement
Power outlets and power cables	• If the external power supply system provides country-specific power outlets, use AC power cables comply with the local standards. • If a DC power distribution box is used, use DC power cables. • Each router has its own power cables delivered as accessories. The power cables can only be used on the router in the same package and cannot be used on any other device.

2.6 Preparing Installation Tools

Table 2-6 lists installation tools to be prepared before router installation.

Table 2-6 Installation tools

Tool	Function	Picture
Measuring tape	Measures distances.	
ESD wrist strap	Prevents ESD damages when you touch or operate the device or components.	
Utility knife	Cuts cartons or paper.	
Flat-head screwdriver	Tightens or loosens slotted screws.	
Phillips screwdriver	Tightens or loosens cross recessed screws.	
Marker	Draws lines and marks labels.	

Tool	Function	Picture
Diagonal pliers	Cut insulation tubes and cable ties.	
Multimeter	Tests cabinet insulation, cable connectivity, and device electrical performance indicators including voltage, current, and resistance.	
Claw hammer	Used to knock or shape a workpiece, or extract a nail.	
Hammer drill	Drills installation holes on a wall.	

3 Unpacking the Router

Context

NOTE

- Before opening the package, check whether the seal label or package is damaged. If there are signs of damage, stop unpacking and contact the supplier. If all packages are intact and the number of packages is correct, unpack the packages to check the equipment and components.
- Cartons of routers vary according to router dimensions, but the same unpacking method is used. The following figures illustrate the procedure for unpacking a 300.0 mm x 216.4 mm x 44.0 mm (11.81 in. x 8.52 in. x 1.73 in.) router.

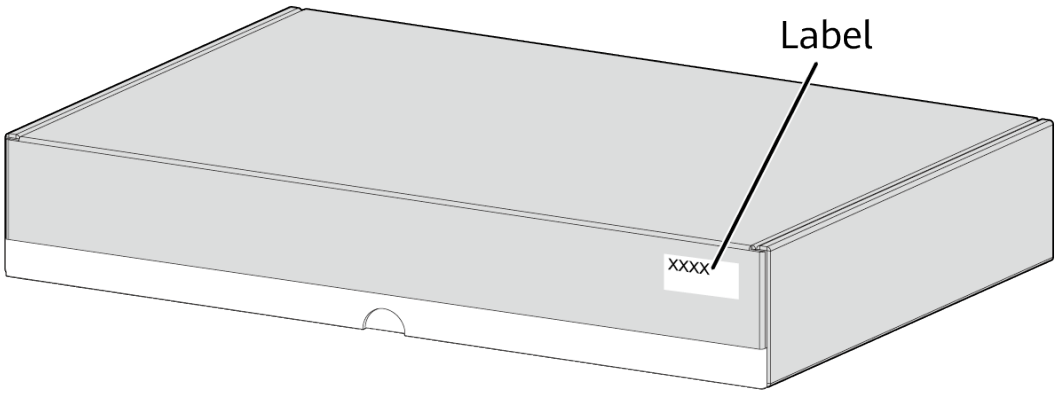
- Do not unpack the router until you are ready to begin installation. Moving an unpacked router over a long distance may cause damages to the router.
- If the router is found eroded or damped, stop unpacking, check for the reason, and contact the supplier.
- Wear gloves or take other protection measures to prevent hand injuries when unpacking a carton.
- Keep the cartons safe for future transportation of the routers.

Tools

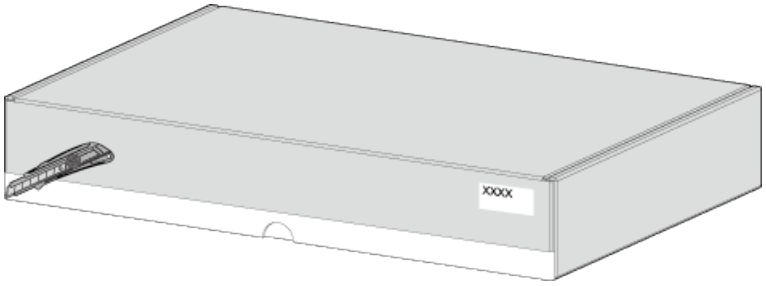
- Protective gloves
- Utility knife

Procedure

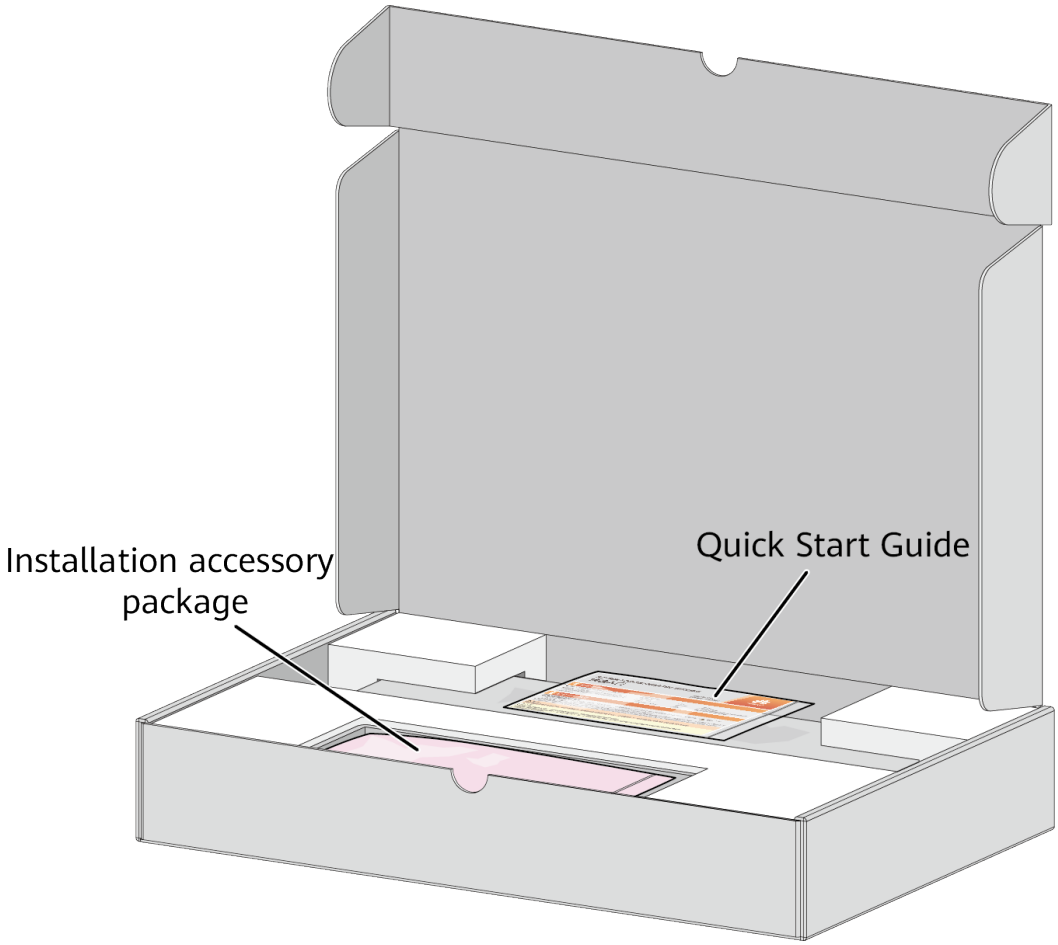
Step 1 Check the label on the carton to confirm whether the router model is correct and learn about precautions to take.



Step 2 Use a utility knife to cut the adhesive tape around the cover of the carton.



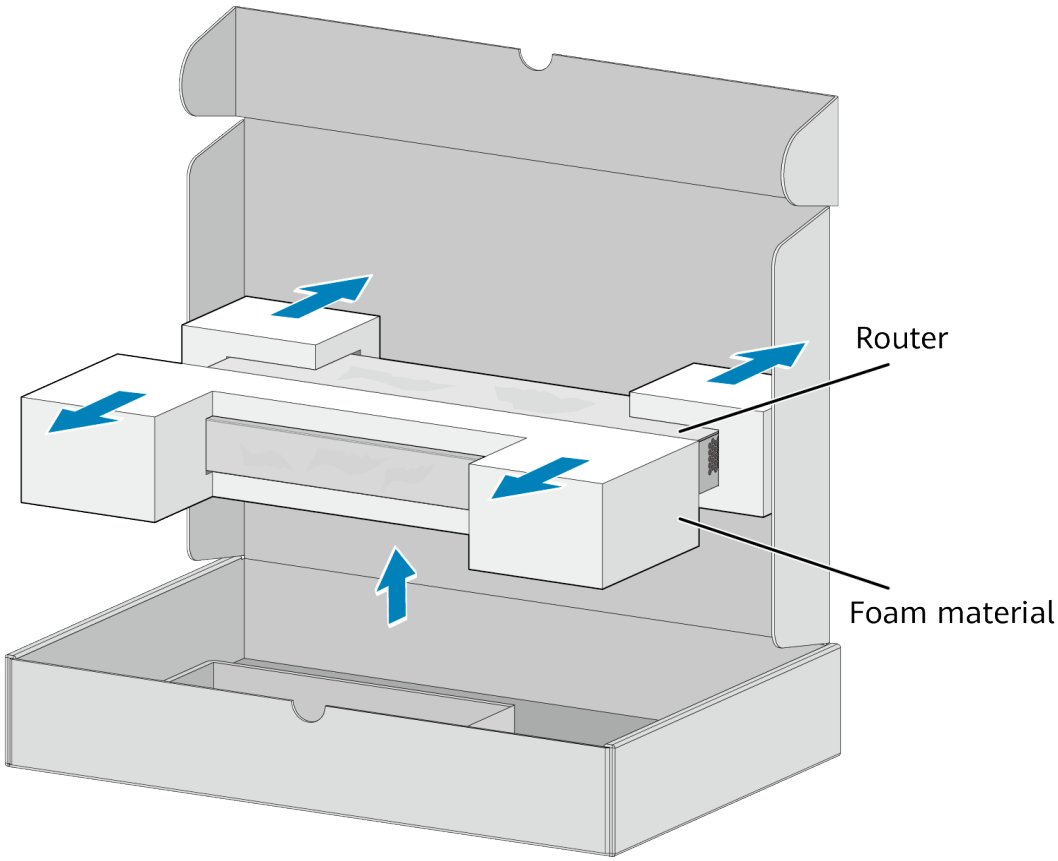
Step 3 Open the carton and take out the installation accessory package and the *Quick Start Guide* package.



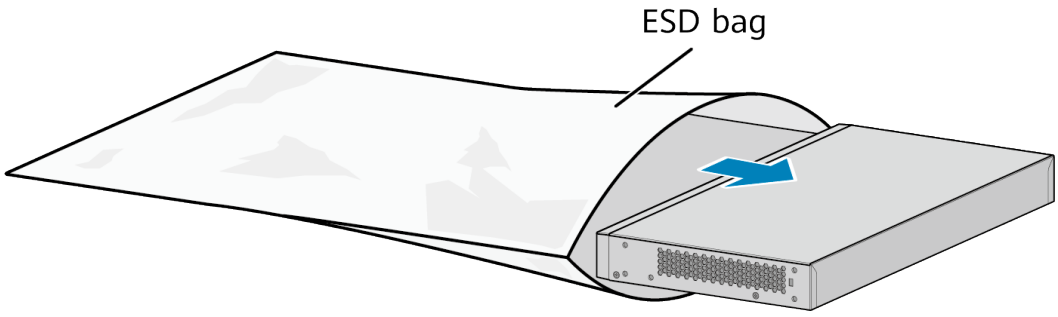
NOTE

The *Quick Start Guide* manual may be included in the installation accessory package or packaged independently.

Step 4 Take the router out of the carton and remove the foam packing materials.



Step 5 Take the router out of the ESD bag and check router surfaces and the warranty seal on the router. If the warranty seal is damaged, stop unpacking and contact the supplier. Huawei is unable to provide warranty services if the warranty seal is damaged or removed.



Step 6 Check whether the nameplate on the router is consistent with the label on the carton. The nameplate is attached to the bottom of the router.

----End

Follow-up Procedure

Save the installation accessory package for later use. The installation accessory package contains the following items: ground cable, screws, rubber pads, *Quick Start Guide* manual, and warranty card.

NOTE

The type and quantity of items in an installation accessory package vary depending on the product model.

4 Installing AR303/AR303W/AR611/AR611-LTE4EA/AR611-S/AR611W/AR611W-S/AR611W-LTE4CN/AR611W-LTE6CN/AR617VW/AR617VW-LTE4EA/AR617VW-LTE4/AR631I-LTE4CN/AR631I-LTE4EA Routers

4.1 Scenario 1: Installing the Router on a Desk

Context

The methods for installing routers on a desk are the same. An AR617VW-LTE4 router is used as an example.

NOTE

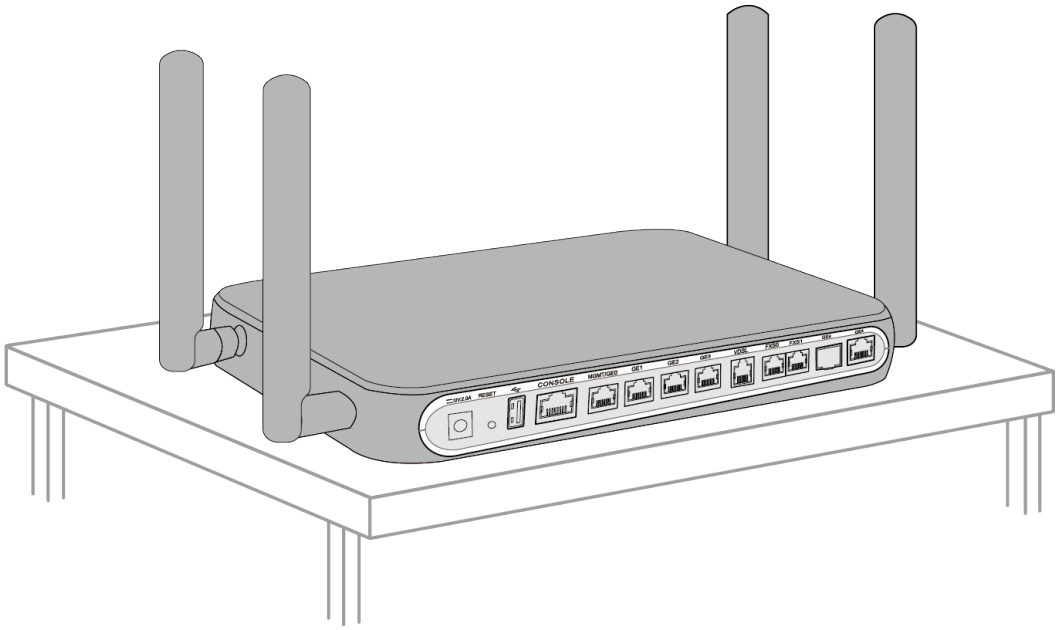
- Ensure that the desk is flat and properly grounded.
- Ensure that there is no obstructions such as concrete or wooden walls between the PC and router, and keep them far away from electrical appliances with a strong electromagnetic field, such as a microwave oven.
- Leave at least 10 cm of clearance around the router for heat dissipation.

Tools and Accessories

None

Procedure

Step 1 Place the router on the desk.



----End

4.2 Scenario 2: Mounting the Router on a Wall

Context

The methods for installing routers on a wall are the same. An AR617VW-LTE4 router is used as an example.

DANGER

Before drilling holes on a wall, make sure that no power cable is routed in the wall. Otherwise, power cables in the wall may cause personal injury.

NOTE

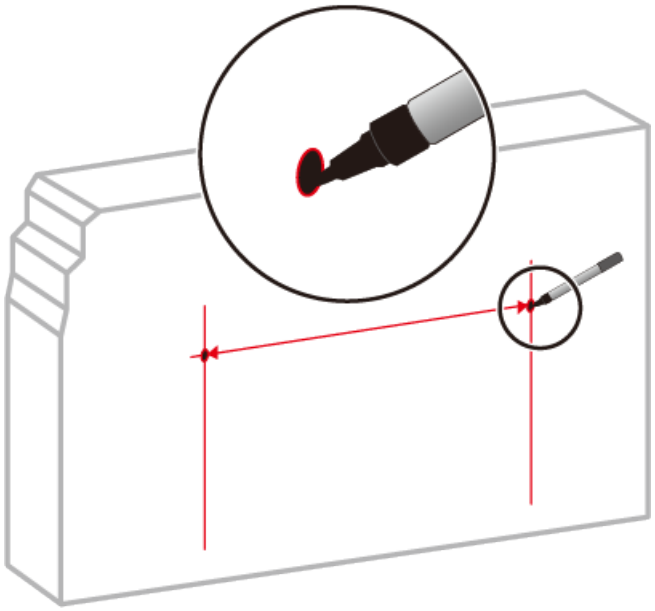
- Ensure that there are no flammable or explosive materials near the router and no obstructions within 100 mm around the router.
- Screws must be installed solid in the wall; otherwise, the wall-mounted router may fall down after cables are connected.

Tools and Accessories

- Measuring tape
- Marker
- Hammer drill
- Claw hammer
- Phillips screwdriver
- Wall anchors and mounting screws (separately purchased)

Procedure

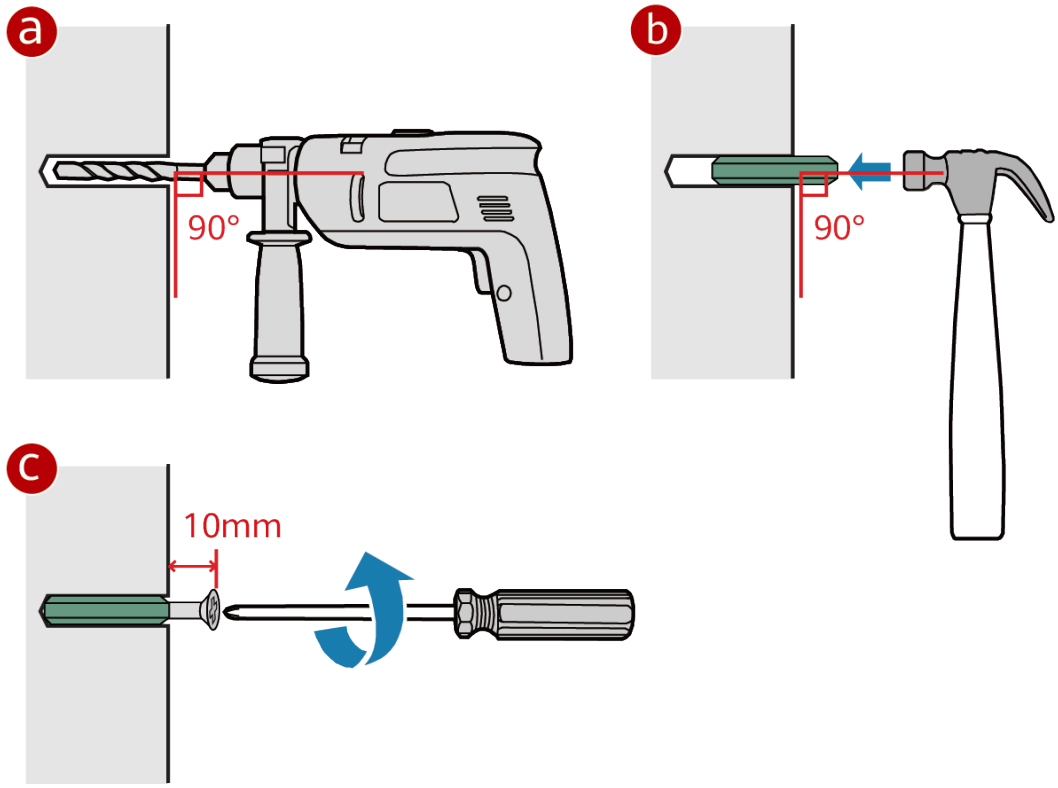
Step 1 Use a measuring tape to determine positions of two mounting holes, keep the two positions aligned, and mark the positions with a marker. Ensure that the distance between the two mounting holes is the same as that of the two holes on the router.



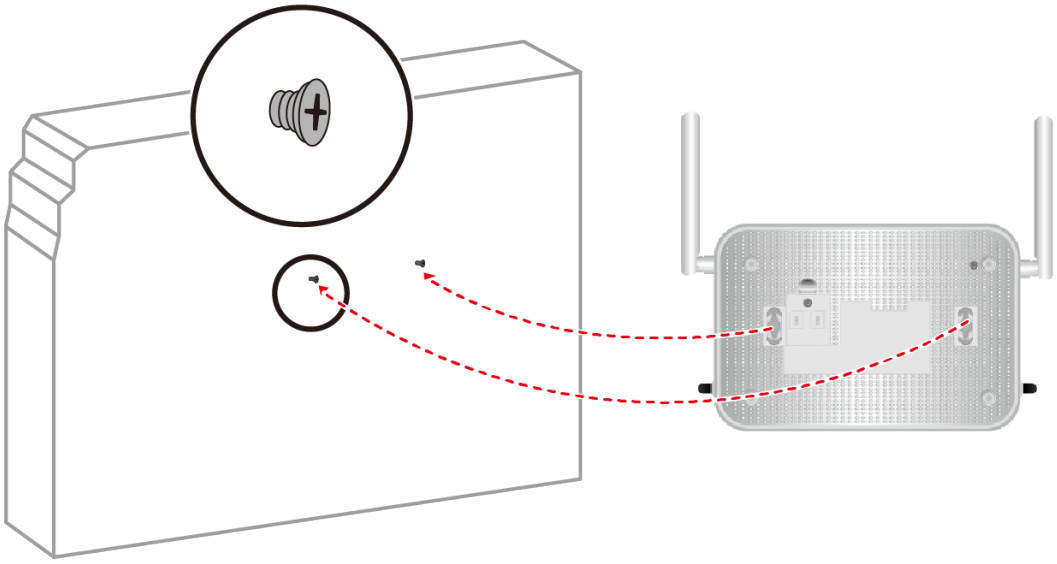
Step 2 Drill holes and install mounting screws.

1. Choose an appropriate drill bit according to the diameter of the mounting screws. The diameter of the mounting screws cannot exceed 4 mm.
2. Hammer the hollow wall anchors into the mounting holes.

3. Use a Phillips screwdriver to screw the mounting screws into the wall anchors. Leave the screws protruding 10 mm from the wall.



Step 3 Align the mounting holes on the rear of the router with mounting screws and hang the router on the mounting screws.



----End

4.3 Scenario 2: Mounting the Device on a Wall (AR631I-LTE4CN/AR631I-LTE4EA)

Context

DANGER

Before drilling holes on a wall, make sure that no power cable is routed in the wall. Otherwise, power cables in the wall may cause personal injury.

NOTICE

- Take water-proofing measures to protect a wall-mounted device from damages caused by water.
- Screws must be installed solid in the wall; otherwise, the wall-mounted device may fall down after cables are connected.
- Ensure that there are no flammable or explosive materials near the device and no obstructions within 100 mm around the device.
- Install the device at an appropriate height to ensure that the indicators can be observed easily.

Tools and Accessories

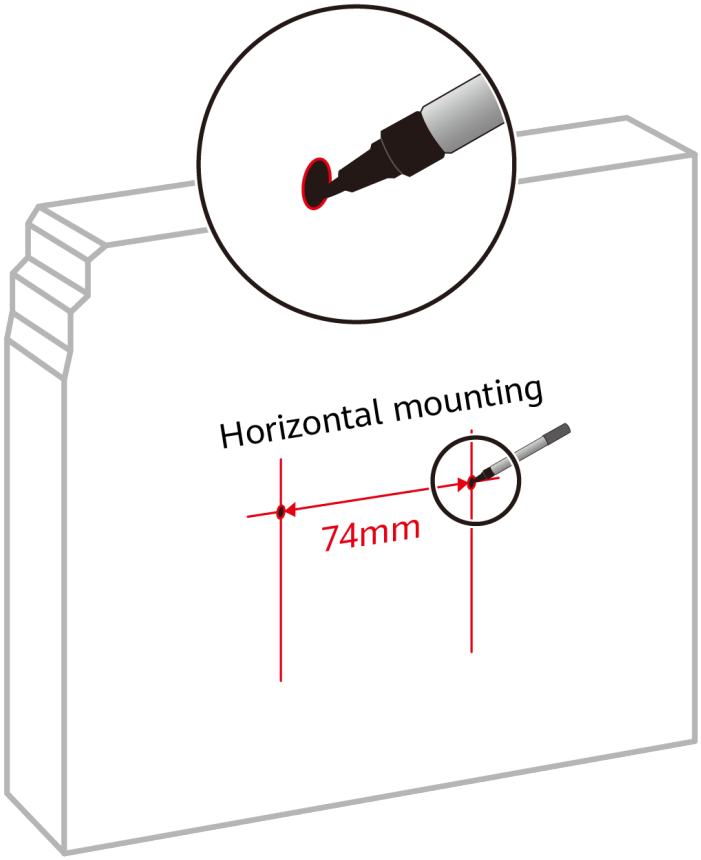
- Measuring tape
- Marker
- Phillips screwdriver
- Mounting bracket
- Four M3x6 countersunk screws
- Two M4x8 pan head screws

Procedure

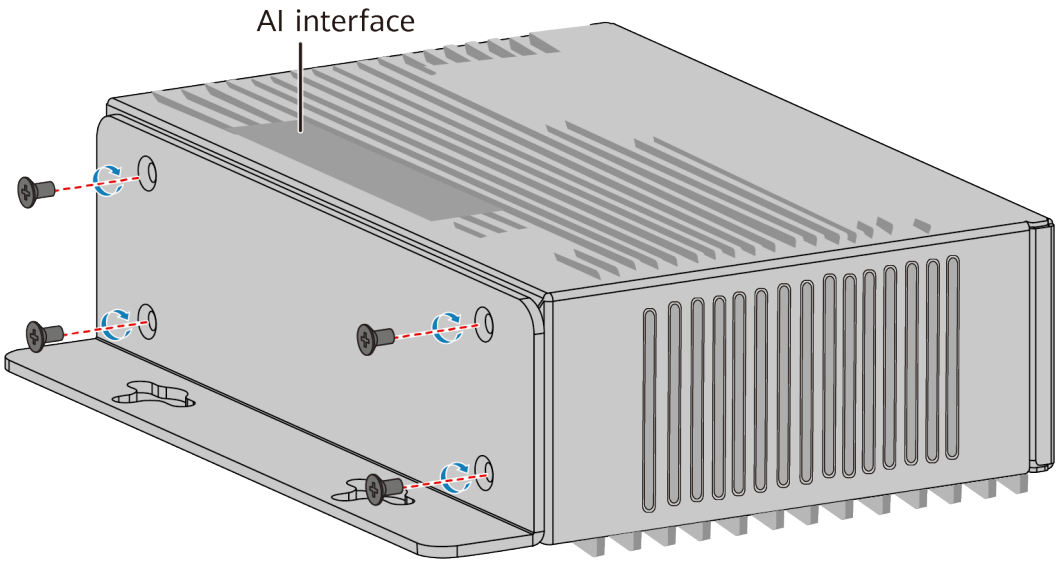
Step 1 Use a measuring tape to determine two positions for installing the mounting bracket. Keep the two positions on a horizontal line and mark the positions with a marker.

NOTE

The center distance between the two mounting holes for the mounting bracket is 74 mm.



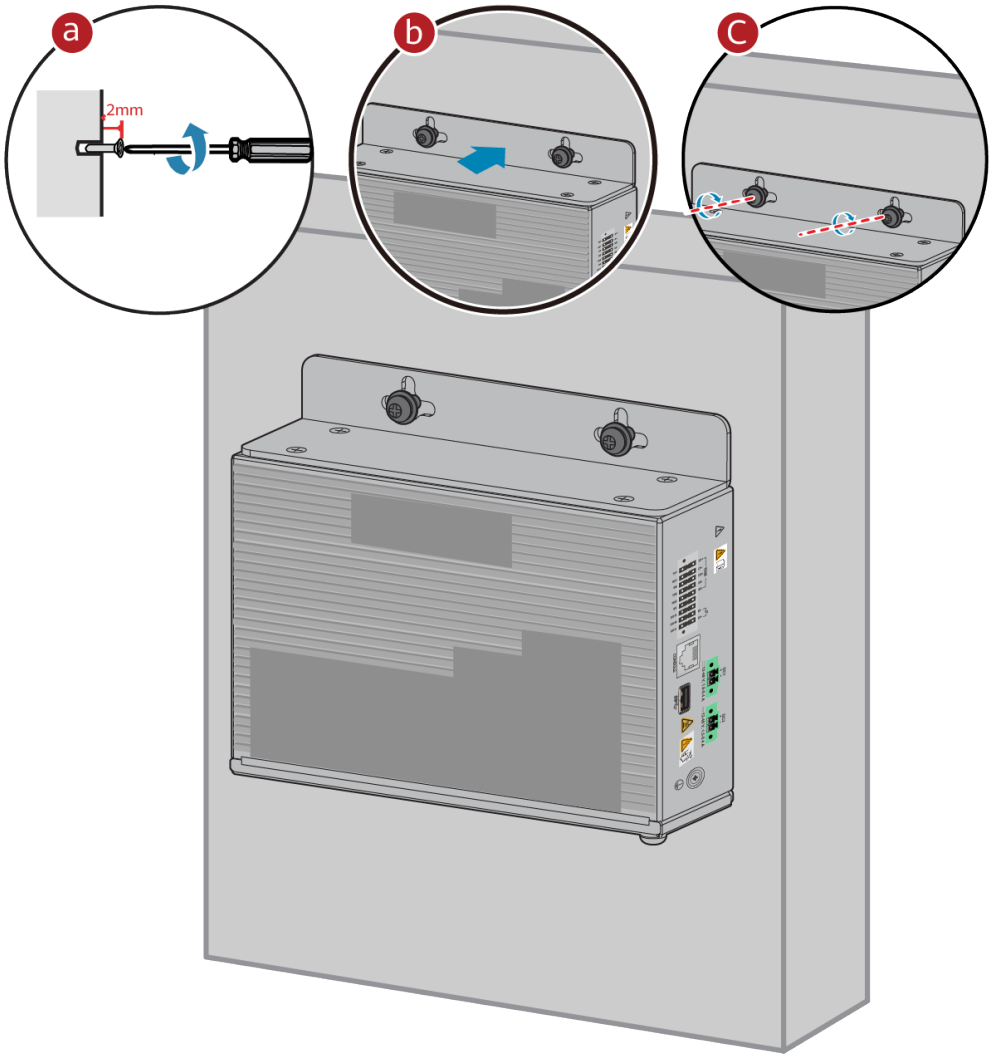
Step 2 Use a Phillips screwdriver to fix the mounting bracket on the rear of the device with four countersunk M3x6 screws.



Step 3 Mount the device on the wall.

1. Use the Phillips screwdriver to install two M4x8 pan head screws in the marked positions on the wall, and leave 2 mm of the screws out of the wall.
2. Hang the device on the M4x8 pan head screws through mounting holes on the mounting bracket.

3. Fasten the M4x8 pan head screws with the Phillips screwdriver.



----End

4.4 Scenario 3: Mounting the Device on a DIN Rail (AR631I-LTE4CN/AR631I-LTE4EA)

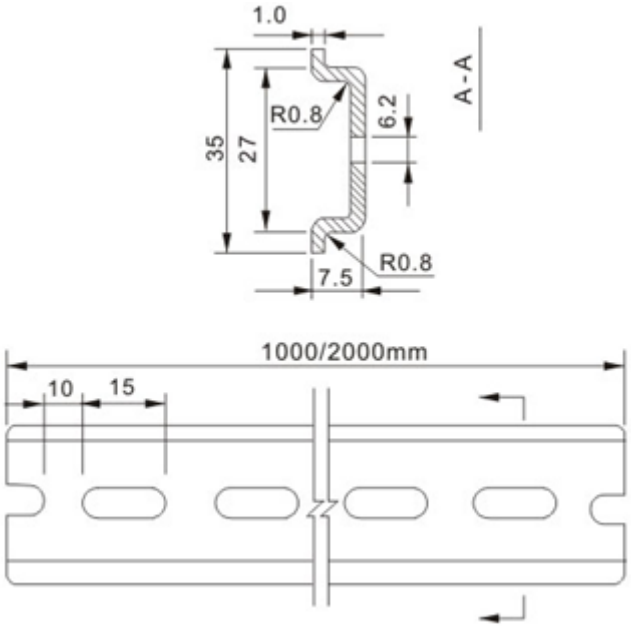
Context

Make sure the following prerequisites are met before the installation:

- The DIN rail has been secured in position.

  The DIN rail model is TH35-7.5 (1.0) and is manufactured according to IEC75. **Figure 4-1** dimensions of the DIN rail. (Unit: mm)

Figure 4-1 Dimensions of the DIN rail



- The device is placed near the DIN rail for convenient movement.

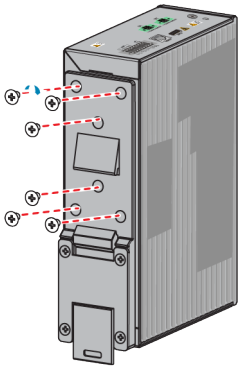
Tools and Accessories

- ESD wrist strap
- Phillips screwdriver
- M3 screw
- DIN mounting bracket (separately purchased)
- DIN rail (separately purchased)

Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

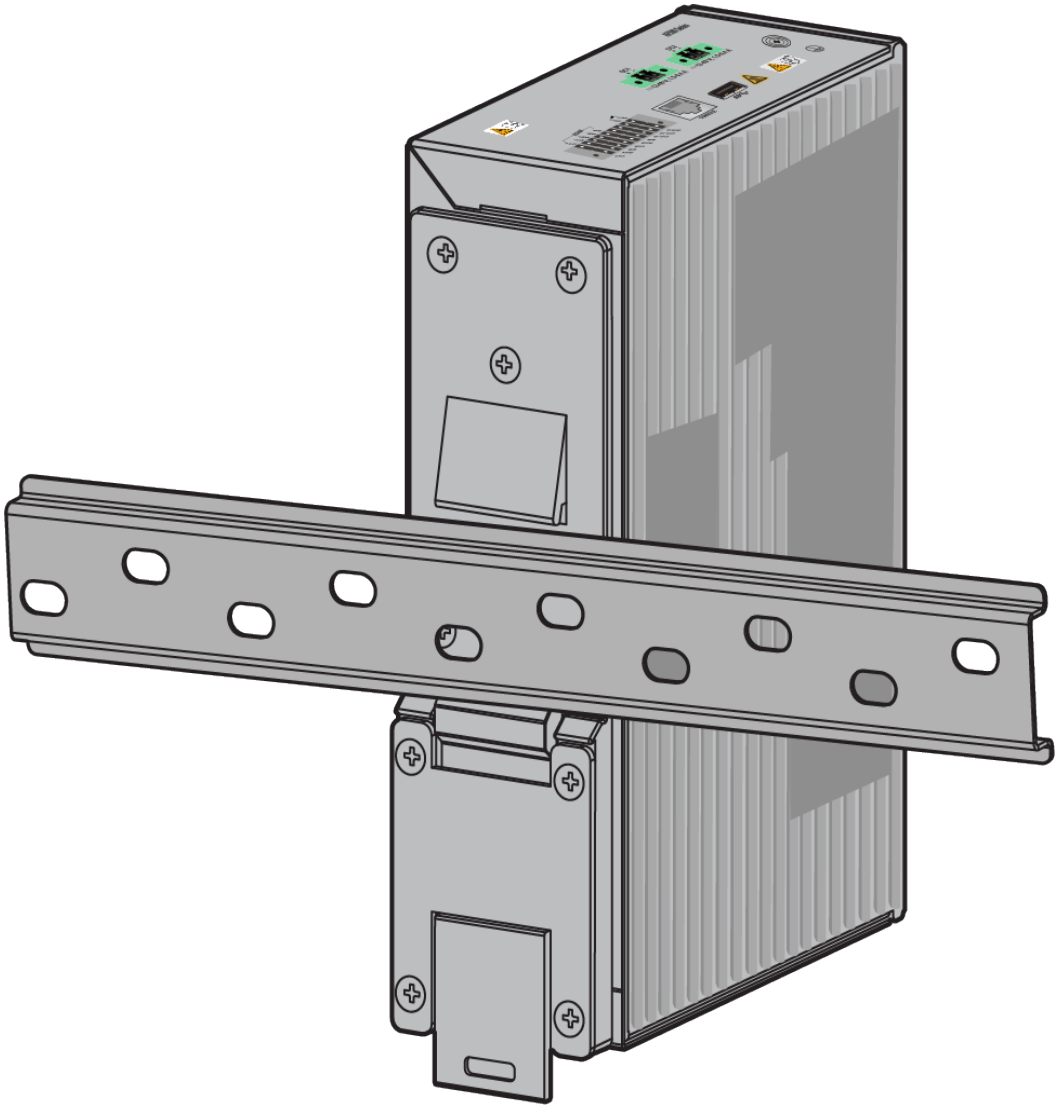
Step 2 Mount the DIN mounting bracket onto the rear panel of the device with six M3 screws, and then use a Phillips screwdriver to tighten the M3 screws. The tightening torque of M3 screws does not exceed 3.3 N·m.



Step 3 Place the rear panel of the device in front of the DIN rail and ensure that the DIN rail fits in between the fixture near the top of the DIN mounting bracket and the spring latch near the bottom.

Step 4 Make the device incline forward with the bottom away from the DIN rail, and place the fixture at the rear of the DIN mounting bracket on the top of the DIN rail.

Step 5 Slowly push the device toward the DIN rail to make the spring latch near the bottom of the DIN mounting bracket move down. The spring latch then bounces back to fix the device on the DIN rail.



NOTE

If the spring latch is too tight to move down, you can pull down the spring latch during the installation.

----End

Follow-up Procedure

After installing DIN rails, the device can be installed in an outdoor cabinet (provided by the customer). An outdoor cabinet is a power supply chassis. It provides installation space and stable power supply for network devices in outdoor applications. It also provides anti-theft, waterproof, moisture-proof, and heat dissipation functions. The network devices in the outdoor cabinet are connected to the cabinet through communications cables, and the operating parameters of the cabinet are configured and monitored.

Table 4-1 describes the requirements for outdoor cabinet parameters.

Table 4-1 Specifications of the outdoor cabinet

Item	Description
Recommended Function Item	Built-in fan
	Built-in power supply module: • 100 V to 240 V, 50 Hz/60 Hz • 48 V battery backup
	DIN rail can be mounted
Maximum power consumption	≥ 120 W/45°C (113°F) (with solar radiation)
Standard operating temperature	-33°C to +55°C (-27.4°F to +131°F) (with solar radiation)
Relative humidity	8% to 100%
Solar radiation intensity	≤ 1120 W/m^2
IP rating	IP55
Air pressure	70 kPa to 106 kPa

Figure 4-2 shows the recommended installation scenario of an outdoor cabinet.

Figure 4-2 Outdoor cabinet installation scenarios

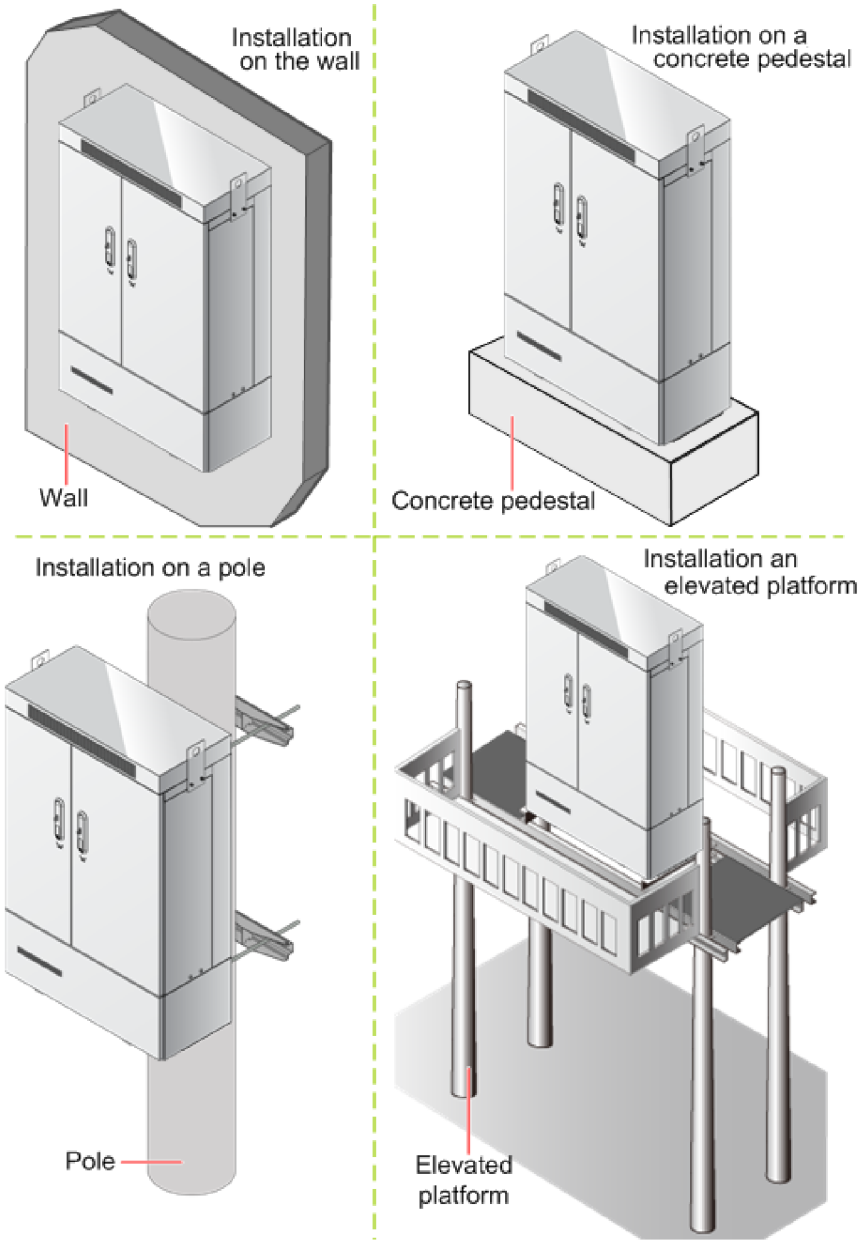


Table 4-2 lists the standards that the outdoor cabinet complies with.

Table 4-2 Standards that the cabinet complies with

Item	Standards Compliance	Level
Environment	ETSI 300 019-1-4: Environmental conditions and environmental test for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weather protected locations	Class 4.1 requirement can meet all ETSI countries environmental requirement

Item	Standards Compliance	Level
	ETSI 300 019-1-2: Environmental conditions and environmental test for telecommunications equipment; Part 1-2: Classification of environmental conditions; Transportation	Class 2.3 Public transportation
	ETSI 300 019-1-1: Environmental conditions and environmental tests for telecommunications equipment; Part 2-1: Classification of environmental conditions; Storage	Class 1.3 E non-weather protected storage locations extended
Lightning protection &EMC	ETSI EN 300 386: Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements	non-telecom central equipments
	EN 55022: Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement	Class B
	EN 55024:Information technology equipment – Immunity characteristics – Limits and methods of measurement	-
	K.45: Resistibility of telecommunication equipment installed in the access and trunk networks to over-voltages and over-currents	-
	IEC 61643: Performance requirement for surge protective device connected to low-voltage distribution systems of telecommunication stations/sites	-
Safety	• IEC/EN60950-1: Information technology equipment-Safety-Part 1: General requirements • IEC/EN60950-22: Information technology equipment-Safety-Part 22: Equipment to be installed outdoors • IEC/EN60950-21: Information technology equipment-Safety-Part 21: Remote Power Feeding	-
Protection	IEC 60529: Degrees of protection provided by enclosures (IP Code)	IP55

Item	Standards Compliance	Level
Structure	• IEC 60297-1: Panels and racks IEC 60297-3 subracks and associated plug-in units IEC 60297-2 Cabinets and Pitches of racks structure • IEC 60297-2: Cabinets and Pitches of racks structure	-
Grounding	K.35: Bonding configurations and earthing at remote electronic sites	-

4.5 (Optional) Installing a SIM Card (AR611-LTE4EA/AR611W-LTE4CN/AR611W-LTE6CN/AR617VW-LTE4EA/AR617VW-LTE4)

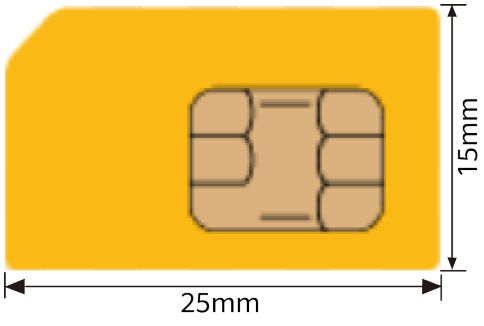
Context

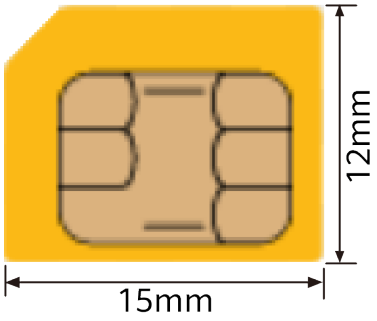
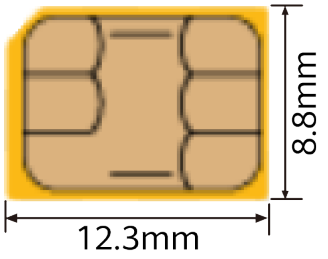
NOTICE

- The Micro SIM card is supported. It is not recommended to use the card cover to prevent poor SIM card contact.
- Hot-swap SIM card is not supported. After replugging the SIM card, you need to restart the RF module or restart the device.

The following table describes the dimensions of a SIM card.

Table 4-3 Dimensions of a SIM Card

Model	Dimensions
Standard SIM card	

Model	Dimensions
Micro SIM card	
Nano SIM card	

Tools

- Phillips screwdriver
- SIM cards (separately purchased)

Procedure

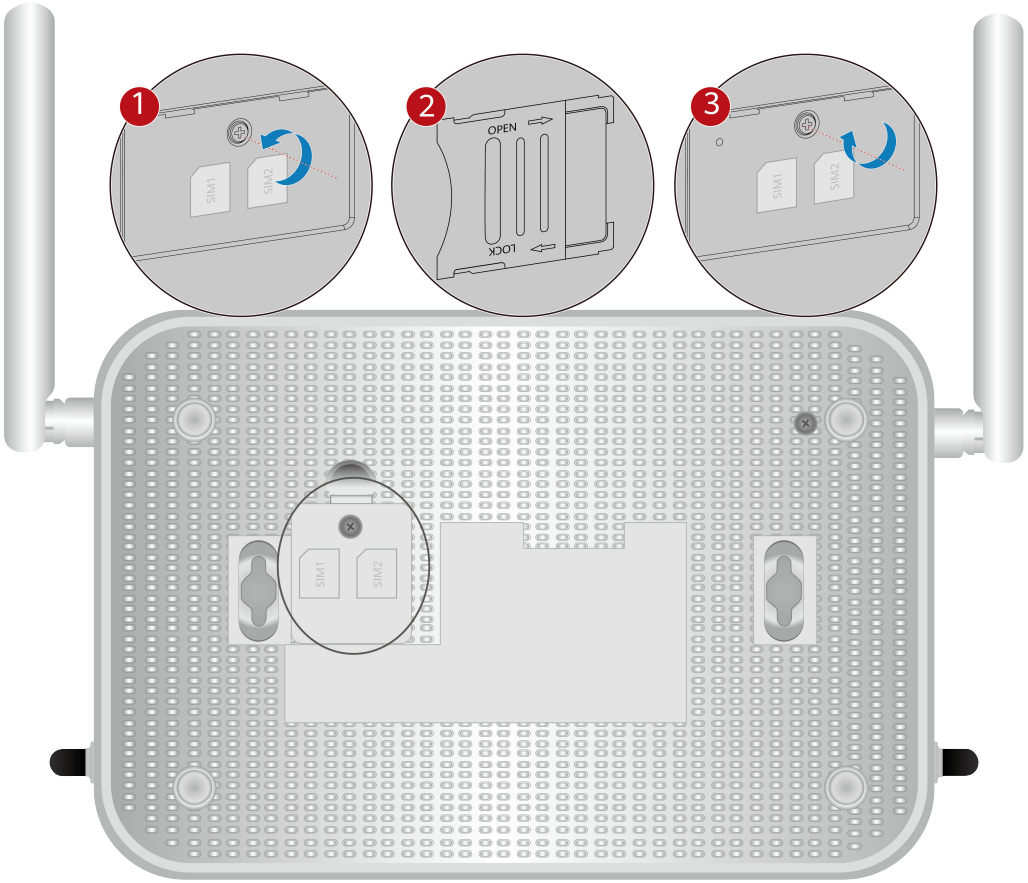
Step 1 Use a Phillips screwdriver to loosen the screw on the SIM card cover, and remove the SIM card cover from the router. Keep the SIM card cover in an appropriate place for later use.

Step 2 Push the SIM card holder toward the OPEN direction and turn it upward. Place the SIM card into the SIM card slot, close the SIM card holder, and push the SIM card holder toward the LOCK direction. When you hear a click, the SIM card holder is locked.

NOTE

- The SIM card cover is used to protect the SIM card. Remove the SIM card cover before installing the SIM card.
- The double-card single-standby is supported, and SIM1 is the default master card. If only one SIM card needs to be installed, install it in slot SIM1.
- When inserting a SIM card, keep the notch on the SIM card in the same direction as the notch marked on the slot.

Step 3 Install the SIM card cover back to the router and tighten the screw to fix the cover.



----End

4.6 (Optional) Installing a SIM Card (AR631I-LTE4CN/AR631I-LTE4EA)

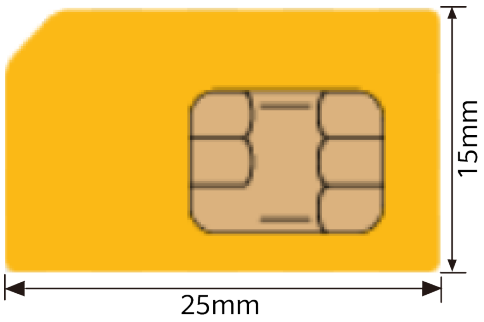
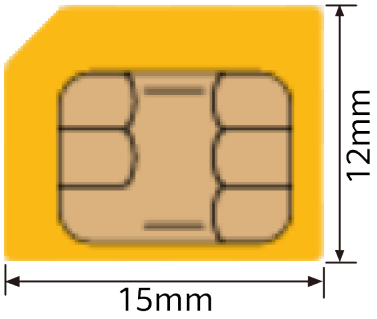
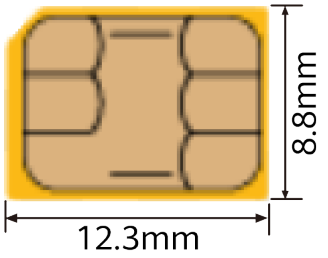
Context

NOTICE

- The industrial micro SIM card is supported. It is not recommended to use the card cover to prevent poor SIM card contact.

Table 4-4 describes the dimensions of a SIM card.

Table 4-4 Dimensions of a SIM Card

Model	Dimensions
Standard SIM card	
Micro SIM card	
Nano SIM card	

Tools

- Phillips screwdriver
- SIM cards (separately purchased)

Procedure

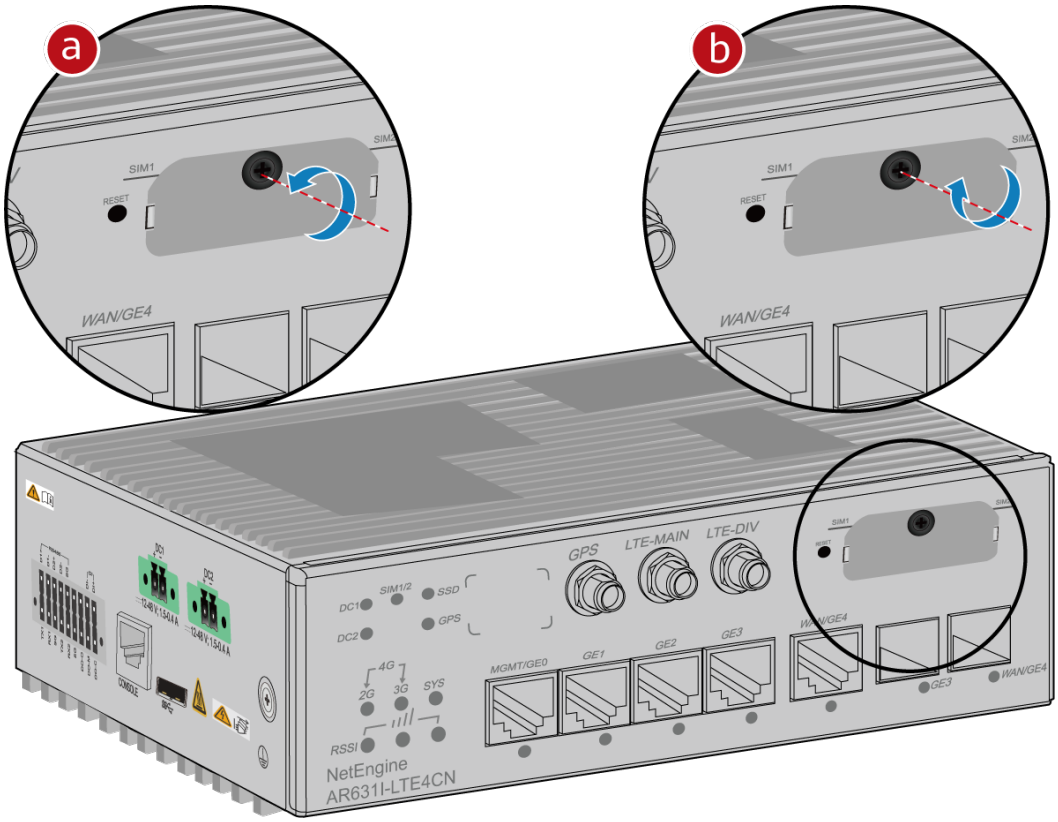
Step 1 Use a Phillips screwdriver to loosen the screw on the SIM card cover, and remove the SIM card cover from the device. Keep the SIM card cover in an appropriate place for later use.

Step 2 Place the SIM card into the SIM card slot.

NOTICE

When inserting a SIM card, keep the notch on the SIM card in the same direction as the notch marked on the slot.

Step 3 Install the SIM card cover back to the device and tighten the screw to fix the cover.



----End

4.7 (Optional) Connecting a RU-5G Remote Unit to an AR Router

Context

An AR router connects to an RU-5G remote unit to connect to a 5G/4G/3G Ethernet to implement high-speed data transmission.

Tools and Accessories

- Ethernet cable (self-provided)

  NOTE

  - Before connecting Ethernet cables, use the Ethernet cable detection tool to check whether the Ethernet cables are normal to ensure that the device works properly.
  - The Ethernet cable is of category 5 or higher type. The length of the Ethernet cable cannot exceed 50 m. The cross-sectional area of an Ethernet cable ranges from 4.9 mm to 7.1 mm.

- RU-5G Remote unit (self-provided)

  NOTE

  For details, see **Appendix G RU-5G Installation**.

- PoE adapter (self-provided)

  NOTE

  When the two GE/PoE_IN interfaces on an RU-5G remote unit use PoE adapters, the Huawei PoE adapters (part number: 02220369) must be used.

  If the GE/PoE_IN interface uses a PoE adapter, place the PoE adapter indoors.

Procedure

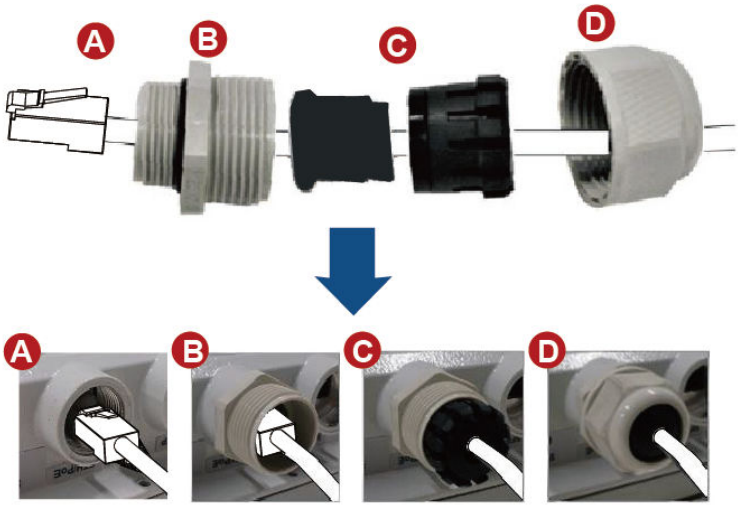
Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Route the Ethernet cable through the waterproof PG connector, as shown in the following figure. Insert the RJ45 connector (without sheath) of the Ethernet cable into the GE/PoE_IN (GE0/PoE_IN or GE1/PoE_IN) interface on the device, and then tighten the waterproof PG connectors in sequence B, C, and D.

NOTE

Tighten components of PG connectors B to the device with a torque of 2.5 N·m, and components D to B to a torque of 1.8 N·m. The waterproof PG connector is used for round Ethernet cables. Flat Ethernet cables cannot be used.

Ensure that the RJ45 connector is correctly connected to the device. Otherwise, the Ethernet cable may be damaged. Before removing the Ethernet cable from the device, remove the waterproof PG connector first and then remove the RJ45 connector.



Step 3 Connect the other end of the Ethernet cable according to the networking mode.

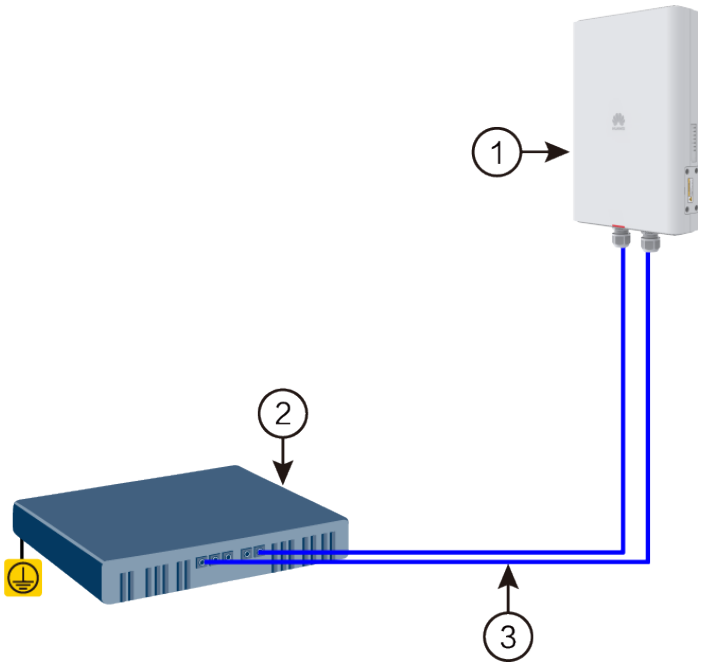
Option	Description
Figure 4-3	In this scenario, all networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Connect the other end of the Ethernet cable to the PoE port on the AR router.

Option	Description
Figure 4-4	In this scenario, the RU-5G is installed outdoors and other networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Install an SPD on the other end of one network cable and connect the cable to the Ethernet interface on the AR router. 3. Install an SPD on the other end of the other network cable and connect it to the PoE port on the PoE adapter. 4. Use a network cables to connect the Ethernet interface on the AR router and the DATA port on the PoE adapter.

NOTE

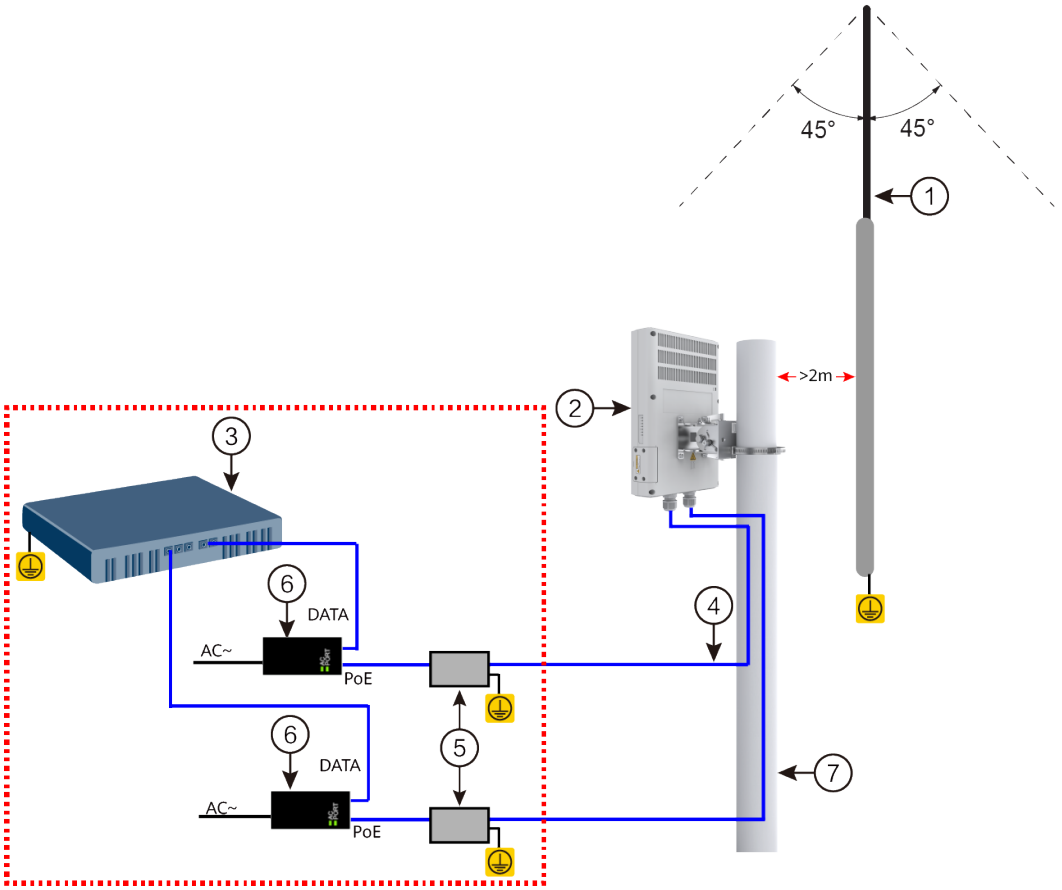
- When the AR router, PoE adapter, and RU-5G remote unit are installed indoors, no SPD is required for the AR router Ethernet interface, AR router power input interface, PoE adapter output interface, and PoE adapter power input interface.
- When the AR router and PoE adapter are installed indoors and the RU-5G remote unit is installed outdoors, an SPD must be installed on the AR router network interface and output interface on the PoE adapter. Huawei SPD (part number: 19020303) or an SPD with the same specifications is recommended for the output of the AR router Ethernet ports and PoE adapters.

Figure 4-3 Co-deployment Networking 1 (RU-5G PoE Power Supply Using an AR Router)



1. RU-5G remote unit
2. AR router (PoE supported)
3. Ethernet cable
-

Figure 4-4 Co-deployment Networking Mode 2 (RU-5G Powered by PoE adapters)



NOTE

The devices in the red box are installed indoors.

1. Lightning rod	2. RU-5G remote unit	3. AR router (PoE not supported)	4. Ethernet cable
5. SPD	6. PoE adapter	7. Pole	-

----End

4.8 (Optional) Installing Antennas

Context

Table 4-5 lists the routers that support antennas.

Table 4-5 Routers supporting antennas

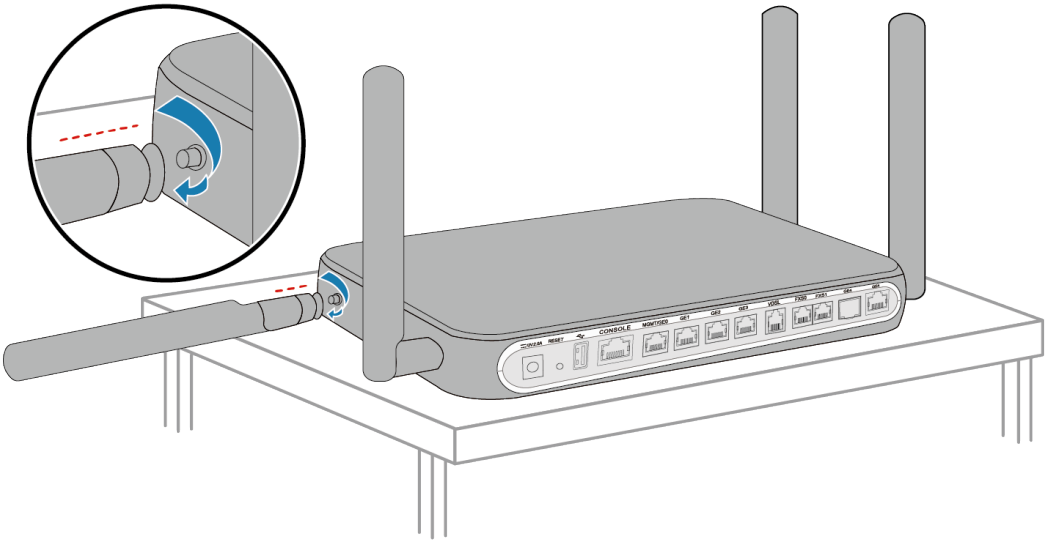
Model	Antenna Type
AR611W-LTE4CN AR617VW-LTE4EA AR617VW-LTE4 AR611-LTE4EA AR611W-LTE6CN	LTE whip antenna **NOTE** The LTE whip antenna is delivered with the router installation accessory package.

Tools and Accessories

LTE Whip Antenna

Procedure

Step 1 Connect the antennas to the SMA connectors on the rear panel of the router.



Step 2 Adjust positions of the antennas to obtain the optimal wireless transmission and receiving performance. If the router is placed on a desk, make the primary antenna vertical to the desk and secondary antenna parallel to the desk.

----End

4.9 (Optional) Installing the LTE Indoor Remote Antenna(AR611W-LTE4CN/AR617VW-LTE4EA/AR617VW-LTE4/AR611-LTE4EA/AR611W-LTE6CN)

Context

If the router uses channels 12 and 13 of the 2.4 GHz band to provide Wi-Fi service, the LTE antenna interfaces must be configured with LTE indoor remote antennas.

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connections may damage interface modules or the router.

NOTE

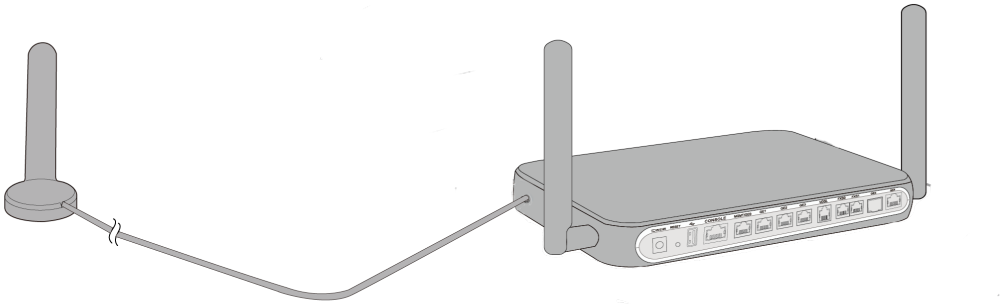
Indoor LTE remote antennas are not included in the installation accessory package and need to be purchased separately.

Tools and Accessories

- LTE indoor remote antenna

Procedure

Step 1 Connect the plug of the indoor LTE remote antenna to an SMA connector on the router.



LTE Indoor Remote Antenna

Step 2 Fix the LTE indoor remote antennas on a metal surface that can be magnetized or keep the antennas away from the Wi-Fi antenna.

Step 3 (Optional) If the LTE indoor remote antennas are fixed in a limited position, fix the LTE indoor remote antennas on the router and keep the antennas away from the Wi-Fi antenna as far as possible.

----End

4.10 Installing an Indoor LTE Remote Antenna (AR631I-LTE4CN/AR631I-LTE4EA)

Context

NOTICE

- Do not power on the device before you finish connecting cables.
- When connecting cables, pay attention to port identifiers to ensure correct cable connections. Incorrect cable connections may cause damage to the port modules or the device.

NOTE

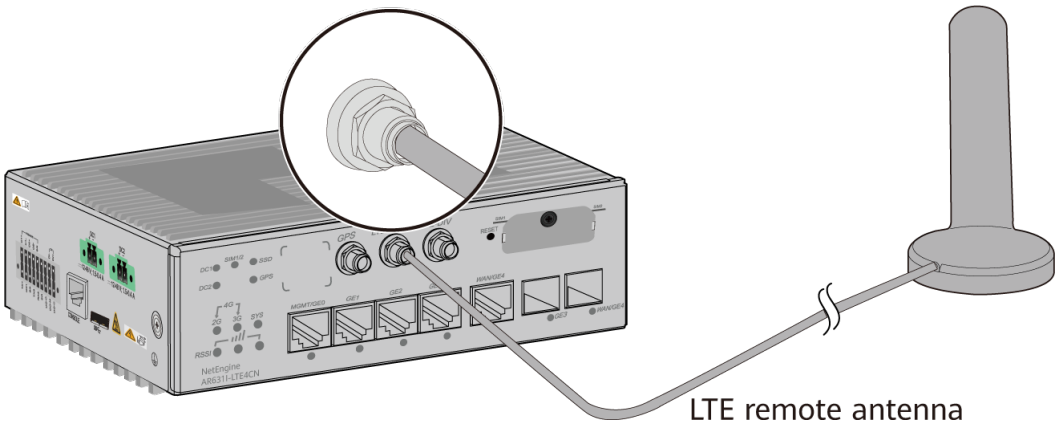
The LTE indoor remote antenna is not included in the installation accessory package and needs to be purchased separately. The method for connecting an outdoor LTE antenna is similar to that for connecting an indoor LTE remote antenna. This section uses an indoor LTE remote antenna as an example.

Tools and Accessories

- Indoor LTE remote antenna
- Phillips screwdriver
- Self-tapping screw
- Anti-theft screw

Procedure

Step 1 Connect one end of the indoor LTE remote antenna to the SMA connector on the device.



Step 2 Use a self-tapping screw or anti-theft screw to secure the indoor LTE remote antenna in an appropriate place, for example, on a wall.

----End

4.11 Connecting the Router

4.11.1 Connecting the Console Cable

Context

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connection may damage interface modules or the router.

Tools and Accessories

- Console cable

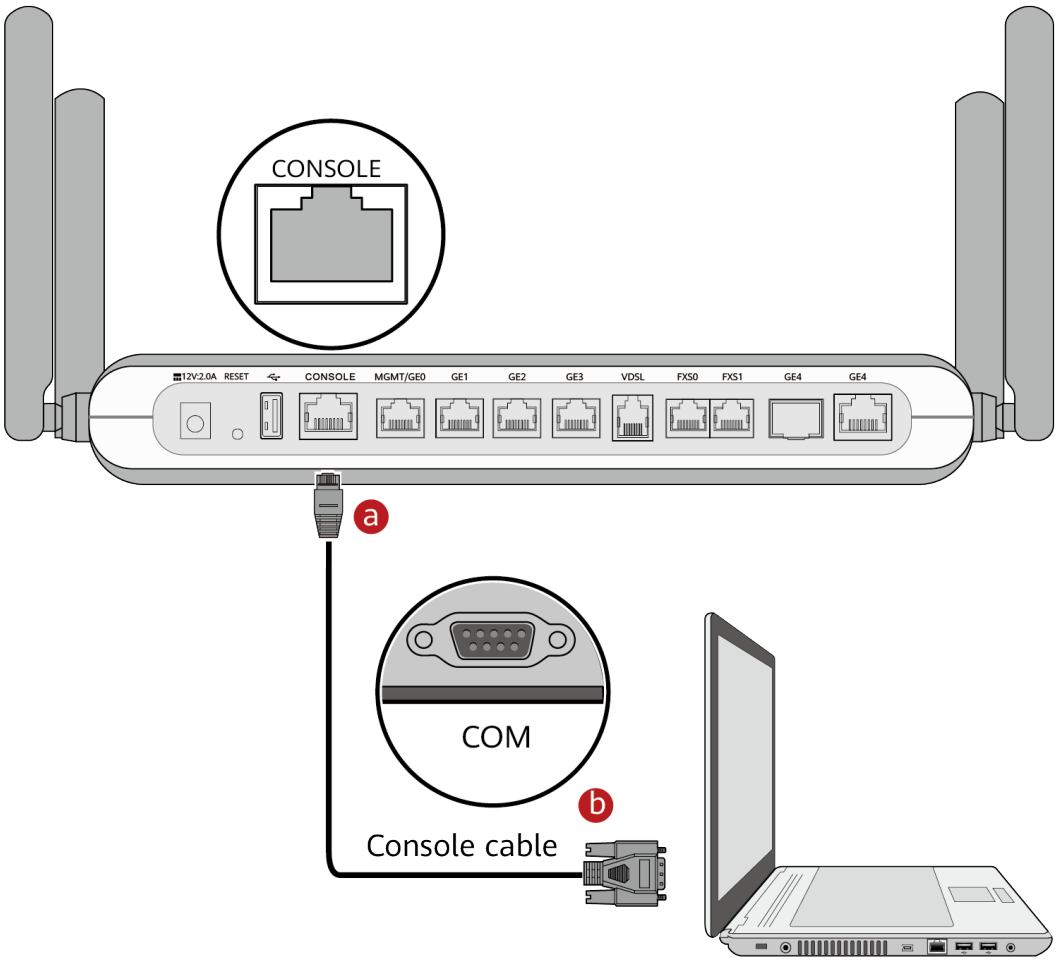
NOTE

The console cable is not included in the installation accessory package and needs to be purchased separately.

Procedure

Step 1 Connect the console cable.

1. Connect the RJ45 connector of the console cable to the CONSOLE interface (RJ45) of the router.
2. Connect the DB9 connector of the console cable to the serial interface (COM) of a management PC.



----End

Follow-up Procedure

After the console cable is connected, you need to configure terminal emulation software on the management PC to log in to the command configuration interface of the router.

NOTE

For details about how to use specific terminal emulation software, see the related software user guide or online help.

For details about how to log in to the device through the console port for the first time, see **Basic Configuration Guide** > **First Login to a Device** > **Logging In to a Device** > **Logging In to a Device for the First Time Through a Console Port** in the "CLI-based Configuration".

4.11.2 Connecting Telephone Cables (AR617VW/AR617VW-LTE4EA/AR617VW-LTE4)

Tools and Accessories

- Telephone line

- Splitter

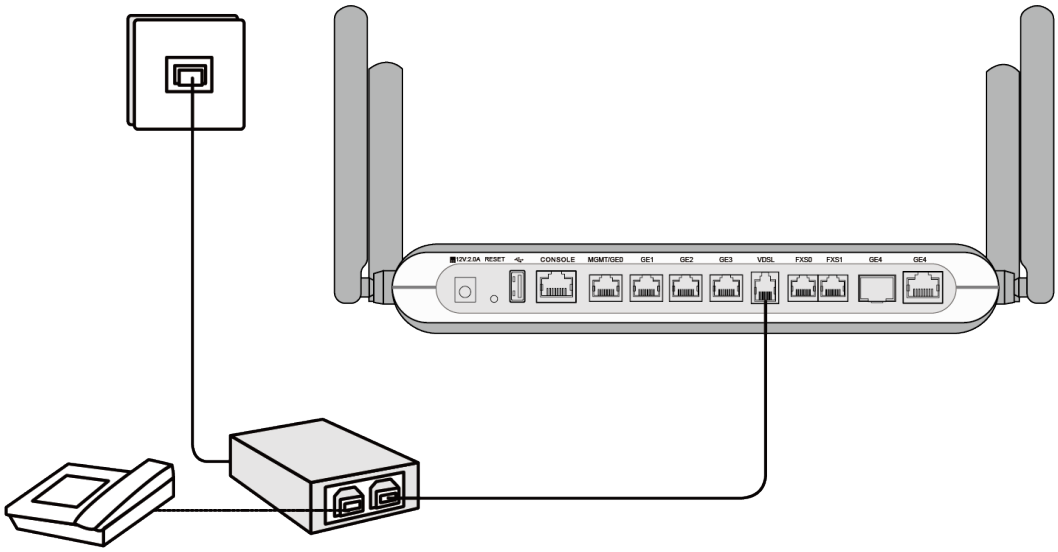
Procedure

Step 1 Use one telephone cable to connect the splitter and router.

1. Connect one end of the telephone cable to the DSL port on the router.
2. Connect the other end of the telephone cable to the modem port on the splitter.

Step 2 Use another telephone cable to connect the splitter to the telephone cable jack on the wall.

1. Connect one end of the telephone cable to the cable port on the splitter.
2. Connect the other end of the telephone cable to the telephone cable jack on the wall.



NOTE

If the voice call function is required, connect the telephone port on the splitter to a telephone through a telephone cable.

----End

Follow-up Procedure

After connecting the telephone cable, perform the following steps to set network access parameters:

1. Set the IP address of the PC to be on the same network segment as the web address **192.168.1.1**.
2. Open a browser. In the address box, enter **https://192.168.1.1** and press **Enter**.
3. Enter the user name and password and click **Log In**.

NOTE

- The default username and password are available in *AR Router Default Usernames and Passwords* (**Enterprise Network** or **Carrier**). If you have not obtained the access permission of the document, see **Help** on the website to find out how to obtain it.
- To protect against unauthorized access, change the password after the first login.
- The system will be locked if you enter an incorrect user name or password three consecutive times. It will be unlocked 1 minute later.
- If you do not perform any operations within 5 minutes after logging in to the system, you will exit the system and the system automatically returns to the login page.

4. On the **Internet Configuration** page, enter the correct Internet access account and password provided by the Internet service provider (ISP). Then, click **Next**.

NOTE

- Click **Next** or **Skip directly** if you cannot configure the Internet access account and password.
- When you log in to the management page the first time, the **Internet Configuration** page is displayed. In other cases, you need to click **Fast Setting** in the upper right corner to go to this page.

5. On the **Wi-Fi Configuration** page, enter your desired SSID (WLAN name) and WLAN password. Then, click **Next**.

NOTE

- The default SSID is **PnP**_*xxxxxx* and the default WLAN password is **AR***xxxxxx*, where *xxxxxx* is the last six digits of the ESN.
- To better secure your WLAN, promptly change the SSID and WLAN password.

After you complete the preceding settings, check the status of the DSL indicator. If the DSL indicator is steady green, you can start browsing the Internet.

You need to perform the preceding operations on a computer once only.

4.11.3 Connecting the RS485/RS232/DI/DO Cable (AR631I-LTE4CN/AR631I-LTE4EA)

Context

NOTICE

- Do not power on an device before you finish installing the router and connecting cables.
- When connecting cables, notice port identifiers to ensure correct cable connections. Incorrect cable connections may cause damage to the port module or the device.

Tools and Accessories

- Wire stripper

- Flat-head screwdriver
- 2x9-pin Phoenix connector
- 18 cables (separately purchased)

Procedure

Step 1 Assemble the RS485/RS232/DI/DO cables.

NOTE

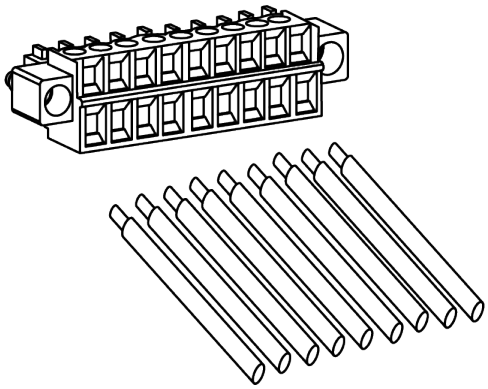
The cables are connected to the 2x9-pin Phoenix connector in the same way. The following procedure uses one cable as an example.

1. Use a wire stripper to strip about 7 mm length of the insulation off one end of the cable.

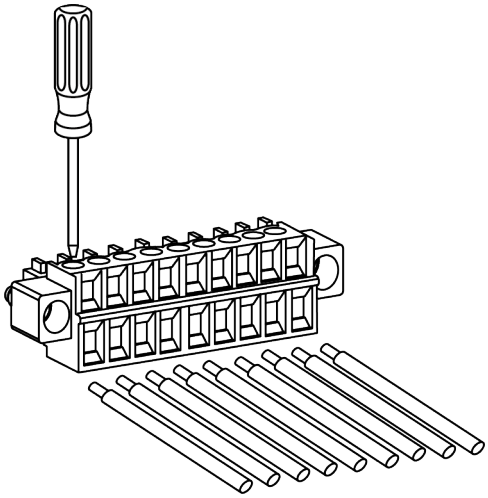
NOTICE

Do not cut the metal conductor of the cable when stripping the insulation.

2. Insert the bare wire into a wire hole.



3. Tighten the screw on the wire hole with a flat-head screwdriver to lock the wire.

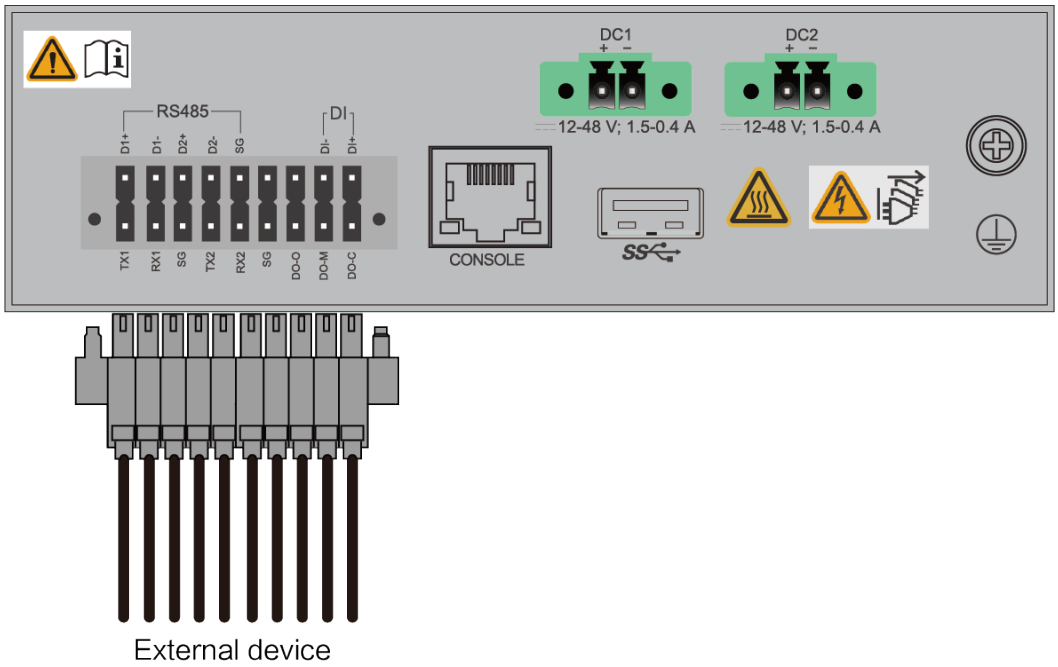


NOTICE

There must be no exposed metal part at the joints of wire holes and bare wires on the 2x9-pin Phoenix connector.

Step 2 Connect the RS485/RS232/DI/DO cables.

1. Insert the 2x9-pin Phoenix connector to the RS485/RS232/DI/DO interface of the device, and then tighten the slotted screws at both ends of the Phoenix connector with a flat-head screwdriver.
2. Connect the other end of the RS485/RS232/DI/DO cable to an external device.



----End

4.11.4 Connecting Ethernet Cables

Tools and Accessories

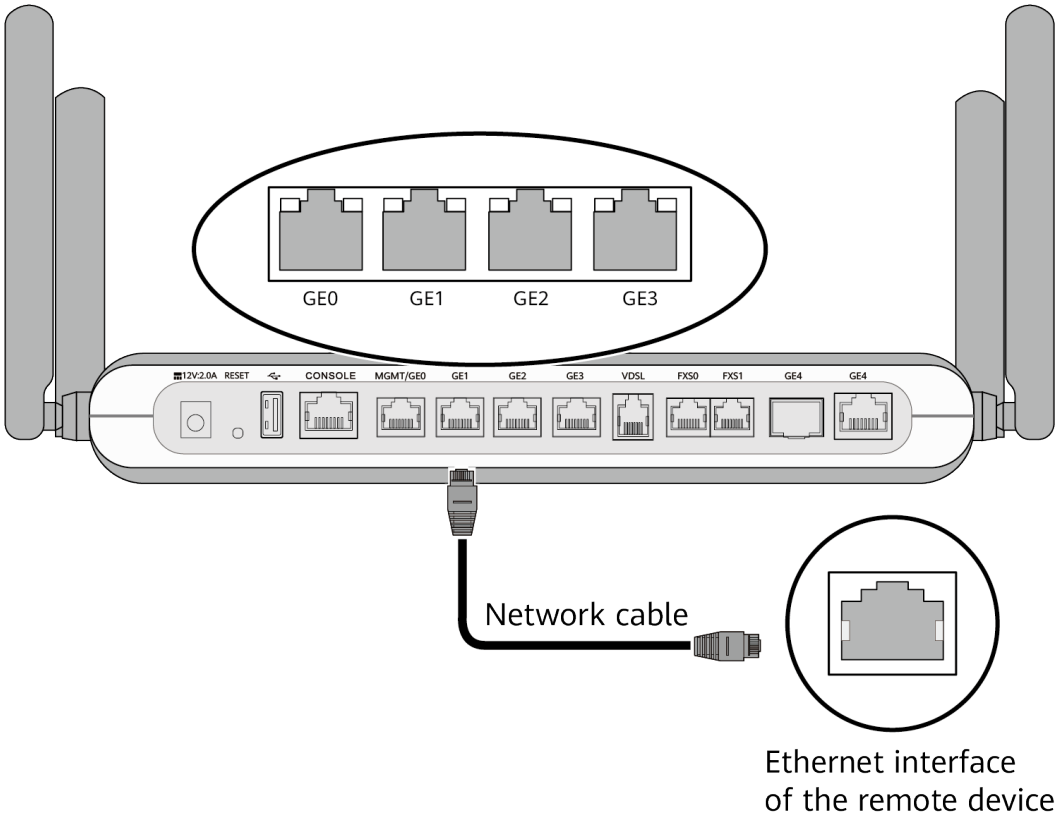
- Diagonal pliers
- Cable ties
- Marker
- Ethernet cable
- Ethernet cable labels

Procedure

Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Attach temporary labels to both ends of each Ethernet cable and write numbers on the labels to identify the Ethernet cables.

Step 3 Connect one end of an Ethernet cable to an Ethernet interface of the router and the other end to an Ethernet interface of the remote device.



Step 4 Arrange the Ethernet cables to make them parallel, and then bundle them with cable ties. Use diagonal pliers to cut off redundant cable ties.

Step 5 Remove the temporary labels from the Ethernet cables, and then attach formal labels 2 cm away from the connectors at both ends.

----End

Follow-up Procedure

Check the following items after connecting Ethernet cables:

- Labels are correctly filled and securely attached to cables, with clear text facing the same direction.
- Cables and connectors are complete, intact, and tightly connected.

4.11.5 Connecting the Power Adapter

Context

DANGER

To avoid electric shock, do not connect power cables while the power is on.

NOTE

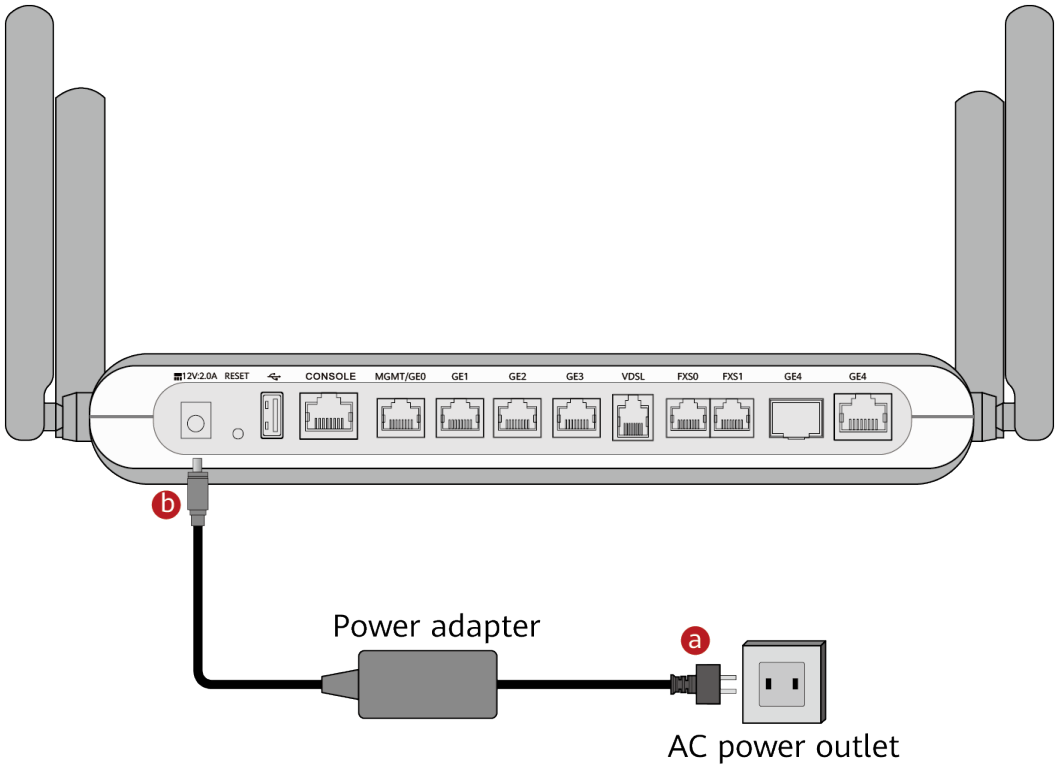
- Do not power on the router before you finish connecting the power cables.
- Each router has its own power cables delivered as accessories. The power cables can only be used on the router in the same package and cannot be used on any other device.
- The AC power cable parameters vary in different countries or regions. The figures are for reference only and may differ from the cables delivered.

Tools and Accessories

- Power adapter
- AC power cable

Procedure

Step 1 Connect one end of the power adapter to the power socket on the router and the other end of the power adapter to an AC power outlet.



----End

Follow-up Procedure

Perform the following operations after connecting the power cable:

- Verify that the power adapter is securely connected to the power socket on the router.
- If multiple routers are installed, attach labels to both ends of each power cable and write numbers on the labels to identify them.

4.12 Powering On and Off the Router

Context

Before you power on the router, observe and ensure the following:

- The power cables and ground cables have been correctly connected.
- The input voltage is in the range of 90 V AC to 270 V AC.

Procedure

Step 1 Turn on the power switch of the external power supply system connected to the router.

Step 2 Turn on the power switch on the router or the power module to start the router.

Skip this procedure if the router has no power switch or pluggable power module.

Step 3 After the router starts, check indicators on the front panel. The following table describes the indicator states when the router is running normally.

Indicator	Description
PWR	Steady green: The system power supply is normal.

----End

Follow-up Procedure

To power off the router, perform the following steps:

NOTICE

Powering off the router will interrupt all the services on the router. Exercise caution when you perform this operation.

1. Turn off the power switch on the router or power module.
2. Turn off the power switch of the external power supply system.

5 Installing AR611E-S/AR651/AR651K/AR651-X8/AR651U-A4/AR651W/AR651W-8P/AR651W-X4/AR657W/AR651F-Lite/AR651C/AR1610-X6/AR6121E/AR6121K/AR6121/AR6121-S/AR6121C-S/AR720/AR730 Routers

5.1 Scenario 1: Installing the Router on a Desk

Context

The methods for installing routers on a desk are the same. An AR651W-X4 router is used as an example.

NOTE

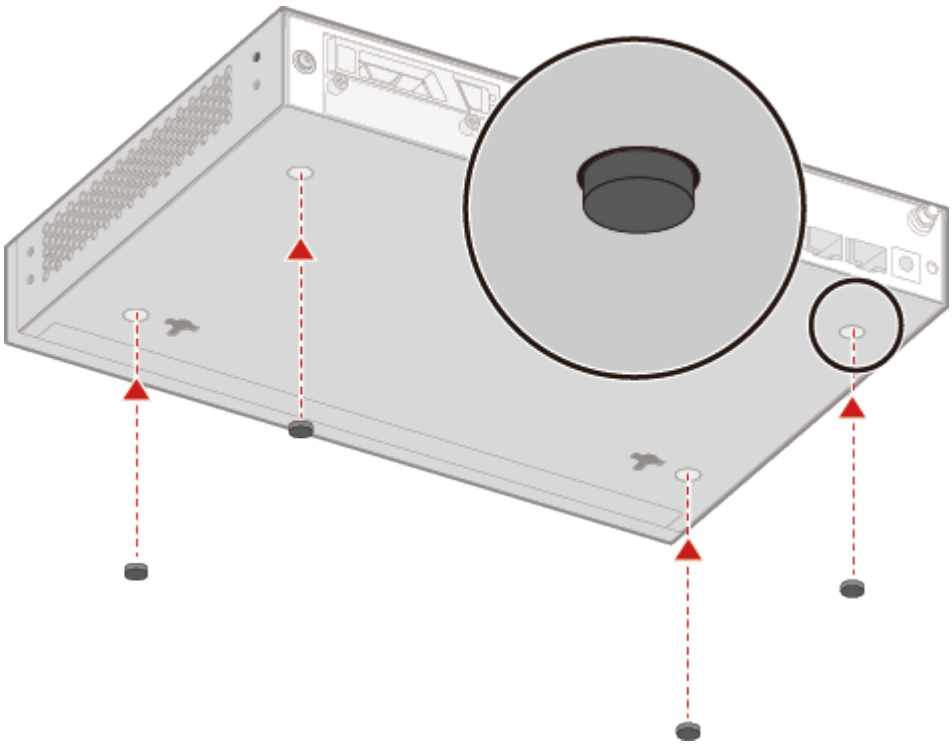
- Ensure that the desk is flat and properly grounded.
- Leave at least 50 mm of clearance around the router for heat dissipation.
- Do not place other objects on the router.

Tools and Accessories

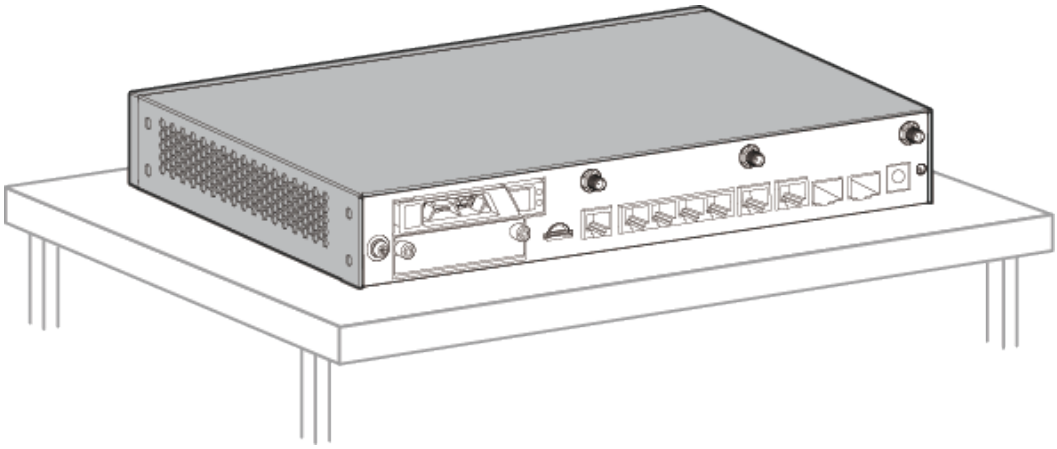
- Rubber pads (4)

Procedure

Step 1 Attach four rubber pads in the imprinted round areas marked plus (+) signs at the bottom of the router.



Step 2 Gently place the router on the desk.



----End

5.2 Scenario 2: Mounting the Router on a Wall (AR651/AR651K/AR651-X8/AR651U-A4/AR651W/AR651W-8P/AR651W-X4/AR657W)

Context

DANGER

Before drilling holes on a wall, make sure there are no power cables in the wall to avoid electric shock.

NOTE

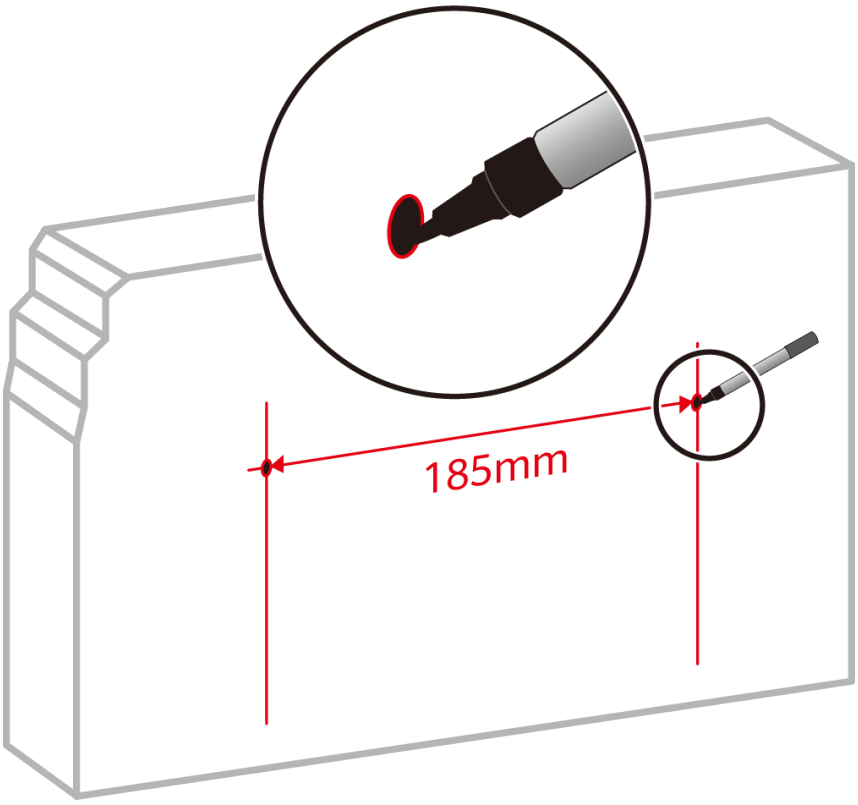
- Take water-proofing measures to protect a router from damages caused by water.
- Ensure that there are no flammable or explosive materials near the router and no obstructions within 100 mm around the router.
- Screws must be installed solid in the wall; otherwise, the router may fall down after cables are connected.

Tools and Accessories

- Measuring tape
- Marker
- Hammer drill
- Claw hammer
- Phillips screwdriver
- Wall anchors and mounting screws (self-provided)

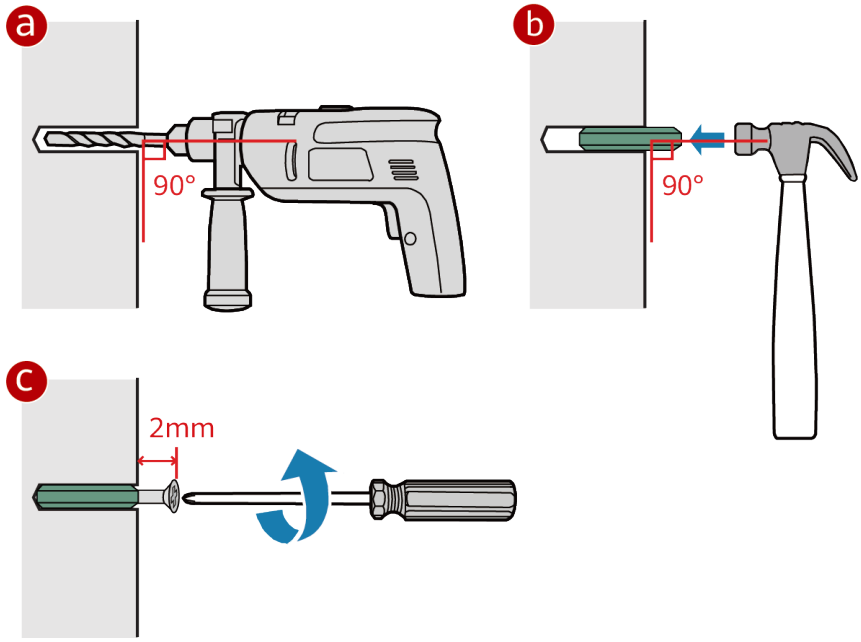
Procedure

Step 1 Use a measuring tape to determine the two mounting bracket installation positions. Keep the two positions on a horizontal line and mark the positions with a marker.

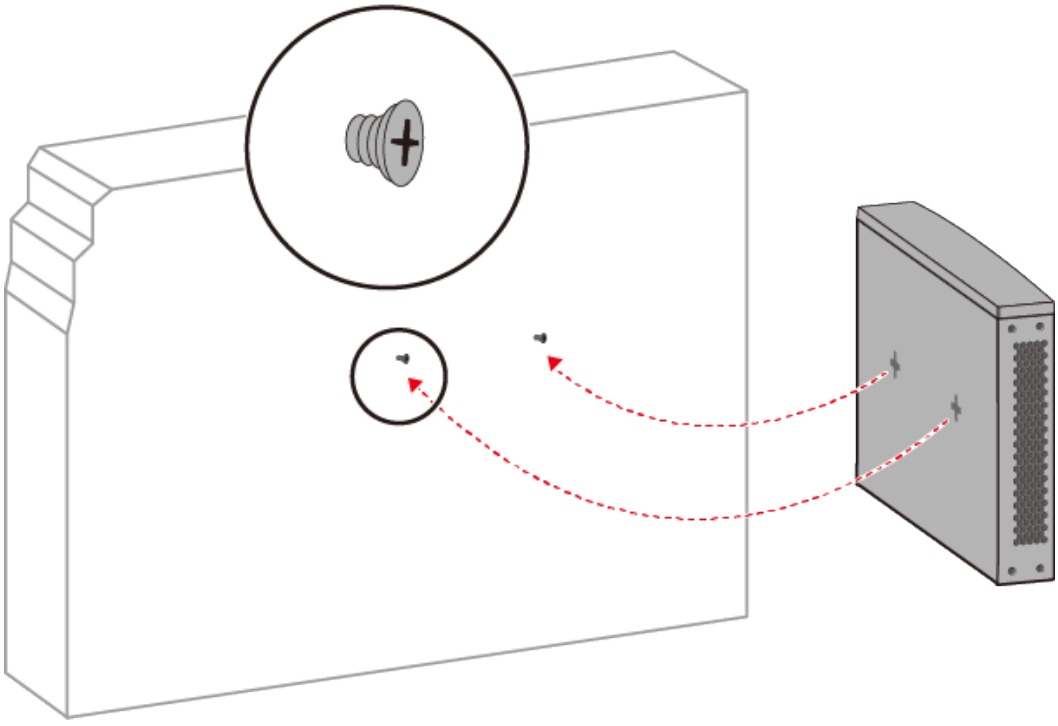


Step 2 Drill holes and install mounting screws.

1. Choose an appropriate drill bit according to the diameter of the mounting screws. The diameter of the mounting screws cannot exceed 4 mm.
2. Hammer the hollow wall anchors into the mounting holes.
3. Use a Phillips screwdriver to screw the mounting screws into the wall anchors. Leave the screws protruding 2 mm from the wall.



Step 3 Align the mounting holes on the rear of the router with mounting screws and hang the router on the mounting screws.



----End

5.3 Scenario 3: Mounting a Router on a Wall (AR6121K/AR651F-Lite/AR651C/AR6121E/AR6121/AR6121-S/AR6121C-S/AR720/AR730)

Context

DANGER

Before drilling holes on a wall, make sure that no power cable is routed in the wall. Otherwise, power cables in the wall may cause personal injury.

NOTE

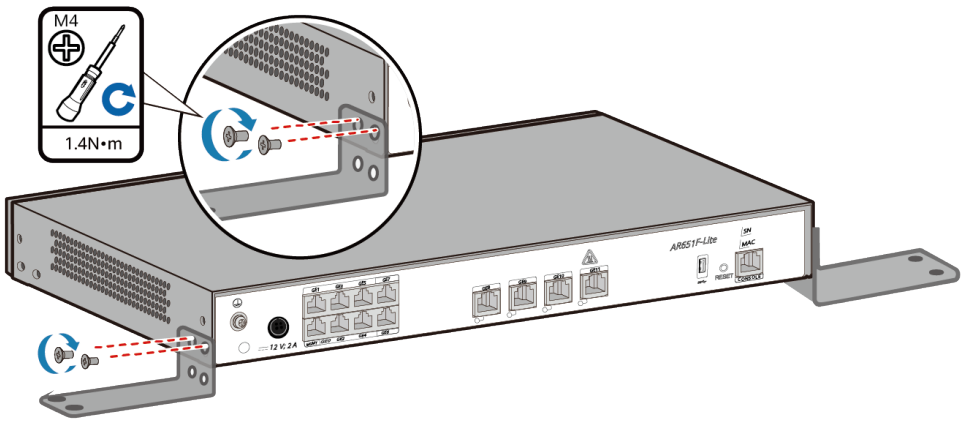
- Take water-proofing measures to protect a wall-mounted router from damages caused by water.
- Ensure that there are no flammable or explosive materials near the router and no obstructions within 100 mm around the router.
- Screws must be installed solid in the wall; otherwise, the wall-mounted router may fall down after cables are connected.

Tools and Accessories

- Measuring tape
- Marker
- Hammer drill (ϕ8)
- Claw hammer
- Phillips screwdriver
- Mounting brackets (two)
- M4 screws (four)
- M6 expansion bolts (four)
- Torque wrench

Procedure

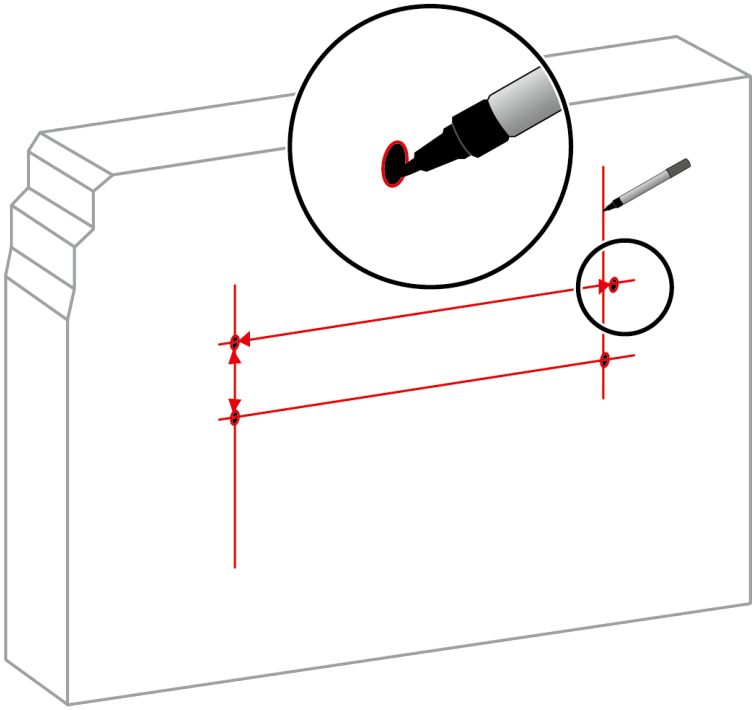
Step 1 Use a Phillips screwdriver to fix the mounting brackets to both sides of the router using M4 screws, with a torque of 1.4 N·m.



Step 2 Use a measuring tape to determine the four mounting bracket installation positions. Keep the upper and lower installation positions respectively on a horizontal line and mark the positions with a marker.

NOTE

- The wall must be a bearing wall. Otherwise, the wall is not suitable for wall-mounting.
- Install the router at an appropriate height to ensure that the indicators can be observed easily.

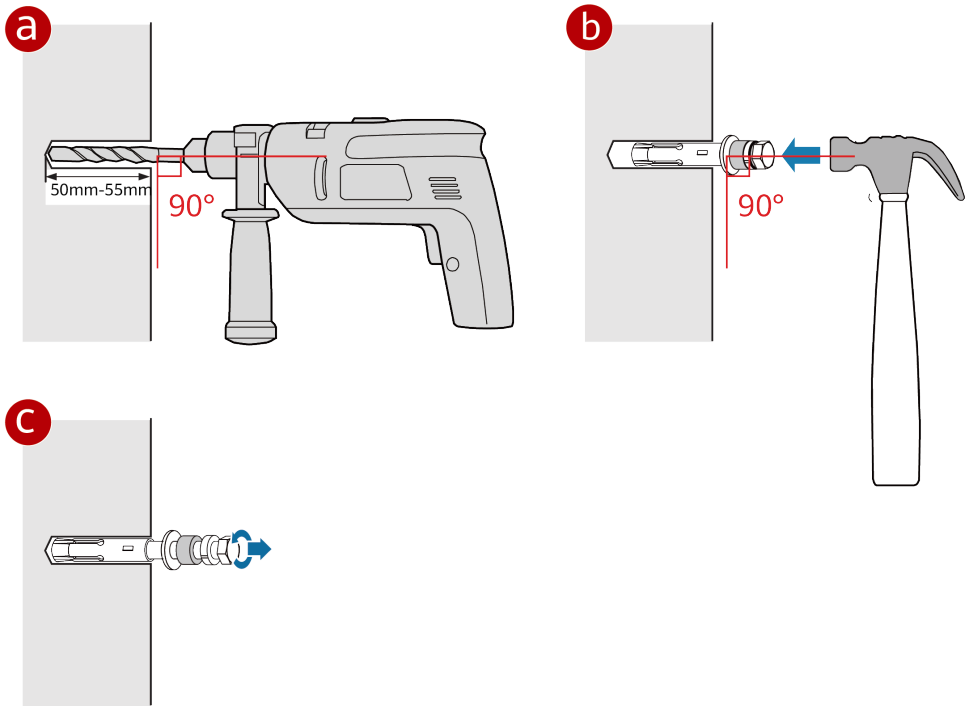


Step 3 Drill holes and install mounting expansion bolts in the wall.

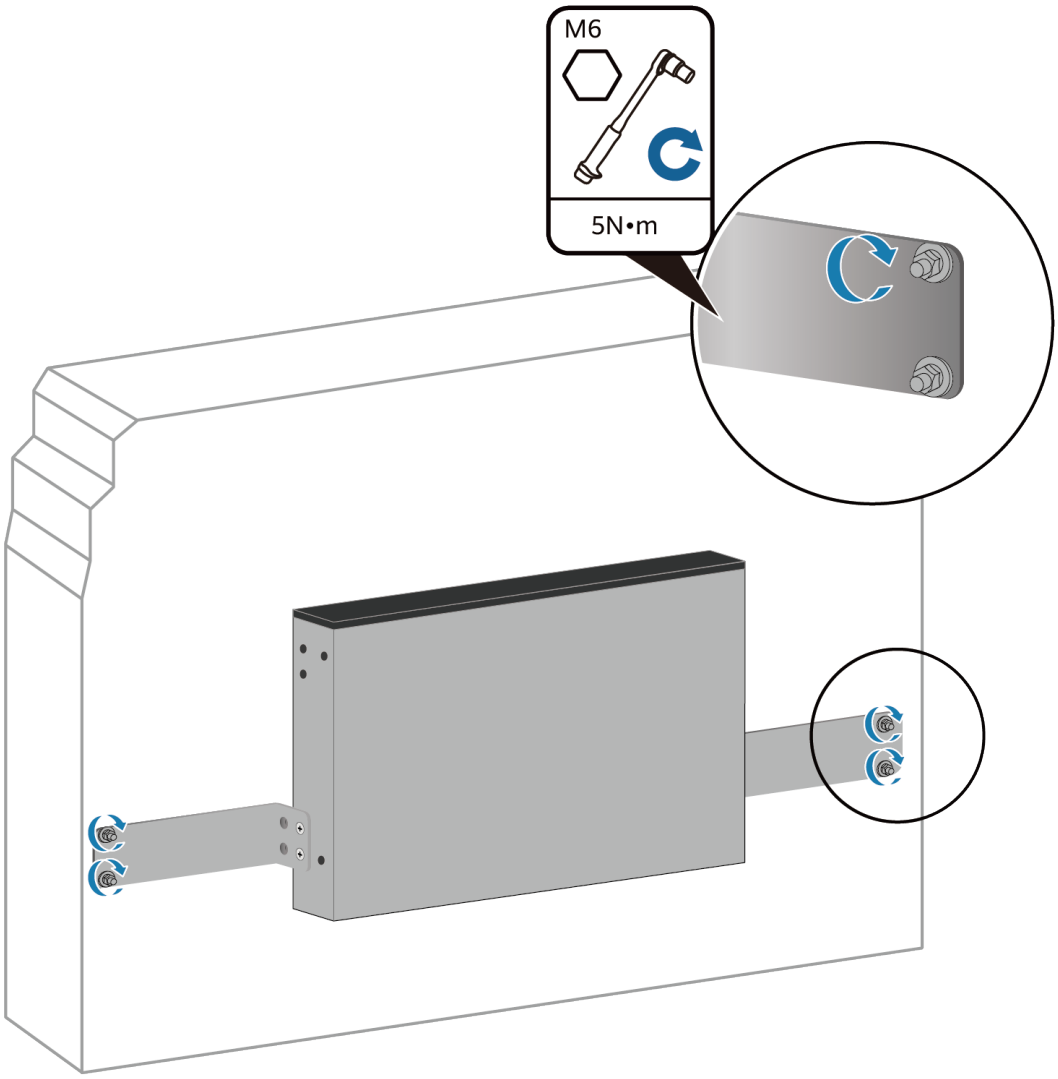
1. Use an 8-mm drill bit to drill holes in the marked positions.
2. Insert M6 expansion bolts into the holes and screw the M6 nuts to fasten the expansion bolts.

   NOTE

   M6 expansion bolts of part number 26010179 are recommended.
3. Remove the nut, flat washer, and spring washer.



Step 4 Place the router on the M6 expansion bolts, fasten the spring washers, flat washers, and nuts in order, and secure the router on the wall using a torque wrench, with a torque of 5 N·m.



----End

5.4 Scenario 4: Installing a Router in a Cabinet/Rack (AR651F-Lite/AR651C)

Context

This installation method applies to the AR651F-Lite/AR651C router.

NOTE

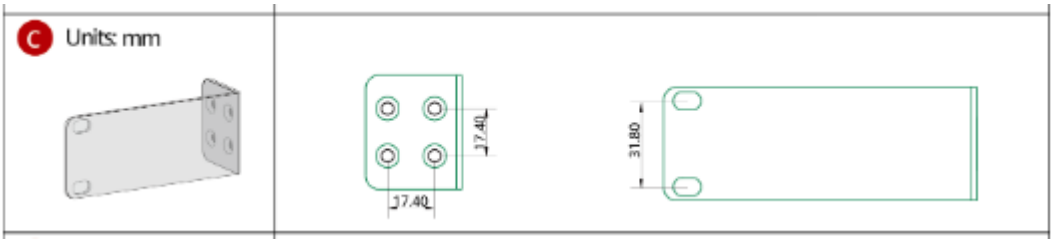
- The router can be installed into a 19-inch standard cabinet/rack. A separately purchased non-standard cabinet/rack must have sufficient space for chassis installation.
- Leave at least 50 mm of clearance around the router for heat dissipation.
- If multiple routers are installed into a cabinet, it is recommended that at least 1 U of space (1 U = 44.45 mm) be kept between two routers. These routers must have the same airflow direction; otherwise, heat dissipation is affected by hot air circulation.

Tools and Accessories

- Phillips screwdriver
- Flat-head screwdriver
- Floating nuts (self-provided)
- Mounting brackets
- M4 screws
- M6 screws

NOTE

The mounting brackets, M4 screws, and M6 screws are not included in the installation accessory package of the AR651F-Lite/AR651C router and need to be purchased separately.

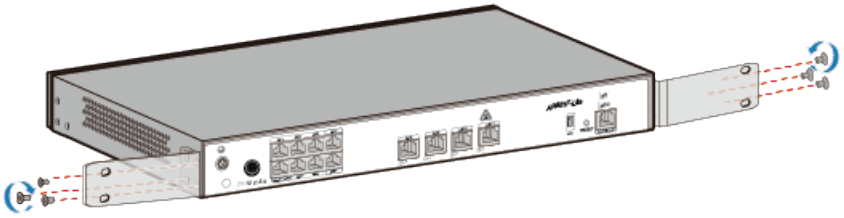


Procedure

Step 1 Use a Phillips screwdriver to fix the mounting brackets to both sides of the router with M4 screws.

NOTE

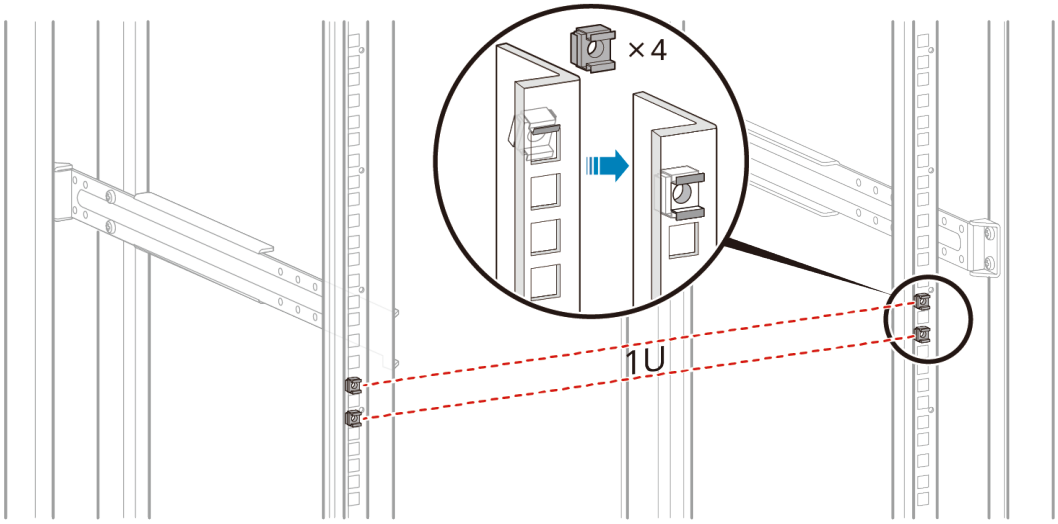
The mounting brackets can be installed on both sides close to the front panel or rear panel.



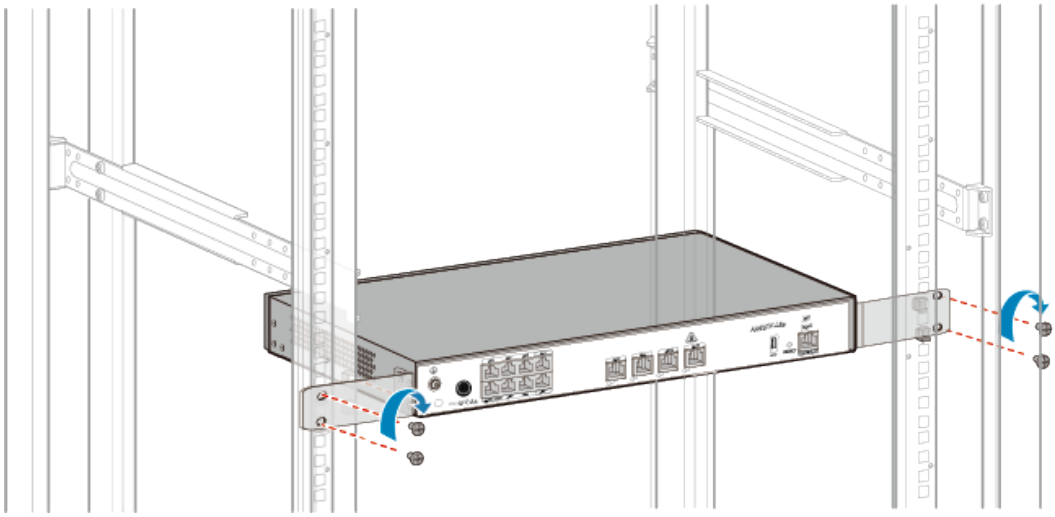
Step 2 Install two floating nuts on each front mounting rail. Leave a mounting hole between the two floating nuts on the same mounting rail.

NOTE

- The length of three adjacent mounting holes may not be 1 U. Observe the scale ticks on the mounting rails when installing floating nuts.
- You can use a flat-head screwdriver to install floating nuts.



Step 3 Move the router into the cabinet. Support the bottom of the router and tighten the M6 screws on the mounting brackets. Tighten the lower M6 screws first, and then the upper M6 screws.



----End

5.5 Scenario 5: Installing the Router into a Cabinet/Rack (AR651/AR651K/AR651-X8/AR651U-A4/AR651W/AR651W-8P/AR651W-X4/AR657W/AR1610-X6/AR6121K/AR6121/AR6121E/AR6121-S/AR6121C-S/AR6121E-S/AR6121EC-S/AR720/AR730)

Context

The methods for installing AR651/AR651K/AR651-X8/AR651U-A4/AR651W/AR651W-8P/AR651W-X4/AR657W/AR1610-X6/AR651K/AR6121K/AR6121/

AR6121E/AR6121-S/AR6121C-S/AR6121E-S/AR6121EC-S/AR720/AR730 routers into a cabinet or rack are the same. An AR1610-X6 router is used as an example.

NOTE

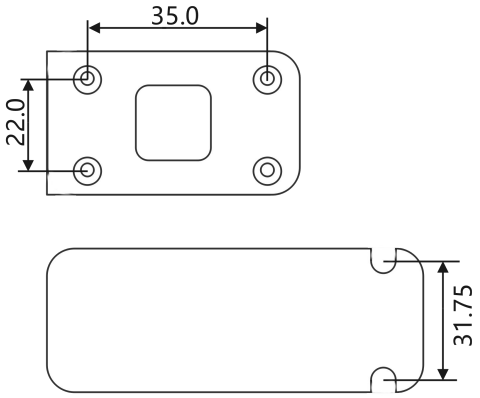
- The router can be installed into a 19-inch standard cabinet/rack. A separately purchased non-standard cabinet/rack must have sufficient space for chassis installation.
- It is not recommended that a Wi-Fi-capable router be installed into a cabinet/rack.
- Leave at least 50 mm of clearance around the router for heat dissipation.
- If multiple routers are installed into a cabinet, it is recommended that at least 1 U of space (1 U = 44.45 mm) be kept between two routers. These routers must have the same airflow direction; otherwise, heat dissipation is affected by hot air circulation.

Tools and Accessories

- Phillips screwdriver
- Flat-head screwdriver
- Floating nuts (four, separately purchased)
- Mounting brackets
- M4 screws (used to fix mounting brackets on both sides of the router. The number of mounting mounting brackets depends on the router model.)
- M6 screws (four, separately purchased)

NOTE

The mounting brackets, M4 screws, and M6 screws are not included in the installation accessory package of AR651/AR651K/AR651-X8/AR651U-A4/AR651W/AR651W-8P/AR651W-X4/AR657W routers and need to be purchased separately. The following figure shows the spacing between mounting ear holes. The unit is mm.

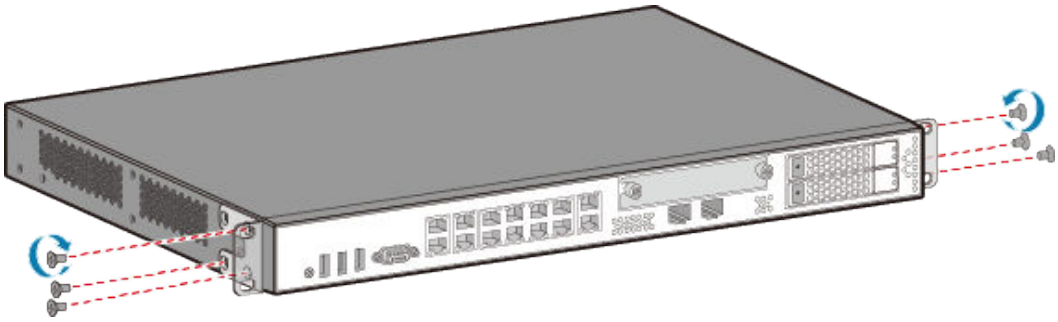


Procedure

Step 1 Use a Phillips screwdriver to fix the mounting brackets to both sides of the router with M4 screws.

NOTE

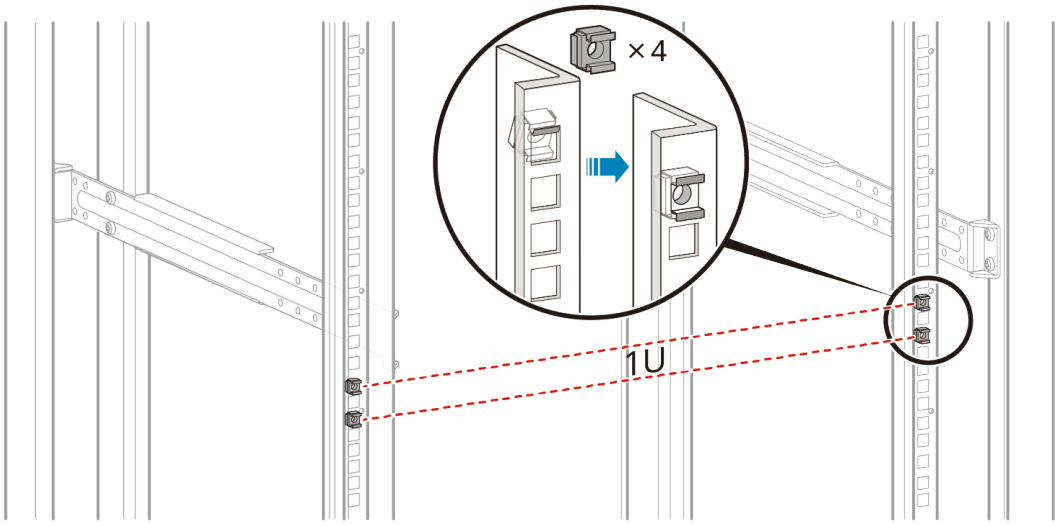
The mounting brackets can be installed on both sides close to the front panel or rear panel.



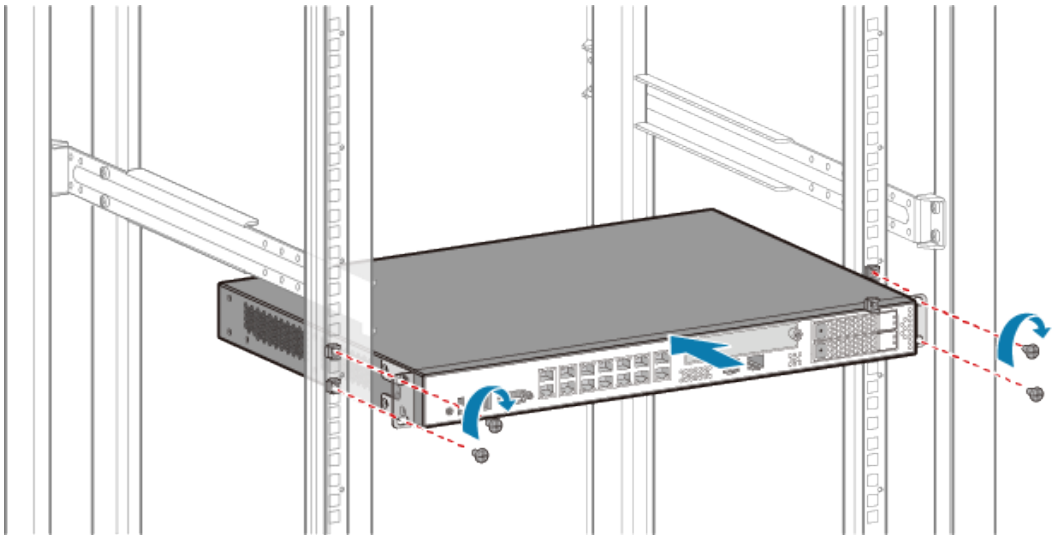
Step 2 Install two floating nuts on each front mounting rail. Leave a mounting hole between the two floating nuts on the same mounting rail.

NOTE

- The length of three adjacent mounting holes may not be 1 U. Observe the scale ticks on the mounting rails when installing floating nuts.
- You can use a flat-head screwdriver to install floating nuts.



Step 3 Move the router into the cabinet. Support the bottom of the router and tighten the M6 screws on the mounting brackets. Tighten the lower M6 screws first, and then the upper M6 screws.



----End

5.6 (Optional) Installing Cards

Context

The methods for installing cards on a router are the same. The following procedure uses a SIC card as an example.

NOTE

- All cards (excluding 1LTE4, 1LTE4-EA, 1CLTE4-CN, 1ELTE6-EA, and 1LTE6-EA) are hot swappable.
- Vacant slots in the router must be covered with filler panels.
- When installing a card, slowly push it into the slot. If you feel resistance or find the card inclined, pull the card out and push it into the slot again. Do not push the card with force; otherwise, the connectors on the card and backplane may be damaged.
- A card can be installed only in a router that supports this card. For the specific cards supported by different routers, see **Cards** in the *Hardware Description*.
- The AR651F-Lite/AR651C does not support card installation.

Tools and Accessories

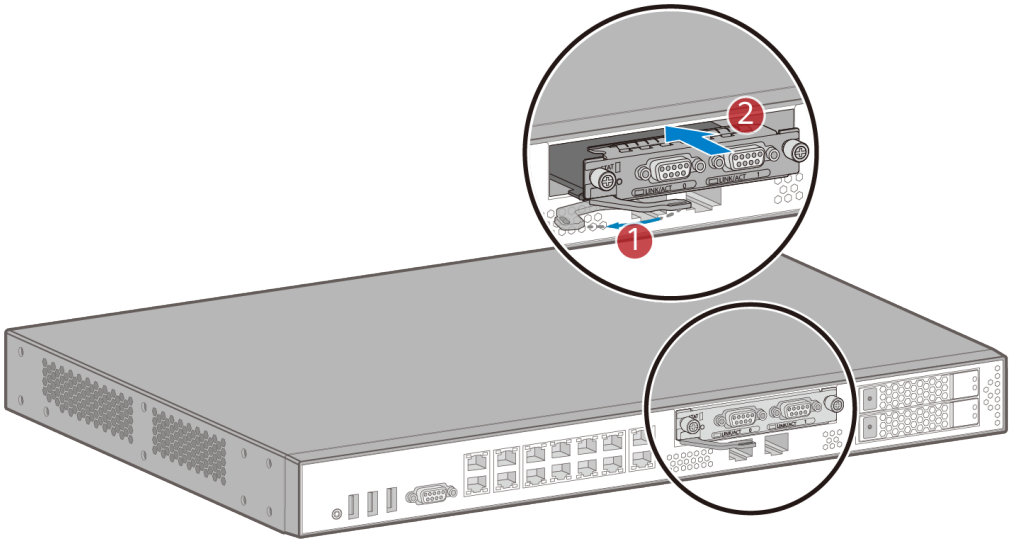
- ESD wrist strap
- Phillips screwdriver

Procedure

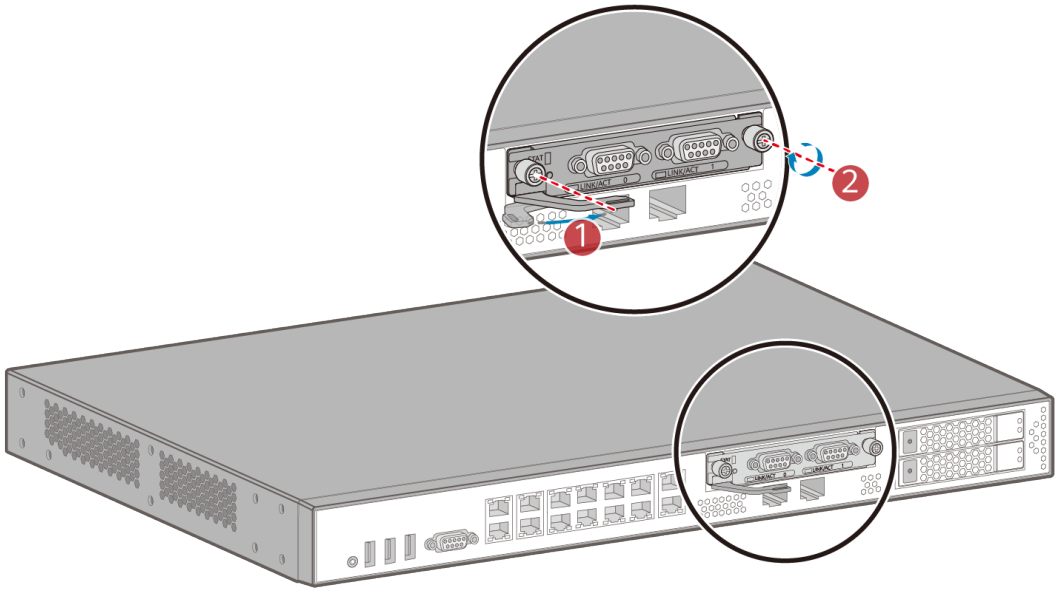
Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Hold the captive screw and pull out the filler panel. Keep the filler panel for future use.

Step 3 Pull the ejector lever of the card 45 degrees outward. Gently push the card into the chassis with your thumbs, until the screws on the front panel are completely in the chassis.



Step 4 Lower the ejector levers and push them until the card cannot move forward. Then turn the Phillips screwdriver clockwise to tighten the captive screws on the card.



----End

5.7 (Optional) Installing a Hard Disk

Context

The methods for installing hard disks in different routers are the same.

NOTE

Hard disks are not hot swappable.

Tools and Accessories

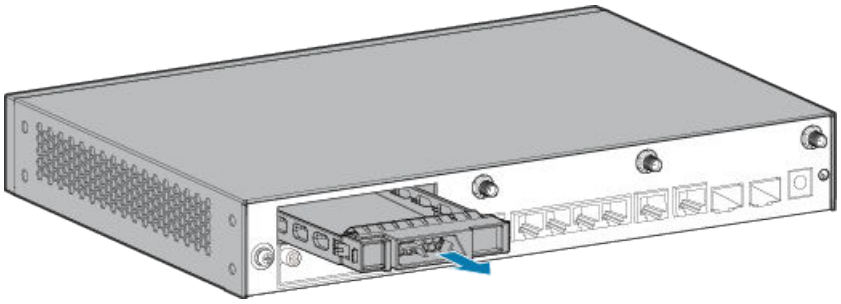
- Hard disk
- Hard disk holder
- Phillips screwdriver

NOTE

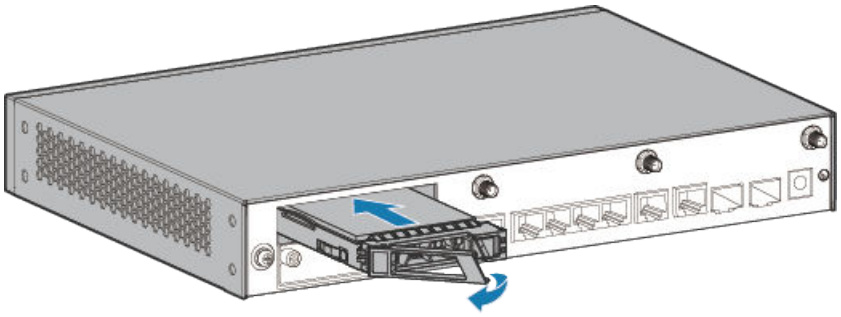
- The hard disk is not included in the installation accessory package and needs to be purchased from Huawei separately. Hard disks purchased from Huawei have been equipped with a holder.
- The hard disk holder in the installation accessory package delivered with the router are reserved. The current version does not support the installation of hard disks that are purchased by customers.
- The installation accessory package of AR1600 series routers does not include the hard disk holder.

Procedure

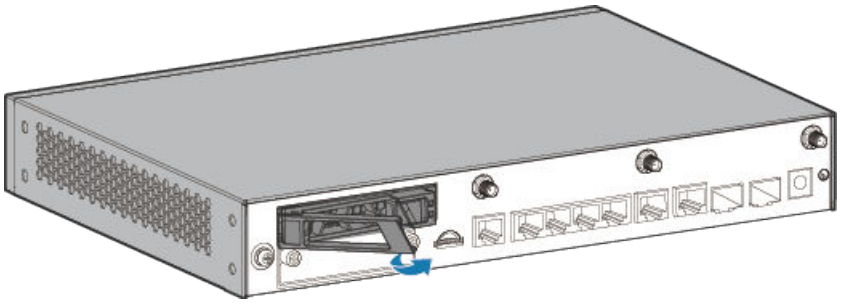
Step 1 Hold down the release button on the left side of the filler panel and pull out the filler panel.



Step 2 Open the locking latch of the hard disk holder and insert the hard disk into the router.



Step 3 Close the locking latch to lock the hard disk in the router.



----End

5.8 (Optional) Installing a PoE Power Supply

Context

If the AR651W-8P needs to supply power to powered devices (PDs) such as IP phones, WLAN APs, and IP cameras, connect a PoE power supply to the router.

NOTE

LAN interfaces GE0 to GE7 of the AR651W-8P support PoE power supply.

Tools and Accessories

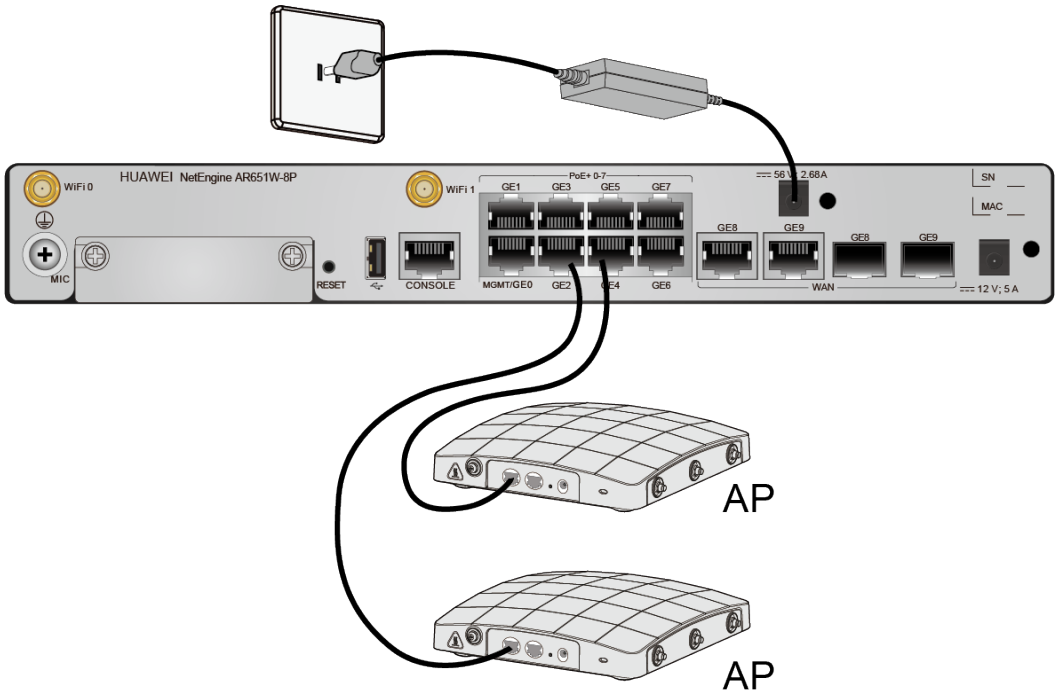
- PoE power supply

  NOTE

  The PoE power supply is not included in the installation accessory package and needs to be purchased separately.

Procedure

Step 1 Connect one end of the PoE power supply to the PoE power jack of the router and the other end to an AC power outlet.



----End

5.9 (Optional) Installing the SIM Card on a SIC Card

Context

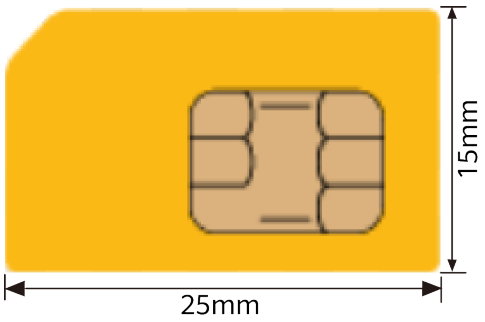
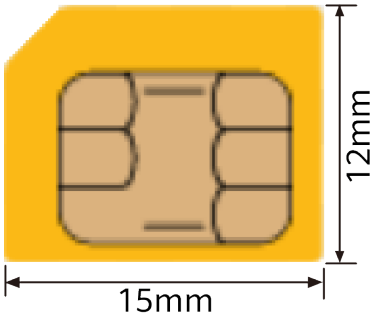
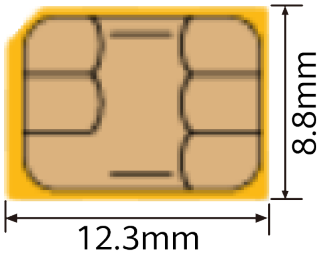
This method applies to SIC cards with 3G/LTE/5G functions. The methods for installing the SIM card on a SIC card are the same. A 3G-HSPA+7 card is used as an example.

NOTICE

- The standard SIM card is supported. It is not recommended to use the card cover to prevent poor SIM card contact.
- Hot-swap SIM card is not supported. After replugging the SIM card, you need to restart the RF module or restart the device.
- Ensure that the SIM card slot is locked after the SIM card is removed or installed.

The following table describes the dimensions of a SIM card.

Table 5-1 Dimensions of a SIM Card

Model	Dimensions
Standard SIM card	
Micro SIM card	
Nano SIM card	

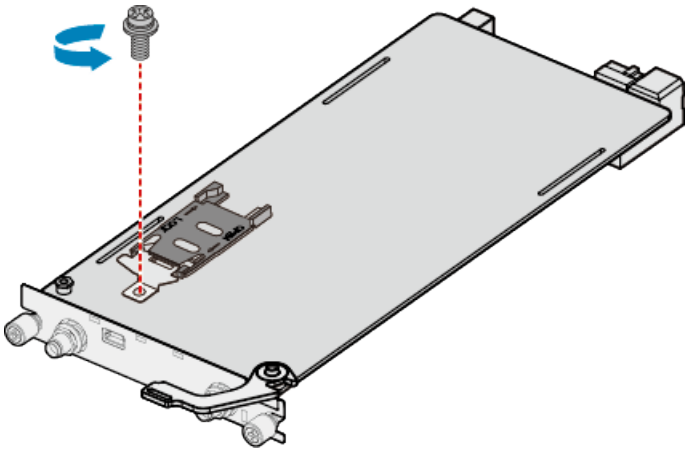
Tools

- Phillips screwdriver
- ESD wrist strap
- SIM card (self-provided)

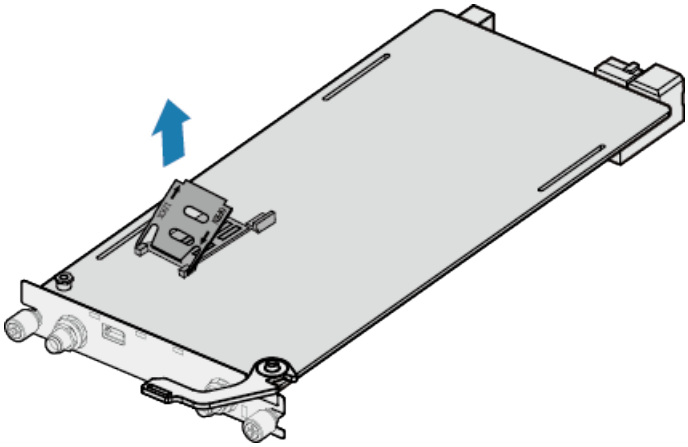
Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Loosen the screw on the SIM card holder.



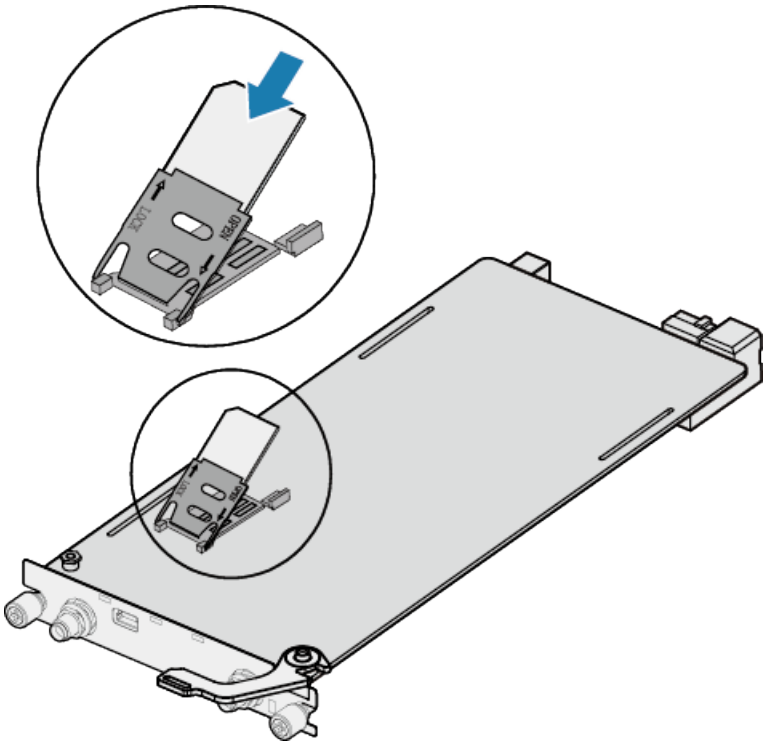
Step 3 Slide the SIM card holder horizontally towards the direction specified by the OPEN arrow and open the SIM card holder.



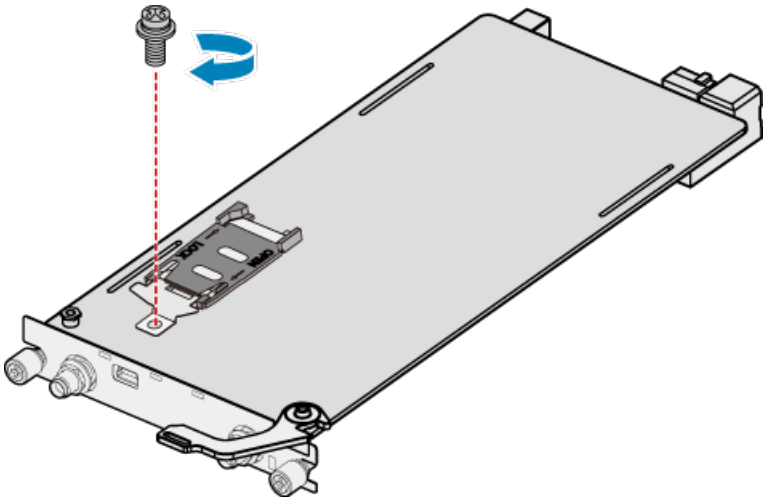
Step 4 Insert a SIM card into the SIM card holder.

NOTE

When inserting a SIM card, keep the notch on the SIM card in the same direction as the notch marked on the slot.



Step 5 Slide the SIM card holder towards the direction specified by the LOCK arrow, close the SIM card holder, and tighten the screw.



----End

5.10 (Optional) Installing the SIM Card on a MIC Card

Context

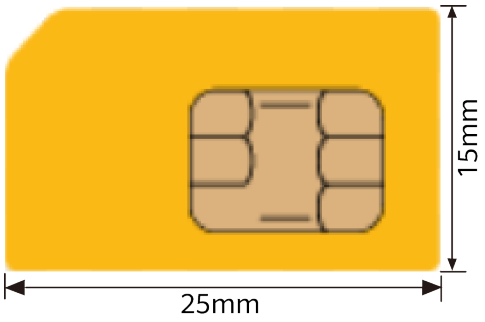
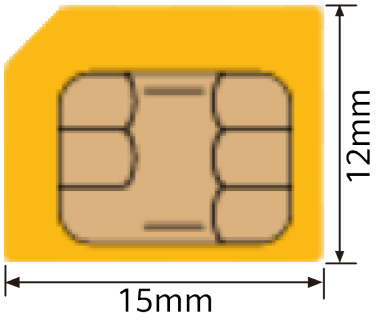
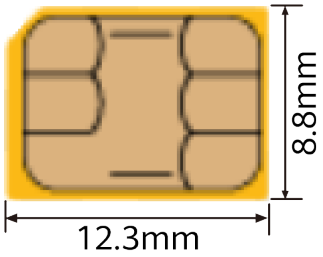
This method applies to MIC cards with LTE functions.

NOTICE

- The standard SIM card is supported. It is not recommended to use the card cover to prevent poor SIM card contact.
- Hot-swap SIM card is not supported. After replugging the SIM card, you need to restart the RF module or restart the device.
- Ensure that the SIM card slot is locked after the SIM card is removed or installed.

The following table describes the dimensions of a SIM card.

Table 5-2 Dimensions of a SIM Card

Model	Dimensions
Standard SIM card	
Micro SIM card	
Nano SIM card	

Tools

- Phillips screwdriver
- ESD wrist strap
- SIM card (self-provided)

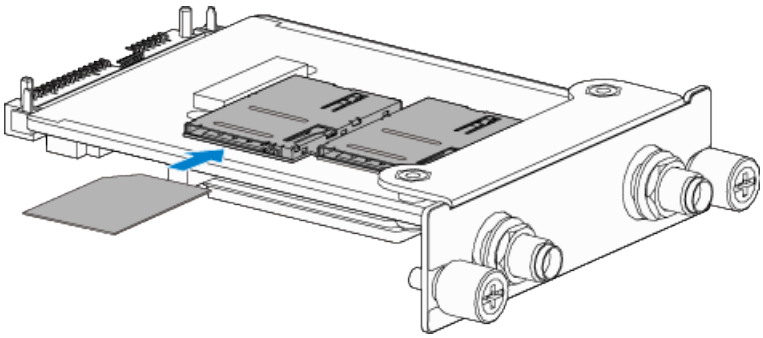
Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Insert a SIM card into the SIM card holder.

NOTE

- When inserting a SIM card, keep the notch on the SIM card in the same direction as the notch marked on the slot.
- If only one SIM card needs to be installed, install it in slot SIM1.



----End

5.11 (Optional) Connecting a RU-5G Remote Unit to an AR Router

Context

An AR router connects to an RU-5G remote unit to connect to a 5G/4G/3G Ethernet to implement high-speed data transmission.

Tools and Accessories

- Ethernet cable (self-provided)

  NOTE

  - Before connecting Ethernet cables, use the Ethernet cable detection tool to check whether the Ethernet cables are normal to ensure that the device works properly.
  - The Ethernet cable is of category 5 or higher type. The length of the Ethernet cable cannot exceed 50 m. The cross-sectional area of an Ethernet cable ranges from 4.9 mm to 7.1 mm.

- RU-5G Remote unit (self-provided)

  NOTE

  For details, see **Appendix G RU-5G Installation**.

- PoE adapter (self-provided)

NOTE

When the two GE/PoE_IN interfaces on an RU-5G remote unit use PoE adapters, the Huawei PoE adapters (part number: 02220369) must be used.

If the GE/PoE_IN interface uses a PoE adapter, place the PoE adapter indoors.

Procedure

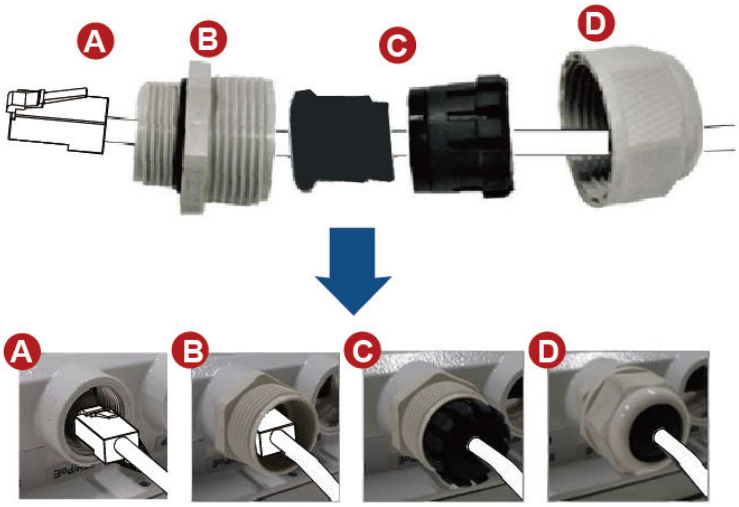
Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Route the Ethernet cable through the waterproof PG connector, as shown in the following figure. Insert the RJ45 connector (without sheath) of the Ethernet cable into the GE/PoE_IN (GE0/PoE_IN or GE1/PoE_IN) interface on the device, and then tighten the waterproof PG connectors in sequence B, C, and D.

NOTE

Tighten components of PG connectors B to the device with a torque of 2.5 N·m, and components D to B to a torque of 1.8 N·m. The waterproof PG connector is used for round Ethernet cables. Flat Ethernet cables cannot be used.

Ensure that the RJ45 connector is correctly connected to the device. Otherwise, the Ethernet cable may be damaged. Before removing the Ethernet cable from the device, remove the waterproof PG connector first and then remove the RJ45 connector.



Step 3 Connect the other end of the Ethernet cable according to the networking mode.

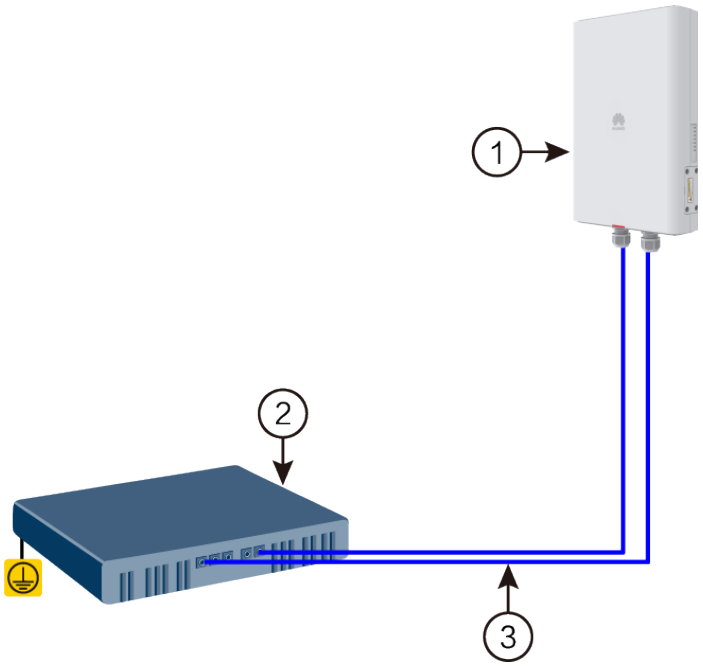
Option	Description
Figure 5-1	In this scenario, all networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Connect the other end of the Ethernet cable to the PoE port on the AR router.

Option	Description
Figure 5-2	In this scenario, the RU-5G is installed outdoors and other networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Install an SPD on the other end of one network cable and connect the cable to the Ethernet interface on the AR router. 3. Install an SPD on the other end of the other network cable and connect it to the PoE port on the PoE adapter. 4. Use a network cables to connect the Ethernet interface on the AR router and the DATA port on the PoE adapter.

NOTE

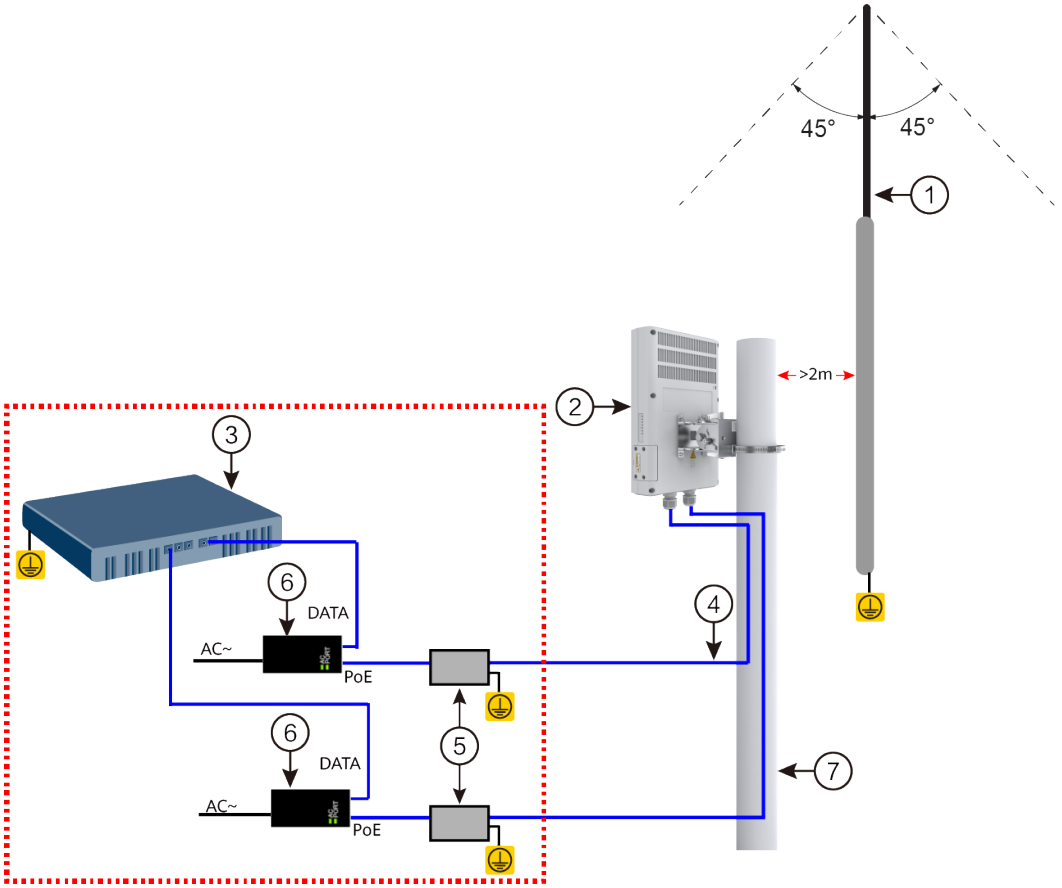
- When the AR router, PoE adapter, and RU-5G remote unit are installed indoors, no SPD is required for the AR router Ethernet interface, AR router power input interface, PoE adapter output interface, and PoE adapter power input interface.
- When the AR router and PoE adapter are installed indoors and the RU-5G remote unit is installed outdoors, an SPD must be installed on the AR router network interface and output interface on the PoE adapter. Huawei SPD (part number: 19020303) or an SPD with the same specifications is recommended for the output of the AR router Ethernet ports and PoE adapters.

Figure 5-1 Co-deployment Networking 1 (RU-5G PoE Power Supply Using an AR Router)



1. RU-5G remote unit
2. AR router (PoE supported)
3. Ethernet cable
-

Figure 5-2 Co-deployment Networking Mode 2 (RU-5G Powered by PoE adapters)



NOTE

The devices in the red box are installed indoors.

1. Lightning rod	2. RU-5G remote unit	3. AR router (PoE not supported)	4. Ethernet cable
5. SPD	6. PoE adapter	7. Pole	-

----End

5.12 Installing Antennas

5.12.1 Installing Wi-Fi Antennas

Context

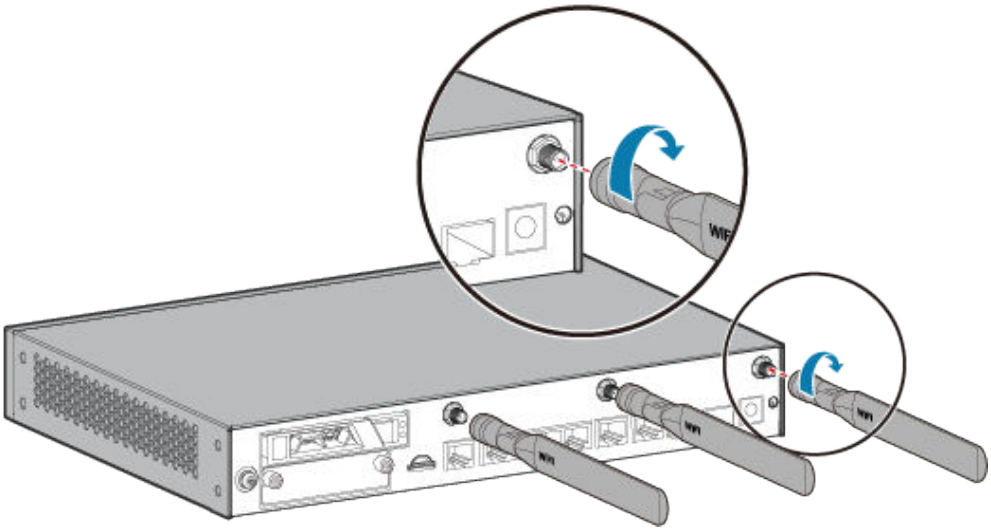
You must install antennas in routers that need to support the Wi-Fi function.

Tools and Accessories

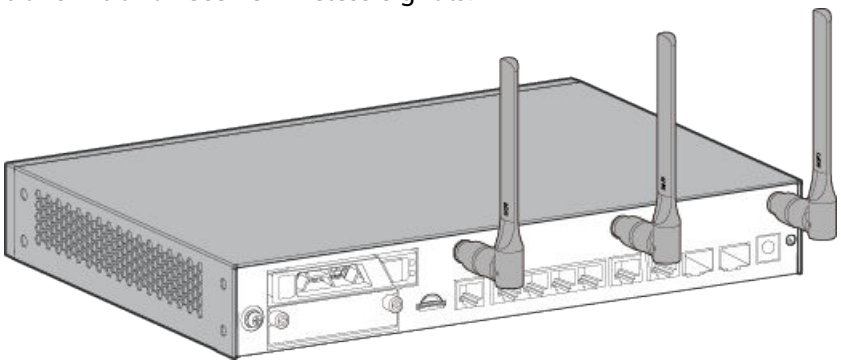
- Wi-Fi antennas

Procedure

Step 1 Install Wi-Fi antennas in antenna interfaces of the router.



Step 2 Make the Wi-Fi antennas vertical to the ground so that the router can better transmit and receive wireless signals.



----End

5.12.2 (Optional) Installing the LTE Indoor Remote Antenna

Context

If the router uses channels 12 and 13 of the 2.4 GHz band to provide Wi-Fi service, the LTE antenna interfaces must be configured with LTE indoor remote antennas.

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connections may damage interface modules or the router.

NOTE

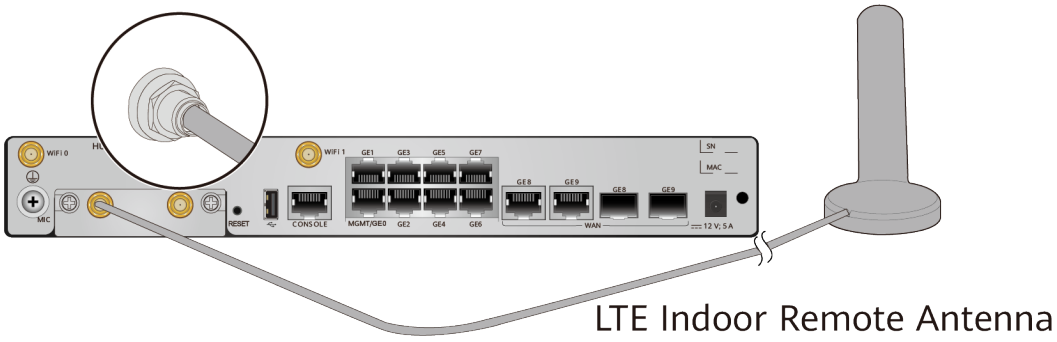
Indoor LTE remote antennas are not included in the installation accessory package and need to be purchased separately.

Tools and Accessories

- LTE indoor remote antenna

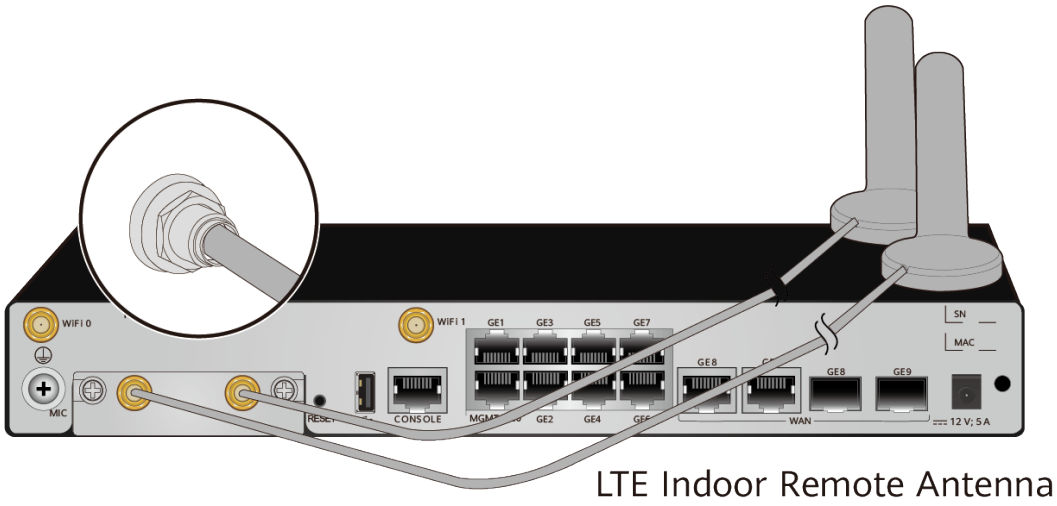
Procedure

Step 1 Connect the plug of the indoor LTE remote antenna to an SMA connector on the router.



Step 2 Fix the LTE indoor remote antennas on a metal surface that can be magnetized or keep the antennas away from the Wi-Fi antenna.

Step 3 (Optional) If the LTE indoor remote antennas are fixed in a limited position, fix the LTE indoor remote antennas on the router and keep the antennas away from the Wi-Fi antenna as far as possible.



----End

5.13 Connecting the Router

5.13.1 Connecting the Ground Cable

Context

Grounding the router helps protect it from lightning, electromagnetic interference, and electrostatic discharge.

The ground cable can be connected to a ground bar or a ground point on the cabinet or rack. The following procedure uses the connection to a ground point as an example.

NOTE

If a cabinet or rack has anti-rust coating, scrape off the paint around the ground point to ensure reliable grounding.

Tools and Accessories

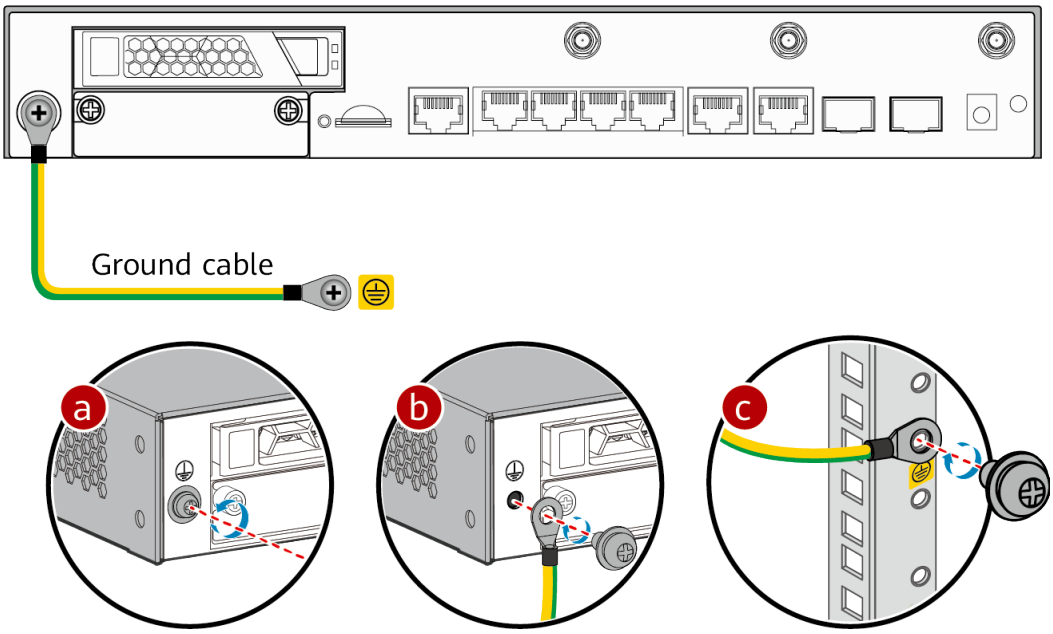
- Phillips screwdriver
- ESD wrist strap
- Ground cable
- M6 screw (self-provided)

Procedure

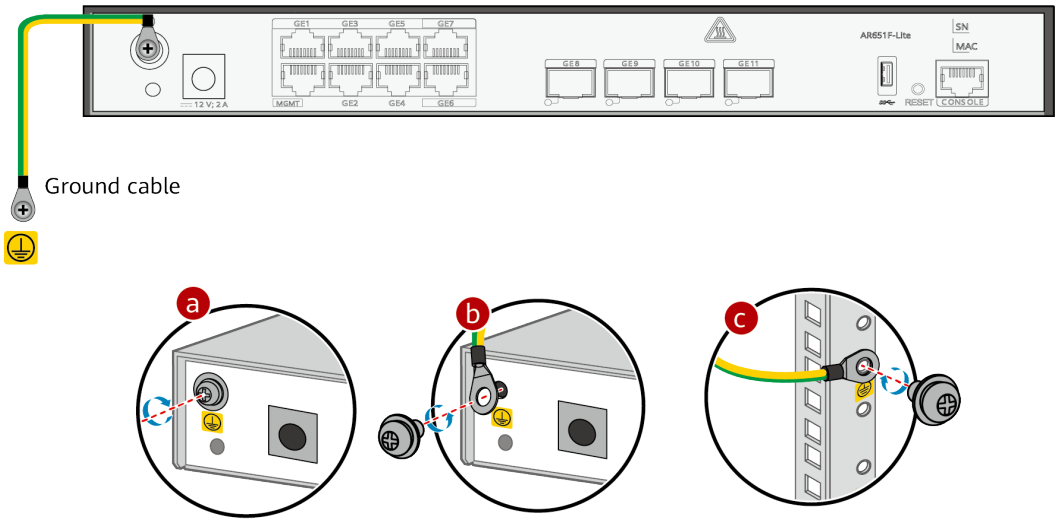
Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Connect the ground cable.

1. Use a Phillips screwdriver to remove the M4 screw from the ground point on the router. Keep the M4 screw in an appropriate place for later use.
2. Connect the M4 lug of the ground cable to a ground point on the router and fix it with an M4 screw.
3. Connect the M6 lug of the ground cable to a ground point on the cabinet and fix it with an M6 screw.



The AR651C or AR651F-Lite has the ground cable routed out from the top.



----End

5.13.2 Connecting the Console Cable

Tools and Accessories

- Console cable

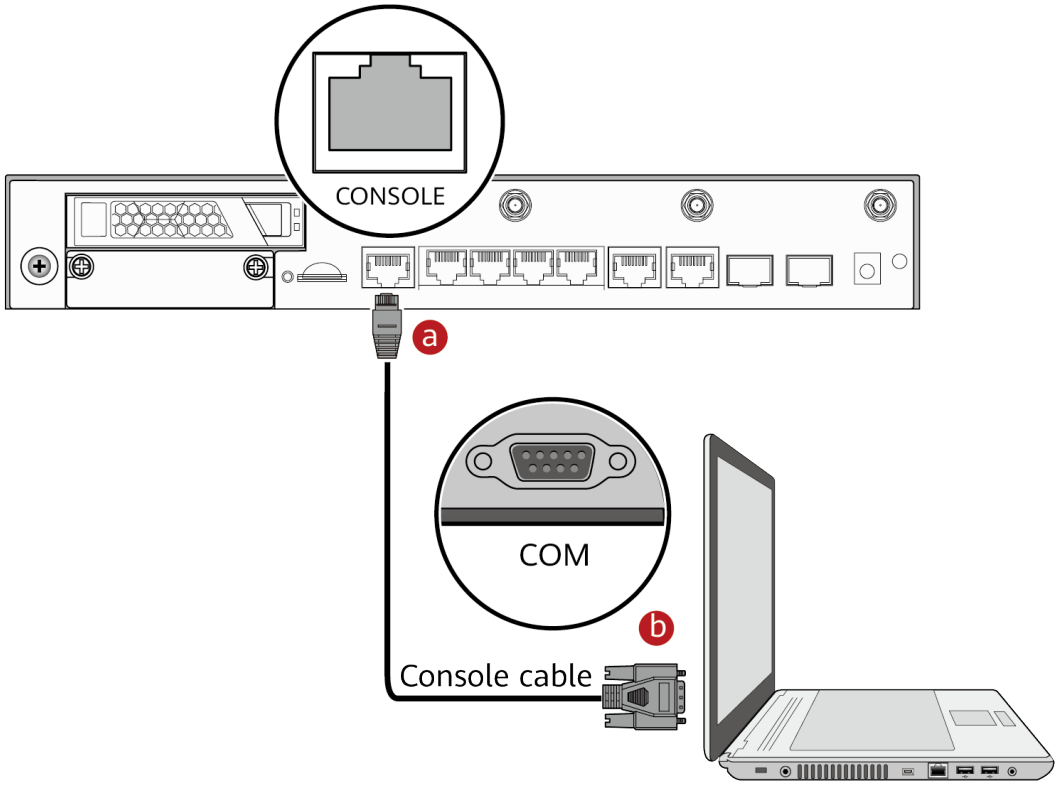
NOTE

The console cable is not included in the installation accessory package of the AR651/AR651K/AR651-X8/AR651C/AR651F-Lite/AR651U-A4/AR651W-X4/AR651W/AR657W routers and needs to be purchased separately.

Procedure

Step 1 Connect the console cable.

1. Connect the RJ45 connector of the console cable to the console interface (RJ45) of the router.
2. Connect the DB9 connector of the console cable to the serial interface (COM) of a management PC.



----End

Follow-up Procedure

After the console cable is connected, you need to configure terminal emulation software on the management PC to log in to the command configuration interface of the router.

NOTE

For details about how to use specific terminal emulation software, see the related software user guide or online help.

For details about how to log in to the device through the console port for the first time, see **Basic Configuration Guide** > **First Login to a Device** > **Logging In to a Device** > **Logging In to a Device for the First Time Through a Console Port** in the "CLI-based Configuration".

5.13.3 Connecting Ethernet Cables

Tools and Accessories

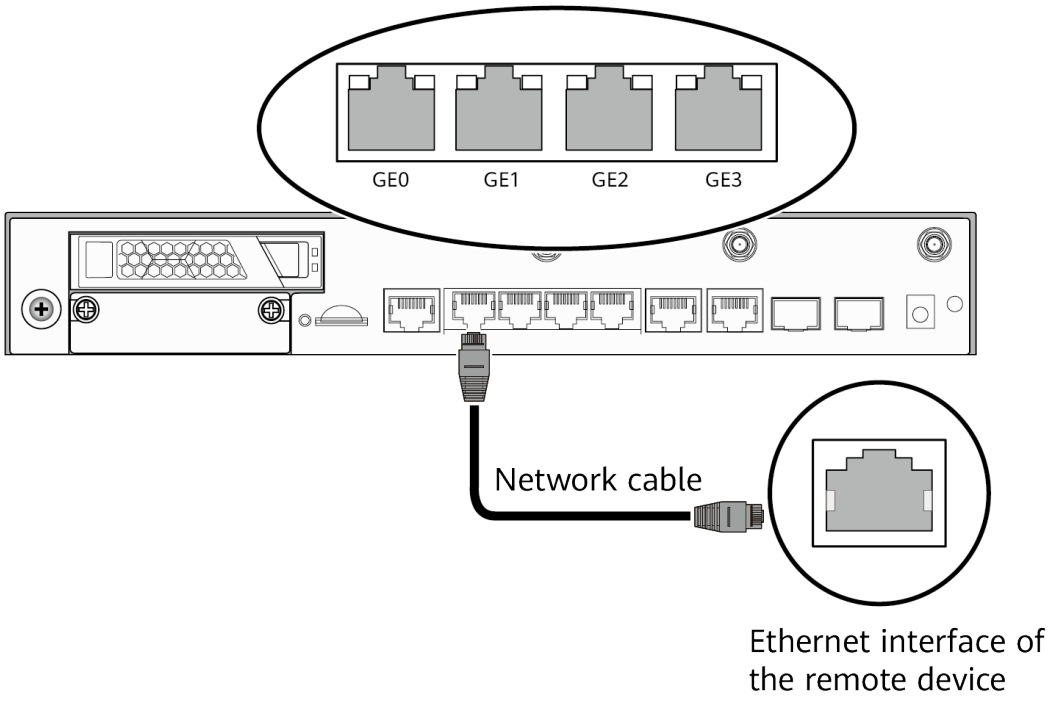
- Diagonal pliers
- Cable ties
- Marker
- Ethernet cables (self-provided)
- Ethernet cable labels

Procedure

Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Attach temporary labels to both ends of each Ethernet cable and write numbers on the labels to identify the Ethernet cables.

Step 3 Connect one end of an Ethernet cable to an Ethernet interface of the router and the other end to an Ethernet interface of the remote device.



Step 4 Arrange the Ethernet cables to make them parallel, and then bundle them with cable ties. Use diagonal pliers to cut off redundant cable ties.

Step 5 Remove the temporary labels from the Ethernet cables, and then attach formal labels 2 cm away from the connectors at both ends.

----End

Follow-up Procedure

Check the following items after connecting Ethernet cables:

- Labels are correctly filled and securely attached to cables, with clear text facing the same direction.

- Cables and connectors are complete, intact, and tightly connected.

5.13.4 Connecting the Power Adapter

Context

DANGER

To avoid electric shock, do not connect power cables while the power is on.

NOTE

- Do not power on the router before you finish connecting the power cables.
- Each router has its own power cables delivered as accessories. The power cables can only be used on the router in the same package and cannot be used on any other device.
- The AC power cable parameters vary in different countries or regions. The figures are for reference only and may differ from the cables delivered.

Tools and Accessories

- ESD wrist strap
- Power adapter
- AC power cable
- AC terminal locking latch

Procedure

Step 1 Verify that the router is reliably grounded.

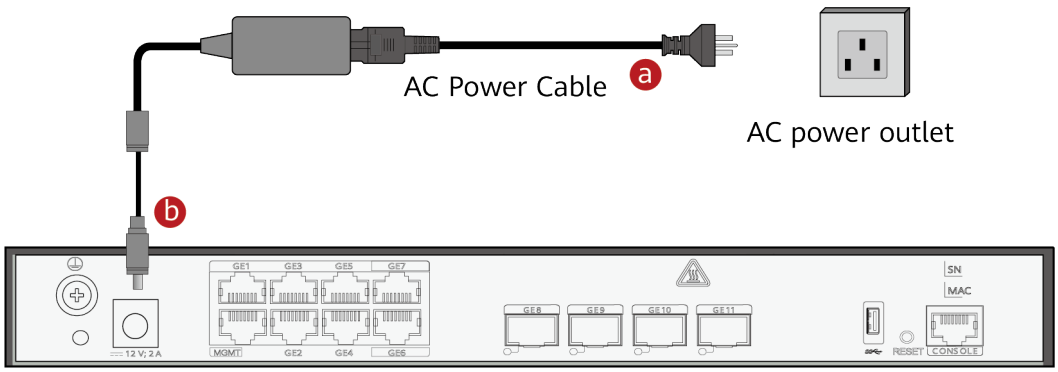
Step 2 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 3 Connect the power adapter.

NOTE

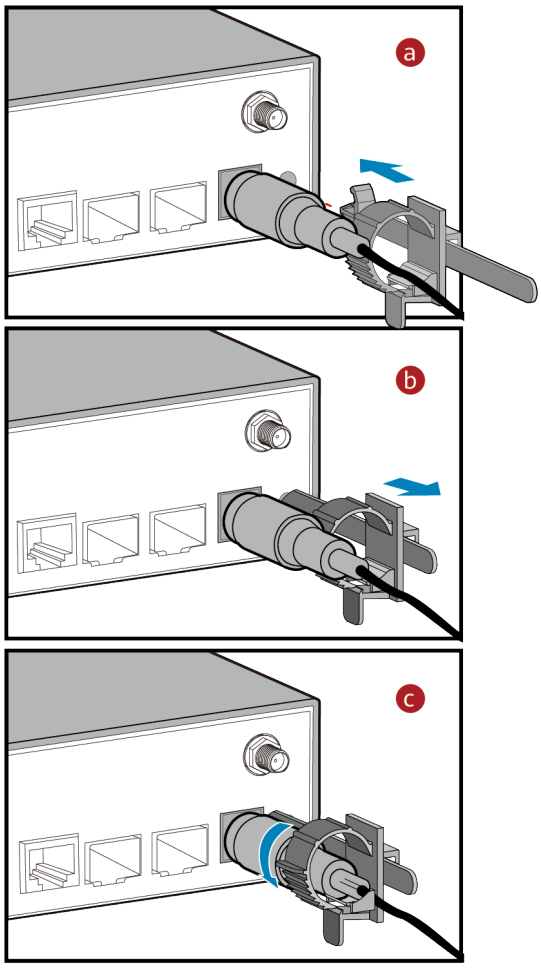
The router does not have a power switch, and its power supply is controlled by the power switch of the external power supply system.

1. Connect one end of the power adapter to the power socket on the router.
2. Connect the other end of the power adapter to an AC power cable, and connect the AC power cable to an AC power outlet.



Step 4 (Optional) Connect the AC terminal locking latch.

1. Insert the AC terminal locking latch into the jack on the rear panel of the router.
2. Adjust the AC terminal locking latch to a proper position.
3. Lock the AC power cable with the AC terminal locking latch.



----End

Follow-up Procedure

Perform the following operations after connecting the power adapter:

- Verify that the AC power cable is securely connected to the power socket on the router.
- If multiple routers are installed, attach labels to both ends of each power cable and write numbers on the labels to identify them.

5.13.5 Connecting the AC Power Cable

Context

This method applies to AR1600 series and AR6121K/AR6121/AR6121-S/AR6121C-S/AR6121E-S/AR6121EC-S/AR720/AR730 routers.

DANGER

To avoid electric shock, do not connect power cables while the power is on.

NOTE

- Do not power on the router before you finish connecting the power cables.
- Each router has its own power cables delivered as accessories. The power cables can only be used on the router in the same package and cannot be used on any other device.
- The AC power cable parameters vary in different countries or regions. The figures are for reference only and may differ from the cables delivered.

Tools and Accessories

- ESD wrist strap
- AC power cable
- AC terminal locking latch

Procedure

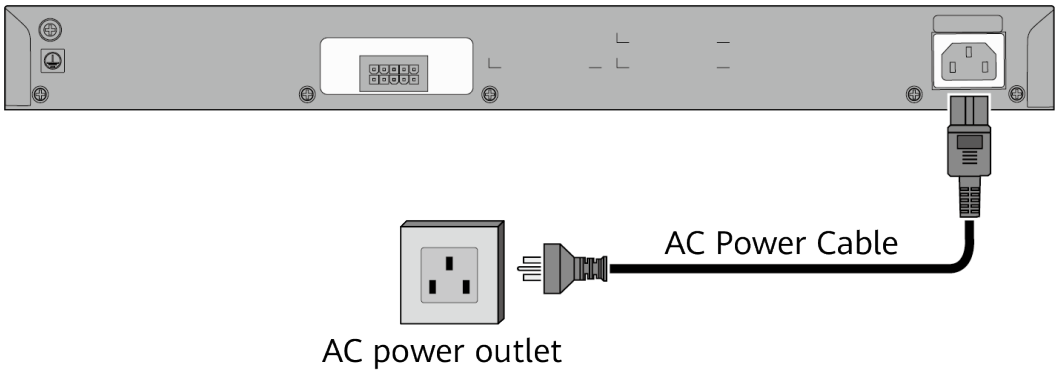
Step 1 Verify that the router is reliably grounded.

Step 2 Set the power switch to OFF.

Step 3 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 4 Connect the AC power cable.

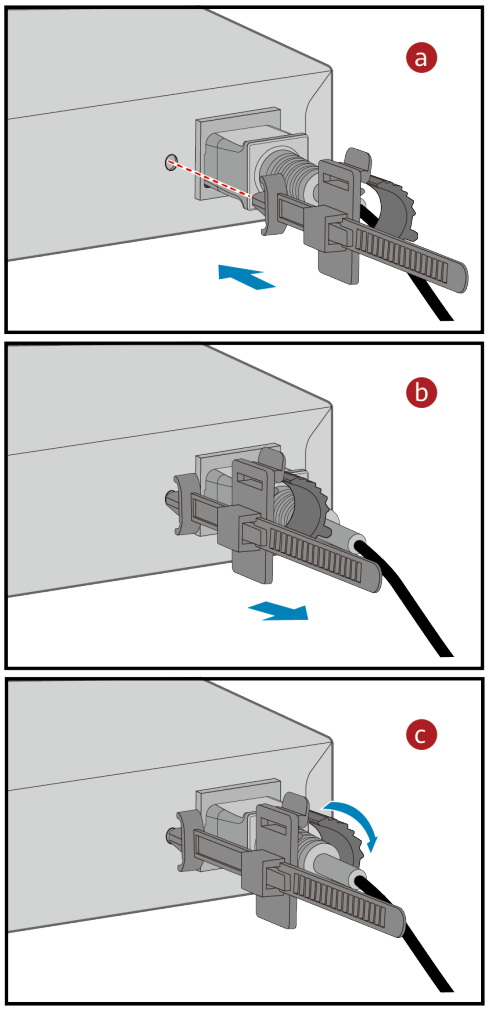
1. Connect one end of the AC power cable to the power socket on the router.
2. Connect the other end of the AC power cable to an AC power outlet.



Step 5 (Optional) Connect the AC terminal locking latch.

1. Insert the AC terminal locking latch into the jack on the rear panel of the router.

2. Adjust the AC terminal locking latch to a proper position.
3. Lock the AC power cable with the AC terminal locking latch.



----End

Follow-up Procedure

Perform the following operations after connecting the AC power cable:

- Verify that the AC power cable is securely connected to the power socket on the router.
- If multiple routers are installed, attach labels to both ends of each power cable and write numbers on the labels to identify them.

5.14 Powering On and Off the Router

Context

Before you power on the router, observe and ensure the following:

- The power cables and ground cables have been correctly connected.

- The input voltage is in the range of 90 V AC to 264 V AC.

Procedure

Step 1 Turn on the power switch of the external power supply system connected to the router.

Step 2 Turn on the power switch on the router or the power module to start the router.

Skip this procedure if the router has no power switch or pluggable power module.

Step 3 After the router starts, check indicators on the front panel. The following table describes the indicator states when the router is running normally.

Indicator	Description
SYS	Slow blinking green: The system is running properly.
PWR	Steady green: The system power supply is normal.

----End

Follow-up Procedure

To power off the router, perform the following steps:

NOTICE

Powering off the router will interrupt all the services on the router. Exercise caution when you perform this operation.

1. Turn off the power switch on the router or power module.
2. Turn off the power switch of the external power supply system.

6 Installing the AR6120/AR6120-VW/ AR6140-16G4XG/AR6140E-9G-2AC/ AR6140-9G-2AC/AR6140K-9G-2AC/AR6120-S/ AR6140-S/AR6140E-S/AR6140H-S Series Routers

6.1 Scenario 1: Installing a Router in a Cabinet

6.1.1 Using Mounting Brackets (AR6120/AR6120-VW/AR6120-S)

Context

NOTICE

- Leave at least 50 mm of clearance around the router for heat dissipation.
- Seen from the front panel of the router, the airflow of the router is left to right.
- If multiple routers are installed in a cabinet, it is recommended that at least 1 U of space (1 U = 44.45 mm) be kept between two routers. These routers must have the same airflow direction; otherwise, heat dissipation is affected by hot air circulation.

Make sure the following before the installation:

- The cabinet is well fixed.
- The router installation position in the cabinet is determined and arranged properly.
- The router to be installed is available and located near the cabinet for convenient movement.

Tools and Accessories

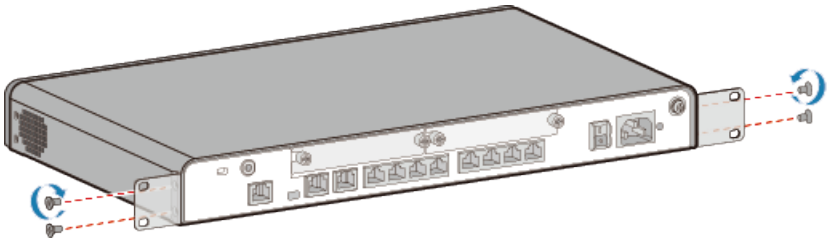
- Phillips screwdriver
- Flat-head screwdriver
- Floating nuts (four, separately purchased)
- Mounting brackets
- M4 screws (used to fix mounting brackets on both sides of the router. The number of mounting mounting brackets depends on the router model.)
- M6 screws (four, separately purchased)

Procedure

Step 1 Use a Phillips screwdriver to fix the mounting brackets to both sides of the router with M4 screws.

NOTE

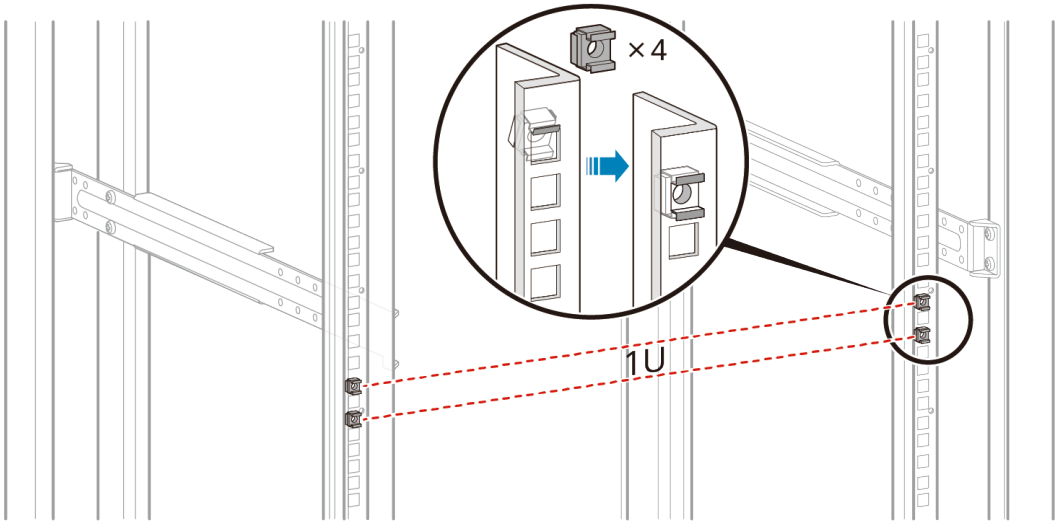
The mounting brackets can be installed on both sides close to the front panel or rear panel.



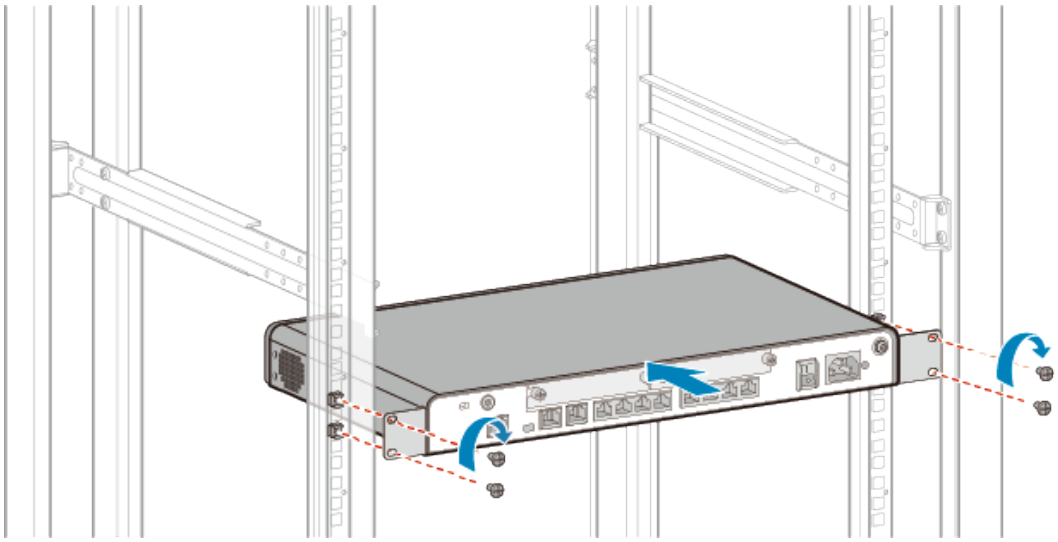
Step 2 Install two floating nuts on each front mounting rail. Leave a mounting hole between the two floating nuts on the same mounting rail.

NOTE

- The length of three adjacent mounting holes may not be 1 U. Observe the scale ticks on the mounting rails when installing floating nuts.
- You can use a flat-head screwdriver to install floating nuts.



Step 3 Move the router into the cabinet. Support the bottom of the router with one hand and tighten the M6 screws on the mounting brackets with the other hand. Tighten the lower screws first, and then the upper screws.



----End

6.1.2 Using Mounting Brackets and Mounting Bracket Guide Rails (AR6140-16G4XG/AR6140-9G-2AC/AR6140E-9G-2AC/ AR6140K-9G-2AC/AR6140-S/AR6140E-S/AR6140H-S)

Context

NOTICE

- Leave at least 50 mm of clearance around the router for heat dissipation.
- Seen from the front panel of the router, the airflow of the router is left to right.
- If multiple routers are installed in a cabinet, it is recommended that at least 1 U of space (1 U = 44.45 mm) be kept between two routers. These routers must have the same airflow direction; otherwise, heat dissipation is affected by hot air circulation.

Make sure the following before the installation:

- The cabinet is well fixed.
- The router installation position in the cabinet is determined and arranged properly.
- The router to be installed is available and located near the cabinet for convenient movement.

Tools and Accessories

- Phillips screwdriver
- Flat-head screwdriver
- Floating nuts (four, separately purchased)
- Mounting brackets
- Mounting bracket guide rails
- M4 screws (used to fix mounting brackets on both sides of the router. The number of mounting mounting brackets depends on the router model.)
- M6 screws (four, separately purchased)

Procedure

Step 1 Use a Phillips screwdriver to fix the mounting brackets to both sides of the router with M4 screws.

NOTE

The mounting brackets can be installed on both sides close to the front panel or rear panel.

Figure 6-1 Installing front mounting brackets

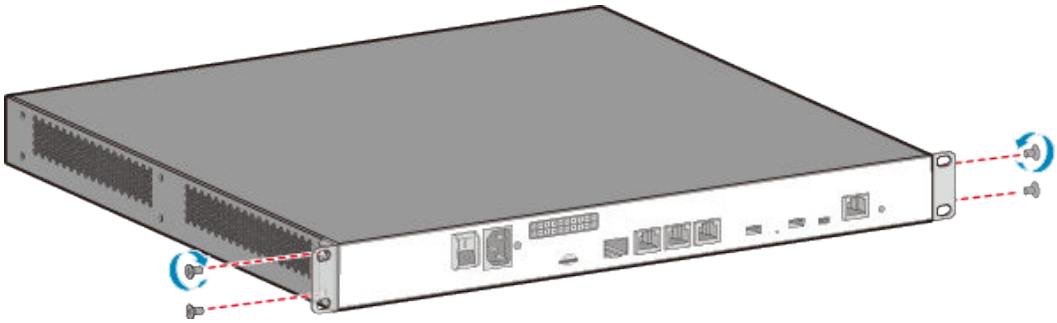
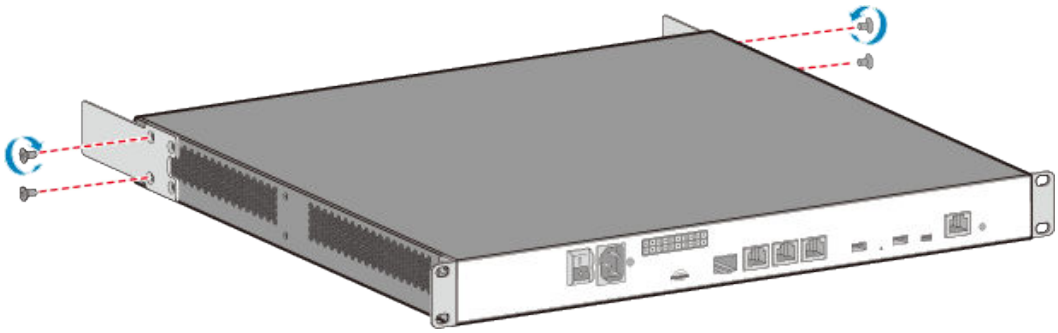


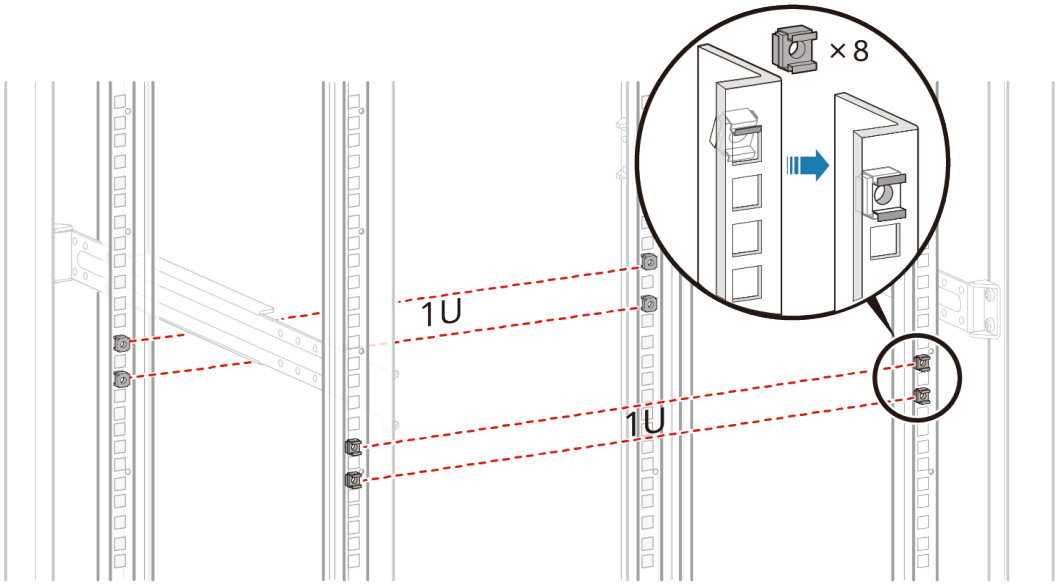
Figure 6-2 Install rear mounting brackets



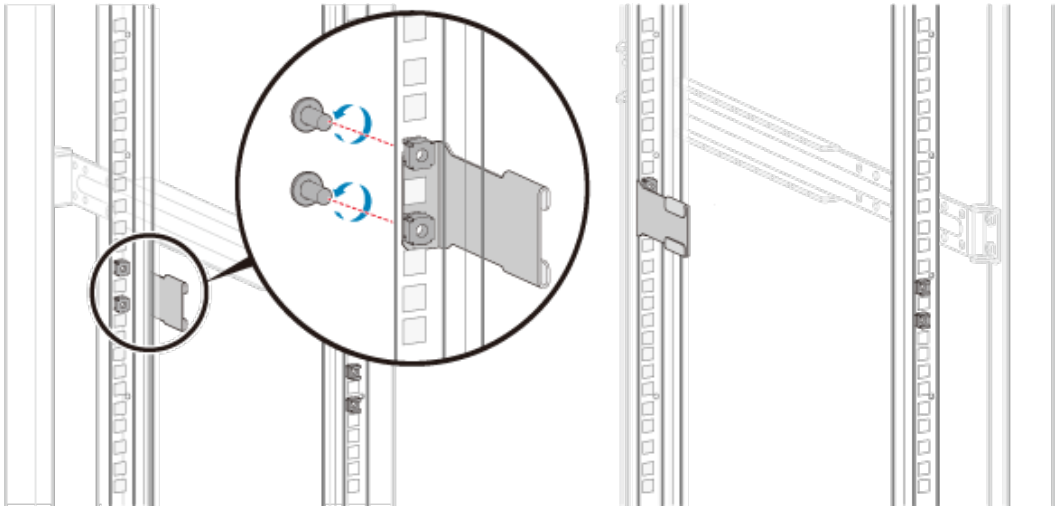
Step 2 Install two floating nuts on each of the front and rear mounting rails. Leave a mounting hole between the two floating nuts on the same mounting rail.

NOTE

- The length of three adjacent mounting holes may not be 1 U. Observe the scale ticks on the mounting rails when installing floating nuts.
- The floating nuts on the rear mounting rails must be aligned with the floating nuts on the front mounting rails.
- You can use a flat-head screwdriver to install floating nuts.

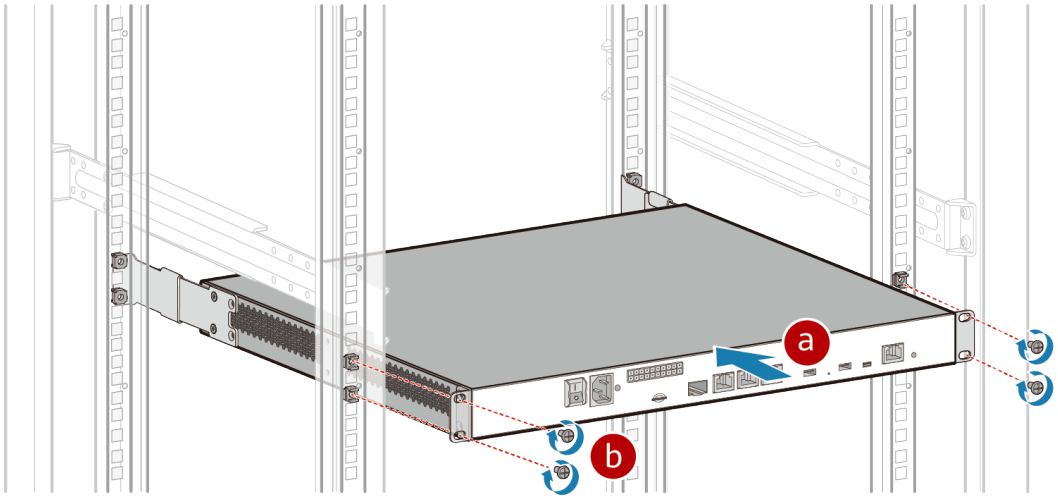


Step 3 Fix the mounting bracket guide rails on the rear mounting rails.



Step 4 Install the router into the cabinet.

1. Move the router into the cabinet, align the rear mounting brackets with the guide rails, and gently push the router into the cabinet until the front mounting brackets are completely attached to the front mounting rails.
2. Use M6 screws to fix the front mounting brackets on the cabinet.



----End

6.2 Scenario 2: Installing a Router on a Desk (AR6120/ AR6120-VW/AR6120-S)

Context

NOTICE

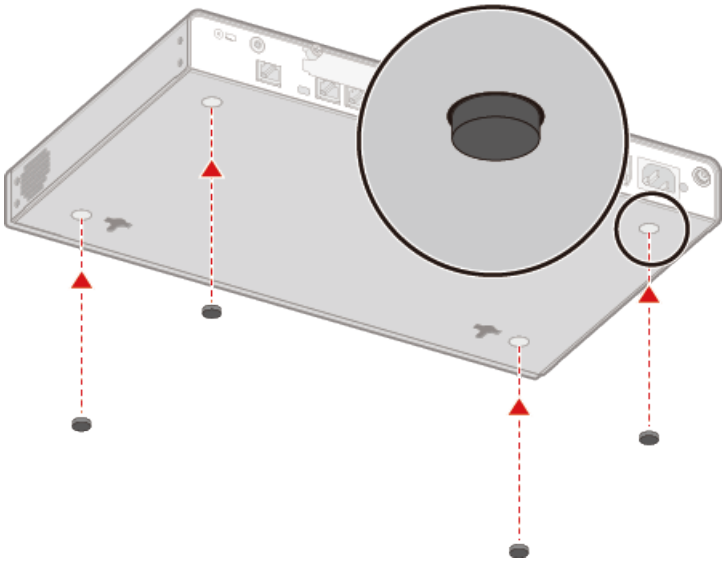
- Ensure that the desk is flat and properly grounded.
- Leave at least 50 mm of clearance around the router for heat dissipation.
- Do not place other objects on the router.

Tools and Accessories

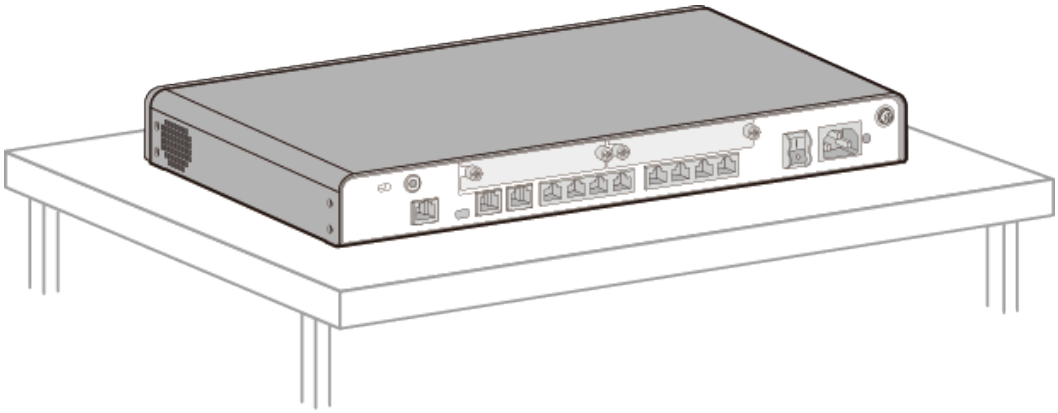
- Rubber pads (four)

Procedure

Step 1 Attach four rubber pads in the imprinted round areas marked plus (+) signs at the bottom of the router.



Step 2 Gently place the router on the desk.



----End

6.3 Scenario 3: Mounting a Router on a Wall (AR6120/ AR6120-VW/AR6120-S)

Context

DANGER

Before drilling holes on a wall, make sure that no power cable is routed in the wall. Otherwise, power cables in the wall may cause personal injury.

NOTICE

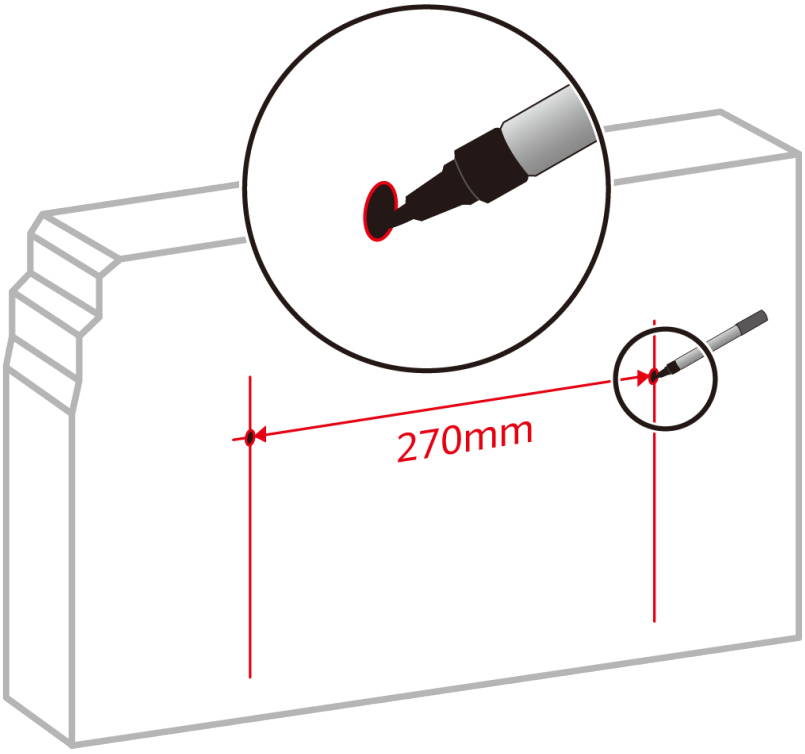
- The interface side of a wall-mounted router must face down to protect interfaces from water.
- Screws must be installed solid in the wall; otherwise, the wall-mounted router may fall down after cables are connected.
- Ensure that there are no flammable or explosive materials near the router and no obstructions within 100 mm around the router.
- Install the router at an appropriate height to ensure that the indicators can be observed easily.

Tools and Accessories

- Measuring tape
- Marker
- Hammer drill
- Claw hammer
- Phillips screwdriver
- Wall anchors and mounting screws (separately purchased)

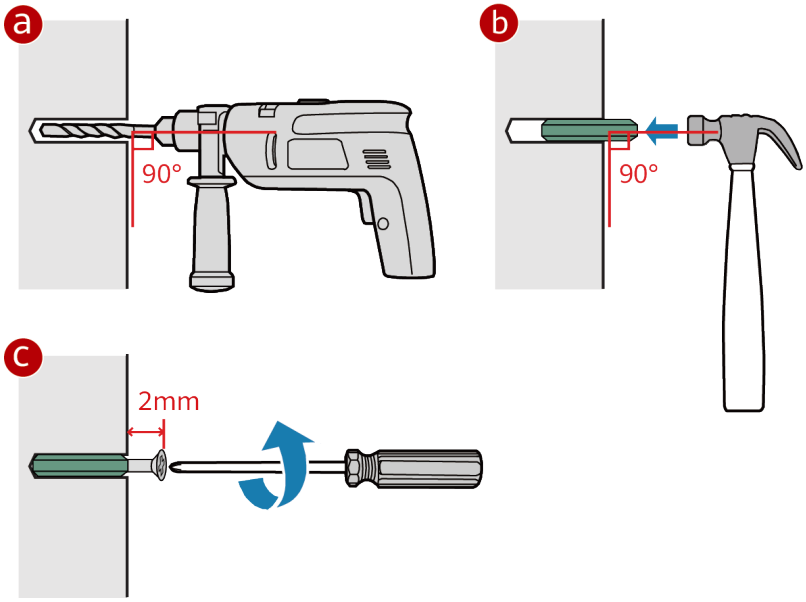
Procedure

Step 1 Use a measuring tape to determine positions of two mounting holes, keep the two positions aligned, and mark the positions with a marker.

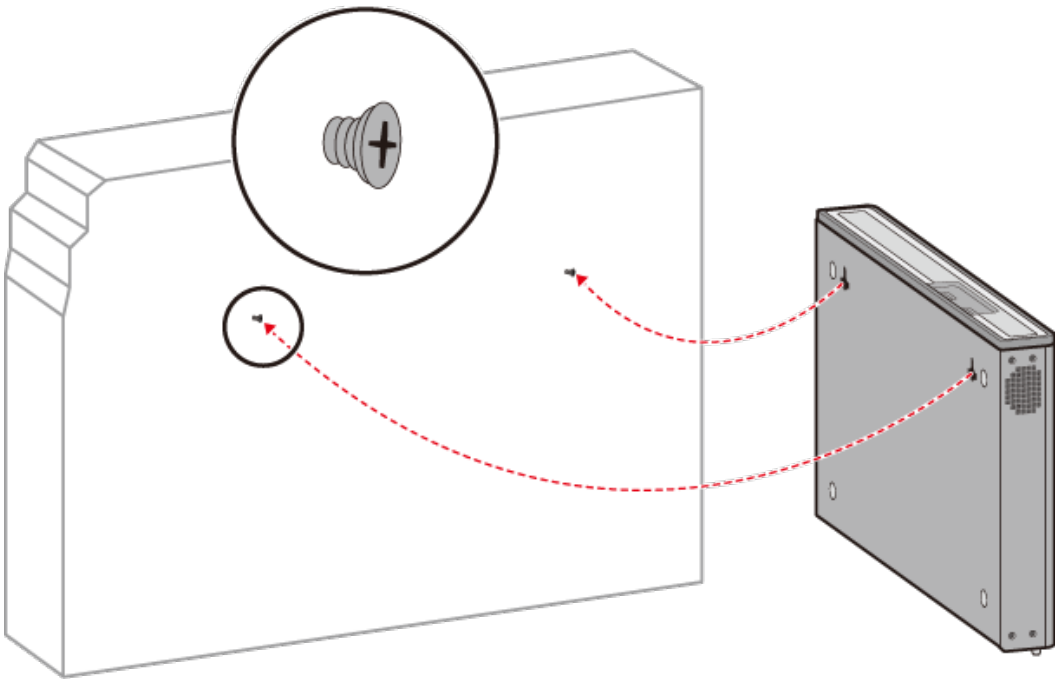


Step 2 Drill holes and install mounting screws.

1. Choose an appropriate drill bit according to the diameter of the mounting screws. The diameter of the mounting screws cannot exceed 4 mm.
2. Hammer the hollow wall anchors into the mounting holes.
3. Use a Phillips screwdriver to screw the mounting screws into the wall anchors. Leave the screws protruding 2 mm from the wall.



Step 3 Align the mounting holes on the rear of the router with mounting screws and hang the router on the mounting screws.



----End

6.4 Installing Cards

Context

NOTE

- All cards are hot swappable.
- Vacant slots in the router must be covered with filler panels.
- When installing a card, slowly push it into the slot. If you feel resistance or find the card inclined, pull the card out and push it into the slot again. Do not push the card with force; otherwise, the connectors on the card and backplane may be damaged.
- A card can only be installed in a router that supports this card. For the specific cards supported by different routers, see **Cards** in the *Hardware Description*.
- During installation of ADSL cards, if outdoor overhead routing is involved, configure a protective unit on the distribution frame and properly ground the protective unit.

Tools and Accessories

- ESD wrist strap
- Phillips screwdriver

Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Loosen the captive screw on the filler panel and remove the filler panel.

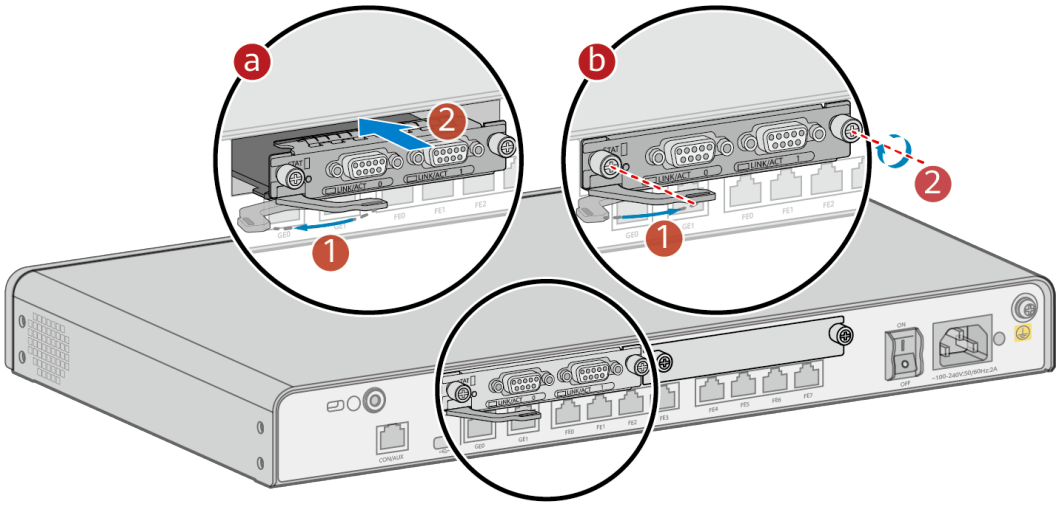
Step 3 Perform the following steps depending on whether slots are combined:

- When no slots are combined:

  NOTE

  The methods for installing SIC and WSIC cards into SIC and WSIC slots are the same. The following procedures install a SIC card into a SIC slot.

  a. Rotate the ejector levers outward and slide the card into the slot horizontally along the guide rails until the card panel is closely attached to the router panel.
  b. Rotate the ejector levers inward until the card is completely seated in the slot, and then tighten the captive screws on both sides of the card.

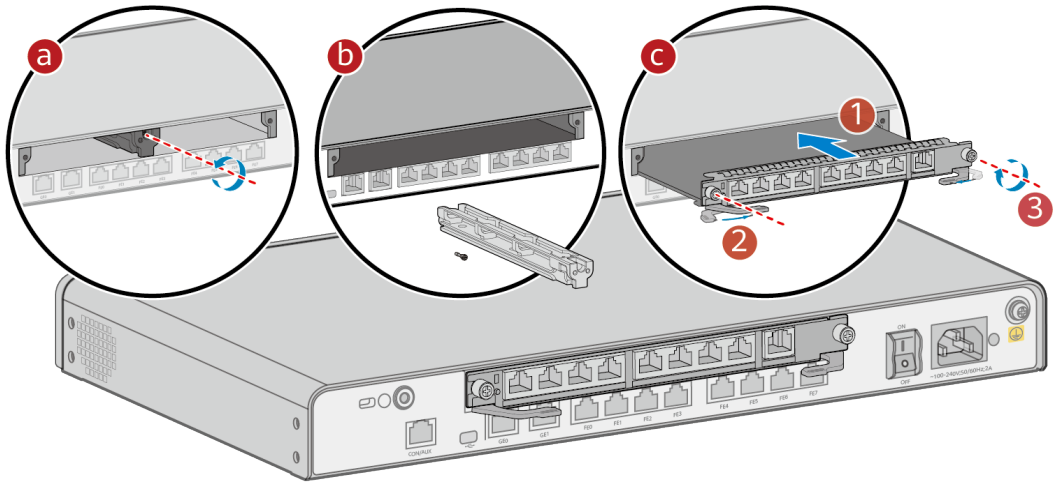


- When slots are combined:

  NOTE

  Slots of a router can be combined into a larger slot. For example, two SIC slots can be combined into a WSIC slot, and two SIC slots and the WSIC slot below them can be combined into an XSIC slot. In this example, two SIC slots are combined into a WSIC slot.

  a. Loosen the captive screw on the guide rail between the two SIC slots.
  b. Remove the guide rail to combine the two SIC slots into a WSIC slot.
  c. Slide the WSIC card into the WSIC slot horizontally along the guide rails until the card is completely seated in the slot. Rotate the ejector levers inward to lock the card in the slot, and then tighten the captive screws on both sides.



----End

6.5 (Optional) Installing the SIM Card on a SIC Card

Context

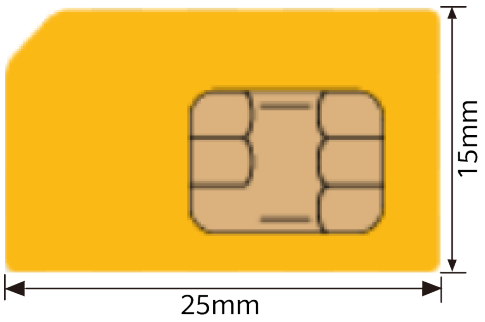
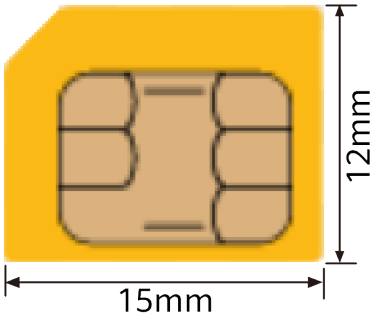
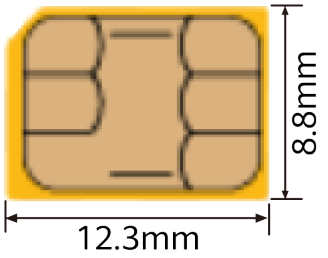
This method applies to SIC cards with 3G/LTE/5G functions. The methods for installing the SIM card on a SIC card are the same. A 3G-HSPA+7 card is used as an example.

NOTICE

- The standard SIM card is supported. It is not recommended to use the card cover to prevent poor SIM card contact.
- Hot-swap SIM card is not supported. After replugging the SIM card, you need to restart the RF module or restart the device.
- Ensure that the SIM card slot is locked after the SIM card is removed or installed.

The following table describes the dimensions of a SIM card.

Table 6-1 Dimensions of a SIM Card

Model	Dimensions
Standard SIM card	
Micro SIM card	
Nano SIM card	

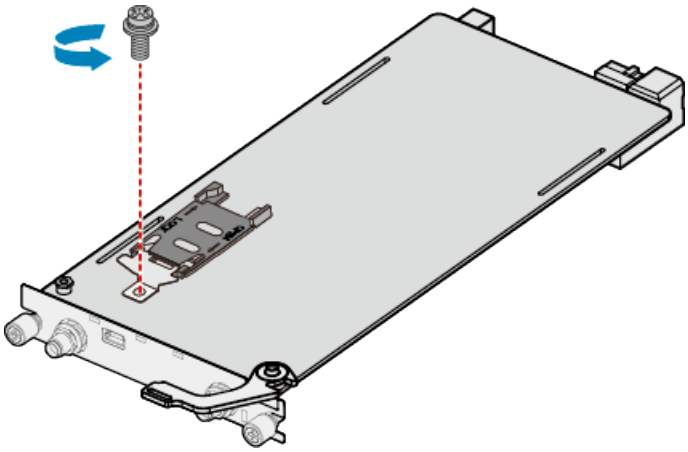
Tools

- Phillips screwdriver
- ESD wrist strap
- SIM card (self-provided)

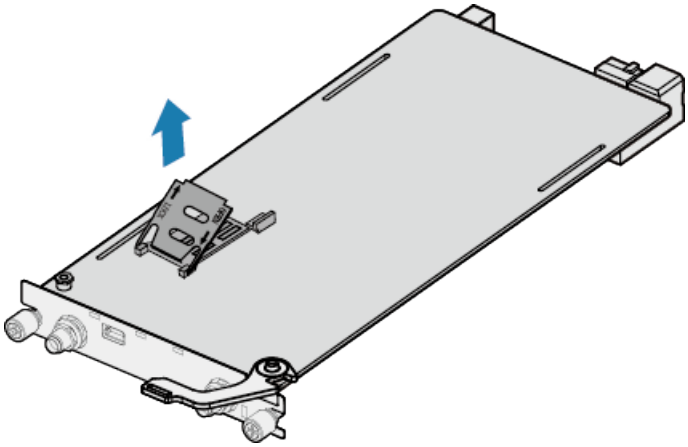
Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Loosen the screw on the SIM card holder.



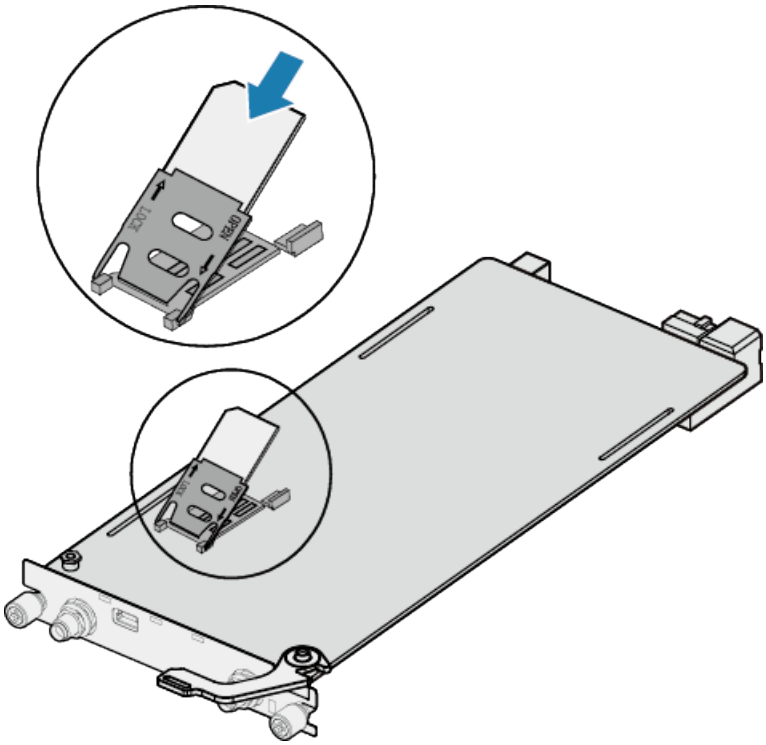
Step 3 Slide the SIM card holder horizontally towards the direction specified by the OPEN arrow and open the SIM card holder.



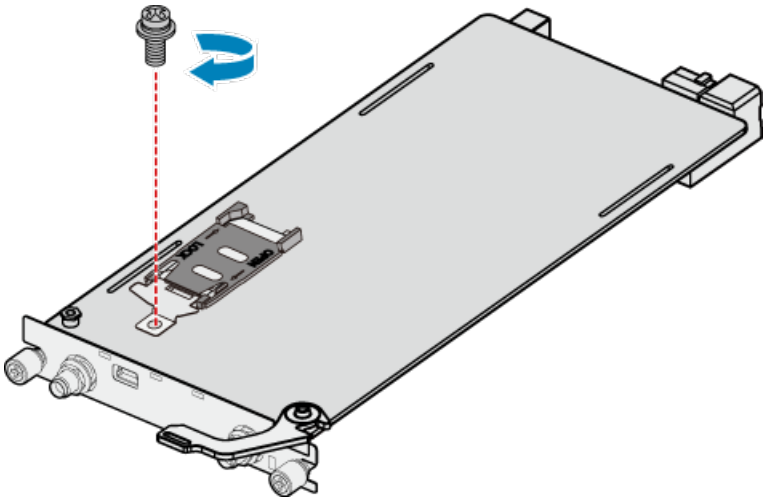
Step 4 Insert a SIM card into the SIM card holder.

NOTE

When inserting a SIM card, keep the notch on the SIM card in the same direction as the notch marked on the slot.



Step 5 Slide the SIM card holder towards the direction specified by the LOCK arrow, close the SIM card holder, and tighten the screw.



----End

6.6 (Optional) Connecting a RU-5G Remote Unit to an AR Router

Context

An AR router connects to an RU-5G remote unit to connect to a 5G/4G/3G Ethernet to implement high-speed data transmission.

Tools and Accessories

- Ethernet cable (self-provided)

  NOTE

  - Before connecting Ethernet cables, use the Ethernet cable detection tool to check whether the Ethernet cables are normal to ensure that the device works properly.
  - The Ethernet cable is of category 5 or higher type. The length of the Ethernet cable cannot exceed 50 m. The cross-sectional area of an Ethernet cable ranges from 4.9 mm to 7.1 mm.

- RU-5G Remote unit (self-provided)

  NOTE

  For details, see **Appendix G RU-5G Installation**.

- PoE adapter (self-provided)

  NOTE

  When the two GE/PoE_IN interfaces on an RU-5G remote unit use PoE adapters, the Huawei PoE adapters (part number: 02220369) must be used.

  If the GE/PoE_IN interface uses a PoE adapter, place the PoE adapter indoors.

Procedure

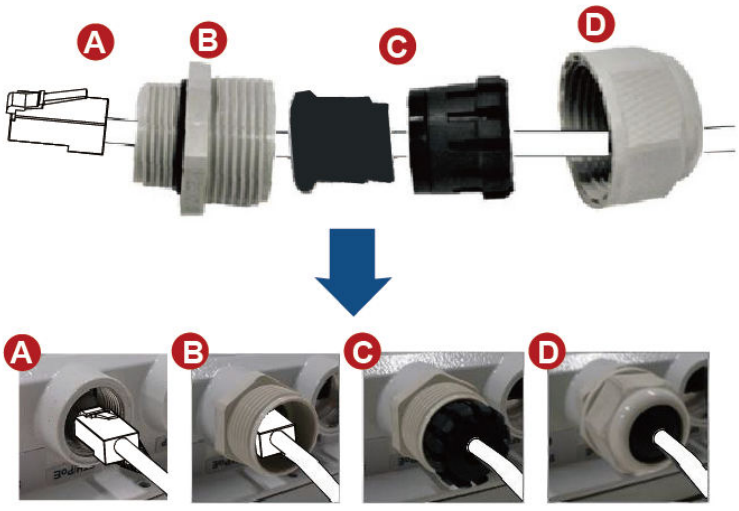
Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Route the Ethernet cable through the waterproof PG connector, as shown in the following figure. Insert the RJ45 connector (without sheath) of the Ethernet cable into the GE/PoE_IN (GE0/PoE_IN or GE1/PoE_IN) interface on the device, and then tighten the waterproof PG connectors in sequence B, C, and D.

NOTE

Tighten components of PG connectors B to the device with a torque of 2.5 N·m, and components D to B to a torque of 1.8 N·m. The waterproof PG connector is used for round Ethernet cables. Flat Ethernet cables cannot be used.

Ensure that the RJ45 connector is correctly connected to the device. Otherwise, the Ethernet cable may be damaged. Before removing the Ethernet cable from the device, remove the waterproof PG connector first and then remove the RJ45 connector.



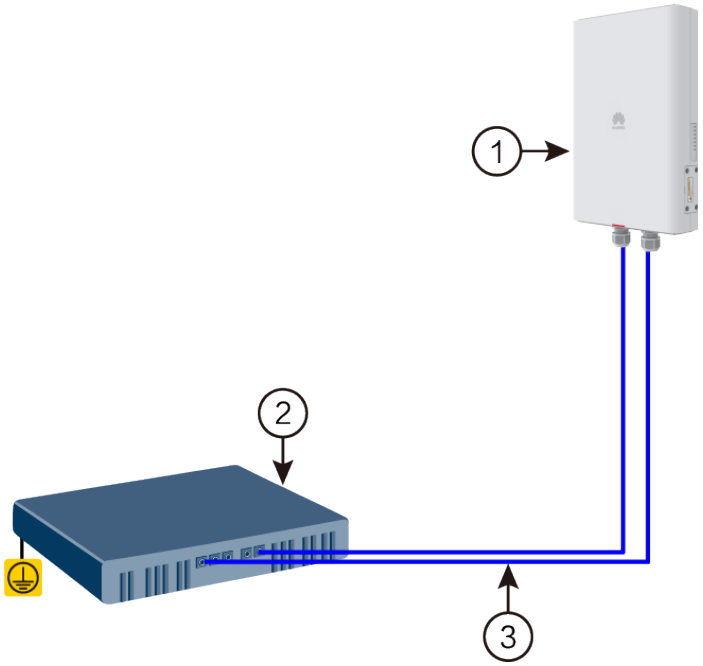
Step 3 Connect the other end of the Ethernet cable according to the networking mode.

Option	Description
Figure 6-3	In this scenario, all networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Connect the other end of the Ethernet cable to the PoE port on the AR router.
Figure 6-4	In this scenario, the RU-5G is installed outdoors and other networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Install an SPD on the other end of one network cable and connect the cable to the Ethernet interface on the AR router. 3. Install an SPD on the other end of the other network cable and connect it to the PoE port on the PoE adapter. 4. Use a network cables to connect the Ethernet interface on the AR router and the DATA port on the PoE adapter.

NOTE

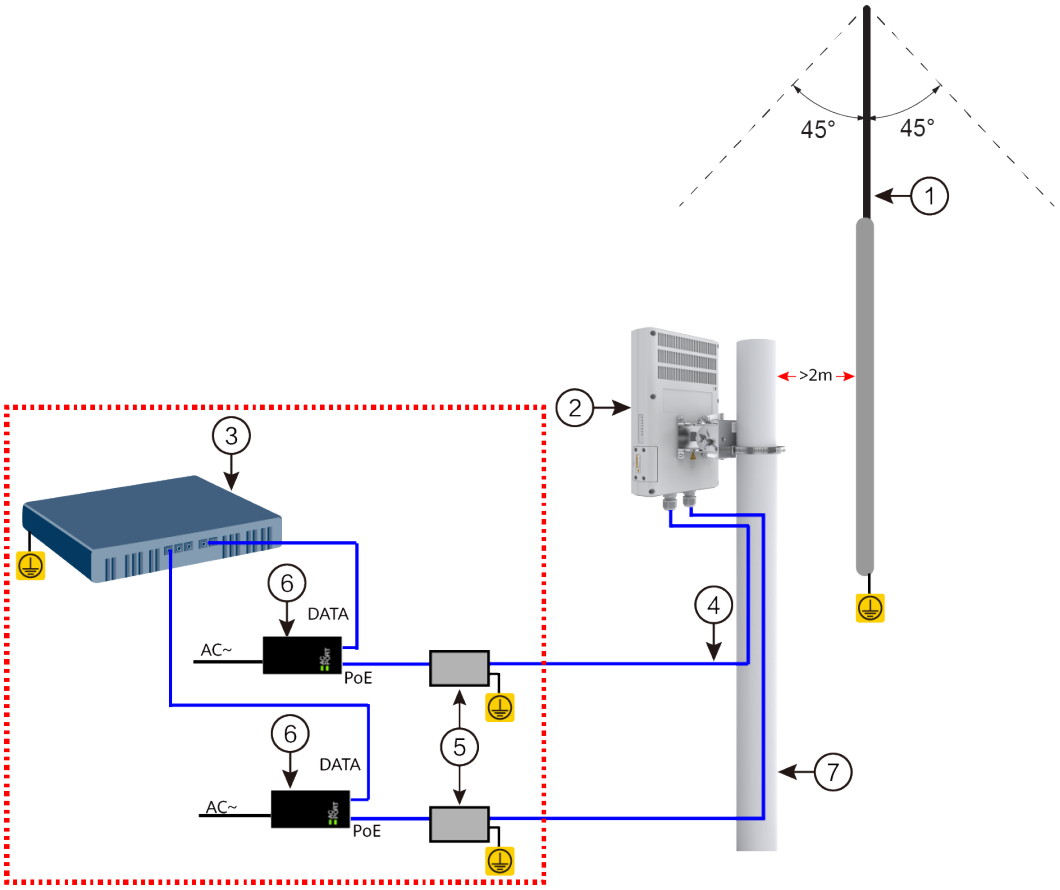
- When the AR router, PoE adapter, and RU-5G remote unit are installed indoors, no SPD is required for the AR router Ethernet interface, AR router power input interface, PoE adapter output interface, and PoE adapter power input interface.
- When the AR router and PoE adapter are installed indoors and the RU-5G remote unit is installed outdoors, an SPD must be installed on the AR router network interface and output interface on the PoE adapter. Huawei SPD (part number: 19020303) or an SPD with the same specifications is recommended for the output of the AR router Ethernet ports and PoE adapters.

Figure 6-3 Co-deployment Networking 1 (RU-5G PoE Power Supply Using an AR Router)



1. RU-5G remote unit	2. AR router (PoE supported)	3. Ethernet cable	-

Figure 6-4 Co-deployment Networking Mode 2 (RU-5G Powered by PoE adapters)



NOTE

The devices in the red box are installed indoors.

1. Lightning rod	2. RU-5G remote unit	3. AR router (PoE not supported)	4. Ethernet cable
5. SPD	6. PoE adapter	7. Pole	-

----End

6.7 (Optional) Installing Antennas

Context

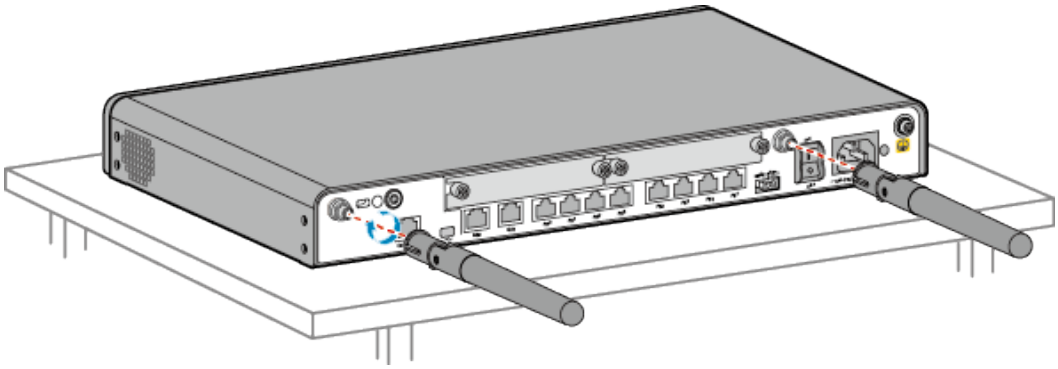
Only the AR6120-VW supports antennas.

Tools and Accessories

- Wi-Fi antenna

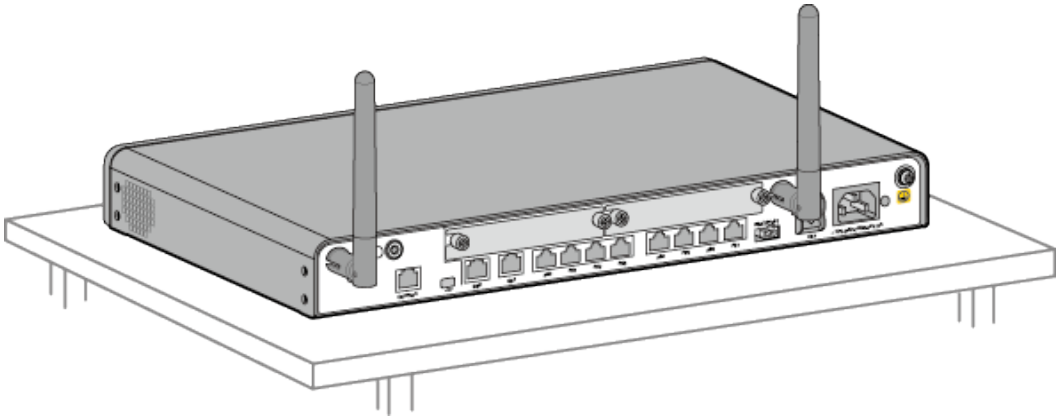
Procedure

Step 1 Connect the Wi-Fi antennas to the SMA connectors on the rear panel of the router.

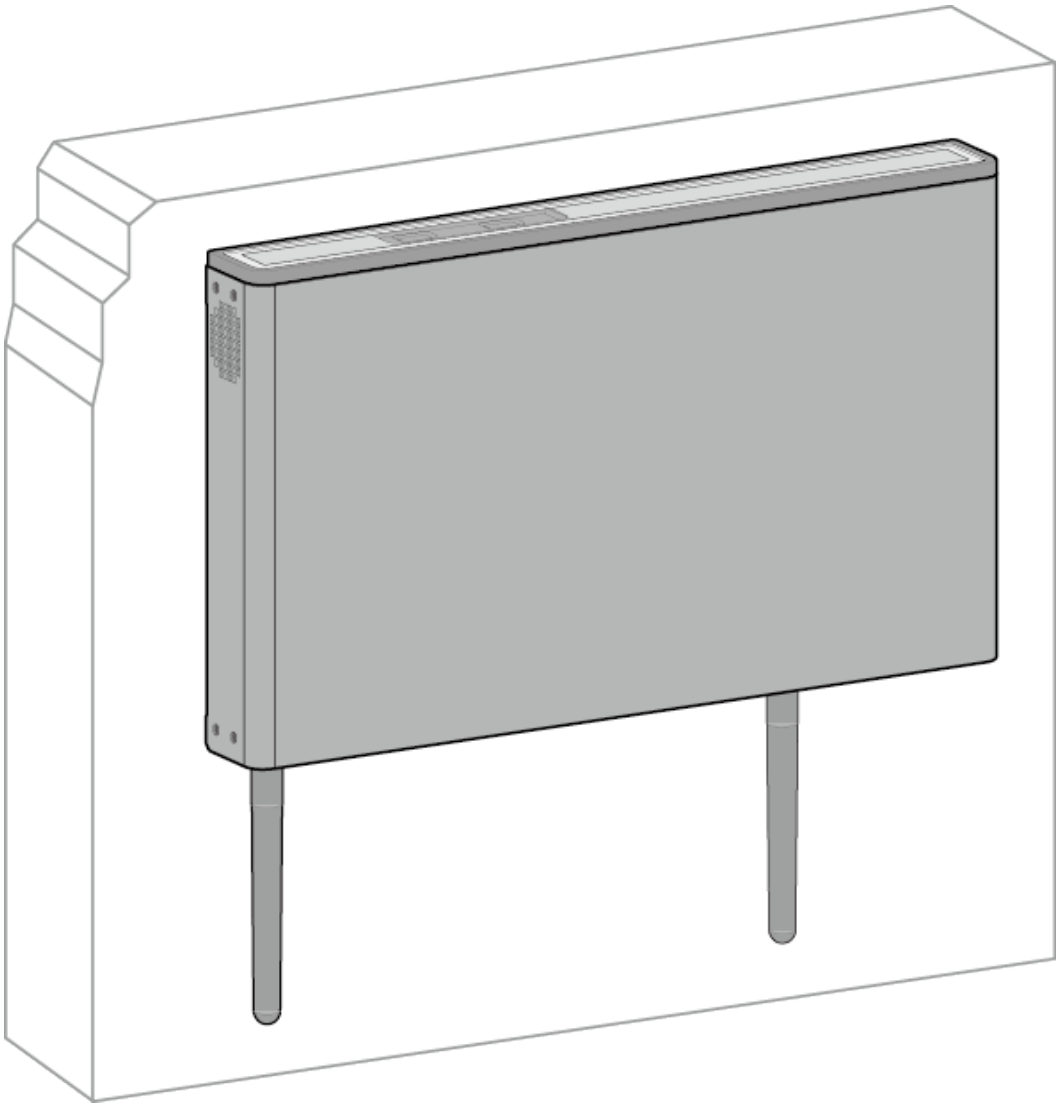


Step 2 Adjust positions of the antennas to obtain the optimal wireless transmission and receiving performance.

- If the router is placed on a desk, make the Wi-Fi antennas vertical to the desk.



- If the router is mounted on a wall, make the Wi-Fi antennas parallel with the wall.



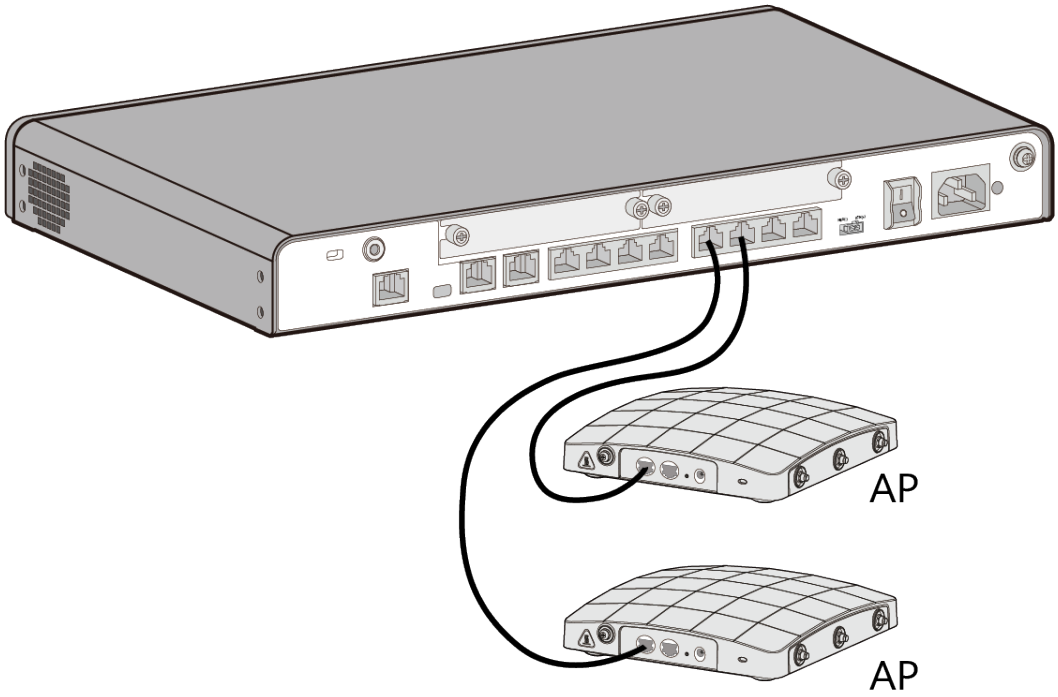
----End

6.8 (Optional) Installing a PoE Power Supply

Context

If the AR6120-VW needs to supply power to powered devices (PDs) such as IP phones, WLAN APs, and IP cameras, as shown in **Figure 6-5**, connect a PoE power supply to the router.

Figure 6-5 PoE power supply



NOTE

LAN interfaces GE0-P to GE7-P of the AR6120-VW support PoE power supply.

Tools and Accessories

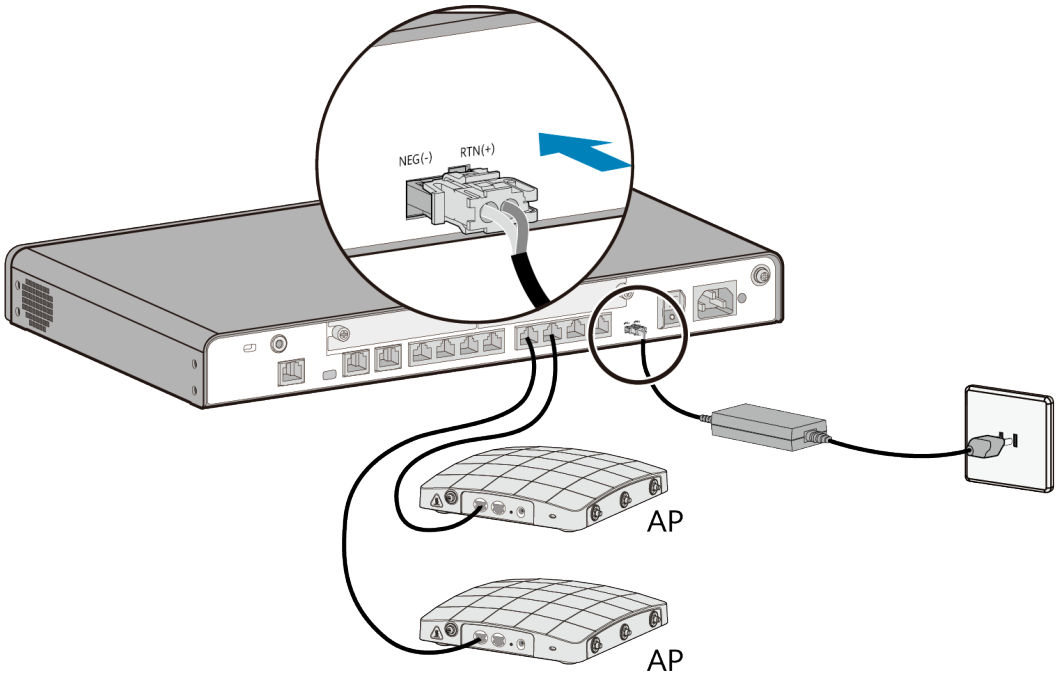
- PoE power supply

NOTE

The PoE power supply is not included in the installation accessory package and needs to be purchased separately.

Procedure

Step 1 Connect one end of the PoE power supply to the PoE power jack of the router and the other end to an AC power outlet.



----End

6.9 (Optional) Installing a Cable Management Strip and a Protective Unit

Context

If unshielded network cables are used as E&M trunk cables and need to be lead outdoors, install a cable management strip on the cabinet and install protective units on the cable management strip.

Tools and Accessories

- Impact tool
- Diagonal pliers
- Phillips screwdriver
- Cable management strip holder
- Cable management strip
- Protective units
- M6 screws

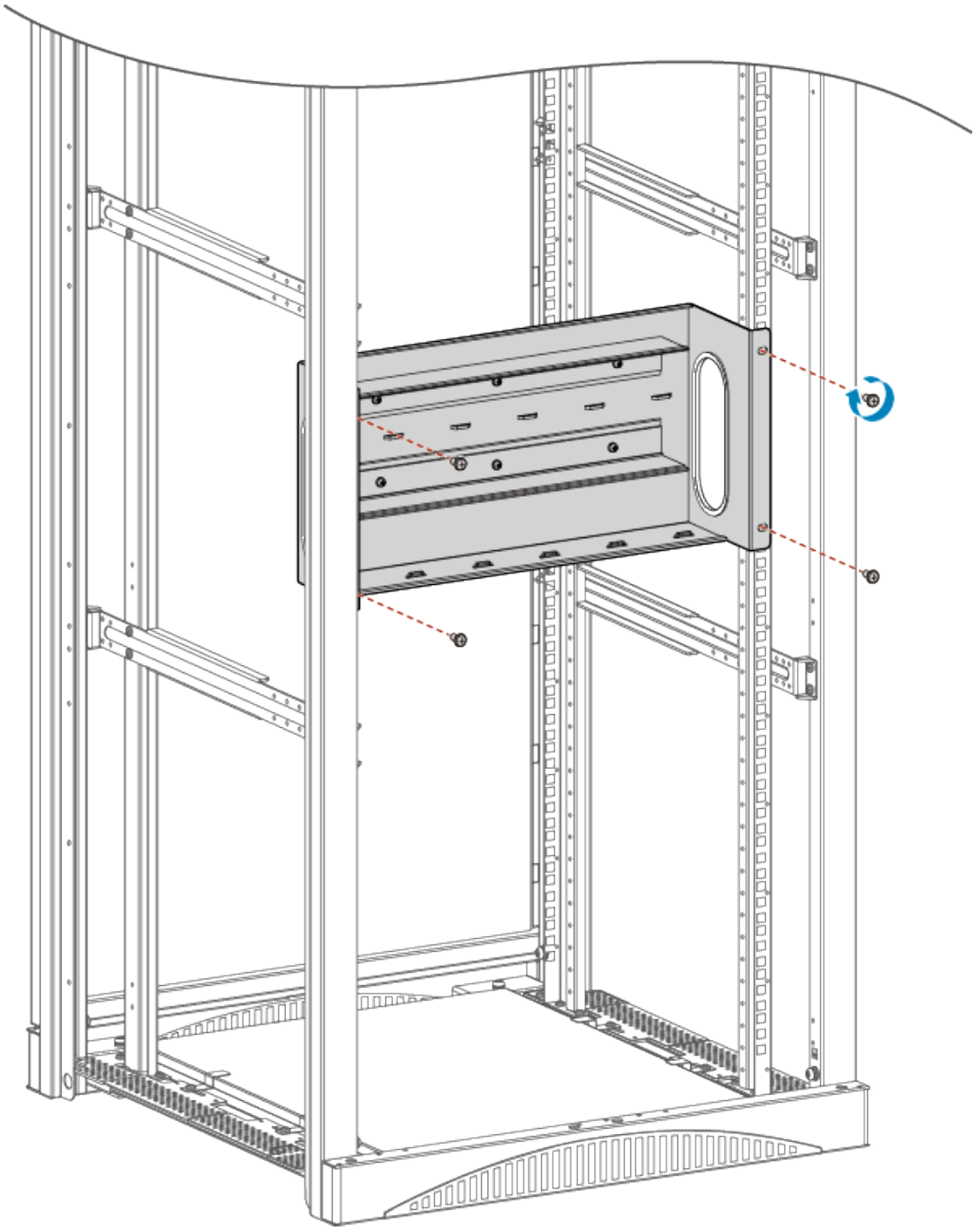
NOTE

The cable management strip holder, cable management strip, protective units, and M6 screws are not included in the installation accessory package delivered with a card and need to be purchased separately.

Procedure

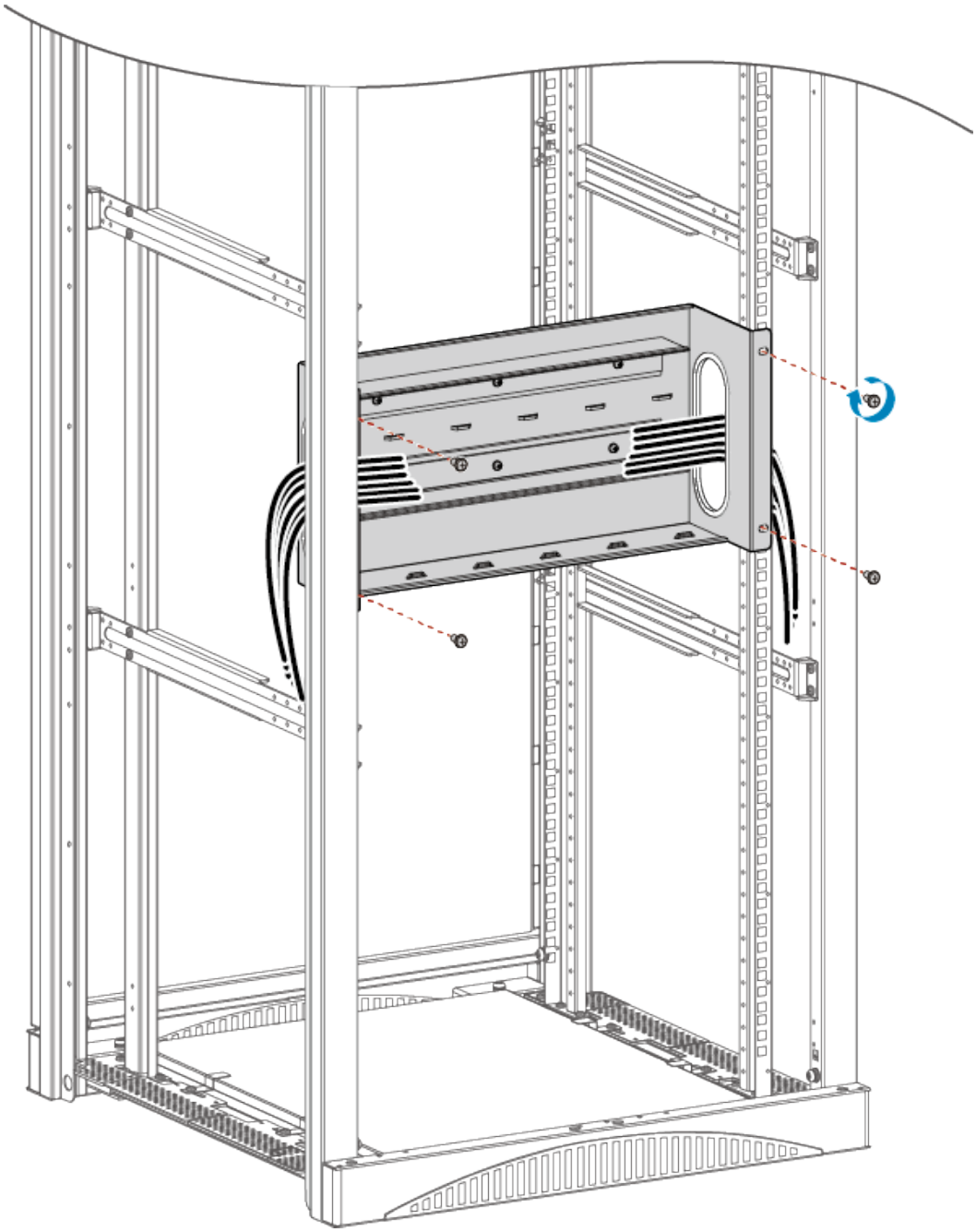
Step 1 Use a Phillips screwdriver and M6 screws to fix the cable management strip holder onto mounting rails of the cabinet, as shown in **Figure 6-6**.

Figure 6-6 Installing the cable management strip holder onto the cabinet



Step 2 Put the unshielded network cable connected to the local device through the cable inlet at one side of the cable management strip holder, and put the unshielded network cable connected to the remote device through the cable inlet at the other side of the cable management strip holder. See **Figure 6-7**.

Figure 6-7 Connecting unshielded network cables



Step 3 Connect the unshielded network cables to a cable management strip.

NOTE

The following describes connection of one unshielded network cable. Connect all the unshielded network cables in the same way.

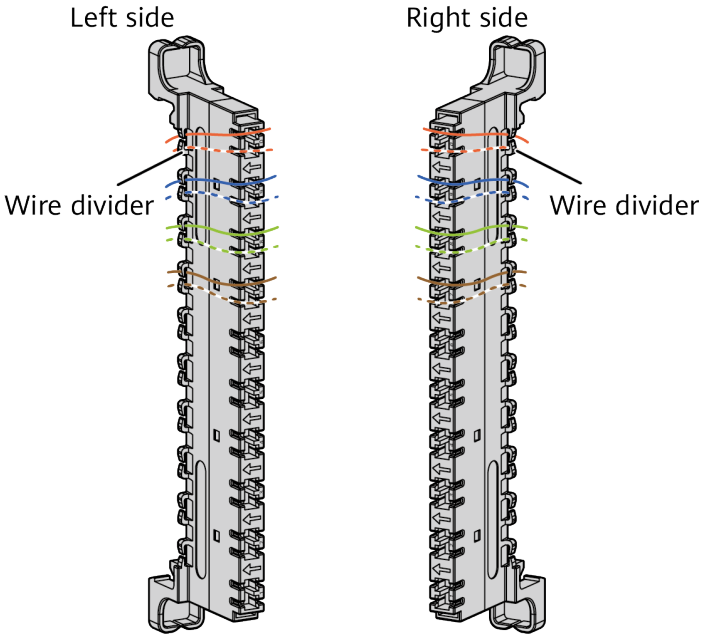
1. Use a pair of diagonal pliers to strip off about 15 cm of insulation coating of the unshielded network cable.
2. Divide the four twisted pairs of the cable into eight wires and arrange them orderly.
3. At the local device side, put each two wires through a pair of wire dividers at the left side of the cable management strip and lead the wires into the wire

slots at the left side. At the remote device side, put each two wires through a pair of wire dividers at the right side of the cable management strip and lead the wires into the wire slots at the right side. See **Figure 6-8**

NOTICE

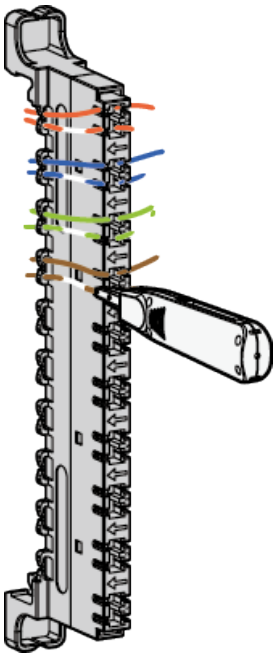
The two wires in the same wire slot on the cable management strip must be the same color.

Figure 6-8 Connecting an unshielded network cable to a cable management strip



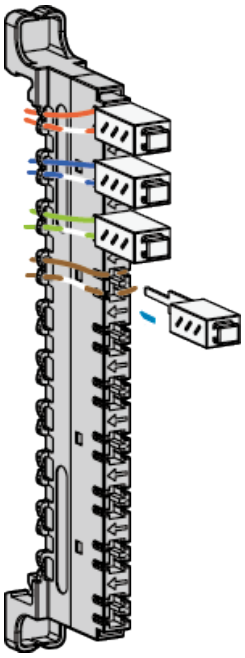
4. Use an impact tool to push the wires into the wire slots. Press a wire with the impact tool until you hear a click, as shown in **Figure 6-9**.

Figure 6-9 Push wires using an impact tool



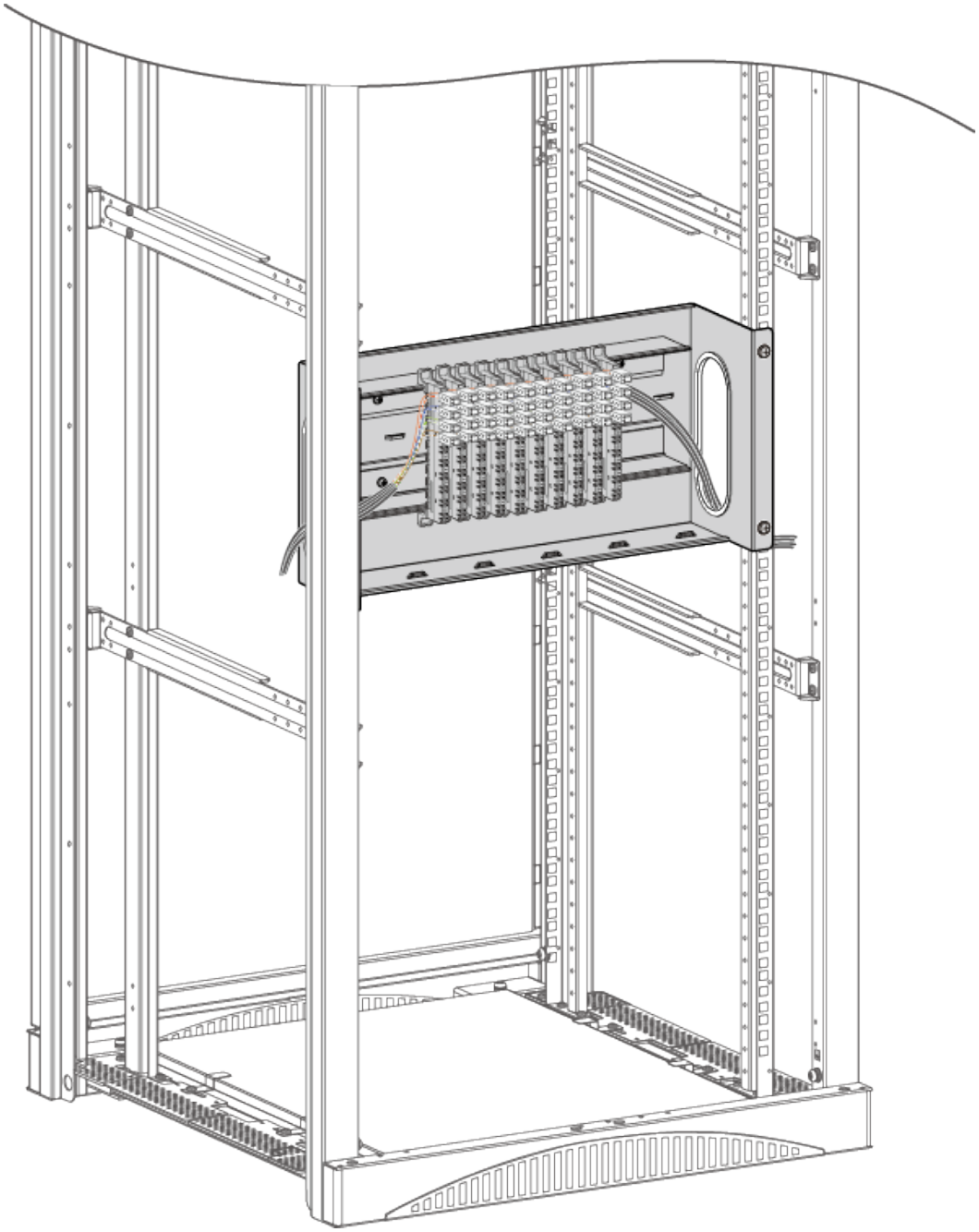
5. Install a protective unit on each wire slot with wires connected. Keep a protective unit vertical with a wire slot (with the diode of the protective unit facing the arrowhead on the wire slot), and insert the protective unit until it is completely in the wire slot, as shown in **Figure 6-10**.

Figure 6-10 Installing protective units



6. Install the cable management strip onto the cable management strip holder, making the end with a shorter hook face up and the end with longer hook face down, as shown in **Figure 6-11**. Gently shake the cable management strip. If the cable management strip is still fixed on the holder, it is installed properly.

Figure 6-11 Installing the cable management strip on the cable management strip holder



----End

6.10 Connecting the Router

6.10.1 Connecting the Ground Cable

Context

NOTICE

- The ground cable of a router must be correctly connected to protect the router against lightning and interference.
- Do not power on the router before you finish connecting cables.

Tools and Accessories

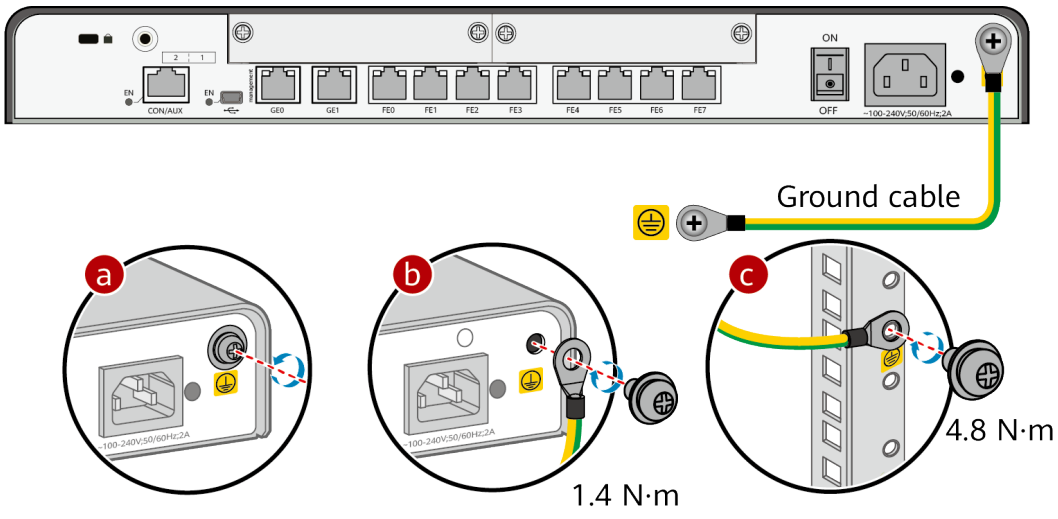
- Phillips screwdriver
- Multimeter
- ESD wrist strap
- Ground cable
- M6 screws (separately purchased)

Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Connect the ground cable.

1. Use a Phillips screwdriver to remove the M4 screw from the ground point on the rear panel of the router. Keep the M4 screw in an appropriate place for later use.
2. Align the M4 lug of the ground cable with the tapped hole on the ground point, and then secure the ground cable with the M4 screw, Tighten the M4 screw with a torque of 1.4 N·m.
3. Connect the M6 lug of the ground cable to a ground point on the cabinet, Tighten the M6 screw with a torque of 4.8 N·m.



----End

Follow-up Procedure

Perform the following operations after connecting the ground cable:

- Check that the ground cable is securely connected to the ground points.
- Use a multimeter to measure the resistance between the ground points at two ends of the ground cable. The resistance must be smaller than 5 ohm.

6.10.2 Connecting the Console Cable

Context

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connection may damage interface modules or the router.

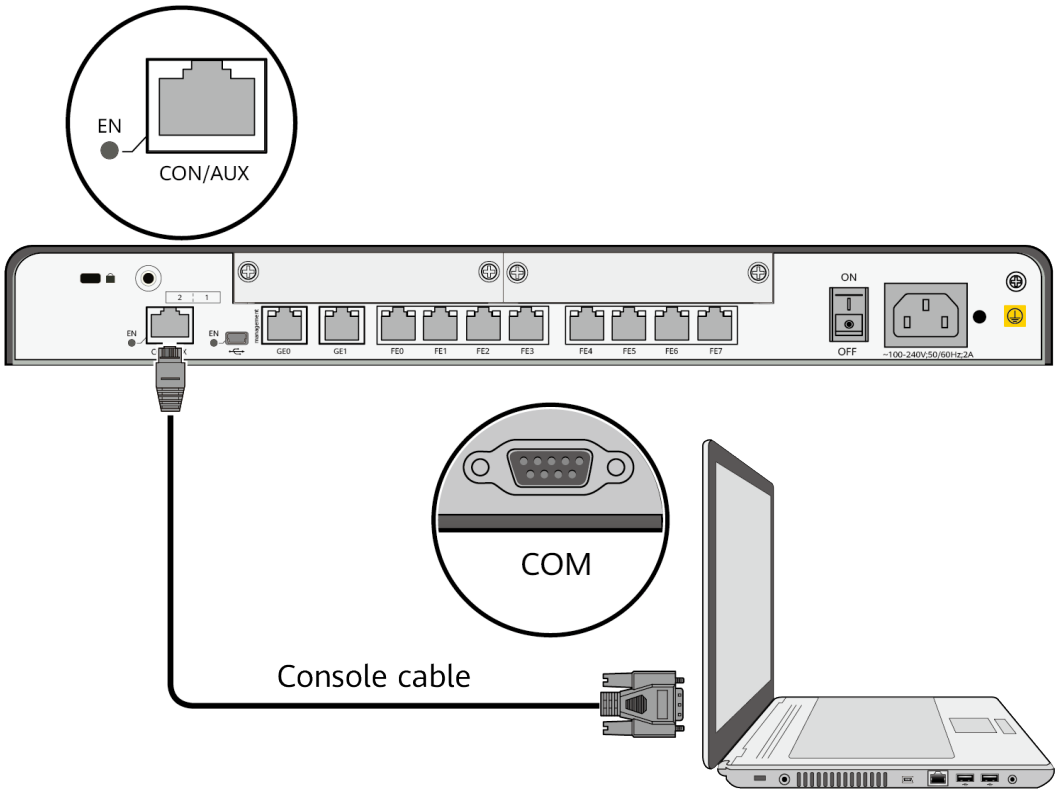
Tools and Accessories

- Console cable

Procedure

Step 1 Connect the console cable.

1. Connect the RJ45 connector of the console cable to the CON/AUX interface (RJ45) of the router.
2. Connect the DB9 connector of the console cable to the serial interface (COM) of a management PC.



----End

Follow-up Procedure

After the console cable is connected, you need to configure terminal emulation software on the management PC to log in to the command configuration interface of the router.

NOTE

For details about how to use specific terminal emulation software, see the related software user guide or online help.

For details about how to log in to the device through the console port for the first time, see **Basic Configuration Guide** > **First Login to a Device** > **Logging In to a Device** > **Logging In to a Device for the First Time Through a Console Port** in the "CLI-based Configuration".

6.10.3 Connecting Ethernet Cables

Context

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connection may damage interface modules or the router.

Tools and Accessories

- Diagonal pliers
- Cable ties
- Marker
- Network cables (separately purchased)
- Network cable labels

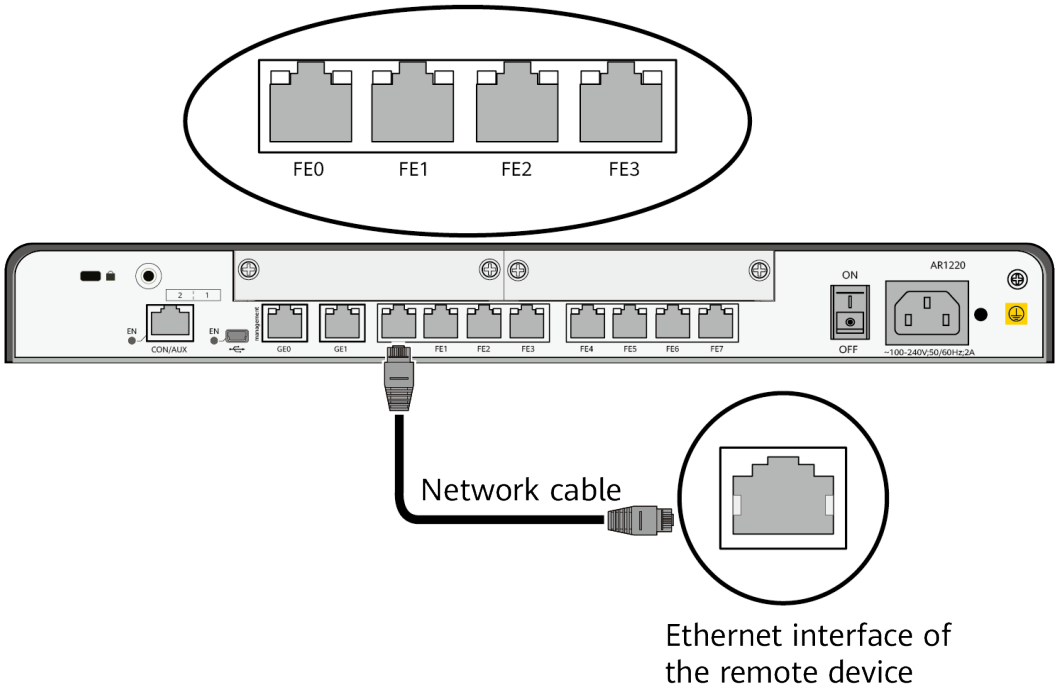
Procedure

Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Attach temporary labels to both ends of each Ethernet cable and write numbers on the labels to identify the Ethernet cables. For details, see **13.3 Engineering Labels for Network Cables**.

Step 3 Lead the Ethernet cables into the cabinet from the top cable inlet (for overhead cabling) or bottom cable inlet (for on-ground cabling), and route the cables from one side of the cabinet.

Step 4 Connect one end of an Ethernet cable to an Ethernet interface of the router and the other end to an Ethernet interface of the remote device.



Step 5 Arrange the Ethernet cables to make them parallel, and then bundle them with cable ties. Use diagonal pliers to cut off redundant cable ties.

Step 6 Remove the temporary labels from the Ethernet cables, and then attach formal labels 2 cm away from the connectors at both ends.

----End

Follow-up Procedure

Check the following items after connecting Ethernet cables:

- Labels are correctly filled and securely attached to cables, with texts facing the same direction.
- Cables and connectors are complete, intact, and tightly connected.

6.10.4 Connecting Optical Modules and Optical Fibers

Context

CAUTION

Invisible laser beams will cause eye damage. Do not look into bores of optical modules or connectors of optical fibers without eye protection.

NOTICE

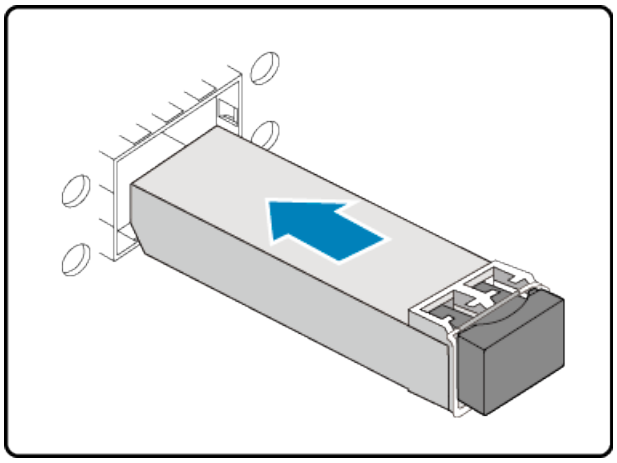
- A router must use Huawei-certified optical modules. Non-Huawei-certified optical modules cannot ensure transmission reliability and may affect service stability. Huawei is not responsible for any problem caused by the use of non-Huawei-certified optical modules and will not fix such problems.
- Do not over bend optical fibers. The bend radius of an optical fiber should be no less than 40 mm.
- Do not bundle optical fibers too tight. Otherwise, optical fiber performance may be degraded, affecting communications between devices.

Procedure

Step 1 Gently push an optical module into an optical interface until you hear a click.

NOTE

If the optical module cannot be completely inserted into the optical interface, do not force it into the interface. Turn the optical module 180 degrees over and try again.



Step 2 Remove the dust plug from the optical module.

NOTE

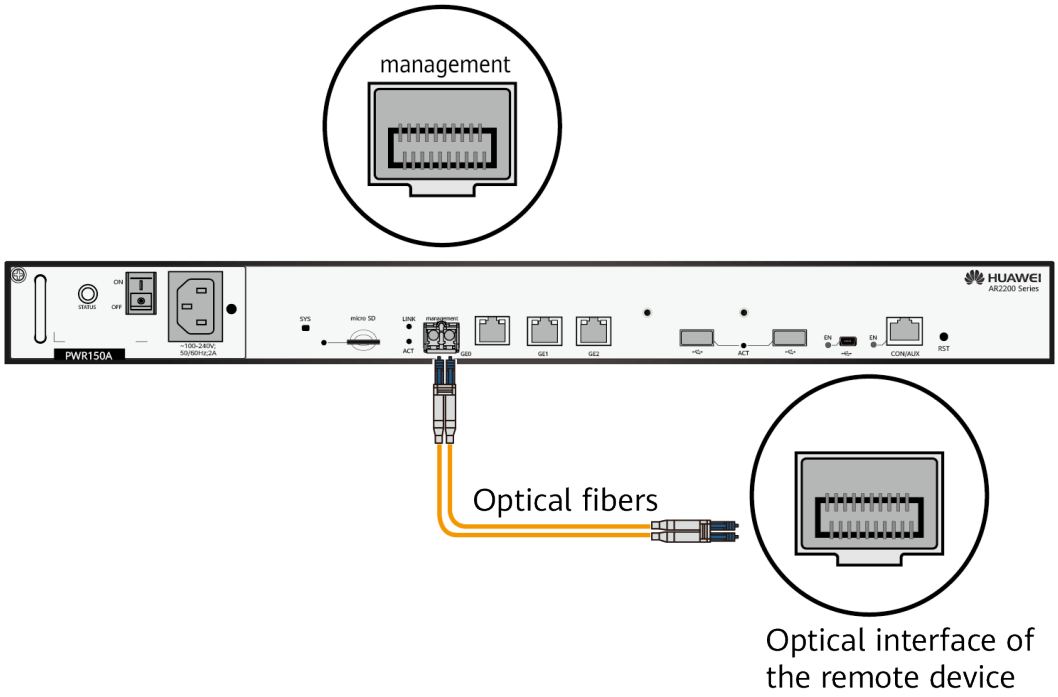
Place the dust plug in an appropriate place. After optical fibers are removed from the optical module, cover the optical module with the dust plug to protect it from dust.

Step 3 Before connecting optical fibers, attach temporary labels on both ends of each optical fiber to identify them. For details on how to make labels of optical fibers, see **13.2 Engineering Labels for Optical Fibers**.

Step 4 Remove the dust caps from the fiber connectors. Connect one end of the optical fiber to the optical module and the other end to the remote device.

NOTE

Connect the receive and transmit ends of the fiber connector according to the identifiers on receive and transmit bores of the optical module. Do not connect the two ends reversely.



Step 5 Arrange the optical fibers to make them parallel and bundle them with fiber binding tape at an interval of 150 mm to 300 mm.

Step 6 Replace all the temporary labels with formal labels on the optical fibers.

----End

6.10.5 Connecting the AC Power Cable

Context

DANGER

To avoid electric shock, do not connect power cables while the power is on.

NOTICE

- Do not power on a router before you finish connecting power cables and network cables.
- Each router has its own power cables delivered as accessories. The power cables can only be used on the router in the same package and cannot be used on any other device.

NOTE

The AC power cable parameters vary in different countries or regions. The figures in this section are for reference only and may differ from the cables delivered.

Tools and Accessories

- ESD wrist strap
- AC Power Cable
- AC terminal locking latch

Procedure

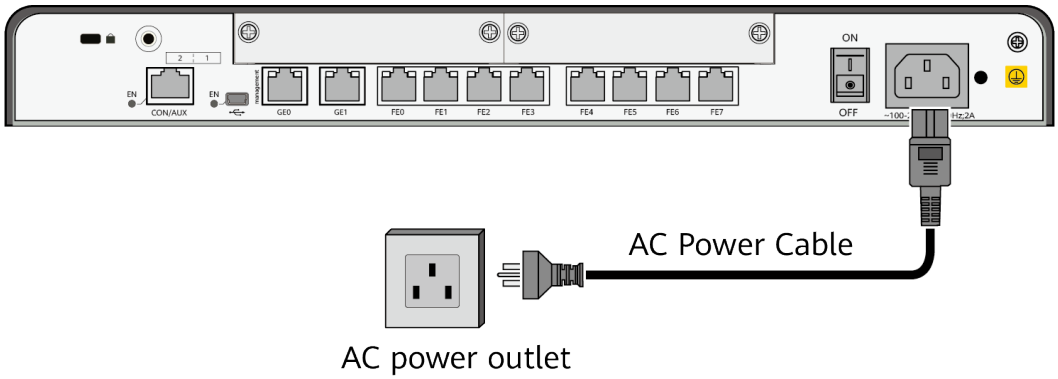
Step 1 Verify that the router is reliably grounded.

Step 2 Set the power switch to OFF.

Step 3 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

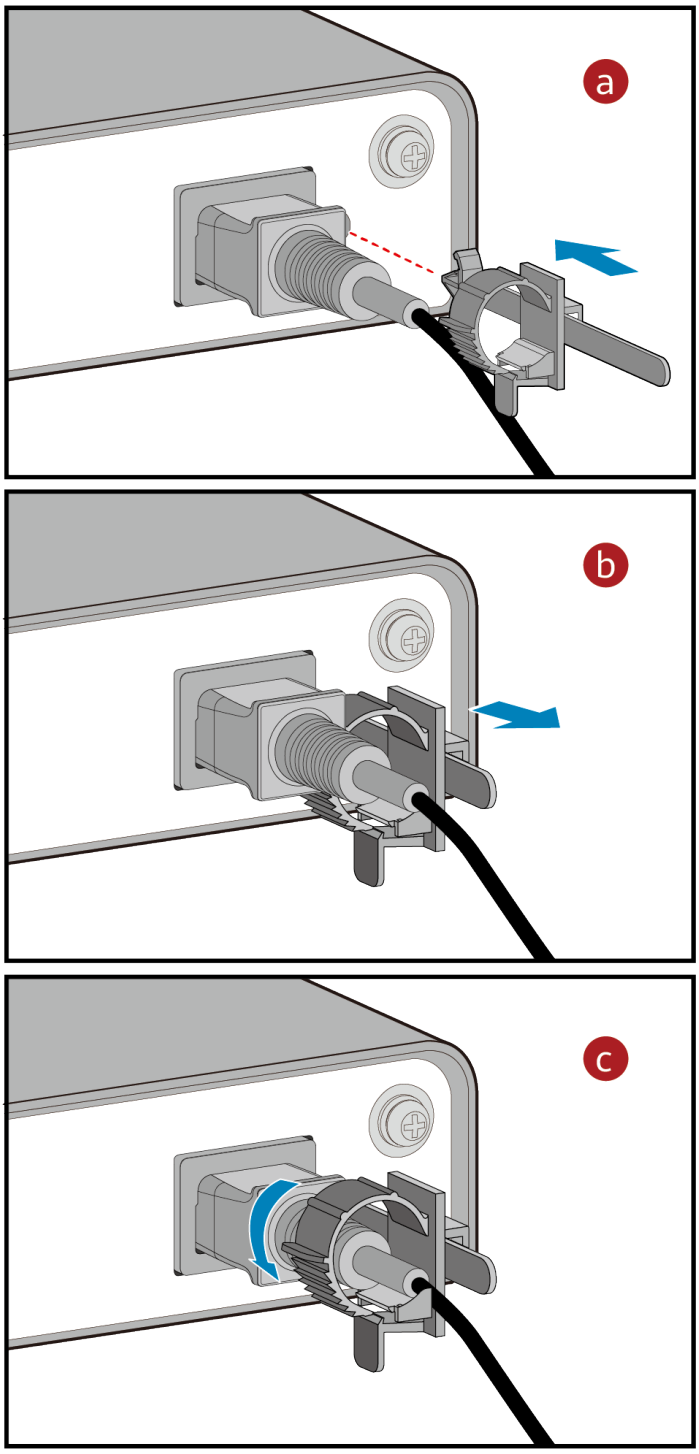
Step 4 Connect the AC power cable.

1. Connect one end of the AC power cable to the power socket on the router.
2. Connect the other end of the AC power cable to an AC power outlet.



Step 5 Connect the AC terminal locking latch.

1. Insert the AC terminal locking latch into the jack on the rear panel of the router.
2. Adjust the AC terminal locking latch to a proper position.
3. Lock the AC power cable with the AC terminal locking latch.



----End

Follow-up Procedure

Perform the following operations after connecting the AC power cable:

- Verify that the AC power cable is securely connected to the power socket on the router.

- If multiple routers are installed, attach labels to both ends of each power cable and write numbers on the labels to identify them.

6.11 Powering On and Off the Router

Context

Before you power on the router, check and ensure the following:

- The power module is correctly connected.
- The input voltage is in the range of 90 V AC to 264 V AC.

Procedure

- Power on the router.

  Turn on the power switch of the power supply system, and then turn on the power switch on the router to start the router.

  After the router starts, check indicators on the front panel to check whether the router runs normally. **Figure 6-12** describes the indicator states when the router is running normally.

  Figure 6-12 Normal indicator states on the router

Indicator	Description
SYS	Slow blinking green: The system is running properly.

- Power off the router.

  NOTICE

  Powering off the router will interrupt all the services on the router. Exercise caution when you perform this operation.

Turn off the power switch on the router, and then turn off the power switch of the power supply system.

----End

Follow-up Procedure

After the router starts, you can log in to its CLI to configure, manage, and maintain the router. For details, see the *CLI-based Configuration*.

7 Installing AR6280/AR6300/AR6280K/ AR6300K/AR6280-S/AR6300-S Routers

7.1 Installing the Router into a Cabinet

Context

NOTICE

- Leave at least 50 mm of clearance around the router for heat dissipation.
- Seen from the front panel of the router, the airflow of the router is left to right.
- If multiple routers are installed in a cabinet, it is recommended that at least 1 U of space (1 U = 44.45 mm) be kept between two routers. These routers must have the same airflow direction; otherwise, heat dissipation is affected by hot air circulation.

Make sure the following before the installation:

- The cabinet is well fixed.
- The router installation position in the cabinet is determined and arranged properly.
- The router to be installed is available and located near the cabinet for convenient movement.

Tools and Accessories

- Phillips screwdriver
- Flat-head screwdriver
- Floating nuts (four, separately purchased)
- Mounting brackets
- L-shaped guide rails (separately purchased)
- M4 screws (used to fix mounting brackets on both sides of the router. The number of mounting mounting brackets depends on the router model.)
- M5 screws (used to fix L-shaped guide rails on both sides of the cabinet. The number of required L-shaped guide rails depends on the number of required L-shaped guide rails.)
- M6 screws (four, separately purchased)

Procedure

Step 1 Use a Phillips screwdriver to fix the mounting brackets to both sides of the router with M4 screws.

NOTE

The mounting brackets can be installed on both sides close to the front panel or rear panel.

- **Figure 7-1** shows installation of mounting brackets on an AR6280K/AR6280/AR6280-S.
- **Figure 7-2** shows installation of mounting brackets on an AR6300K/AR6300/AR6300-S.

Figure 7-1 Installing mounting brackets on an AR6280K/AR6280/AR6280-S

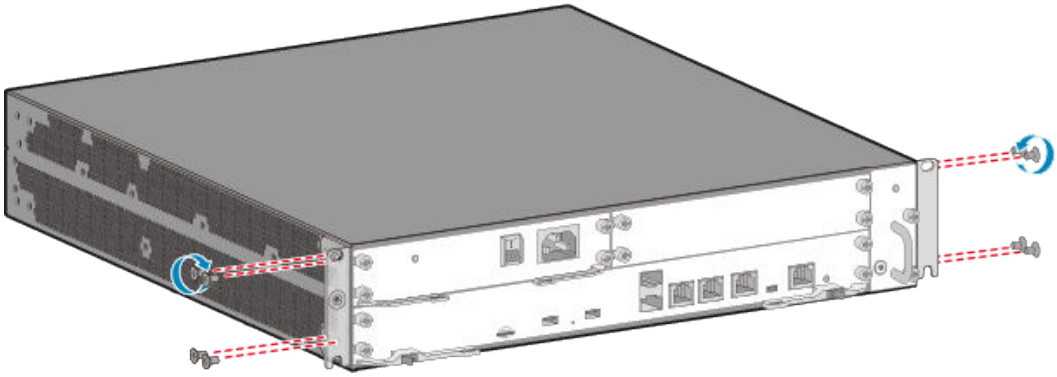
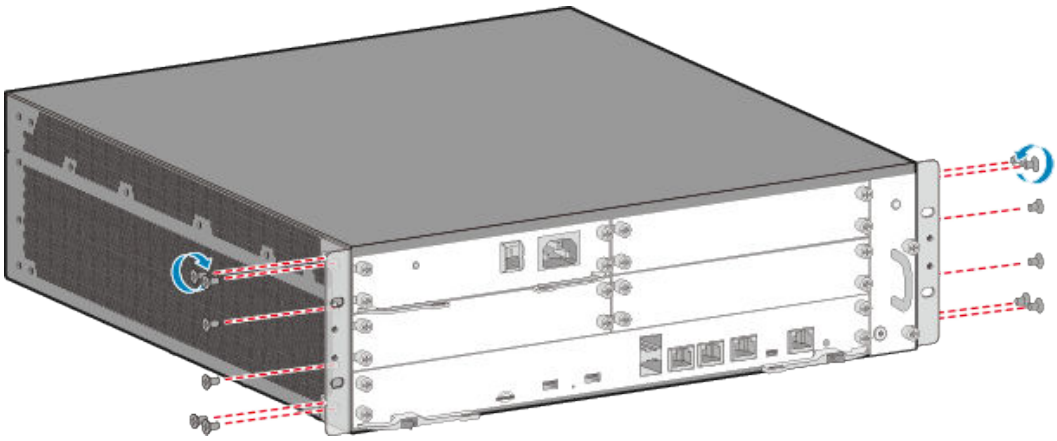
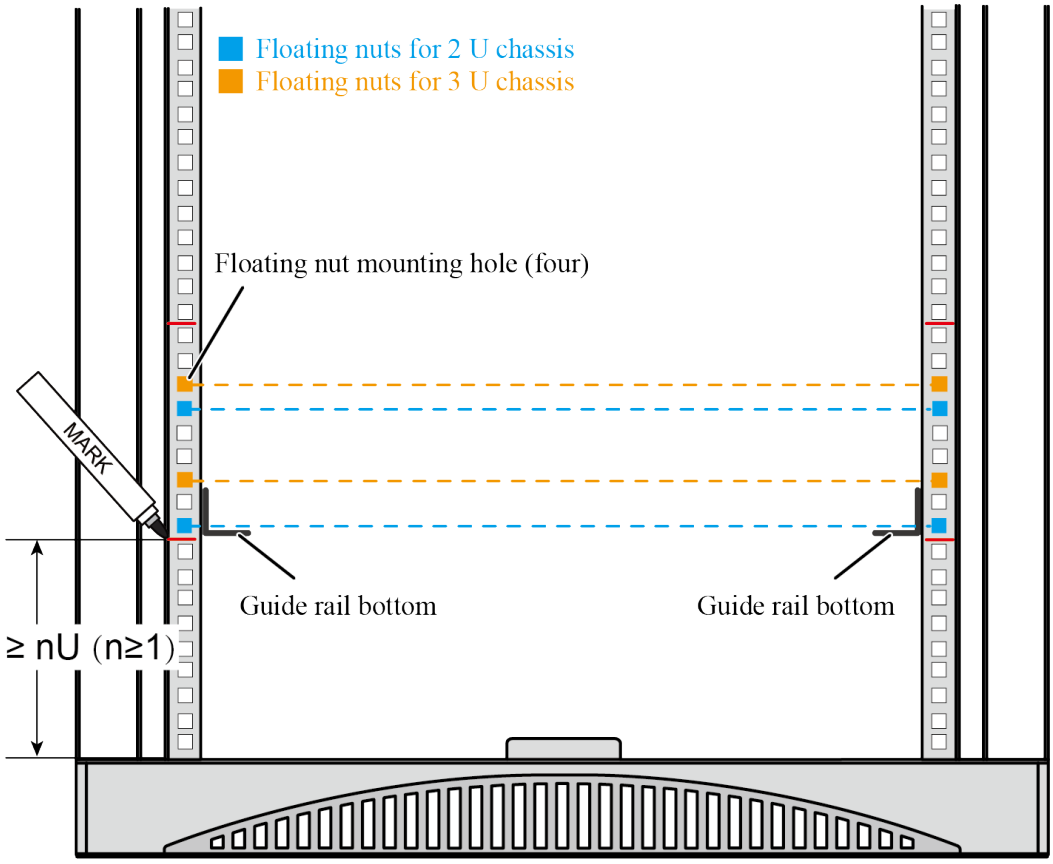


Figure 7-2 Installing mounting brackets on an AR6300K/AR6300/AR6300-S



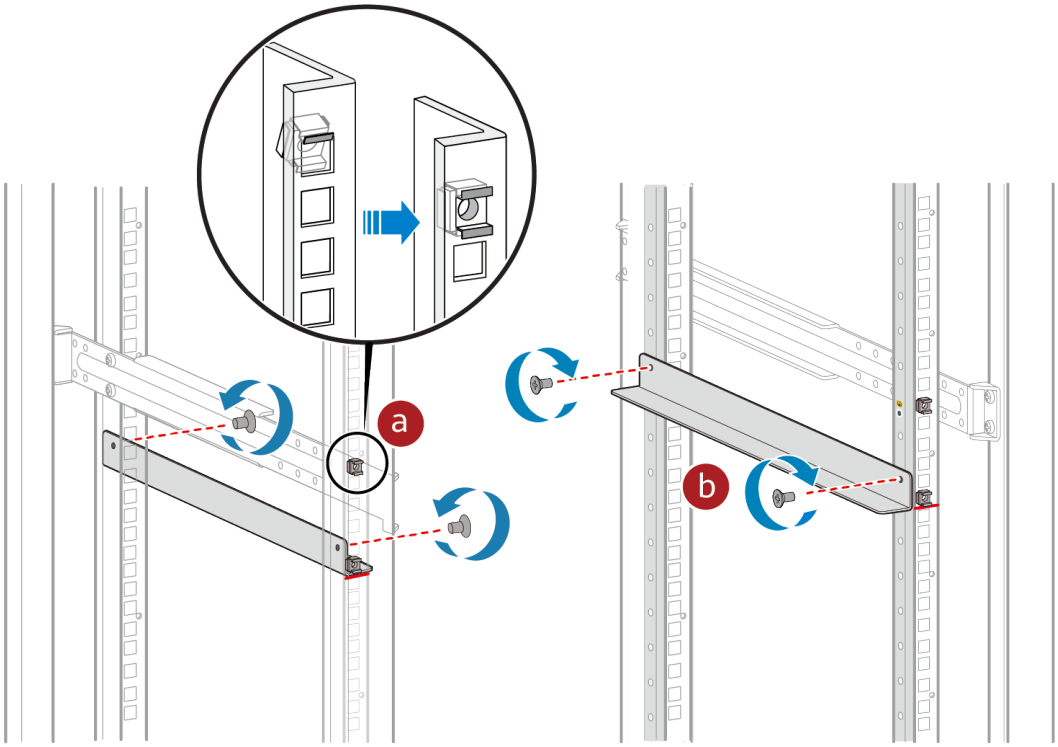
Step 2 Mark the positions of L-shaped guide rails and floating nuts.

- An AR6280K/AR6280/AR6280-S router is 2 U high, which is the distance between six mounting holes. Mark the mounting holes for L-shaped guide rails and floating nuts with a marker.
- An AR6300K/AR6300/AR6300-S router is 3 U high, which is the distance between nine mounting holes. Mark the mounting holes for L-shaped guide rails and floating nuts with a marker.



Step 3 Install the floating nuts and L-shaped guide rails.

1. Use a flat-head screwdriver to install four floating nuts in the marked positions on the front mounting rails, two on left and two on right. Ensure that the floating nuts on the left and right are on the same horizontal plane.
2. Use a Phillips screwdriver to fix the L-shaped guide rails in the marked positions with M5 screws. The bottom edges of the L-shaped guide rails must be in line with the bottom edges of the marked mounting holes.



Step 4 Install the router into the cabinet.

1. Move the router into the cabinet, place the router on the L-shaped guide rails, and gently push the router into the cabinet until the mounting brackets are completely attached to the front mounting rails.
2. Use M6 screws to fix the mounting brackets on the cabinet.

Figure 7-3 Installing an AR6280K/AR6280/AR6280-S into a cabinet

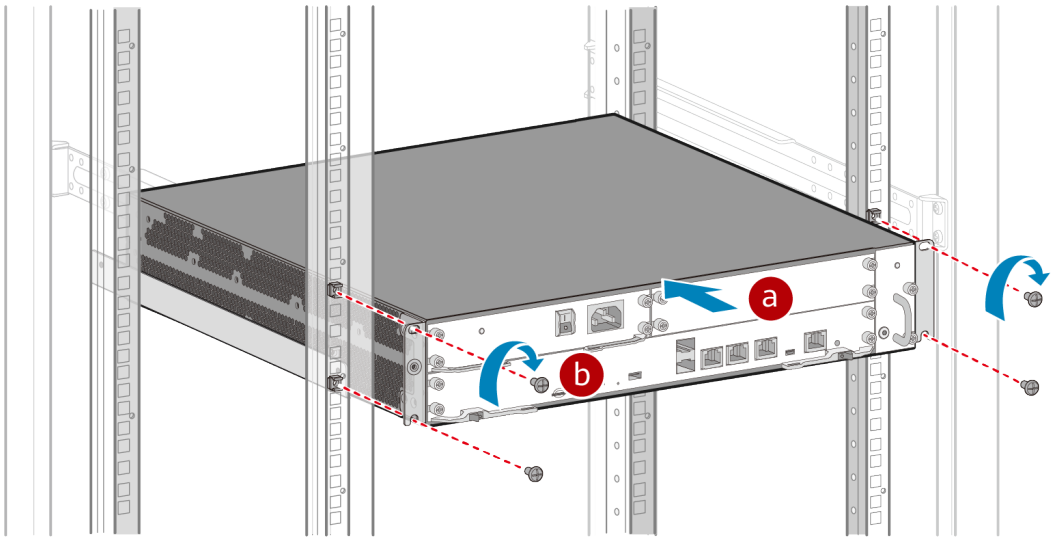
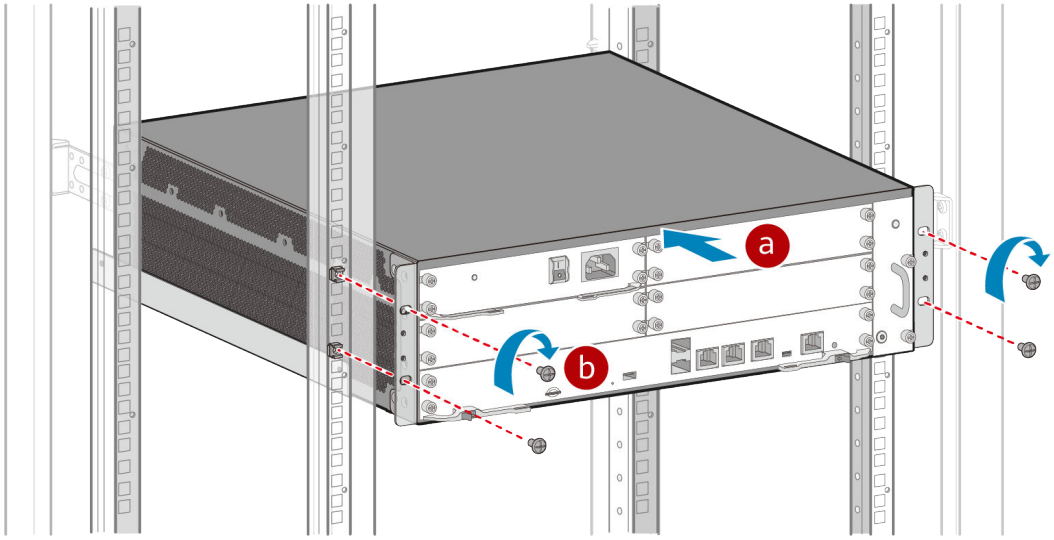


Figure 7-4 Installing an AR6300K/AR6300/AR6300-S into a cabinet



----End

7.2 Installing Cards

Context

NOTICE

- All cards are hot swappable.
- Vacant slots in the router must be covered with filler panels.
- When installing a card, slowly push it into the slot. If you feel resistance or find the card inclined, pull the card out and push it into the slot again. Do not push the card with force; otherwise, the connectors on the card and backplane may be damaged.
- A card can only be installed in a router that supports this card. For the specific cards supported by different routers, see **Cards** in the *Hardware Description*.

Tools and Accessories

- ESD wrist strap
- Phillips screwdriver

Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Loosen the captive screw on the filler panel and remove the filler panel.

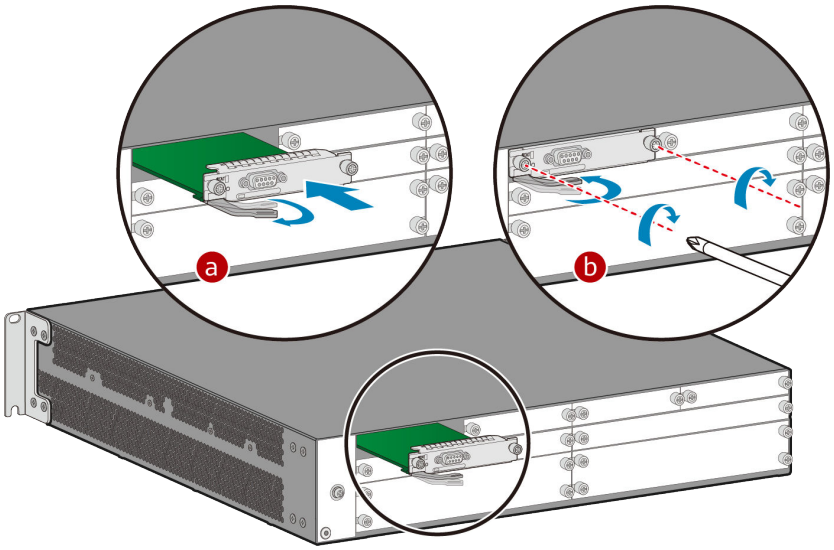
Step 3 Perform the following steps depending on whether slots are combined:

- When no slots are combined:

  NOTE

  The methods for installing SIC, WSIC, and XSIC cards into SIC, WSIC, and XSIC slots are the same. The following procedures install a SIC card into a SIC slot.

  a. Rotate the ejector levers outward and slide the card into the slot horizontally along the guide rails until the card panel is closely attached to the router panel.
  b. Rotate the ejector levers inward until the card is completely seated in the slot, and then tighten the captive screws on both sides of the card.

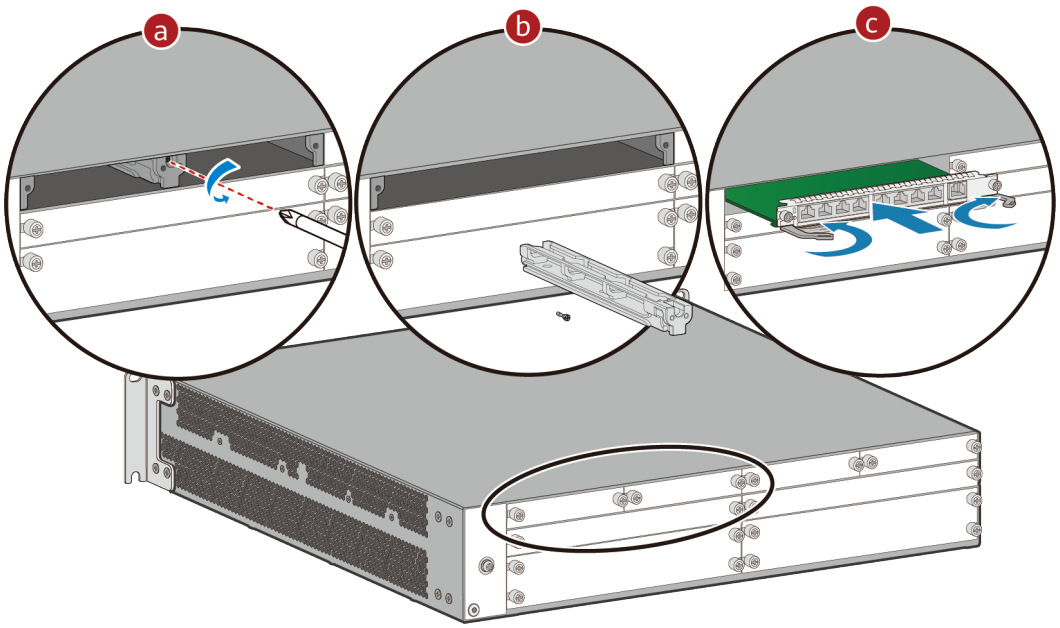
  

- When slots are combined:

  NOTE

  Slots of a router can be combined into a larger slot. For example, two SIC slots can be combined into a WSIC slot, and two SIC slots and the WSIC slot below them can be combined into an XSIC slot. In this example, two SIC slots are combined into a WSIC slot.

  a. Loosen the captive screw on the guide rail between the two SIC slots.
  b. Remove the guide rail to combine the two SIC slots into a WSIC slot.
  c. Slide the WSIC card into the WSIC slot horizontally along the guide rails until the card is completely seated in the slot. Rotate the ejector levers inward to lock the card in the slot, and then tighten the captive screws on both sides.



----End

7.3 (Optional) Installing the SIM Card on a SIC Card

Context

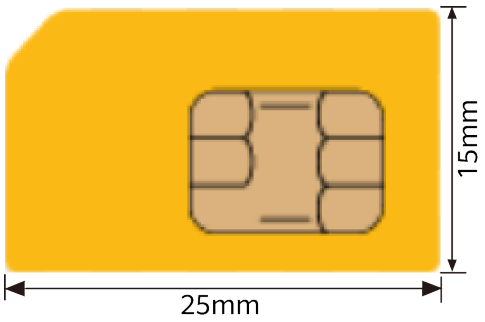
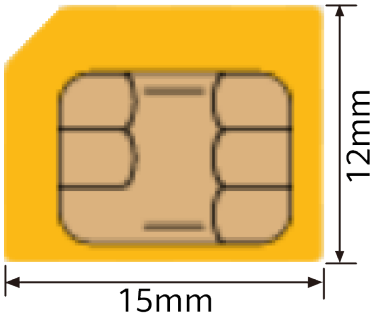
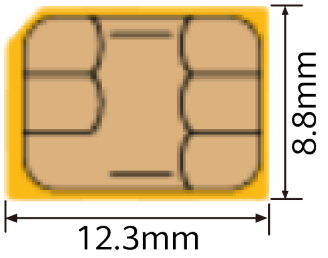
This method applies to SIC cards with 3G/LTE/5G functions. The methods for installing the SIM card on a SIC card are the same. A 3G-HSPA+7 card is used as an example.

NOTICE

- The standard SIM card is supported. It is not recommended to use the card cover to prevent poor SIM card contact.
- Hot-swap SIM card is not supported. After replugging the SIM card, you need to restart the RF module or restart the device.
- Ensure that the SIM card slot is locked after the SIM card is removed or installed.

The following table describes the dimensions of a SIM card.

Table 7-1 Dimensions of a SIM Card

Model	Dimensions
Standard SIM card	
Micro SIM card	
Nano SIM card	

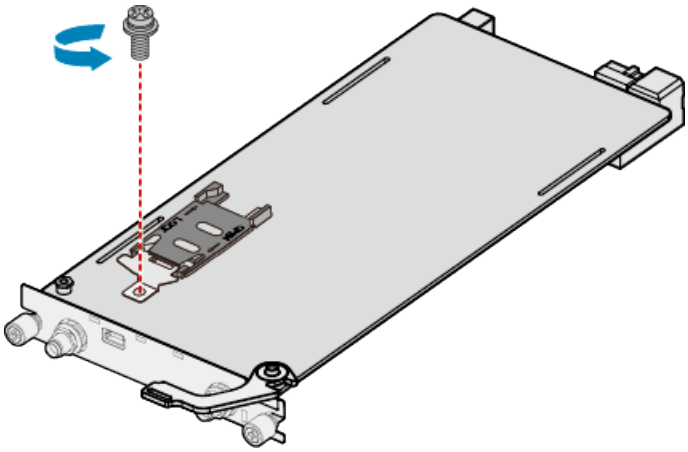
Tools

- Phillips screwdriver
- ESD wrist strap
- SIM card (self-provided)

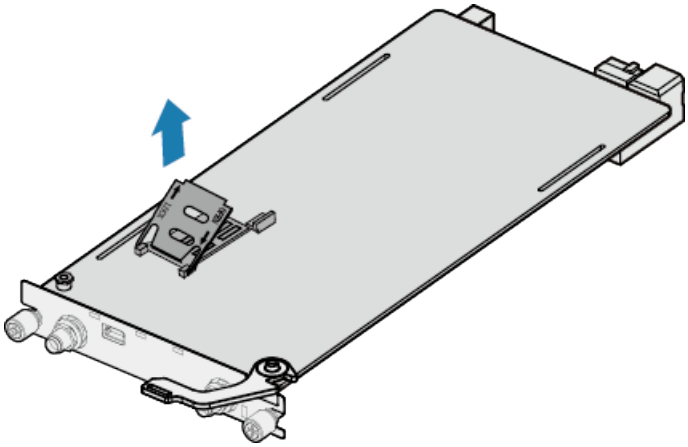
Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Loosen the screw on the SIM card holder.



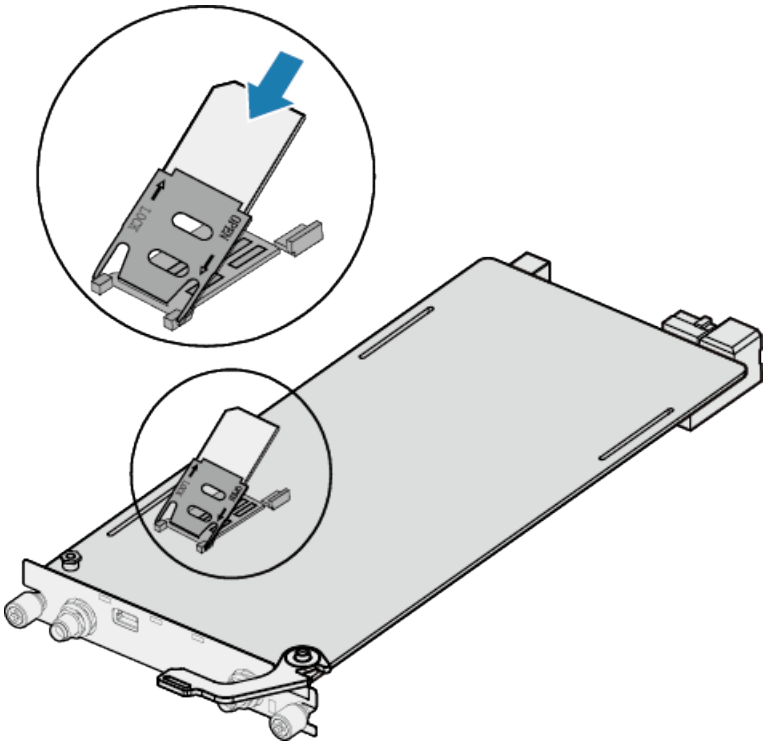
Step 3 Slide the SIM card holder horizontally towards the direction specified by the OPEN arrow and open the SIM card holder.



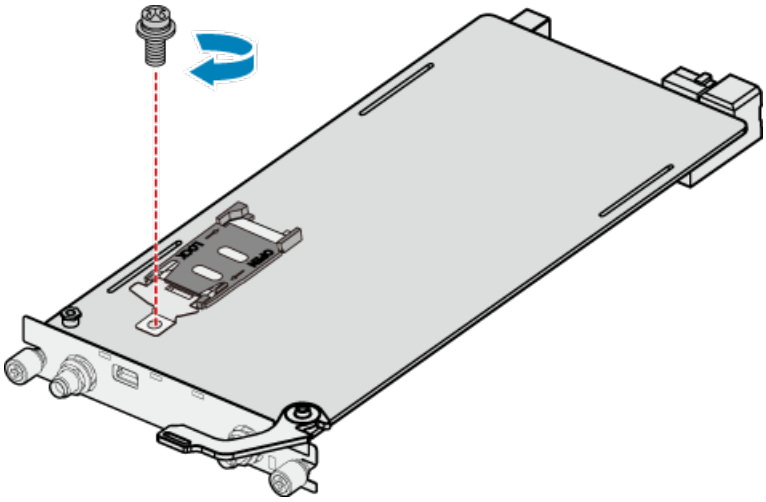
Step 4 Insert a SIM card into the SIM card holder.

NOTE

When inserting a SIM card, keep the notch on the SIM card in the same direction as the notch marked on the slot.



Step 5 Slide the SIM card holder towards the direction specified by the LOCK arrow, close the SIM card holder, and tighten the screw.



----End

7.4 (Optional) Connecting a RU-5G Remote Unit to an AR Router

Context

An AR router connects to an RU-5G remote unit to connect to a 5G/4G/3G Ethernet to implement high-speed data transmission.

Tools and Accessories

- Ethernet cable (self-provided)

  NOTE

  - Before connecting Ethernet cables, use the Ethernet cable detection tool to check whether the Ethernet cables are normal to ensure that the device works properly.
  - The Ethernet cable is of category 5 or higher type. The length of the Ethernet cable cannot exceed 50 m. The cross-sectional area of an Ethernet cable ranges from 4.9 mm to 7.1 mm.

- RU-5G Remote unit (self-provided)

  NOTE

  For details, see **Appendix G RU-5G Installation**.

- PoE adapter (self-provided)

  NOTE

  When the two GE/PoE_IN interfaces on an RU-5G remote unit use PoE adapters, the Huawei PoE adapters (part number: 02220369) must be used.

  If the GE/PoE_IN interface uses a PoE adapter, place the PoE adapter indoors.

Procedure

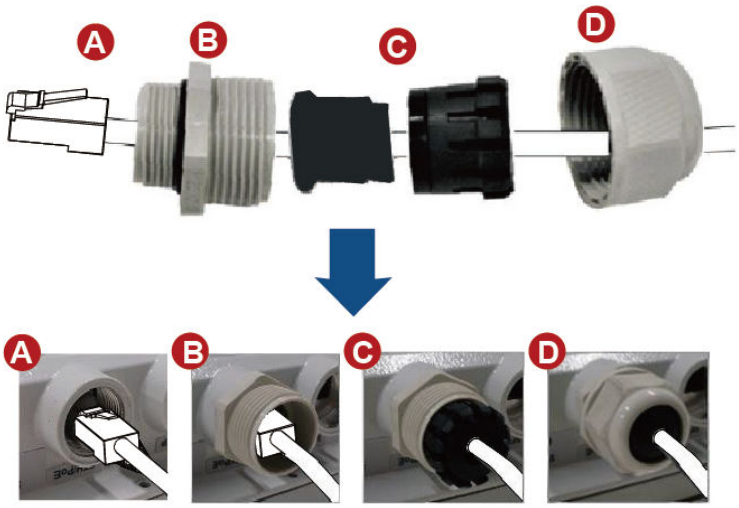
Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Route the Ethernet cable through the waterproof PG connector, as shown in the following figure. Insert the RJ45 connector (without sheath) of the Ethernet cable into the GE/PoE_IN (GE0/PoE_IN or GE1/PoE_IN) interface on the device, and then tighten the waterproof PG connectors in sequence B, C, and D.

NOTE

Tighten components of PG connectors B to the device with a torque of 2.5 N·m, and components D to B to a torque of 1.8 N·m. The waterproof PG connector is used for round Ethernet cables. Flat Ethernet cables cannot be used.

Ensure that the RJ45 connector is correctly connected to the device. Otherwise, the Ethernet cable may be damaged. Before removing the Ethernet cable from the device, remove the waterproof PG connector first and then remove the RJ45 connector.



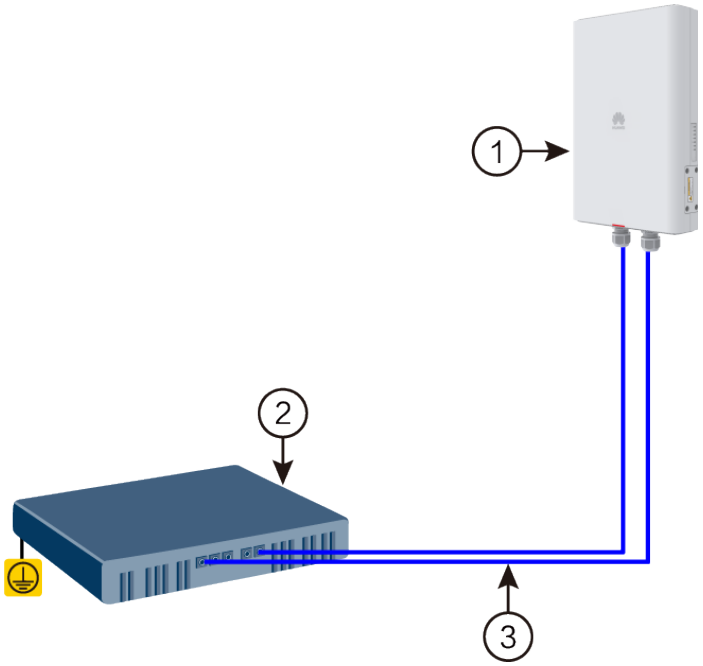
Step 3 Connect the other end of the Ethernet cable according to the networking mode.

Option	Description
Figure 7-5	In this scenario, all networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Connect the other end of the Ethernet cable to the PoE port on the AR router.
Figure 7-6	In this scenario, the RU-5G is installed outdoors and other networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Install an SPD on the other end of one network cable and connect the cable to the Ethernet interface on the AR router. 3. Install an SPD on the other end of the other network cable and connect it to the PoE port on the PoE adapter. 4. Use a network cables to connect the Ethernet interface on the AR router and the DATA port on the PoE adapter.

NOTE

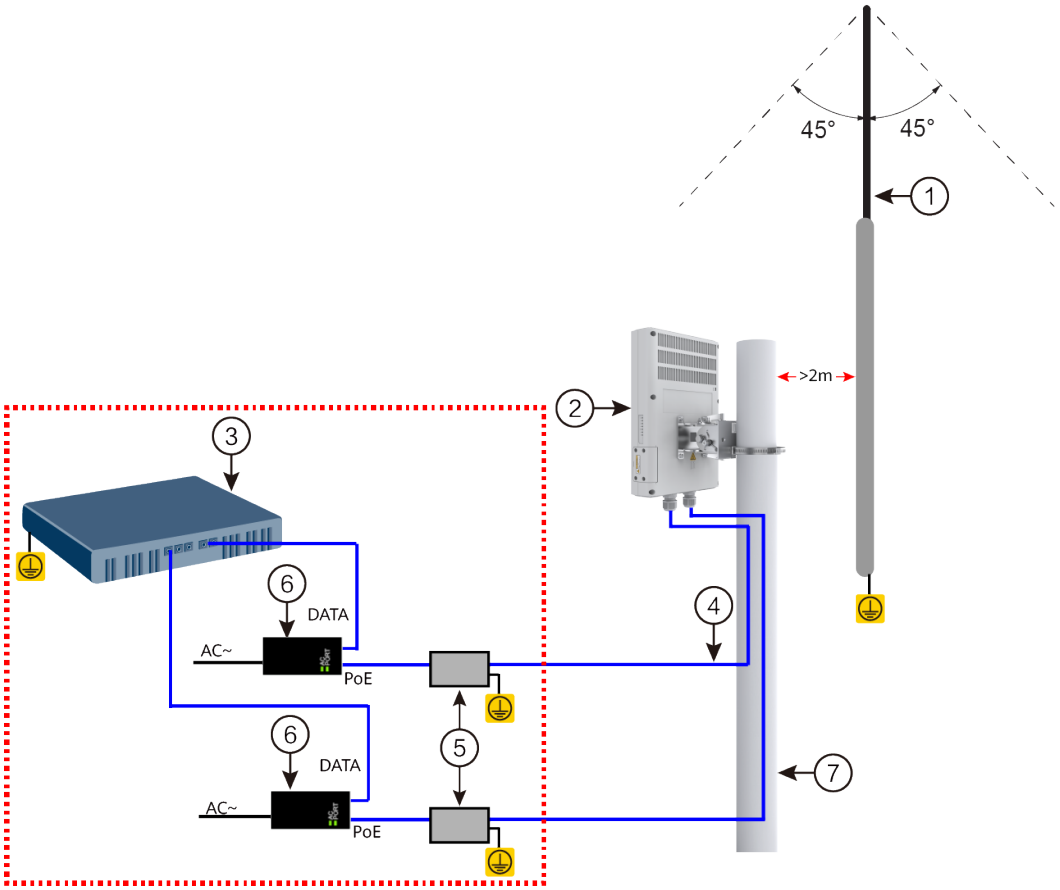
- When the AR router, PoE adapter, and RU-5G remote unit are installed indoors, no SPD is required for the AR router Ethernet interface, AR router power input interface, PoE adapter output interface, and PoE adapter power input interface.
- When the AR router and PoE adapter are installed indoors and the RU-5G remote unit is installed outdoors, an SPD must be installed on the AR router network interface and output interface on the PoE adapter. Huawei SPD (part number: 19020303) or an SPD with the same specifications is recommended for the output of the AR router Ethernet ports and PoE adapters.

Figure 7-5 Co-deployment Networking 1 (RU-5G PoE Power Supply Using an AR Router)



1. RU-5G remote unit	2. AR router (PoE supported)	3. Ethernet cable	-

Figure 7-6 Co-deployment Networking Mode 2 (RU-5G Powered by PoE adapters)



NOTE

The devices in the red box are installed indoors.

1. Lightning rod	2. RU-5G remote unit	3. AR router (PoE not supported)	4. Ethernet cable
5. SPD	6. PoE adapter	7. Pole	-

----End

7.5 Installing a Power Module

Context

Each router is configured with one power module by default. When you purchase another power module for a router, follow the instructions in this section to install the power module.

NOTICE

- AC and DC power modules cannot be used together in the same router.
- A power module can be hot swapped.
- Vacant slots in the router must be covered with filler panels.

Tools and Accessories

- ESD wrist strap
- Phillips screwdriver

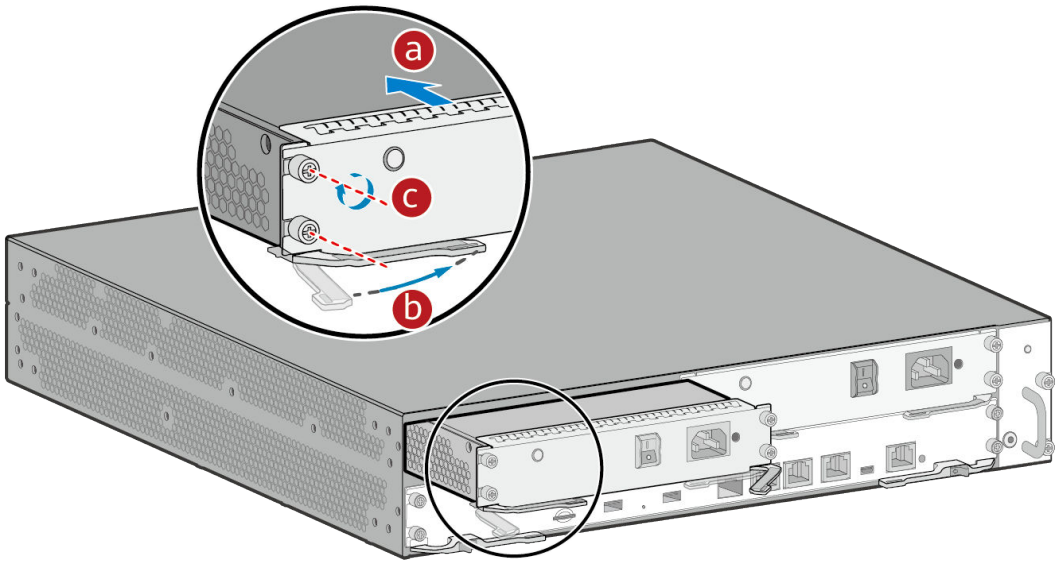
Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Loosen the captive screw on the filler panel and remove the filler panel.

Step 3 Install a power module in the router.

1. Rotate the ejector levers on the power module outward and slide the power module into the slot along the guide rails until the power module is completely attached to the router panel.
2. Rotate the ejector levers inward to lock the power module in the slot.
3. Use a Phillips screwdriver to tighten the captive screws on the power module.



----End

7.6 (Optional) Installing a DSP Card on the SRU

Context

To enable a router configured with the SRU-200H supported voice function to provide the voice service, you need to install a DSP card on the SRU.

Tools

- ESD wrist strap
- DSP card (optional part)

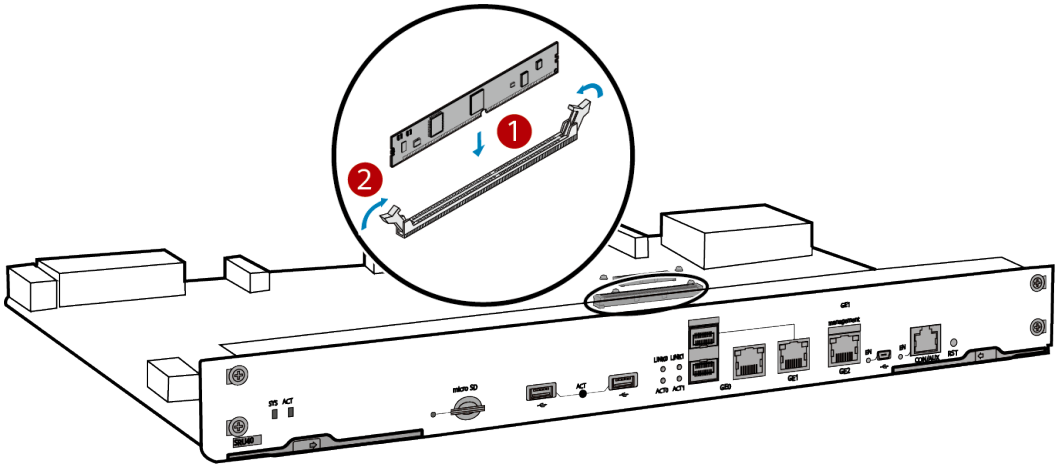
Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 (Optional) If the SRU has been installed on the router, remove it.

Step 3 Install a DSP card.

Insert the DSP card in the DSP DIMM slot and close the locking latches.



Step 4 (Optional) Install the SRU on the router.

----End

Follow-up Procedure

Verify that the DSP card is installed correctly.

1. After completing the installation, start the router.
2. After the router starts, run the following commands:
```
<Huawei> system-view
[Huawei] voice
[Huawei-voice] display voice dsp state 0/0
```
3. If the following information is displayed, the DSP card is installed correctly and working normally.
```
Symbol:
          0-idle $-G.711 busy A-All busy W-Wastage X-fault
          @-IP loopback *-PCM loopback #-prohibited
Channel NO.  DSP channel state
  ------------------------------------------------------------------
 0000-0049  00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
```



```
 0050-0099  00000 00000 0000
Total:
    64  DSP channel
    64  idle, 0 G.711 Busy, 0 All Busy, 0 Wastage, 0 Fault,
    0   IP loopback, 0 PCM loopback, 0 prohibited
```

7.7 (Optional) Installing a Cable Management Strip and a Protective Unit

Context

If unshielded network cables are used as E&M trunk cables and need to be lead outdoors, install a cable management strip on the cabinet and install protective units on the cable management strip.

Tools and Accessories

- Impact tool
- Diagonal pliers
- Phillips screwdriver
- Cable management strip holder
- Cable management strip
- Protective units
- M6 screws

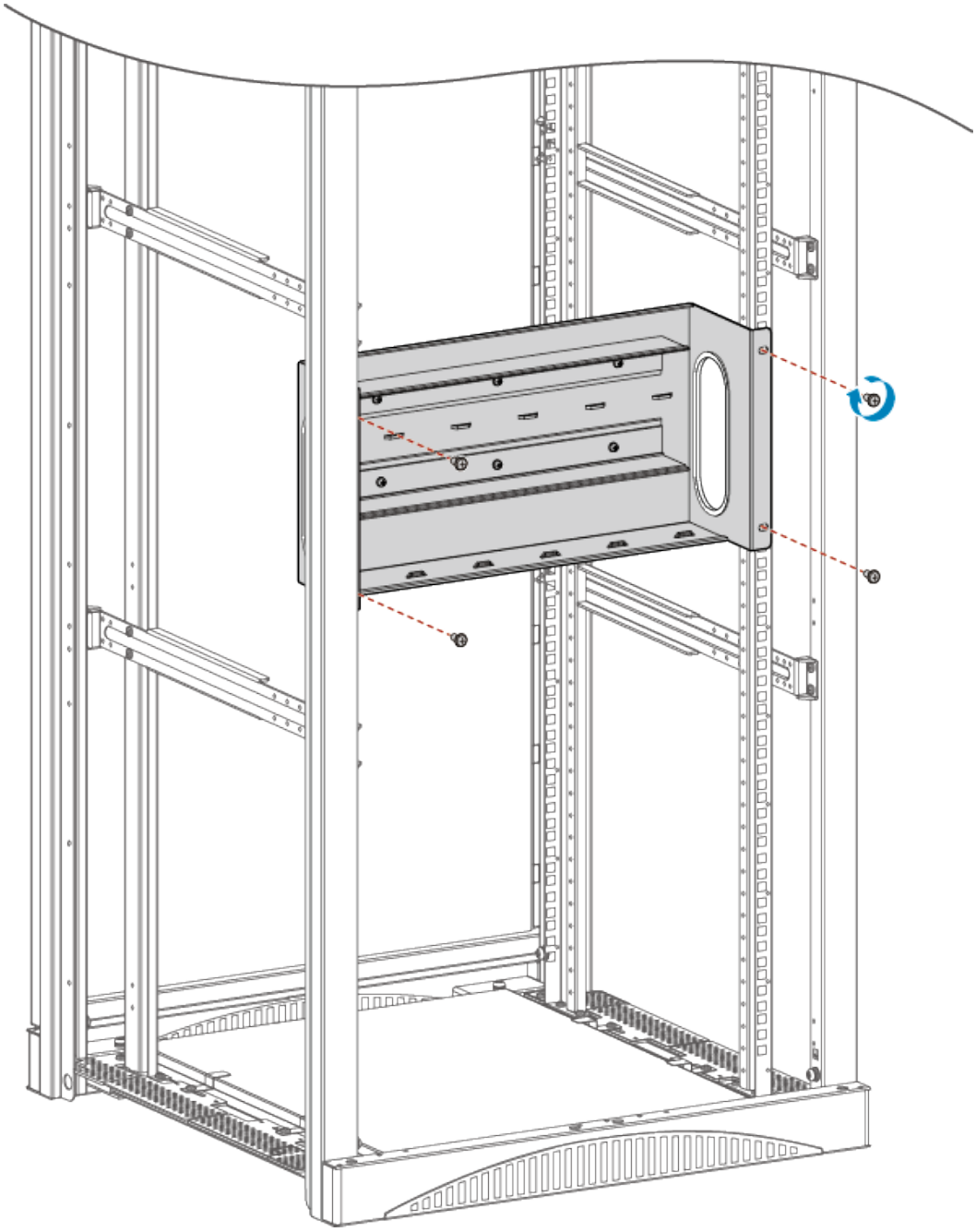
NOTE

The cable management strip holder, cable management strip, protective units, and M6 screws are not included in the installation accessory package delivered with a card and need to be purchased separately.

Procedure

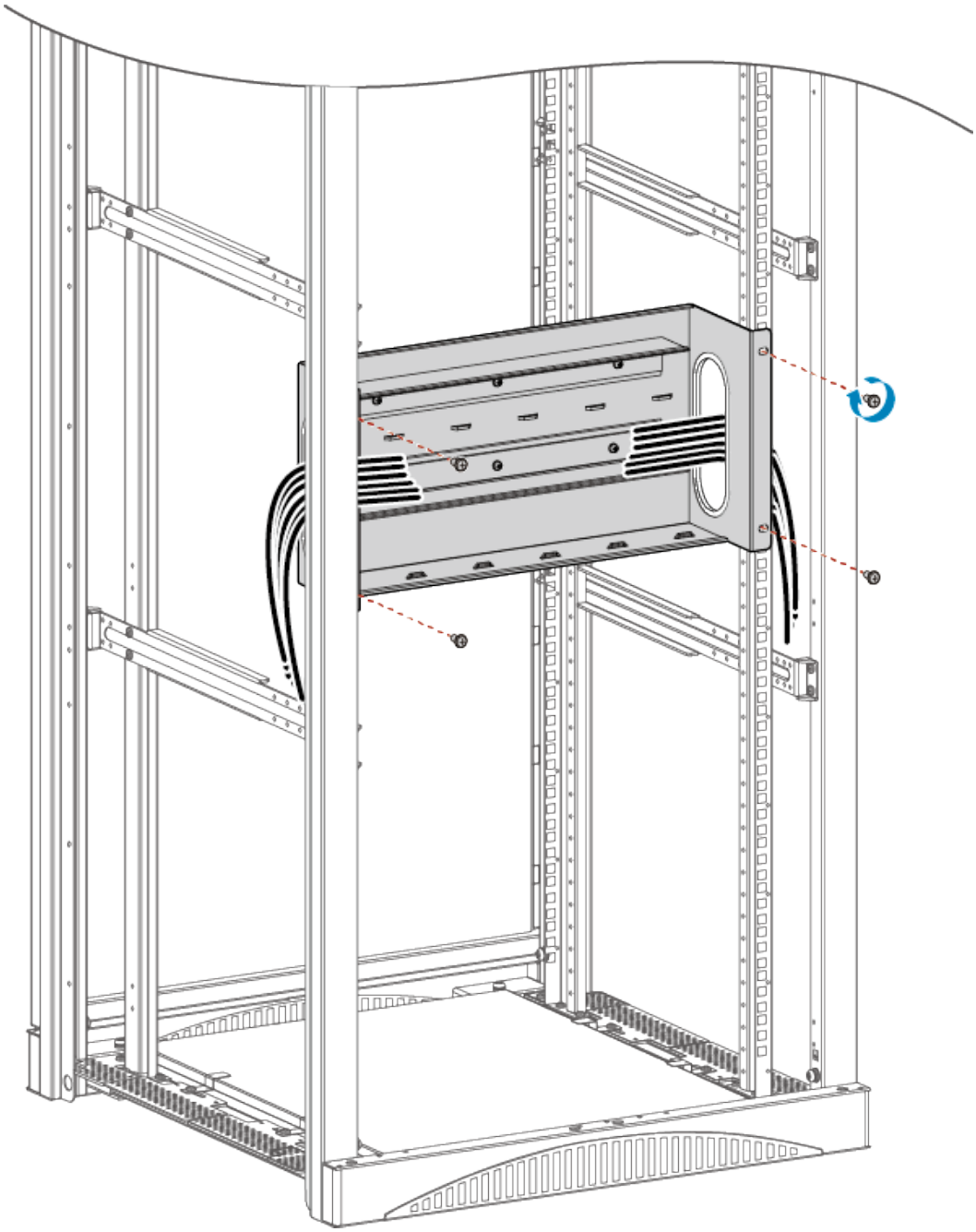
Step 1 Use a Phillips screwdriver and M6 screws to fix the cable management strip holder onto mounting rails of the cabinet, as shown in **Figure 7-7**.

Figure 7-7 Installing the cable management strip holder onto the cabinet



Step 2 Put the unshielded network cable connected to the local device through the cable inlet at one side of the cable management strip holder, and put the unshielded network cable connected to the remote device through the cable inlet at the other side of the cable management strip holder. See **Figure 7-8**.

Figure 7-8 Connecting unshielded network cables



Step 3 Connect the unshielded network cables to a cable management strip.

NOTE

The following describes connection of one unshielded network cable. Connect all the unshielded network cables in the same way.

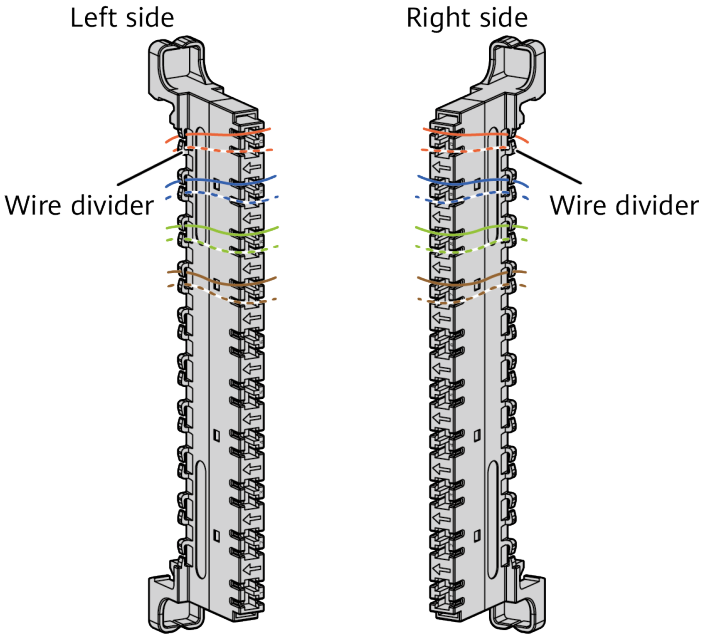
1. Use a pair of diagonal pliers to strip off about 15 cm of insulation coating of the unshielded network cable.
2. Divide the four twisted pairs of the cable into eight wires and arrange them orderly.
3. At the local device side, put each two wires through a pair of wire dividers at the left side of the cable management strip and lead the wires into the wire

slots at the left side. At the remote device side, put each two wires through a pair of wire dividers at the right side of the cable management strip and lead the wires into the wire slots at the right side. See **Figure 7-9**

NOTICE

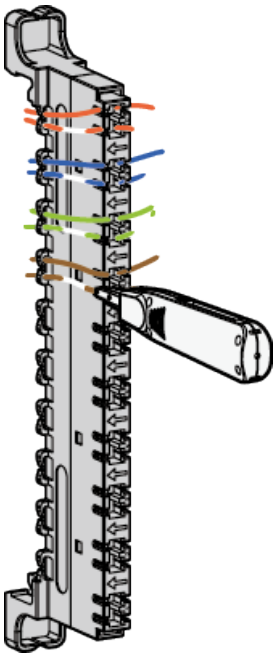
The two wires in the same wire slot on the cable management strip must be the same color.

Figure 7-9 Connecting an unshielded network cable to a cable management strip



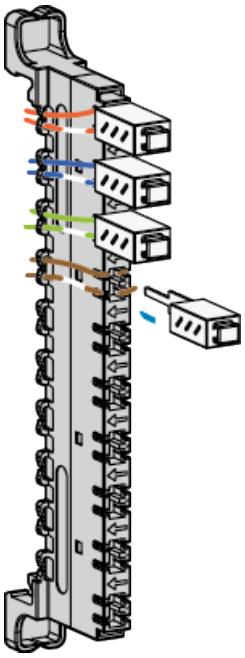
4. Use an impact tool to push the wires into the wire slots. Press a wire with the impact tool until you hear a click, as shown in **Figure 7-10**.

Figure 7-10 Push wires using an impact tool



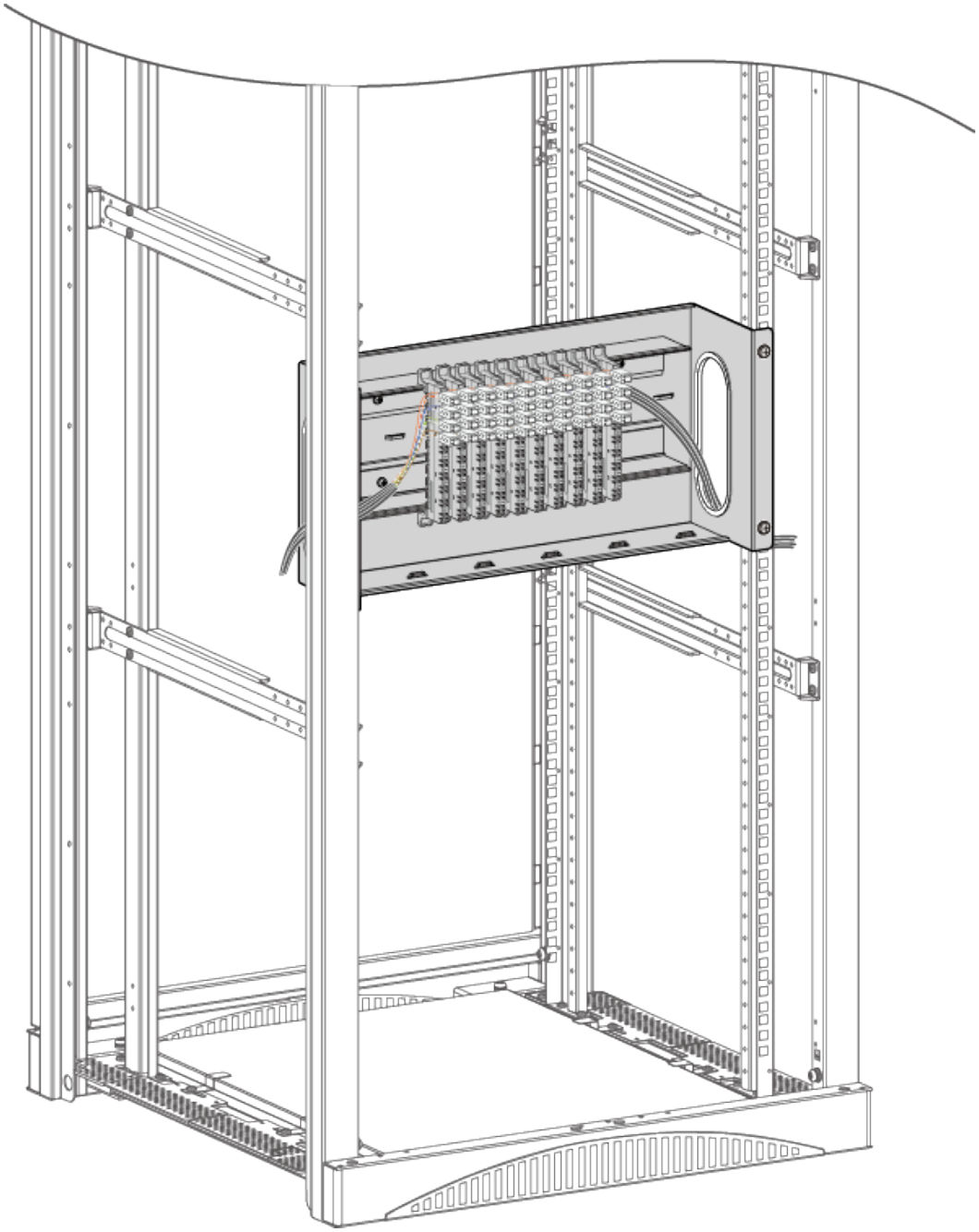
5. Install a protective unit on each wire slot with wires connected. Keep a protective unit vertical with a wire slot (with the diode of the protective unit facing the arrowhead on the wire slot), and insert the protective unit until it is completely in the wire slot, as shown in **Figure 7-11**.

Figure 7-11 Installing protective units



6. Install the cable management strip onto the cable management strip holder, making the end with a shorter hook face up and the end with longer hook face down, as shown in **Figure 7-12**. Gently shake the cable management strip. If the cable management strip is still fixed on the holder, it is installed properly.

Figure 7-12 Installing the cable management strip on the cable management strip holder



----End

7.8 Connecting the Router

7.8.1 Connecting the Ground Cable

Context

NOTICE

- The ground cable of a router must be correctly connected to protect the router against lightning and interference.
- Do not power on the router before you finish connecting cables.

Tools and Accessories

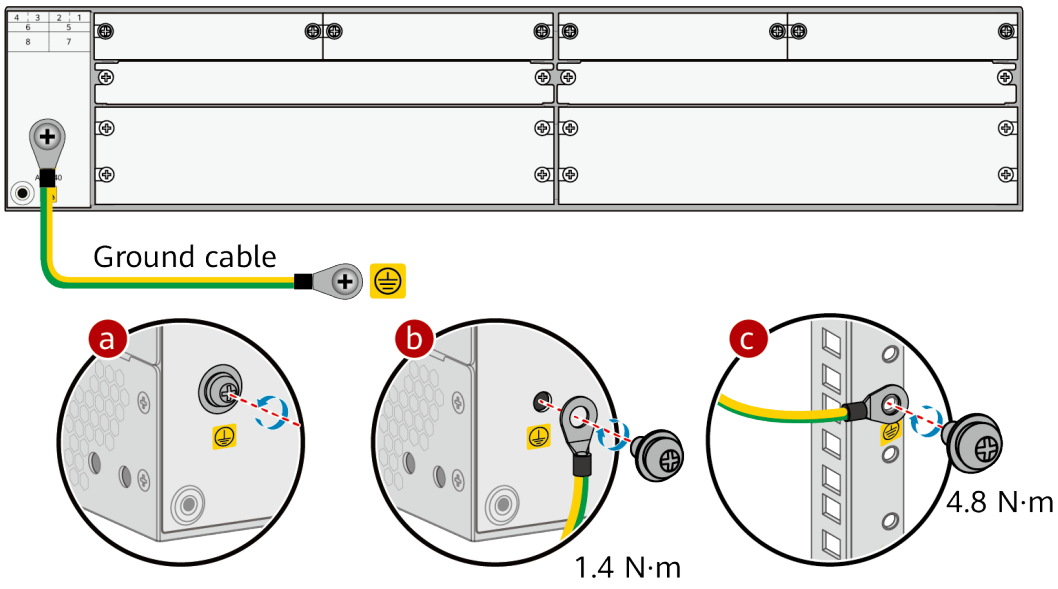
- Phillips screwdriver
- Multimeter
- ESD wrist strap
- Ground cable
- M6 screws (separately purchased)

Procedure

Step 1 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

Step 2 Connect the ground cable.

1. Use a Phillips screwdriver to remove the M4 screw from the ground point on the rear panel of the router. Keep the M4 screw in an appropriate place for later use.
2. Align the M4 lug of the ground cable with the tapped hole on the ground point, and then secure the ground cable with the M4 screw, Tighten the M4 screw with a torque of 1.4 N·m.
3. Connect the M6 lug of the ground cable to a ground point on the cabinet, Tighten the M6 screw with a torque of 4.8 N·m.



----End

Follow-up Procedure

Perform the following operations after connecting the ground cable:

- Check that the ground cable is securely connected to the ground points.
- Use a multimeter to measure the resistance between the ground points at two ends of the ground cable. The resistance must be smaller than 5 ohm.

7.8.2 Connecting the Console Cable

Context

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connection may damage interface modules or the router.

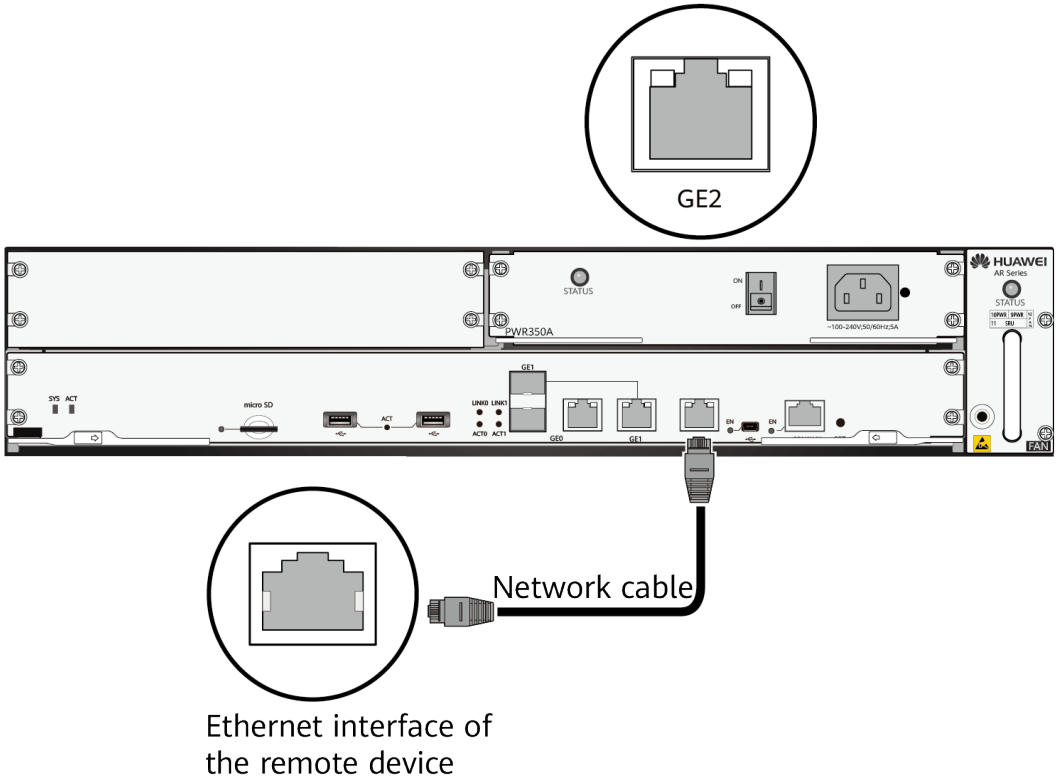
Tools and Accessories

- Console cable

Procedure

Step 1 Connect the console cable.

1. Connect the RJ45 connector of the console cable to the CONSOLE interface (RJ45) of the router.
2. Connect the DB9 connector of the console cable to the serial interface (COM) of a management PC.



----End

Follow-up Procedure

After the console cable is connected, you need to configure terminal emulation software on the management PC to log in to the command configuration interface of the router.

NOTE

For details about how to use specific terminal emulation software, see the related software user guide or online help.

For details about how to log in to the device through the console port for the first time, see **Basic Configuration Guide** > **First Login to a Device** > **Logging In to a Device** > **Logging In to a Device for the First Time Through a Console Port** in the "CLI-based Configuration".

7.8.3 Connecting Ethernet Cables

Context

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connection may damage interface modules or the router.

Tools and Accessories

- Diagonal pliers
- Cable ties
- Marker
- Network cables (separately purchased)
- Network cable labels

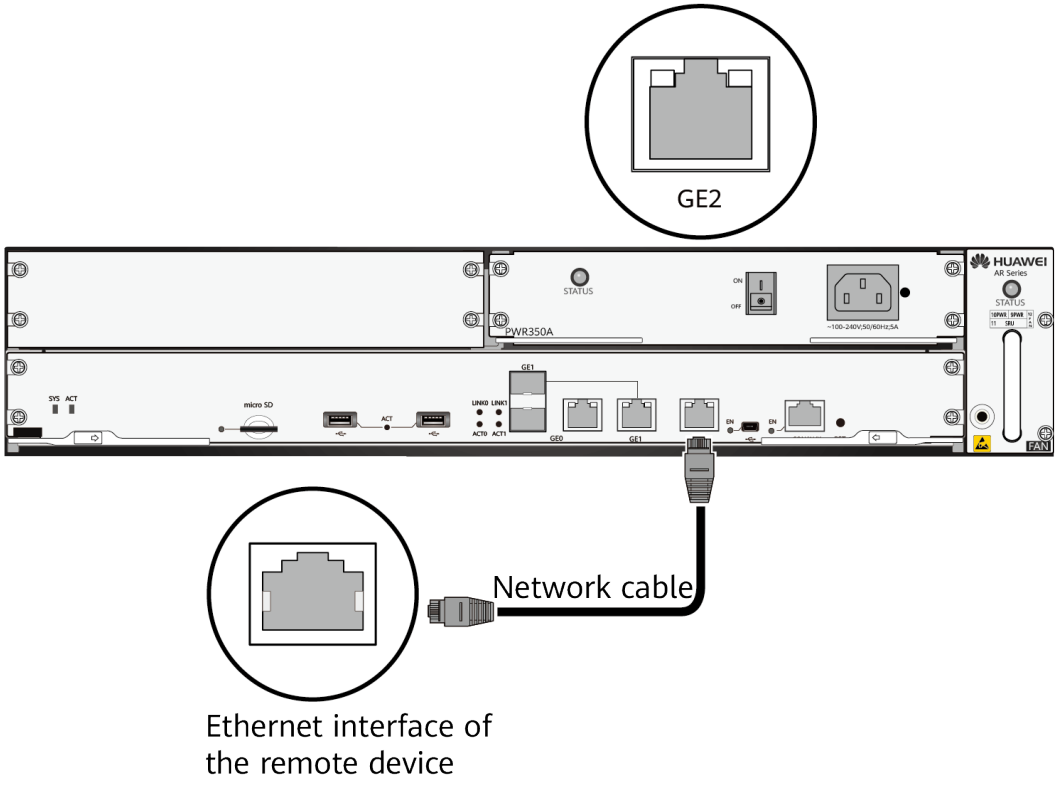
Procedure

Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Attach temporary labels to both ends of each Ethernet cable and write numbers on the labels to identify the Ethernet cables. For details, see **13.3 Engineering Labels for Network Cables**.

Step 3 Lead the Ethernet cables into the cabinet from the top cable inlet (for overhead cabling) or bottom cable inlet (for on-ground cabling), and route the cables from one side of the cabinet.

Step 4 Connect one end of an Ethernet cable to an Ethernet interface of the router and the other end to an Ethernet interface of the remote device.



Step 5 Arrange the Ethernet cables to make them parallel, and then bundle them with cable ties. Use diagonal pliers to cut off redundant cable ties.

Step 6 Remove the temporary labels from the Ethernet cables, and then attach formal labels 2 cm away from the connectors at both ends.

----End

Follow-up Procedure

Check the following items after connecting Ethernet cables:

- Labels are correctly filled and securely attached to cables, with texts facing the same direction.
- Cables and connectors are complete, intact, and tightly connected.

7.8.4 Connecting Optical Modules and Optical Fibers

Context

CAUTION

Invisible laser beams will cause eye damage. Do not look into bores of optical modules or connectors of optical fibers without eye protection.

NOTICE

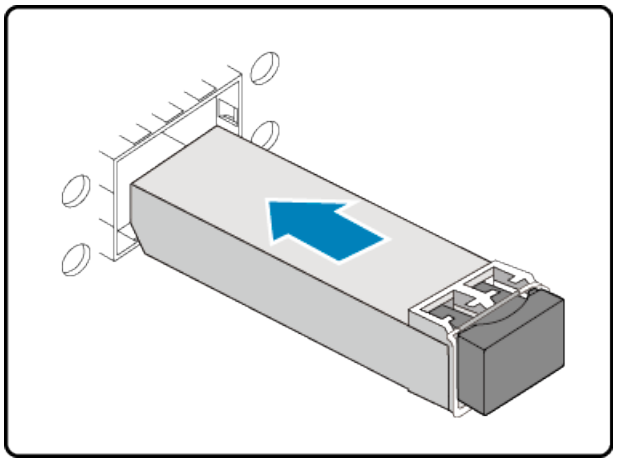
- A router must use Huawei-certified optical modules. Non-Huawei-certified optical modules cannot ensure transmission reliability and may affect service stability. Huawei is not responsible for any problem caused by the use of non-Huawei-certified optical modules and will not fix such problems.
- Do not over bend optical fibers. The bend radius of an optical fiber should be no less than 40 mm.
- Do not bundle optical fibers too tight. Otherwise, optical fiber performance may be degraded, affecting communications between devices.

Procedure

Step 1 Gently push an optical module into an optical interface until you hear a click.

NOTE

If the optical module cannot be completely inserted into the optical interface, do not force it into the interface. Turn the optical module 180 degrees over and try again.



Step 2 Remove the dust plug from the optical module.

NOTE

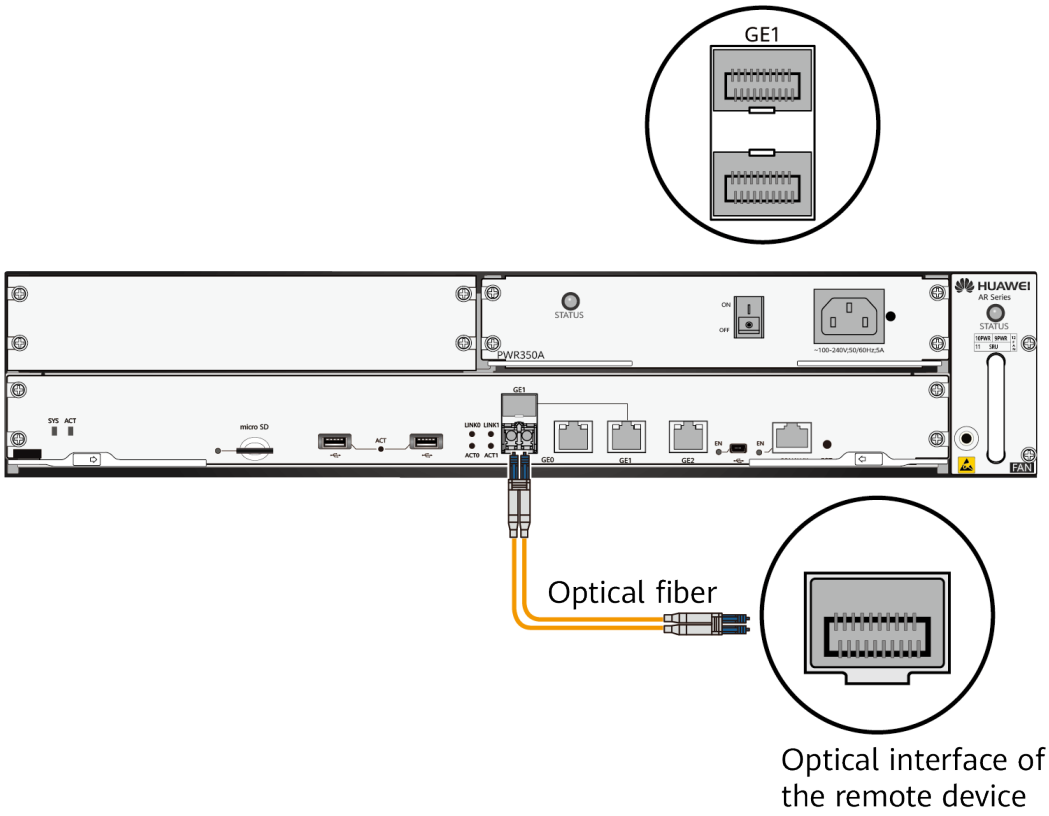
Place the dust plug in an appropriate place. After optical fibers are removed from the optical module, cover the optical module with the dust plug to protect it from dust.

Step 3 Before connecting optical fibers, attach temporary labels on both ends of each optical fiber to identify them. For details on how to make labels of optical fibers, see **13.2 Engineering Labels for Optical Fibers**.

Step 4 Remove the dust caps from the fiber connectors. Connect one end of the optical fiber to the optical module and the other end to the remote device.

NOTE

Connect the receive and transmit ends of the fiber connector according to the identifiers on receive and transmit bores of the optical module. Do not connect the two ends reversely.



Step 5 Arrange the optical fibers to make them parallel and bundle them with fiber binding tape at an interval of 150 mm to 300 mm.

Step 6 Replace all the temporary labels with formal labels on the optical fibers.

----End

7.8.5 Connecting the AC Power Cable

Context

DANGER

To avoid electric shock, do not connect power cables while the power is on.

NOTICE

- Do not power on a router before you finish connecting power cables and network cables.
- Each router has its own power cables delivered as accessories. The power cables can only be used on the router in the same package and cannot be used on any other device.

NOTE

The AC power cable parameters vary in different countries or regions. The figures in this section are for reference only and may differ from the cables delivered.

Tools and Accessories

- ESD wrist strap
- AC Power Cable
- AC terminal locking latch

Procedure

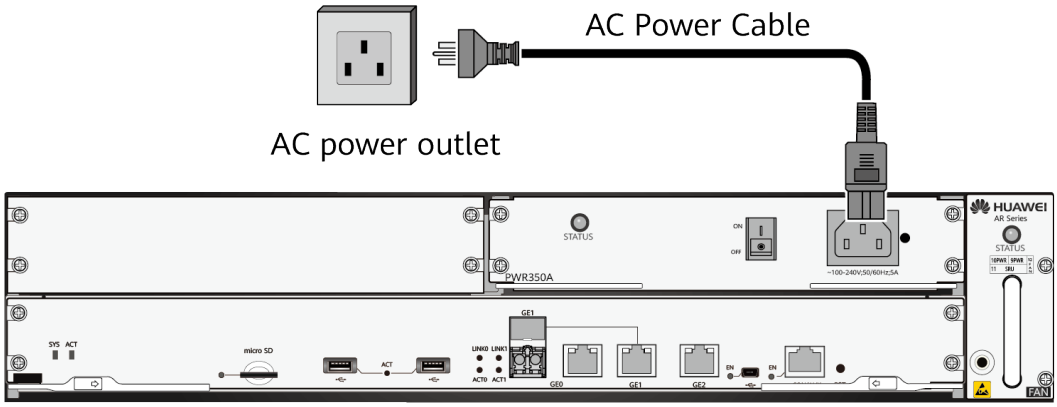
Step 1 Verify that the router is reliably grounded.

Step 2 Set the power switch to OFF.

Step 3 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

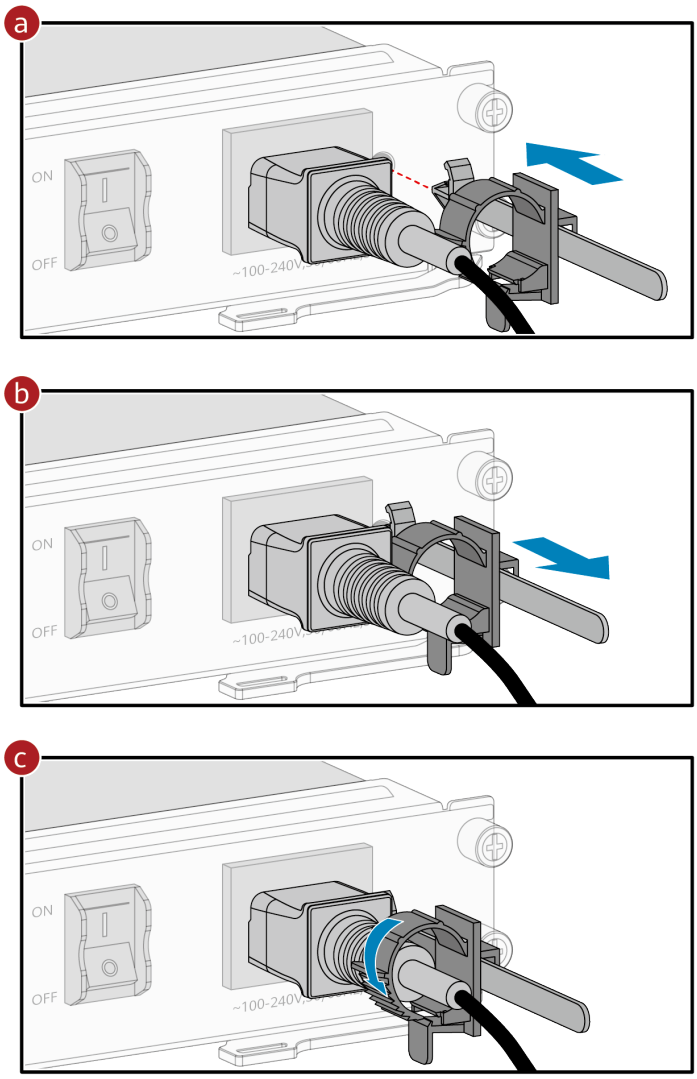
Step 4 Connect the AC power cable.

1. Connect the one end of the AC power cable to the power socket on the AC power module.
2. Connect the other end of the AC power cable to an AC power outlet.



Step 5 Connect the AC terminal locking latch.

1. Insert the AC terminal locking latch into the jack beside the power socket.
2. Adjust the AC terminal locking latch to a proper position.
3. Lock the AC power cable with the AC terminal locking latch.



----End

Follow-up Procedure

Perform the following operations after connecting the AC power cable:

- Verify that the AC power cable is securely connected to the power socket on the router.
- If multiple routers are installed, attach labels to both ends of each power cable and write numbers on the labels to identify them.

7.8.6 Connecting DC Power Cables

Context

DANGER

To avoid electric shock, do not connect power cables while the power is on.

NOTICE

- Do not power on a router before you finish connecting power cables and network cables.
- Each router has its own power cables delivered as accessories. The power cables can only be used on the router in the same package and cannot be used on any other device.

NOTE

The DC power cable parameters vary in different countries or regions. The figures in this section are for reference only and may differ from the cables delivered.

Tools and Accessories

- ESD wrist strap
- DC power cables
- Cord end terminal
- OT bare crimp terminal

Procedure

Step 1 Verify that the router is reliably grounded.

Step 2 Set the power switch to OFF.

Step 3 Wear an ESD wrist strap. Ensure that the ESD wrist strap is grounded and in a close contact with your wrist.

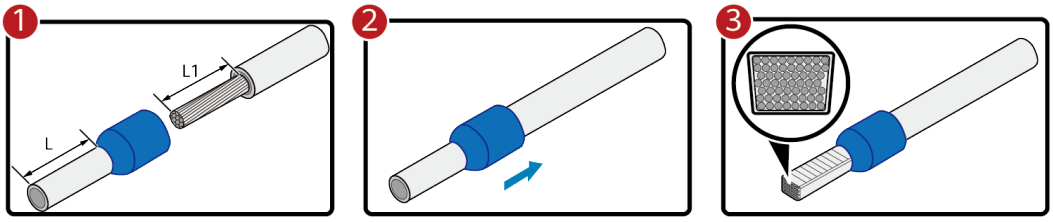
Step 4 Install cord end terminals or OT bare crimp terminals on the DC power cables.

NOTE

The cord end terminals and OT bare crimp terminals are delivered in the installation accessory package. When using a DC power module in the router, select the terminals as required.

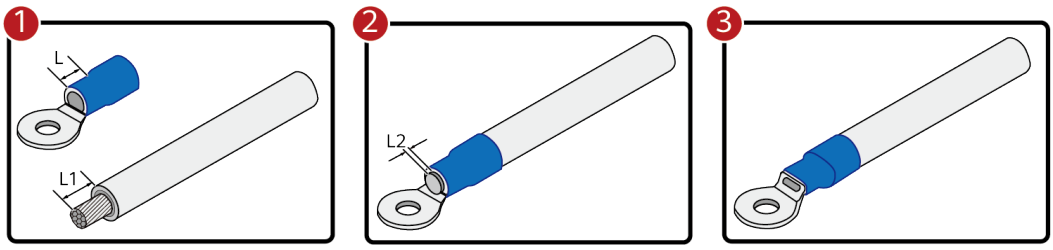
- If the DC power supply system for the router requires cord end terminals, assemble the DC power cables by referring to **Figure 7-13**.

Figure 7-13 Installing a cord end terminal



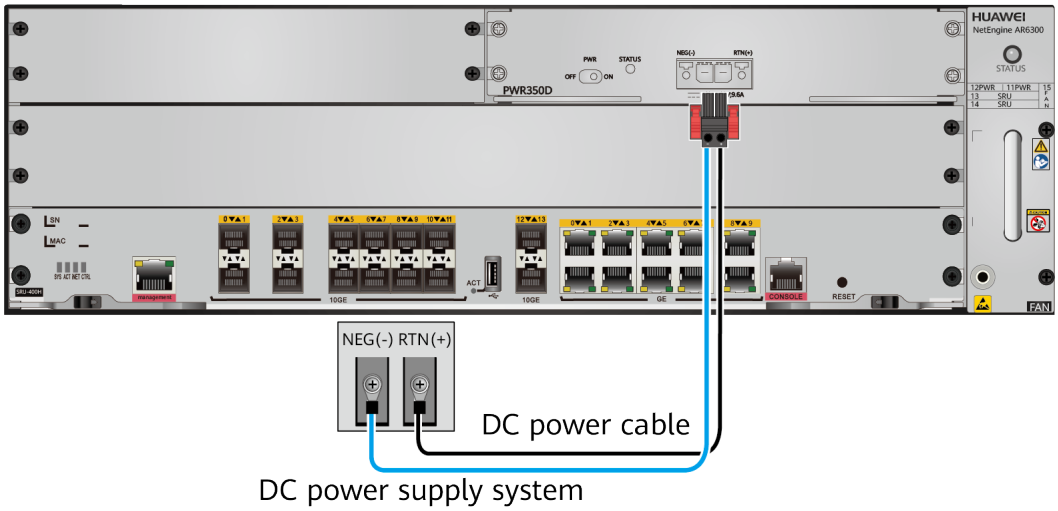
- If the DC power supply system for the router requires OT bare crimp terminals, assemble the DC power cables by referring to **Figure 7-14**.

Figure 7-14 Installing an OT bare crimp terminal



Step 5 Connect the DC power cables.

1. Insert the one end of the DC power cables to the DC power terminals on the DC power module.
2. Connect the other end of the power cables to output terminals of the external DC power supply system.



----End

Follow-up Procedure

Perform the following operations after connecting the DC power cables:

- Verify that DC power cables are securely connected to the power terminals.
- If multiple routers are installed, attach labels to both ends of each power cable and write numbers on the labels to identify them.

7.9 Powering On and Off the Router

Context

Before you power on the router, check and ensure the following:

- The power module is correctly connected.
- The input voltage is in the range of 90 V AC to 264 V AC.

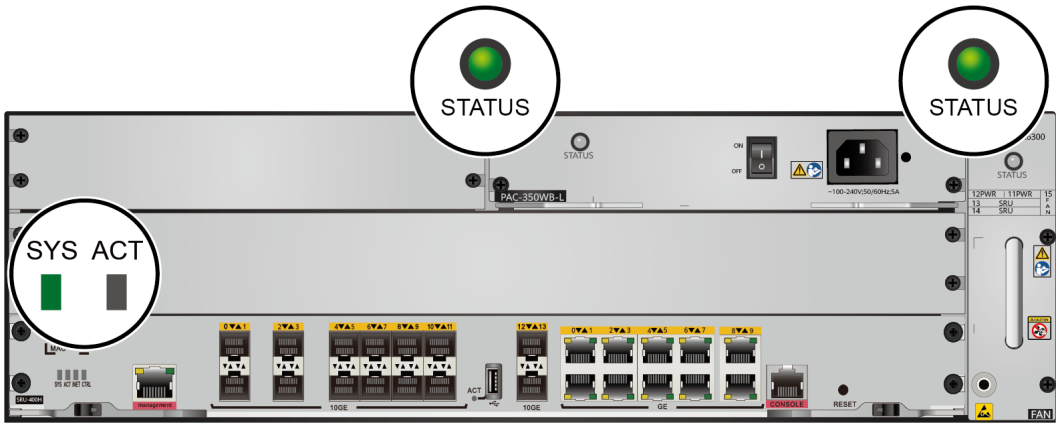
Procedure

- Power on the router.

  Turn on the power switch of the power supply system, and then turn on the power switch on the router to start the router.

  After the router starts, check the STATUS indicator of the power module first. If this indicator is in normal state, check the other indicators of the router. **Figure 7-15** describes the indicator states when the router is running normally.

  Figure 7-15 Normal indicator states on the router

Hardware Module	Indicator	Description
Power module	STATUS	Steady green: The output power is within the allowed range.
MPU	SYS	Slow blinking green: The system is running properly.
Fan module	STATUS	Slow blinking green: The fan module is running properly.

- Power off the router.

  NOTICE

  Powering off the router will interrupt all the services on the router. Exercise caution when you perform this operation.

  Turn off the power switch on the router, and then turn off the power switch of the power supply system.

----End

Follow-up Procedure

After the router starts, you can log in to its CLI to configure, manage, and maintain the router. For details, see the *CLI-based Configuration*.

8 Post-Installation Checks

Table 8-1 lists the post-installation items to be checked.

Table 8-1 Post-installation checklist

No.	Check Item	Method
1	The installation position of the router meets the requirement in the associated engineering design document.	Observe
2	The surfaces of the router are clean and smooth, free from fingerprints, stains, and scratches.	Observe
3	Components are correctly installed in the cabinet. No component is loose or damaged.	Observe
4	All screws are correctly tightened.	Observe
5	There are no objects on the chassis.	Observe
6	There is at least 50 mm (2.0 in.) clearance at the left and right sides of the chassis for heat dissipation.	Measure
7	Signal cables are not damaged or broken and have no splices.	Observe
8	Signal cable connectors are clean, intact, and correctly connected. Wires of each signal cable are securely clamped in the connectors.	Observe
9	Each signal cable has labels attached at both ends, with clear text facing the same direction.	Observe
10	The power cables and ground cable are all copper wires, and are not spliced or damaged.	Observe

No.	Check Item	Method
11	The power cables and ground cable are routed in compliance with the associated engineering design document and meet the power distribution requirements.	Observe
12	The power cables and ground cable are securely connected in compliance with regulations. Ground cable lugs are protected with spring washers on flat washers.	Observe
13	The power cables and ground cable are separated from the signal cables.	Observe
14	The power cables and ground cable are routed straightly and bundled neatly. Sufficient slack is left at the bent part of the cables.	Observe
15	Optical fibers routed out of the cabinet are protected. For example, they are routed in a corrugated pipe or trough.	Observe
16	The bend radius of optical fibers is 20 times larger than their diameter. Generally, the bend radius is larger than 40 mm.	Measure
17	Optical fibers are bundled neatly using binding tape with suitable force.	Observe
18	No signal cables are routed near the heat vents on the cabinet.	Observe
19	Cables in the cabinet do not cross each other and cables outside the cabinet are bundled.	Observe

9 Logging In to a Device

9.1 Using the console interface login settings

Prerequisites

nstall third-party terminal simulation software on the PC by referring to user manual or online help.

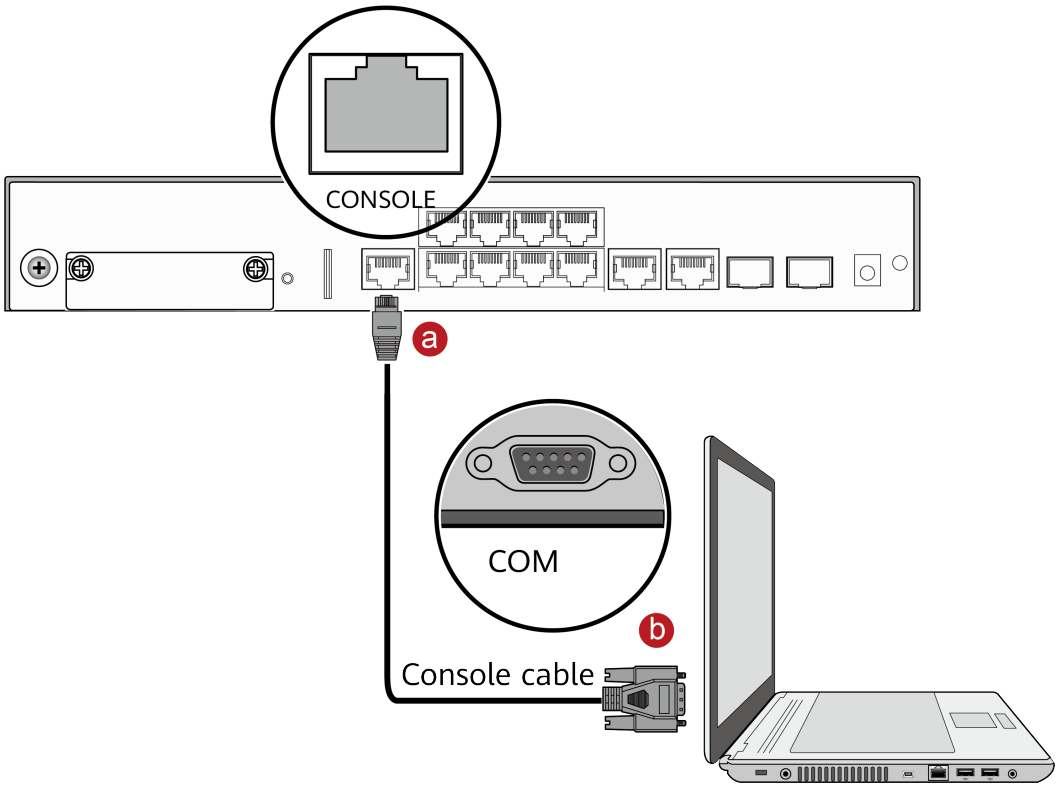
The password entered in interactive mode is not displayed on the screen.

Procedure

Step 1 Turn on the power switch on the external power supply and log in to the router after the SYS indicator blinks once every 2 seconds (indicating that the router is running properly).

Step 2 Use a console cable to connect a PC to the console interface of the router.

1. Connect the RJ45 connector of the console cable to the CONSOLE interface (RJ45) of the router.
2. Connect the DB9 connector of the console cable to the serial interface (COM) of a management PC.



Step 3 Start the terminal simulation software, create a connection, configure the connected port, and set communication parameters as follows.

- Transmission rate: 9600
- Data bit (B): 8
- Parity bit: None
- Stop bit (S): 1
- Flow control mode: None

Step 4 Press Enter until the following information is displayed. (The following information is only for reference)

```
Login authentication
Warning: An initial username and password are required for the first login via the console.
Set a username and password and keep them safe.Otherwise you will not be able to login via the
console.
New Username:
Password:
Confirm password:
The account create success.
Info:Configuration console exit, please retry to log on
```

NOTE

The default username and password are available in *AR Router Default Usernames and Passwords* (**Enterprise Network** or **Carrier**). If you have not obtained the access permission of the document, see **Help** on the website to find out how to obtain it.

----End

Follow-up Procedure

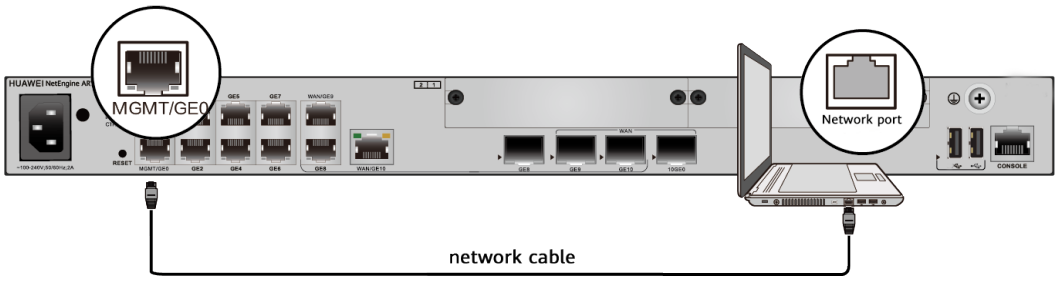
After successful login, you can configure the router on the command line interface. For more information, see the CLI-based Configuration of the product.

9.2 Using the web login settings

Procedure

Step 1 Turn on the power switch on the external power supply and log in to the router after the SYS indicator blinks once every 2 seconds (indicating that the router is running properly).

Step 2 Use a network cable to connect a PC to the management interface marked with the MGMT silkscreen on the router.



Step 3 Assign the PC with an IP address on the same network segment as the router IP address. The available IPaddresses are in the range from 192.168.1.2 to 192.168.1.254, and the subnet mask is 255.255.255.0.

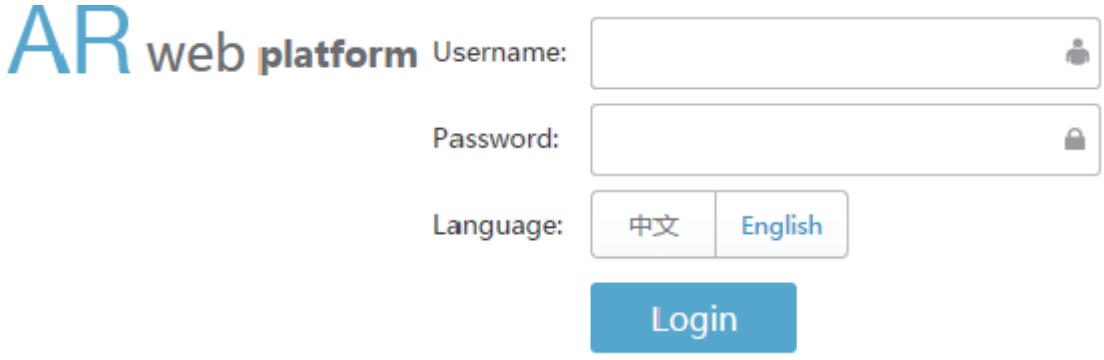
NOTE

For the AR300 and AR700 series routers, in V300R022C00 and later versions, the configurable IP address ranges from 192.168. 112.2 to 192.168. 112.254.

Step 4 Start the browser, enter the URL https://192.168.1.1 in the address box, press Enter to access the page for creating a user. After you configure theuser name and password, the web system login page is automatically displayed.

NOTE

For the AR300 and AR700 series routers, in V300R022C00 and later versions, the login address of the web system is 192.168.112.1.



Step 5 Enter the user name and password, and click Login to access the web page.

----End

Follow-up Procedure

On the web page, you can configure the router. For more information, see the Web-based Configuration of the product.

10 Appendix A On-site Cable Assembly and Installation

10.1 Cable Assembly Precautions

Checking the Appearance of Cables

- If the cable jacket or insulation is visibly dirty, clean it before assembly.
- If the jacket or insulation of a cable has visible damage, irreparable scuffing, or other defects, do not use the cable.
- If the shield layer of a cable is damaged, do not use the cable.
- If the cable jacket or insulation cracks after the cable is bent or twisted, discard this cable and check whether other cables have the same problem. If other cables have the same problem, replace these cables.

Checking the Appearance of Connectors

- Do not use connectors with visible defects, damage, rust or scuffing.
- Do not use connectors if their shells or pins have exposed part or uneven plating, or their pins are lost, broken, or bent.
- Do not use connectors that have dirt on their pins or in their jacks or if there are conductors between pins or between pins and the shell.

Precautions for Assembly

- Use dedicated tools or tools delivered by Huawei and follow the methods given here during assembly.
- Hold terminals of cables instead of pulling the cables themselves when installing or removing cable components.
- Take the following precautions when cutting or stripping cables:
  - Make cables slightly longer than necessary.
  - Coil cables longer than 2 m (6.56 ft) after cutting. Bind and fasten the coils using bundling ropes. The inner diameters of the coils should be larger than 20 times the outer diameters of the cables.
  - When stripping the jackets of cables, avoid damaging the shield layers (braid or aluminum foil), insulation, core conductors, and other jackets that do not need to be stripped.
  - After assembling cables, cut all visible cross sections of jackets to ensure that the cross sections are arranged neatly.
  - Do not touch the core conductors of cables with your hands. Terminate exposed conductors in a timely way after stripping off insulation so that the surface of the conductors does not become oxidized.
- Take the following precautions when crimping and connecting cables or connectors:
  - The terminals and conductors should be connected tightly after they are crimped. They should not be moved or turned.
  - Cut all the exposed copper wires.
  - Try to avoid a second crimping of sleeves.
  - Keep all the conductors clean and aligned.

NOTE

The connectors, cables, and tools provided by different vendors may be different. The figures in this document are for your reference only.

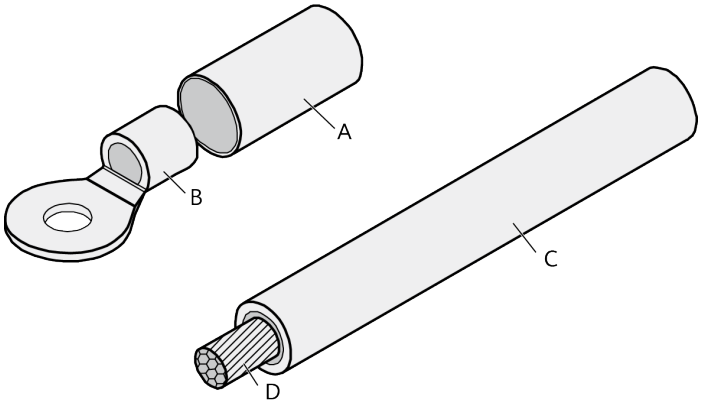
10.2 Assembling Power Cables

10.2.1 Assembling the OT Terminal and Power Cable

Context

Figure 10-1 shows the components of an OT terminal and a power cable.

Figure 10-1 Components of an OT terminal and a power cable

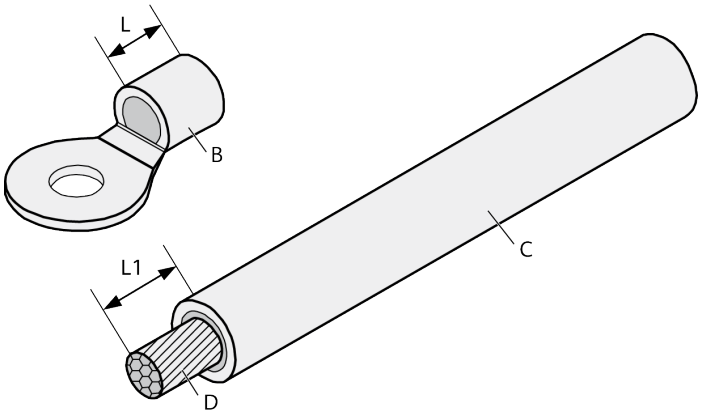


A. Heat-shrinkable tubing | B. Bare crimping terminal | C. Insulation | D. Conductor

Procedure

Step 1 Based on the cross-sectional area of the cable conductor, strip a length of insulation coating C to expose the conductor D of length L1, as shown in **Figure 10-2**. The recommended values of L1 are listed in **Table 10-1**.

Figure 10-2 Stripping a power cable (OT terminal)



NOTICE

- When you strip a power cable, do not damage the conductor of the cable.
- If the bare crimping terminal is not provided by Huawei, the value of L1 is 1 mm (0.04 in.) to 2 mm (0.08 in.) greater than the value of L.

Table 10-1 Mapping between the cross-sectional area of the conductor and the value of L1

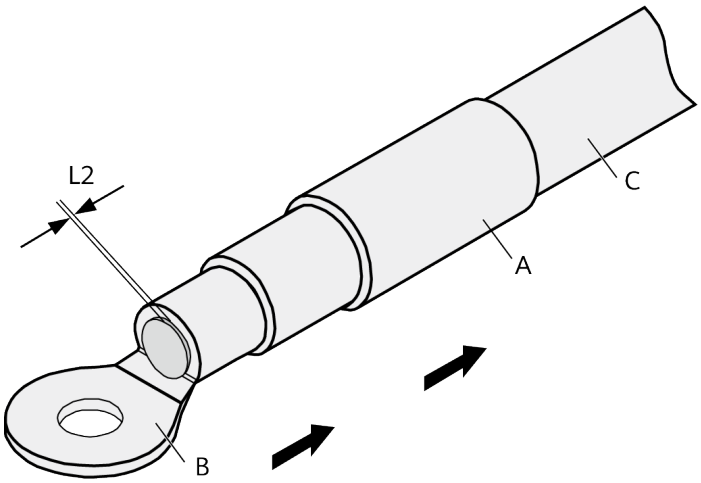
Cross-Sectional Area of Conductor (mm^2 ($in.^2$))	Value of L1 (mm (in.))	Cross-Sectional Area of Conductor (mm^2 ($in.^2$))	Value of L1 (mm (in.))
1 (0.002)	7 (0.28)	10 (0.015)	11 (0.43)
1.5 (0.002)	7 (0.28)	16 (0.025)	13 (0.51)
2.5 (0.004)	7 (0.28)	25 (0.039)	14 (0.55)
4 (0.006)	8 (0.31)	35 (0.054)	16 (0.63)
6 (0.009)	9 (0.35)	50 (0.077)	16 (0.63)

NOTE

If you are proficient in assembling OT terminals and power cables, you can obtain the value of L1 by comparing the part to be crimped with the power cable.

Step 2 Put the heat-shrinkable (A) tubing onto the bare crimping terminal, as shown in **Figure 10-3**.

Figure 10-3 Putting the heat shrink tubing onto the bare crimping terminal



Step 3 Put the OT terminal B onto the exposed conductor, and ensure that the OT terminal is in good contact with the insulation coating C, as shown in **Figure 10-3**.

NOTICE

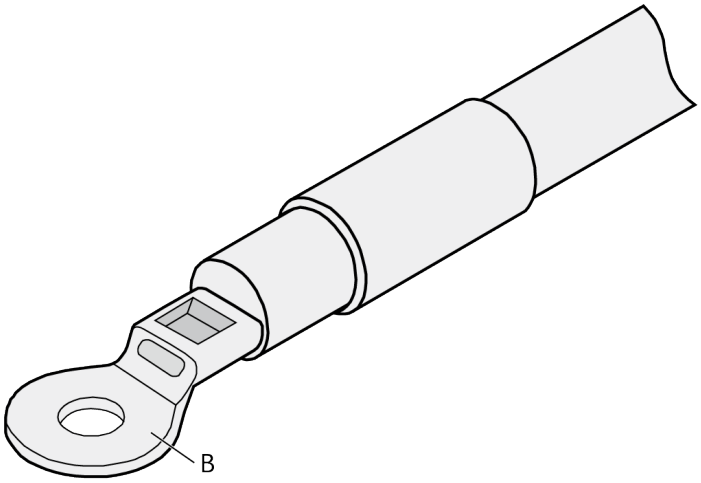
After the conductor is fed into the OT terminal, the protruding part of the conductor, or L2 in **Figure 10-3**, must not be longer than 2 mm (0.08 in.).

Step 4 Crimp the joint parts of the bare crimping terminal and the conductor, as shown in **Figure 10-4**.

NOTE

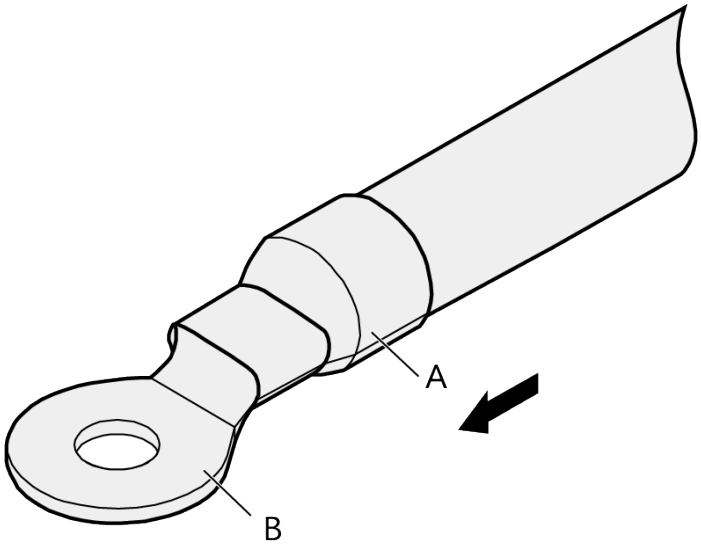
The shapes of crimped parts may vary with the crimping dies.

Figure 10-4 Crimping the joint parts of the bare crimping terminal and the conductor (OT terminal)



Step 5 Push the heat shrink tubing (A) toward the connector until the tube covers the crimped part, and then use a heat gun to heat the tube, as shown in **Figure 10-5**.

Figure 10-5 Heating the heat shrink tubing (OT terminal)



NOTICE

Stop heating the shrink tubing when the connector is securely locked in the shrink tubing. Do not heat the shrink tubing too long as this may damage the insulation coating.

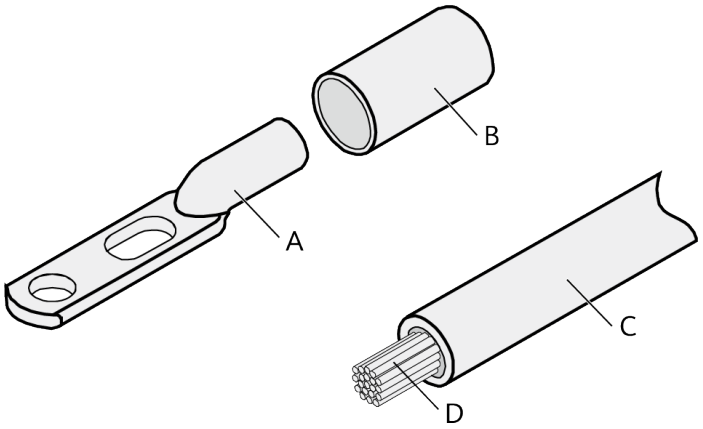
----End

10.2.2 Assembling the JG Terminal and Power Cable

Context

Figure 10-6 shows the components of a JG terminal and a power cable.

Figure 10-6 Components of a JG terminal and a power cable



A. JG terminal | B. Heat-shrinkable tubing | C. Insulation layer of a power cable | D. Conductor of a power cable

Procedure

Step 1 Strip a part of the insulation to expose the cable conductor with a length of L, as shown in Figure 10-7. The recommended values of L are listed in Table 10-2.

NOTICE

- When you strip a power cable, do not damage the conductor of the cable.
- If the bare crimping terminal is not provided by Huawei, you can adjust the value of L as required.

Figure 10-7 Stripping a power cable (JG terminal)

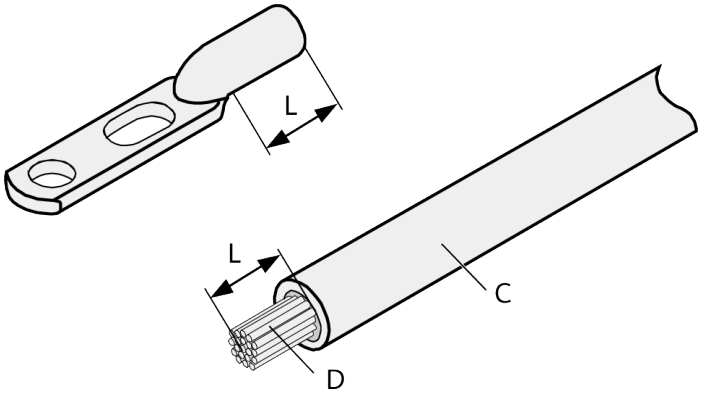
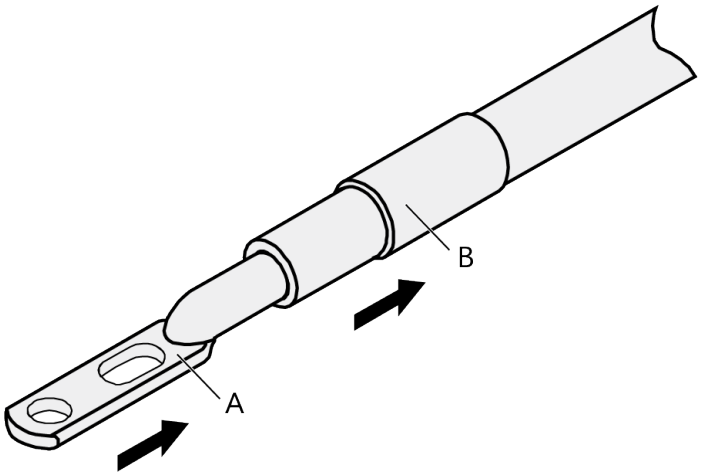


Table 10-2 Mapping between the cross-sectional area of the conductor and the value of L

Cross-Sectional Area of Conductor (mm^2($in.^2$))	Value of L (mm(in.))
16 (0.025)	13 (0.51)
25 (0.039)	14 (0.55)
35 (0.054)	16 (0.63)
50 (0.077)	16 (0.63)

Step 2 Put the heat shrink tubing onto the bare crimping terminal, as shown in **Figure 10-8**.

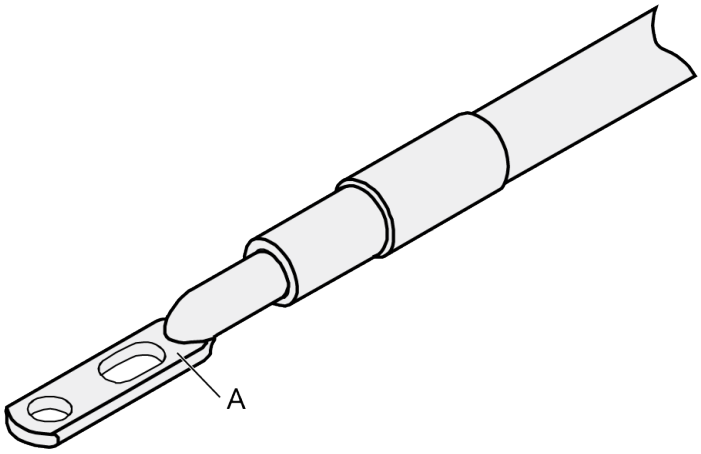
Figure 10-8 Putting the heat shrink tubing onto the bare crimping terminal



Step 3 Put the bare crimping terminal onto the exposed conductor, and ensure that the bare crimping terminal is in good contact with the insulation of the power cable, as shown in **Figure 10-8**.

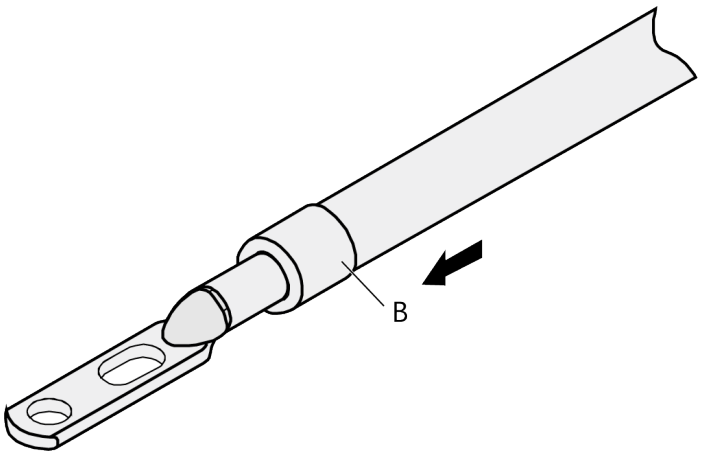
Step 4 Crimp the joint parts of the bare crimping terminal and the conductor, as shown in **Figure 10-9**.

Figure 10-9 Crimping the joint parts of the bare crimping terminal and the conductor (JG terminal)



Step 5 Push the heat shrink tubing toward the connector until the tube covers the crimped part, and then use a heat gun to heat the tube, as shown in **Figure 10-10**.

Figure 10-10 Heating the heat shrink tubing (JG terminal)



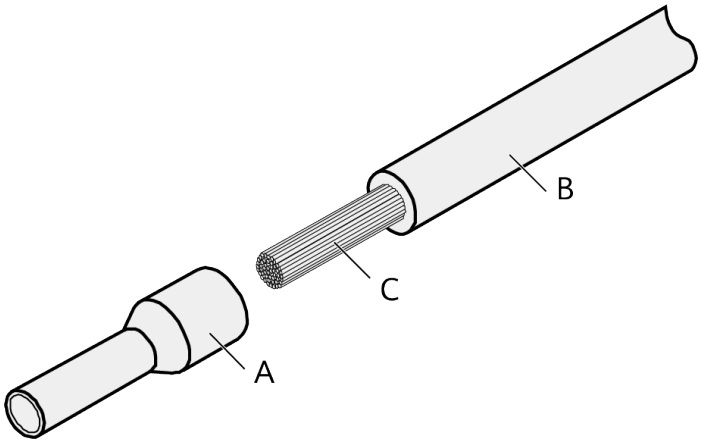
----End

10.2.3 Assembling the Cord End Terminal and the Power Cable

Context

Figure 10-11 shows the components of a cord end terminal and a power cable.

Figure 10-11 Components of a cord end terminal and a power cable



A. Cord end terminal | B. Insulation layer of a power cable | C. Conductor of a power cable

Procedure

Step 1 Strip a part of the insulation to expose the cable conductor with a length of L1, as shown in **Figure 10-12**. The recommended values of L1 are listed in **Table 10-3**.

NOTICE

When you strip a power cable, do not damage the conductor of the cable.

Figure 10-12 Stripping a power cable (cord end terminal)

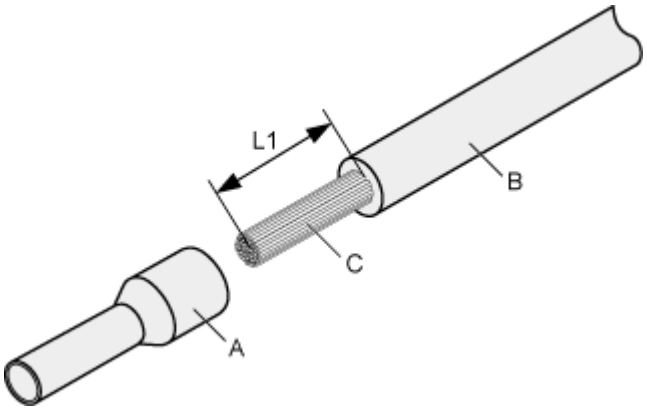


Table 10-3 Mapping between the cross-sectional area of the conductor and the value of L1

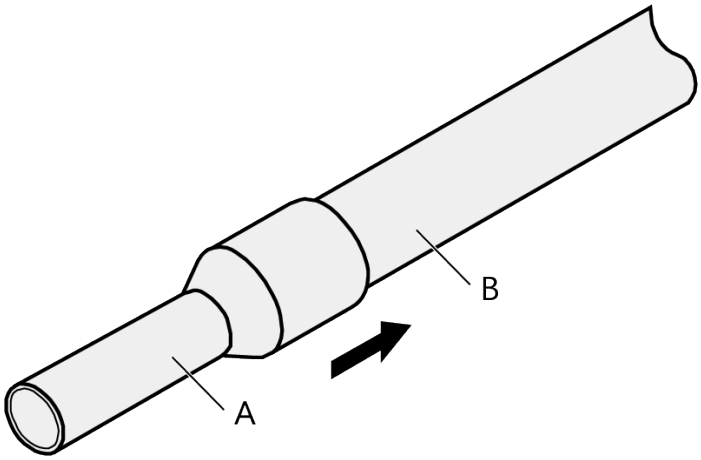
Cross-Sectional Area of Conductor (mm^2($in.^2$))	Value of L1 (mm(in.))	Cross-Sectional Area of Conductor (mm^2($in.^2$))	Value of L1 (mm(in.))
1 (0.002)	8 (0.31)	10 (0.015)	15 (0.59)
1.5 (0.002)	10 (0.39)	16 (0.025)	15 (0.59)
2.5 (0.004)	10 (0.39)	25 (0.039)	18 (0.71)
4 (0.006)	12 (0.47)	35 (0.054)	19 (0.75)
6 (0.009)	14 (0.55)	50 (0.077)	26 (1.02)

Step 2 Put the cord end terminal onto the conductor, and ensure that the conductor is aligned with the edge of the cord end terminal, as shown in **Figure 10-13**.

NOTICE

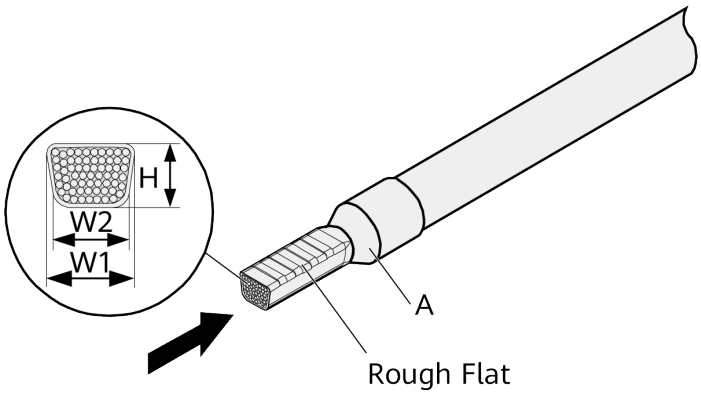
After the conductor is fed into the cord end terminal, the protruding part of the conductor must not be longer than 1 mm (0.04 in.).

Figure 10-13 Putting the cord end terminal onto the conductor



Step 3 Crimp the joint parts of the cord end terminal and the conductor, as shown in **Figure 10-14**.

Figure 10-14 Crimping the cord end terminal and the conductor



Step 4 Check the maximum width of the tubular crimped terminal. The maximum width of a tubular crimped terminal is listed in **Table 10-4**.

Table 10-4 Maximum width of a tubular crimped terminal

Cross-Sectional Area of Tubular Terminal (mm^2($in.^2$))	Maximum Width of Crimped Terminal W1 (mm(in.))
0.25 (0.0004)	1 (0.04)
0.5 (0.0008)	1 (0.04)
1.0 (0.0015)	1.5 (0.06)
1.5 (0.0023)	1.5 (0.06)
2.5 (0.0039)	2.4 (0.09)
4 (0.006)	3.1 (0.12)
6 (0.009)	4 (0.16)
10 (0.015)	5.3 (0.21)
16 (0.025)	6 (0.24)
25 (0.039)	8.7 (0.34)
35 (0.054)	10 (0.39)

----End

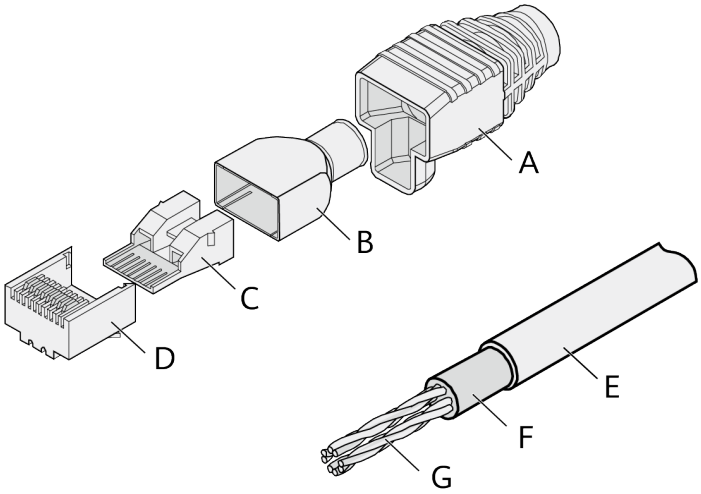
10.3 Assembling Ethernet Cables

10.3.1 Assembling the Shielded RJ45 Connector and Ethernet Cable

Context

Figure 10-15 shows the components of an RJ45 connector and a shielded Ethernet cable.

Figure 10-15 Shielded RJ45 connector and cable

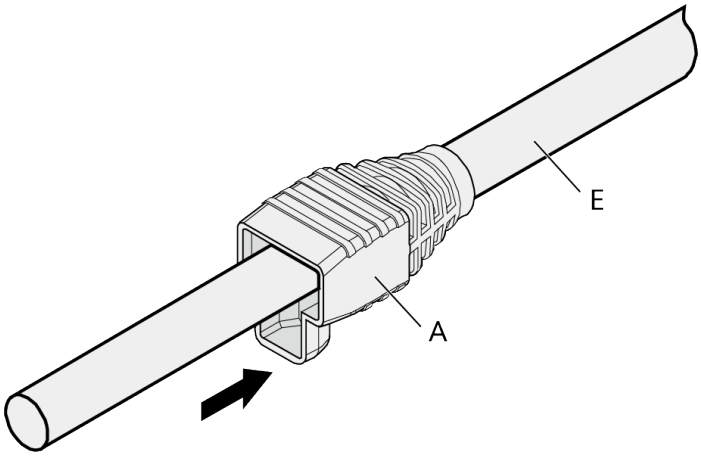


A. Jacket of connector	B. Metal shell of connector	C. Wire holder of connector	D. Plug of connector
E. Jacket of Ethernet cable	F. Shield layer of Ethernet cable	G. Twisted-pair wires	-

Procedure

Step 1 Fit the jacket of the connector onto the Ethernet cable, as shown in Figure 10-16.

Figure 10-16 Fitting the jacket of the connector onto the Ethernet cable

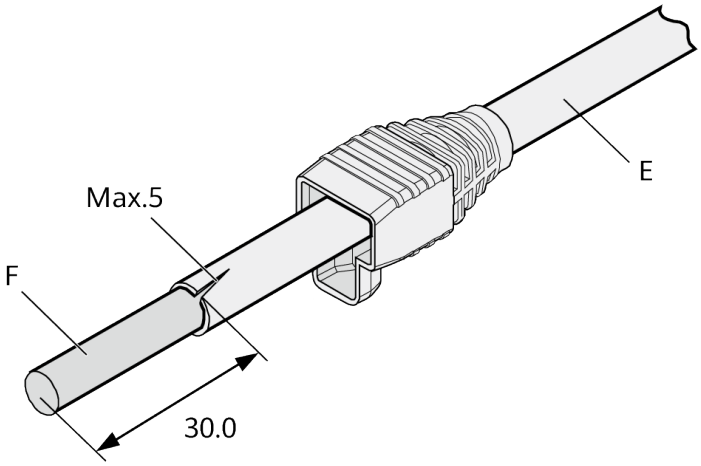


Step 2 Remove a 30 mm (1.18 in.) long section of the jacket, cut off the nylon twine inside the jacket, and cut a no more than 5 mm (0.20 in.) cleft in the jacket, as shown in Figure 10-17.

NOTICE

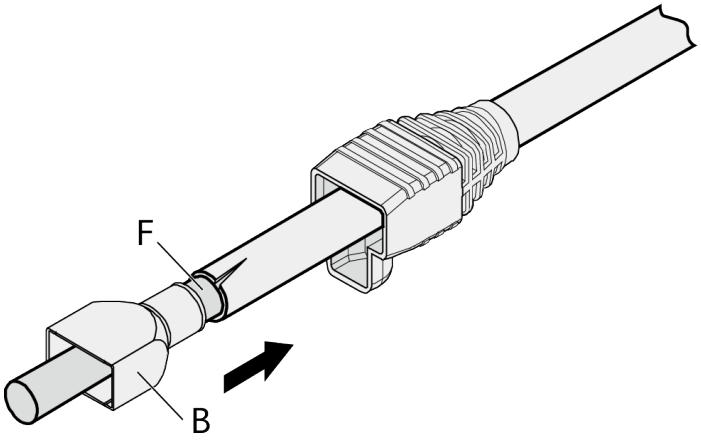
- When you remove a section of the jacket, do not damage the shield layer of the twisted-pair cable.
- When you remove the shield layer, do not damage the insulation of the twisted-pair cable.

Figure 10-17 Removing the jacket of a twisted-pair cable (unit: mm (in.))



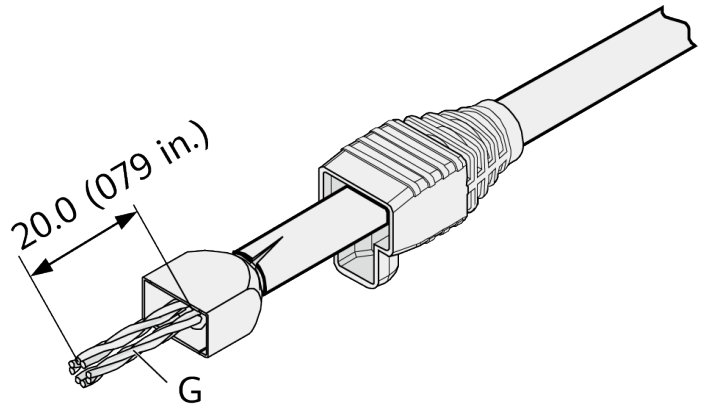
Step 3 Fit the metal shell onto the twisted-pair cable. The shield layer is covered by the metal shell, as shown in **Figure 10-18**.

Figure 10-18 Fitting the metal shell onto the twisted-pair cable



Step 4 Fit the metal shell onto the twisted-pair cable until the shield layer is covered completely. Along the edge of the metal shell, cut off the aluminum foil shield layer and ensure that there is no surplus copper wire. The exposed twisted-pair cable is about 20 mm (0.79 in.) long, as shown in **Figure 10-19**.

Figure 10-19 Removing the shield layer of a twisted-pair cable (unit: mm (in.))



Step 5 Lead the four pairs of twisted-pair wires through the wire holder, as shown in **Figure 10-20** and **Figure 10-21**. Ensure that the colored wires are in the correct location in the cable.

Figure 10-20 Leading wires through the wire holder

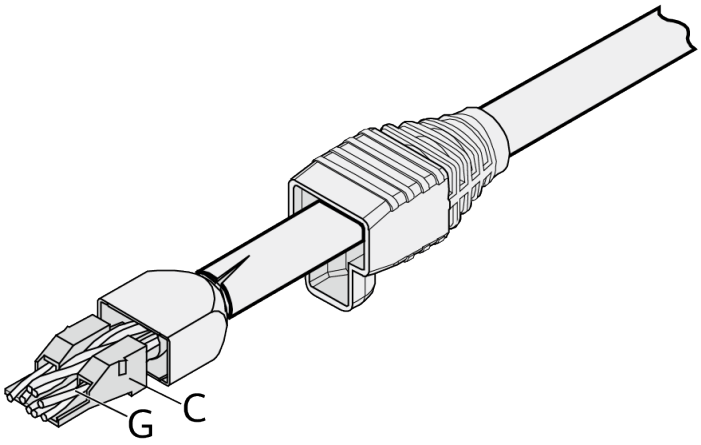
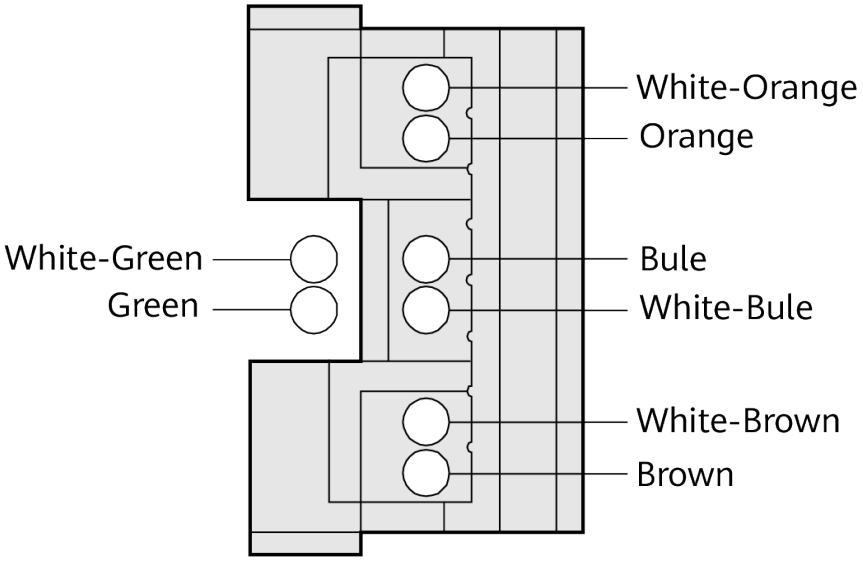


Figure 10-21 Cable locations in a wire holder



Step 6 Align the four pairs of cables in the holder, as shown in **Figure 10-22**. The connections between the wires and the pins are shown in **Figure 10-23** and listed in **Table 10-5**.

Figure 10-22 Four pairs of cables on a wire holder

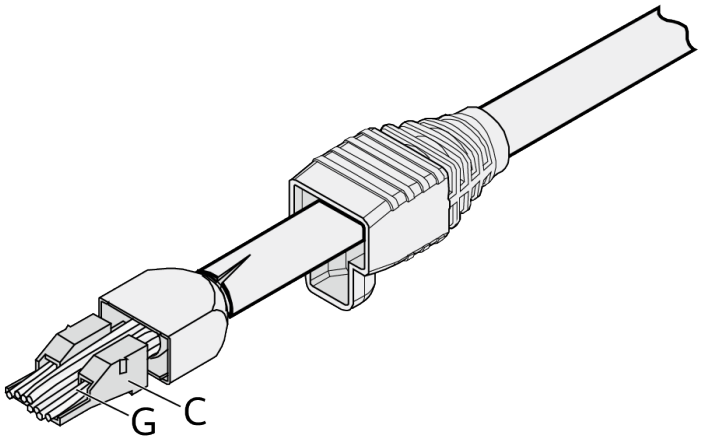


Figure 10-23 Connections between wires and pins

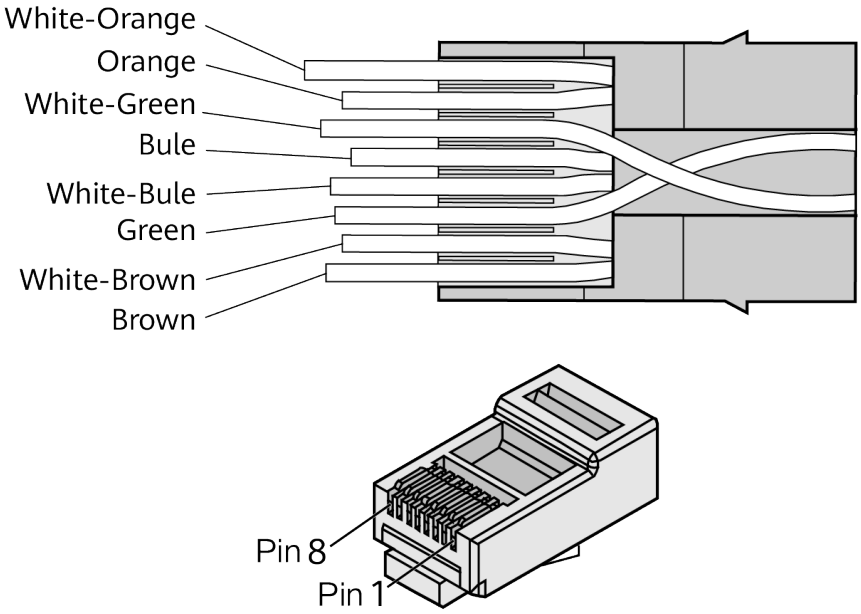


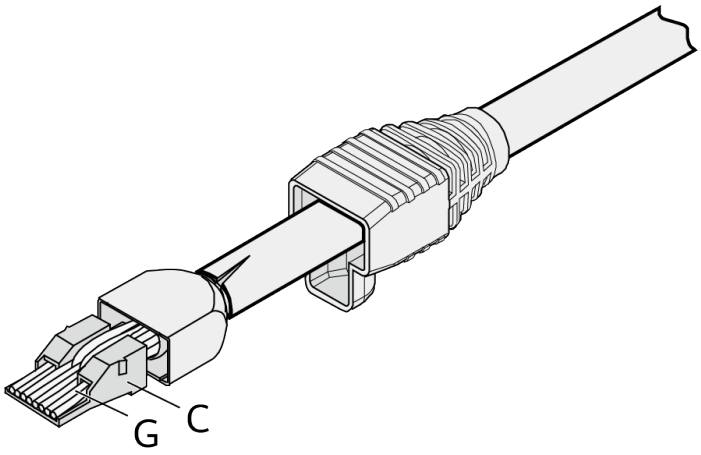
Table 10-5 Connections between wires and pins (using a straight-through cable as an example)

Matching Pins of Wires	Wire Color
1	White-Orange
2	Orange
3	White-Green
4	Blue

Matching Pins of Wires	Wire Color
5	White-Blue
6	Green
7	White-Brown
8	Brown

Step 7 Cut off the surplus cables along the lower edge of the wire holder, as shown in **Figure 10-24**.

Figure 10-24 Cutting off surplus cables

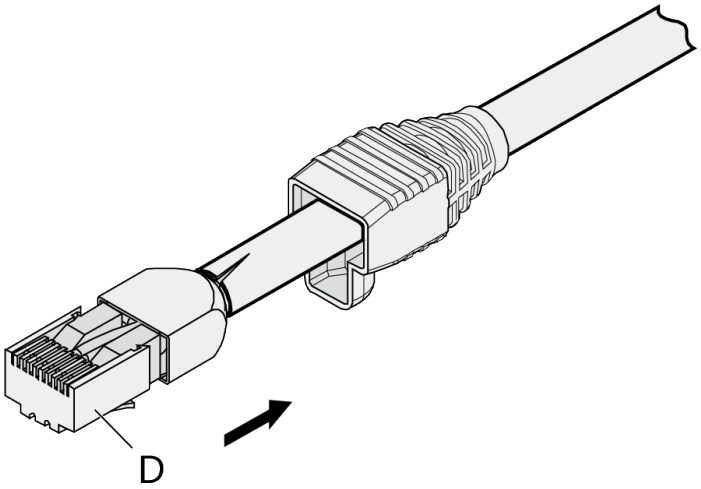


Step 8 Put the connector body onto the wire holder and turn the metal shell by 90°, as shown in **Figure 10-25**.

NOTE

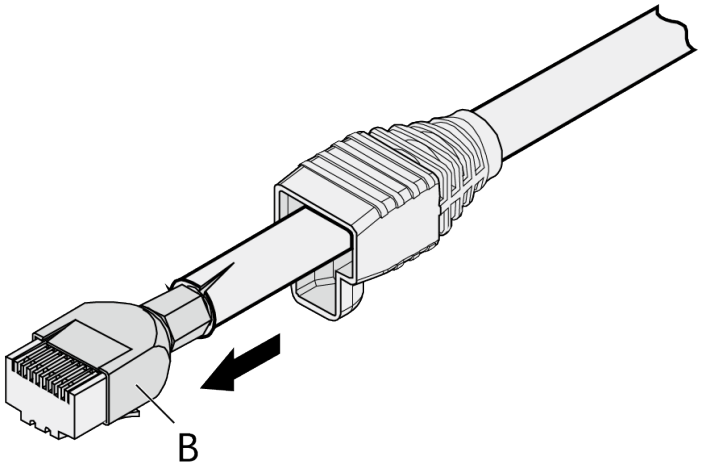
Ensure that the wire holder is in good contact with the connector body.

Figure 10-25 Putting the connector body onto the wire holder



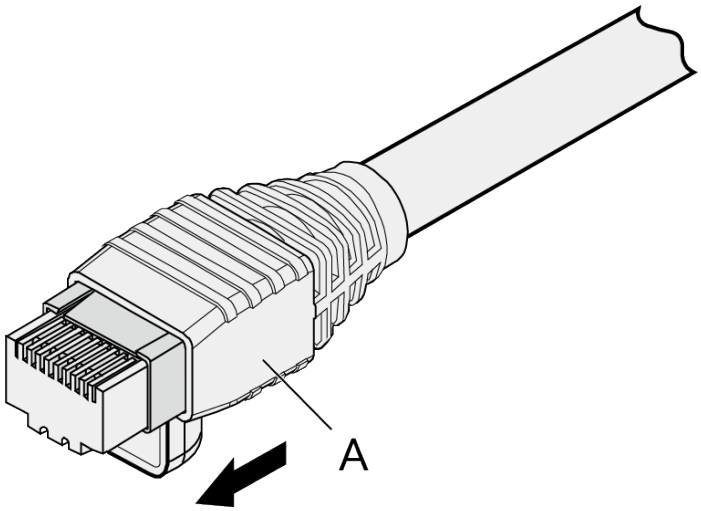
Step 9 Push the metal shell toward the connector body until the wire holder and the connector body are engaged completely. Crimp the connector, as shown in **Figure 10-26**.

Figure 10-26 Crimping the connector



Step 10 Push the jacket towards the metal shell until the metal shell is covered. This completes the assembly of one end of the cable, as shown in **Figure 10-27**.

Figure 10-27 Pushing the metal shell



Step 11 To complete the assembly of the other end, repeat steps 1 to 10.

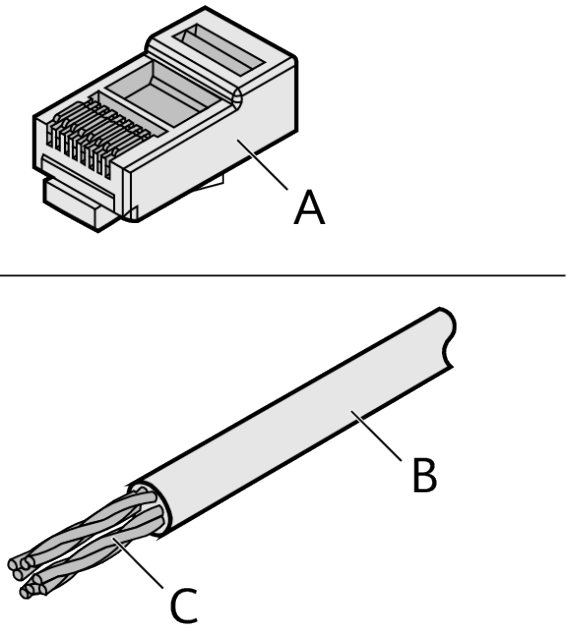
----End

10.3.2 Assembling an Unshielded RJ45 Connector and Ethernet Cable

Context

Figure 10-28 shows the components of an unshielded RJ45 connector and cable.

Figure 10-28 Components of an unshielded RJ45 connector and cable



A. Plug of connector B. Jacket C. Twisted-pair wires

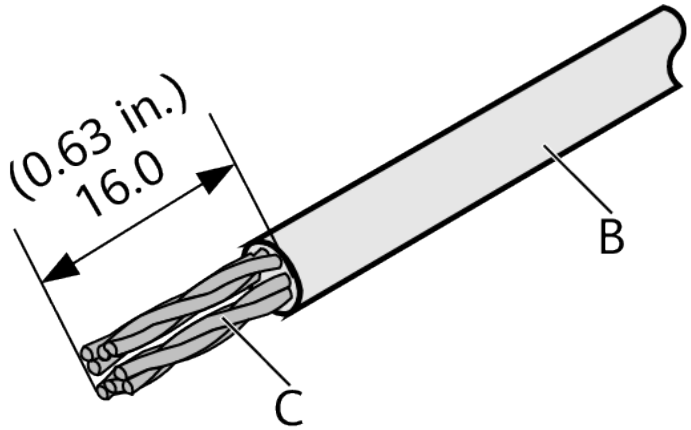
Procedure

Step 1 Remove a 16-mm (0.63 in.) long section of the jacket, as shown in **Figure 10-29**.

NOTICE

When you remove the shield layer, do not damage the insulation of the twisted-pair cable.

Figure 10-29 Removing the jacket of a twisted-pair cable (unit: mm (in.))



Step 2 Align the four pairs of wires and cut the ends neatly, as shown in **Figure 10-30**. The connections between the wires and the pins are listed in **Table 10-6**.

Figure 10-30 Connections between wires and pins (unit: mm (in.))

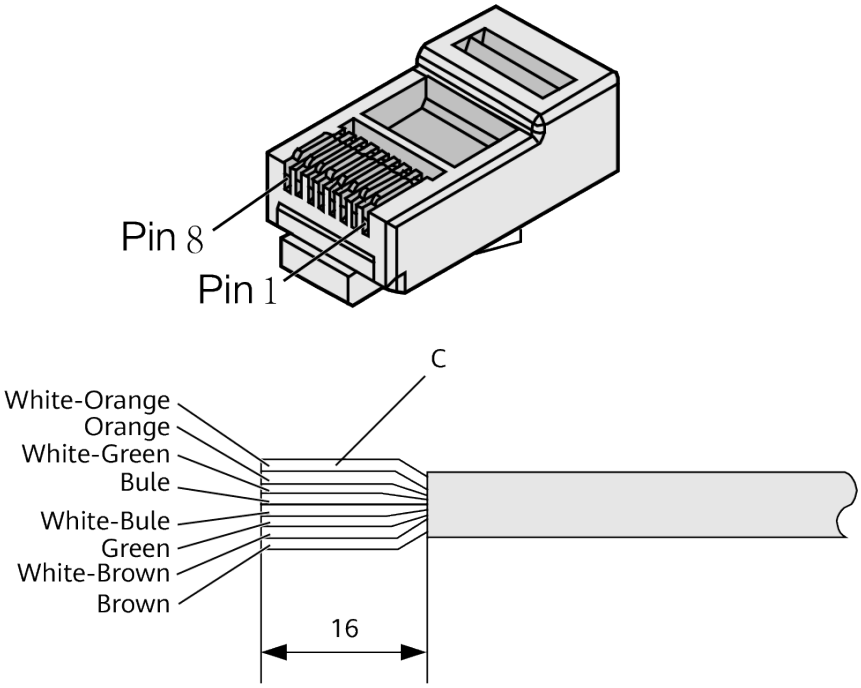


Table 10-6 Connections between wires and pins (using a straight-through cable as an example)

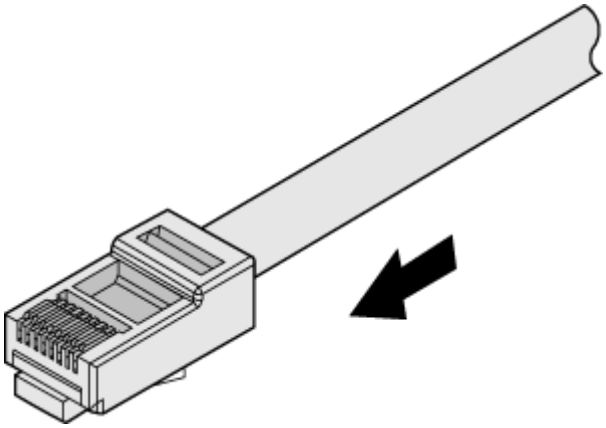
Matching Pins of Wires	Wire Color
1	White-Orange
2	Orange
3	White-Green
4	Blue
5	White-Blue
6	Green
7	White-Brown
8	Brown

Step 3 Feed the cable into the plug, and crimp the connector, as shown in **Figure 10-31**.

NOTE

When inserting the cable, check from the side or bore of the plug to ensure that the cable is completely seated in the plug.

Figure 10-31 Crimping the connector



Step 4 To complete the assembly of the other end, repeat steps 1 to 3.

----End

10.3.3 Checking the Appearance of Contact Strips

Context

- To ensure proper contact between the crimped wires and the wire conductors, the heights and sizes of the contact strips must be standard and the same.
- The contact strips must be parallel to each other, with an offset of less than ± 5°. The top margin of a strip must be parallel to the axis of the connector, with an offset of less than ± 10°.
- To ensure conductivity, the surface of the contact strips must be clean.
- The contact strips must be in good contact with the RJ45 socket. The plastic separators must remain intact and be aligned.
- The contact strip blade must extend beyond the ends of the wires. The ends of the wires must be in contact with the edge of the RJ45. The distance between them must be less than 0.5 mm (0.02 in.).

Procedure

Step 1 Hold the crimped connector, with the front side facing you, and check whether the contact strips are of the same height. The height should be 6.02 ± 0.13 mm (0.237 ± 0.005). If a measuring tool is not available, you can compare the connector with a standard connector. **Figure 10-32** shows an unqualified piece, and **Figure 10-33** shows a qualified piece.

NOTE

All unqualified pieces must be crimped again.

Figure 10-32 Contact strips of different heights

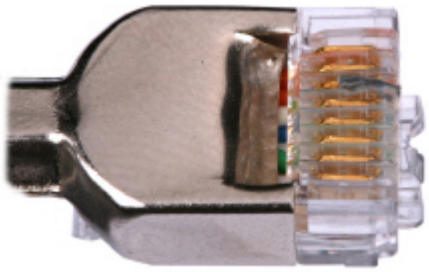
Figure 10-33 Contact strips of the same height

Step 2 Hold an RJ45 connector and turn it 45°. Observe the top edges of the metal contact strips. **Figure 10-34** shows an unqualified piece.

Figure 10-34 Unparallel contact strips of different heights

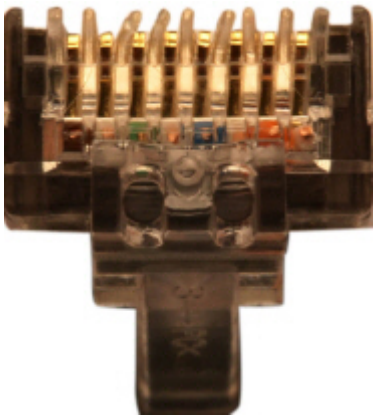
Step 3 Check whether the contact strips are clean. If they are not clean and the dirt cannot be removed, replace it with a new RJ45 connector. **Figure 10-35** shows an unqualified piece.

Figure 10-35 Dirt on a contract strip



Step 4 Check whether the contact strips and the plastic separators are well aligned and intact. If a separator is skewed and cannot be fixed, replace it with a new RJ45 connector. **Figure 10-36** shows an unqualified piece.

Figure 10-36 Skewed plastic separators



Step 5 Hold the connector with the side facing towards you, and check whether you can see the cross-sections of the wires. Ensure that the ends of the wires are in good contact with the edge of the RJ45, and that the contact strip blade extends beyond the ends of the wires and is crimped with the wires. If not, replace the connector. **Figure 10-37** shows an unqualified piece.

Figure 10-37 Wires not in good contact with the edge of the RJ45

----End

10.3.4 Testing the Connection of Assembled Cables

Context

Huawei provides two types of Ethernet cables: straight-through cables and crossover cables.

- Straight-through cables are connected in a one-to-one manner. They are used to connect terminals such as a computer or switch to network devices. **Table 10-7** lists the connections of core wires in a straight-through cable.

  Table 10-7 Connections of core wires in a straight-through cable

RJ45 Connector 1	RJ45 Connector 2	Core Wire Color	Twisted or Not
2	2	Orange	Twisted
1	1	Orange-White	
6	6	Green	Twisted
3	3	Green-White	
4	4	Blue	Twisted
5	5	Blue-White	
8	8	Brown	Twisted
7	7	Brown-White	

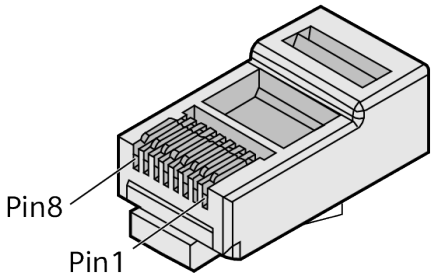
- Crossover cables are connected in a crossover manner. They are used to connect terminals such as two computers or switches. **Table 10-8** lists the connections of core wires in a crossover cable.

  Table 10-8 Connections of core wires in a straight crossover cable

RJ45 Connector 1	RJ45 Connector 2	Core Wire Color	Twisted or Not
6	2	Orange	Twisted
3	1	Orange-White	
2	6	Green	Twisted
1	3	Green-White	
4	4	Blue	Twisted
5	5	Blue-White	
8	8	Brown	Twisted
7	7	Brown-White	

Figure 10-38 shows the pins of an RJ45 connector.

Figure 10-38 Pins of an RJ45 connector



Procedure

Step 1 Feed both connectors of the cable into the ports of the cable tester.

Step 2 After the connectors are properly inserted, turn on the tester. If the indicators from 1 to G turn on simultaneously, you can infer that the pins work normally and the wires are correctly connected.

NOTE

Turn the switch to the S position to slow down lighting of the indicators so that you can see the indicators more clearly, as shown in Figure 10-39.

Figure 10-39 Testing the conduction and connections of wires

Step 3 Gently shake the connector and repeat Step 2 to check whether the metal contact strips are in good contact with the core wires and Ethernet ports, as shown in Figure 10-40.

Figure 10-40 Checking the reliability

The procedure for testing a crossover cable is the same as that for testing a straight-through cable except for the sequence in which the indicators turn on, which depends on the wire connections of a crossover cable.

The Ethernet cable is qualified if the indicators turn on in the following sequence:

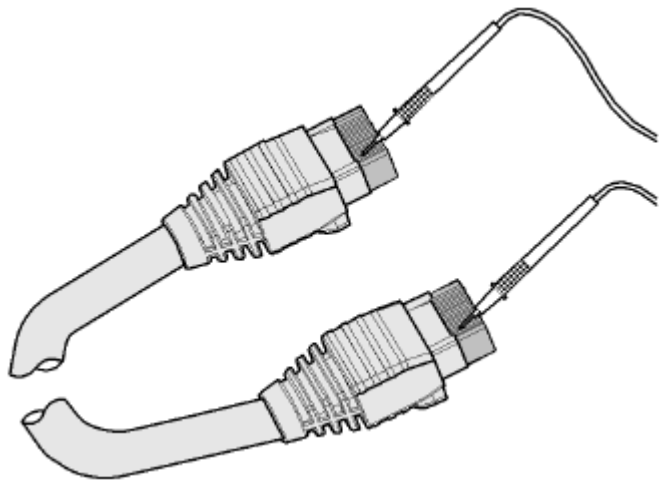
At the master (left) section of the tester, the indicators turn on in the sequence of 1-8-G. At the slave (right) section of the tester, the indicators turn on in the sequence of 3-6-1-4-5-2-7-8-G.

If the indicators do not come on in this sequence, the Ethernet cable is unqualified.

NOTE

If a tester is not available, you can use a multimeter to perform a simple test, as shown in **Figure 10-41**.

Figure 10-41 Testing the connection of an Ethernet cable



----End

10.4 Installing Cable Accessories

10.4.1 Precautions for Installing Cable Accessories

Tools

Use dedicated tools provided or specified by Huawei and follow the installation procedure described here.

NOTE

The illustrations in this document may differ from actual situations, but the installation methods are the same. For example, in this document, the adapters of cable connectors have separate interfaces. In the actual situation, the adapters may have interfaces fixed on equipment.

Bending Radius

Unless otherwise specified, bending radius (R) of cables or fibers must meet the requirements listed in **Table 10-9**.

Table 10-9 Bending radius of cables or fibers

Cable or Fiber	Bending Radius (R)
Ordinary cable	In normal cases, R ≥ 2d. When the cable is connected with a connector, R ≥ 5d.
Fiber	R ≥ 40 mm (1.57 in.); Bending angle > 90°

NOTE

The letter d indicates the diameter of a cable or fiber.

Precautions for Installation

- Hold terminals of cables instead of pulling the cables themselves when installing or removing cable components.
- Do not insert a connector forcibly when the connector is blocked. Use a dedicated tool to pull out the connector. Install the connector again after you check that the pins are inserted properly.
- Before tightening screws on cable connectors, ensure that the connectors are properly connected to their adapters. Tighten the screw with appropriate force using a flat-head or Phillips screwdriver instead of bare hands or an electric

screwdriver. If the screw cannot be screwed into the tapped hole, determine the reason and try again. Do not apply too much force, or the screw or adapter may be damaged.

- When removing densely aligned cables or fiber connectors, use dedicated pliers such as cable-pulling pliers and fiber-pulling pliers.
- Do not twist, bend, stretch, or extrude fibers during installation.
- Cover the idle fiber connectors with dust caps. Remove the dust caps before using the fiber connectors.

Requirements for Cable Routing

- To protect cables, remove the burrs in the cable through-holes or install protective rings in the holes.
- To ease the connection and to avoid stress, keep cable joints slack. After connecting multiple cables to a connector that has multiple interfaces, keep the cables slack to avoid generating stress.
- Bind or clean cables gently because cable distortion affects signal quality.
- Keep cables away from moveable components such as doors.
- Sharp objects must not touch cable wiring to prevent damage to cables.
- To protect power cables, route power cables of the active and standby power modules separately.

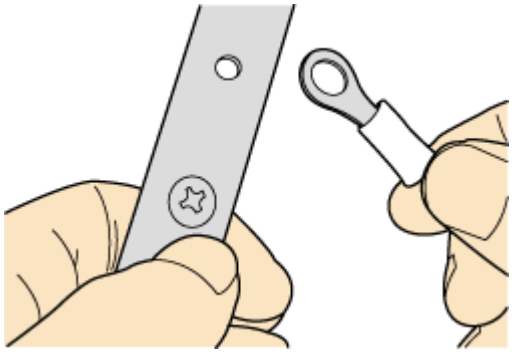
10.4.2 Installing Power Adapters

10.4.2.1 Installing the OT Terminal

Procedure

- Install an OT terminal.
  a. Align the hole of the OT terminal (conductor upward) with a connecting hole, as shown in **Figure 10-42**.

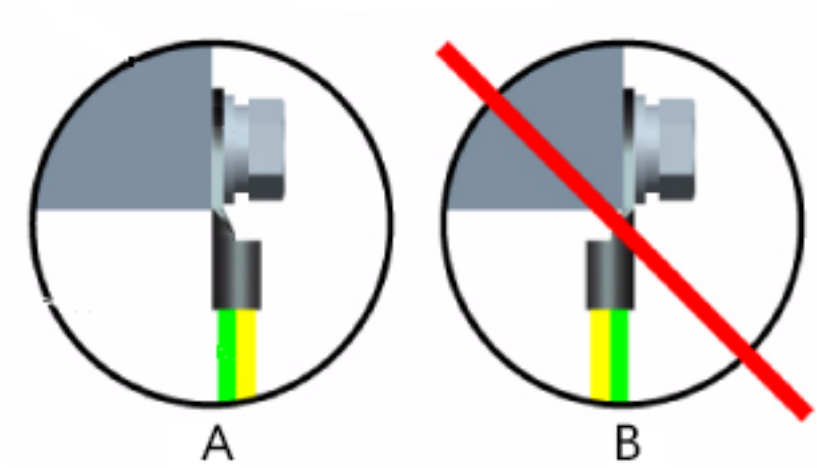
  Figure 10-42 Aligning the OT terminal with a connecting hole



NOTE

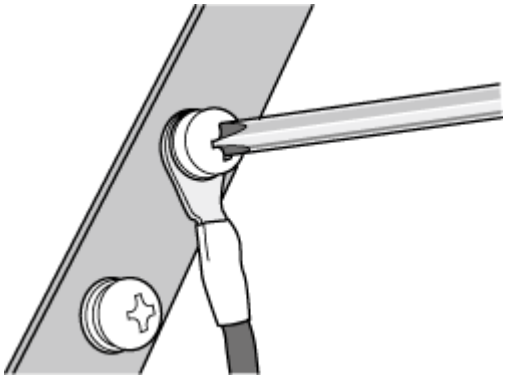
When you install an OT terminal, the crimping sleeve is installed as shown in Figure 10-43, where A is correct and B is incorrect.

Figure 10-43 Installing an OT terminal, showing the orientation of crimping sleeve



b. Place the spring washer and flat washer in turn, mount a matching screw, and fasten it clockwise, as shown in Figure 10-44.

Figure 10-44 Installing two terminals back to back

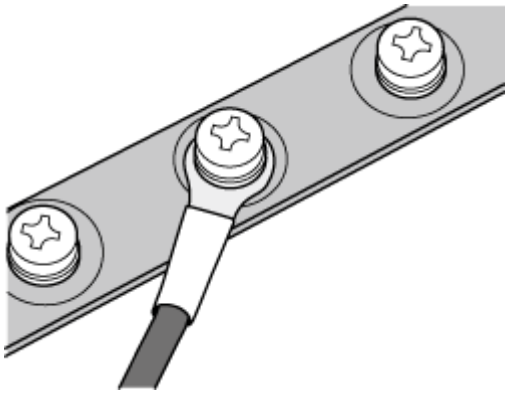


NOTICE

Ensure that the OT terminal is not in contact with other terminals or metal components.

c. Move the cable slightly and ensure that it is securely connected, as shown in Figure 10-45.

Figure 10-45 Installed OT terminal



- Install two OT terminals on a post.

  Before you install two OT terminals on a post, ensure that the two terminals can be installed on the post and that the electrical connecting pieces have a large contact area. Two OT terminals can be installed using any of these methods:

  – Bend the upper OT terminal at a 45- or 90-degree angle, as shown in **Figure 10-46**.
  – Cross the two terminals, as shown in **Figure 10-47**.

  Figure 10-46 Bending the upper OT terminal at a 45- or 90-degree angle

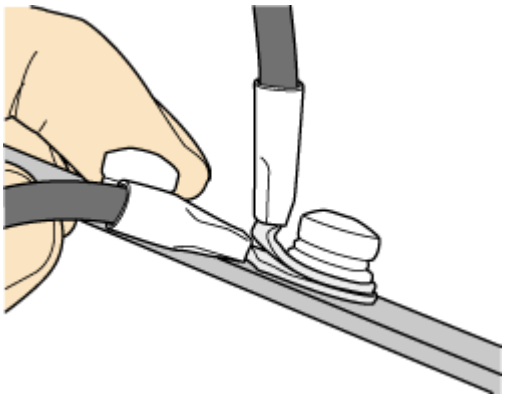
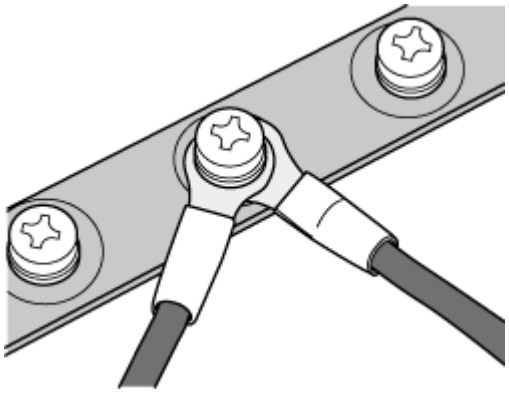
  

Figure 10-47 Crossing two terminals



NOTICE

If the two terminals are different sizes, place the smaller one above the bigger one. A maximum of two terminals can be installed on a post.

- To remove an OT terminal, loosen the screw counterclockwise.

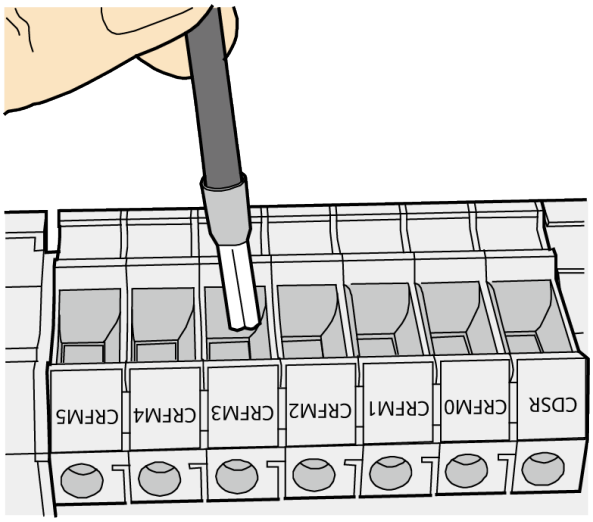
----End

10.4.2.2 Installing the Cord End Terminal

Procedure

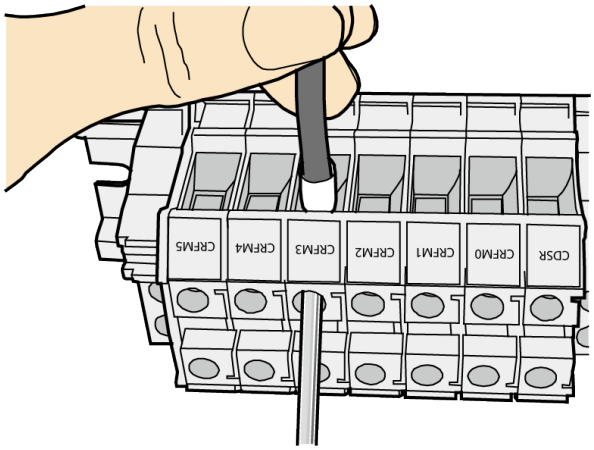
Step 1 Hold a cord end terminal upright and place it on a terminal jack, as shown in Figure 10-48. To ensure bump contact and dense connection, place the plain side of the terminal outwards.

Figure 10-48 Placing a terminal on a terminal jack vertically



Step 2 Insert the terminal into the jack vertically, and turn the screw clockwise to fasten the terminal, as shown in **Figure 10-49**.

Figure 10-49 Feeding the terminal into the jack



NOTICE

- Ensure that the exposed section of the terminal is less than 2 mm (0.079 in.) in length.
- Do not press the insulation of the terminal.
- Insert only one terminal into one jack.

Step 3 Move the cable slightly and ensure that it is securely connected.

Step 4 Before you remove a cord end terminal, loosen the screw counterclockwise.

----End

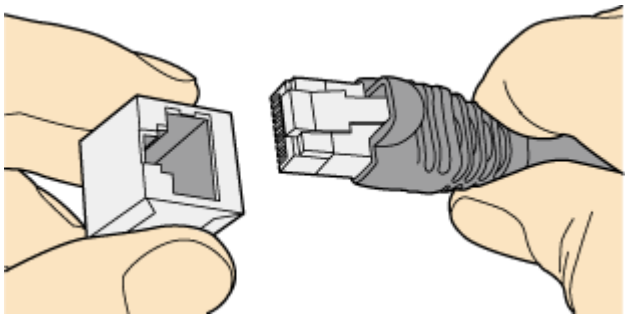
10.4.3 Installing Ethernet Adapters

10.4.3.1 Installing a Shielded Ethernet Connector

Procedure

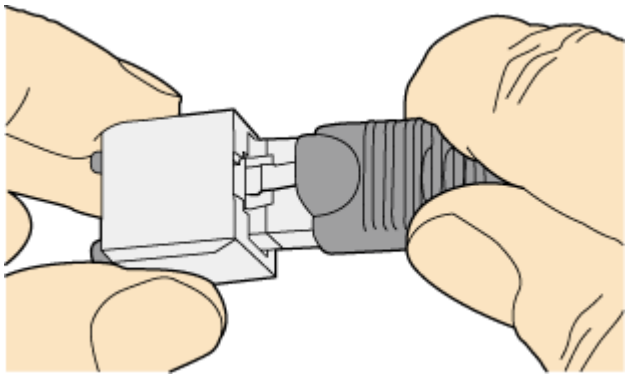
Step 1 Hold the male and female connectors, with the male connector facing the female connector, as shown in **Figure 10-50**.

Figure 10-50 Holding the male and female shielded connectors



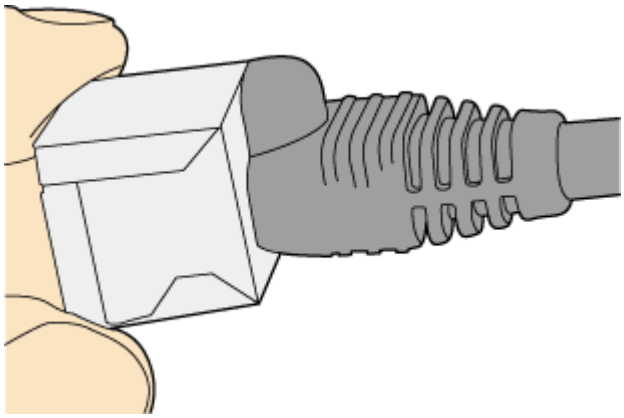
Step 2 Insert the male connector into the female connector, as shown in **Figure 10-51**.

Figure 10-51 Feeding the male shielded connector into the female shielded connector



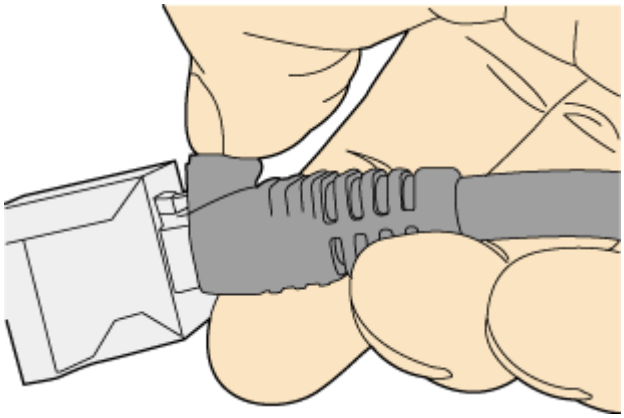
Step 3 When you hear a click, the cable connector is completely inserted in the port. (The clip on the cable connector pops up to fix the connector in the port.) Pull the connector slightly and ensure that it is securely connected, as shown in **Figure 10-52**.

Figure 10-52 Installed shielded Ethernet connector



Step 4 To remove an Ethernet connector, press the locking key and pull out the connector, as shown in **Figure 10-53**.

Figure 10-53 Removing a shielded Ethernet connector



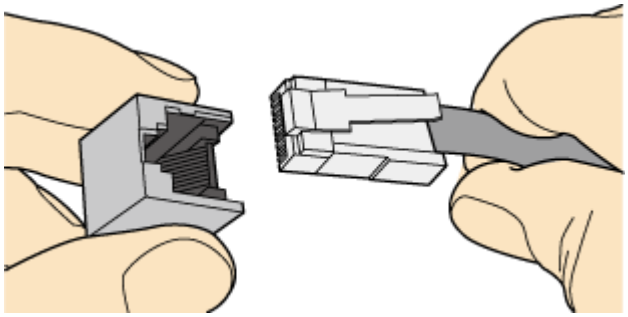
----End

10.4.3.2 Installing an Unshielded Ethernet Connector

Procedure

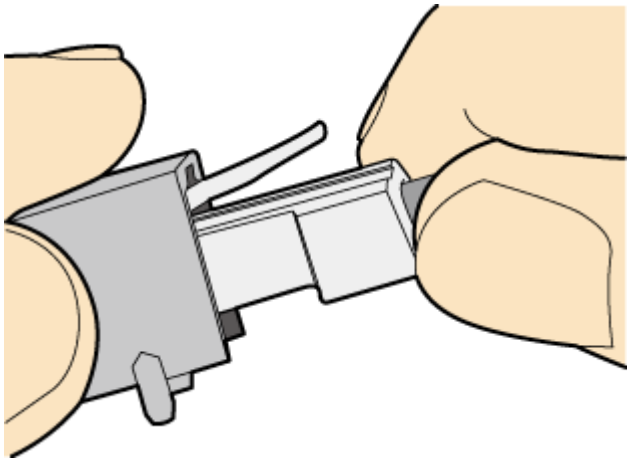
Step 1 Hold the male and female connectors, with the male connector facing the female connector, as shown in **Figure 10-54**.

Figure 10-54 Holding the male and female unshielded connectors



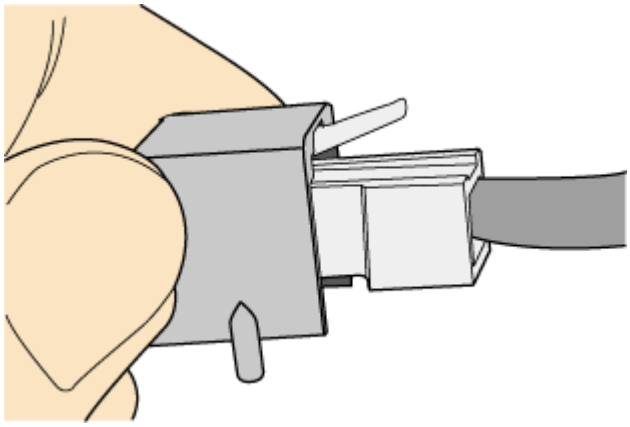
Step 2 Feed the male connector into the female connector, as shown in **Figure 10-55**.

Figure 10-55 Feeding the male connector into the female unshielded connector



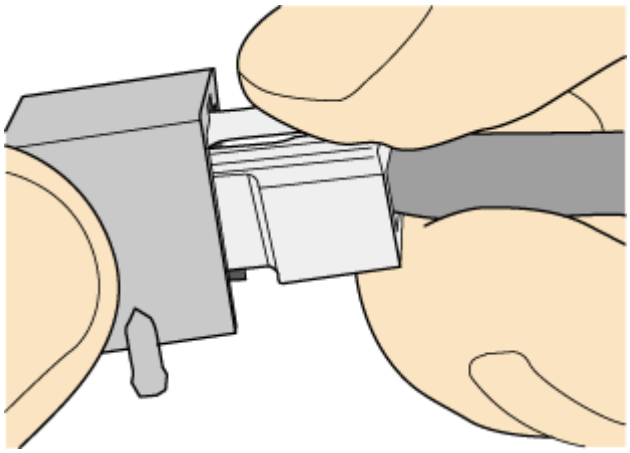
Step 3 A crisp click indicates that the connector is locked by the locking key. Pull the connector slightly and ensure that it is securely connected. **Figure 10-56** shows an installed Ethernet connector.

Figure 10-56 Installed unshielded Ethernet connector



Step 4 To remove an Ethernet connector, press the locking key and pull out the connector, as shown in **Figure 10-57**.

Figure 10-57 Removing an unshielded Ethernet connector



----End

10.4.4 Installing Fiber Connectors

Context

NOTICE

- After you remove the dustproof cap, ensure that the fiber pins are clean and install them as soon as possible.
- When you disassemble fiber connectors, you must use a dedicated tool if the connectors are densely installed.

10.4.4.1 Cleaning Fiber Connectors

Procedure

Step 1 Clean the pins of a fiber connector by using lint-free cotton and alcohol.

Step 2 Clean the pins again by using dust-free cotton. If necessary, clean the pins by using an air gun. Ensure that the pins are free from any fiber or debris.

----End

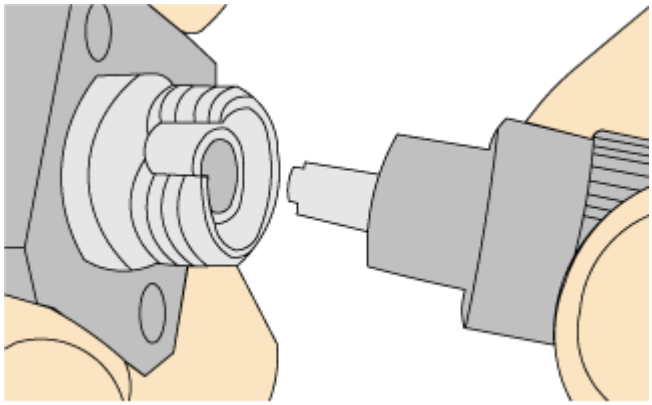
10.4.4.2 Installing an FC Fiber Connector

Procedure

Step 1 Remove the dustproof cap of the FC connector and store it for future use.

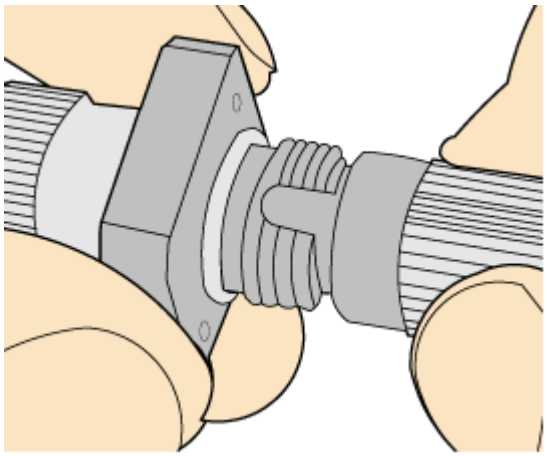
Step 2 Align the core pin of the male connector with that of the female connector, as shown in **Figure 10-58**.

Figure 10-58 Aligning the male connector with the female connector



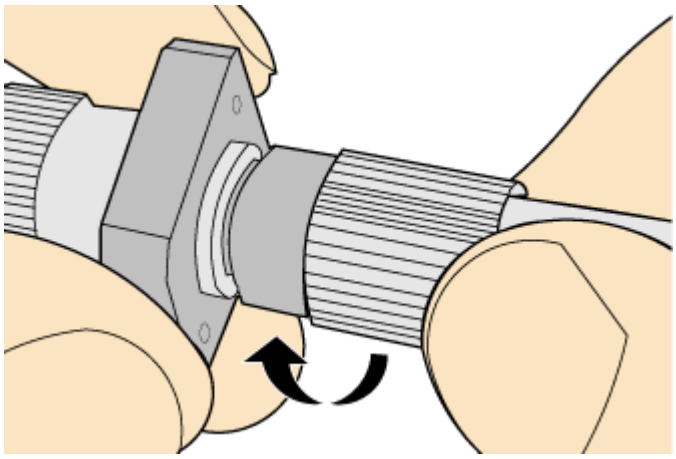
Step 3 Align the male connector with the female connector and gently push the male connector until it is completely seated in the female connector, as shown in **Figure 10-59**.

Figure 10-59 Feeding the male connector into the female connector



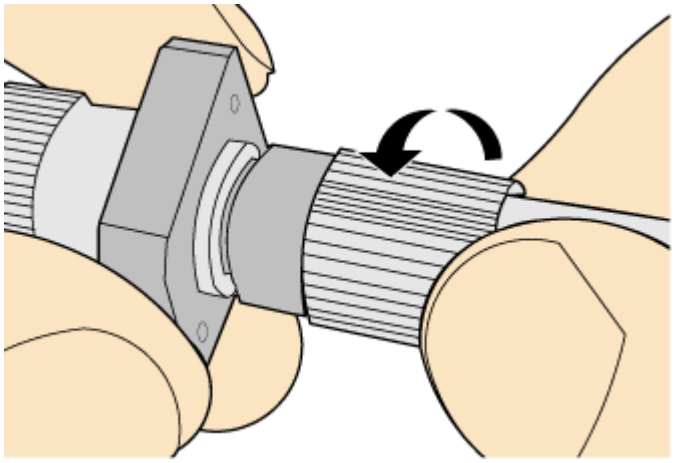
Step 4 Fasten the locking nut clockwise and ensure that the connector is securely installed, as shown in **Figure 10-60**.

Figure 10-60 Fastening the locking nut



Step 5 To disassemble an FC fiber connector, loosen the locking nut counterclockwise, and gently pull the male connector, as shown in **Figure 10-61**.

Figure 10-61 Disassembling an FC fiber connector



----End

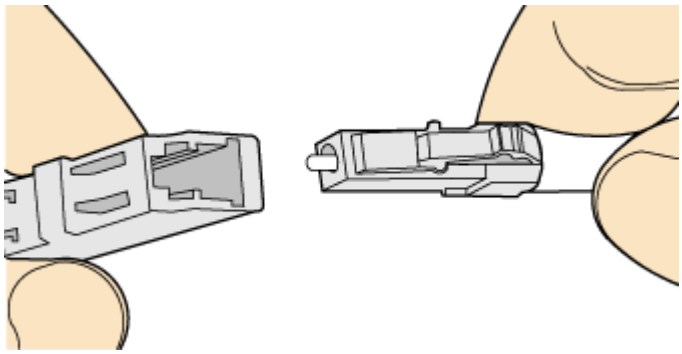
10.4.4.3 Installing an LC Fiber Connector

Procedure

Step 1 Remove the dustproof cap of the LC fiber connector and store it for future use.

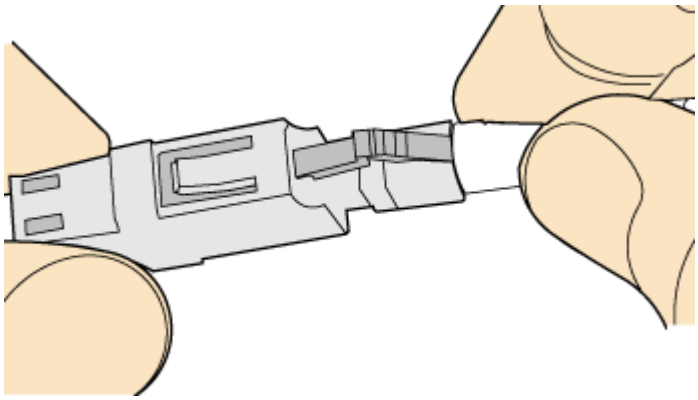
Step 2 Align the core pin of the male connector with that of the female connector, as shown in **Figure 10-62**.

Figure 10-62 Aligning the male connector with the female connector



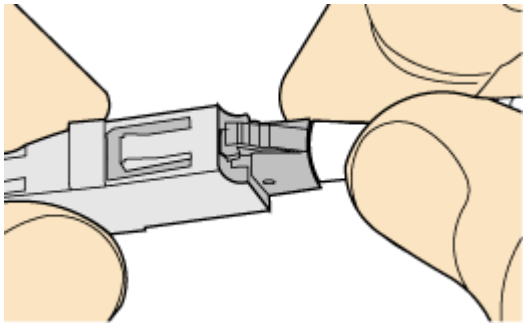
Step 3 Align the male connector with the fiber adapter and gently push the male connector until it is completely seated in the fiber connector, as shown in **Figure 10-63**.

Figure 10-63 Feeding the male connector into the female connector



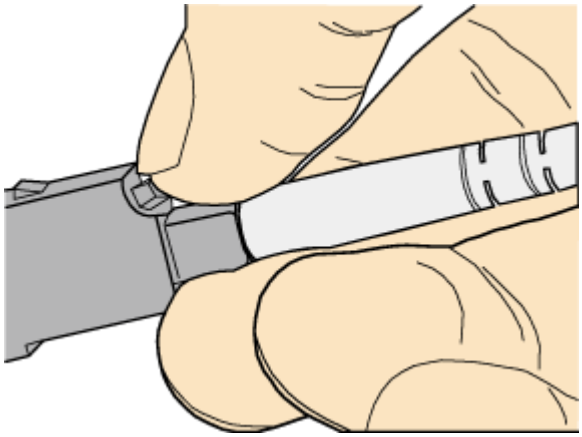
Step 4 A clicking sound indicates that the male connector is locked, as shown in **Figure 10-64**.

Figure 10-64 Installed LC connector



Step 5 To disassemble an LC fiber connector, press the locking nut to release the locking clips from the bore, and gently pull the male connector, as shown in **Figure 10-65**.

Figure 10-65 Disassembling an LC fiber connector



----End

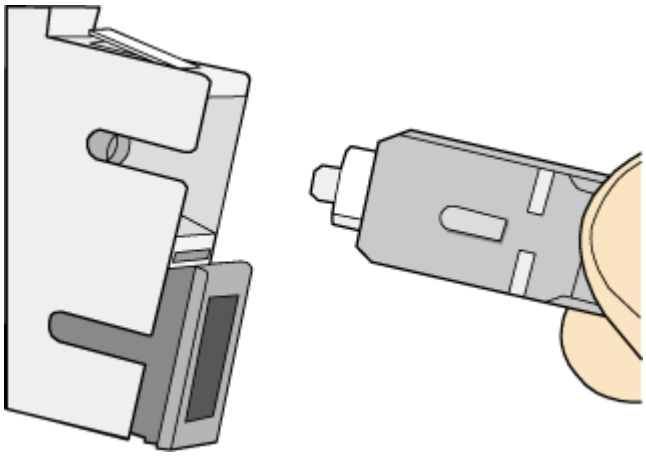
10.4.4.4 Installing the SC Fiber Connector

Procedure

Step 1 Remove the dustproof cap of the SC fiber connector and store it for future use.

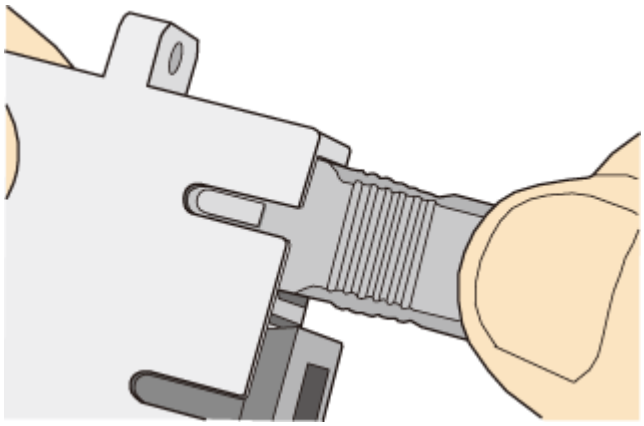
Step 2 Align the core pin of the male connector with that of the female connector, as shown in **Figure 10-66**.

Figure 10-66 Aligning the male connector with the female connector



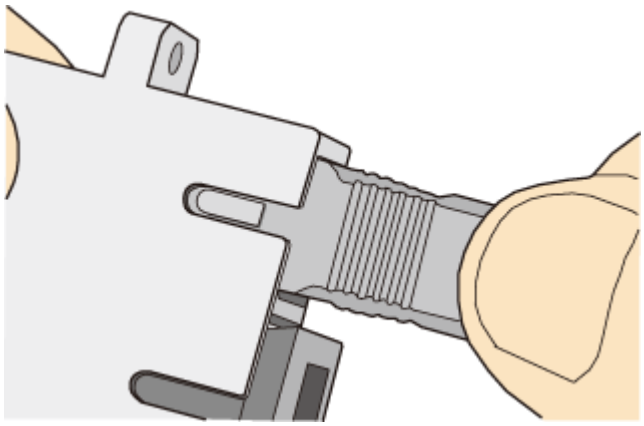
Step 3 Feed the fiber connector into the female connector, with your fingers holding the shell of the fiber connector (not the pigtail). When you hear a click, the fiber connector is secured by the clips (internal parts, not illustrated in the figure). Pull the fiber connector gently. If the connector does not loosen, the installation is complete. See **Figure 10-67**.

Figure 10-67 Installed SC fiber connector



Step 4 To disassemble an SC fiber connector, hold the shell of the connector (do not hold the fiber) and gently pull the connector in the direction vertical to the adapter. Unlock the male connector, and then separate it from the shell, as shown in **Figure 10-68**.

Figure 10-68 Disassembling an SC fiber connector



----End

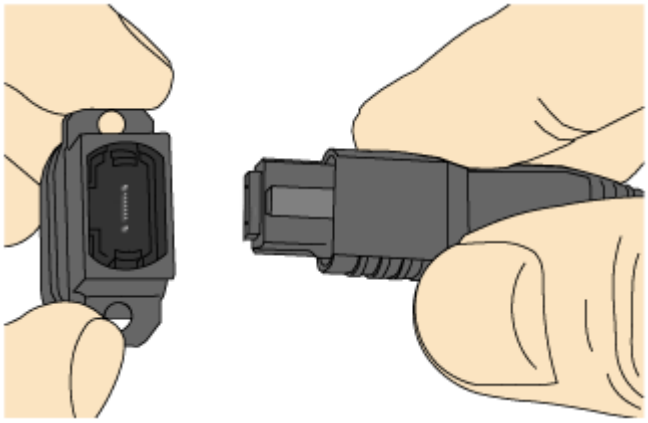
10.4.4.5 Installing an MPO Connector

Procedure

Step 1 Remove the dustproof cap of the MPO fiber connector and store it for future use.

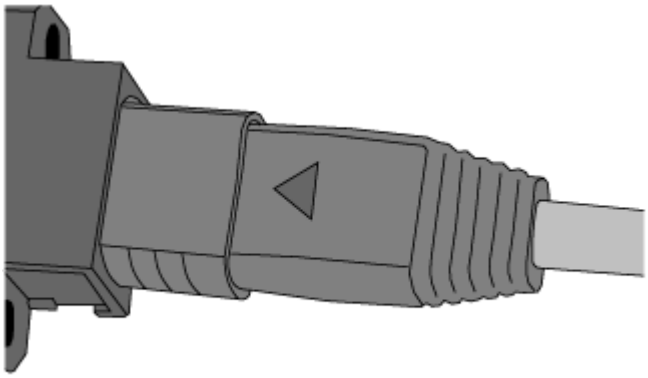
Step 2 Align the core pin of the male connector with that of the female connector, as shown in **Figure 10-69**.

Figure 10-69 Aligning the male connector with the female connector



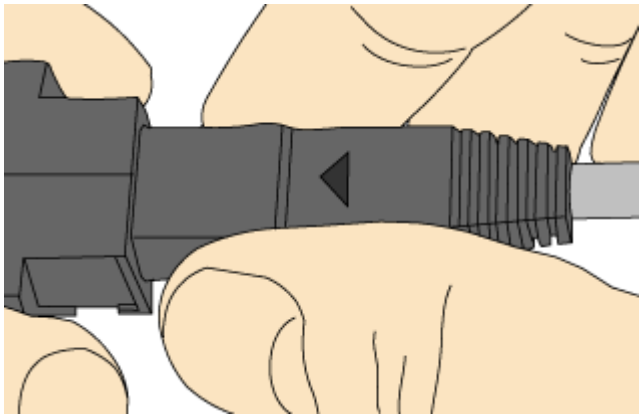
Step 3 Hold the shell labeled "PUSH" and feed the male connector into the female connector until you hear a clicking sound. The male and female connectors are securely installed, as shown in **Figure 10-70**.

Figure 10-70 Installed MPO fiber connector



Step 4 To disassemble an MPO fiber connector, hold the shell labeled "PULL" and remove the male connector, as shown in **Figure 10-71**.

Figure 10-71 Disassembling an MPO fiber connector



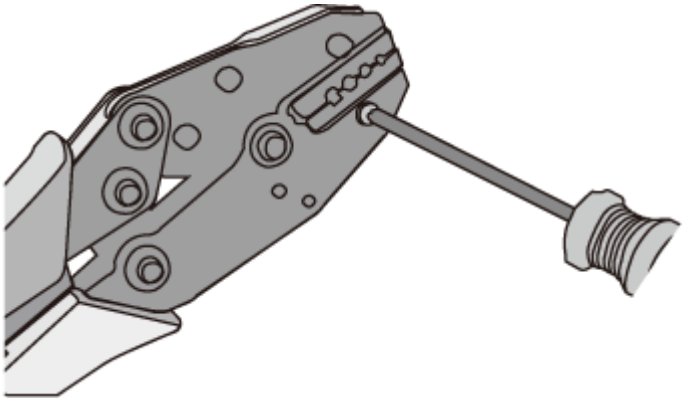
----End

10.5 Replacing the Mold of the Crimping Tool

Procedure

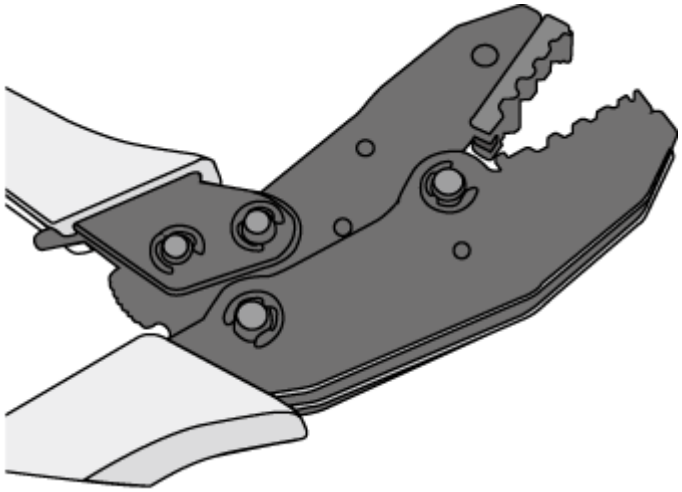
Step 1 Hold the handles of a pair of COAX crimping tools. Loosen the two fastening screws counterclockwise, as shown in **Figure 10-72**.

Figure 10-72 Loosening two fastening screws



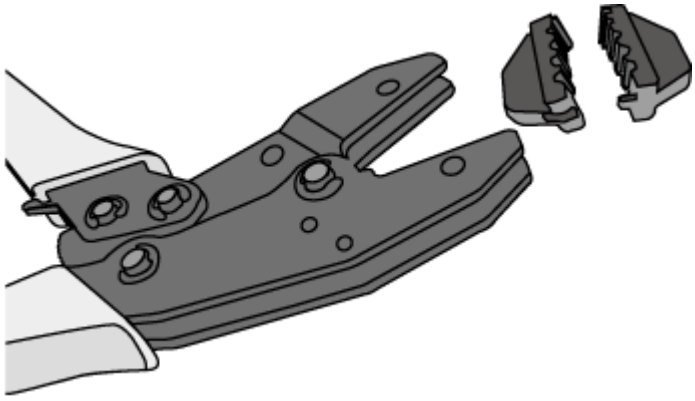
Step 2 Hold the handles of the COAX crimping tools to open the self-locking mechanism. The jaw of the COAX crimping tools opens automatically, as shown in **Figure 10-73**.

Figure 10-73 Pliers jaw opening automatically



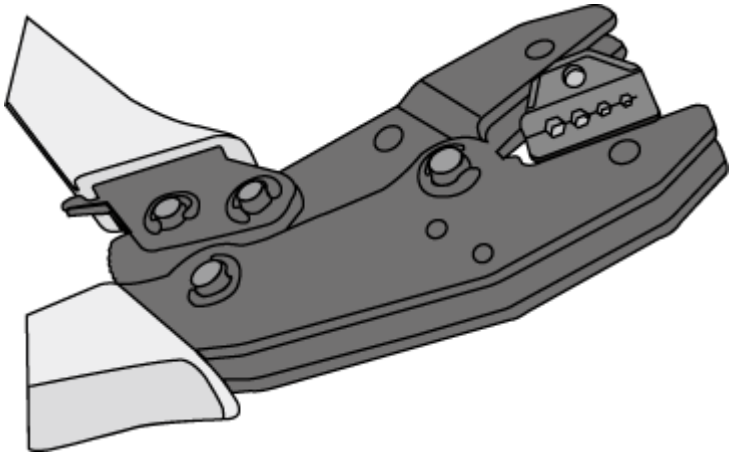
Step 3 Remove the mold from the COAX crimping tools, as shown in **Figure 10-74**.

Figure 10-74 Removing the mold from the COAX crimping tools



Step 4 Place the mold to be installed into the jaw of the COAX crimping tools and align the screw holes, as shown in **Figure 10-75**.

Figure 10-75 Installing a new mold in the COAX crimping tool

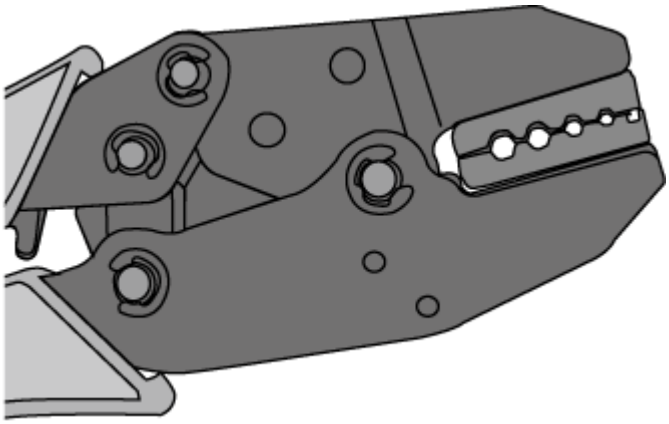


NOTICE

Keep the short side of the mold inwards and the long side outwards, with the teeth of the mold aligning from the larger size to the smaller size.

Step 5 Hold the handles of the COAX crimping tools tightly to match the mold and the jaw completely. Align the screw holes, as shown in **Figure 10-76**.

Figure 10-76 Aligning the screw holes



Step 6 Hold the handles of the COAX crimping tools with one hand. Tighten the two fastening screws clockwise. **Figure 10-77** and **Figure 10-78**shows the mold installed in the COAX crimping tool.

Figure 10-77 Mold installed in the COAX crimping tool

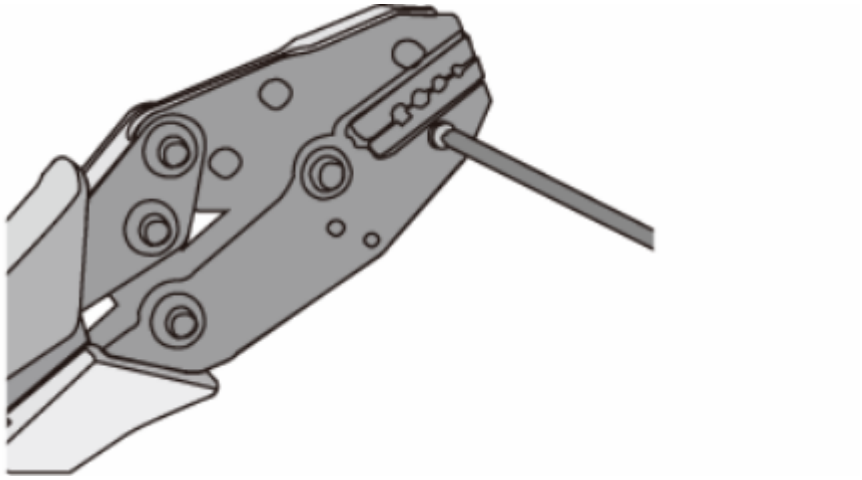
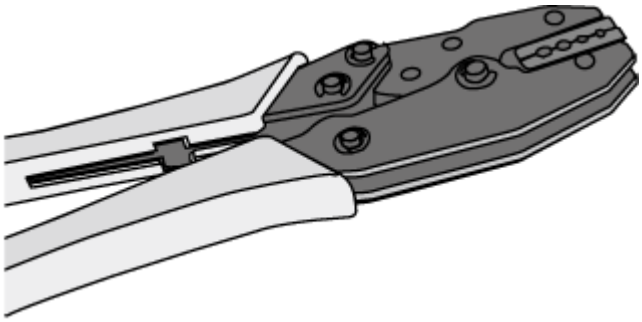


Figure 10-78 An installed mold



----End

11 Appendix B Environmental Requirements for Device Operation

11.1 Environmental Requirements for an Equipment Room

11.1.1 Requirements for Selecting a Site for an Equipment Room

When designing a project, consider the communication network planning and technical requirements of the equipment. Also consider hydrographic, geological, seismic, power supply, and transportation factors.

Construction, structure, heating and ventilation, power supply, lighting and fire-proof construction of the equipment room should be designed by specialized construction designers to suit the environmental requirements of devices. The equipment room should also follow local regulations concerning the industrial construction, environmental protection, fire safety, and civil air defense. Construction must conform to government standards, regulations, and other requirements.

The equipment room should be located in a place free from high temperature, dust, toxic gases, explosive materials, or unstable voltage. Keep the equipment room away from significant vibrations or loud noises, as well as power transformer stations.

The specific requirements for selecting a site for an equipment room are as follows:

- The room should be located at a distance of at least 5 km (3.11 mi.) from heavy pollution sources such as smelting and coal mines. It should be located at a distance of at least 3.7 km (2.30 mi.) from moderate pollution sources

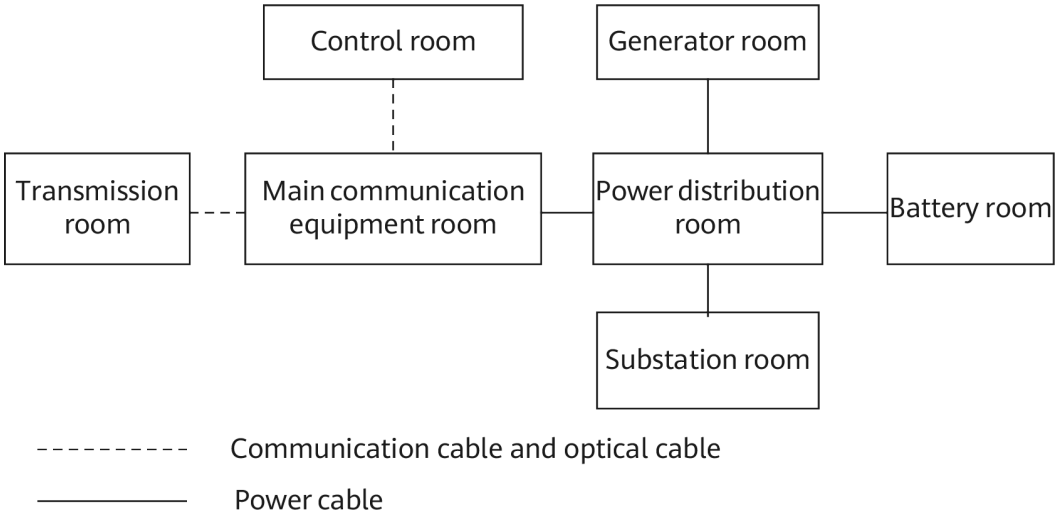
such as chemical, rubber, and galvanization factories. It should be located at a distance of at least 2 km (1.24 mi.) from light pollution sources such as packinghouses and tanyards. If these pollution sources cannot be avoided, ensure that the equipment room is upwind of the pollution sources. In addition, use a high-quality equipment room or protection products.

- The room should be located away from livestock farms, or be upwind of the livestock farms. Do not use an old livestock room or fertilizer warehouse as the equipment room.
- The equipment room must be far away from residential areas. An equipment room that is not far away from residential areas must comply with equipment room construction standards to avoid noise pollution.
- The room should be located far away from industrial and heating boilers.
- The room should be at least 3.7 km (2.30 mi.) away from the seaside or salt lake. Otherwise, the equipment room should be airtight with cooling facilities. In addition, alkalized soil cannot be used as the construction material. Otherwise, equipment suitable for wet conditions must be used.
- The doors and windows of the equipment room must be kept closed to maintain an airtight room.
- Using steel doors to ensure sound insulation is recommended.
- No cracks or openings are allowed on the walls or floors. The outlet holes on the walls or windows must be sealed. Walls must be constructed such that they are smooth, wear-resistant, dustproof, flame retardant, sound insulated, heat absorptive, and have electromagnetic shielding.
- The air vent of the room should be far from the exhaust of city waste pipes, big cesspools and sewage treatment tanks. The room should be in the positive pressure state to prevent corrosive gases from entering the equipment room and corroding components and circuit boards.
- It is recommended that the room be on or above the second floor. If this requirement cannot be met, the ground for equipment installation in the room should be at least 600 mm (23.62 in.) above the maximum flood level.
- The equipment room should be strong enough to resist winds and downpours.
- The room should be located away from dusty roads or sand. If this is unavoidable, the doors and windows of the equipment room must not face pollution sources.
- Do not place air conditioning vents near the equipment so that they blow directly on the equipment because condensation may be blown into the equipment.
- Do not use decorative materials that contain sulfur in the equipment room.

11.1.2 Equipment Room Layout

An equipment room usually contains mobile switching equipment, telecommunications equipment, power supply equipment, and other auxiliary equipment. To ensure easy maintenance and management, place the equipment in different rooms. **Figure 11-1** shows the layout of the equipment room.

Figure 11-1 Layout of the equipment room



The general layout principles of the equipment room are as follows:

- It should meet requirements for laying out and maintaining communication cables and power cables.
- It should reduce the cabling distance, which facilitates cable maintenance, reduces potential communication faults, and maximizes efficiency.

11.1.3 Construction Requirements for the Equipment Room

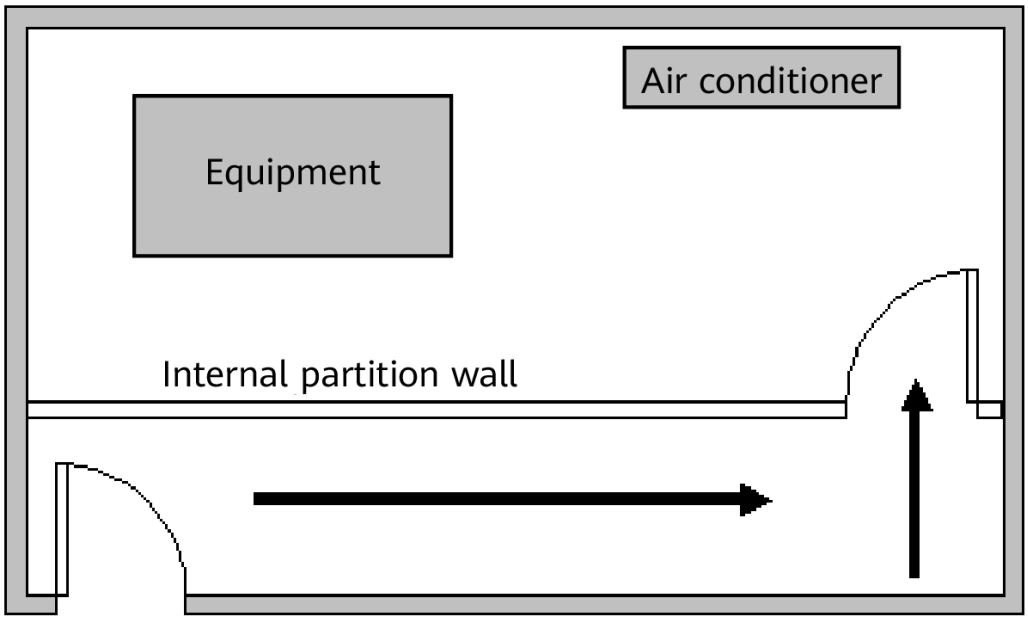
Table 11-1 describes the construction requirements for the equipment room.

Table 11-1 Construction requirements for the equipment room

Item	Requirements
Area	The smallest area of the equipment room can accommodate the equipment with the largest capacity.
Net height	The minimum height of the equipment room should not be less than 3 m (9.84 ft). The minimum height of the equipment room is the net height below overhead beams or ventilation pipes.
Floor	The floor in the equipment room should be semi-conductive and dustproof. A raised floor with an ESD covering is recommended. Cover the raised floor tightly and solidly. The horizontal tolerance of each square meter should be less than 2 mm (0.08 in.). If raised floors are unavailable, use a static-electricity-conductive floor material, with a volume resistivity of 1.0 x 107 ohms to 1.0 x 1010 ohms. Ground this floor material or raised floor. You can connect them to ground using a one megohm current-limiting resistor and connection line.
Load-bearing capacity	The floor must bear loads larger than 150 kg/m^2 (0.21 bf/$in.^2$).

Item	Requirements
Door and windows	The door of the equipment room should be 2 m (6.56 ft) high and 1 m (3.28 ft) wide. One door is enough. Seal the doors and windows with dustproof plastic tape. Use double-pane glass in the windows and seal them tightly.
Wall surface treatment	Paste wallpaper on the wall or apply flat paint. Do not use pulverized paint.
Cable trays	Use cable trays to arrange cables. The inner faces of the cable trays must be smooth. The reserved length and width of the cable trays, and the number, position and dimensions of the holes must comply with the requirements of device arrangement.
Water pipe	Do not pass service pipes, drainpipes, and storm sewers through the equipment room. Do not place a fire hydrant in the equipment room, but place it in the corridor or near the staircase.
Internal partition wall	Separate the area where the equipment is installed from the equipment room door. The partition wall can block some outside dust.
Installation position of the air conditioner	Install air conditioner vents so that the air does not blow directly on equipment.
Other requirements	Avoid the proliferation of mildew, and keep out rodents (like mice).

Figure 11-2 Internal partition wall inside the equipment room



11.1.4 Equipment Room Environment

Dust on devices may cause electrostatic discharge and result in poor contact for connectors or metal connection points. This problem can shorten the life span of devices and cause faults.

The equipment room must be free from explosive, conductive, magnetically-permeable, and corrosive dust. **Table 11-2** lists the requirement for dust concentration in the equipment room.

Table 11-2 Requirements for dust particles in the equipment room

Mechanical active material	Unit	Concentration
Dust particle	Particle /m^3	≤ 3x 10^4 (no visible dust accumulated on a workbench in three days)
Suspending dust	mg/m^3	≤0.2
Precipitable dust	$mg/m^2 \cdot h$	≤1.5
Description • Dust particle diameter ≥ 5 μm • Suspending dust diameter ≤ 75 μm • 75 μm ≤ precipitable dust diameter ≤ 150 μm		

Take the following measures to meet the requirements:

- Use dustproof materials for ground, wall, and ceiling construction.
- Use screens on the door and windows facing outside. The outer windows should be dust-proof.
- Clean the equipment room regularly and clean the air filter monthly.
- Wear shoe covers and ESD clothing before entering the equipment room.

11.1.5 Requirements for Corrosive Gases

The room should be free from dusts and corrosive gases, such as SO_2, H_2S, and NH_3. **Table 11-3** lists the requirements for the corrosive gas concentration.

Table 11-3 Requirements for corrosive gas concentration

Chemical active material	Unit	Concentration
SO_2	mg/m^3	≤0.20

Chemical active material	Unit	Concentration
H_2S	mg/m^3	≤0.006
NH_3	mg/m^3	≤0.05
Cl_2	mg/m^3	≤0.01

Take the following measures to meet the requirements:

- Avoid constructing the room near a place where the corrosive gas concentration is high, such as a chemical plant.
- Ensure the air intake vent of the room is in the prevailing upwind direction from any pollution source.
- Place batteries in different rooms.
- A professional service should monitor the corrosive gas conditions regularly.

11.1.6 Requirements for ESD Prevention

The absolute value of electrostatic voltage must be less than 1000 V.

Take the following measures to meet this requirement:

- Train operators about ESD prevention.
- Keep the correct humidity level in the equipment room to reduce the impact of static electricity.
- Lay out an ESD floor in equipment rooms.
- Wear ESD shoes and clothing before entering equipment room.
- Use ESD tools, such as wrist straps, tweezers, and pullers.
- Ground all conductive materials in the room, including computer terminals. Use ESD worktables.
- Keep non-ESD materials (such as common bags, foam, and rubber) at least 30 cm (11.81 in.) away from boards and ESD-sensitive components.

11.1.7 Electromagnetism Requirements for the Equipment Room

All interference sources, inside or outside the equipment room, can cause equipment problems with capacitive coupling, inductive coupling, electromagnetic wave radiation, and common impedance (including grounding system) coupling. Prevent the interference using these approaches:

- Take effective measures against electrical interference from the power supply system.
- Do not use the working ground of the equipment as the same ground for surge protection. Separate them as far as possible.
- Keep the equipment far away from high-power radio transmitters, radar units, and high-frequency and high-current equipment.

- Use electromagnetic shielding if necessary.

11.1.8 Requirements for Lightning Proof Grounding

Table 11-4 lists the requirements for lightning proof grounding.

Table 11-4 Requirements for lightning proof grounding

Item	Requirements
Capital construction	• Use reinforced concrete to construct the equipment room. • Install a lightning proof device like a lightning rod outside the room. • The lightning proof ground shares the same grounding body with the protective ground of the room.
Power cables leading in the equipment room need to be equipped with a surge protector	• After the low-voltage power cables are led into the room, install the surge protector for the power cables in the AC voltage stabilizer and the AC power distribution panel (box). Correctly ground the surge protector nearby. • For an equipment room in urban area, install a power supply surge protector with the nominal discharge current of no less than 20 kA. For an equipment room that is built in a suburb and subject to lightning strikes, install a power supply surge protector with the nominal discharge current of more than 60 kA. For an equipment room that is built in a mountain area and subject to frequent lightning strikes, or in a separate high-rise building in a city, install a power supply surge protector with the nominal discharge current of more than 100 kA. • The ground cable of the surge protector should be no longer than 1 m (3.28 ft).
Grounding for DC power distribution	• Connect the DC working ground (positive pole of the -48 V DC power supply or the negative pole of the 24 V DC power supply) with the indoor collective ground cable nearby. The total ground cable should meet the maximum load of the equipment. • The power equipment must have a DC working ground cable, which can connect the power equipment to the collective ground cable of the telecommunication site (or the protective ground bar of the equipment room).

Item	Requirements
Equipotential connection	• Properly ground the devices and auxiliary devices in the room such as mobile base station, transmission, switching equipment, power supply equipment, and cable distribution frame. Connect all PGND cables to the collective protective ground bar. Connect all PGND cables in one equipment room to one protective ground bar. • Apply joint grounding to the working ground and protective ground of devices, which means the two share one grounding network. • The cable tray, rack or shell, metal ventilation pipe, metal door or window of the equipment should be grounded for protection.
General requirements for grounding	• Do not connect the neutral line of the AC power cable with the protective ground of any telecom equipment in the equipment room. • Do not install a fuse or switch on the ground cable. • All ground cables should be as short as possible, and arranged in a straight line.
Grounding resistance	• The grounding resistance must be lower than 1 ohm. • The upper end of the grounding body should be at least 0.7 m (2.30 ft) over the ground. In cold areas, bury the grounding body below the frozen ground. • Measure the grounding resistance periodically to ensure effective grounding.
Routing of signal cable	• Do not arrange the signal cables overhead in the equipment room. All signal cables must be led into the site underground. • Use the cables with a metal jacket or place them into a metal pipe if they come out/in the equipment room. • Ground the idle lines inside the cable in the equipment room. • Signal cables should be deployed on internal walls. Do not deploy outdoor aerial cables. • Keep signal cables away from power cables and surge protection devices.

Item	Requirements
Collective ground cable	• Use a ground ring or ground bar for the collective ground cable. • Do not use aluminum cables as ground cables. Adopt measures to prevent electrification corrosion when connecting different metal parts together. • Use a copper busbar as the collective ground cable with a cross-sectional area of no less than 120 mm^2 (0.19 $in.^2$), or use the galvanized flat steel of the same resistance. Insulate the collective ground cable from the reinforcing steel bars of the building.
Grounding lead-in	The grounding lead-in should be a maximum of 30 m (98.42 ft) long. Use the galvanized flat steel with cross-sectional area of 40 mm x 4 mm (1.58 in. x 0.158 in.) or 50 mm x 5 mm (1.97 in. x 0.197 in.).
Grounding of the cabinet	• All the devices including the surge protection device in the cabinet must be connected in an equipotential manner. The ground cables can be aggregated to the ground bar or surge protector socket first, and then the ground bar or surge protector socket can be connected to the ground. • The resistance between the device ground terminals and ground bar cannot exceed 0.1 ohm. • The cabinet can be grounded using the protecting earthing (PE) wire of the electrical network in the building, zinc-coated angle steel, or the main steel bar of the building. • If the cabinet is grounded using the PE wire of the electrical network, use a multimeter to test the grounding status. If the voltage between the PE wire and neutral wire is lower than 5 V and the voltage between the PE wire and live wire is about 220 V, the PE wire is grounded well. If the tested AC voltages are not within the ranges, the cabinet must be grounded in other ways. • The yellow-green ground cable contains multiple copper wires. The cross-sectional area of the ground cable must be no less than 6 mm^2 (0.0093 $in.^2$) and the length cannot exceed 3 m (9.84 ft.). • Ground cables cannot be twisted with signal cables. • Antirust and anticorrosion measures must be taken on the ground terminals. • The fiber reinforcing rib can be directly connected to the ground bar of the cabinet. Before wrapping the reinforcing rib with insulation tape, cut a 0.5 m (1.64 ft.) segment from the reinforcing rib. Wrap the reinforcing rib with at least five layers of insulation tape. Keep the reinforcing rib at least 5 cm (1.969 in.) from the cabinet surface.

11.2 Requirements for Power Supply

11.2.1 Requirements for AC Power Supply

An AC power supply system consists of power mains, uninterruptible power supplies (UPSs), and self-supplied electric generators. In addition to meeting the requirements of the server load, the AC power supply must have a simple connection line, safe operation, flexible scheduling, and easy maintenance.

The low-voltage power supply should be 3-phase, 5-wire mode or monophase 3-wire mode. This AC power supply should be 110 V/220 V, with a frequency of 50 Hz.

The UPS should supply the same power and operate at the same phase as the power mains. The switching time between the UPS and mains should be less than 10 ms; otherwise, the networking devices will reboot or reset.

For power distribution capacity in the equipment room, both the working current and fault current of the devices should be considered. Ensure that independent AC power supplies protect independent devices. Configure the current-carrying capacity of the protection switch of the equipment room for more than that of the devices.

Table 11-5 lists the voltage range of the AC power supply for the devices.

Table 11-5 Voltage range of AC power supply

Item	Requirements
AC power capacity to support the devices	-10% to +5% of the rated voltage
AC power capacity to support the power modules and important buildings	-15% to +10% of the rated voltage
Frequency of alternating current	-4% to +4% of the rated value
Voltage wave shape sine distortion	Within 5% of the rated voltage

The automated electric generator must have a standard interface that supports telecommunication protocols, remote telecommunication, monitoring, and control.

AC power cables should meet the following specifications:

- AC neutral should have a conductor with the same cross section as the phase line.

- AC cables should have non-flammable insulation. The layout of AC cables should comply with local regulations. Low-voltage power distribution rooms should comply with local regulations.

11.2.2 Recommendations for AC Power Supply

The following are recommendations for the AC power supply.

- If the voltage of the power mains that supply power directly to devices exceeds the rated voltage by -10% to 5%, or exceeds the voltage range that devices can support, a voltage regulating device or voltage stabilizing device is required.
- If the mains do not supply power for the device directly, or if the mains voltage exceeds the rated voltage by -15% to 10% or exceeds the input voltage range of the DC power supply, a voltage regulating device or voltage stabilizing device is required.
- A UPS or inverter power supply system is required to provide uninterrupted AC power to support the telecommunication load.
- If abnormalities occur on the mains, telecommunication servers should be equipped with a self-supplied electric generator to support the key telecommunication load. The capacity should be not less than 150% to 200% of the total uninterruptible power supply.
- Storage batteries are usually installed in a parallel connection of two groups. UPS storage batteries are generally installed in one group. The redundancy required for the UPS can rely on concatenation or parallel connection. When an inverter or a UPS is used, the active inverter is determined by the maximum power and a backup inverter is required.

11.2.3 Requirements for DC Power Supply

The equipment room should receive stable and reliable DC power. Deploy the power equipment near the telecommunications equipment to make the DC feeder as short as possible. To reduce power consumption and installation cost, the loop voltage drop from the battery port to the equipment port should be less than 3.2 V.

- A large-scale enterprise can deploy an independent power supply system on each floor to supply power to the telecommunications equipment room on the respective floor.
- A medium-scale enterprise can use a power room and a battery room for centralized power supply or use distributed power supply systems.
- A small-scale enterprise can deploy an integrated power supply system in its equipment room but must take measures to prevent corrosive gases released from batteries from eroding circuit boards of telecommunications equipment.

Table 11-6 lists the specifications for the DC power supply.

Table 11-6 Specifications for the DC power supply

Item	Requirements
Range of the -48 V input voltage	-38 V to -72 V
DC power capacity to support the surge current	Greater than 1.5 times the rated current
Regulated voltage precision	If the AC input voltage is in the range of 85% to 110% of the rated value, and the load current is in the range of 5% to 100% of the rated value, the output voltage of the rectifier ranges from -46.0 V to -56.4 V, with the regulated voltage precision less than or equal to 1%.
Overshoot amplitude of switch on/off	Integral value of the DC output voltage ±5%
Peak noise voltage	≤200 mV
Dynamic response	The recovery time is less than 200 ms. The overshoot is in the range of the integral value of the DC output voltage ±5%.

11.2.4 Recommendations for DC Power Supply

The following are recommendations for the DC power supply.

- Use distributed power supply mode. Use multiple DC power supply systems and put power equipment in multiple locations.
- Adopt a standard DC power supply system, and set the output voltage to the communications equipment within the required range.
- Improve reliability of the AC power supply system to reduce the necessary capacity of storage batteries. For small offices, increase the capacity of storage batteries if it is difficult to enhance reliability of the AC power supply system.
- The total capacity of the high-frequency switching rectifier must satisfy the power of the communication loading and battery charging. If there are 10 or fewer active rectifier modules, configure one backup module. If there are more than 10 active modules, configure one backup module for every 10 active modules.
- Install storage batteries in two or more groups. The capacity is determined by the duration for which the storage batteries must supply power. For most offices, the batteries should be able to supply power for at least one hour.

12 Appendix C Equipment Grounding Specifications

12.1 General Grounding Specifications

Table 12-1 shows the general grounding specifications.

Table 12-1 General grounding specifications

No.	Description
1	The working ground and protective ground, including the shielded ground and the lightning-proof ground of the cable distribution frame should share the same grounding conductor.
2	The cable trays, shells, metal ventilation pipes, metal doors and windows in the equipment room should be grounded for protection.
3	The metal parts of the equipment which are electrically floating in normal conditions should be grounded for protection.
4	The ground cable must be connected securely to the protective ground bar of the equipment room.
5	Do not use other equipment as part of the ground cable or electrical connection.

12.2 Grounding Specifications for an Equipment Room

The grounding resistance of a comprehensive communication building should be less than or equal to one ohm. The grounding resistance of an ordinary communication office should be less than five ohms. The grounding resistance in an area where the earth resistance rate is high should be less than 10 ohms.

12.3 Grounding Specifications for Devices

Table 12-2 lists the equipment grounding specifications.

Table 12-2 Equipment Grounding Specifications

No.	Description
1	All communication devices and auxiliary devices (such as mobile base stations, transmission and switching devices, power supply devices) in the equipment room should be grounded for protection. Connect all protective ground for various devices jointly to a general ground bar, and then to the same protective ground bar in the room together with the protective ground (PGND) of the device.
2	The PGND of the equipment is shorted to the copper ground bar provided by the customer. The short-circuiting cable used should be a yellow-green plastic insulated cable with a copper core and a cross-sectional area greater than 25 sq. mm (0.039 sq. in.).
3	There are grounding terminals and grounding lugs at the lower part of the front door, rear door and side panel of the cabinet, connected to the grounding terminals of the cabinet framework through connection cables with cross-sectional area of no less than 1.6 sq. mm (0.002 sq. in.).
4	Ensure that all metal components of the cabinet conduct well. No insulating coating should be sprayed on the connection part of the metal components.
5	Connect the cabinets in the same row by fastening captive screws and gaskets on the top of the cabinets. Do not spray any coating into a rectangular area measuring 30 mm x 50 mm (1.18 in. x 1.97 in.) around the connection hole for a captive bolt. Measures to prevent rust and corrosion must be taken for this area. Zinc electroplating with iridescent yellow chromate conversion coating should be applied to the gasket and nut to ensure good electrical contact.

No.	Description
6	When combining cabinets of the same type, short-circuiting cables are required to connect the ground busbars (if any) of the cabinets. The cross-sectional area of the short-circuiting cable is 6 sq. mm (0.009 sq. in.) and is no more than 300 mm (11.8 in.) long. Connect the two ends of the short-circuiting cable to the ground busbar terminals of neighboring cabinets and fix them firmly.

12.4 Grounding Specifications for Communications Power Supply

Table 12-3 shows the grounding specifications for communication power supplies.

Table 12-3 Grounding specifications for communication power supplies

No.	Description
1	The inlet for the AC power cable at the equipment room should be equipped with a surge protection device (C-level) with a nominal discharge current no less than 20 kA.
2	The protective ground for the power supply and that for communication equipment share the same grounding conductor. If the power supply and the equipment are in the same equipment room, use the same protective ground bar for them if possible.
3	Use a surge protection circuit on the AC power interface.
4	The positive of the -48 V DC power supply or negative pole of the 24 V DC power supply should be grounded at the output of the DC power supply.
5	The working ground and protective ground of the DC power supply equipment should use the same grounding conductor with the protective ground of the switching equipment. If the power supply and equipment are in the same equipment room, use the same protection ground bar for them if possible.
6	Add surge protection on the DC power interface.

12.5 Grounding Specifications for Signal Cables

Table 12-4 lists the grounding specifications for signal cables.

Table 12-4 Grounding specifications for signal cables

No.	Description
1	Equip the cable outdoors with a metal jacket, well grounded at both ends, or connect the ends of the metal jacket to the protective ground bar of the equipment room. For cables inside the equipment room, install surge protection devices at the interface to the equipment. The PGND cable for the surge protection devices should be as short as possible.
2	The incoming and outgoing signal cables to and from the office and unused wires inside the cable should be grounded for protection.
3	The Tone & Data Access (TDA) cable must pass through the Main Distribution Frame (MDF) with surge protective device (SPD) when going out of the office. The cable's shield layer should be connected to the protective ground of the MDF. The MDF should use the same grounding conductor as the cabinet.
4	Do not route signal cables overhead.

12.6 Specifications for Laying Out Grounding Cables

Table 12-5 shows the specifications for the ground cable.

Table 12-5 Specifications for laying out ground cables

No.	Description
1	The grounding wire should not run parallel to or twist around the signal cable.
2	Bury ground underground or arrange them indoors. Do not route ground cables overhead.
3	Do not connect two cables together to extend the PGND cable, or add any switches or fuses.
4	The PGND cable should be an alternating yellow and green plastic insulated one with a copper core.
5	The neutral line of the AC power cable cannot be connected to the protective ground of transmission and communication equipment in the equipment room.
6	A PGND cable should be as short as possible, with a length of no more than 45 m (147.64 ft).

13 Appendix D Engineering Labels for Cables

An engineering label serves as an identifier for on-site installation and maintenance after the installation. Labels on the cables facilitate correct and orderly connection of cables, and easy maintenance after installation.

Engineering labels are specialized for power cables and signal cables:

- Signal cables include network cables, optical fibers, and user cables.
- Power cables include the AC power cables and DC power cables.

NOTE

Fill in labels according to specified requirements to keep consistency of labels in the equipment room. Make a relevant statement in the self-check report.

13.1 Introduction to Labels

13.1.1 Label Materials

Features:

- Thickness: 0.09 mm (0.004 in.)
- Color: chalk white
- Material: polyester (PET)
- Ambient temperature: -29°C (-20.2°F) to +149°C (300.2°F)

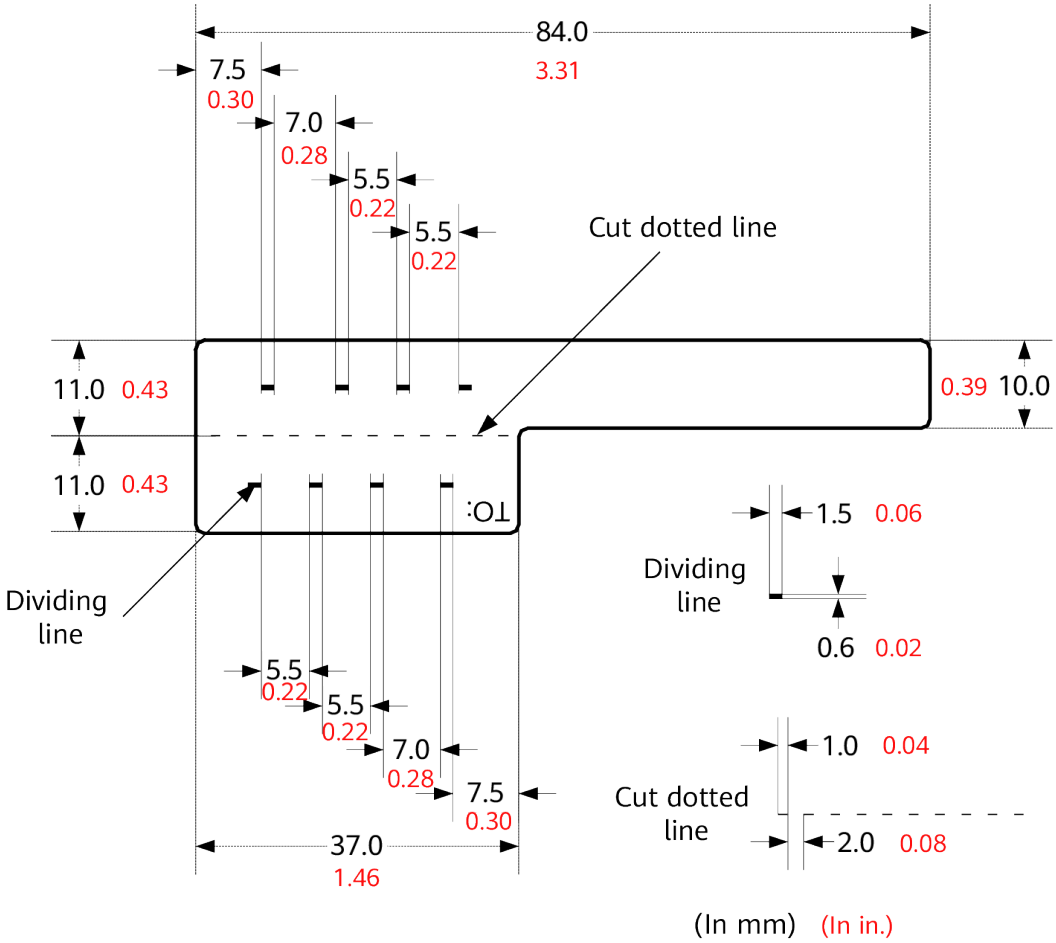
- Printed by a laser printer and written with a marker
- Pass UL and CSA authentication

13.1.2 Type and Structure

Label for Signal Cables

The label for signal cables is L-shaped with fixed dimensions, as shown in **Figure 13-1**.

Figure 13-1 Label for signal cables



To specify more clearly the position of a cable, use the dividing lines on the label. For example, there is a dividing line between the cabinet number and the chassis number, and another one between the chassis number and the slot number. Each dividing line is light blue (Pantone 656c) and 1.5 mm x 0.6 mm (0.06 in. x 0.02 in.).

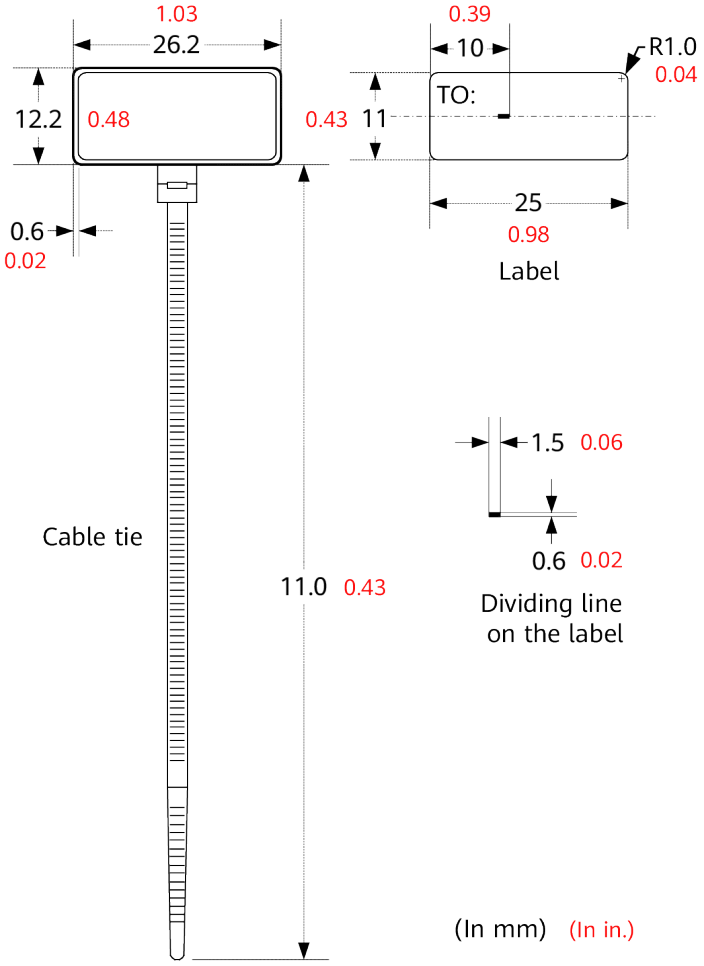
The cut dotted line helps to fold the label when affixed to the cable, and its size is 1 mm x 2 mm (0.04 in. x 0.08 in.).

The word "TO:" (upside down in the figure) at the lower right corner of the label is used to identify the opposite end of the cable on which the label is affixed.

Power Cable Label

The label for power cables should be attached to the identification plate on the cable ties that are attached to the cable. The identification plate has an embossed area 0.2 mm x 0.6 mm (0.008 in. x 0.02 in.) around (symmetric on both sides), and the area in the middle is for affixing the label, as shown in **Figure 13-2**.

Figure 13-2 Power cable label



13.1.3 Label Printing

The contents can be printed or written on the labels. Printing is recommended for the sake of high efficiency and eye-pleasant layout.

Template for Printing

You can obtain a template from the Huawei local office to print labels.

The template is made in Microsoft Word. Follow these instructions to use the template:

- You can modify the contents of the template. Do not change settings of centered characters, direction, and fonts.
- If many characters need to be filled in, decrease the font size, but make sure that the printouts are clear and legible.

Merging Cells in the Template

To merge two or more cells, do as follows:

1. Select **Edit**/**Select All**.
2. Select **Format**/**Borders and Shading**/**Borders**. Select **Box** tab and click **OK**.
3. Drag the mouse to select cells to be merged and select the **Table**/**Merge Cells**.

Requirements on the Printer

To print labels, use a laser jet printer of any model. Before printing labels, set up the page and try printing.

1. Try printing on ordinary paper with both sides blank. Place the blank paper over the whole page of the label paper, and check whether the page setup conforms to the label layout.
2. Make sure the printer properties, such as "paper size" and "direction", have been set correctly.
   - If the printout conforms to the sheet of labels, print the labels on the label paper.
   - If the printout does not conform, adjust the page setup and try printing again until the correct printout is produced.

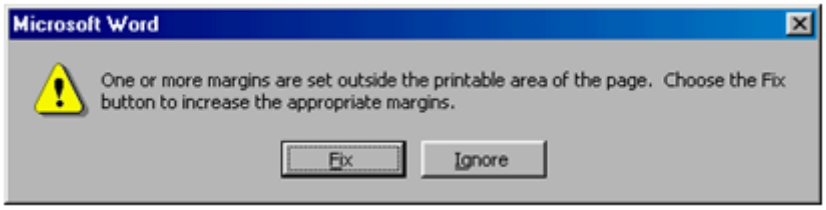
The method for adjusting the page setup is as follows.

1. Select **File**/**Page Setup**.
2. Select **Layout** and set Header and Footer as 0.
3. Select the **Margins** tab page. Select Left for Gutter Position and adjust the values of Top, Bottom, Left, and Right.

   NOTE

   If the warning prompt as shown in **Figure 13-3** appears before printing, click **Ignore** to continue the printing.

   Figure 13-3 Warning prompt before printing



After the page setup has been made correctly, save it for future use. This page setup is only necessary the first time you use the template to print the labels.

Requirements for Feeding the Printer

The label paper consists of two layers and has undergone multiple processing procedures such as printing and cutting. No matter what model of printer you use,

feed in the labels one page at a time. To avoid jamming the labels, never use the auto-feed mode.

Feed in the label paper in the correct direction to ensure that the text is printed in a correct position.

Requirements for the Printed Label

Make sure that the printed labels satisfy the following requirements:

- All the printouts must be on the label, and nothing should be printed on the backing layer of the label page.
- Contents in the cells should be aligned in the center. In a single-line printout, the dividing lines and the word "TO:" should not be covered by printed characters.
- When the cells are merged and the printouts are made in multiple lines, avoid covering the word "TO:" when printing the text. Use the space bar to move the text to the next line.

13.1.4 Writing Labels

Writing Tools

To make sure the printouts are clear and legible, use black markers instead of ball-point pens to write the labels.

If no marker is available, black ball-point pens are allowed, although not recommended. Compared with ball-point pens, waterproof markers are better. When writing with a ball-point pen, do not leave the oil on the label, which may contaminate the label and blur the words.

NOTE

The delivered marker has two nibs. Use the smaller nib to write the labels.

Font

For the sake of legibility, use standard block letters and numbers as shown in **Table 13-1** (Times New Roman).

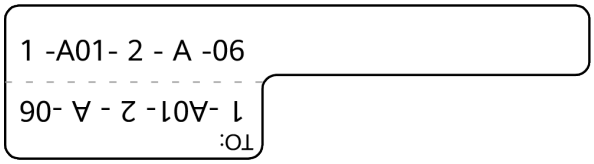
Table 13-1 Standard typeface for handwriting

0	1	2	3	4	5	6	7	8
9	A	B	C	D	E	F	G	H
I	J	K	L	M	N	O	P	Q
R	S	T	U	V	W	X	Y	Z

Determine the size of characters based on the number of letters or digits and ensure that the characters are distinct and tidy.

Placement of text on a label is shown in **Figure 13-4**.

Figure 13-4 Placement of text on a label



13.1.5 Attaching Labels

After printing or writing the label, remove the label from the page and attach it to the signal cable, or the identification plate of the power cable. The methods for attaching labels are described in the following sections.

Label for Signal Cables

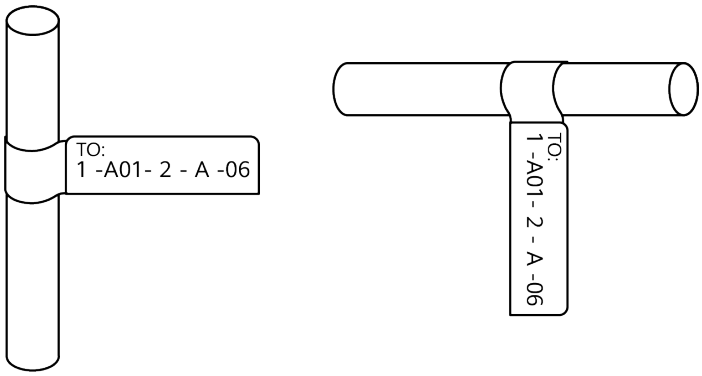
- Choose the place to attach labels.

  The label is attached 2 cm (0.79 in.) from the connector on a signal cable. In special cases (for example, to avoid cable bending or affecting other cables), other positions are allowed to attach the labels. The rectangular part with text is attached facing right or downward, as shown in **Figure 13-5**. The details are as follows:

  – The identification card is to the right of the cable in vertical cabling.

  – The identification card should be downward when you lay out the cable horizontally.

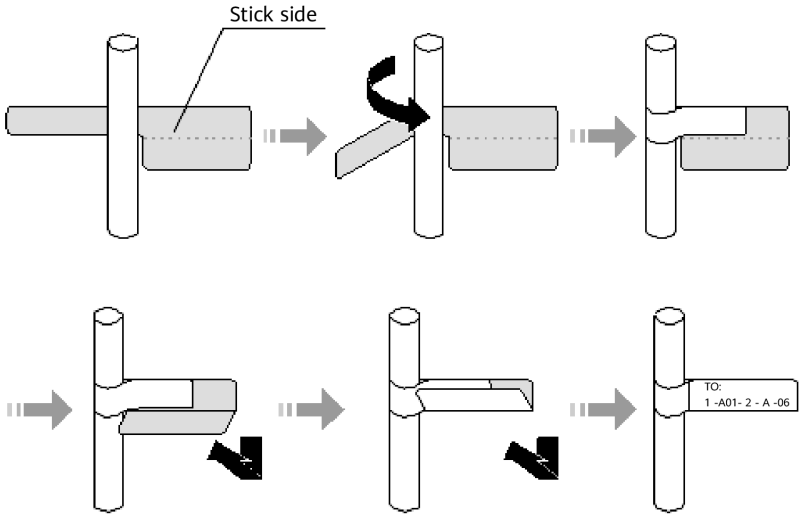
  Figure 13-5 Text area of the label

- Procedure for attaching labels

  Figure 13-6 shows the methods and procedures for attaching labels.

Figure 13-6 Label for signal cables



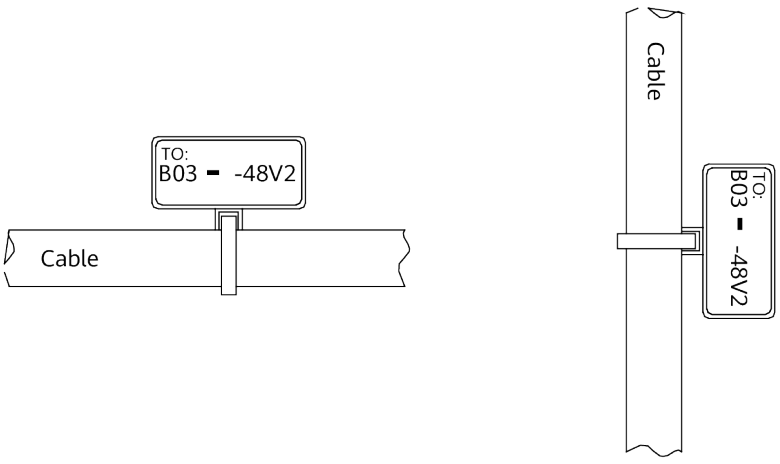
Power Cable Label

Remove the label from the backing page, and attach it to the identification plate on the cable tie. The label should be attached to the rectangular flute on the identification plate, and attached to only one side of the identification plate. The cable ties are bundled at 2 cm (0.79 in.) from the connectors, and other positions are allowed in special circumstances.

Cable ties should be bound on both ends of a cable. After the bundling, the finished identification plate should be on top of the cable in horizontal cabling, or on the right side of the cable in vertical cabling, as shown in **Figure 13-7**. The details are as follows:

- The identification card is to the right of the cable in vertical cabling.
- The identification card is on the top of the cable in horizontal cabling. Make sure that the label is facing out.

Figure 13-7 Binding the label for the power cable



The identification card is on the top of the cable in horizontal cabling.

The identification card is to the right of the cable in vertical cabling.

13.1.6 Contents of Engineering Labels

Contents of Labels for Power Cables

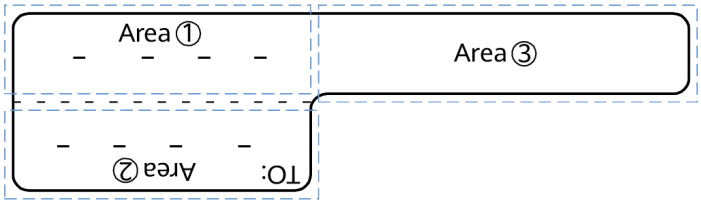
Labels for power cables are affixed on only one side of the identification plates. On the labels, there is information (the part after the word "TO:") about the location of the device on the other end of the cable, like the location of control cabinet, distribution box or power socket.

Contents of Labels for Signal Cables

The two sides of the label affixed on the signal cable carry information about the location of the ports connected to both ends of the cable. **Figure 13-8** shows the information on both sides of the labels affixed to the signal cables.

- Area 1 contains the location information of the local end of the cable.
- Area 2 (with the word "TO:") contains the location information of the opposite end of the cable.
- Area 3 has been folded up inside the label.

Figure 13-8 Printed parts on the label for signal cables



Seen from the cabling end of the equipment, the text part of the label is on the right side of the cable. The side with "TO:" that is facing outside carries the location information of the opposite end; and the other side carries the location information of the local end.

In other words, the information in Area 1 at one end is the same as the information in Area 2 at the other end of the cable.

13.1.7 Precautions for Using Engineering Labels

When using labels, pay attention to the following points:

- When printing, writing, or attaching labels, keep the labels clean.
- Since the label paper is made of moistureproof material, ink-jet printers and ink pens cannot be used to print and write labels.
- Labels should be attached neatly. New-type labels are L-shaped. If they are pasted at incorrect locations or in the incorrect direction, the appearance of the device is affected.
- Power cable ties should be attached in the same positions on power cables, with identification plates on the same side.
- The positions of "up", "down", "left" or "right" are all based on the viewpoint of the engineering person who is working on the label.

13.2 Engineering Labels for Optical Fibers

These labels are affixed to the optical fibers that connect the optical interfaces on the boards in a chassis, or on the device boxes. There are two types of labels for optical cables:

- One is for the fiber that connects the optical interfaces on two devices.
- The other is for the fiber that connects the device and the ODF.

13.2.1 Labels for the Optical Fibers Connecting Devices

Meaning of the Label

Table 13-2 lists information on both sides of the labels affixed to the optical fibers that connect two devices.

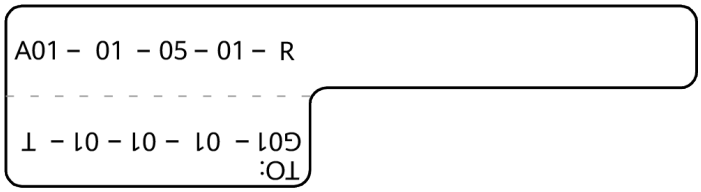
Table 13-2 Information on labels affixed to the fibers between two devices

Content	Meaning	Example
MN-B-C-D-R/T	MN: cabinet number	M: The cabinet rows from front to back are numbered from A to Z. N: The cabinet columns from left to right are numbered from 01 to 99. For example, A01 is the cabinet in row A and column 01.
	B: chassis number	Numbered in bottom-up order with two digits, for example, 01.
	C: physical slot number	Numbered in top-down and left-right order starting from 01. For example, 01 is the first slot at the top left of the chassis.
	D: optical interface number.	Numbered in top-down and left-right order, consistent with the port sequence number on the device.
	R: Receiving interface T: optical transmitting interface	-

Example of the Label

Figure 13-9 shows a sample label on an optical fiber.

Figure 13-9 Sample label on an optical fiber between two devices



The meaning of the label is listed in **Figure 13-9**.

- "A01-01-05-01-R" indicates that the local end of the optical fiber is connected to the optical receiving interface 01 in slot 5, chassis 01 in the cabinet in row A, column 01 in the machine room.
- "G01-01-01-01-T" indicates that the opposite end of the optical fiber is connected with optical transmitting interface 01 in slot 01, chassis 01 in the cabinet in row G, column 01 in the machine room.

13.2.2 Labels for the Optical Fibers Connecting the Device and an ODF

Meaning of the Labels

Table 13-3 shows information on both sides of labels attached to an optical fiber between a device and an optical distribution frame (ODF).

Table 13-3 Information on labels affixed to a fiber between a device and an ODF

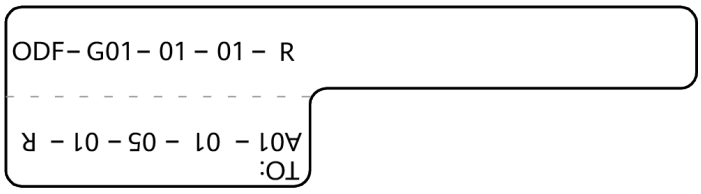
Content	Meaning	Example
MN-B-C-D-R/T	MN: cabinet number	For example, A01.
	B: chassis number	Numbered in bottom-up order with two digits, for example, 01.
	C: physical slot number	Numbered in top-down and left-right order starting from 01. For example, 01 is the first slot at the top left of the chassis.
	D: optical interface number.	Numbered in top-down and left-right order, consistent with the port sequence number on the device.
	R: Optical receiving interface T: optical transmitting interface	-

Content	Meaning	Example
ODF-MN-B-C-R/T	MN: row number and column number of an ODF	M: The cabinet rows from front to back are numbered from A to Z. N: The cabinet columns from left to right are numbered from 01 to 99. For example, G01 is the ODF of row G and column 01.
	B: row number of the terminal device	Range from 01 to 99, for example, 01-01.
	C: column number of the terminal device	
	R: Optical receiving interface T: optical transmitting interface	-

Example of the Label

Figure 13-10 shows a sample label on an optical fiber.

Figure 13-10 Sample label on an optical fiber between the device and the ODF



Meaning of the label in Figure 13-10

- "ODF-G01-01-01-R" indicates that the local end of the optical fiber is connected to the optical receiving terminal in row 01, column 01 of the ODF in row G, column 01 in the machine room.
- "A01-01-05-01-R" indicates that the opposite end of the optical fiber is connected to optical receiving interface 1 in slot 05, chassis 01 in the cabinet in row A, column 01 in the machine room.

13.3 Engineering Labels for Network Cables

Applicable Ranges

The labels can be applied to Ethernet cables.

Label Content

Table 13-4 shows the information on both sides of the labels affixed to Ethernet cables.

You can also decide the label content based on the actual environment. If the device is not installed in the cabinet, for example, you can remove the cabinet number.

Table 13-4 Information on the Ethernet cables

Content	Meaning	Example
MN-B-C-D	MN: cabinet number	For example, A01 is the first cabinet in row A.
	B: chassis number	Numbered in bottom-up order with two digits, for example, 01.
	C: physical slot number	Numbered with two digits in top-down and left-right order. For example, 01.
	D: network port number	Numbered in top-down and left-right orders. For example, 01.
MN-Z	MN: cabinet number	For example, B02 is the second cabinet in row B.
	Z: Location number	Fill in the location number of the terminal device on site. If the cable is connected to a device in a cabinet, specify the serial numbers of the cabinet, the chassis, and the Ethernet interface of the device. For example, B02-03-12. If the cable is connected to the Network Management Station (NMS), specify the specific location of the NMS.

The contents of the labels for network cables connecting hubs and devices or agents and the network cables for other purposes should be specified according to actual connections. The details are as follows:

- For a network cable connecting a hub and device, the label on the hub end should indicate the numbers of the chassis and cabinet where the hub resides, and the serial number on the hub. The label on the device end should indicate the number of the chassis and cabinet where the device is located. If the device is a standalone device, provide the specific position of the device.
- For a network cable connecting a hub and an agent or terminal, the label on the agent or terminal end should contain the serial number of the network interface. The definitions of the cabinet number and chassis number are the same as those described in Table 13-4.

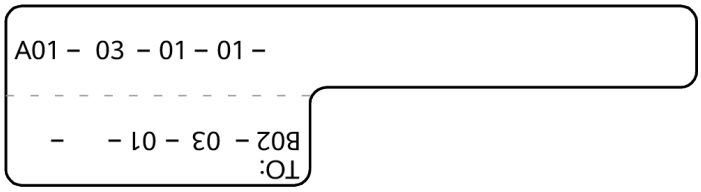
- If the hub is a standalone device without a cabinet or chassis, the label should contain specific location information that identifies the hub.

The serial number on the hub, the network interface number of the agent or terminal, and the location of the standalone device should be specified according to actual connections.

Label Example

Figure 13-11 shows a sample label on an Ethernet cable.

Figure 13-11 Sample label on an Ethernet cable



Meaning of the label in Figure 13-11.

- "A01-03-01-01" indicates that one end of the network cable is connected to network interface 01 in slot 01, chassis 03 of the cabinet in row A, column 01 in the equipment room.
- "B02-03-01" indicates that another end of the network cable is connected to network interface 01 in chassis 03 of the cabinet on row B, column 02 in the equipment room. No slot number is given.

13.4 Engineering Labels for User Cables

Attach labels to both ends of a user cable to indicate the locations of the cable on the device and main distribution frame (MDF).

Meaning of the Engineering Labels for User Cables

Table 13-5 shows the contents of the labels.

Table 13-5 Contents of the engineering labels for user cables

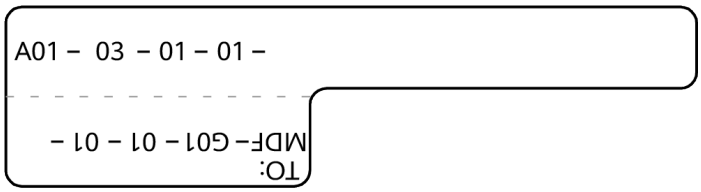
Content	Meaning	Example
MN-B-C-D	MN: cabinet number	For example, A01 is the first cabinet in row A.
	B: frame number	Numbered in the bottom-up order with two digits, for example, 03.
	C: physical slot number	Numbered with two digits in top-down and left-right order. For example, 01.
	D: cable number	Numbered with two digits in top-down and left-right order. For example, 01.

Content	Meaning	Example
MDF-MN-B-C	MN: row number and column number of the MDF	M: The rows of cabinets from front to back are numbered from A to Z. N: The columns of cabinets from left to right are numbered from 01 to 99. For example, G01 is the MDF of Row G and Column 01.
	B: row number of the terminal device	Ranges from 01 to 99, for example, 01-01.
	C: column number of the terminal device	

Example of the Label

Figure 13-12 shows a sample label on a user cable.

Figure 13-12 Sample label on a user cable



The meaning of the label in **Figure 13-12** is as follows:

- "A01-03-01-01" indicates that the local end of the user cable is connected to port 1 in slot 1, chassis 03 of the cabinet in row A, column 01 in the equipment room.
- "MDF-G01-01-01" indicates that the opposite end of the user cable is connected to the terminal in row 01, column 01 of the MDF in row G, column 01 in the equipment room.

13.5 Engineering Labels for Power Cables

13.5.1 Engineering Labels for DC Power Cables

These labels are affixed to the DC power cables that provide power supply for cabinets, including the -48 V, PGND, and BGND cables. Here, the DC power cables also include power cables and PGND cables.

The labels for DC power cables are affixed to one side of the identification plates on cable ties. For details of the labels, see **Table 13-6**.

Table 13-6 Contents of the label

Content	Meaning
MN(BC)-B--48Vn	MN(BC): BC is written right under MN. B: chassis number, numbered in bottom-up order with two digits, for example, 01. N: power socket number, numbered as 1 to 3 in the bottom-up and left-to-right orders. On the loaded cabinet side, only MN is used to identify the cabinet. On the power cabinet side, MN identifies the row and column number of the power distribution equipment like a control cabinet and distribution box, and BC identifies the row and column number of the -48 V connector. If there is no row number or column number, or the connector can be identified without them, BC can be omitted. It is unnecessary to identify the row and column number for BGND and PGND.
MN(BC)-B-BGND	
MN(BC)-B-PGND	

The label only carries location information about the destination direction of the power cable whereas information about the local end is unnecessary. That is, the label only carries location information about the opposite equipment, the control cabinet, or the distribution box. **Table 13-6** lists the information on two -48 V power supplies on the label. The information on other DC voltages, such as 24 V and 60 V should be given in similar methods.

Make sure that labels are affixed in the correct direction. That is, after the cable ties are bundled onto the cable, the identification plates with the labels should face up, and the text on the labels in the same cabinet should be in the same direction. For details, see **Figure 13-13**.

Figure 13-13 Example of the labels for DC power cables

Label on the loaded conbinet side (indicating the poation of the cable on the power distribiuion box)

Label on the distribiuion box side (indicating the poation of the cable on the loaded conbinet side)

The meaning of the label in **Figure 13-13** is as follows:

- On the loaded cabinet side, the label "A01/B08--48V2" on the cable indicates that the cable is -48 V DC supply, which is from the eighth connector in row B of -48 V bus bar in the cabinet in row A, and column 1 in the equipment room.

- On the distribution box side, the label "B03--48V2" indicates that the cable is -48 V DC supply, connected to DC power socket 2 in row B, column 03 in the equipment room.

NOTE

In the power distribution box or the first power cabinet of a row in a transmission equipment room, every terminal block on the -48 V connector bar has a numeric identification. For example, in the above label of "A01/B08--48V2", "08" (or sometimes "8") is the numeric identification of the terminal block.

PGND and BGND are two copper bars, on which the terminal blocks are short-circuited. Therefore, it makes no difference which terminal is connected to them. It is only necessary to give the row and column of the power distribution box, instead of giving the specific serial number of the terminal block on the copper bar. For example, if the label on the loaded cabinet side is "A01-BGND", it means that the power cable is a BGND that connects BGND copper bar in the power distribution box in row A, column 01 in the machine room. Information on the labels for PGND cables should be given in a similar way.

13.5.2 Engineering Labels for AC Power Cables

These labels are affixed to both ends of an AC power cable that provides AC power supply to cabinets, including 110/220 V, PGND, and BGND cables. The 110/220 V AC cables and related PGND and BGND cables are covered with an insulating sheath, so the labels need to contain only the word "AC" and the cabinet numbers.

The labels for AC power cables are affixed to one side of the identification plates on cable ties. For details, see **Table 13-7**.

Table 13-7 Label content

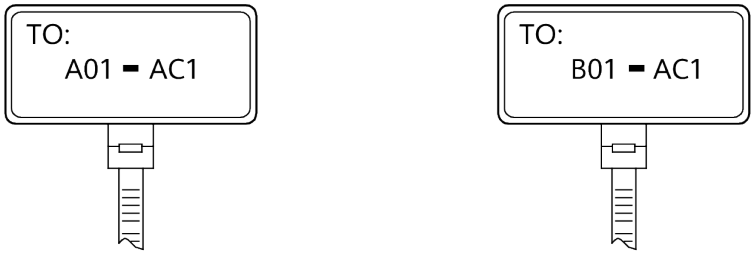
Content	Meaning
MN-(B)-ACn	MN: serial number of the cabinet or the socket where the power is led in B: chassis number, numbered in bottom-up order with two digits, for example, 01. n: power port number, numbered as 1 to 3 in bottom-up and left-to-right order. Serial number of the socket where the power is led in: the location of the socket is marked according to the actual situation. If the sockets can be identified by row numbers and column numbers, they can be numbered following the same rule for the cabinets. If the sockets cannot be identified by rows and columns, specify the detailed locations to avoid confusion with other sockets.

The label only carries location information about the opposite equipment and the power socket; information about the local end is unnecessary.

Make sure that labels are affixed in the correct direction. That is, after the cable ties are bundled onto the cable, the identification plates with the labels should

face up, and the text on the labels in the same cabinet should be in the same direction, as shown in **Figure 13-14**.

Figure 13-14 Labels for AC power cables



Label on the loaded cabinet side (indicating the position of the cable on the power distribution box)

Label on the distribution box side (indicating the position of the cable on the loaded cabinet side)

Meaning of the label in **Figure 13-14**.

- On the equipment cabinet side, the label marked "A01-AC1" indicates that the power cable is connected to the first AC power socket of row A and column 01 in the equipment room.
- On the power socket side, the label marked "B01-AC1" indicates that the power cable is connected to the first AC power socket in the cabinet of row B and column 01 in the equipment room.

14 Appendix E Guide to Using Optical Modules

Common Faults of an Optical Module

1. An optical module is not completely installed in position.

   If the optical module is not completely installed in position and the latch boss is not secured, the device cannot identify the optical module. After the optical module works for a long time, it will be ejected under external stress.

2. The optical receptacle on an optical module is contaminated.

   If an optical module is not cleaned or protected properly, contaminants may accumulate on the fiber pin in the optical module. As a result, the coupling efficiency is reduced, optical signals are cut off, or even worse, the surface of the fiber pin is damaged permanently.

3. An optical module is burnt.

   If high-power optical signals (caused by an optical time domain reflectometer or self-loop test) are transmitted through an optical module that is used for long-distance transmission but no optical attenuator is used, the optical power will exceed the overload power of the avalanche photodiode (APD). Then the optical module is burnt.

The preceding faults lead to temporary or long-term cut-off of optical signals; or even cause permanent damages to the optical module, affecting communication services.

Measures to Prevent a Loosened Optical Module

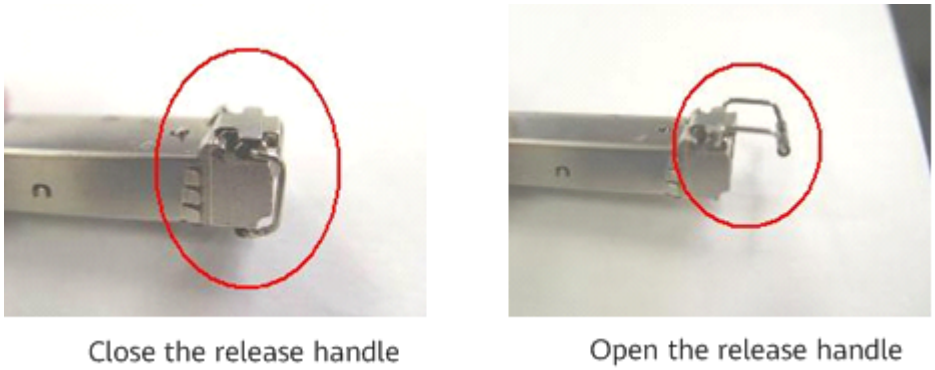
1. When installing an optical module, insert it in position. If you hear a click or feel a slight shake, it indicates that the latch boss is secured.

   If the latch boss is not secured, the gold finger of the optical module is not in good contact with the connector on the board. In this case, the link may be connected but optical signals will be cut off or the optical module will be loosened when the optical module is shaken or hit.

2. **Figure 14-1** shows the release handle on an optical module when it is open and closed. When inserting the optical module, make sure that the release handle is closed. At this time, the latch boss locks the optical module. After

the optical module is inserted, try pulling it out to see if it is installed in position. If the optical module cannot be pulled out, it is secured.

Figure 14-1 State of the release handle



Measures to Prevent Receptacle Contamination

1. Cleaning tissues must be prepared on site. You need to clean the optical connector before inserting it in the receptacle. This protects the receptacle against contamination on the surface of the optical connector.

   Figure 14-2 Cleaning optical fibers with special cleaning tissues

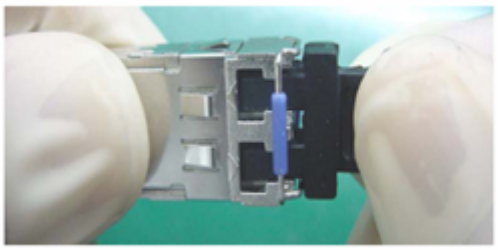
   

   NOTE

   Place at least three cleaning tissues on the work bench. As shown in **Figure 14-2**, wipe the end of an optical connector from left to right or from right to left on a cleaning tissue, and then move the connector end to the unused part of the cleaning tissue to continue.

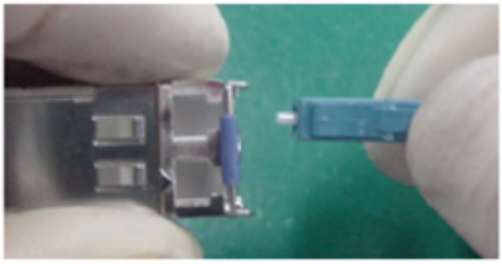
2. Cover an unused optical module with a protective cap to prevent dust, as shown in **Figure 14-3**.

   Figure 14-3 Installing a protective cap

If no protective cap is available, use fibers to protect the optical module, as shown in **Figure 14-4**.

Figure 14-4 Using fibers to protect an optical module



3. Cover unused optical connectors with protective caps, as shown in **Figure 14-5**, and then lay out fibers on the fiber rack or coil them in a fiber management tray to prevent fibers from being squeezed.

Figure 14-5 Installing a protective cap on a fiber

4. If a receptacle or an optical connector has not been used for a long time and is not covered with a protective cap, you need to clean it before using it. Clean a receptacle with a cotton swab, as shown in **Figure 14-6**. Clean an optical connector with cleaning tissues.

Figure 14-6 Cleaning a receptacle with a cotton swab

NOTICE

When cleaning a receptacle, insert the cotton swab and turn it slowly in the receptacle. Do not use too much strength because the receptacle may be damaged.

5. If optical signals are lost during the operation of a device, use the preceding method to clean the receptacle or the optical connector. In this manner, the possibility of contamination can be excluded.

Measures to Prevent an Optical Module from Being Burnt

1. Before using an optical time-domain reflectometer (OTDR) to test the connectivity or the attenuation of optical signals, disconnect the optical fibers from the optical module. Otherwise, the optical module will be burnt.
2. When performing a self-loop test, use an optical attenuator. Do not loosen the optical connector instead of the optical attenuator.

Precautions

1. The optical connector should be vertically inserted in the receptacle to avoid damages to the receptacle.
2. Fibers must be inserted into optical modules of the corresponding type. That is, multimode fibers must be inserted into multimode optical modules, and single mode fibers must be inserted into single mode optical modules. If a fiber is inserted into an optical module of a different mode, faults may occur. For example, optical signals will be lost.

15 Appendix F Fault Tag

*Customer name:						
Address:						
Contact person:						
Tel.:		Fax:				
Category*: □ RMA □ Return □ Analysis						
BOM Code	Product Description	Bar Code*	Fault Occurring Date*	Description of the Fault Phenomena*	Category No.*	Software Version*
Reasons for Repairing (Category No.):						

Category No. includes the following eight types: F001 - Wear out damaged (◊ In warranty Period ◊ Out of warranty period) F002 - Deployment damaged F003 - Intransit damaged F004 - Version upgrade F005 - Batch replace F007 - Overdue spare parts inspecting F008 - Others F011 - Running circumstance change
Note: ● For optical interface cards returned, the optical interfaces should be covered with protection caps. ● In general, the analysis card will not be returned to you. If you have any special requirements, please contact Huawei. ● One ***Fault Tag*** should be adapted in one return category, such as RMA/ Return/Analysis. ● The items marked with "*" are the mandatory fields that you must fill in.

16 Appendix G RU-5G Installation

16.1 RU-5G Remote Unit Installation

This guide describes how to install RU-5G remote unit. The installation and cable connection methods for most devices are similar. This guide uses the RU-5G-101 as an example.

16.1.1 Preparing for Installation

This section describes safety precautions and tool preparations for RU-5G remote unit installation.

Safety Precautions

- Take proper measures to prevent injuries and device damage.
- Place the device in a dry and flat position away from any liquid and prevent the device from slipping.
- Keep the device clean.
- Do not put the device and tools in the aisles.

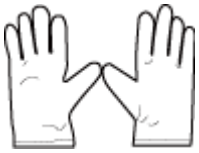
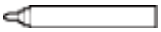
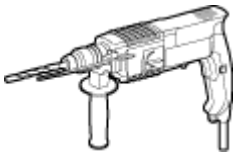
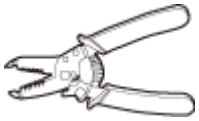
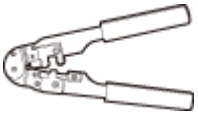
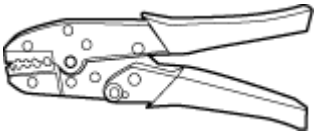
CAUTION

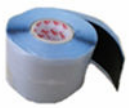
Only the qualified personnel are permitted to install and remove the device and its accessories. Before installation and operation, read the safety precautions carefully.

Tool Preparation

To install devices, prepare tools listed in **Table 16-1**.

Table 16-1 Tools

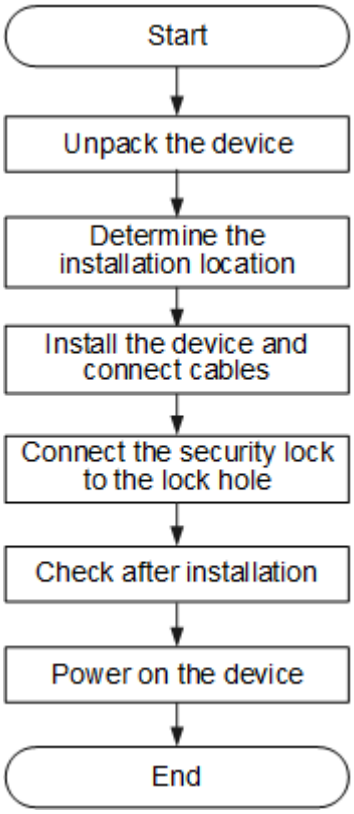
Phillips screwdriver 	ESD gloves 	Slip-proof glove 
Marker 	Hammer drill 	Claw hammer 
Diagonal pliers 	Wire stripper 	RJ45 crimping tool 
Cable cutter 	Network cable tester 	Multimeter 
Ladder 	Utility knife 	Level 
Long measuring tape 	Adjustable wrench 	Torque wrench 
Safety belt 	Safety helmet 	Anti-skid shoes 

Waterproof tape 	Insulation tape 	Scissors 
Inner hexagon wrench (M3) 	Optical power meter 	-

16.1.2 Installation Flowchart

Figure 16-1 shows the flowchart for installing an RU-5G-101.

Figure 16-1 Installation flowchart



16.1.3 Unpacking the Equipment

Before unpacking the carton, ensure that the packing carton is intact and not damaged or soaked. Stop unpacking if the equipment is rusted or soggy. Then, investigate causes and contact the supplier.

After unpacking, check items in the carton against the packing list. If any item is missing, contact the supplier or agent.

Usually, the packing list contains the following items.

- RU-5G remote unit
- Mounting bracket
- Screws
- Hose clamp
- Quick start guide
- Warranty card

NOTE

- The numbers and types of items in the installation accessory package differ for different product models.
- The installation accessory package of the device does not include the console cable.

16.1.4 Determining the Installation Position

The device can be installed against a pole or a wall. The device must be installed by professional installation personnel, and the installation position is determined according to the site survey.

When determining the device installation position, comply with the following rules:

- Do not install the device in the place with high temperature, dust, noxious gas, or unstable voltage, or in the place near flammable or explosive materials and interference sources such as a large radar station, radio station, and transformer station.
- Place the device far away from electronic devices that may produce radio interference.
- Install the device in a hidden position that does not affect daily lives and work of residents.
- Make the engineering design by fully considering such factors as hydrology, geology, earthquake, electric power, traffic, and lightning protection. The selected site should comply with the environment design specifications of communications equipment.

16.1.5 Installing the Device

NOTE

Remove the protective film on the surface before installation to prevent electrostatic discharge.

16.1.5.1 Wall Mouning

Context

A wall for installing the device needs to meet the following requirements:

- The wall can bear the weight of four times the total weight of the device and mounting bracket without damage. The wall bearing capacity of the RU-5G must be at least 16 kg.
- When the tightening torx of a screw reaches 12 N·m, the screw still properly works, without crack or damage on the wall.

Wall mounting requires use of the mounting bracket and matching expansion bolts.

NOTE

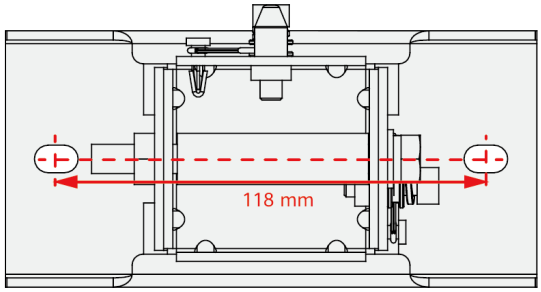
- When fixing the sheet metal mounting bracket, ensure that the arrows point upwards on the  label.
- When installing the device on the mounting bracket, ensure that arrows on the mounting bracket point upward and the device logo is upside up.

DANGER

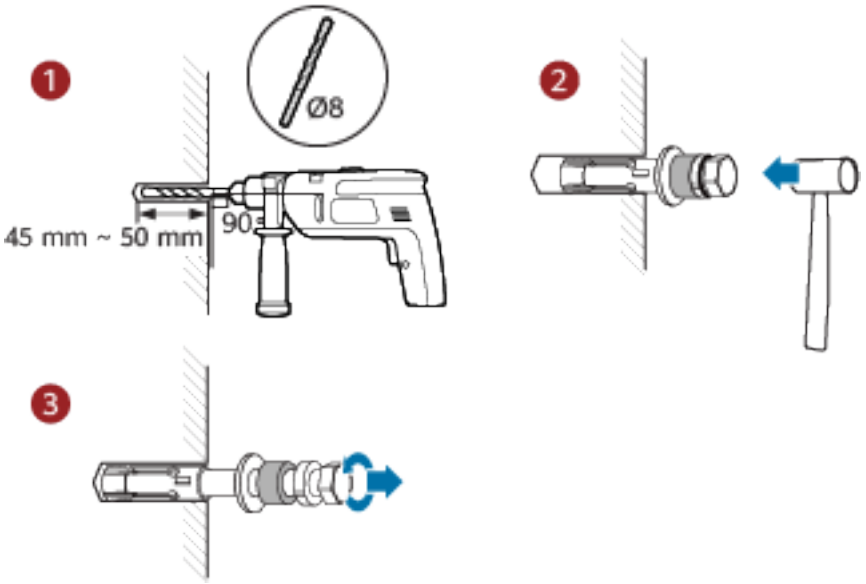
Before drilling holes on a wall, make sure that no power cable is routed in the wall. Otherwise, power cables in the wall may cause personal injury.

Procedure

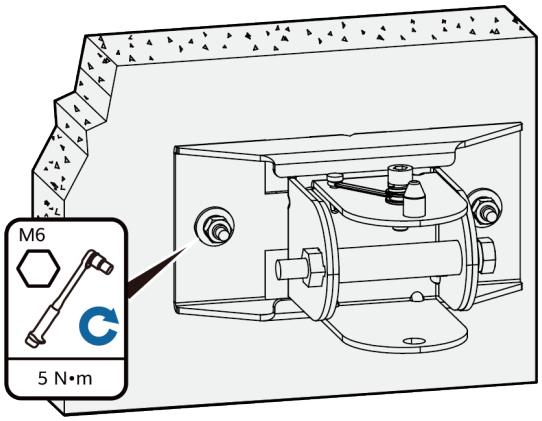
Step 1 Fix the wall mounting bracket to the wall, adjust the installation position, and use the marker and level to mark the drilling positions where expansion bolts are installed, as shown in the following figure.



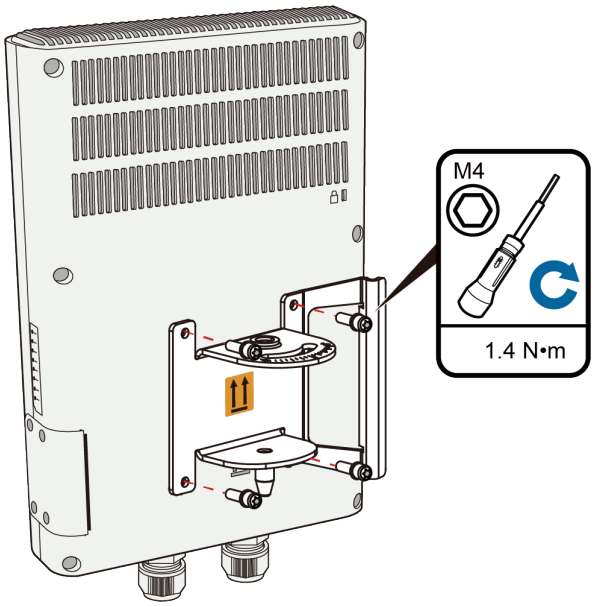
Step 2 Use an 8 mm drill bit to drill 45 mm to 50 mm deep holes in the drilling positions and hammer the expansion bolts into the installation holes until the flat washers are completely attached to the wall. Then, remove the nut, spring washer, and flat washer in order.



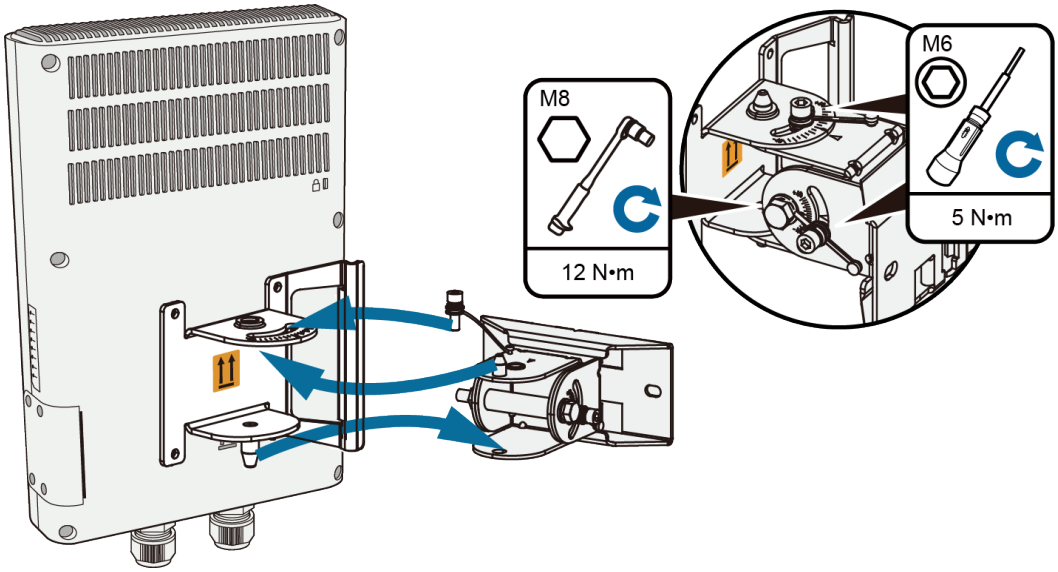
Step 3 Hang the wall mounting bracket on the expansion bolts and use a wrench to fasten the flat washers, spring washers, and nuts in order.



Step 4 Use four M4 inner hexagon screws to fasten the device mounting bracket to the device.



Step 5 Remove the topmost screw from the wall mounting bracket, hang the device mounting bracket onto the topmost screw, and tighten the screw until the screw passes through the hole of the horizontal scale plate (the screw should not be too tight).



Step 6 Loosen the two screws in the horizontal direction, adjust the horizontal and vertical angles of the device using the scale plate, and tighten all screws.

----End

16.1.5.2 Pole Mouning

Context

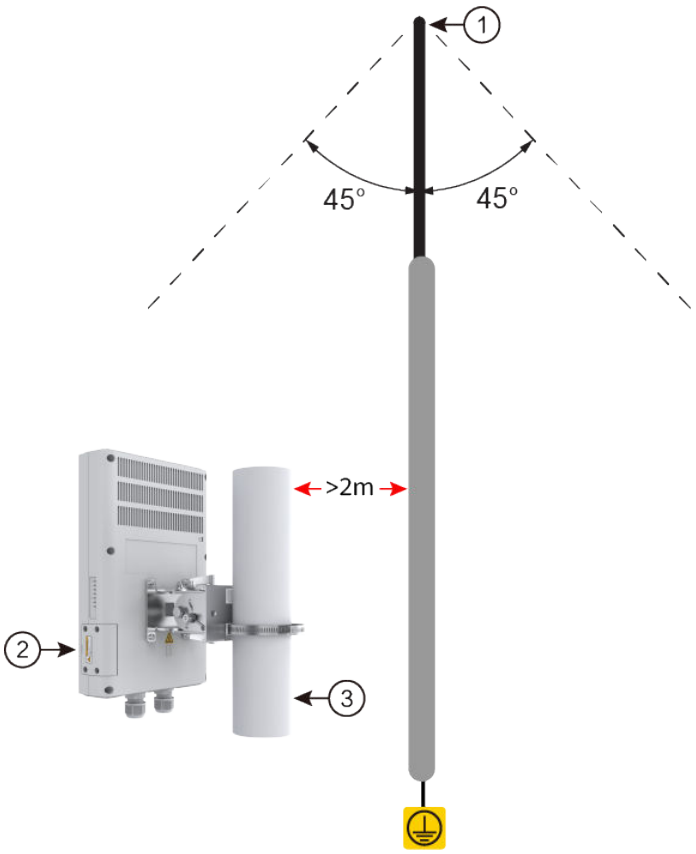
A device must be installed on a pole with a diameter of 48 mm to 114 mm and the difference between the outer and inner diameters should be at least 2.5 mm.

NOTE

- When fixing the sheet metal mounting bracket, ensure that the arrows point upwards on the  label.
- When installing the device on the mounting bracket, ensure that arrows on the mounting bracket point upward and the device logo is upside up.

NOTICE

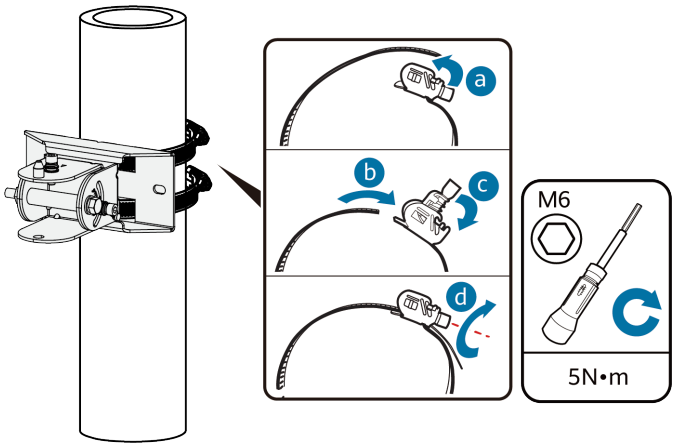
When installing a device on a rooftop, ensure that the top of the device is within the 45-degree surge protection area of the lightning rod.



1. Lightning rod	2. RU-5G remote unit	3. Pole

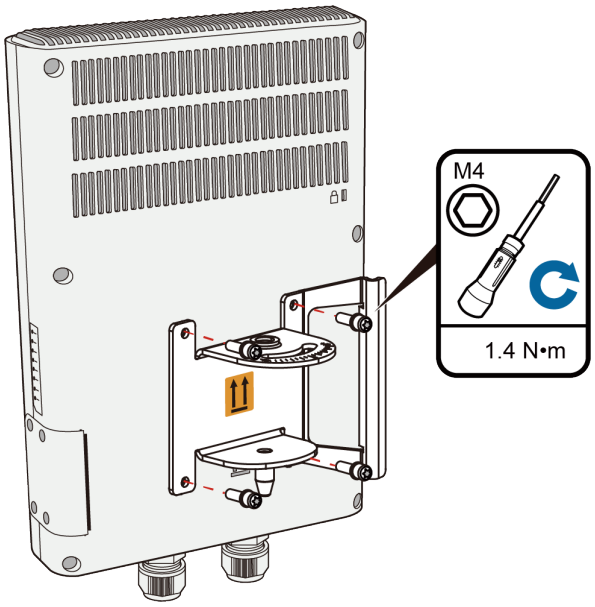
Procedure

Step 1 Determine the device installation position and attach the pole mounting bracket on the pole using the hose clamp.

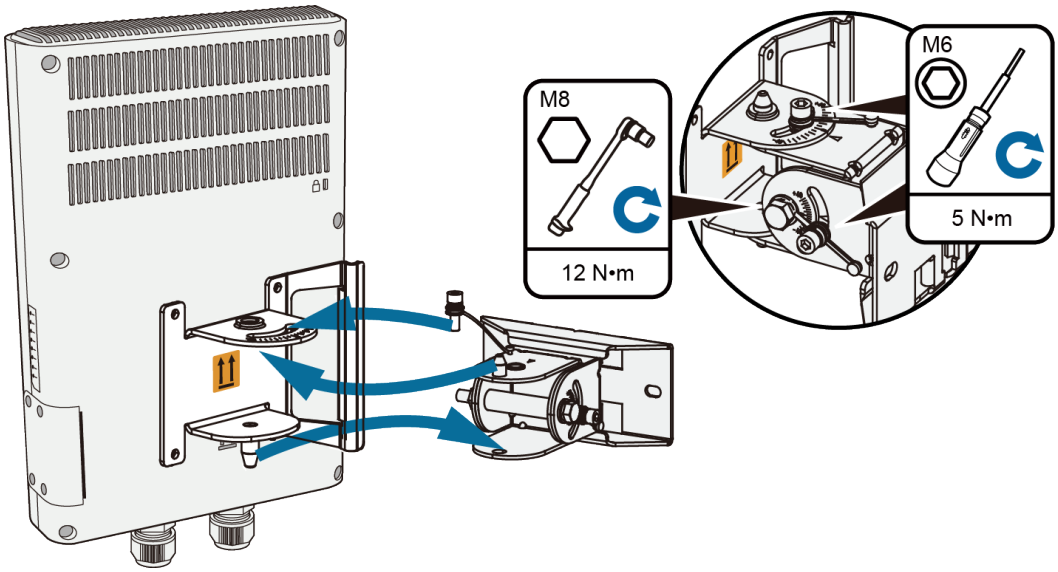


1. Use the M6 hex torque screwdriver to loosen screws on the hose clamp and lift the lid.
2. Slide the hose clamp through the hole of the mounting bracket, attach it to the pole, and close the hose clamp.
3. Close the lid.
4. Use the hex torque screwdriver to tighten the screws.

Step 2 Use four M4 inner hexagon screws to fasten the device mounting bracket to the device.



Step 3 Remove the topmost screw from the wall mounting bracket, hang the device mounting bracket onto the topmost screw, and tighten the screw until the screw passes through the hole of the horizontal scale plate (the screw should not be too tight).



Step 4 Loosen the two screws in the horizontal direction, adjust the horizontal and vertical angles of the device using the scale plate, and tighten all screws.

----End

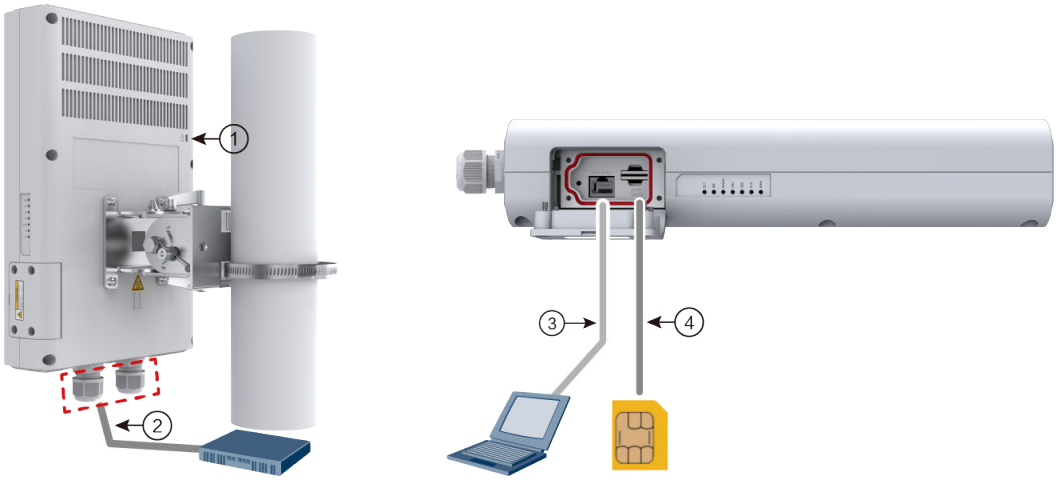
16.1.6 Connecting the Device

The console interface and SIM card slot are located in the maintenance compartment on the side of the device. Remove the protective cover before using the console port and SIM card slot, and install the protective cover after using the console port and SIM card slot.

CAUTION

Use an M3 Allen key to remove and install the protective cover. Tighten the four M3 inner hexagon screws on the protective cover to 0.6 N·m to prevent water intrusion.

Figure 16-2 External cable connections



No.	Item	Connect To
1	Security slot ( )	Antitheft lock (provided by the customer)
2	Ethernet cable ( )	PoE ports on AR routers or other devices
3	Console cable ( )	Operation terminal (usually a PC)
4	Two SIM card slots	Micro SIM card

NOTE

When connecting cables, take waterproof measures on the following parts: See the corresponding cable installation guide for the detailed procedure.

- The Ethernet cable and optical fiber use waterproof PG connectors and do not need to be wrapped using tapes.
- To power a device using a non-standard PoE adapter, ensure that the output power of the adapter supports the maximum power consumption of the device . Otherwise, the device may restart due to insufficient power.

16.1.6.1 Connecting Ethernet Cables (Co-deployment)

Context

An AR router connects to an RU-5G remote unit to connect to a 5G/4G/3G Ethernet to implement high-speed data transmission.

Tools and Accessories

- Ethernet cable (self-provided)

NOTE

- Before connecting Ethernet cables, use the Ethernet cable detection tool to check whether the Ethernet cables are normal to ensure that the device works properly.
- The Ethernet cable is of category 5 or higher type. The length of the Ethernet cable cannot exceed 50 m. The cross-sectional area of an Ethernet cable ranges from 4.9 mm to 7.1 mm.

- RU-5G Remote unit (self-provided)

  NOTE

  For details, see **Appendix G RU-5G Installation**.

- PoE adapter (self-provided)

  NOTE

  When the two GE/PoE_IN interfaces on an RU-5G remote unit use PoE adapters, the Huawei PoE adapters (part number: 02220369) must be used.

  If the GE/PoE_IN interface uses a PoE adapter, place the PoE adapter indoors.

Procedure

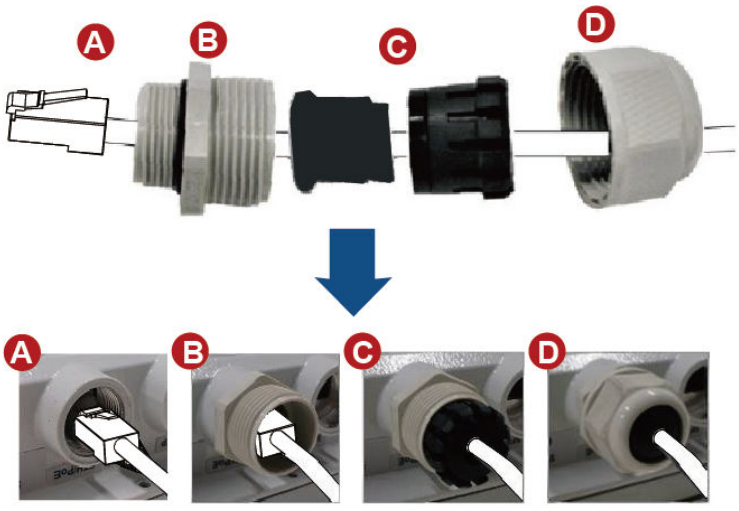
Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Route the Ethernet cable through the waterproof PG connector, as shown in the following figure. Insert the RJ45 connector (without sheath) of the Ethernet cable into the GE/PoE_IN (GE0/PoE_IN or GE1/PoE_IN) interface on the device, and then tighten the waterproof PG connectors in sequence B, C, and D.

NOTE

Tighten components of PG connectors B to the device with a torque of 2.5 N·m, and components D to B to a torque of 1.8 N·m. The waterproof PG connector is used for round Ethernet cables. Flat Ethernet cables cannot be used.

Ensure that the RJ45 connector is correctly connected to the device. Otherwise, the Ethernet cable may be damaged. Before removing the Ethernet cable from the device, remove the waterproof PG connector first and then remove the RJ45 connector.



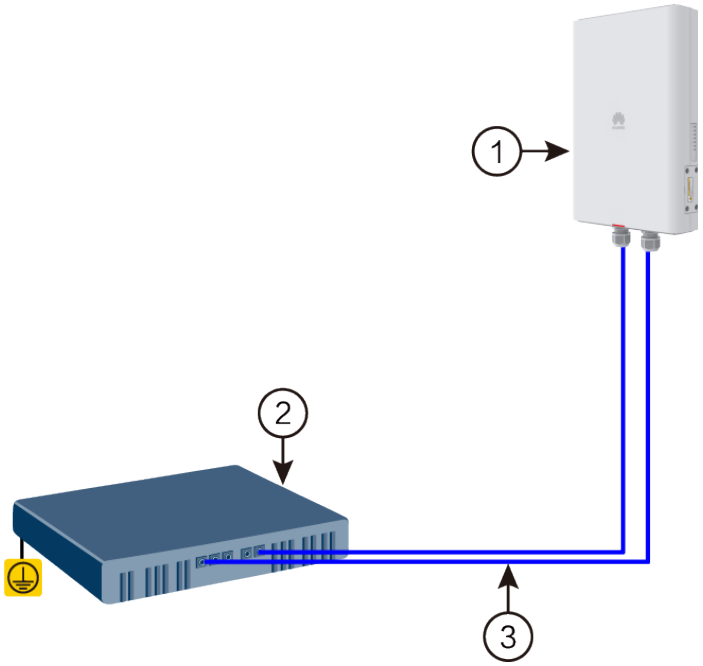
Step 3 Connect the other end of the Ethernet cable according to the networking mode.

Option	Description
Figure 16-3	In this scenario, all networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Connect the other end of the Ethernet cable to the PoE port on the AR router.
Figure 16-4	In this scenario, the RU-5G is installed outdoors and other networking devices are installed indoors. 1. The two Ethernet cables connecting the RU-5G are routed next to each other. 2. Install an SPD on the other end of one network cable and connect the cable to the Ethernet interface on the AR router. 3. Install an SPD on the other end of the other network cable and connect it to the PoE port on the PoE adapter. 4. Use a network cables to connect the Ethernet interface on the AR router and the DATA port on the PoE adapter.

NOTE

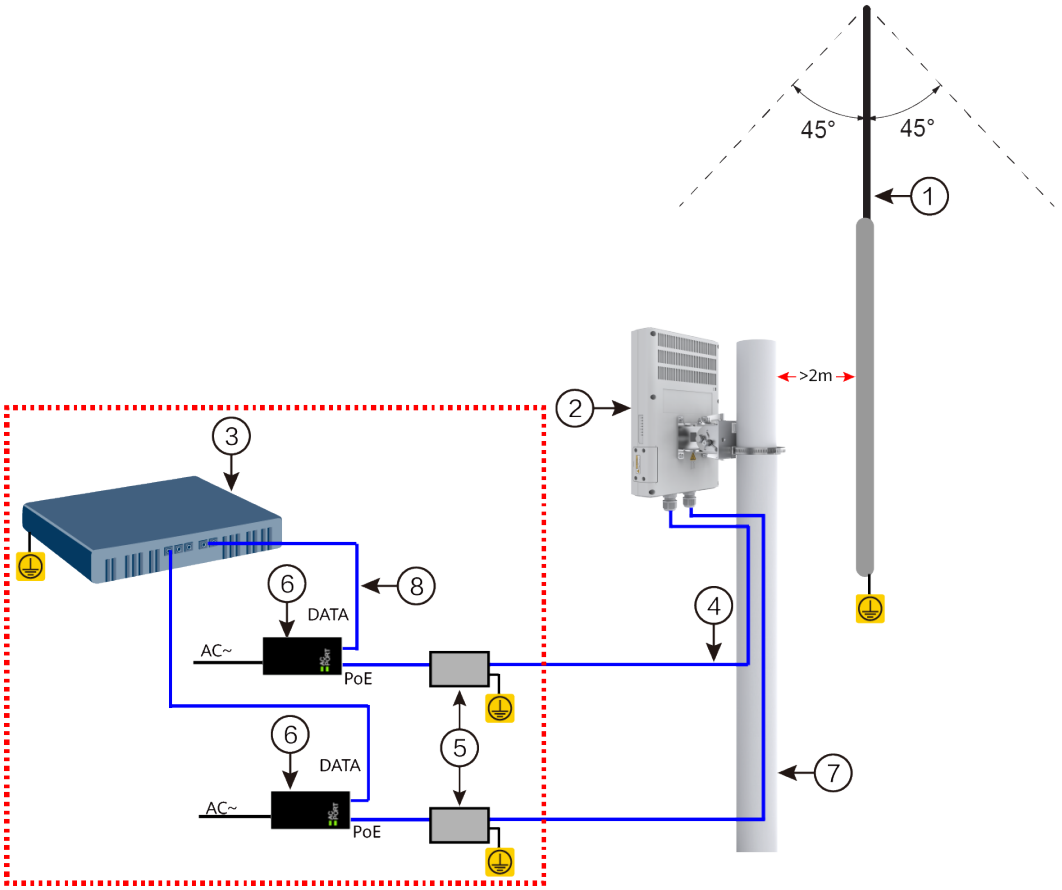
- When the AR router, PoE adapter, and RU-5G remote unit are installed indoors, no SPD is required for the AR router Ethernet interface, AR router power input interface, PoE adapter output interface, and PoE adapter power input interface.
- When the AR router and PoE adapter are installed indoors and the RU-5G remote unit is installed outdoors, an SPD must be installed on the AR router network interface and output interface on the PoE adapter. Huawei SPD (part number: 19020303) or an SPD with the same specifications is recommended for the output of the AR router Ethernet ports and PoE adapters.

Figure 16-3 Co-deployment Networking 1 (RU-5G PoE Power Supply Using an AR Router)



1. RU-5G remote unit	2. AR router (PoE supported)	3. Ethernet cable	-

Figure 16-4 Co-deployment Networking Mode 2 (RU-5G Powered by PoE adapters)



NOTE

The devices in the red box are installed indoors.

1. Lightning rod	2. RU-5G remote unit	3. AR router (PoE not supported)	4. Ethernet cable (Data transmission and power supply)
5. SPD	6. PoE adapter	7. Pole	8. Ethernet cable (Data transmission)

----End

16.1.6.2 Connecting Ethernet Cables (Independent Deployment)

Context

NOTICE

- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connection may damage interface modules or the router.

Tools and Accessories

- Ethernet cable (self-provided)

  NOTE

  - Before connecting Ethernet cables, use the Ethernet cable detection tool to check whether the Ethernet cables are normal to ensure that the device works properly.
  - The Ethernet cable is of category 5 or higher type. The length of the Ethernet cable cannot exceed 50 m. The diameter of an Ethernet cable ranges from 4.9 mm to 7.1 mm.

- PoE adapter (self-provided)

  NOTE

  When the two GE/PoE_IN interfaces on an RU-5G remote unit use PoE adapters, the Huawei PoE adapters (part number: 02220369) must be used.

  If the GE/PoE_IN interface uses a PoE adapter, place the PoE adapter indoors.

Procedure

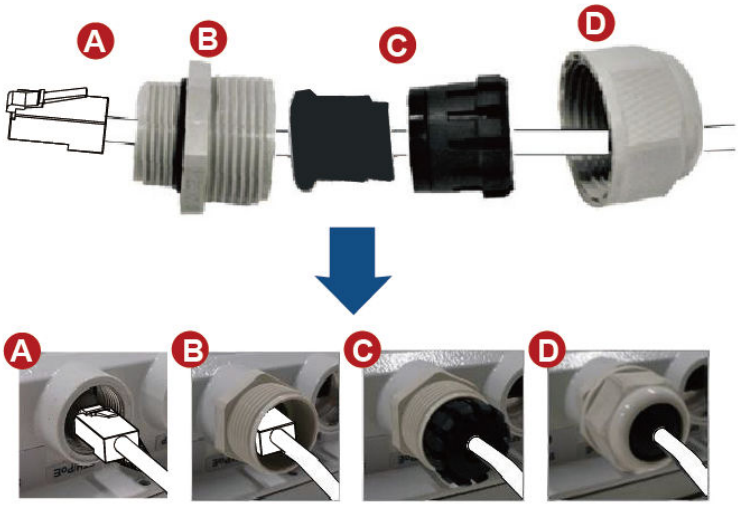
Step 1 Select Ethernet cables of appropriate quantity and lengths according to the number of ports and measured cabling distances.

Step 2 Route the Ethernet cable through the waterproof PG connector, as shown in the following figure. Insert the RJ45 connector (without sheath) of the Ethernet cable into the GE/PoE_IN (GE0/PoE_IN or GE1/PoE_IN) interface on the device, and then tighten the waterproof PG connectors in sequence B, C, and D.

NOTE

Tighten components of PG connector B to the device with a torque of 2.5 N·m, and components D to B to a torque of 1.8 N·m. The waterproof PG connector is used for round Ethernet cables. Flat Ethernet cables cannot be used.

Ensure that the RJ45 connector is correctly connected to the device. Otherwise, the Ethernet cable may be damaged. Before removing the Ethernet cable from the device, remove the waterproof PG connector first and then remove the RJ45 connector.



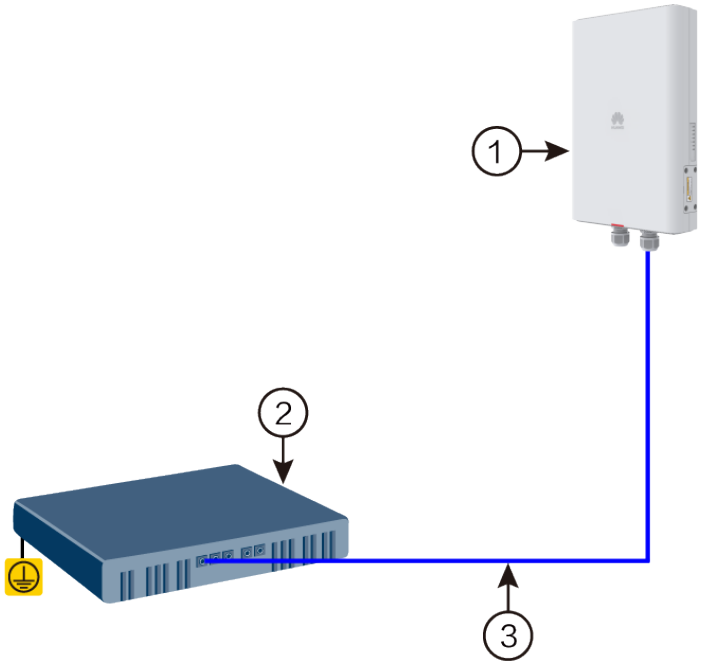
Step 3 Connect the other end of the Ethernet cable according to the networking mode.

Option	Description
Figure 16-5	In this scenario, all networking devices are installed indoors. 1. Connect one end of an Ethernet cable to one GE/PoE_IN interface on the RU-5G, and the other end to the PoE interface on a remote device. 2. If required, connect another remote device to the other GE/PoE_IN interface on the RU-5G.
Figure 16-6	In this scenario, the RU-5G is installed outdoors and other networking devices are installed indoors. 1. Connect one end of an Ethernet cable to one GE/PoE_IN interface on the RU-5G, and the other end of the Ethernet cable to a surge protective device (SPD), which is then connected to the PoE interface of the PoE adapter. 2. Connect one end of another Ethernet cable to an SPD, and the other end to the DATA interface on the PoE adapter. 3. If required, connect another remote device to the other GE/PoE_IN interface on the RU-5G.

NOTE

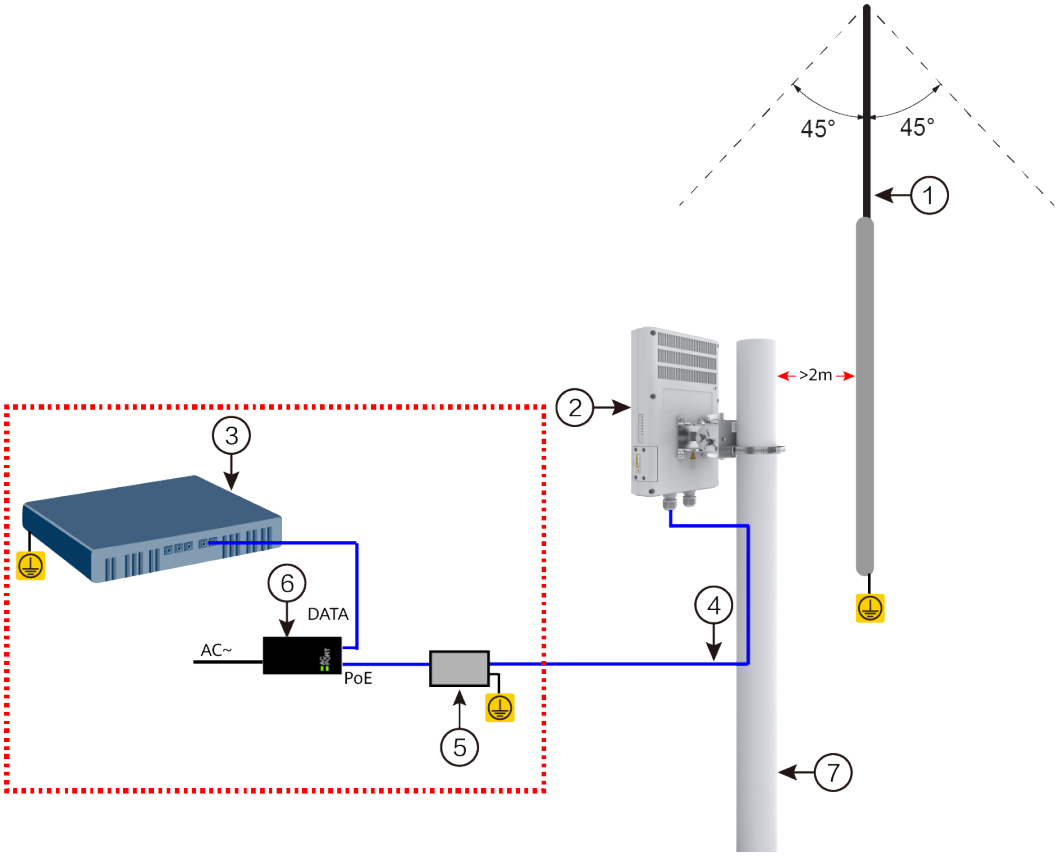
- It is recommended that both GE0/PoE_IN and GE1/PoE_IN interfaces be used to supply power to the RU-5G-101.
- When the remote device, PoE adapter, and RU-5G remote unit are installed indoors, no SPD is required for the remote device Ethernet interface, Remote device power input interface, PoE adapter output interface, and PoE adapter power input interface.
- When the remote device and PoE adapter are installed indoors and the RU-5G remote unit is installed outdoors, an SPD must be installed on the Remote device network interface and output interface on the PoE adapter. Huawei SPD (part number: 19020303) or an SPD with the same specifications is recommended for the output of the Remote device Ethernet ports and PoE adapters.

Figure 16-5 Independent deployment Networking 1 (RU-5G PoE Power Supply Using an AR Router)



1. RU-5G remote unit	2. Remote device (PoE supported)	3. Ethernet cable	-

Figure 16-6 Independent deployment Networking Mode 2 (RU-5G Powered by PoE adapters)



NOTE

The devices in the red box are installed indoors.

1. Lightning rod	2. RU-5G remote unit	3. Remote device (PoE not supported)	4. Ethernet cable
5. SPD	6. PoE adapter	7. Pole	-

----End

16.1.6.3 Installing SIM Cards

Context

NOTICE

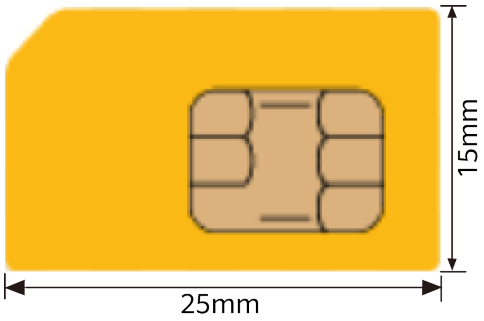
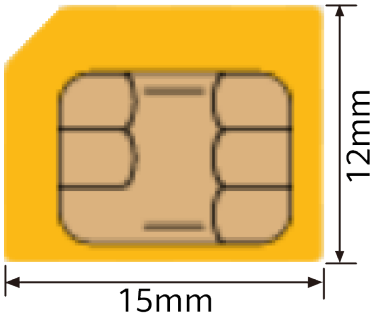
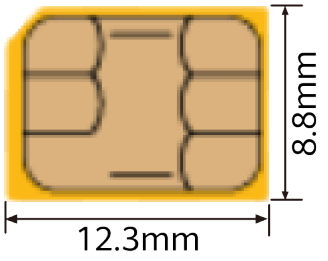
- The Micro SIM card is supported. It is not recommended to use the card cover to prevent poor SIM card contact.
- Hot-swap SIM card is not supported. After replugging the SIM card, you need to restart the RF module or restart the device.

NOTE

The SIM card needs to be prepared by the user.

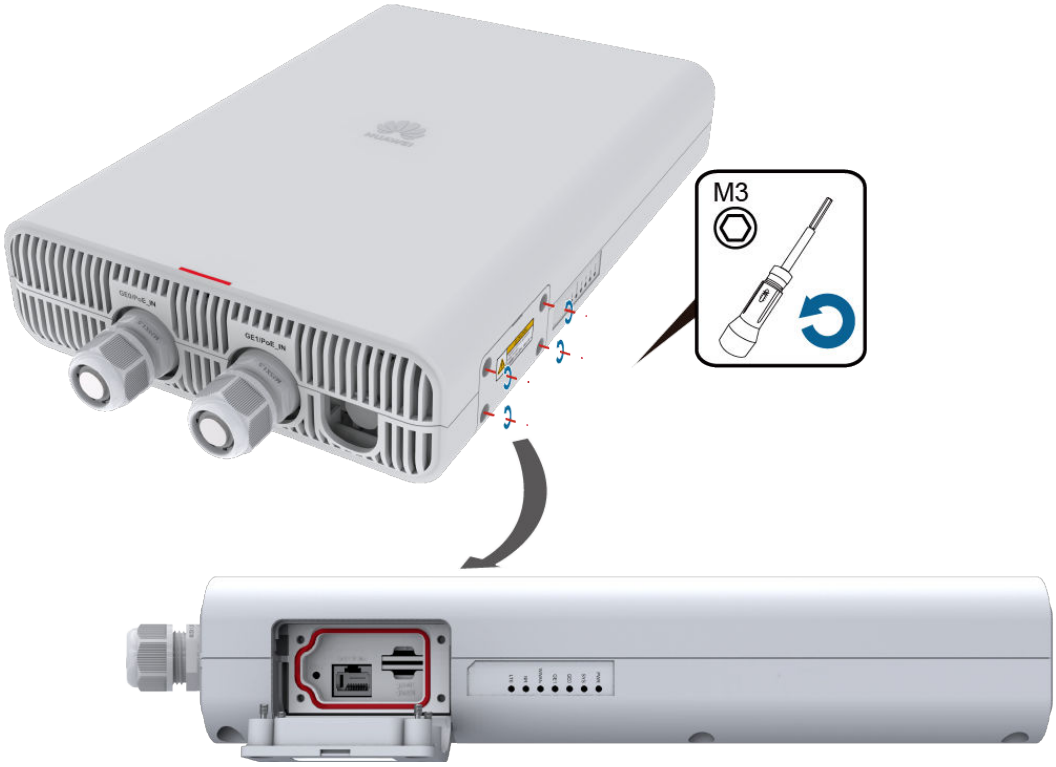
The following table describes the dimensions of a SIM card.

Table 16-2 Dimensions of a SIM Card

Model	Dimensions
Standard SIM card	
Micro SIM card	
Nano SIM card	

Procedure

Step 1 Loosen the four M3 inner hexagon screws on the protective cover on the side of the device, remove the protective cover.



Step 2 Place the SIM card into the SIM card slot in the direction marked on the card slot. If you hear a click, the SIM card is properly installed.

NOTE

- The SIM card cover is used to protect the SIM card. Remove the SIM card cover before installing the SIM card.
- The double-card single-standby is supported, and SIM1 is the default master card. If only one SIM card needs to be installed, install it in slot SIM1.

Step 3 Reinstall the protective cover and tighten the screws on the protective cover.

CAUTION

Tighten the four M3 inner hexagon screws to 0.6 N·m to prevent water from entering the device.

----End

16.1.6.4 Connecting a Console Cable

Context

NOTICE

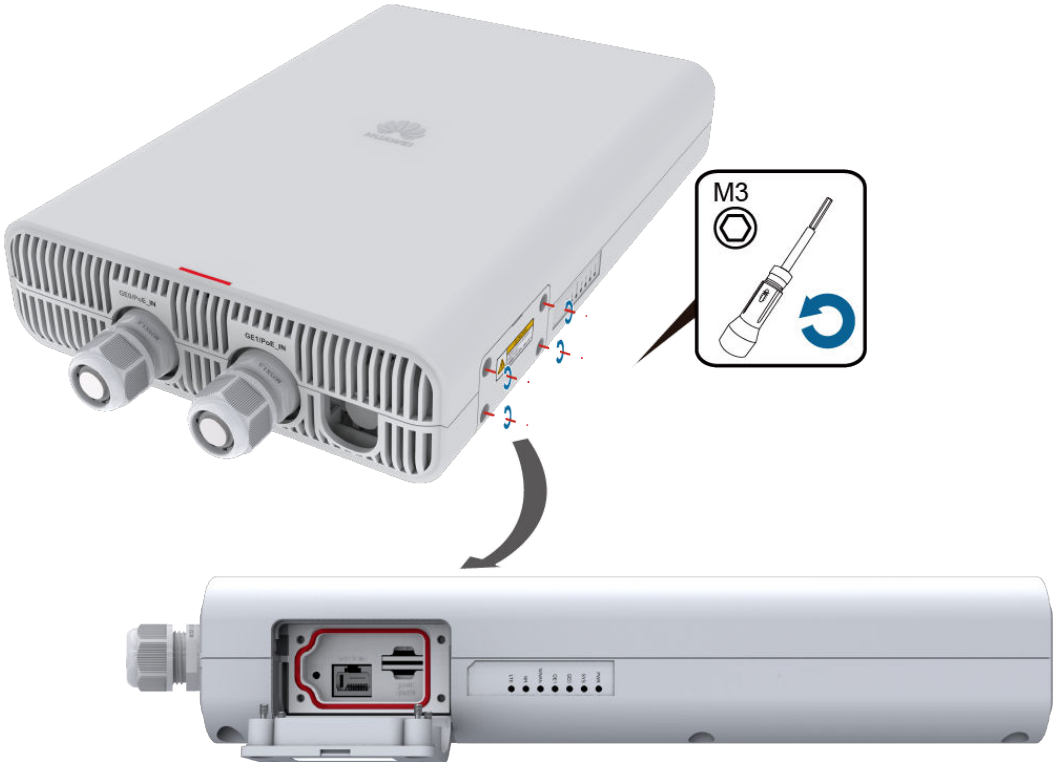
- Do not power on the router before you finish connecting cables.
- Notice flags on interfaces when connecting cables. Incorrect cable connection may damage interface modules or the router.

NOTE

The console cable is not included in the installation accessory package and needs to be purchased separately.

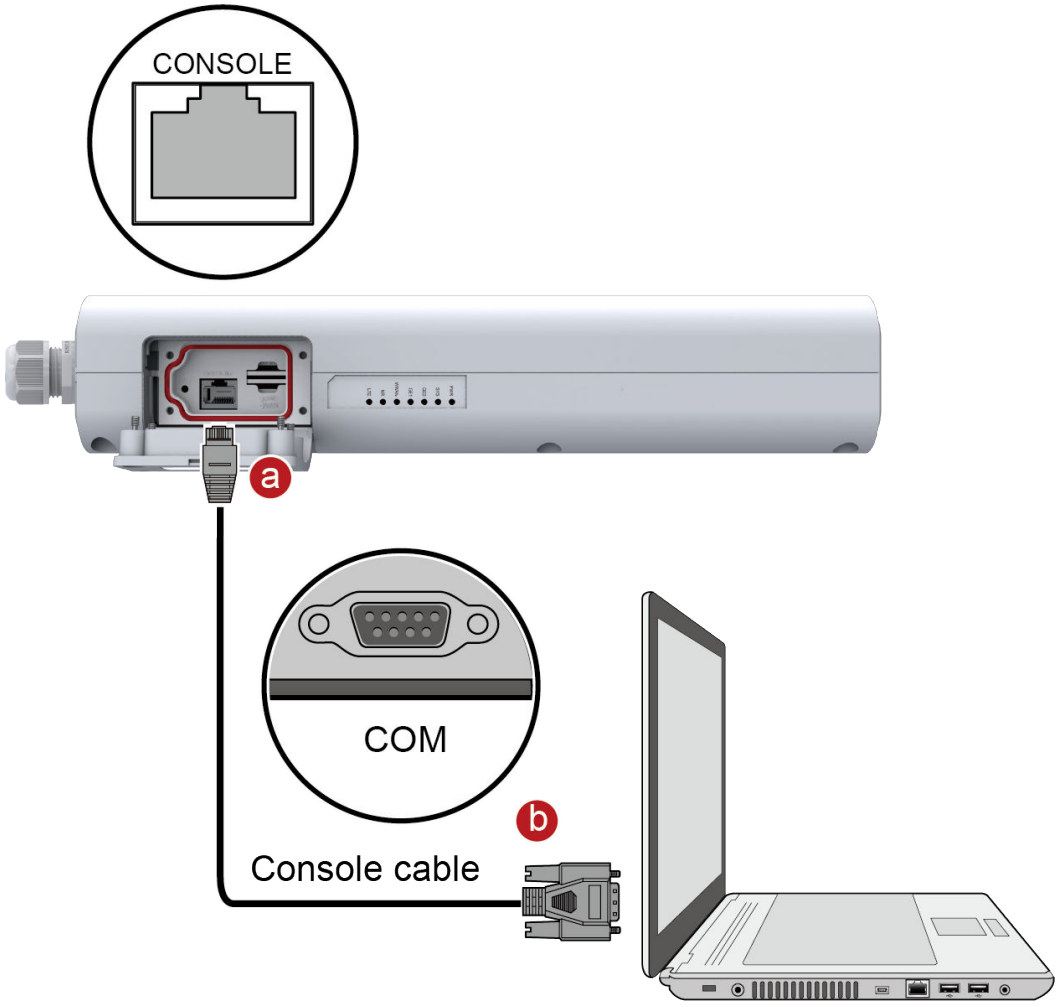
Procedure

Step 1 Loosen the four M3 inner hexagon screws on the protective cover on the side of the device, remove the protective cover, and place it properly.



Step 2 Connect the console cable.

1. Connect the RJ45 connector of the console cable to the CONSOLE interface (RJ45) of the device.
2. Connect the DB9 connector of the console cable to the serial interface (COM) of a management PC.



----End

Follow-up Procedure

After the console cable is connected, you need to configure terminal emulation software on the management PC to log in to the command configuration interface of the router.

NOTE

For details about how to use specific terminal emulation software, see the related software user guide or online help.

For details about how to log in to the device through the console port for the first time, see **Device Management Configuration Guide** > **RU-5G Configuration** > **RU-5G Maintenance** > **Logging In to an RU-5G Through the Console Port** in the "CLI-based Configuration".

Install the protective cover after using the console interface.

CAUTION

Tighten the four M3 inner hexagon screws to 0.6 N·m to prevent water from entering the device.

16.1.6.5 (Optional) Installing the Security Lock

Context

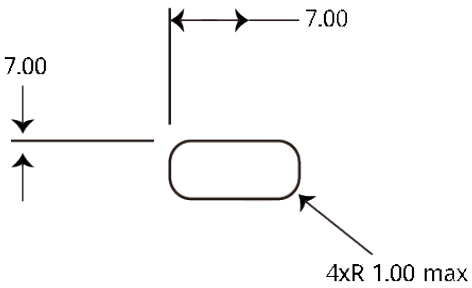
There is a security slot on the device. You can lock the device to an immovable object to prevent the device against theft.

1. Security slot ( )	-

NOTE

You need to purchase the security lock separately.

The security slot is 7 mm long and 3 mm wide. The maximum radius of its four round corners is 1 mm.



Procedure

Step 1 Fasten the cable of the security lock to an immovable object around.

Step 2 Insert the security lock into the security slot and lock it.

----End

16.1.7 Checking the Device After Installation

Table 16-3 shows the items to be checked after device installation is complete.

Table 16-3 installation checklist

No.	Check Item
1	The device is installed by strictly following the design draft. The installation position meets space requirements, with maintenance space reserved.
2	The device is securely installed.
3	Waterproof inspection: • Waterproof caps are installed on idle interfaces and securely fastened. • Tighten the four M3 torx screws on the protection cover of the maintenance compartment to 0.6 N·m (26.55 lbf·in.) to prevent water from entering the cabinet.
4	Connectors of signal cables are complete, intact, and tightly connected. The signal cables are not damaged or broken.
5	PG connectors of Ethernet cables are secured fastened as required.
6	Labels on cables, feeders, or jumpers are clear and correct.

16.1.8 Powering on the Device

After the device is powered on, observe indicators on the device to determine the system running status.

Figure 16-7 shows the indicators on a RU-5G-101 remote unit, and Table 16-4 describes the indicator states and meanings.

Figure 16-7 Indicators

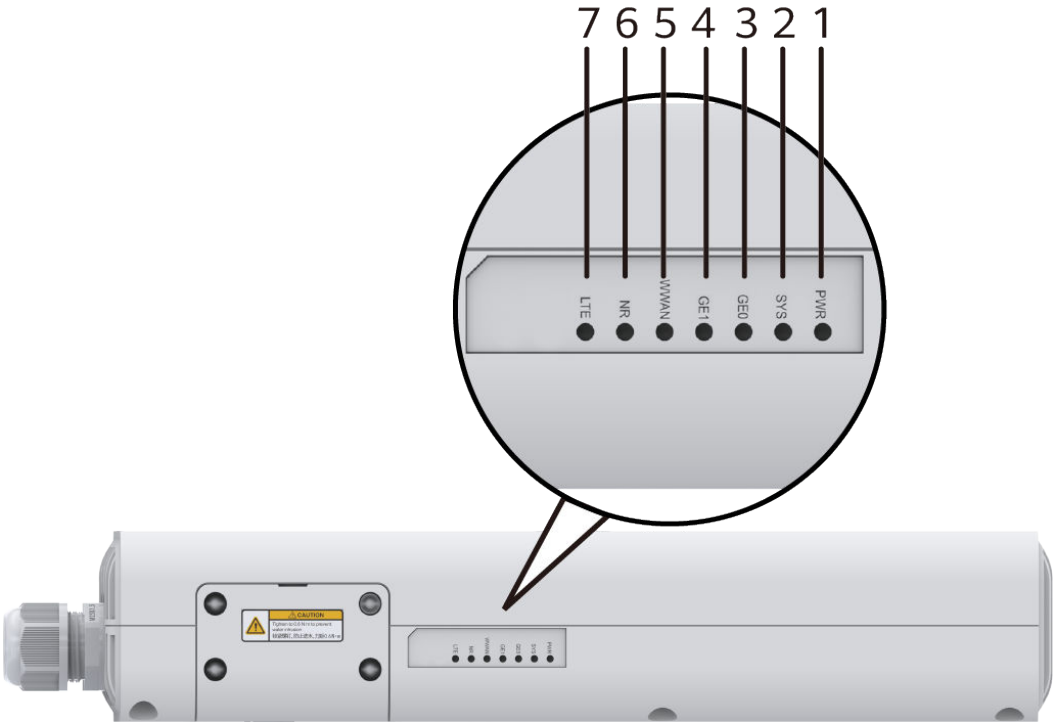


Table 16-4 Indicator description

Number	Indicator	Color	Description
1	PWR	Green	Steady on: The system power supply is normal.
		-	Off: The system power is off.
2	SYS	Green	Slow blinking: The system is running properly. Fast blinking: The system is being powered on or restarting.
		Red	Steady on: A fault that affects services has occurred and cannot be rectified automatically. The fault needs to be rectified manually.
		Off	Off: The system software is not running or is resetting.
3	GE0	Green	Steady on: A link has been established on the corresponding LAN interface. Blinking: Data is being transmitted or received on the corresponding LAN interface.

Number	Indicator	Color	Description
		-	Off: No link is established on the corresponding LAN interface.
4	GE1	Green	Steady on: A link has been established on the corresponding LAN interface. Blinking: Data is being transmitted or received on the corresponding LAN interface.
		-	Off: No link is established on the corresponding LAN interface.
5	WWAN	Green	Steady on: A 5G/LTE/3G link has been set up and is active. Blinking: Data is being transmitted or received over the 5G/LTE/3G link. Off: The 5G/LTE/3G link has not been set up or is inactive.
6	NR	Green	Steady on: The 5G signal strength is high. Fast blinking: The 5G signal strength is medium. Slow blinking: The 5G signal strength is low. Off: No 5G signal is available.
7	LTE	Green	Steady on: The LTE signal strength is high. Fast blinking: The LTE signal strength is medium. Slow blinking: The LTE signal strength is low. Off: No LTE signal is available.

NOTE

For details about how to configure the device after the device is powered on, see **Device Management Configuration Guide** > **RU-5G Configuration** in the "CLI-based Configuration".

CAUTION

Do not frequently power on and off the device.

There is a scald warning label attached on the device, warning you not to touch the device after the device has been operating for a long time.

16.1.9 Logging In to the Device for the First Time

16.1.9.1 Using the console interface login settings

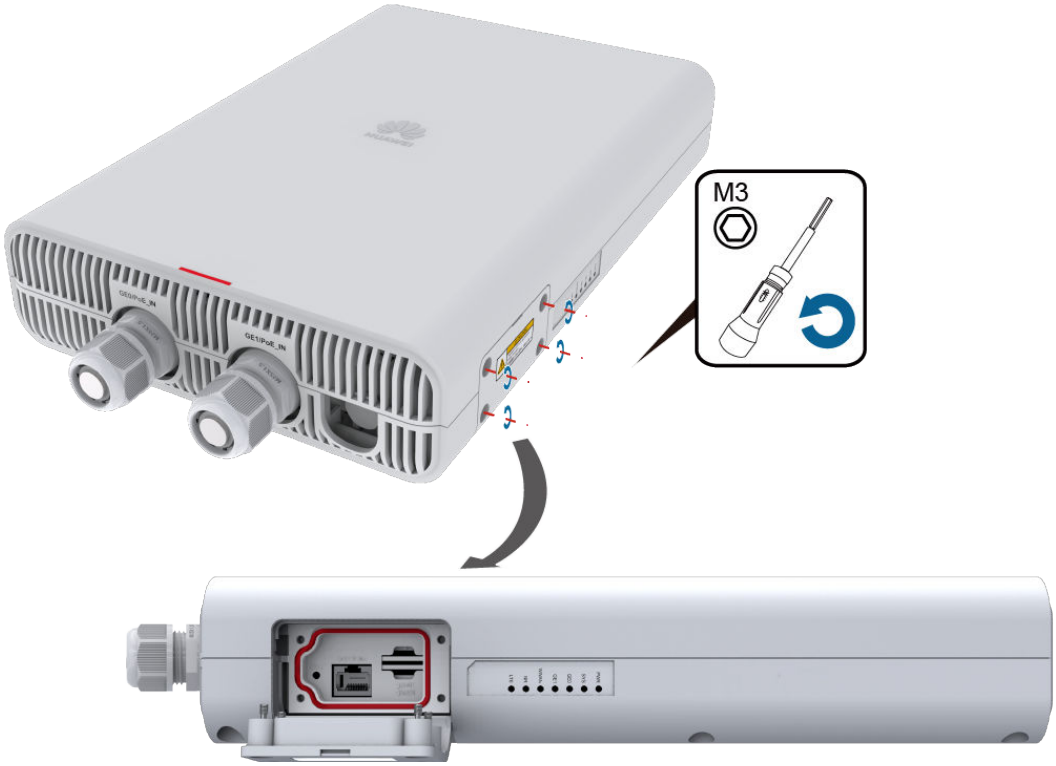
Prerequisites

Install third-party terminal simulation software on the PC by referring to user manual or online help.

The password entered in interactive mode is not displayed on the screen.

Procedure

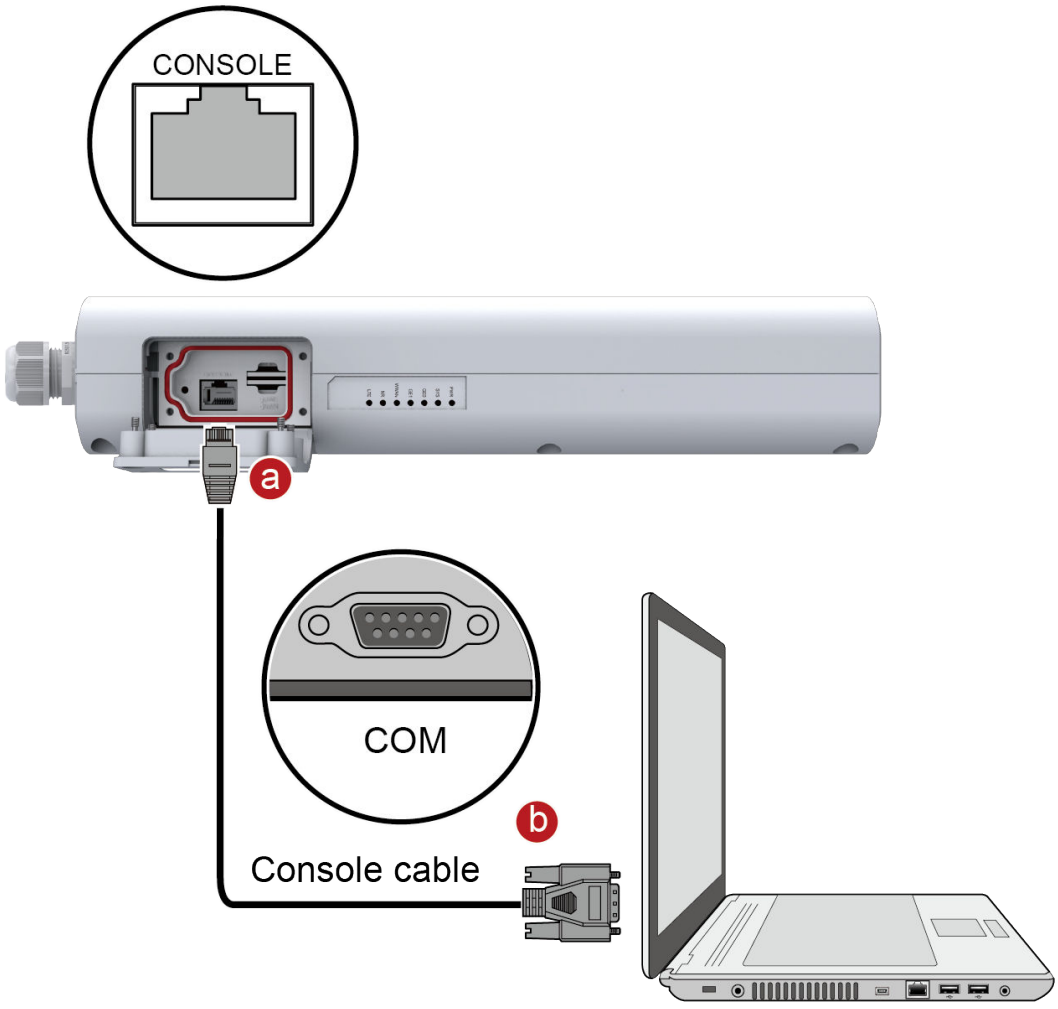
Step 1 Loosen the four M3 inner hexagon screws on the protective cover on the side of the device, remove the protective cover, and place it properly.



Step 2 Connect the console cable.

1. Connect the RJ45 connector of the console cable to the CONSOLE interface (RJ45) of the device.

2. Connect the DB9 connector of the console cable to the serial interface (COM) of a management PC.



Step 3 Start the terminal simulation software, create a connection, configure the connected port, and set communication parameters as follows.

- Transmission rate: 9600
- Data bit (B): 8
- Parity bit: None
- Stop bit (S): 1
- Flow control mode: None

Step 4 Press Enter until the following information is displayed. (The following information is only for reference)

```
Login authentication
Warning: An initial username and password are required for the first login via the console.
Set a username and password and keep them safe.Otherwise you will not be able to login via the
console.
New Username:
Password:
Confirm password:
The account create success.
Info:Configuration console exit, please retry to log on
```


NOTE

The default username and password are available in *AR Router Default Usernames and Passwords* (**Enterprise Network** or **Carrier**). If you have not obtained the access permission of the document, see **Help** on the website to find out how to obtain it.

----End

