# Ruijie Reyee
# RG-EG400 Series Routers

## Implementation Cookbook



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# Preface

## Intended Audience

This document is intended for:

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

## Technical Support

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

## Conventions

### 1. GUI Symbols

| Interface symbol | Description | Example |
|---|---|---|
| **Boldface** | 1. Button names<br>2. Window names, tab name, field name and menu items<br>3. Link | 1. Click **OK**.<br>2. Select **Config Wizard**.<br>3. Click the **Download File** link. |
| > | Multi-level menus items | Select **System** > **Time**. |

### 2. Signs

This document also uses signs to indicate some important points during the operation. The meanings of these signs are as follows:

**Warning**

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

**Note**

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

**Instruction**

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

**Specification**

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

### 3. Instruction

This manual is used to guide users to understand the product, install the product, and complete the configuration.

- The example of the port type may be different from the actual situation. Please proceed with configuration according to the port type supported by the product.
- The example of display information may contain the content of other product series (such as model and description). Please refer to the actual display information.
- The routers and router product icons involved in this manual represent common routers and layer-3 switches running routing protocols.

# Overview

This cookbook consists of multiple independent volumes, introducing the installation, deployment, and web-based configuration of the RG-EG400 series routers, including:

01- Installation Guide

02- ReyeeOS 2.342 Configuration Guide

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# 1 Overview

## 1.1 About the RG-EG400XS Series

The RG-EG400XS series routers are data communications products independently developed by Ruijie Networks, with full ownership of intellectual property rights. The high-performance egress routers are suitable for medium and large hotels, residential communities, HQ-branch enterprises, and chain businesses. With a recommended egress bandwidth of 2500 Mbps, they meet high-bandwidth demands and can support up to 400 concurrent users. The RG-EG400XS series routers offer flexible multi-WAN and policy-based routing features, comprehensive online behavior management policies, and user-friendly, high-performance VPN bonding features. As the primary devices of a self-organizing network, the routers can work with managed switches and wireless access points (APs) to achieve network-wide centralized configuration. They support remote network management and troubleshooting via a dedicated mobile app.

**Table 1-1 RG-EG400XS Series Specifications**

| Model | 10/100/1000/2500BASE-T Port | 10G SFP+ Port | PoE Port | Power Supply |
|---|---|---|---|---|
| RG-EG406XS-P | 5 (1 x fixed LAN port,1 x fixed WAN port, 3 x LAN/WAN ports) | 1 (1x LAN/WAN port) | 4 | Power adapter |
| RG-EG406XS | 5 (1 x fixed LAN port,1 x fixed WAN port, 3 x LAN/WAN ports) | 1 (1x LAN/WAN port) | / | Power adapter |

## 1.2 Package Contents

### 1.2.1 RG-EG406XS-P

**Table 1-2 Package Contents**

| No. | Item | Quantity |
|---|---|---|
| 1 | RG-EG406XS-P router | 1 |
| 2 | Power adapter | 1 |
| 3 | Rubber pad | 4 |
| 4 | Power cord | 1 |
| 5 | User Manual | 1 |
| 6 | Warranty Card | 1 |

### 1.2.2 RG-EG406XS

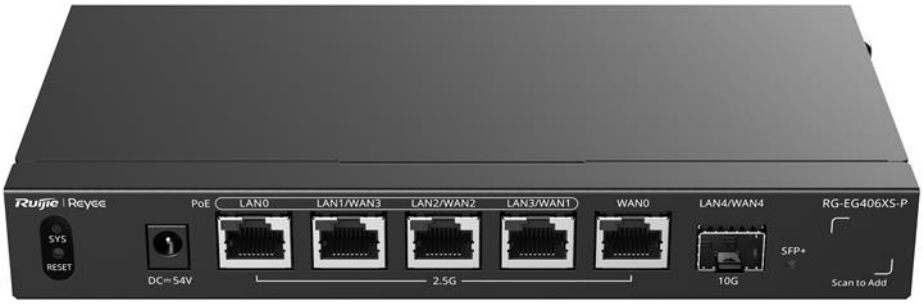
**Table 1-3 Package Contents**

| No. | Item | Quantity |
|---|---|---|
| 1 | RG-EG406XS router | 1 |
| 2 | Power adapter | 1 |
| 3 | Rubber pad | 4 |
| 4 | Rack-mount bracket | 2 |
| 5 | User Manual | 1 |
| 6 | Warranty Card | 1 |
| 7 | M3 x 6 mm cross recessed countersunk head screws | 6 |

## 1.3 Product Appearance

### 1.3.1 RG-EG406XS-P

**Figure 1-1 RG-EG406XS-P Appearance**




**Note**

This image is for reference only. The actual product may vary.

**Figure 1-2 Front Panel**

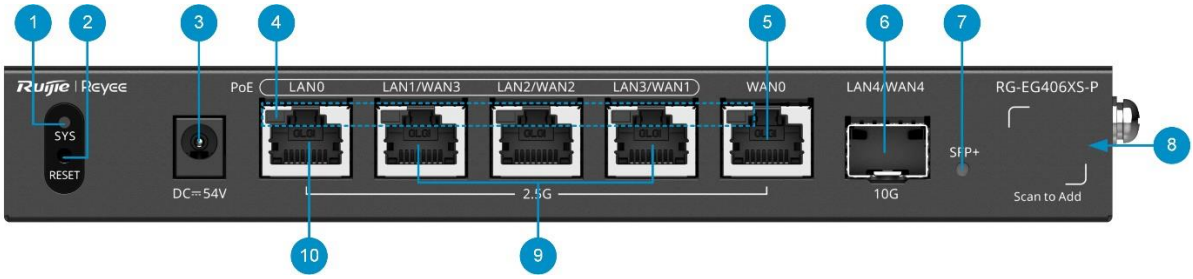



**Table 1-4 Components on the Front Panel**

| No. | Component | Description |
|---|---|---|
| 1 | System LED | Indicates the working status of the device.<br>● Off: The device is powered off.<br>● Fast blinking green (eight blinks per second): The device is starting up.<br>● Solid green: The device is operating normally.<br>● Slow blinking green (one blink every two seconds): The device is not connected to Ruijie Cloud.<br>● Blinking green (two blinks per second): The device is undergoing a reset or firmware update.<br>● Blinking red (two blinks per second): The firmware is corrupted. |
| 2 | Reset button | Used to restart the device or reset the device to factory settings.<br>● Press and hold the button for less than 2 seconds: The device restarts.<br>● Press and hold the button for more than 5 seconds until the system status LED starts blinking: The device restores to factory defaults and restarts. |
| 3 | DC input plug | Connects to the DC power adapter to power on the router. |
| 4 | Link/ACT LED for an RJ45 port | Indicates the working status of the RJ45 port.<br>● Solid green: A link is set up on the port.<br>● Blinking green: The port is transmitting and receiving data. |
| 5 | WAN port | Indicates a 10/100/1000/2500BASE-T port connected to a Digital Subscriber Line (DSL) or cable modem for Internet access. |
| 6 | LAN/WAN optical port | Indicates a 10GE SFP+ port, which can be used as a WAN port. |
| 7 | Link/ACT LED for the optical port | Indicates the working status of the optical port.<br>● Solid green: A link is set up on the port.<br>● Blinking green: The port is transmitting and receiving data. |
| 8 | QR code | Scan the QR code to download the dedicated app. |
| 9 | LAN/WAN port | LAN1 to LAN3 are 10/100/1000/2500BASE-T ports and can be used as WAN ports. |
| 10 | LAN port | LAN0 is a 10/100/1000/2500BASE-T port and is a fixed LAN port. |

**Note**

After the router is reset, the default management address is http://192.168.110.1 (default password: admin).

**Figure 1-3 Bottom View**

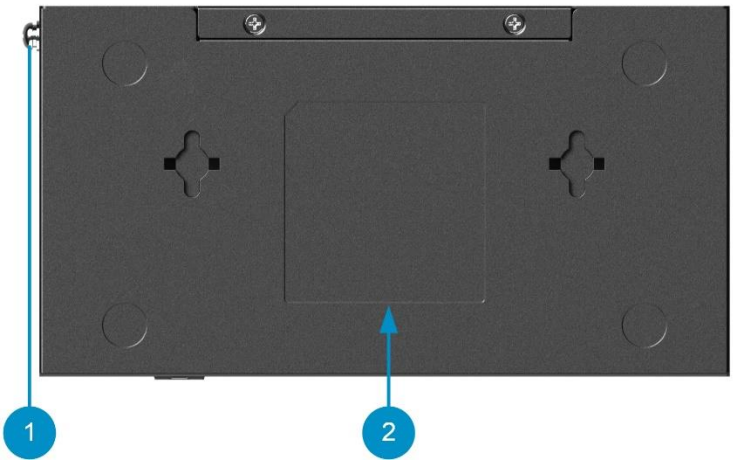



**Table 1-5 Other Components**

| No. | Item | Description |
|---|---|---|
| 1 | Grounding stud | Connects to the terminal of a grounding wire to ground the chassis. |
| 2 | Label | Contains the product name, model, I/O parameters, default IP address, etc. |

## 1.3.2 RG-EG406XS

**Figure 1-4 RG-EG406XS Appearance**

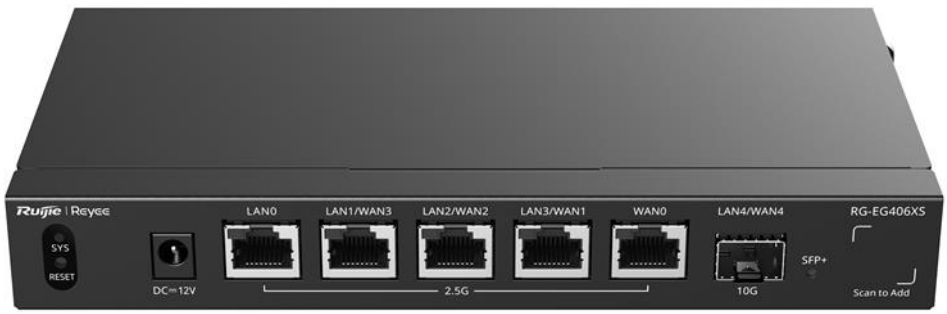




**Figure 1-5 Front Panel**

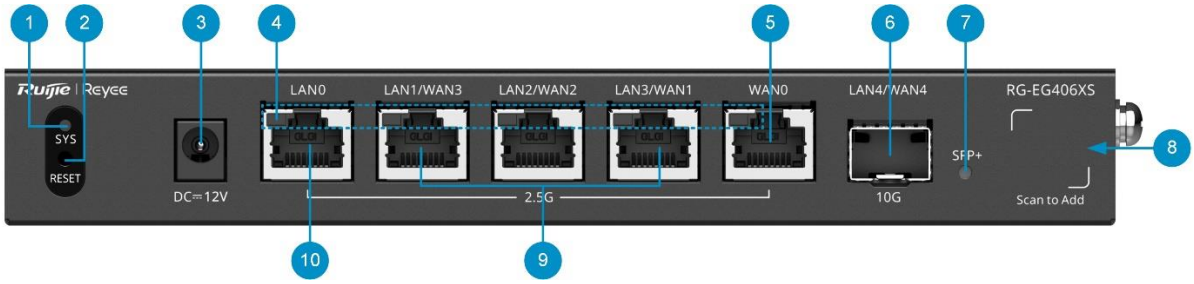



**Table 1-6 Components on the Front Panel**

| Mark | Item | Description |
|---|---|---|
| 1 | System LED | Indicates the working status of the system.<br>● Off: The device is powered off.<br>● Fast blinking green (eight blinks per second): The device is starting up.<br>● Solid green: The system is operating normally.<br>● Slow blinking green (one blink every two seconds): The device is not connected to Ruijie Cloud.<br>● Blinking green (two blinks per second): The device is undergoing a reset or firmware update.<br>● Blinking red (two blinks per second): The firmware is corrupted. |
| 2 | Reset button | Used to restart the device or reset the device to factory settings.<br>● Press and hold the button for less than 2 seconds: The device restarts.<br>● Press and hold the button for more than 5 seconds until the system status LED starts blinking: The device restores to factory defaults and restarts. |
| 3 | DC input plug | Connects to the DC power adapter to power on the router. |
| 4 | Link/ACT LED for an RJ45 port | Indicates the working status of the RJ45 port.<br>● Solid green: A link is set up on the port.<br>● Blinking green: The port is transmitting and receiving data. |
| 5 | WAN port | Indicates a 10/100/1000/2500BASE-T port connected to a DSL or cable modem for Internet access. |
| 6 | LAN/WAN optical port | Indicates a 10GE SFP+ port, which can be used as a WAN port. |

| Mark | Item | Description |
|---|---|---|
| 7 | Link/ACT LED for the optical port | Indicates the working status of the optical port.<br>● Solid green: A link is set up on the port.<br>● Blinking green: The port is transmitting and receiving data. |
| 8 | QR code | Scan the QR code to download the dedicated app. |
| 9 | LAN/WAN port | LAN1 to LAN3 are 10/100/1000/2500BASE-T ports and can be used as WAN ports. |
| 10 | LAN port | LAN0 is a 10/100/1000/2500BASE-T port and is a fixed LAN port. |

**Note**

After the router is reset, the default management address is http://192.168.110.1 (default password: admin).

**Figure 1-6 Label of RG-EG406XS**

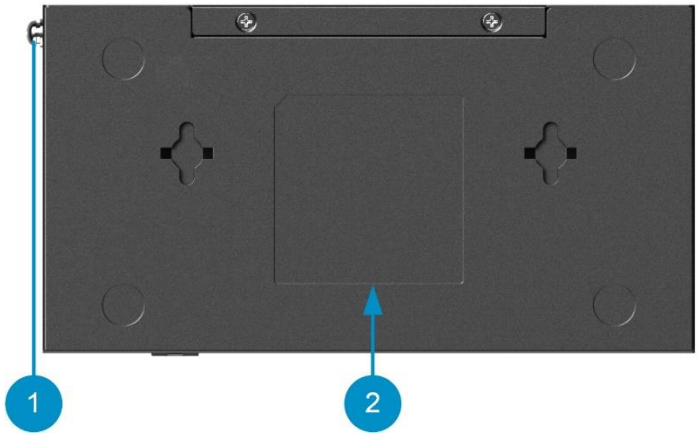



**Table 1-7 Other Components**

| Mark | Item | Description |
|---|---|---|
| 1 | Grounding stud | Connects to the terminal of a grounding wire to ground the chassis. |
| 2 | Label | Contains the product name, model, I/O parameters, default IP address, etc. |

# 1.4 Technical Specifications

## 1.4.1 RG-EG406XS-P

**Table 1-8 Technical Specifications**

| | |
|---|---|
| **Model** | RG-EG406XS-P |
| **CPU** | Quad-core processor, 2 GHz clock frequency per core |
| **Flash Memory** | 256 MB |
| **SDRAM** | 1 GB DDR4 |
| **Fixed Service Port** | 5 x10/100/1000/2500BASE-T ports<br>1 x 10GE SFP+ port<br>By default, LAN0 to LAN4 are LAN ports, while WAN0 is a WAN port. LAN1 to LAN4 can be used as WAN ports. |
| **Power Supply** | DC adapter:<br>Rated input voltage: 100 V AC to 240 V AC, 50 Hz to 60 Hz<br>Maximum input voltage: 90 V AC to 264 V AC, 47 Hz to 63 Hz (optional)<br>Rated input current: 2.5 A<br>Output:<br>Rated output voltage: 54 V DC<br>Maximum output current: 2.4 A |
| **Dimensions of the DC Connector** | Inner diameter: 2.1 mm (0.08 in.)<br>Outer diameter: 5.5 mm (0.22 in.)<br>Depth: 10.0 mm (0.39 in.) |
| **Ground-Leakage Current** | ≤ 3.5 mA |
| **EEE** | Supported |
| **PoE** | Supported |
| **PoE Out Standard** | IEEE 802.3af (PoE) and IEEE 802.3at (PoE+) |
| **PoE Budget** | 110 W |
| **Max. Power Consumption** | 9.2 W (with no PoE load)<br>129 W (with full PoE load) |
| **Operating Temperature** | 0ºC to 40ºC (32°F to 104°F) |
| **Storage Temperature** | –40°C to +70°C (–40°F to +158°F) |
| **Operating Humidity** | 10% RH to 90% RH (non-condensing) |

| | |
|---|---|
| **Storage Humidity** | 5% RH to 95% RH (non-condensing) |
| **Fan** | N/A |
| **IP Rating** | IP20 |
| **Certification** | CE |
| **Dimensions (W x D x H)** | 202 mm x 108 mm x 28 mm (7.95 in. x 4.25 in. x 1.1 in.) |
| **Weight** | 0.62 kg (1.37 lbs) |
| **Shipping Weight** | 1.56 kg (3.44 lbs) |

**Warning**

- This is a Class A product. The equipment room should be located away from residential areas. Equipment rooms near residential areas should meet construction specifications to avoid noise and radio interference.
- This equipment is not suitable for use in locations where children are likely to be present.

### 1.4.2 RG-EG406XS

**Table 1-9 Technical Specifications**

| | |
|---|---|
| **Model** | RG-EG406XS |
| **CPU** | Quad-core processor, 2 GHz clock frequency per core |
| **Flash Memory** | 256 MB |
| **SDRAM** | 1 GB DDR4 |
| **Fixed Service Port** | 5 x10/100/1000/2500BASE-T ports<br>1 x 10GE SFP+ port<br>By default, LAN0 to LAN4 are LAN ports, while WAN0 is a WAN port. LAN1 to LAN4 can be used as WAN ports. |
| **Power Supply** | DC adapter:<br>Rated input voltage: 100 V AC to 240 V AC, 50 Hz to 60 Hz<br>Maximum input voltage: 90 V AC to 264 V AC, 47 Hz to 63 Hz (optional)<br>Rated input current: 0.5 A<br>Output:<br>Rated output voltage: 12 V DC<br>Maximum output current: 1 A |

| | |
|---|---|
| **Dimensions of the DC Connector** | Inner diameter: 2.1 mm (0.08 in.)<br>Outer diameter: 5.5 mm (0.22 in.)<br>Depth: 10.0 mm (0.39 in.) |
| **Ground-Leakage Current** | ≤ 3.5 mA |
| **EEE** | Supported |
| **PoE** | Not Supported |
| **Max. Power Consumption** | 9 W |
| **Operating Temperature** | 0ºC to 40ºC (32°F to 104°F) |
| **Storage Temperature** | –40°C to +70°C (–40°F to +158°F) |
| **Operating Humidity** | 10% RH to 90% RH (non-condensing) |
| **Storage Humidity** | 5% RH to 95% RH (non-condensing) |
| **Fan** | N/A |
| **IP Rating** | IP20 |
| **Certification** | CE |
| **Dimensions (W x D x H)** | 202 mm x 108 mm x 28 mm (7.95 in. x 4.25 in. x 1.1 in.) |
| **Weight** | 0.61 kg (1.34 lbs) |
| **Shipping Weight** | 1.28 kg (2.82 lbs) |

**Warning**

- This is a Class A product. The equipment room should be located away from residential areas. Equipment rooms near residential areas should meet construction specifications to avoid noise and radio interference.
- This equipment is not suitable for use in locations where children are likely to be present.

# 2 Preparing for Installation

## 2.1 Safety Precautions

**Note**

- The equipment mentioned in this manual cannot be mounted on a wall.
- To avoid personal injury or equipment damage, review the safety guidelines in this chapter before you begin the installation.
- The following safety guidelines may not include all the potentially hazardous situations.

### 2.1.1 General Precautions

- Do not place the equipment in a wet position, and keep the equipment away from liquid. Keep the chassis clean and dust-free.
- Install the equipment in a position far away from heat sources.
- Ensure that the rack and power distribution system are properly grounded.
- Keep the equipment away from walk areas.
- During installation and maintenance, do not wear loose clothing or ornament that may get caught in the chassis.
- Keep tools and components away from walking areas.

### 2.1.2 Handling Safety

- Avoid moving the equipment frequently.
- Turn off all power supplies and disconnect all power cords before lifting or moving the equipment.
- Keep balance and prevent personal injuries when lifting or moving the equipment.

### 2.1.3 Electricity Safety

**Warning**

- Any deviation from standard or improper electrical operations can result in accidents such as fires or electric shocks, potentially causing severe or even fatal harm to both individuals and equipment.
- Direct or indirect touch through a wet object on high-voltage and mains supply can bring a fatal danger.

- Always observe the local regulations and standards. Only qualified personnel should be allowed to operate the equipment.
- Carefully check the work area for potential hazards, including ungrounded power system, absent safety grounds, and damp floors.
- Locate the emergency power-off switch in the room before installation. In the case of an accident, cut off the power supply immediately.
- Do not assume that the power supply is turned off. Never assume that power is disconnected from a circuit. Always check.

- Select the right leakage protector (also called “leakage current switch” or “leakage current breaker”) for the power supply system. This equipment automatically disconnects the power supply in the event of leakage and the risk of electric shock. A leakage protector should meet the following requirements:
  - The rated leakage action current of each leakage protector is greater than twice the theoretical maximum leakage current of all the power supplies in the system.

    For example, if a system is equipped with 16 identical power supplies, and the leakage current of each power supply is equal to or less than 3.5 mA, then the leakage current of the system totals 56 mA. A leakage protector with a rated leakage action current of 30 mA supports no more than four power supplies (that is, action current of the leakage protector/2/Maximum leakage current of each power supply = 30/2/3.5 ≈ 4.28). In this case, 16 power supplies in the system require at least four leakage protectors with a rated action current of 30 mA, with each leakage protector supporting four power supplies.
  - Although the number of power supplies in a system differs in models, the rated leakage action current of each leakage protector divided by two must be greater than the sum of the maximum leakage current of all the power supplies.

    The rated leakage non-action current of a leakage protector should be 50% of the leakage action current. If the non-action current value is too small, the high sensitivity level can cause the circuit to break, leading to power cutoff and service interruption, even if the leakage current value is normal.

    For example, if a leakage protector has a rated leakage action current of 30 mA, the rated leakage non-action current should be 15 mA. The leakage protector will not activate unless the leakage current exceeds 15 mA.

**Caution**

- To ensure personal safety, each leakage protector in the system must have a rated leakage action current equal to or below 30 mA, which is the recognized safety threshold for the human body current. If the total leakage current of the system exceeds twice the 30 mA limit, the system must be equipped with two or more leakage protectors to maintain safety.
- The leakage current values vary with equipment. For the leakage current value of each equipment model, see the technical specifications in Chapter 1.

### 2.1.4 Preventing ESD Damage

- Ensure proper grounding of both the equipment and the installation site.
- Keep the site as dust-free as possible.
- Maintain appropriate humidity conditions.

## 2.2 Site Requirements

The equipment must be installed indoors for normal operation and prolonged service life. The installation site must meet the following requirements.

### 2.2.1 Floor Loading

Assess the combined weight of the equipment and its accessories, such as rack and cables, and verify that the floor under the rack can bear the weight.

If the RG-EG406XS router is installed inside a rack, the following conditions must be met:

- Install the router into an open rack. If the router is installed into a closed rack, ensure that the rack has proper ventilation and heat dissipation.
- The rack is strong enough to support the weight of the router and its accessories.
- You are advised to install the equipment into a standard rack and maintain a proper clearance around the air vents for heat dissipation.
- The rack is properly grounded.

To install the equipment on a workbench, make sure that the workbench meets the following conditions:

- The size of the workbench is suitable and a proper clearance can be maintained around the air vents for heat dissipation.
- The workbench must be properly grounded.

### 2.2.2 Airflow

Maintain a minimum clearance of 100 mm (3.94 in.) around the equipment for air circulation and normal heat dissipation. After various cables are connected, bundle the cables or place them in the cable management bracket to avoid blocking air inlets. Dust the equipment every three months to avoid blocking the ventilation openings.

### 2.2.3 Space

You are advised to have a pathway of 0.8 meters (2.62 ft.) wide in the equipment room. This space ensures that you can move the chassis and swap the modules easily.

Do not install the equipment against a wall. Instead, maintain a minimum clearance of 0.4 m (15.75 in.) around the equipment for heat dissipation and equipment maintenance.

### 2.2.4 Temperature and Humidity

To ensure normal operation and prolonged service life of the equipment, maintain appropriate temperature and humidity conditions in the equipment room.

Prolonged exposure to inappropriate temperature and humidity conditions can cause damage to the equipment.

- In an environment with high relative humidity, insulating materials are prone to poor insulation or even electricity leakage.
- In an environment with low relative humidity, insulating gaskets may shrink, resulting in screw loosening.
- In a dry environment, static electricity is more likely to occur, posing a risk to the internal circuits of equipment.
- A high temperature can accelerate the aging process of insulation materials, greatly reducing the availability of the equipment and severely affecting its service life.

The temperature and humidity requirements of the equipment are as follows:

**Table 2-1 Operating Environment Requirements**

| Operating Temperature | Operating Humidity |
|---|---|
| 0ºC to 40ºC (32ºF to 104ºF) | 10% RH to 90% RH (non-condensing) |

**Note**

The operating temperature and humidity are measured at 1.5 m (4.92 ft.) above the floor and 0.4 m (1.31 ft.) before the rack when there is no protective plate in front or on the rear of the rack.

## 2.2.5 Cleanliness

Dust poses a significant hazard to the equipment. Dust on the enclosure causes electrostatic adhesion, leading to poor contact with the metallic joints. Electrostatic adhesion is more likely to occur in an indoor environment with relatively low humidity, not only affecting the service life of the equipment, but also causing communication faults. The following table lists the requirements for dust concentration and particle size in the equipment room.

**Table 2-2 Requirements for Dust**

| Particle Diameter | Unit | Concentration |
|---|---|---|
| ≥ 0.5 μm | Particles/$m^3$ | ≤ 3.5 x $10^6$ |
| ≥ 5 μm | Particles/$m^3$ | ≤ 3 x $10^4$ |

Apart from dust, there are also requirements on the salt, acid, and sulfide in the air of the equipment room. These harmful substances will accelerate metal corrosion and component aging. Therefore, the equipment room should be properly protected against harmful gases, such as sulfur dioxide, hydrogen sulfide, nitrogen dioxide, chlorine gas, and so on. The following table lists the limits on harmful gases.

**Table 2-3 Requirements for Gases**

| Gas | Average ($mg/m^3$) | Maximum ($mg/m^3$) |
|---|---|---|
| Sulfur dioxide ($SO_2$) | 0.3 | 1.0 |
| Hydrogen sulfide ($H_2S$) | 0.1 | 0.5 |
| Nitrogen dioxide ($NO_2$) | 0.5 | 1.0 |
| Chlorine gas ($Cl_2$) | 0.1 | 0.3 |

**Note**

**Average** refers to the average value of harmful gases measured in a week. **Maximum** refers to the upper limit of harmful gases measured in a week for up to 30 minutes every day.

## 2.2.6 Grounding

A proper grounding system is crucial for ensuring stable and reliable operation, as well as preventing lightning strikes and interference. Carefully check the grounding conditions at the installation site according to the grounding requirements, and complete grounding properly based on the site situation.

- Safe Grounding

Ensure that the equipment is securely grounded using grounding wires if the equipment uses the AC power supply. Otherwise, electric shocks may occur when the insulation resistance between the power module and the chassis decreases.

**Caution**

- The building should provide a protective ground connection to ensure that the equipment is connected to a protective ground.
- Verify that the AC socket is reliably connected to the protective grounding system of the building. If not, a protective grounding wire should be used to connect the protective grounding lug of the AC socket to the protective grounding system of the building.
- The cross-sectional area of the protective grounding wire should be at least 0.75 $mm^2$ (18 AWG).

- Lightning Grounding

The lightning protection system is an independent system composed of a lightning rod, a downlead conductor, and a connector connected to the grounding system. The grounding system is typically used for power reference grounding and safety grounding of the rack. Lightning grounding is required only for facilities and is not required for the equipment.

- EMC Grounding

Electromagnetic compatibility (EMC) grounding includes shielded grounding, filter grounding, noise and interference suppression, and level reference, which contribute to the overall grounding requirements. The grounding resistance should be smaller than 1 ohm. Connect the grounding lug to the ground before operating the equipment.

### 2.2.7 EMI

All interference sources, either from outside or inside of the equipment or application system, affect the equipment by capacitive coupling, inductive coupling, or electromagnetic waves. Electromagnetic interference (EMI) occurs due to radiated interference or conducted interference, depending on the transmission path. When the energy, often RF energy, from a component arrives at a sensitive component through space, the energy is known as radiated interference. The interference source can be either a part of the interfered system or a completely electrically isolated unit. Conducted interference occurs when interference is transferred from one unit to another unit through cables, which are usually electromagnetic wires or signal cables connected between the source and the sensor. Conducted interference often affects the power supply of the equipment, but can be controlled by a filter. Radiated interference may affect any signal path in the equipment, and is difficult to shield.

The requirements for the equipment anti-interference are as follows:

- Take interference prevention measures for the power supply system.
- Keep the switch away from the grounding system or surge protection grounding system of the power facility.
- Keep the equipment far away from high-frequency current equipment such as high-power radio transmitting stations and radar stations.
- Take electromagnetic shielding measures when necessary.

### 2.2.8 Surge Protection

Although the equipment can guard against lightning strikes, strong lightning strikes may still damage the equipment. Take the following surge protection measures:

- Ensure that the grounding wire of the rack is in good contact with the ground.
- Ensure that the neutral point of the AC power socket is in good contact with the ground.
- Install a power lightning arrester in front of the power input end to enhance surge prevention for the power supply.

### 2.2.9 Installation Site

Regardless of whether the equipment is installed in a rack or on a workbench, ensure that the following conditions are met:

- Maintain a proper clearance around the air inlets and outlets for heat dissipation.
- The installation site has a good cooling and ventilation system.
- The installation site is sturdy enough to support the weight of the chassis and its components.
- The installation site is properly grounded.

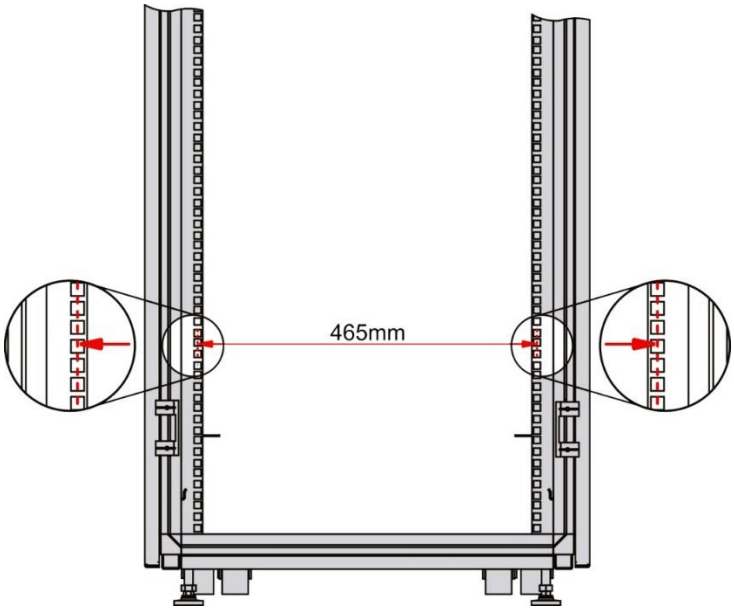
## 2.3 Rack Requirements

If you want to install the equipment in a rack, make sure that the rack observes the following requirements:

(1) A standard 19-inch rack is used.

(2) The left and right square-hole rack posts are 465 mm (18.31 in.) apart.

**Figure 2-1 19-inch Rack**




(3) The square-hole rack post is at least 180 mm (7.09 in.) from the front door, and the front door is at most 25 mm (0.98 in.) thick. This ensures an available clearance of at least 155 mm (6.10 in.). The rack depth (distance between front and rear doors) is at least 1000 mm (39.37 in.).

(4) The guide rails or tray can bear the weight of the equipment and its accessories.

(5) The rack has a reliable grounding lug for the chassis to connect to earth ground.

(6) The rack has a reliable ventilation system. The open area of front and rear doors is greater than 50%.

## 2.4 Notes for Connecting Optical Cables

Before connecting the optical cables, verify that the fiber connector type and fiber type match the optical port type. Attention should also be paid to the Rx and Tx ends of an optical cable. The Tx end of the local device must be connected to the Rx end of the peer device, and vice versa.

## 2.5 Tools

**Table 2-4 Tools**

| | |
|---|---|
| **Common Tools** | Phillips screwdriver, power cords, Ethernet cables, fastening bolts, diagonal pliers, and binding straps |
| **Dedicated Tools** | Anti-ESD gloves, wire stripper, crimping pliers, crystal connector crimping pliers, and wire cutter |
| **Meter** | Multimeter |
| **Relevant Equipment** | PC, display, and keyboard |

**Note**

The equipment is delivered without a toolkit. Prepare the preceding tools by yourself.

# 3 Installing the Routers

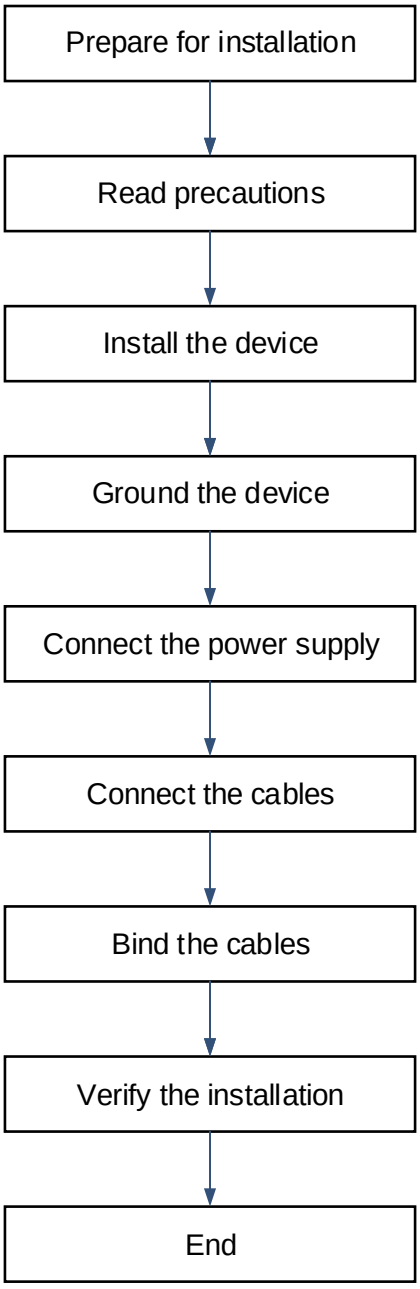
**Caution**

Before installing the equipment, ensure that guidelines and requirements in Chapter 2 have been met.

## 3.1 Installation Procedure

The installation steps are shown in the following figure.

**Table 3-1 Installation Procedure**



## 3.2 Before You Begin

Carefully plan and arrange the installation position, networking mode, power supply, and cabling before installation. Confirm the following requirements before installation:

- The installation site provides sufficient space for heat dissipation.
- The installation site meets the temperature and humidity requirements of the equipment.
- The power supply and required current are available at the installation site.
- The Ethernet cables have been deployed at the installation site.
- The selected power supply modules meet the system power requirements.
- The position of the indoor emergency power switch is identified before installation. In the case of an accident, cut off the power supply immediately.

## 3.3 Precautions

During installation, pay attention to the following:

- Do not power on the equipment during installation.
- Install the equipment in a well-ventilated position.
- Do not subject the equipment to high temperatures.
- Keep the equipment away from high voltage cables.
- Install the equipment indoors.
- Do not expose the equipment to a thunderstorm or strong electric field.
- Keep the equipment clean and dust-free.
- Cut off the power switch before cleaning the equipment.
- Do not wipe the equipment with a damp cloth.
- Do not wash the equipment with liquid.
- Do not open the enclosure when the equipment is working.
- Fasten the equipment tightly.
- Before powering off the equipment that contains a hard disk drive, be sure to switch off the power switch on the back panel of the router.

## 3.4 Installing a Router

**Note**

The RG-EG406XS supports both rack and workbench installation, while the RG-EG406XS-P supports workbench installation only.

### 3.4.1 Mounting the Router into a Rack

#### 1. Precautions

If you want to install the RG-EG406XS router into a rack, mount the rack first. When mounting the rack, note the following:

- All expansion bolts for fastening the rack base to the ground should be installed and tightened in sequence from bottom to up (large flat washer, spring washer, and nut), and the installation holes on the base and the expansion bolts are properly aligned.
- The installed rack should not be moved.
- The installed rack should be vertical to the ground.
- When multiple racks are placed side by side in the equipment room, they should be aligned with each other, leaving an error of less than 5 mm (0.20 in.).
- The front/rear doors of the rack should be installed to allow you to open and close them smoothly. The locks should work normally, and all keys should be complete.
- There should be no unnecessary and informal labels inside the rack and on service modules.
- Filler panels are installed on vacant slots.
- The screws in the rack should be fastened tightly and be of the same model.
- The equipment is securely installed, and the screws on the panel should be fastened tightly.
- All wiring outlets at the top and bottom of the rack should be installed with rodent-resistant nets with clearance of no more than 15 mm (0.59 in.) in diameter to prevent rodents and other small animals from entering the rack.
- Antistatic wrist straps should be provided in the rack.

#### 2. Installation Preparations

(1) Plan the available space before installing the rack. Reserve enough space for the front and rear doors for equipment maintenance.

(2) Install and fasten the rack in the designed position as planned.

(3) Install the appropriate cable troughs and cables.

(4) Install the tray and cable management brackets on the rack according to the number of equipment installed into the rack.

#### 3. Installation Procedure

The RG-EG406XS router can be installed in a 19-inch EIA rack. The installation steps are as follows:

(1) Remove the M3 x 6 mm Phillips countersunk head screws packaged with the rack-mount brackets, align one end of the rack-mount bracket against the side of the device, and securely fasten the rack-mount bracket using four M3 x 6 mm Phillips countersunk head screws. Follow the same procedure to install the other rack-mount bracket.

**Figure 3-1 Securing the Rack-Mount Brackets**

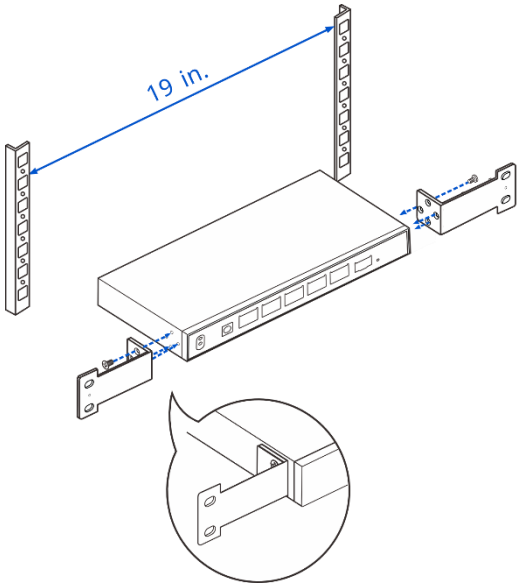
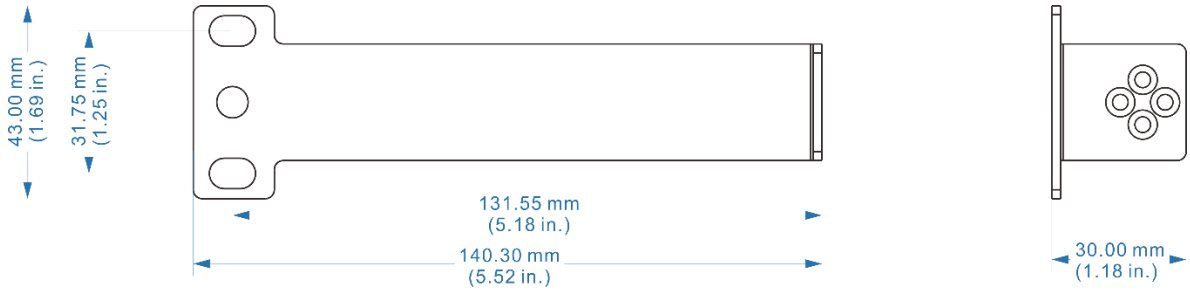
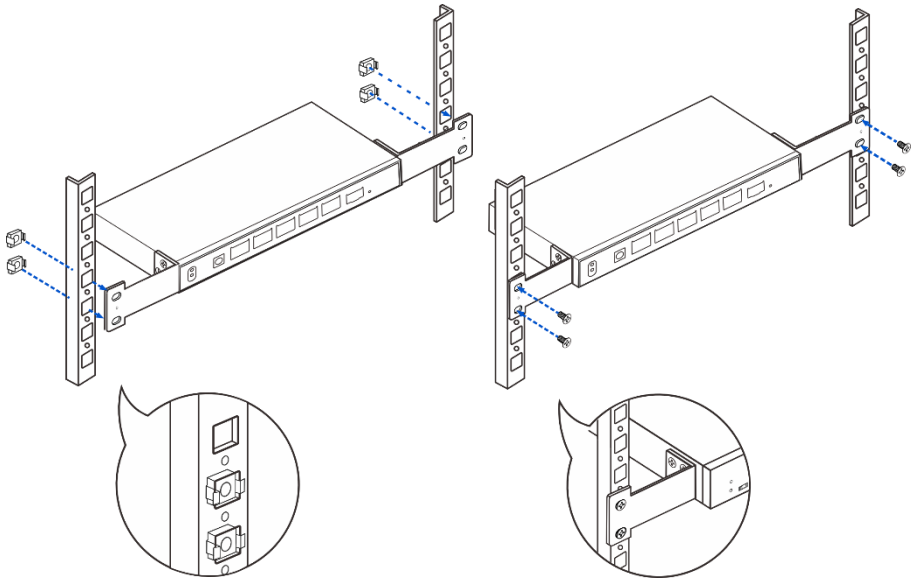



**Table 3-2 Rack-Mount Bracket Dimensions**



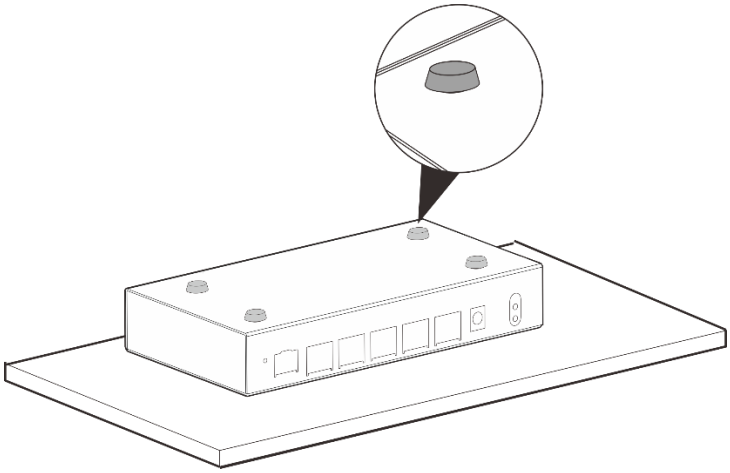

(2) Mount the device into the rack and secure the other ends of the brackets to square-hole rack posts using the cage nuts and M6 screws.



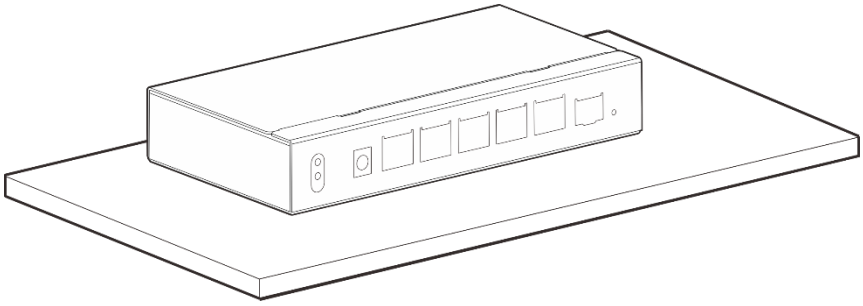
### 3.4.2 Mounting the Router on a Workbench

If a standard 19-inch rack is unavailable, you can mount the router on a workbench.

(1) Attach the four rubber pads to the four corners on the bottom of the device.



(2) Place the device on the workbench to ensure adequate airflow and good heat dissipation.



**Caution**

The workbench used for installing and operating the device must not be moved.

## 3.5 Connecting the Grounding Wire

The router has a grounding stud for grounding protection. Connect the grounding stud of the device to the grounding lug of the rack with a grounding wire. Then connect the grounding lug to the grounding bar in the equipment room.

Precautions:

- The cross-sectional area of the grounding wire should be determined according to the possible maximum current. Cables with good conductors should be used.
- Do not use bare wires.
- The resistance between the chassis and ground should be less than 1 ohm.

**Caution**

The cross-sectional area of the grounding wire should be at least 2.5 $mm^2$ (12 AWG).

## 3.6 Connecting the Power Cord

The device is equipped with a three-core power cord. You are advised to use a single-phase three-core power socket or a multi-function power socket with a neutral point connector. The neutral point of the power supply must be well grounded in the building. Typically the neutral point has been buried in the ground during the cabling. You need to confirm whether the power supply of the building has been properly grounded.

Please connect the power cord based on the following steps:

(1) Insert the ring of the adapter's DC connector into the DC input plug of the device. Plug the end of the power cord into the power socket on the adapter and the other end into the AC power socket. For those devices without the adapter power supply, plug the end of the power cord into the power socket on the rear panel of the device and the other end of the power cord into the AC power socket.

(2) Please check the status of the system LED on the front panel of the device. If the LED is on, it means that the power cord is connected correctly. Otherwise, please check the power cord connection.

**Caution**

- Please use the power supply adapter and power cord delivered with the equipment to prevent any potential accidents.
- Verify that the AC socket is reliably connected to the protective grounding system of the building. If not, a protective grounding wire should be used to connect the protective grounding lug of the AC socket to the protective grounding system of the building.
- During the installation, the ground connection must always be made first and disconnected last.
- The power socket should be installed in an easily operable position near the equipment.

## 3.7 Connecting Cables

- Connect one end of the Ethernet cable to the Ethernet port of the device, and the other end to the NMS or a control client.
- Insert the twisted pair cable with an RJ45 connector into the corresponding port as indicated on the panel, and distinguish the crossover cable and the straight-through cable.

## 3.8 Bundling Cables

### 3.8.1 Precautions

- Bundle cables in an esthetically pleasing way.
- Ensure that the twisted pairs have natural bends or bends of large radius at the connectors.
- Do not overtighten the cable bundle as it may reduce the cable life and performance.

### 3.8.2 Bundling Steps

(1) Bundle the hanging part of the twisted pairs using cable ties and lead them to both sides of the equipment for convenience.

(2) Fasten the twisted pairs to the cable trough of the mounting bracket.

(3) Extend the twisted pairs under the equipment and route them in a straight line.

# 3.9 Verifying Installation

## 3.9.1 Verifying the Equipment

- Verify if the external power supply matches with the distribution panel of the rack.
- Verify if the front/back rack doors can be closed after the equipment is installed.
- Verify that the rack and all cables are securely fastened.
- Verify that the equipment has been installed in the rack.

## 3.9.2 Verifying Cable Connection

- Verify that the cable matches the port type.
- Verify that cables are properly bundled.

## 3.9.3 Verifying Power Supply

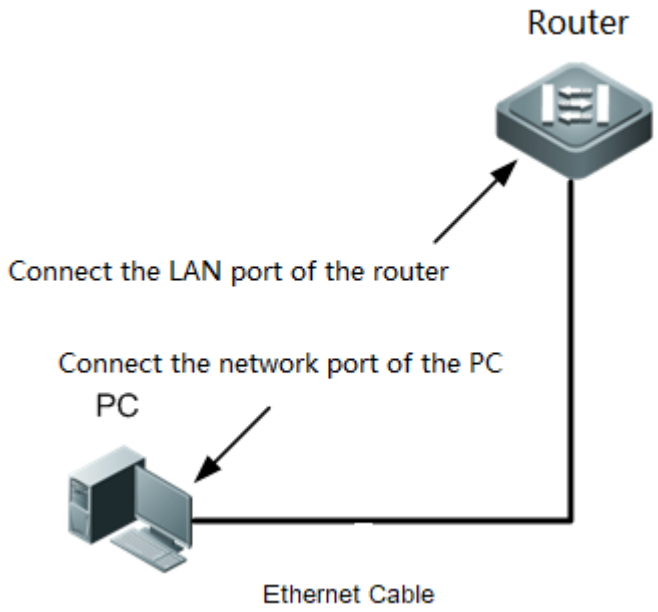
- Verify that the power cord is properly connected and compliant with safety requirements.
- Verify that the equipment is operational after power-on.

# 4 Verifying Operating Status

## 4.1 Setting up Configuration Environment

- Wired Connection: Connect the LAN port of the router to the Ethernet port of a PC with an Ethernet cable. Configure the PC to get an IP address automatically.
- Wireless Connection: Connect the AP to the LAN port of the router with an Ethernet cable. The AP will automatically broadcast SSID “@Ruijie-mXXXX” (XXXX are the last four characters of the MAC address on the device label.) after power-on. Perform configuration on the device after the PC is connected to the wireless network.

**Figure 4-1 Configuration Environment**




## 4.2 Checklist

### 4.2.1 Checklist before Power-on

- The equipment is properly grounded.
- The power cord is properly connected.
- The input voltage meets the requirement.
- The Ethernet cable is properly connected, the client such as a PC used for configuration is already turned on, and the parameters are configured correctly.

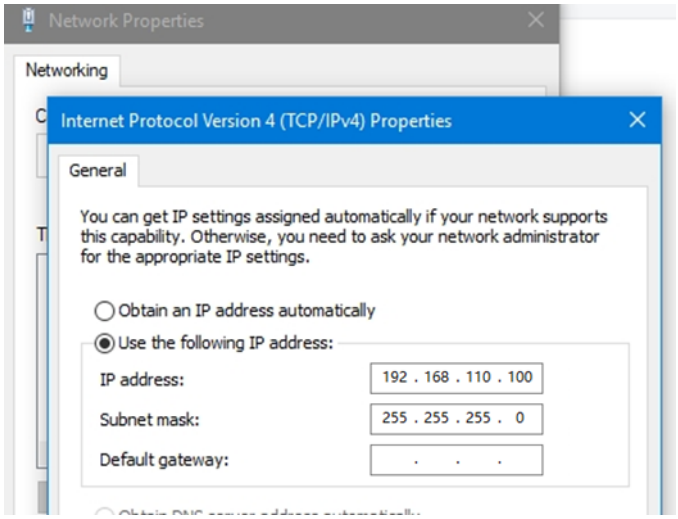
### 4.2.2 Checklist after Power-on

After the equipment is powered on, check whether the LEDs on it are normal to ensure the proper configuration.

## 4.3 Log In to the Web Interface

(1) Start up the PC and configure the local connection attribute on the PC. Set the static IP address of the PC to 192.168.110.XXX (2–254).

**Figure 4-2 Modifying the PC's IP Address**



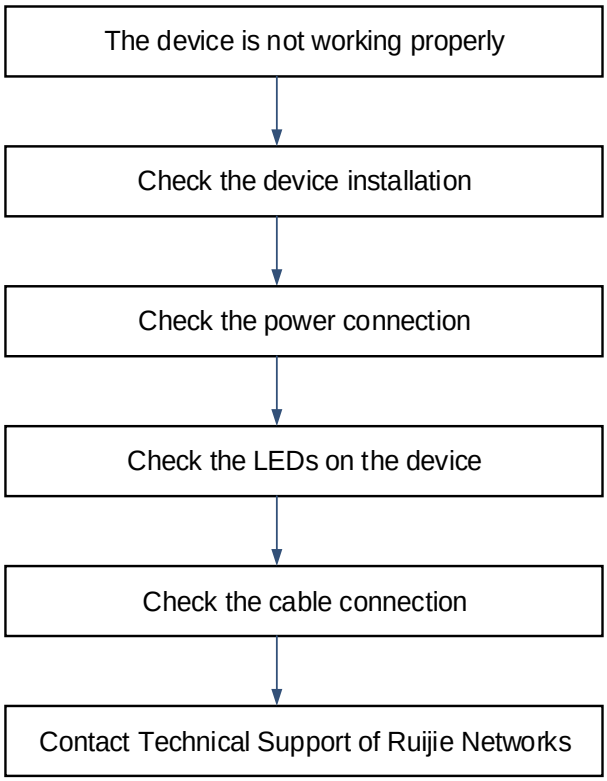

(2) Open a browser, enter 192.168.110.1 into the address bar of the browser, and press **Enter**.

**Caution**

Use the default password "admin" to log in to the switch for the first time. To ensure security, you are advised to change the password after login, and update the password regularly.

# 5 Troubleshooting

## 5.1 General Troubleshooting Procedure




## 5.2 Common Troubleshooting Procedures

### 5.2.1 Password Loss

Press the **Reset** button for more than 5 seconds to restore the device to factory settings and reset the system login password.

### 5.2.2 System LED Error

Cut off all power supplies first. Check if the cables of the rack have been correctly connected and the power socket is functional. Check whether the power cord is tightly connected to the rack power socket. Check whether the power cord is tightly connected and the adapter's DC connector works properly.

# 6 Appendix

## 6.1 Connectors and Media

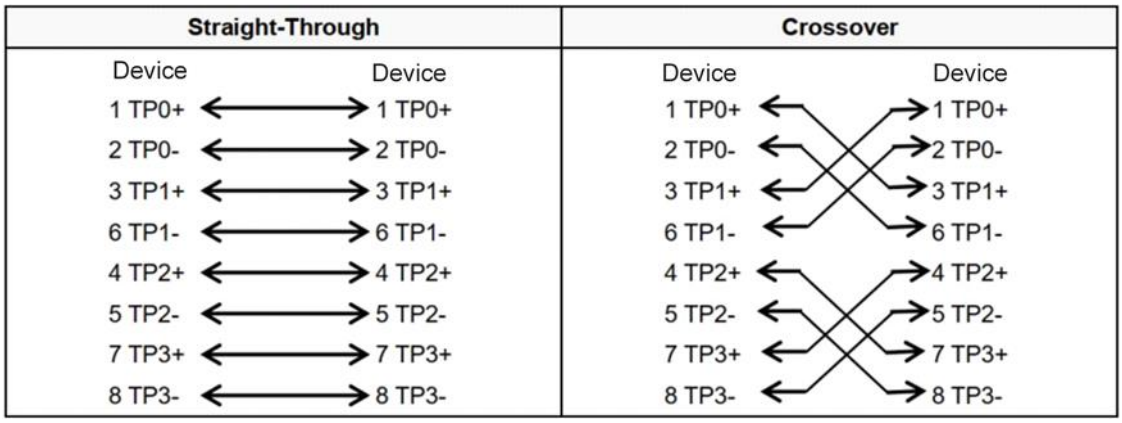
### 6.1.1 10/100/1000/2500BASE-T Port

The 10/100/1000/2500BASE-T port supports auto-negotiation for 10 Mbps, 100 Mbps, 1 Gbps, and 2.5 Gbps connections and also supports auto MDI/MDIX Crossover.

Compliant with IEEE 802.3bz, 2500BASE-T requires Category 5e 100-ohm UTP or STP (STP is recommended) with a maximum distance of 100 meters (328 feet). 2500BASE-T requires all four pairs of wires to be connected for data transmission, as shown in Figure 6-1.

Compliant with IEEE 802.3ab, 1000BASE-T requires Category 5e 100-ohm UTP or STP (STP is recommended) with a maximum distance of 100 meters (328 feet). 1000BASE-T requires all four pairs of wires to be connected for data transmission, as shown in Figure 6-1.

**Figure 6-1 2500BASE-T/1000BASE-T Connection**




The 10/100BASE-T port can also be connected by cables of the preceding specifications. Besides, the 10BASE-T port can be connected by 100-ohm Category 3, Category 4, and Category 5 cables with a maximum distance of 100 meters (328.08 feet). The 100BASE-TX port can be connected by 100-ohm Category 5 cables with a maximum distance of 100 meters (328.08 feet). The following table lists pin assignments for the 10/100BASE-T port.

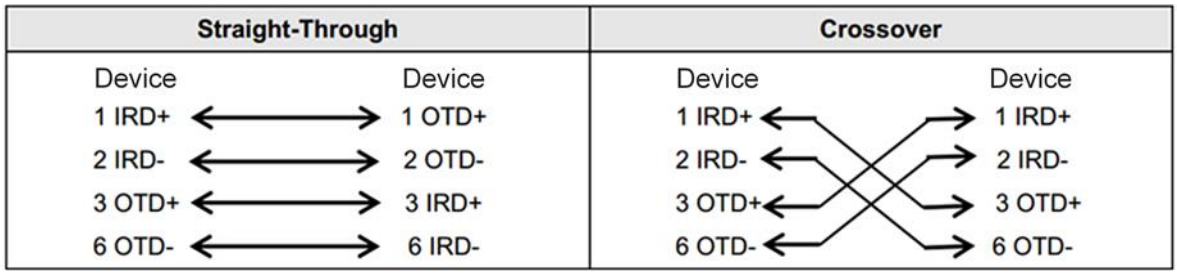
**Table 6-1 100BASE-TX/10BASE-T Pin Assignments**

| Pin | Socket | Plug |
|---|---|---|
| 1 | Input Receive Data+ | Output Transmit Data+ |
| 2 | Input Receive Data- | Output Transmit Data- |
| 3 | Output Transmit Data+ | Input Receive Data+ |
| 6 | Output Transmit Data- | Input Receive Data- |

| Pin | Socket | Plug |
|---|---|---|
| 4,5,7,8 | Not Used | Not Used |

Figure 6-2 shows wiring of straight-through and crossover cables for a 100BASE-TX/10BASE-T port.

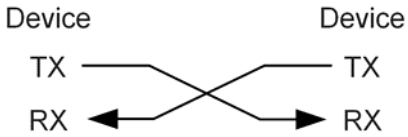
**Figure 6-2 100BASE-TX/10BASE-T Connection**




- Optical Cable Connection

For the optical ports, select single-mode or multimode optical cables for connections according to the optical transceiver connected. Figure 6-3 shows the connection schematic diagram.

**Figure 6-3 Optical Cable Connections**




## 6.2 Mini-GBIC and 10GE SFP+ Module Specifications

SFP modules (mini-GBIC module) and 10GE SFP+ modules are available to cope with port types of switch modules. You can select the mini-GBIC module to suit your specific needs. The models and technical specifications of some mini-GBIC and 10GE SFP+ modules are listed below. For details, see *Ruijie module Installation and Reference Guide.*

**Table 6-2 Models and Specifications of the 1GE Mini-GBIC (SFP) Modules**

| Model | Wave Length (nm) | Fiber Type | DDM (Yes/No) | Intensity of Transmitted Light (dBm) | | Intensity of Received Light (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | | Min | Max | Min | Max |
| MINI-GBIC-SX-MM850 | 850 | MMF | No | –9.5 | –3 | –17 | 0 |
| MINI-GBIC-LX-SM1310 | 1310 | SMF | No | –9.5 | –3 | –20 | –3 |

| Model | Wave Length (nm) | Fiber Type | DDM (Yes/No) | Intensity of Transmitted Light (dBm) | | Intensity of Received Light (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | | Min | Max | Min | Max |
| MINI-GBIC-LH40-SM1310 | 1310 | SMF | Yes | –2 | 3 | –22 | –3 |
| GE-SFP-LX20-SM1310-BIDI | 1310TX/1550 RX | SMF | Yes | –9 | –3 | –20 | –3 |
| GE-SFP-LX20-SM1550-BIDI | 1550TX/1310 RX | SMF | Yes | –9 | –3 | –20 | –3 |
| GE-SFP-LH40-SM1310-BIDI | 1310TX/1550 RX | SMF | Yes | –5 | 0 | –24 | –1 |
| GE-SFP-LH40-SM1550-BIDI | 1550TX/1310 RX | SMF | Yes | –5 | 0 | –24 | –1 |
| MINI-GBIC-ZX80-SM1550 | 1550 | SMF | Yes | 0 | 4.7 | –22 | –3 |
| MINI-GBIC-ZX100-SM1550 | 1550 | SMF | Yes | 0 | 5 | –30 | –9 |
| SFP-MM850 | 850 | MMF | No | –9.5 | –3 | –17 | 0 |
| SFP-SM1310 | 1310 | SMF | No | –9.5 | –3 | –20 | –3 |
| GE-SFP-ZX | 850 | MMF | Yes | –9.5 | –3 | –17 | 0 |
| GE-SX-MM850 | 850 | MMF | Yes | –9.5 | –3 | –17 | 0 |
| GE-LX-SM1310 | 1310 | SMF | Yes | –9 | –3 | –20 | –3 |
| SFP-S4-R1000P1 v1 | 1310 | SMF | Yes | 0 | 5 | –30 | –9 |

**Table 6-3 Models of 1GE SFP Copper Module**

| Standard | Model | DDM (Yes/No) |
|---|---|---|
| 1000BASE-T | Mini-GBIC-GT | No |

**Table 6-4 SFP Module Cabling Specification**

| SFP Model | Interface Type | Fiber Type | Core Size(μm) | Cabling Distance |
|---|---|---|---|---|
| MINI-GBIC-SX-MM850 | LC | MMF | 62.5/125 | 275 m (902.23 ft.) |
| | | | 50/125 | 550 m (1804.46 ft.) |
| MINI-GBIC-LX-SM1310 | LC | SMF | 9/125 | 10 km (6.21 miles) |
| MINI-GBIC-LH40-SM1310 | LC | SMF | 9/125 | 40 km (24.85 miles) |
| GE-SFP-SX-SM1310-BIDI | LC | MMF | 50/125 | 500 m (1640.42 ft.) |
| GE-SFP-SX-SM1550-BIDI | LC | MMF | 50/125 | 500 m (1640.42 ft.) |
| GE-SFP-LX20-SM1310-BIDI | LC | SMF | 9/125 | 20 km (12.43 miles) |
| GE-SFP-LX20-SM1550-BIDI | LC | SMF | 9/125 | 20 km (12.43 miles) |
| GE-SFP-LH40-SM1310-BIDI | LC | SMF | 9/125 | 40 km (24.85 miles) |
| GE-SFP-LH40-SM1550-BIDI | LC | SMF | 9/125 | 40 km (24.85 miles) |
| MINI-GBIC-ZX80-SM1550 | LC | SMF | 9/125 | 80 km (49.71 miles) |
| MINI-GBIC-ZX100-SM1550 | LC | SMF | 9/125 | 100 km (62.14 miles) |
| SFP-MM850 | LC | MMF | 50/125 | 500 m (1640.42 ft.) |
| SFP-SM1310 | LC | SMF | 9/125 | 10 km (6.21 miles) |
| GE-SFP-ZX | LC | MMF | 50/125 | 550 m (1804.46 ft.) |
| GE-SX-MM850 | LC | MMF | 50/125 | 500 m (1640.42 ft.) |
| GE-LX-SM1310 | LC | SMF | 9/125 | 10 km (6.21 miles) |
| SFP-S4-R1000P1 v1 | LC | SMF | 9/125 | 10 km (6.21 miles) |
| Mini-GBIC-GT | RJ45 | Category 5 (or above ) UTP or STP | | 100 m (328.08 ft.) |
| GE-SFP-GT | RJ45 | Category 5 (or above ) UTP or STP | | 100 m (328.08 ft.) |

| SFP Model | Interface Type | Fiber Type | Core Size(μm) | Cabling Distance |
|---|---|---|---|---|
| SFP-GT | RJ45 | Category 5 (or above ) UTP or STP | | 100 m (328.08 ft.) |

**Note**

- For the optical transceiver with a transmission distance exceeding 40 km (24.85 miles) or above, add one in-line optical attenuator on the link to avoid the overload of the optical receiver when short single-mode fiber-optic cables are used.
- Optical transceivers generate laser. Do not look directly into the optical transceiver.
- To keep optical transceivers clean, use dust caps when the transceivers are not connected to optical cables.
- No extra cables are needed when SFP cables are used. To allow two ports to communicate easily, install the two ends of an SFP cable into corresponding ports.

**Table 6-5 Specifications of SFP BIDI Optical Transceiver Pairs**

| Rate/Distance | Module Pairs |
|---|---|
| 1000 Mbps/500 m (1640.42 ft.) | GE-SFP-SX-SM1310-BIDI<br>GE-SFP-SX-SM1550-BIDI |
| 1000 Mbps/20 km (12.43 miles) | GE-SFP-LX20-SM1310-BIDI<br>GE-SFP-LX20-SM1550-BIDI |
| 1000 Mbps/40 km (24.85 miles) | GE-SFP-LH40-SM1310-BIDI<br>GE-SFP-LH40-SM1550-BIDI |
| 10GE/10 km (6.21 miles) | XG-SFP-LR-SM1270-BIDI<br>XG-SFP-LR-SM1330-BIDI |

**Caution**

The BIDI modules must be used in pairs, for example, FE-SFP-LX20-SM1310-BIDI and FE-SFP-LX20-SM1550-BIDI are used together.

**Table 6-6 Models and Specifications of 10GE SFP+ Modules**

| Model | Wavelength (nm) | DDM (Yes/No) | Fiber Type | Transmit (dBm) | | Receive (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | | MIN | MAX | MIN | MAX |
| XG-SFP-SR-MM850 | 850 | Yes | MMF | –7.3 | –1 | –9.9 | –1 |

| Model | Wavelength (nm) | DDM (Yes/No) | Fiber Type | Transmit (dBm) | | Receive (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | | MIN | MAX | MIN | MAX |
| | | | | | | | |
| XG-SR-MM850 | 850 | Yes | MMF | –7.3 | –1 | –9.9 | –1 |
| SFP+MM850 | 850 | Yes | MMF | –7.3 | –1 | –9.9 | –1 |
| XG-SFP-LR-SM1270-BIDI | 1270 | No | SMF | –6.5 | 0.5 | –14.4 | 0.5 |
| XG-SFP-LR-SM1330-BIDI | 1330 | No | SMF | –6.5 | 0.5 | –14.4 | 0.5 |
| XG-LR-SM1310 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| SFP+SM1310 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| XG-SFP-LR-SM1310 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| XG-eSFP-LR-SM1310 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| XG-SFP-ER-SM1550 | 1550 | Yes | SMF | –4.7 | 4 | –11.3 | –1 |
| XG-SFP-ZR-SM1550 | 1550 | Yes | SMF | 0 | 4 | –24 | –7 |
| SFP-S4-R1000P1 v2 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| SFP-S1-R1000P1 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| SFP+1310 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| SFP-M3-R1000P1 | 850 | Yes | MMF | –7.3 | –1 | –11.1 | –1 |
| XG-LR-SM1310 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| HSFP-XG-SFP-LR-SM1310 | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |
| XG-SFP-SR-MM850-I | 850 | Yes | MMF | –7.3 | –1 | –9.9 | –1 |

| Model | Wavelength (nm) | DDM (Yes/No) | Fiber Type | Transmit (dBm) | | Receive (dBm) | |
|---|---|---|---|---|---|---|---|
| | | | | MIN | MAX | MIN | MAX |
| XG-SFP-LR-SM1310-I | 1310 | Yes | SMF | –8.2 | 0.5 | –14.4 | 0.5 |

**Table 6-7 Models and Specifications of 10GE SFP+ AOC Modules**

| Model | Module Type | Connector | Length (m) | Conductor Diameter(AWG) | Data Rate (Gbps) | Support DDM (Yes/No) |
|---|---|---|---|---|---|---|
| XG-SFP-AOC1M | Active | SFP+ | 1 | \ | 10.3125 | Yes |
| XG-SFP-AOC3M | Active | SFP+ | 3 | \ | 10.3125 | Yes |
| XG-SFP-AOC5M | Active | SFP+ | 5 | \ | 10.3125 | Yes |
| XG-SFP-AOC10M | Active | SFP+ | 10 | \ | 10.3125 | Yes |

**Note**

- SFP+ module types are subject to change without prior notice. For more accurate information about the optical transceivers, contact the Ruijie marketing or technical support personnel.
- The DDM function of the AOC cable does not report transmit power, and the transmit power may be displayed as N/A.

**Table 6-8 10GE SFP+ Module Cabling Specification**

| Model | Port Type | Fiber Type | Core Size (μm) | Modal Bandwidth (MHz.km) | Cabling Distance |
|---|---|---|---|---|---|
| XG-SFP-SR-MM850 | LC | MMF | 50/125 | 2000(OM3) | 300 m (984.25 ft.) |
| XG-SR-MM850 | LC | MMF | 50/125 | 2000(OM3) | 300 m (984.25 ft.) |

| Model | Port Type | Fiber Type | Core Size (μm) | Modal Bandwidth (MHz.km) | Cabling Distance |
|---|---|---|---|---|---|
| SFP+MM850 | LC | MMF | 50/125 | 2000(OM3) | 300 m (984.25 ft.) |
| XG-SFP-LR-SM1270-BIDI | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| XG-SFP-LR-SM1330-BIDI | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| XG-SFP-LR-SM1310 | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| SFP+SM1310 | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| XG-SFP-ER-SM1550 | LC | SMF | 9/125 | N/A | 40 km (24.85 miles) |
| XG-SFP-ZR-SM1550 | LC | SMF | 9/125 | N/A | 80 km (49.71 miles) |
| SFP-S4-R1000P1 v2 | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| SFP-S1-R1000P1 | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| SFP+1310 | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| SFP-M3-R1000P1 | LC | MMF | 50/125 | 2000(OM3) | 300 m (984.25 ft.) |

| Model | Port Type | Fiber Type | Core Size (μm) | Modal Bandwidth (MHz.km) | Cabling Distance |
|---|---|---|---|---|---|
| XG-LR-SM1310 | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| HSFP-XG-SFP-LR-SM1310 | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |
| XG-SFP-SR-MM850-I | LC | MMF | 50/125 | 2000(OM3) | 300 m (984.25 ft.) |
| XG-SFP-LR-SM1310-I | LC | SMF | 9/125 | N/A | 10 km (6.21 miles) |

## 6.3 Cabling Recommendations

When the RG-EG406XS is installed in a standard 19-inch rack, cables are routed upward or downward along the sides of the cable management bracket according to the actual situation in the equipment room. All adapted connectors should be placed at the bottom of the rack in an orderly manner instead of outside the rack that is easy to touch. Power cords are routed beside the rack. Top cabling or bottom cabling is adopted according to the actual situation in the equipment room, such as the positions of the DC power distribution box, AC socket, or lightning protection box.

### Requirements for the Minimum Cable Bending Radius

- The bend radius of a fixed power cord, Ethernet cable, or flat cable should be over five times greater than their respective external diameters. The bend radius of these cables that are often bent or plugged should be over seven times greater than their respective external diameters.
- The bend radius of a fixed common coaxial cable should be over seven times greater than its external diameter. The bend radius of these cables that are often bent or plugged should be over 10 times greater than their respective external diameters.
- The minimum bend radius of a high-speed cable, such as an SFP+ cable, should be over five times greater than its external diameter. The bend radius of these cables that are often bent or plugged should be over 10 times greater than their respective external diameters.

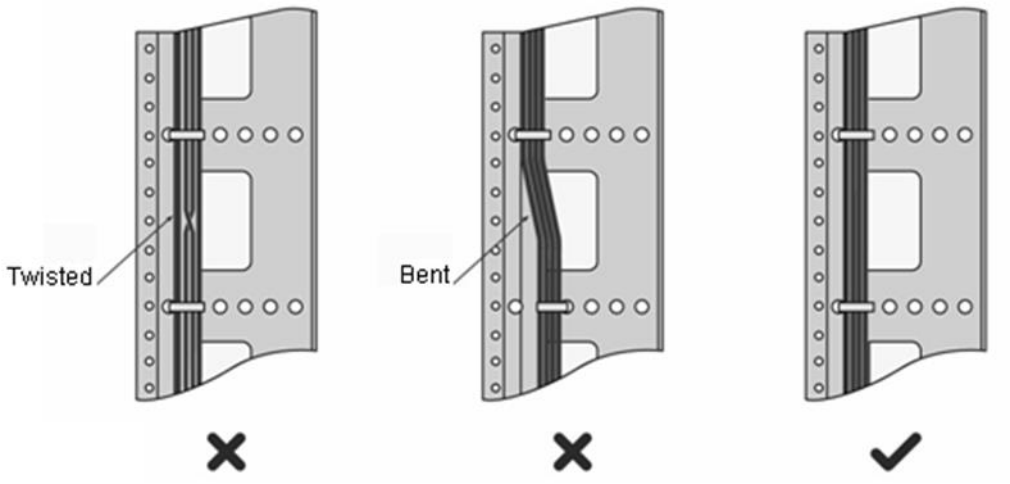
### Requirement for the Minimum Bend Radius of Optical Cables

- The diameter of the optical cable tray should be over 25 times greater than that of the optical cable.
- When an optical cable is moved, the bend radius of the optical cable should be over 20 times greater than the diameter of the optical cable.
- During cabling of an optical cable, its bend radius should be over 10 times greater than its diameter.

## Precautions for Cable Binding

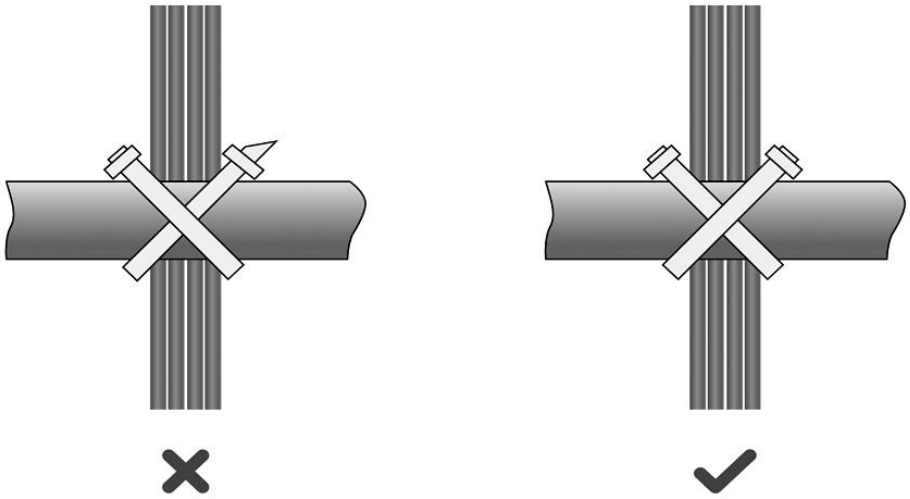
- Before cables are bundled, mark labels and stick the labels to cables wherever appropriate.
- Cables should be neatly and properly bundled in the rack without twisting or bending, as shown in Figure 6-4.

**Figure 6-4 Bundling Cables (1)**



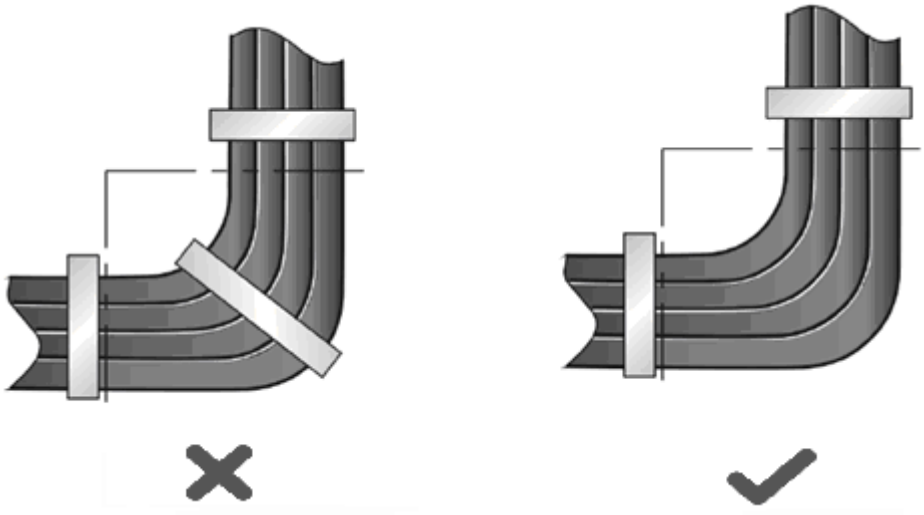

- Cables of different types (such as power cords, signal cables, and grounding wires) should be separated into cabling and bundling. Mixed bundling is disallowed. When they are close to each other, you are advised to adopt crossover cabling. In the case of parallel cabling, maintain a minimum distance of 30 mm (1.18 in.) between power cords and signal cables.
- The cable management brackets and cabling troughs inside and outside the rack should be smooth without sharp corners.
- The metal holes traversed by cables should have a smooth and fully rounded surface or an insulated lining.
- Use cable ties to bundle up cables properly. Please do not connect two or more cable ties to bundle up cables.
- After bundling up cables with cable ties, cut off the remaining part. The cut should be smooth and trim without sharp corners, as shown in Figure 6-5.

**Figure 6-5 Bundling Cables (2)**



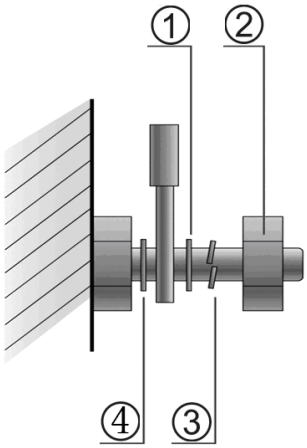
- When cables need to be bent, bundle them first but do not tie cables within the bend. Otherwise, stress may be generated on the cables and cause the wires inside to break, as shown in Figure 6-6.

**Figure 6-6 Bundling Cables (3)**



- Cables not to be assembled or the remaining parts of cables should be folded and placed in a proper position of the rack or cable trough. The proper position refers to a position that does not affect the equipment running or damage the equipment or cables.
- Do not bind power cords to the guide rails of moving parts.
- The power cords connecting moving parts such as door grounding wires should be reserved with some excess after being assembled. This can avoid tension or stress on power cords. After the moving part is installed, the remaining cable part should not touch heat sources, sharp corners, or sharp edges. If heat sources must be touched, high-temperature cables should be used.
- When using screw threads to secure a cable lug, ensure that the bolt or screw is properly tightened and take measures to prevent it from loosening, as shown in Figure 6-7.

**Figure 6-7 Cable Fastening**




1. Flat washer
2. Nut
3. Spring washer
4. Flat washer

- Hard power cords should be fastened in the terminal connection area to prevent stress on the terminal connection and cable.
- Do not use tapping screws to secure cable lugs.
- Power cords of the same type and in the same cabling direction should be bundled up into cable bunches, with cables in cable bunches clean and straight.
- Bundle up cables by using cable tie according to Table 6-9.

**Table 6-9 Cable Bunch**

| Cable Bunch Diameter | Binding Space |
|---|---|
| 10 mm (0.39 in.) | 80–150 mm (3.15–5.91 in.) |
| 10–30 mm (0.39–1.18 in.) | 150–200 (5.91–7.87 in.) |
| 30 mm (1.18 in.) | 200–300 (7.87–11.81 in.) |

- Do not tie cables or bundles in a knot.
- For wiring terminal blocks (such as circuit breakers) with cord end terminals, the metal part of the cord end terminal should not be exposed outside the terminal block during assembly.

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# 1 Change Description

This chapter describes the major changes in software and hardware of different versions and related documentation. For details about hardware changes, see the release notes published with software versions.

## 1.1 ReyeeOS 2.342

### 1.1.1 Hardware Change

The following table lists the applicable hardware models of this version.

| Model | Hardware Version |
| --- | --- |
| RG-EG710XS | 1.xx |
| RG-EG406XS | 1.xx |
| RG-EG406XS-P | 1.xx |

### 1.1.2 Software Feature Changes

Compared with ReyeeOS 2.340, this version has no software feature changes.

# 2 Login

## 2.1 Configuration Environment Requirements

### 2.1.1 PC

- Browser: Google Chrome, Internet Explorer 9.0, 10.0, and 11.0, and some Chromium/Internet Explorer kernel-based browsers (such as 360 Extreme Explorer) are supported. Exceptions such as garble or format error may occur if an unsupported browser is used.
- Resolution: 1024 x 768 or a higher resolution is recommended. If other resolutions are used, the page fonts and formats may not be aligned, the GUI is less artistic, or other exceptions may occur.

## 2.2 Default Configuration

**Table 2-1 Default Web Configuration**

| Item | Default |
|---|---|
| IP address | 192.168.110.1 |
| Password | The default password is "admin". |

## 2.3 Login to Web Interface

### 2.3.1 Connecting to the Router

You can open the management page and complete Internet access configuration only after connecting a client to the router in either of the following ways:

- Wired Connection

Connect a local area network (LAN) port of the router to the network port of the PC, and set the IP address of the PC. For details, see Section 2.3.2 Configuring the IP Address of the Management Client.

- Wireless Connection

Connect the LAN port to the uplink port on the AP and power on the AP. On a mobile phone or laptop, search for wireless network **@Ruijie-m***XXXX* (XXXX is the last four digits of the MAC address of each device). In this mode, you do not need to set the IP address of the management client, and you can skip the operation in Section 2.3.2 Configuring the IP Address of the Management Client.

### 2.3.2 Configuring the IP Address of the Management Client

Configure an IP address for the management client in the same network segment as the default IP address of the device (The default device IP address is 192.168.110.1, and the subnet mask is 255.255.255.0.) so that the management client can access the device. For example, set the IP address of the management client to 192.168.110.200.

### 2.3.3 Login

Enter the IP address (192.168.110.1 by default) of the router in the address bar of the browser to open the login page.

**Note**

If the static IP address of the device is changed, or the device obtains a new dynamic IP address, the new IP address can be used to access the web management system of the device as long as the management client and the device are in the same network segment of a LAN.

(1) On the web page, enter the password and click **Log In** to enter the web management system.




You can use the default password **admin** to log in to the device for the first time.

For security purposes, you are advised to change the default password as soon as possible after logging in, and to regularly update your password thereafter.

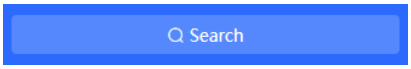
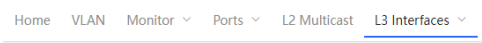
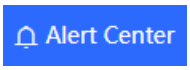
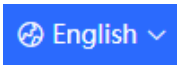
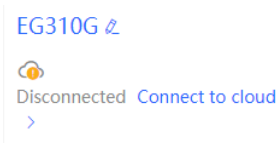
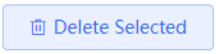
If you forget the IP address or password, hold down the **Reset** button on the device panel for more than 5 seconds when the device is connected to the power supply to restore factory settings. After restoration, you can use the default IP address and password to log in.

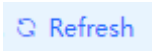
**Caution**

Restoring factory settings will delete the existing configuration and you are required to configure the device again at your next login. Therefore, exercise caution when performing this operation.

### 2.3.4 Frequently-Used Controls on the Web Page

**Table 2-2 Frequently-Used Controls on the Web Page**

| Control | Description |
| --- | --- |
|  | **Monitor**: Click it to view the topology of the self-organizing network and monitor device traffic trend, client traffic usage, device port status, and so on.<br>**Config**: Click it to configure all functions available on the local device. |
|  | Click it to search or select features for quick configuration. |
|  | The navigation bar is arranged horizontally on the top when the device acts as the slave device, and vertically on the left when the device acts as the master device. |
|  | Click it to access the alert list. |
|  | Click it to change the language. |
|  | Click it to log out of the web management system. |
|  | Click it to connect the device to the cloud by scanning the QR code for remote management. |
|  | Click **Add** or **Batch Add** to add one or more table entries in the dialog box that appears. After adding the table entries, you can view the added table entries on this page. |
|  | Click it to delete the selected table entries in batches. |
|  | Quickly locate the table entry you want to find through the drop-down list or by entering a keyword. |
|  | Click them to edit, delete, or bind a table entry. |
|  | If the toggle switch is displayed in gray and the button is on the left, the related function is disabled. If the toggle switch is displayed in blue and the button is on the right, the related function is enabled. |

| Control | Description |
| --- | --- |
|  | Update data on the current page. |
|  | Set the number of table entries displayed on a page. Click a page number or specify the page number to access the corresponding page. |

## 2.4 Work Mode

The device can work in router mode and AC mode. The system menu pages and configuration function scope vary depending on the work mode. By default, the EG router works in router mode. To modify the work mode, see Section 4.1 Switching the Work Mode.

### 2.4.1 Router Mode

The device supports routing functions such as route-based forwarding and network address translation (NAT), VPN, and behavior management. It can allocate addresses to downlink devices, forward network data based on routes, and perform NAT operations.

In the router mode, the device can access the network through Point-to-Point Protocol over Ethernet (PPPoE) dialing, dynamic IP address, and static IP address. It can also directly connect to a fiber-to-the-home (FTTH) network cable or an uplink device to provide network access and manage downlink devices.

### 2.4.2 AC Mode

The device supports Layer 2 forwarding only. The device does not provide the routing and Dynamic Host Configuration Protocol (DHCP) server functions. By default, the WAN interface obtains IP addresses through DHCP. The AC mode is applicable to the scenario where the network is working normally. In AC mode, the device serves as the management controller to access the network in bypass mode and manage the AP.

## 2.5 Configuration Wizard (Router Mode)

### 2.5.1 Getting Started

(1) Power on the device. Connect the WAN interface of the device to an uplink device using an Ethernet cable, or connect the device to the optical modem directly.

(2) Configure the Internet connection type according to requirements of the local Internet Service Provider (ISP). Otherwise, the Internet access may fail due to improper configuration. You are advised to contact your local ISP to confirm the Internet connection type:

- Figure out whether the Internet connection type is PPPoE, DHCP mode, or static IP address mode.
- In the PPPoE mode, a username, a password, and possibly a service name are needed.
- In the static IP address mode, an IP address, a subnet mask, a gateway, and a DNS server need to be configured.

## 2.5.2 Configuration Steps

### 1. Adding a Device to Network

You can manage and configure all devices in the network in batches by default. Please verify the device count and network status before configuration.

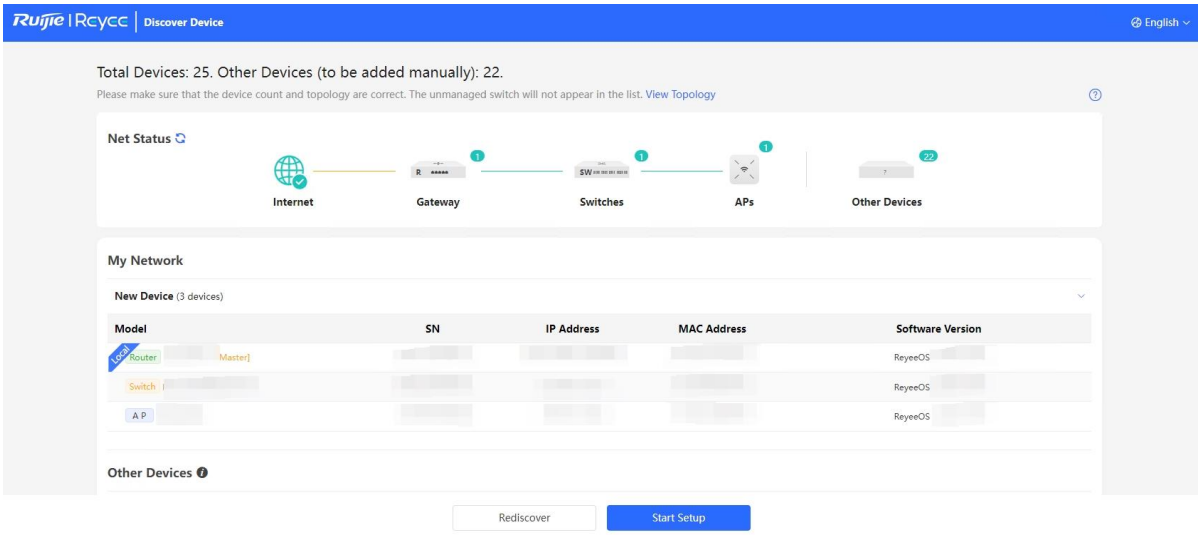
**Note**

New devices will join in a network automatically after being powered on. You only need to verify the device count.

If a new device is detected not in the network, click **Add to My Network** and enter its management password to add the device manually.

**Note**

If there is a firewall device in the network, the **Firewall Port Config** page appears. Select the corresponding port for configuration.




### 2. Creating a Network Project

(1) Click **Start Setup** to configure the Internet connection type and management password.

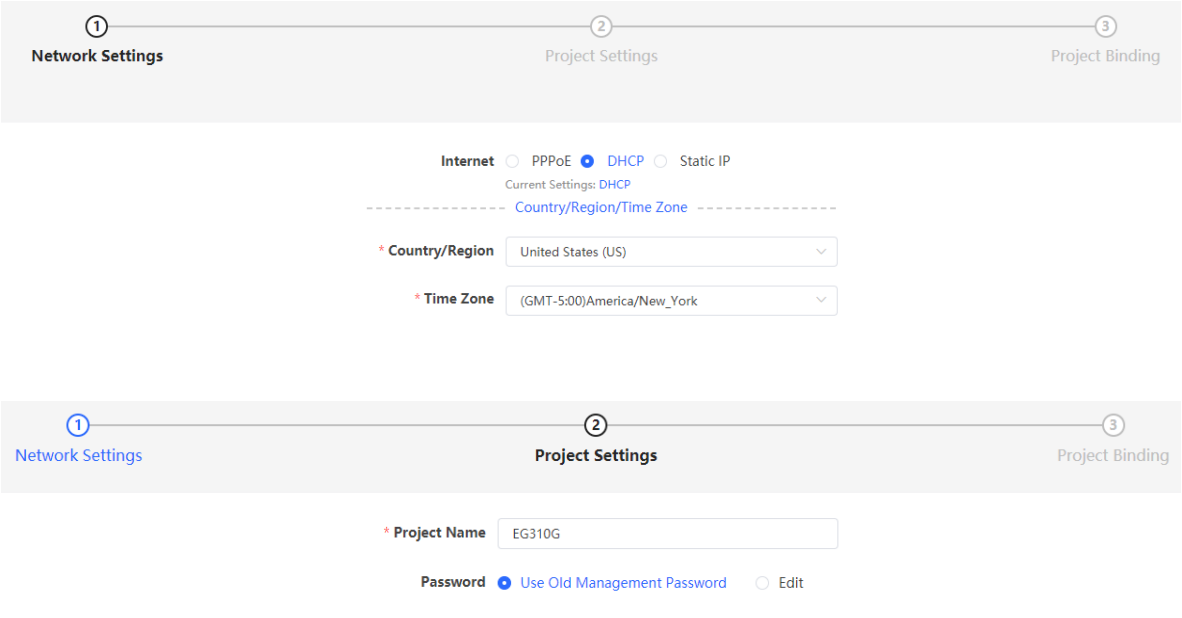
**Note**

Parameters displayed on the **Network Settings** page vary according to device types on the network. The following parameters are displayed when the network contains gateways, switches, and APs.

- **Internet**: Configure the Internet connection type according to the requirements of the local ISP.
  - **DHCP**: The router detects whether it can obtain an IP address via DHCP by default. If the router connects to the Internet successfully, you can click **Next** without entering an account.
  - **PPPoE**: Click **PPPoE**, and enter the username, password, and service name. Click **Next**.

- **Static IP**: Enter the IP address, subnet mask, gateway, and DNS server, and click **Next**.

- **Country/Region**: You are advised to select the actual country or region.
- **Time Zone**: Set the system time. The network time server is enabled by default to provide the time service. You are advised to select the actual time zone.
- **Network Name**: Identify the network where the device is located.
- **Management Password**: The password is used for logging in to the management page.




(2) Click **Create Network & Connect**. The device will deliver the initialization and check the network connectivity.

The device can access the Internet now. Bind the device with a Ruijie Cloud account for remote management. Follow the instruction to log in to Ruijie Cloud for further configuration.

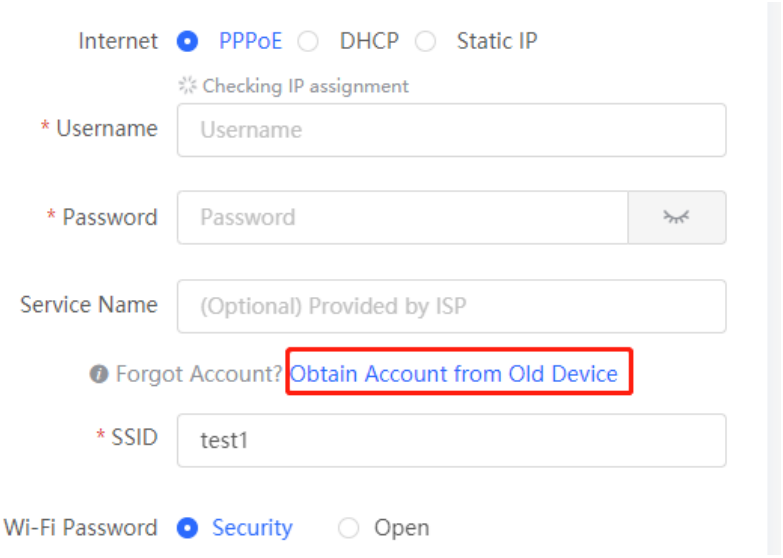
**Note**

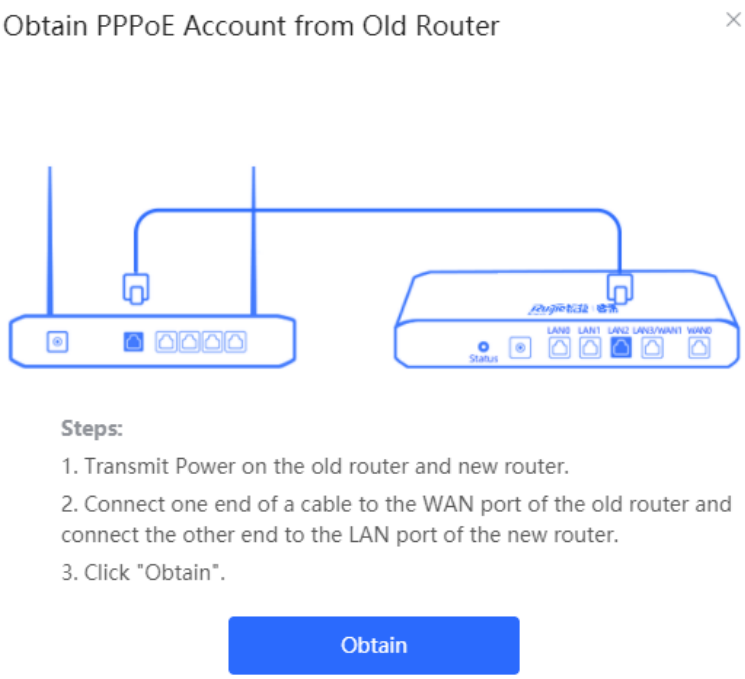
- If your device is not connected to the Internet, click **Service is unavailable.** in the displayed **Internet connection failed.** dialog box to exit the configuration wizard.
- Please log in again with the new password if you change the management password.

### 2.5.3 Forgetting the PPPoE Account

(1) Consult your local ISP.

(2) If you replace the old router with a new one, click **Obtain Account from Old Device**. Connect the old and new routers to a power supply and start them. Insert one end of an Ethernet cable into the WAN interface of the old router and connect the other end to a LAN port of the new router, and click **Obtain**. The new router automatically fetches the PPPoE account of the old router. Click **Save** to make the configuration take effect.



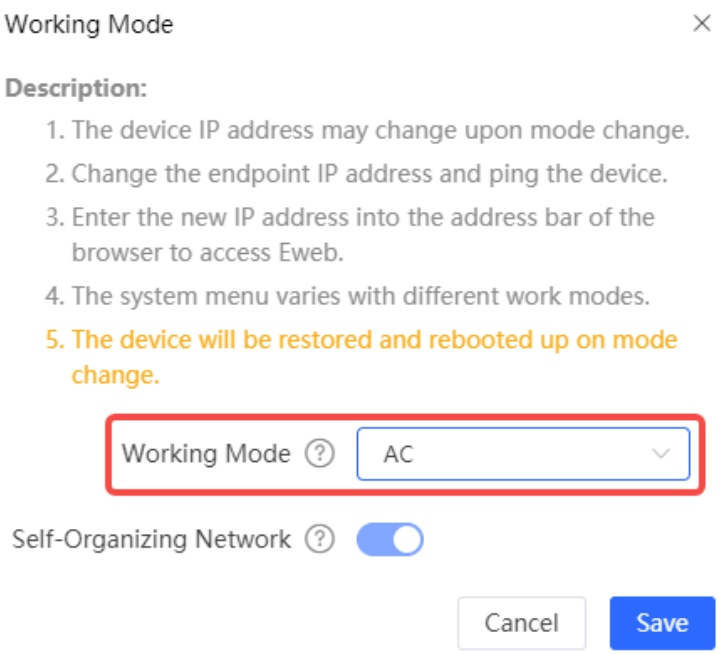

## 2.6 Configuration Wizard (AC Mode)

### 2.6.1 Getting Started

- Power on the device and connect the device to an uplink device.
- Make sure that the device can access the Internet.

### 2.6.2 Configuration Steps

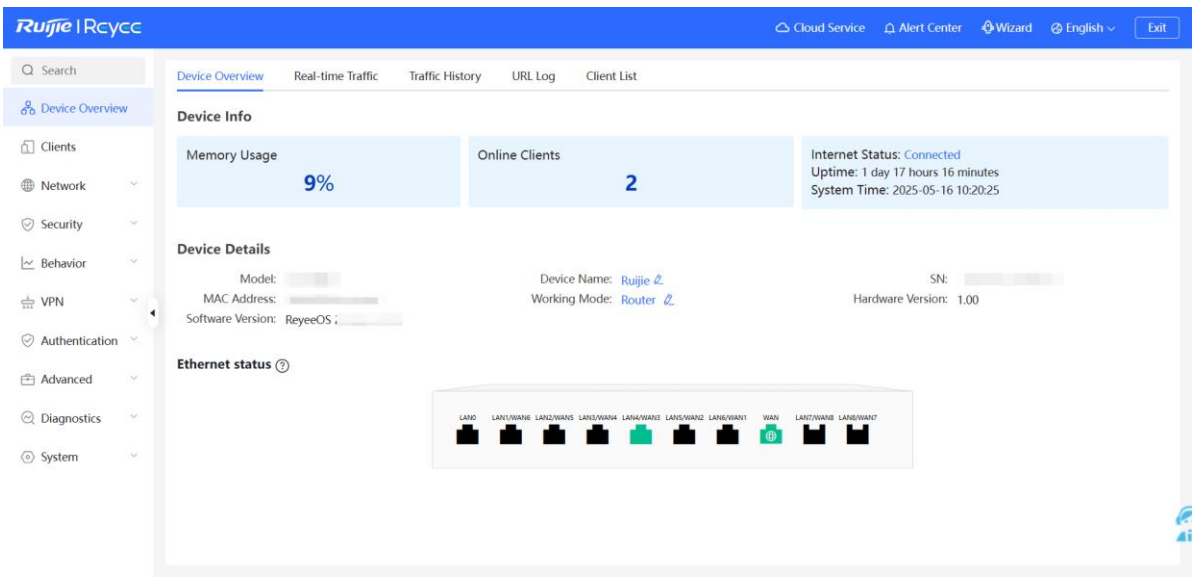
(1) On the work mode setting page, change the work mode from router mode to AC mode. For details, see Section 4.1 Switching the Work Mode.




(2) After mode switching, the device will restart. After restart, the WAN interface on the device obtains an IP address through DHCP and accesses the network by using a dynamic IP address. The default Internet connection type is DHCP mode. You can use the default value or manually configure a static IP address for the WAN interface. For details, see Section 2.5.2 Configuration Steps.

## 2.7 Switching the Work Mode

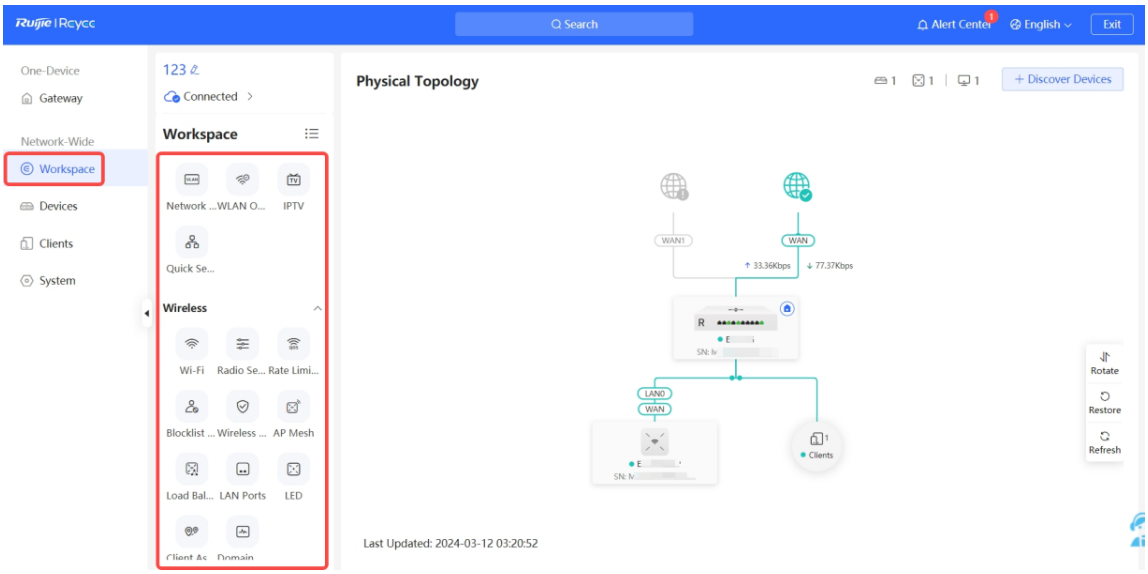
When the self-organizing network discovery function is disabled, which is enabled by default, the web interface will switch to the local device mode. For details, see Section 4.1 Switching the Work Mode.




When the self-organizing network discovery function is enabled, you can switch the web interface between network-wide mode and local device mode.

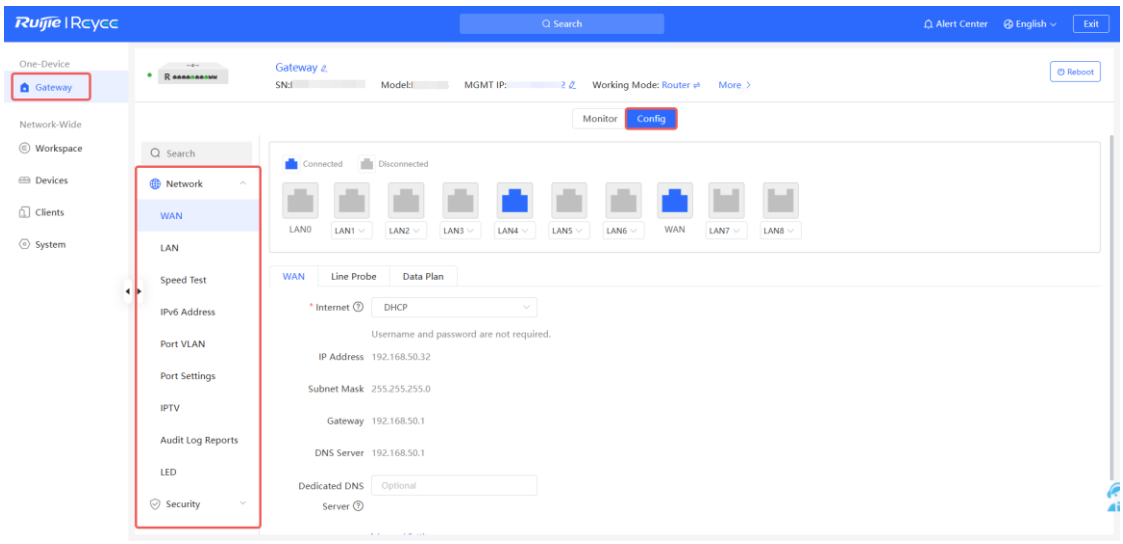
- Network-wide mode: You can view and configure all devices on the network from a network perspective.

  Click **Workspace** in the left navigation bar to access the corresponding functions for network-wide configuration in the secondary menu.

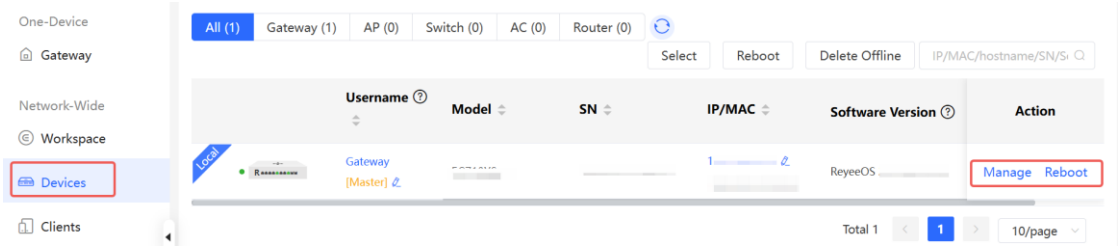



- Local device mode: You can configure only one device on the network. The configuration and management of an individual device can be accessed as follows:

  - Method 1: Choose **Gateway** > **Config** under the **One-Device** menu. On the displayed page, you can access the corresponding functions for single-device configuration in the secondary menu. This method only supports configuring gateway devices on the network.



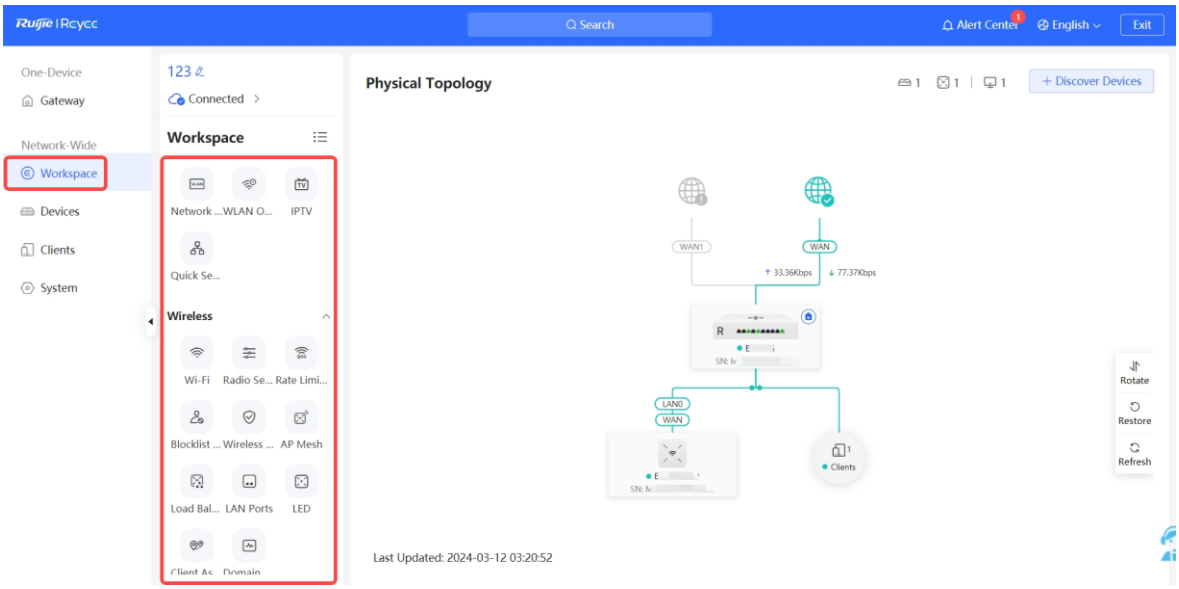

  - Method 2: Choose **Network-Wide** > **Devices**. In the device list, click the **Manage** button next to the target device. This method supports configuring any type of device on the network.


One-Device
Gateway
Network-Wide
Workspace
Devices
Clients
All (1)
Gateway (1)
AP (0)
Switch (0)
AC (0)
Router (0)
Select
Reboot
Delete Offline
IP/MAC/hostname/SN/S
Username
Model
SN
IP/MAC
Software Version
Action
Local
Gateway
[Master]
ReyeeOS
Manage
Reboot
Total 1
1
10/page

# 3 Network-Wide Monitoring

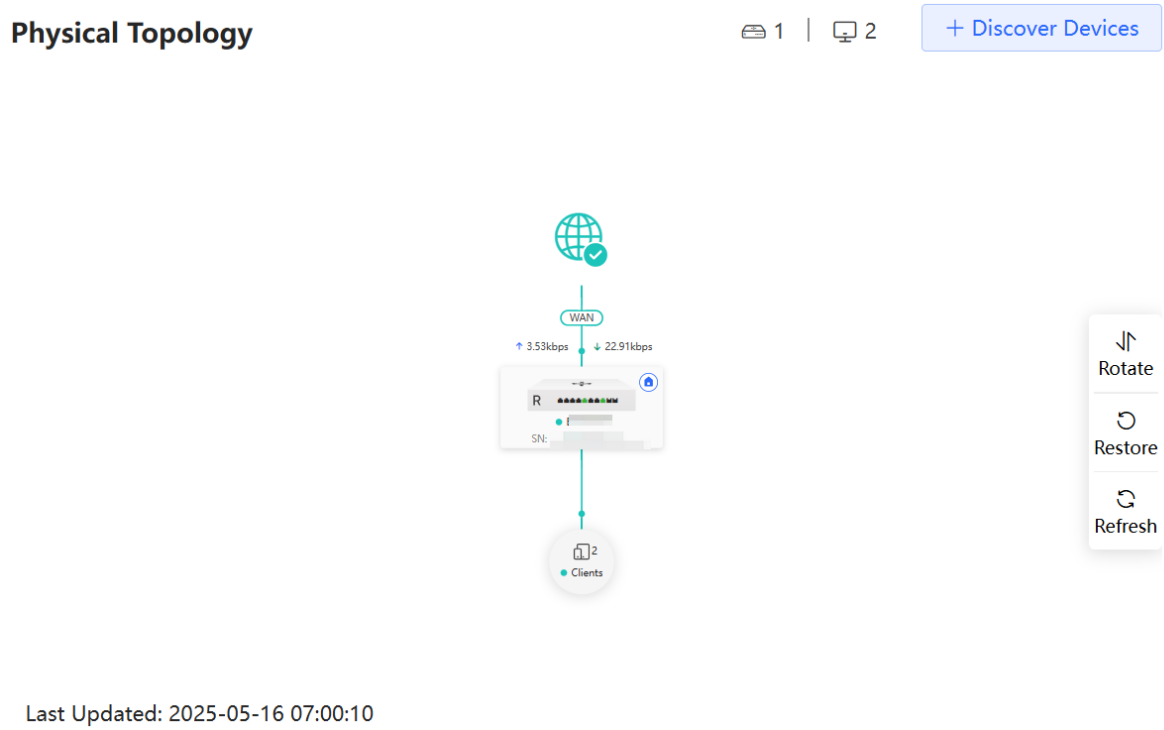
Choose **Network-Wide > Workspace > Physical Topology**.

The **Workspace** page displays the current network topology, uplink and downlink real-time traffic, network connection status. On the current page, you can monitor, configure, and manage the network status of the entire network.

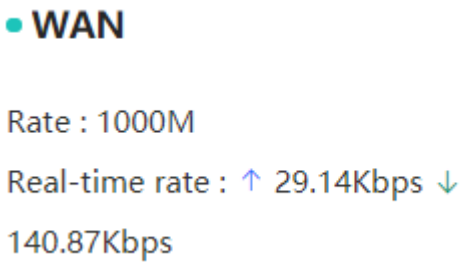



## 3.1 Viewing Networking Information

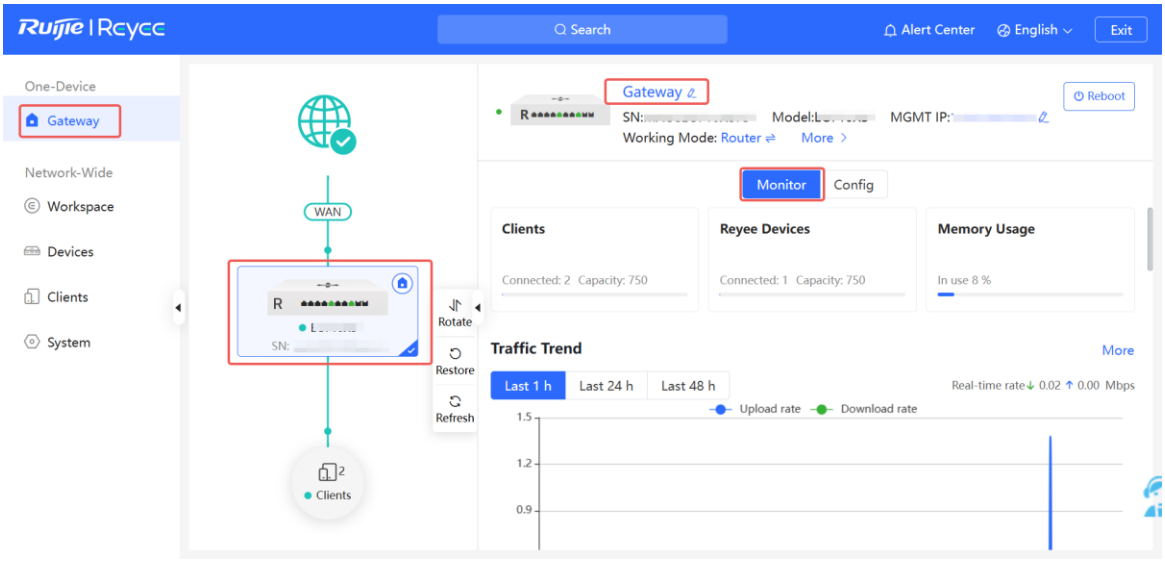
The networking topology contains information about online devices, connected port numbers, device SNs, and uplink and downlink real-time traffic.



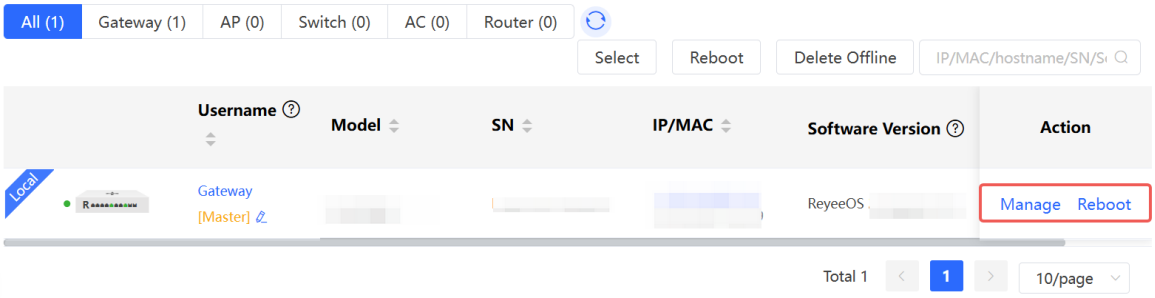

- Click the traffic data to view the bandwidth and real-time rates.



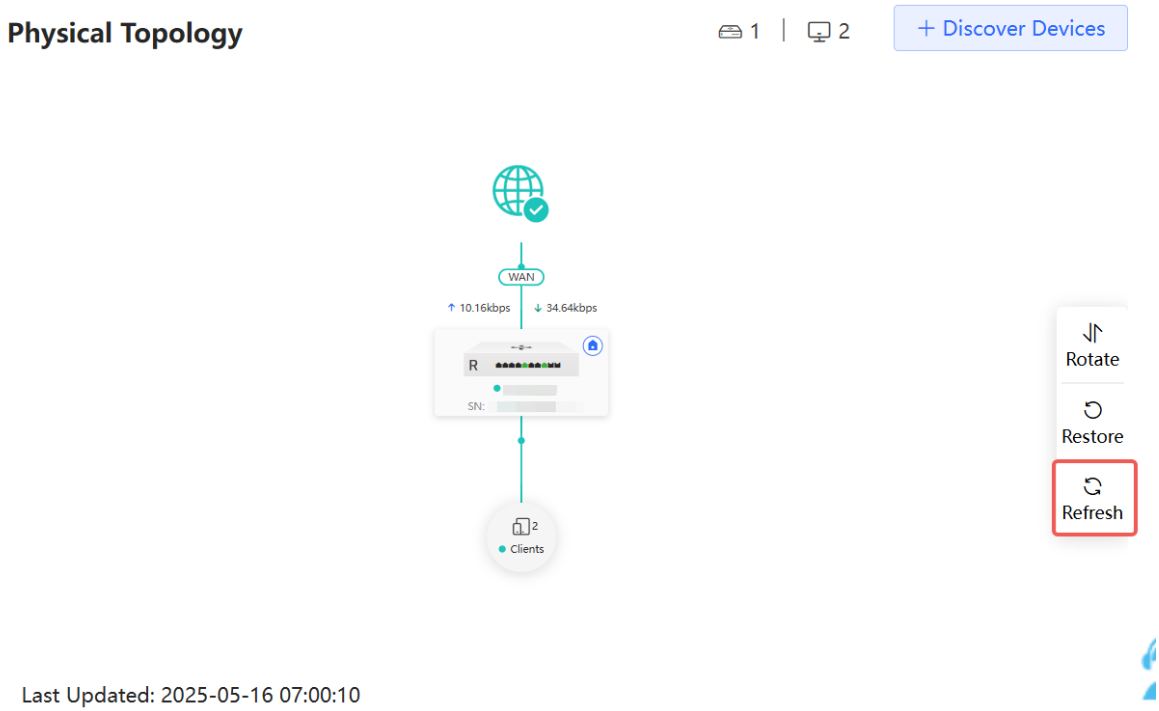

- Click a device in the topology to view the running status and configuration of the device and configure device functions. By default, the product model is used as the device name. Click to modify the device name so that the description can distinguish devices from one another.




- Choose **Network-Wide** > **Devices** to view the devices on the current network. Click **Manage** to monitor the device status and perform configuration. Click **Reboot** to reboot the device.



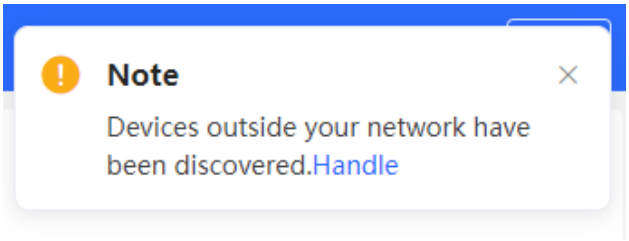

- The update time is displayed in the lower-left corner of the topology view. Click **Refresh** to update the topology to the latest state. It takes some time to update the topology data. Please wait patiently.



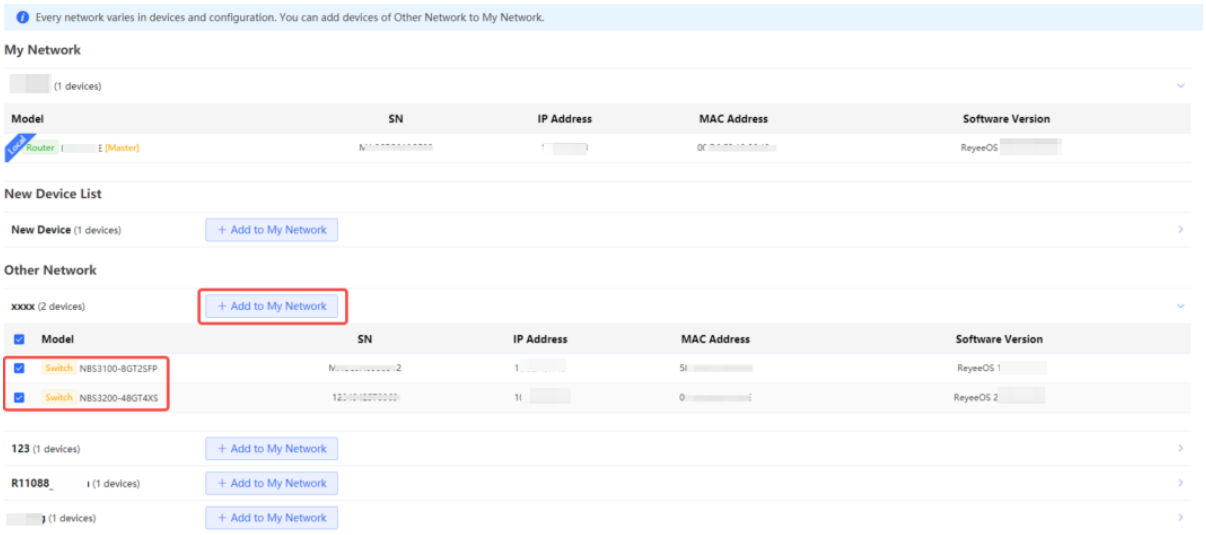

## 3.2 Adding Networking Devices

### 3.2.1 Wired Connection

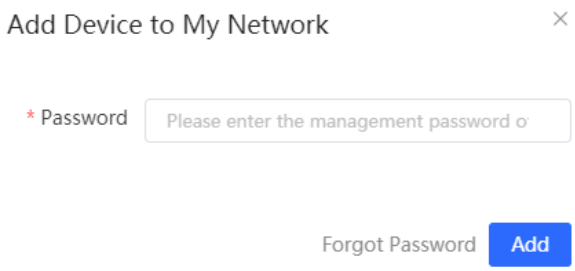
(1) When a new device is connected to the network via a wired connection, the system will display a prompt message indicating the presence of a new device and other unconnected devices. You can click **Handle** to add the new device and other unconnected devices to the network.




(2) After the system switches to the **Network List** page, click **Other Network**. In the **Other Network** section, select the device to be added to the network and click **Add to My Network**.




(3) You do not need to enter the password if the device is newly delivered from factory. If the device has a password, enter the management password of the device. Device addition fails if the password is incorrect.




### 3.2.2 AP Mesh

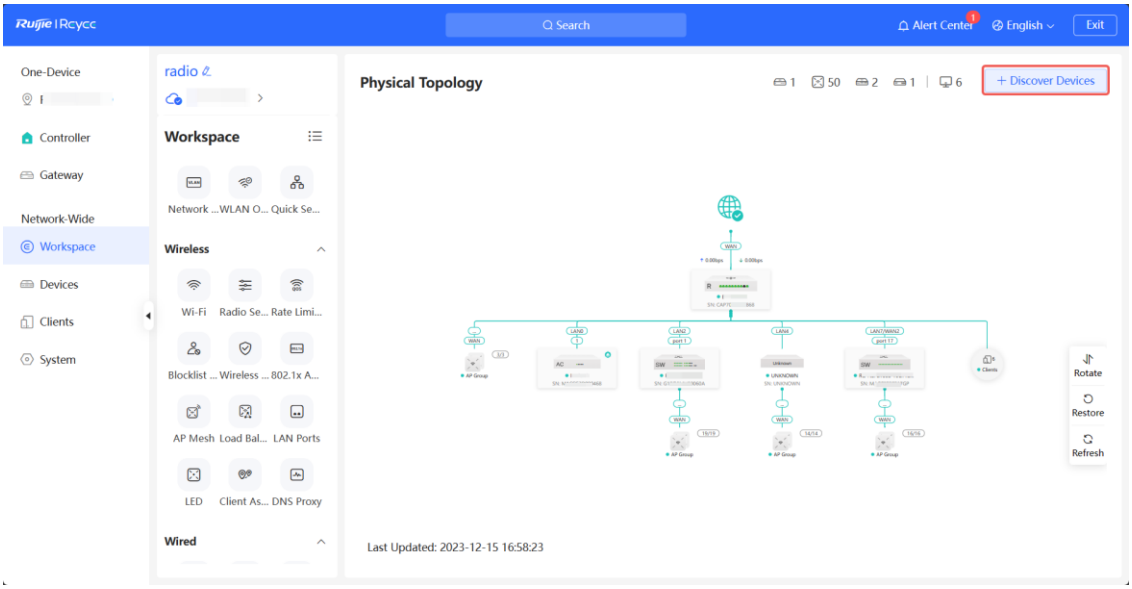
If the AP supports the AP Mesh (Reyee Mesh) function, you do not need to connect cables after powering on the AP. The AP can be added to the current network in Reyee Mesh mode, establish a mesh networking with other wireless devices, and automatically synchronize Wi-Fi configuration.

**Caution**

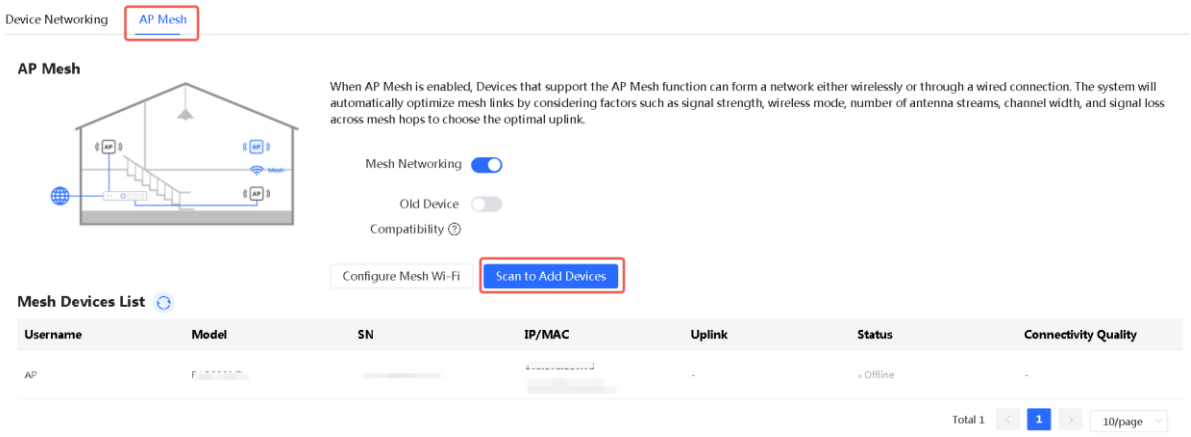
- To scan the AP, the Reyee Mesh function must be enabled on the current network. (For details, see Section 5.9 Reyee Mesh Settings.) The AP should be powered on nearby. It may fail to be scanned in case of long distance or obstacle blocking.
- You can scan to discover new APs on the AP Mesh page only when there are APs supporting the AP Mesh function on the network.

(1) Power on the new AP and place it near the AP or EGW router on the target network.

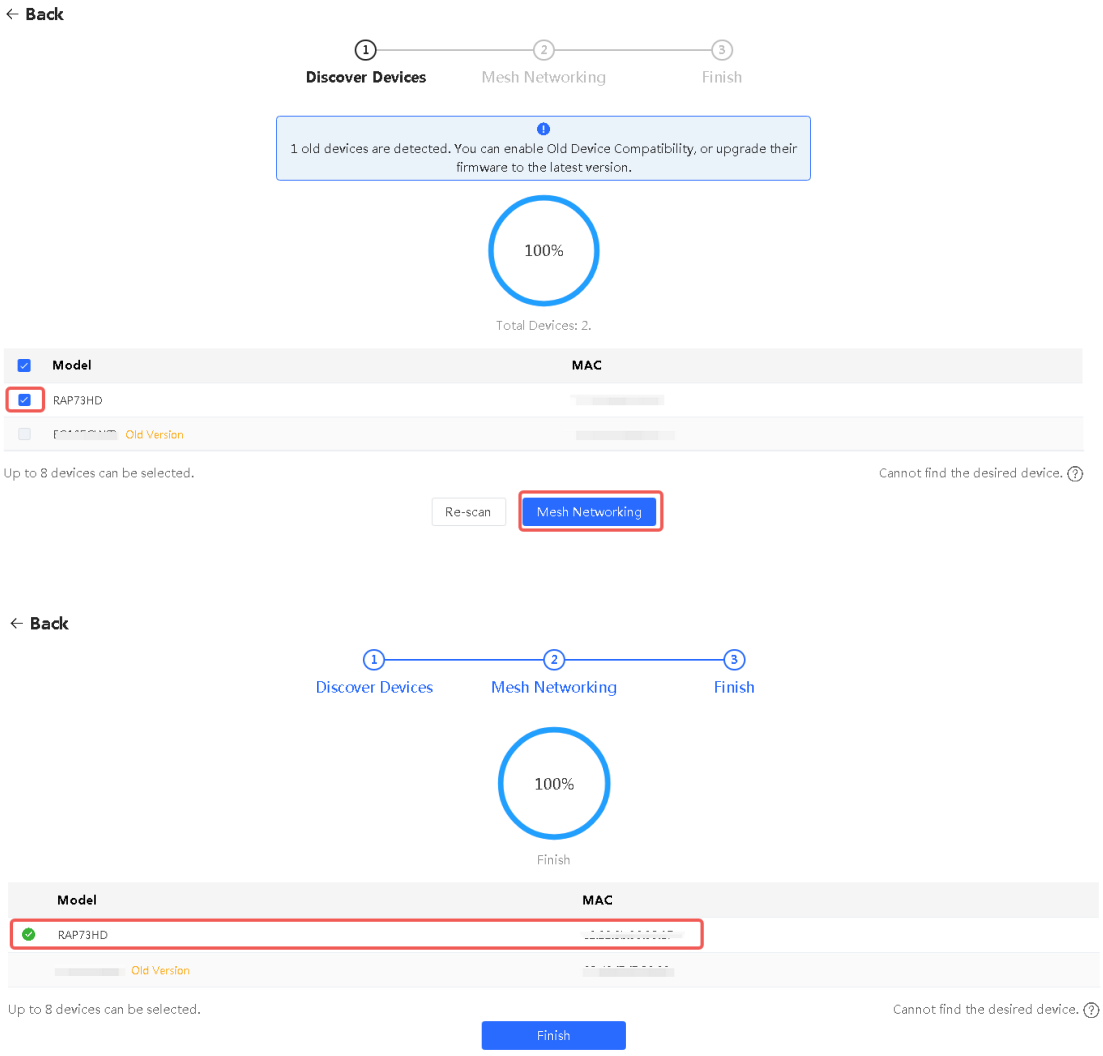
(2) Log in to the web interface of a device on the target network. In **Network-Wide** mode, click **+Discover Devices** in the upper right corner of the **Physical Topology** page to scan the APs in other networks not plugged in with Ethernet cables.




(3) On the **AP Mesh** page, click **Scan to Add Devices** to scan devices that are not connected to the network via an Ethernet cable.




(4) Select the APs to be added and click **Mesh Networking**. Up to eight APs can be selected at a time. Wait until network merging finishes.




(5) Check the topology on the **Physical Topology** page to make sure that the new AP has connected to the uplink device in wireless mode.

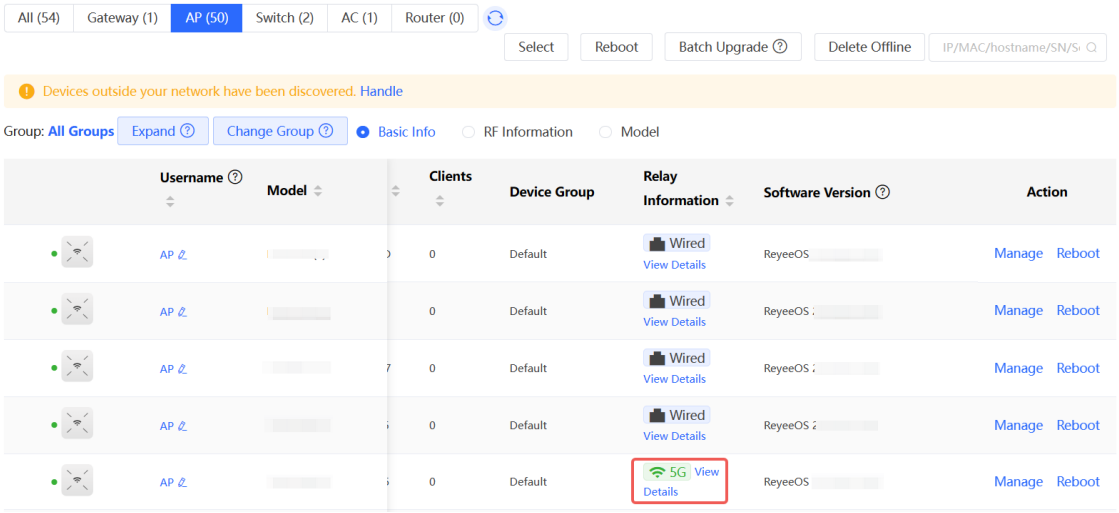


(6) Power off the new AP and install it as planned.

(7) Log in to the web interface of a device on the target network. In **Network-Wide** mode, choose **Devices** > **AP**.

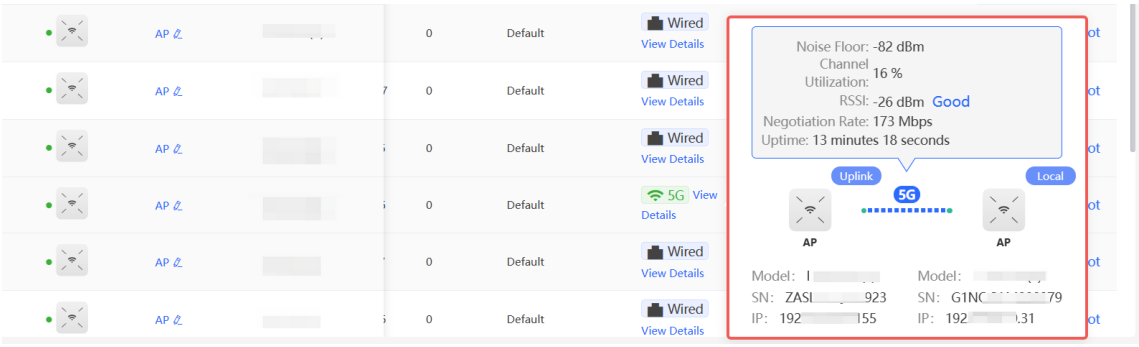
Make sure that the new AP is online and the corresponding entry contains icon 

in the **Relay Information** column. The icon indicates that wireless backhaul is performed through the 5 GHz radio.




(8) Click **View Details** following the 

icon to obtain information about the uplink device and RSSI.




(9) Select the target AP to add it to the current network. You do not need to enter the password if the device to add is new. If the device has a password, enter the management password of the device.

## 3.3 Configuring the Service Network

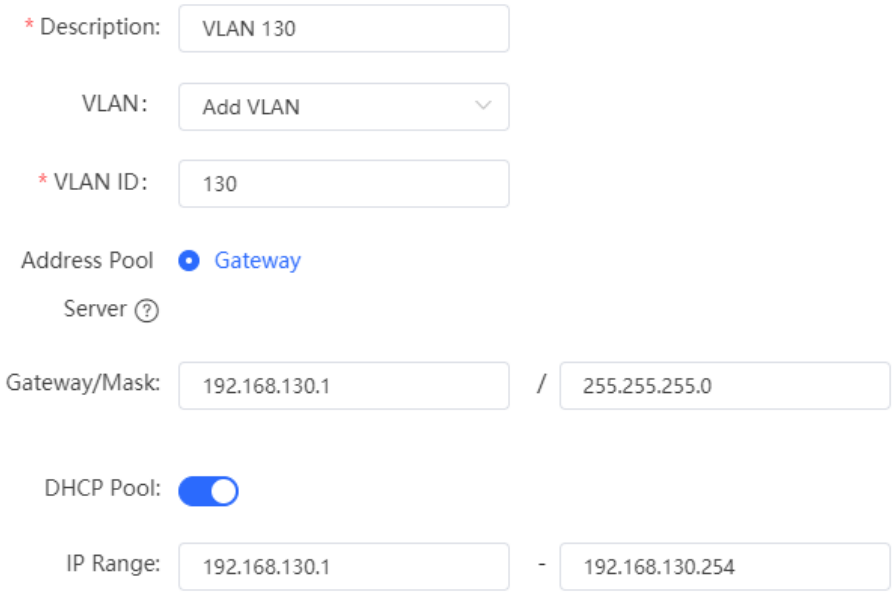
### 3.3.1 Configuring the Wired Network

Choose **Network-Wide > Workspace > Network Planning**

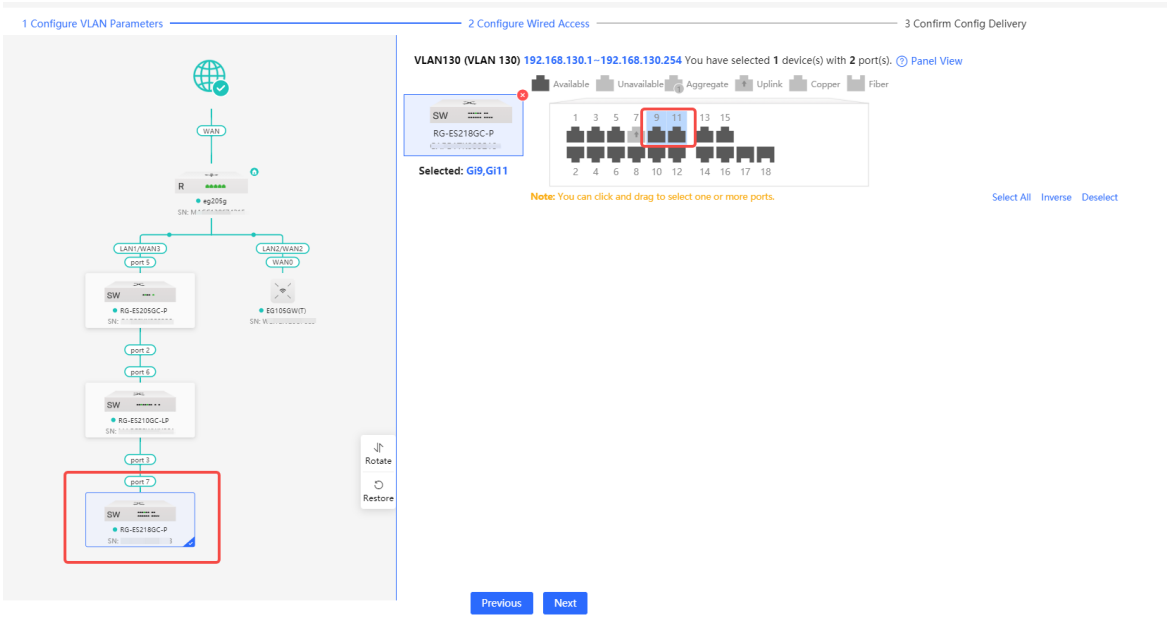
(1) Click **Add Wired VLAN** to add wired network configuration, or select an existing wired VLAN and click **Setup** to modify its configuration.



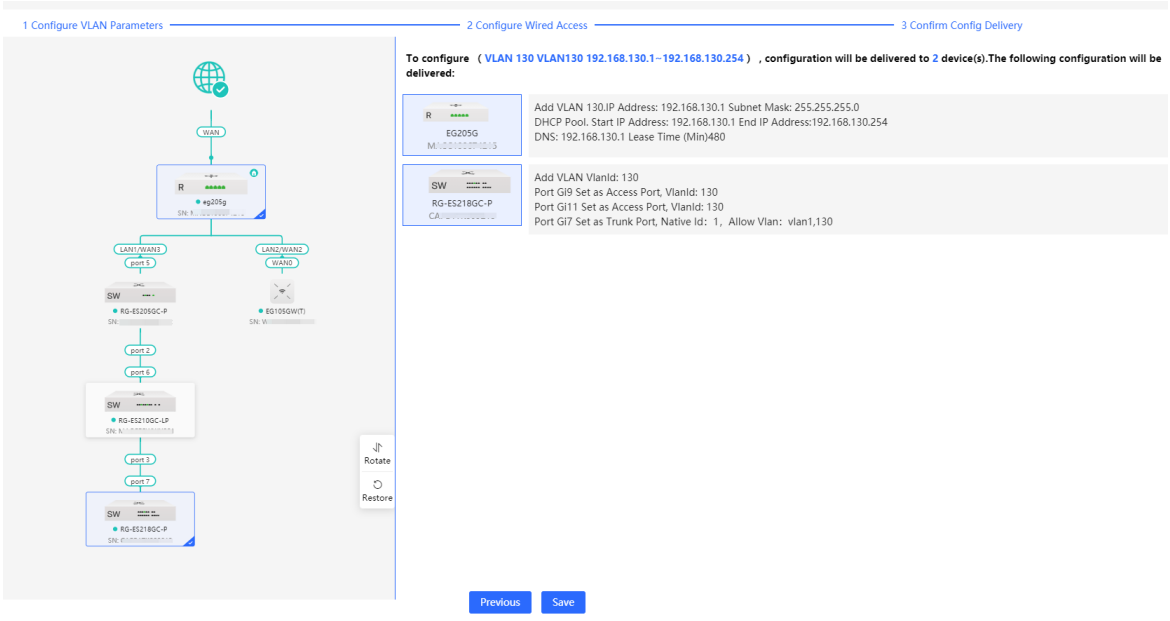

(2) Configure a VLAN for wired access, specify the address pool server for access clients in this VLAN, and determine whether to create a new DHCP address pool. By default, the gateway is used as the address pool server to allocate addresses to access clients. If an access switch is available in this networking, you can select this switch as the address pool server. After setting the service parameters, click **Next**.




(3) Select the switch to configure in the topology, select the switch ports added to this VLAN, and click **Next**.



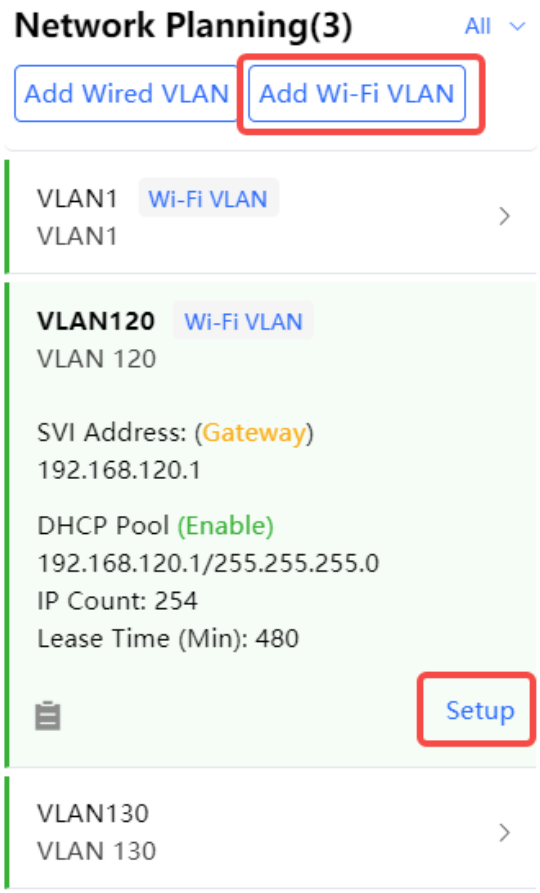

(4) Confirm that the configuration items to be delivered are correct and then click **Save**. Wait a moment for the configuration to take effect.



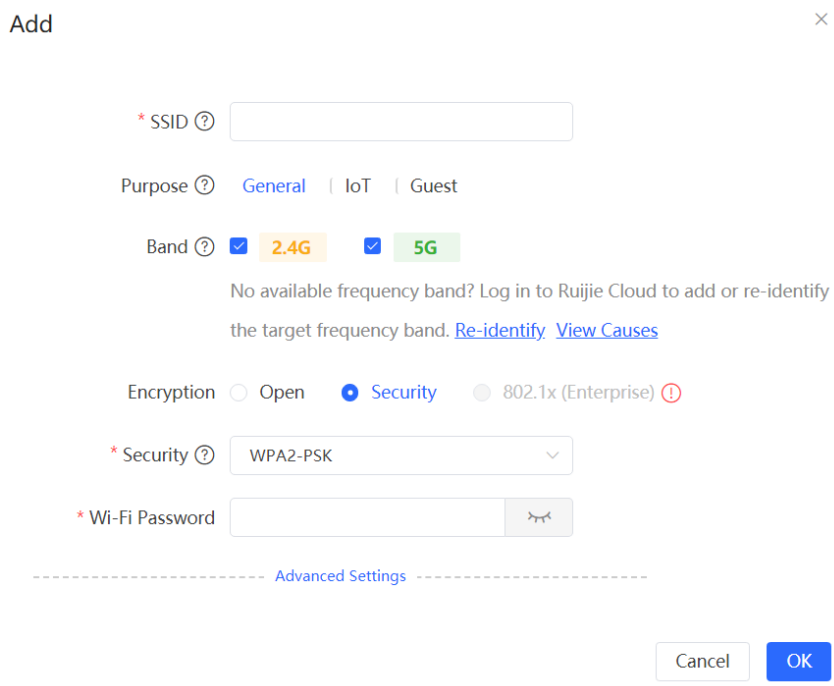

## 3.3.2 Configuring the Wireless Network

Choose **Network-Wide > Workspace > Network Planning**.

(1) Click **Add Wi-Fi VLAN** to add wireless network configuration, or select an existing Wi-Fi VLAN and click **Setup** to modify its configuration.



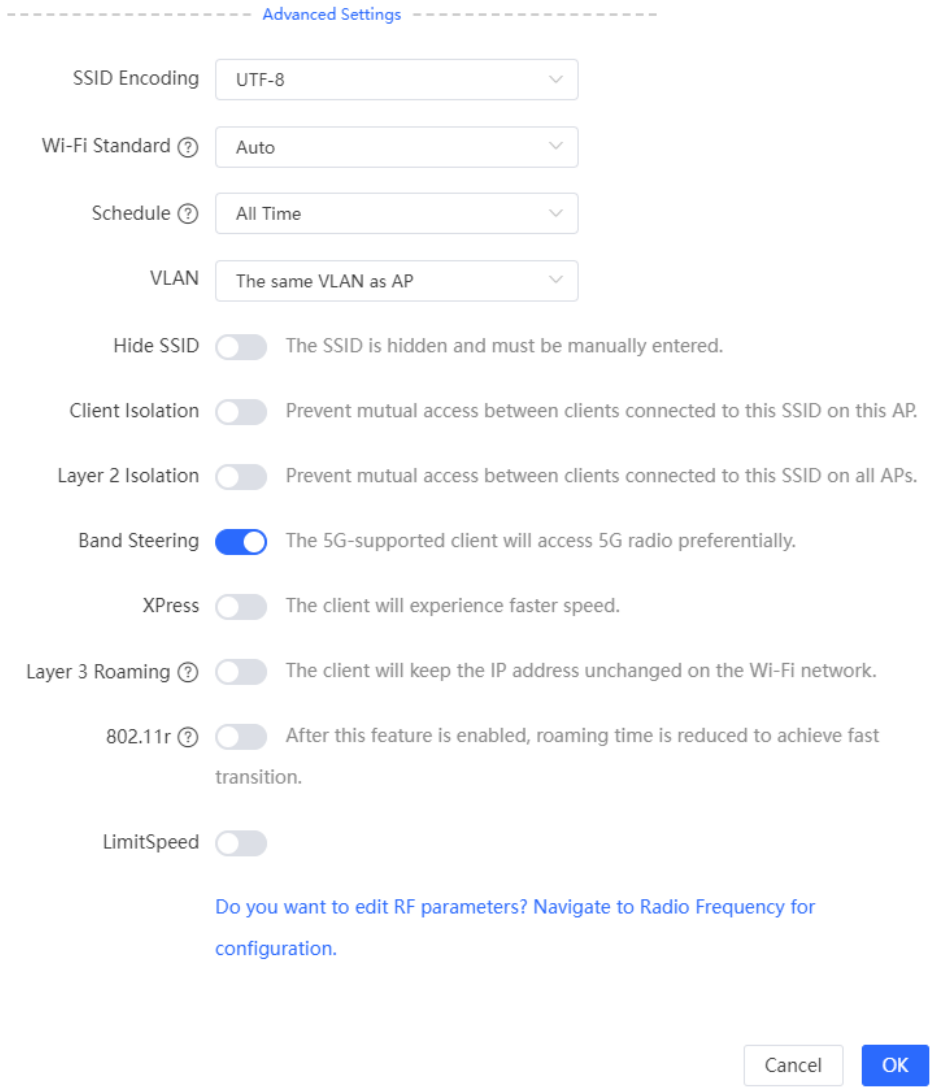

(2) Set the SSID, Wi-Fi password, and applicable bands. Click **Next**.



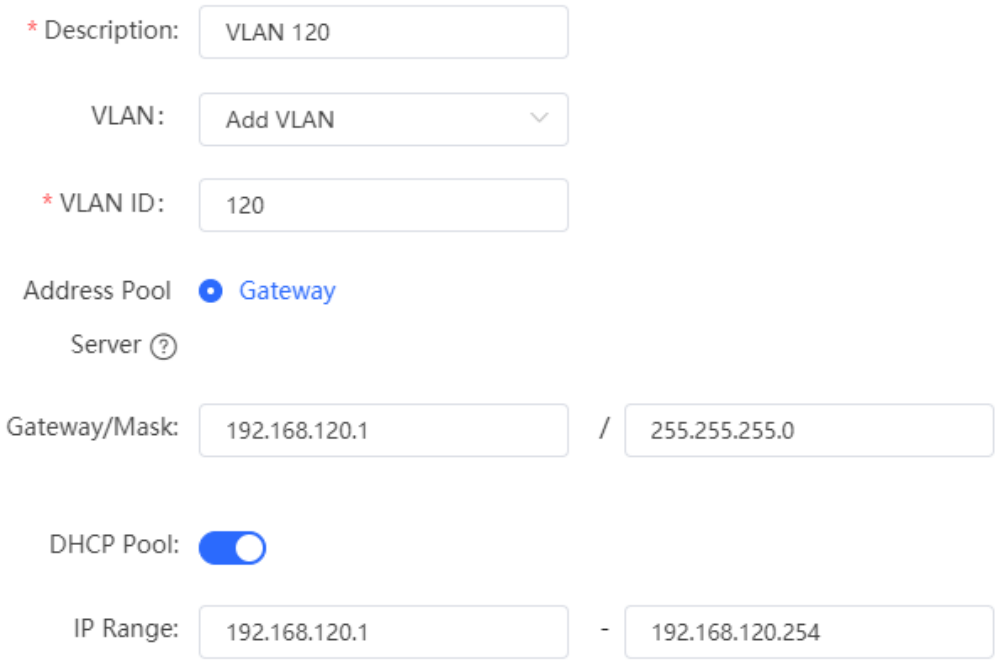

Applicable bands include 2.4 GHz, 5 GHz, and 2.4 GHz + 5 GHz.

Encryption modes include: **Open**, **Security**, and **802.1x (Enterprise)**. When the encryption mode is set to **Security**, you need to set the Wi-Fi password.

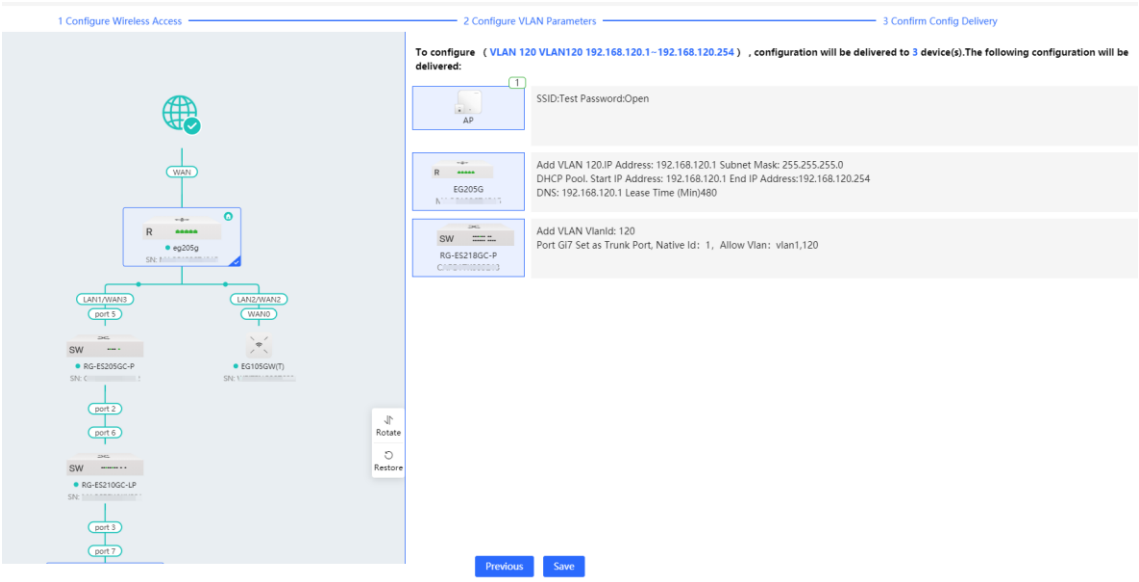
Click **Advanced Settings** to configure the advanced parameters, including Wi-Fi Standard, Wireless Schedule, Hide SSID, Client Isolation and so on.




(3) Configure a VLAN for wireless access, specify the address pool server for access clients in this VLAN, and determine whether to create a new DHCP address pool. By default, the gateway is used as the address pool server to allocate addresses to access clients. If an access switch is available in this networking, you can select this switch as the address pool server. After setting the service parameters, click **Next**.




(4) Confirm that the configuration items to be delivered are correct and then click **Save**. Wait a moment for the configuration to take effect.



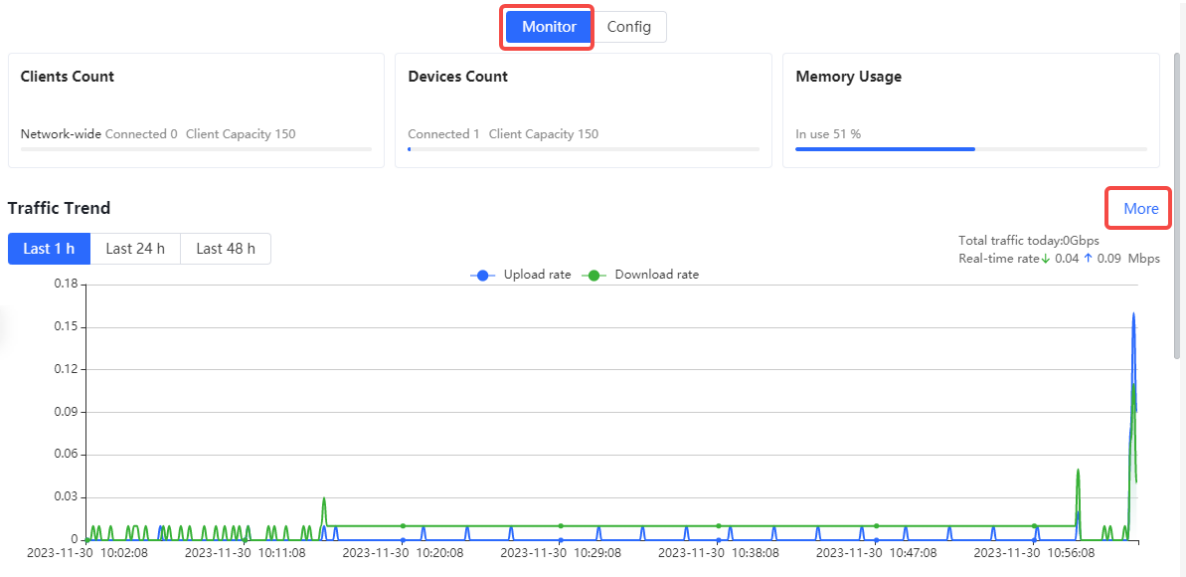

## 3.4 Supporting Traffic Monitoring

Traffic monitoring can be carried out based on ports, users, and applications. The real-time or historical uplink traffic, downlink traffic, and number of sessions can be displayed.

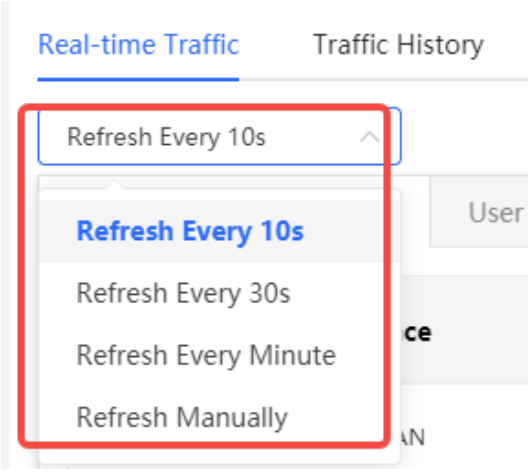
### 3.4.1 Viewing Real-Time Traffic

Choose **One-Device > Gateway > Monitor**.

Click **More** to the right of **Traffic Trend** to access the gateway's monitoring details page. On the page that is displayed, click the **Real-time Traffic** tab.

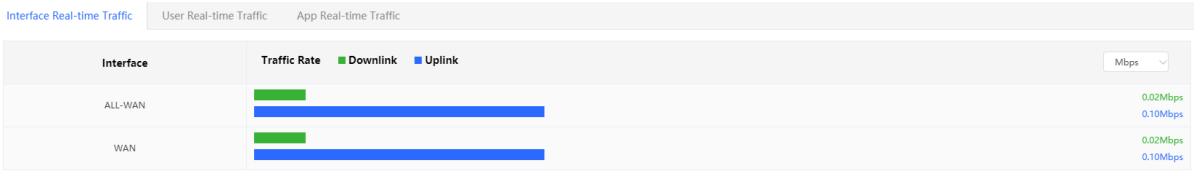



Select a refresh frequency to set the frequency of real-time traffic refresh.



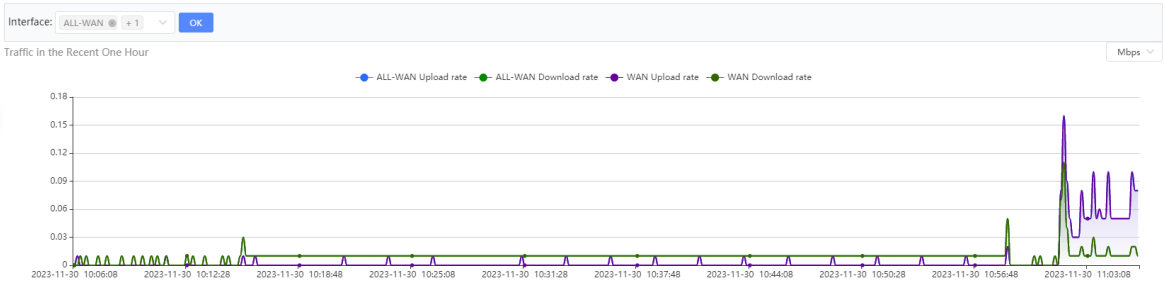

## 1. Viewing Real-time Traffic of an Interface

Click the **Interface Real-Time Traffic** tab to view the uplink or downlink traffic of an interface or the entire device.




- View traffic in the recent one hour

  Select an interface or **ALL-WAN** in the **Interface** drop-down menu. You can view the traffic and sessions of the interface or device in the last one hour, including the sessions of the excluded WAN interface.

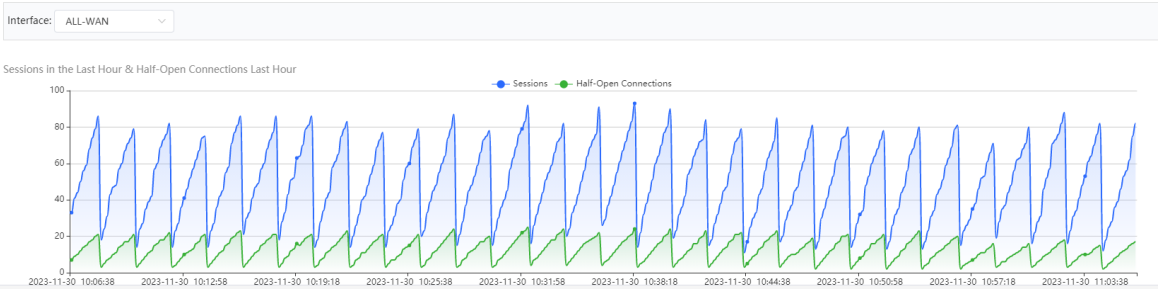



**Note**

Uplink traffic and downlink traffic are color-coded in the figure. You can move the cursor over a curve to view uplink traffic and downlink traffic at a certain time.

- View the number of sessions and half-open connections in the last one hour

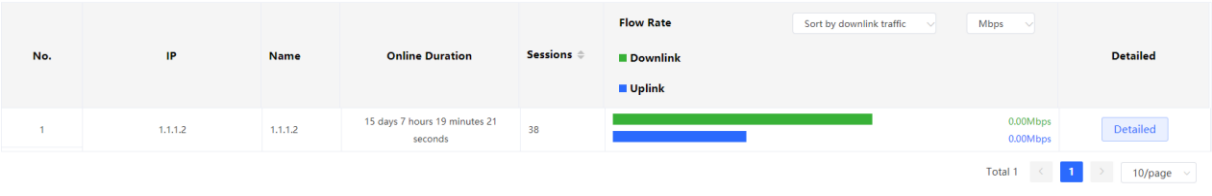
  Select an interface or **ALL-WAN** in the **Interface** drop-down menu to check the number of sessions and half-open connections in the last one hour (including the session information of the excluded WAN interface).




## 2. Viewing Real-time Traffic of a Client

Click the **User Real-Time Traffic** tab to view the IP address, name, online duration, number of sessions, and uplink and downlink traffic of each client.

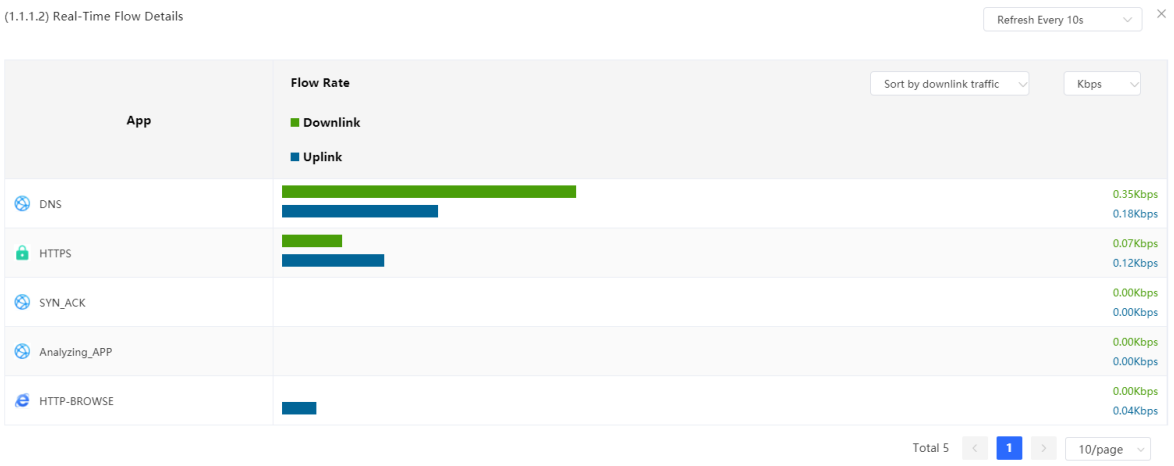
If there are multiple clients, the system displays traffic data by downlink traffic in descending order by default. The sorting mode can be switched based on uplink traffic or downlink traffic. You can set the traffic unit, number of items to be displayed on the current page, paging display, and other functions based on service requirements.




Click **Detailed**. The system displays the uplink and downlink traffic rates of various applications used by the current client. You can set the sorting mode (by downlink traffic or uplink traffic), unit, and other parameters based on service requirements.

**Note**

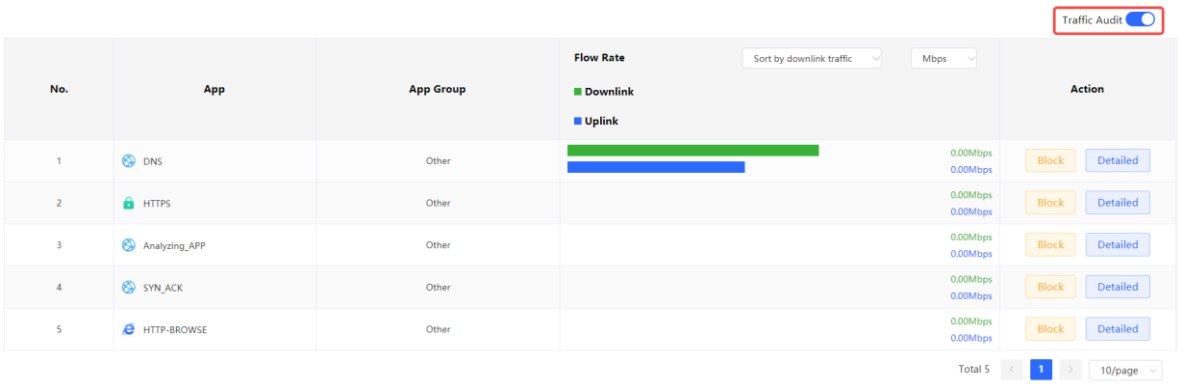
To view real-time traffic of a client, ensure that the **Traffic Audit** function is enabled on the **App Real-time Traffic** page.



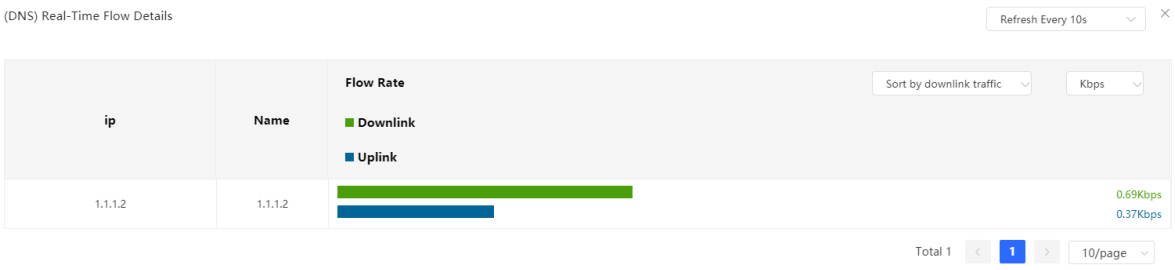

### 3. Viewing Real-time Traffic of an App

Click the **App Real-Time Traffic** tab and enable **Traffic Audit**. You can view the name, application group, uplink traffic, and downlink traffic of each app.

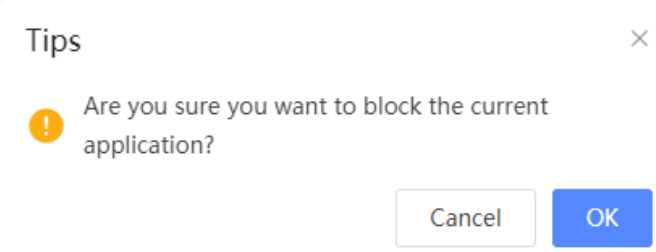
If there are multiple apps, the system displays traffic data by downlink traffic in descending order by default. The sorting mode can be switched based on uplink traffic or downlink traffic. You can set the traffic unit, number of items to be displayed on the current page, paging display, and other functions based on service requirements.




Click **Detailed**. The details of the traffic used by each user of the current application are displayed in the pop-up dialog box. You can set the sorting mode (by downlink traffic or uplink traffic), unit, and other parameters based on service requirements.




Click **Block**. In the displayed message, click **OK** to block the corresponding application.



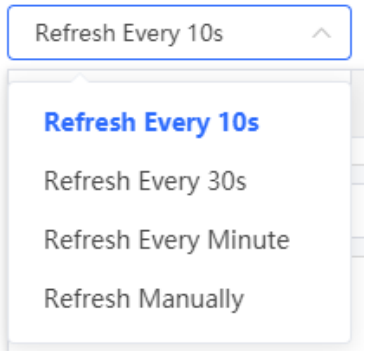

## 3.4.2 Viewing Historical Traffic

Choose **One-Device > Gateway > Monitor**.

Click **More** to the right of the **Traffic Trend** tab. On the gateway monitoring details page, click the **Traffic History** tab.




Select a refresh frequency to set the frequency of historical traffic refresh.



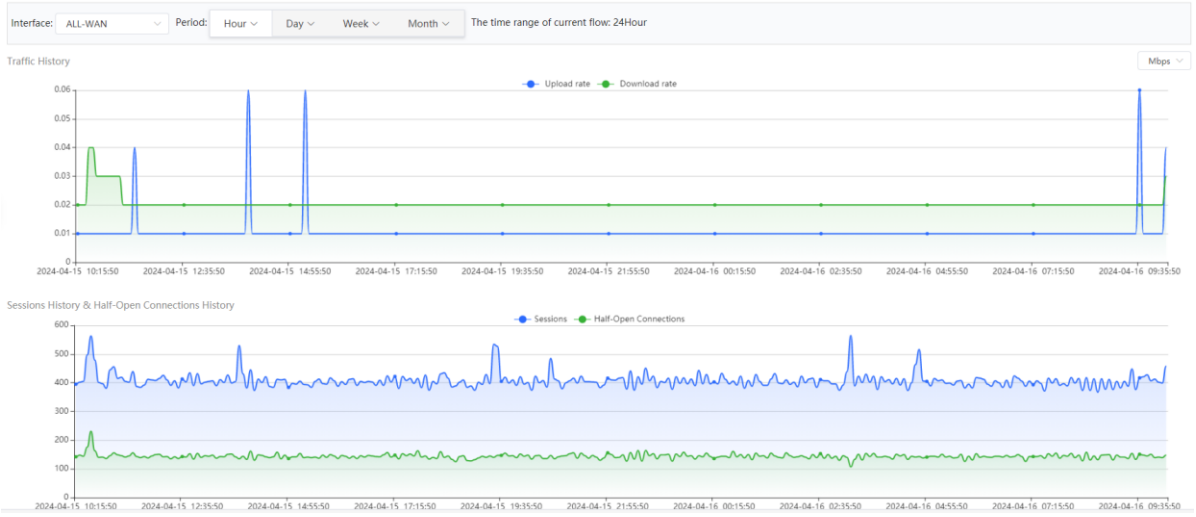

### 1. Viewing Historical Traffic of an Interface

(1) Click the **Traffic History** tab.

(2) Select an interface or ALL-WAN in the Interface drop-down menu.

(3) Select a time range.

(4) The system displays historical traffic, session, and half-open connection statistics of an interface or the device within a specified period.



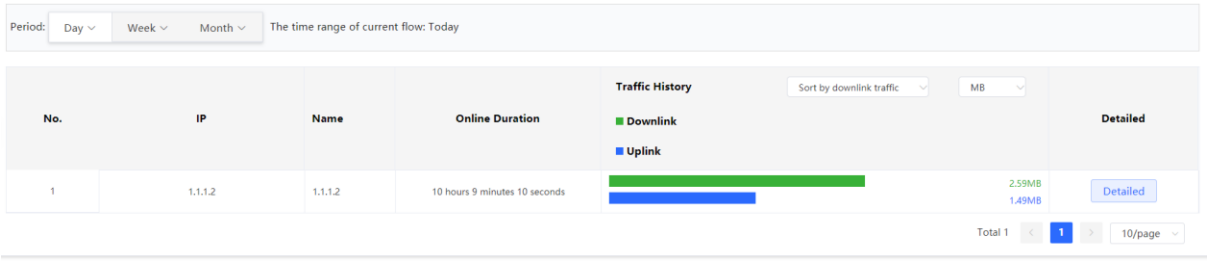

**Note**

Uplink traffic and downlink traffic are color-coded in the figure. You can move the cursor over a curve to view uplink traffic and downlink traffic at a certain time.

### 2. View Historical Traffic of a Client

Click the **User Traffic History** tab. Select a time range. You can view historical traffic data of clients today or this week on the **User Traffic History** page.

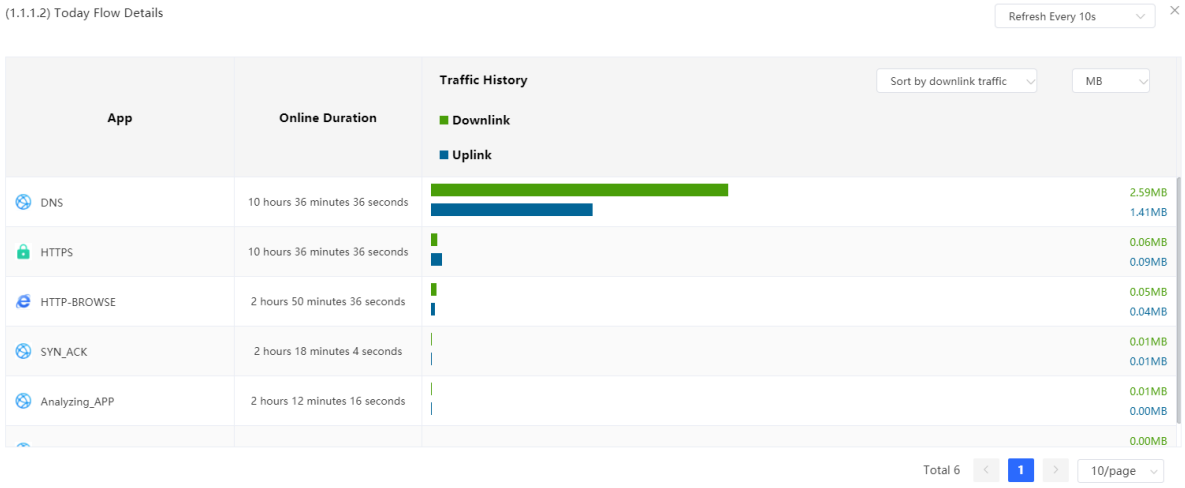
If there are multiple clients, the system displays the traffic data by downlink traffic in descending order by default. You can view the online duration, uplink traffic, and downlink traffic of each client in the time span. The sorting mode can be switched based on the uplink traffic or downlink traffic. You can set the traffic unit, number of items to be displayed on the current page, paging display, and other functions based on service requirements.




Click **Detailed**. The details of the current client's app usage, including the traffic size and online duration, are displayed in a pop-up dialog box. You can set the sorting mode (by downlink traffic or uplink traffic), unit, and other parameters based on service requirements.

**Note**

To view historical traffic of a client, ensure that the **Traffic Audit** function is enabled on the **App Real-Time Traffic** page.




### 3. View Historical Traffic of an App

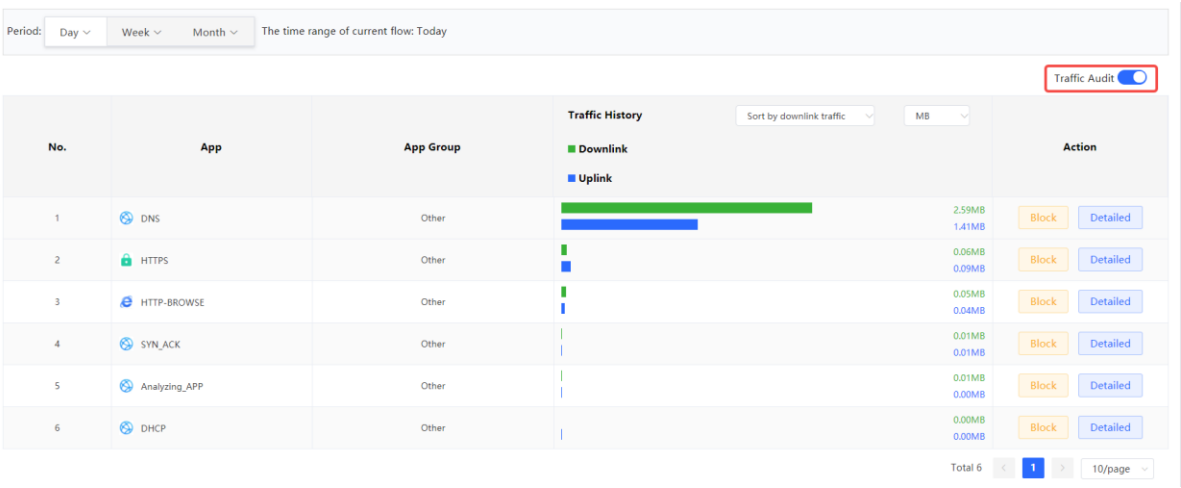
Click the **Traffic History** tab, enable the **Traffic Audit** function, and view the application historical traffic.

**Note**

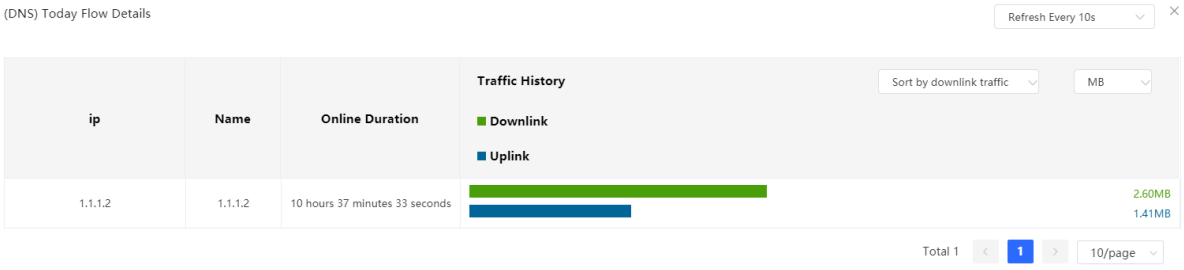
The status of **Traffic Audit** switch is consistent with that on the **App Real-Time Traffic** page. After it is enabled, the **App Real-Time Traffic** function and **App History Traffic** function are enabled.

On the **App History Traffic** page, you can view historical traffic of an application today or this week.

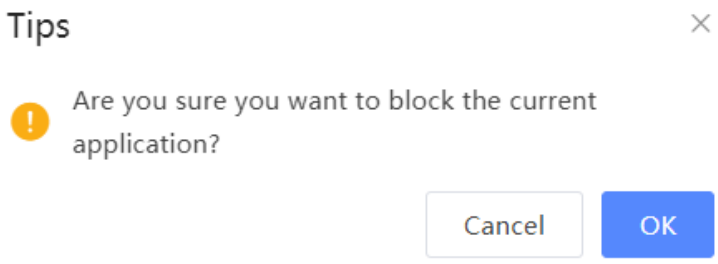
If there are multiple applications, the system displays traffic data by downlink traffic in descending order by default. You can view the name, application group, uplink traffic, and downlink traffic of each application in the time span. The sorting mode can be switched based on uplink traffic or downlink traffic. You can set the traffic unit, number of items to be displayed on the current page, paging display, and other functions based on service requirements.




Click **Detailed**. The system displays details about the traffic used by each client of the current application in a pop-up dialog box. You can set the sorting mode (by downlink traffic or uplink traffic), unit, and other parameters based on service requirements.




Click **Block**. In the displayed message, click **OK** to block the corresponding application.



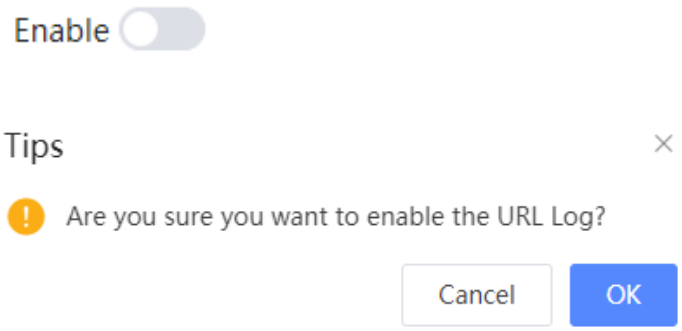

## 3.5 Supporting the URL Logging Function

URL logs record and display website domain names accessed by devices connected to LAN ports within a certain minute, access count, and audit results.

Choose **One-Device > Gateway > Monitor**.

Click **More** to the right of the **Traffic Trend** tab. On the page that is displayed, click the **URL Log** tab.

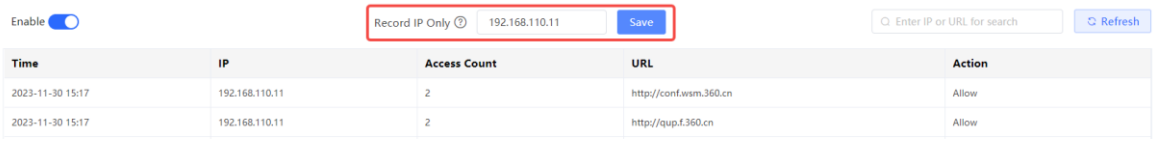
(1) Toggle on the **Enable** switch. On the pop-up dialog box, click **OK**.




(2) (Optional) Configure **record IP**.

The system records access records of all devices connected to LAN ports by default. If you need to view access records of a single device, set **record IP**.

Enter the device IP address in **record IP** and click **Save**.



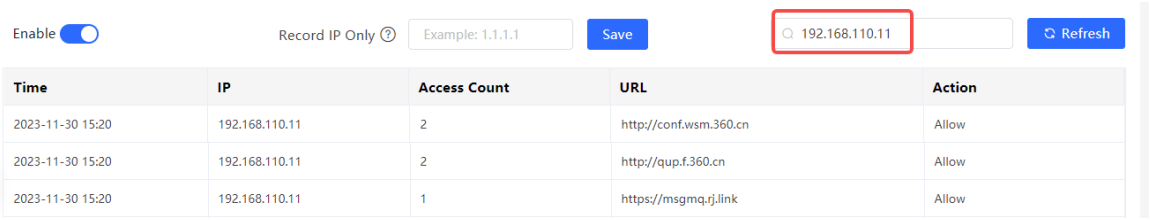

**Note**

If you need to restore access records of all devices connected to LAN ports, clear information in **Record IP Only** and click **Save**.

(3) Check access records.

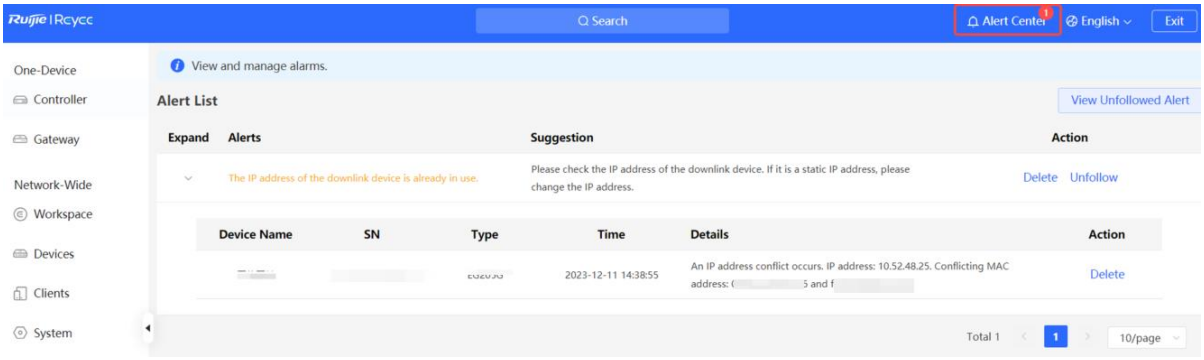
The system displays detailed access records, including the time, IP address.

You can search for access records by IP address or URL.




## 3.6 Processing Alerts

When a network exception occurs, the system generates an alert and provides suggested actions. Click **Alert Center** in the navigation bar to view the faulty device, alert details, and suggested actions. You can troubleshoot the fault based on the suggested actions.


Search
Alert Center
English
Exit
One-Device
Controller
Gateway
Network-Wide
Workspace
Devices
Clients
System
View and manage alarms.
Alert List
View Unfollowed Alert
Expand
Alerts
Suggestion
Action
The IP address of the downlink device is already in use.
Please check the IP address of the downlink device. If it is a static IP address, please change the IP address.
Delete
Unfollow
Device Name
SN
Type
Time
Details
Action
2023-12-11 14:38:55
An IP address conflict occurs. IP address: 10.52.48.25. Conflicting MAC address:
Delete
Total 1
1
10/page

# 4 Network Settings

## 4.1 Switching the Work Mode

### 4.1.1 Work Mode

For details, see Section 2.4 Work Mode.

### 4.1.2 Self-Organizing Network Discovery

When setting the work mode, you can set whether to enable the self-organizing network discovery function. This function is enabled by default.

After the self-organizing network discovery function is enabled, the device can be discovered in the network and discover other devices in the network. Devices network with each other based on the device status and synchronize global configuration. You can log in to the Web management page of any device in the network to check information about all devices in the network. After this function is enabled, clients can maintain and manage the current network more efficiently. You are advised to keep this function enabled.

If the self-organizing network discovery function is disabled, the device will not be discovered in the network and it runs in standalone mode. After logging in to the Web page, you can configure and manage only the currently logged in device. If only one device is configured or global configuration does not need to be synchronized to the device, you can disable the self-organizing network discovery function.

**Note**

- In AC mode, the self-organizing network discovery function is enabled by default.
- After the self-organizing network discovery function is enabled, you can view the self-organizing role of the device on the Device Details page.
- The menus on the Web page vary depending on whether the self-organizing network discovery function is enabled. (For details, see Section 2.7 Switching the Work Mode.) Find the configuration entry for this function according to the instructions in Configuration Steps below.

### 4.1.3 Configuration Steps

Choose **One-Device** > **Gateway**.

Click the current work mode to edit the work mode.

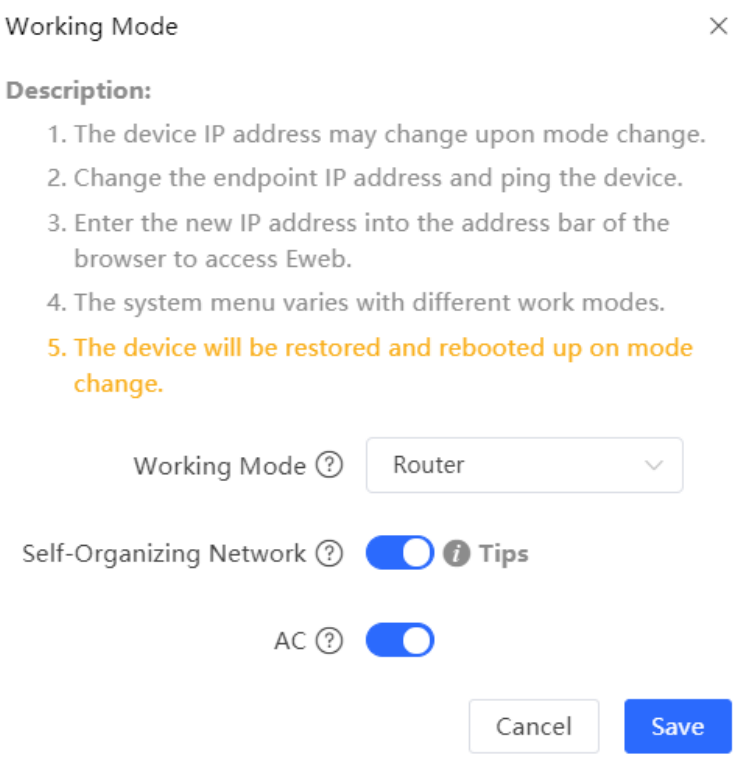
**Caution**

After you switch the work mode, the device will restore factory settings and restart. Please proceed with caution.




**AC function switch**: If a device works in the router mode and the self-organizing network discovery function is enabled, you can enable or disable the AC function. After the AC function is enabled, the device in the router

mode supports the virtual AC function and can manage downlink devices. If this function is disabled, the device needs to be elected as an AC in self-organizing network mode and then manage downlink devices.

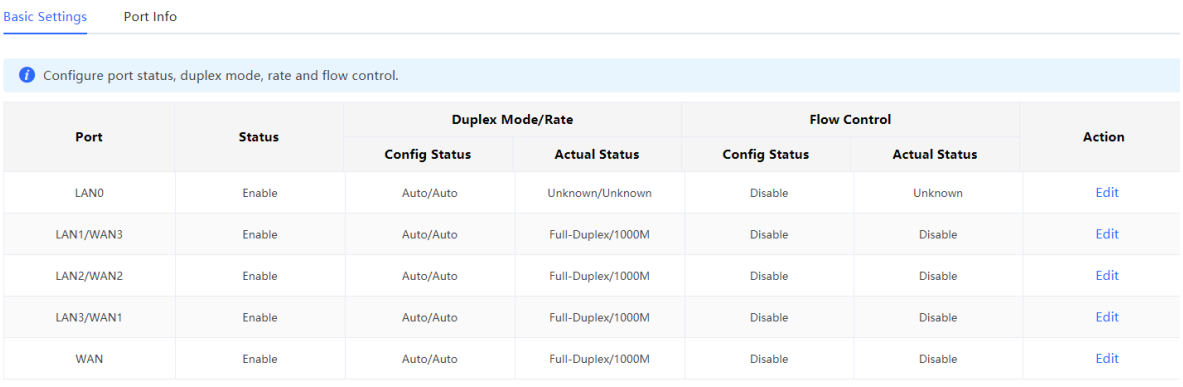



## 4.2 Port Settings

You can choose **Port Settings** to set port parameters and view the port information.

### 4.2.1 Setting the Port Parameters

Choose **One-Device > Gateway > Config > Network > Port Settings > Basic Settings**.




| Port | Status | Duplex Mode/Rate | | Flow Control | | Action |
|---|---|---|---|---|---|---|
| | | Config Status | Actual Status | Config Status | Actual Status | |
| LAN0 | Enable | Auto/Auto | Unknown/Unknown | Disable | Unknown | Edit |
| LAN1/WAN3 | Enable | Auto/Auto | Full-Duplex/1000M | Disable | Disable | Edit |
| LAN2/WAN2 | Enable | Auto/Auto | Full-Duplex/1000M | Disable | Disable | Edit |
| LAN3/WAN1 | Enable | Auto/Auto | Full-Duplex/1000M | Disable | Disable | Edit |
| WAN | Enable | Auto/Auto | Full-Duplex/1000M | Disable | Disable | Edit |

(1) Choose the target port and click **Edit**.

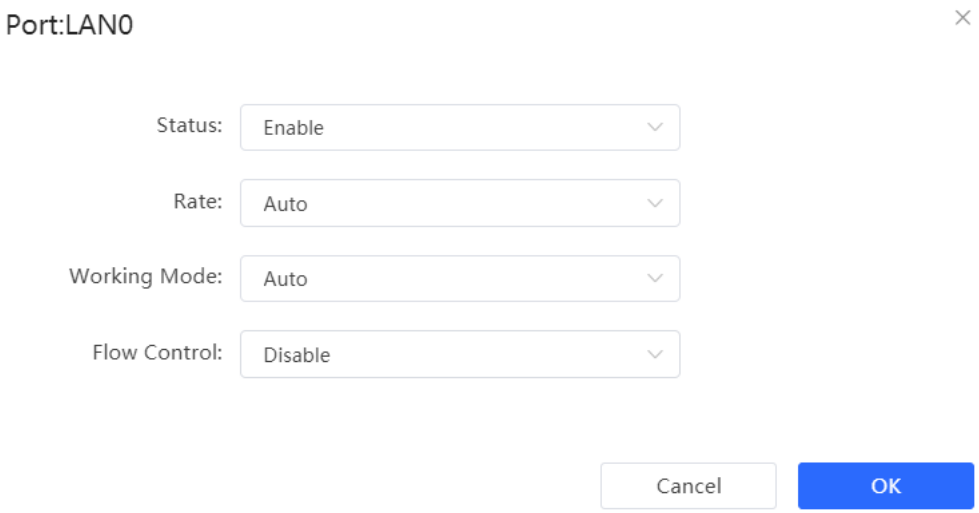


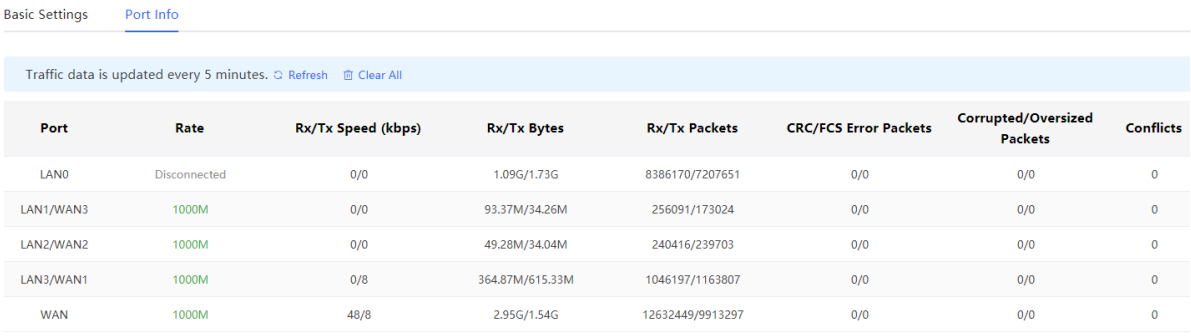

**Table 4-1 Port Configuration Parameters**

| Parameter | Description |
|---|---|
| Status | Enable or disable the port. |
| Rate | Set the data transmission rate of the port. The options are **Auto**, **10M**, **100M**, and **1000M**. When selecting the port rate, ensure that the connected device can communicate at the same rate. If a device only supports a rate of 100 Mbps, but the port rate is set to 1000 Mbps, communication may fail due to rate mismatch. |
| Working Mode | Set the working mode of the port:<br>● **Auto**: The port automatically detects the working mode of the connected device and automatically selects the full-duplex or half-duplex mode based on the connected device.<br>● **Full-duplex**: In full-duplex mode, a port can send and receive data simultaneously, achieving bidirectional communication.<br>● **Half-duplex**: In half-duplex mode, a port can only send or receive data, but not both.<br>**Caution**<br>When the WAN0 port of the RG-EG406XS operates at 10 Mbps or 100 Mbps, the port's working mode cannot be set to half-duplex mode. |
| Flow Control | When wired ports of the device work in different rates, data blocking may occur, leading to slow network speed. Enabling port flow control helps relieve the data congestion.<br>**Caution**<br>When flow control is enabled on the LAN4/WAN4 port of the RG-EG406XS but disabled on the peer device, the actual flow control status displayed on the local device is "Enable." |

(2) Set the port parameters and click **OK**.

### 4.2.2 Viewing the Port Information

Choose **One-Device > Gateway > Config > Network** > **Port Settings** > **Port Info**.




| Port | Rate | Rx/Tx Speed (kbps) | Rx/Tx Bytes | Rx/Tx Packets | CRC/FCS Error Packets | Corrupted/Oversized Packets | Conflicts |
|---|---|---|---|---|---|---|---|
| LAN0 | Disconnected | 0/0 | 1.09G/1.73G | 8386170/7207651 | 0/0 | 0/0 | 0 |
| LAN1/WAN3 | 1000M | 0/0 | 93.37M/34.26M | 256091/173024 | 0/0 | 0/0 | 0 |
| LAN2/WAN2 | 1000M | 0/0 | 49.28M/34.04M | 240416/239703 | 0/0 | 0/0 | 0 |
| LAN3/WAN1 | 1000M | 0/8 | 364.87M/615.33M | 1046197/1163807 | 0/0 | 0/0 | 0 |
| WAN | 1000M | 48/8 | 2.95G/1.54G | 12632449/9913297 | 0/0 | 0/0 | 0 |

## 4.3 Configuring the WAN Ports

Choose **One-Device > Gateway > Config > Network** > **WAN**.

You can configure multi-line access for the device to allow multiple lines to work simultaneously. After you switch to multi-line access, you need to specify the egress provider of the lines and set the load balancing mode, in addition to setting basic network parameters for the WAN interfaces.

**Caution**

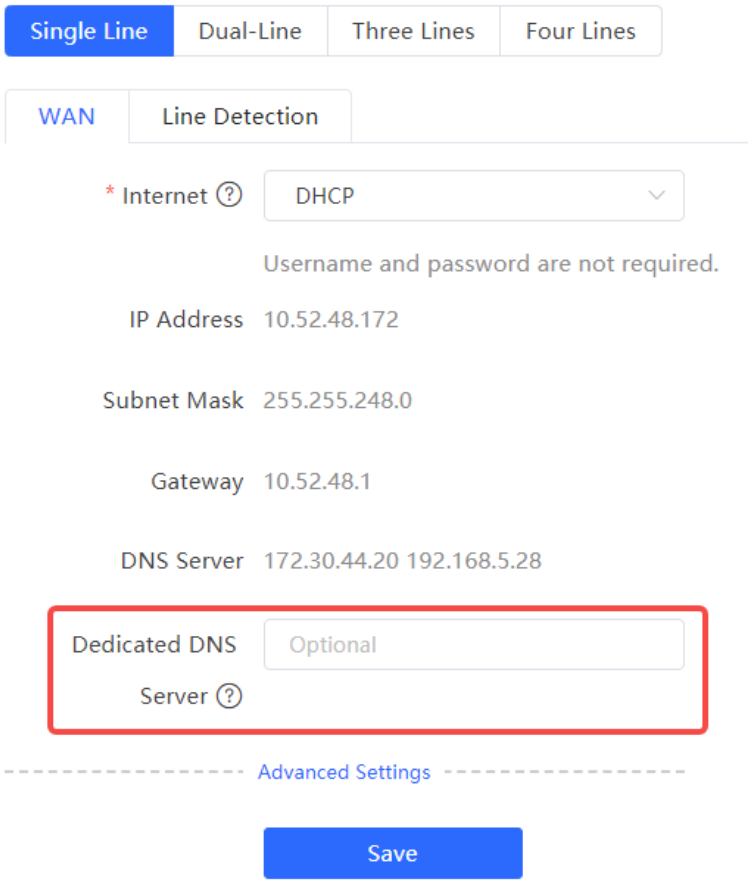
The number of lines supported varies with the product. The actual configuration prevails.

### 4.3.1 Configuring the Internet Access Mode

Choose **One-Device > Gateway > Config > Network** > **WAN**.

The device can access the WAN in one of the following three methods: static IP, DHCP, and PPPoE dialing. Select a proper method based on the actual broadband line type. For details, see Section 2.5 Configuration Wizard (Router Mode).

When the Internet access mode is not **DHCP** or **PPPoE**, you can specify a DNS server to ensure that the device can correctly parse domain names and access Internet resources, thereby improving the access speed and security.

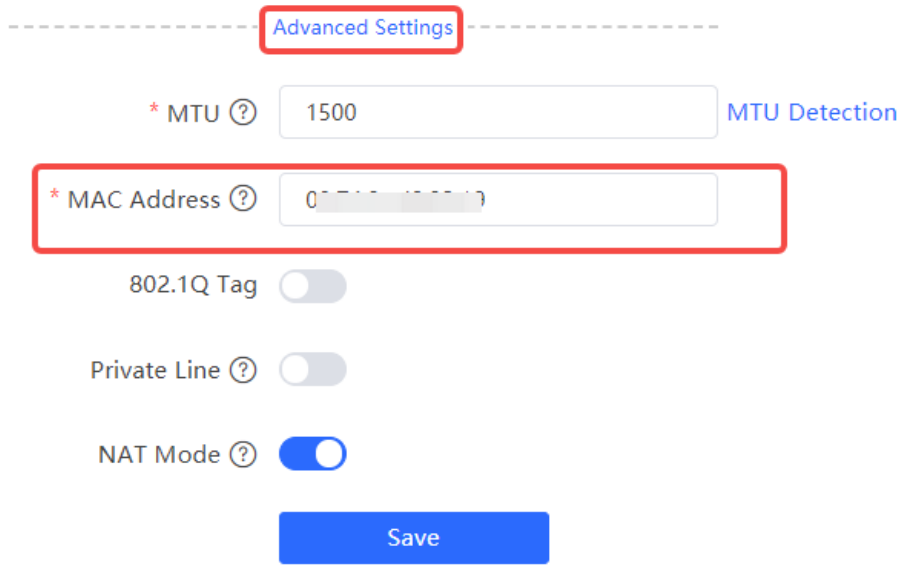



### 4.3.2 Modifying the MAC Address

Choose **One-Device > Gateway > Config > Network > WAN**.

Sometimes, the provider restricts Internet access of devices with unknown MAC addresses out of security considerations. In this case, you can change the MAC addresses of the WAN interfaces to valid MAC addresses.

Select the target WAN interface. Click **Advanced Settings**, enter a MAC address, and click **Save**. You do not need to modify the default MAC address unless otherwise specified.

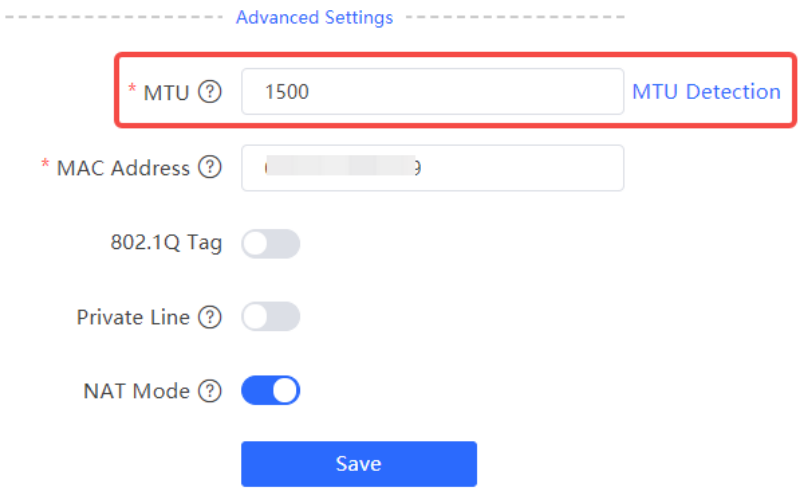



### 4.3.3 Modifying the MTU

Choose **One-Device > Gateway > Config > Network > WAN**.

#### 1. Modifying the MTU

MTU specifies the maximum transmission unit allowed to pass a WAN interface. By default, the MTU of a WAN interface is 1500 bytes. Sometimes, large data packets are limited in transmission speed or prohibited in the ISP network, leading to slow network speed or even network disconnection. If this occurs, you can click **Advanced Settings**, set the MTU to a smaller value.

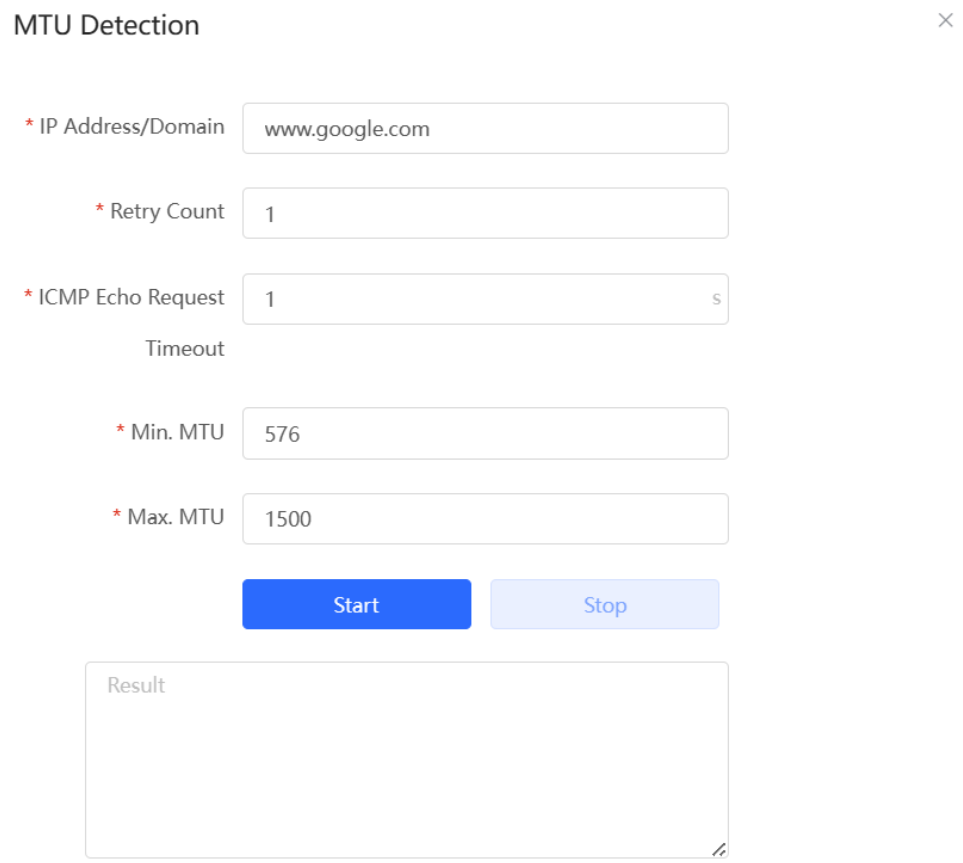



If the MTU value is unknown, click **MTU Detection** to configure the one-click MTU detection, and adjust the MTU settings based on the results obtained from MTU detection.

### 2. Detecting the MTU

Click **MTU Detection** to configure the one-click MTU detection to determine the MTU between two communication devices.

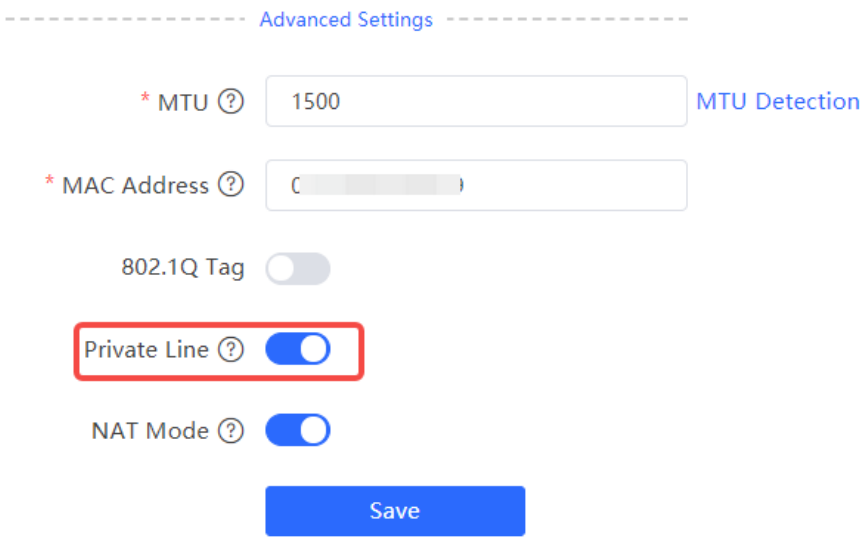
Enter the destination IP/domain name, retry count, ICMP echo request timeout, minimum MTU, maximum MTU, and click **Start** to start the detection.




## 4.3.4 Configuring the Private Line

Choose **One-Device > Gateway > Config > Network > WAN**.

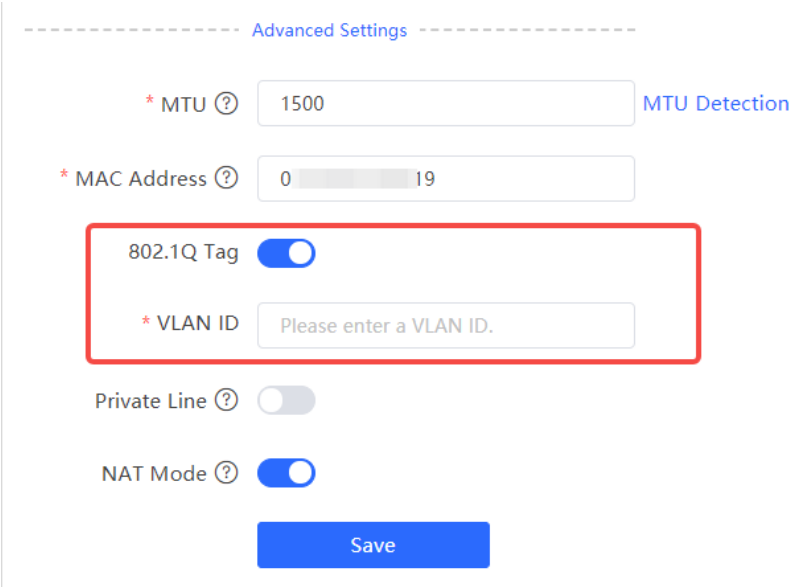
Click **Advanced Settings**, turn on **Private Line** and determine whether to set the current WAN line as a private line. Generally, private lines are used for access to specific internal networks but not the Internet. Private lines provide higher network security.




### 4.3.5 Configuring the VLAN Tag

Choose **One-Device > Gateway > Config > Network > WAN**.

Some ISPs require that packets transmitted to their networks carry VLAN IDs. In this case, you can click **Advanced Settings**, enable the **802.1Q Tag** function and set a **VLAN ID** and **Priority** for the WAN interface. By default, the VLAN tag function is disabled. You are advised to keep the VLAN tag function disabled unless otherwise specified.

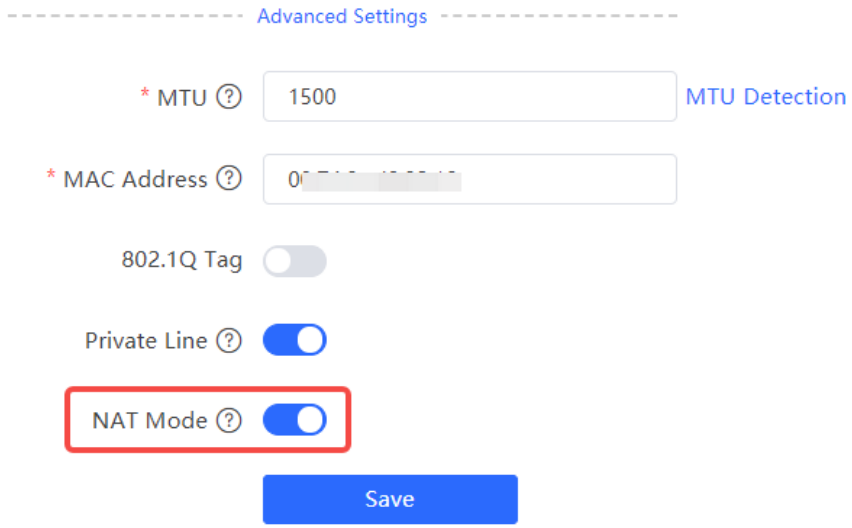



### 4.3.6 Configuring NAT Mode

Choose **One-Device > Gateway > Config > Network > WAN**.

When an intranet needs to communicate with an extranet, Network Address Translation (NAT) must be configured to convert the private IP address into a globally unique IP address, so that the private network can access the public network.

Click **Advanced Settings**, toggle on **NAT Mode** to enable the NAT mode. When the NAT mode is disabled, this router operates in router mode to forward data packets, enabling mutual access between hosts connected to the LAN and the WAN interfaces of this router.




**Caution**

Disabling NAT mode may potentially impact the functionality of the self-organizing network (SON) feature.

### 4.3.7 Configuring the Multi-Line Load Balancing Mode

Choose **One-Device** > **Gateway** > **Config** > **Network** > **Single Line/Dual-Line/Three Lines/Four Lines** > **WAN** > **Load Settings**.

When multiple links are available, some traffic is forwarded along the link selected based on the address library and the remaining traffic is distributed to other links in load balancing mode.

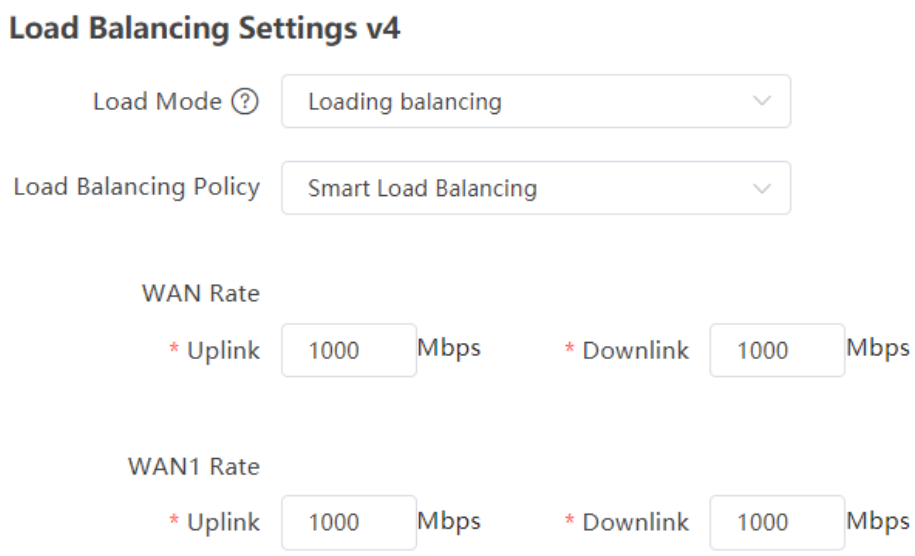
**Table 4-2 Load balancing modes**

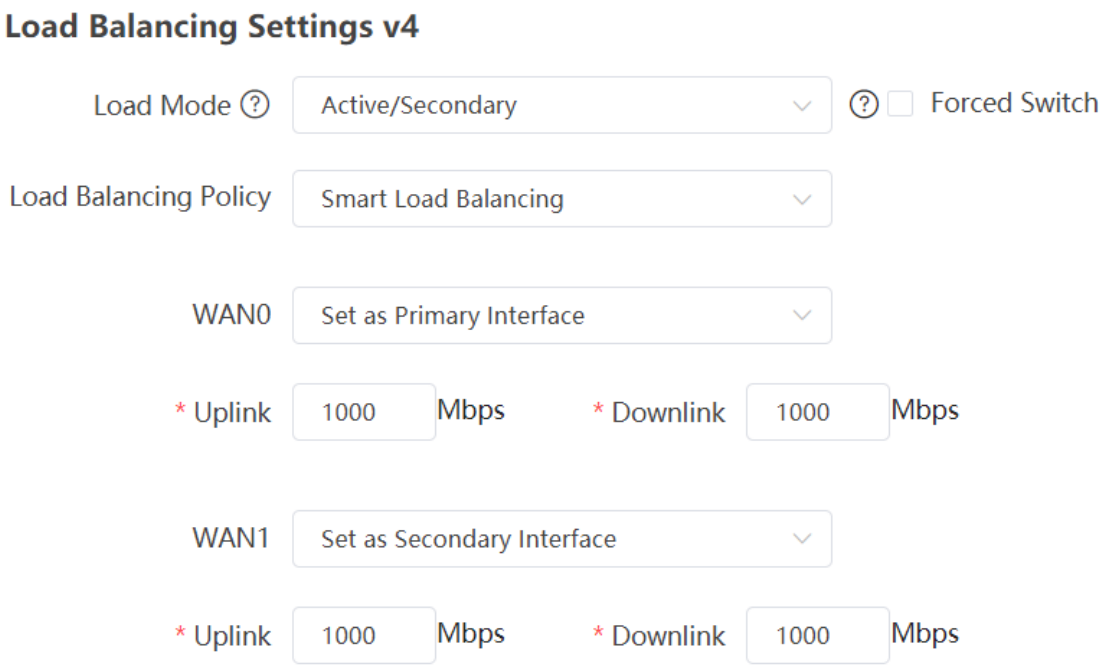
| Load Balancing Mode | Description |
|---|---|
| Loading balancing | The traffic will be distributed across multiple links according to the weight of each WAN interface. Larger traffic will be distributed to the WAN interface with a higher weight.<br>When you select this mode, you must specify the weight of each WAN interface.<br>For example, if the weight of WAN and WAN 1 ports is set to 3 and 2 respectively, then, 60% of the total traffic will be routed over WAN and 40% over WAN 1. |

| Load Balancing Mode | Description |
| --- | --- |
| Active/Secondary | All traffic is routed over the primary interface. Once the primary interface fails, traffic will be switched over to the secondary interface.<br>If there are multiple primary or secondary interfaces, the weight of these interfaces must be set. (See balanced mode.) |
| Forced Switch | With **Load Mode** switched from **Load balancing** to **Active/Secondary**, if **Forced Switch** is not selected, traffic of new connections will be routed through the specified primary interface, while the egress for the traffic of existing connections remains unchanged.<br>When **Forced Switch** is selected, traffic of both new and existing connections will be routed to the primary interface. |

The system supports IPv4 and IPv6 multi-link load balancing. IPv4 multi-link load balancing is enabled by default, while IPv6 multi-link load balancing needs to be enabled manually.

### 1. Configuring IPv4 Multi-Link Balancing






(1) Select a load balancing mode from the **Load Mode** drop-down list.

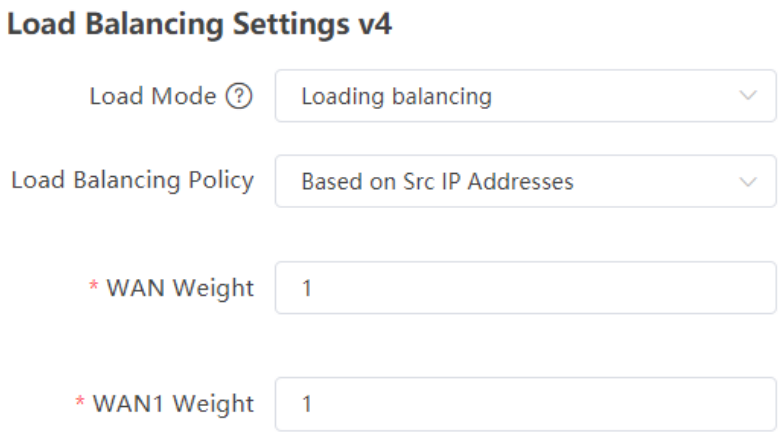
(2) Select a loading balancing policy from the **Load Balancing Policy** drop-down list.

**Table 4-3 Description of Load Balancing Policies (IPv4)**

| Load Balancing Policy | Description |
|---|---|
| Based on Connections | After you enable this policy, the traffic is routed over multiple links based on the links. Packets with the same source IP address, destination IP address, source port, destination port, and protocol are routed over the same link. |
| Based on Src IP Address | After you enable this policy, the traffic is routed over multiple links based on the source IP address. The traffic from the same user (same source IP address) will be routed to the same interface. This policy prevents traffic from the same user from being routed to different links, lowering the risks of network access exceptions. |
| Based on Src and Dest IP Address | After you enable this policy, the traffic is routed over multiple links based on the source IP address and destination. The traffic of the same source IP address and destination IP address will be routed to the same interface. |
| Smart Load Balancing | After you enable this feature, the traffic is routed over multiple links based on the link bandwidth, the actual loads of the links, application recognition and traffic prediction. |

(3) Set the uplink and downlink bandwidths or the weight for each WAN interface.

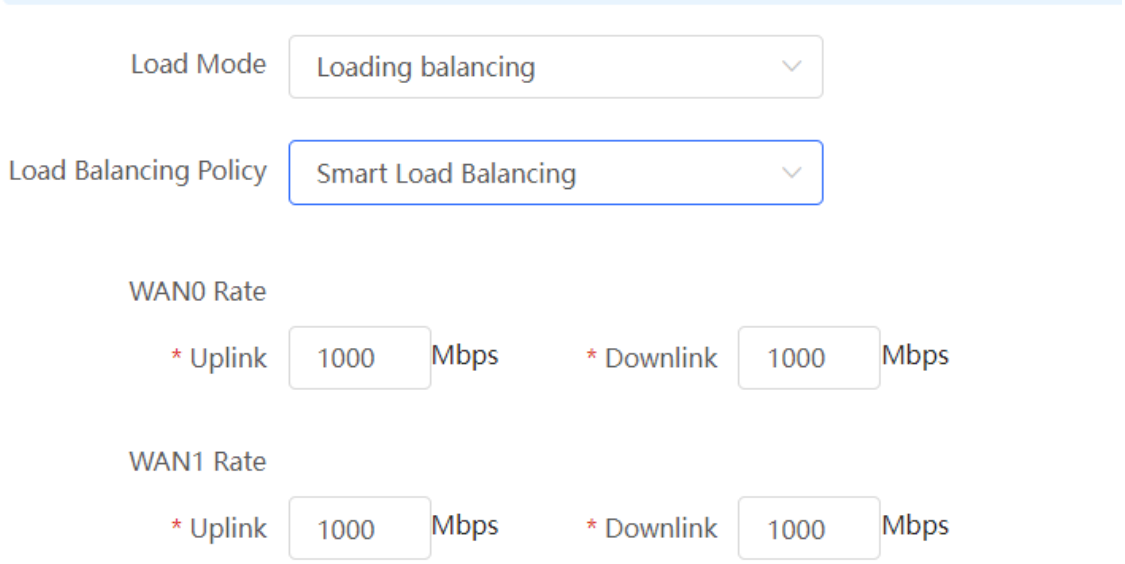
- When the load balancing policy is set to **Based on Connections**, **Based on Src IP Address**, or **Based on Src and Dest IP Address**, a weight must be set for each WAN interface.




**Note**

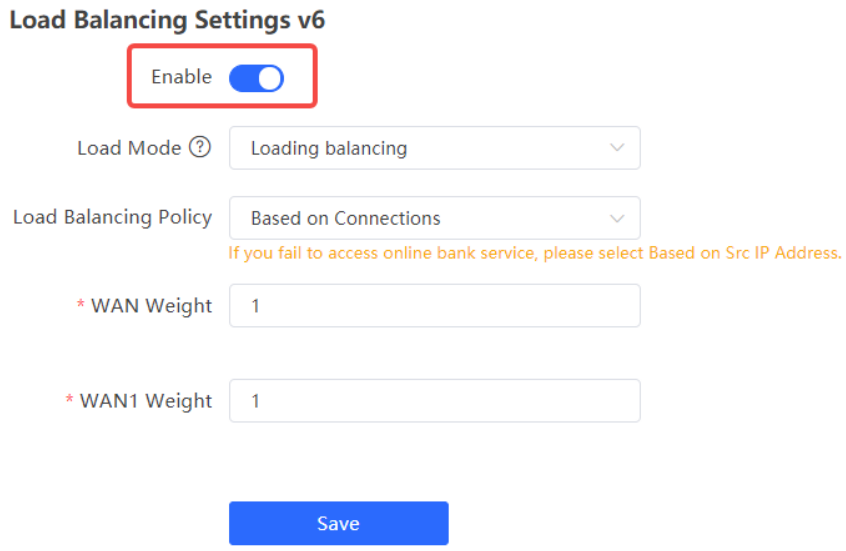
The higher the value of the weight, the more traffic is directed to the WAN interface.

- When the load balancing policy is set to **Smart Load Balancing**, the uplink and downlink bandwidths must be set for each WAN interface.




(4) Click **Save**.

### 2. Configuring IPv6 Multi-Link Balancing




(1) Toggle on **Enable** to enable the IPv6 multi-link load balancing mode.

(2) Select a load balancing mode from the **Load Mode** drop-down list.

(3) Select a loading balancing policy from the **Load Balancing Policy** drop-down list.

**Table 4-4 Description of Load Balancing Policies (IPv6)**

| Load Balancing Policy | Description |
|---|---|
| Based on Connections | After you enable this policy, the traffic is routed over multiple links based on the links. Packets with the same source IP address, destination IP address, source port, destination port, and protocol are routed over the same link. |
| Based on Src IP Address | After you enable this policy, the traffic is routed over multiple links based on the source IP address. The traffic from the same user (same source IP address) will be routed to the same interface. This policy prevents traffic from the same user from being routed to different links, lowering the risks of network access exceptions. |
| Based on Src and Dest IP Address | After you enable this policy, the traffic is routed over multiple links based on the source IP address and destination. The traffic of the same source IP address and destination IP address will be routed to the same interface. |

(4) Set a weight for each WAN interface.

The valid range of weight is 1 to 100000.

**Note**

The higher the value of the weight, the more traffic is directed to the WAN interface.

(5) Click **Save**.

## 4.3.8 Configuring Link Detection

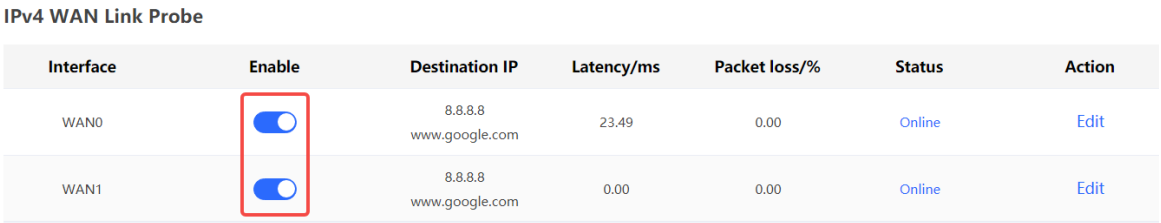
Choose **One-Device > Gateway > Config > Network** > **Single Line/Dual-Line/Three Lines/Four Lines** > **Line Detection**.

After configuring multiple WAN interfaces, use the link detection function to check whether lines are connected to the external network. If the network is down, the system does not select a route based on the interface, such as load balancing, policy-based routing, and ISP routing.

The system supports IPv4 and IPv6 WAN link detection, which can be enabled separately.

### 1. Configuring IPv4 WAN Link Detection

(1) On the **IPv4 WAN Link Probe** page, select a WAN interface, and toggle on **Enable** to enable IPv4 WAN link detection.




(2) In the WAN interface list, select a WAN interface for link detection, and click **Edit**.

(3) Configure the parameters of the link detection function, and click **OK**.

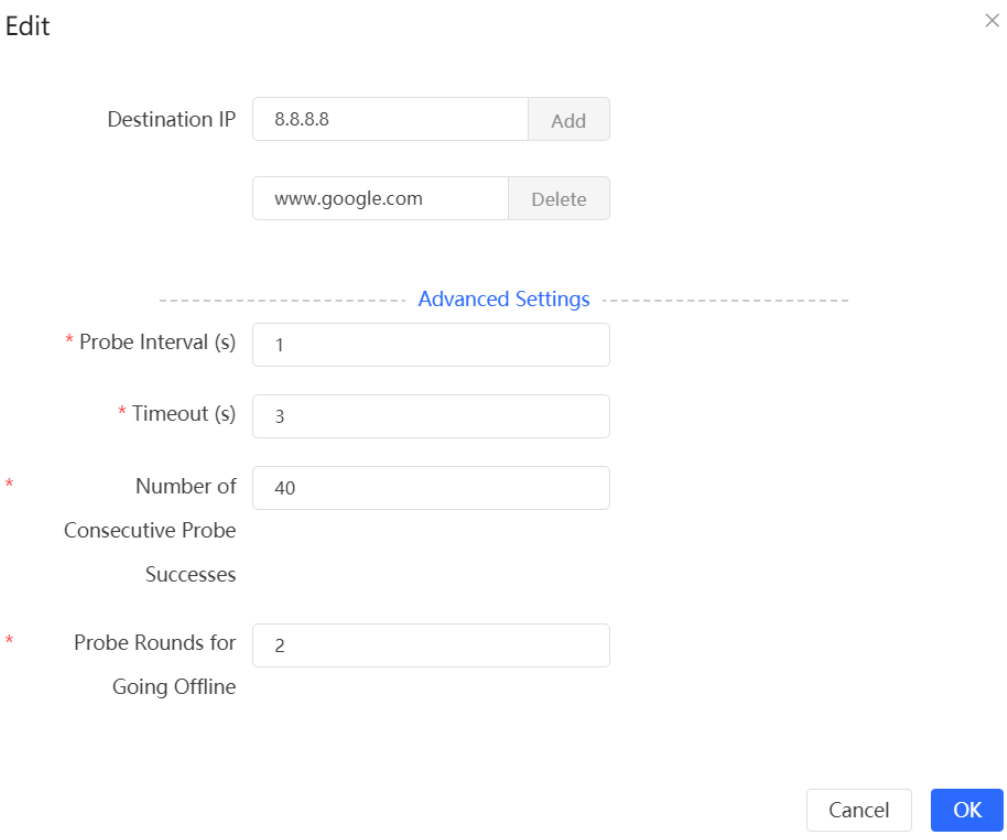


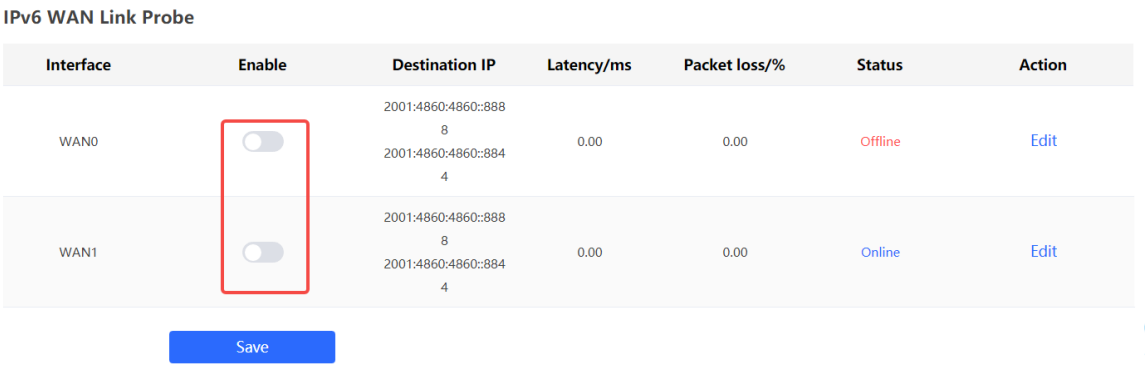
**Table 4-5 Description of Link Detection (IPv4)**

| Parameter | Description |
|---|---|
| Destination IP | The destination IP address to which the system sends ping messages.<br>You can set up to three destination IP addresses. The system sends ping messages to one of the IP addresses randomly during detection. |
| Probe Interval (s) | Interval for the system to perform connectivity detection. The default value is 1 second. |
| Timeout (s) | The maximum timeout period during which the device waits for a response after sending a ping message to the destination IP address. If no response is received within this time, the probe packet is marked as timed out. The default value is 3 seconds. |
| Number of Consecutive Probe Successes | The system periodically sends a ping message to a detection destination IP address at the specified interval. If the ping succeeds and the number of consecutive successful pings reaches the set number of **Number of Consecutive Probe Successes**, the WAN interface is set to be online. |
| Probe Rounds for Going Offline | The system periodically sends a ping message to a detection destination IP address at the specified interval. If the ping fails and the number of consecutive unsuccessful pings reaches the set number of **Probe Rounds for Going Offline**, the WAN interface is set to be offline. |

(4) Click **OK**.

## 2. Configuring IPv6 WAN Link Detection

(1) On the **IPv6 WAN Link Detection** page, toggle on **Enable** to enable IPv6 WAN link detection.




(2) In the WAN interface list, select a WAN interface for link detection, and click **Edit**.

(3) Configure the link detection parameters, and click **OK**.

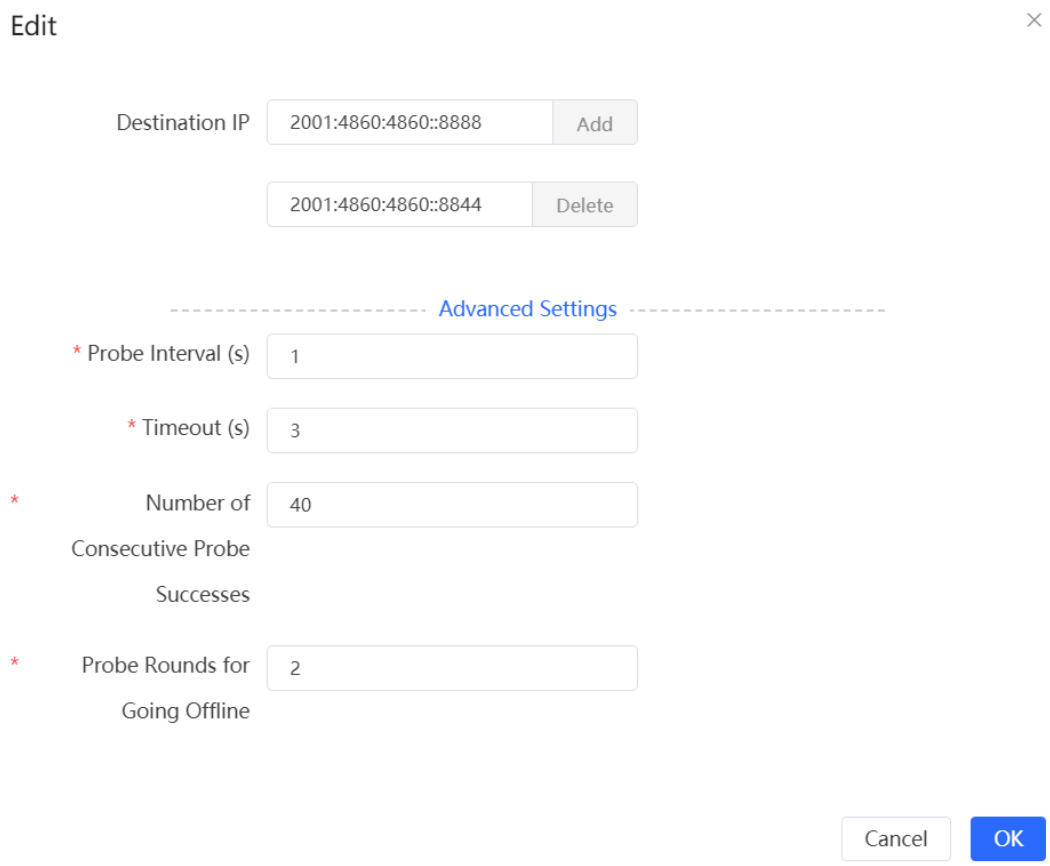



**Table 4-6 Description of Link Detection (IPv6)**

| Parameter | Description |
|---|---|
| Destination IP | The destination IP address (IPv6) to which the system sends ping messages.<br>You can set up to three destination IP addresses. The system sends ping messages to one of the IP addresses randomly during detection. |
| Probe Interval (s) | Interval for the system to perform connectivity detection. The default value is 1 second. |
| Timeout (s) | The maximum timeout period during which the device waits for a response after sending a ping message to the destination IP address. If no response is received within this time, the probe packet is marked as timed out. The default value is 3 seconds. |
| Number of Consecutive Probe Successes | The system periodically sends a ping message to a detection destination IP address at the specified interval. If the ping succeeds and the number of consecutive successful pings reaches the set number of **Number of Consecutive Probe Successes**, the WAN interface is set to be online. |

| Parameter | Description |
| --- | --- |
| Probe Rounds for Going Offline | The system periodically sends a ping message to a detection destination IP address at the specified interval. If the ping fails and the number of consecutive unsuccessful pings reaches the set number of **Probe Rounds for Going Offline**, the WAN interface is set to be offline. |

(4) Click **Save**.

### 4.3.9 Configuring Data Plan

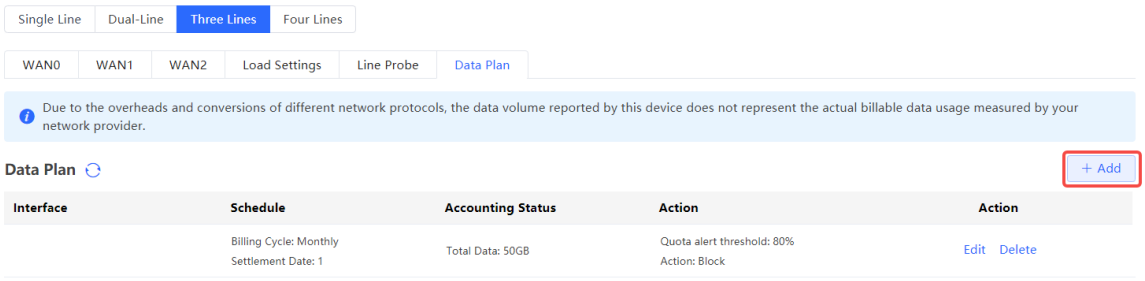
**Note**

Due to the overheads and conversions of different network protocols, the data volume reported by this device does not represent the actual billable data usage measured by your network provider.

Choose **One-Device > Gateway > Config > Network** > **WAN > Data Plan**.

When a traffic limit is set on the WAN interface, traffic to the WAN interface may be blocked or the load balancing ratio of WAN interfaces may be adjusted if this threshold is exceeded.

(1) Click **Add**.




(2) Configure the parameters.

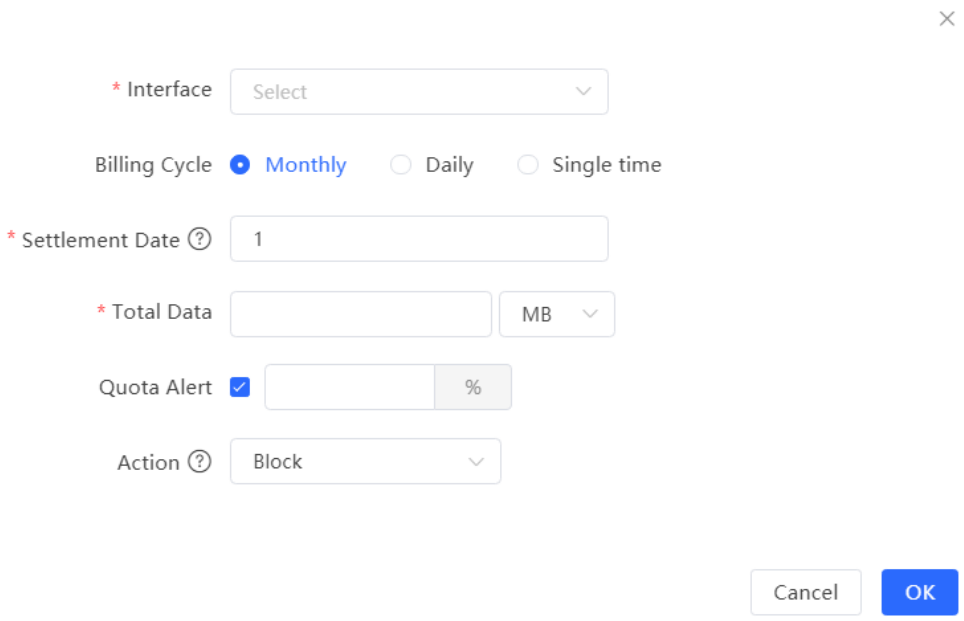


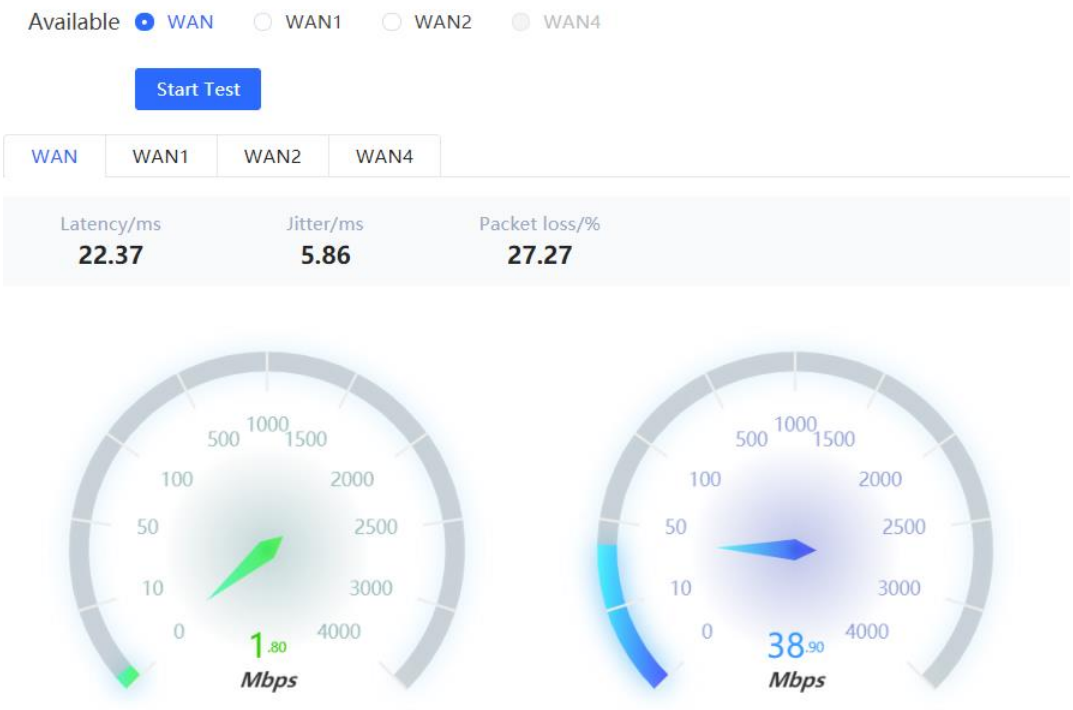

**Table 4-7 Description of Data Plan**

| Parameter | Description |
|---|---|
| Interface | The interface on the network that require traffic limiting configuration. Only one traffic limit policy can be applied to each interface. |
| Billing Cycle | Cycle for traffic quota settlement:<br>● Monthly: The used quota is reset to zero at 00:00 on the settlement day of each month, and billing of traffic usage starts again.<br>● Daily: The used quota is reset to zero at 00:00 daily, and billing of traffic usage starts again.<br>● Single Time: The used quota is not reset cyclically. Once the applied traffic reaches the total limit, billing is stopped. |
| Settlement Date | Required when the **Billing Cycle** is set to **Monthly.** At 0:00 on the settlement date, the used quota is reset to zero. |
| Total Data | The traffic quota for the WAN interface. |
| Quota Alert | When **Quota Alert** is enabled, an alert is generated on Ruijie Cloud if the proportion of used traffic to Total Data exceeds the specified percentage. |
| Action | Action after traffic quota is reached:<br>● None: Continue to apply the current traffic forwarding policy.<br>● Block: Block any traffic from being routed over this WAN interface.<br>● Adjust Load Balance Ratio: Adjust the load balancing ratio of each WAN interface on the network. Once "Adjust Load Balancing Ratio" is selected for one WAN interface, it cannot be selected for others simultaneously. |

## 4.4 Configuring Speed Test

You can use the rate test function to easily monitor the transmission rate of individual ports. In the case of ports with low transmission rates, you can identify and address potential issues to ensure that service quality remains high.

Choose **One-Device > Gateway > Config > Network** > **Speed Test**.




(1) Select the WAN interface to be tested. You can click **Select All** to select all WAN interfaces for the rate test.

(2) Click **Start Test**.

(3) After the rate test is complete, the system will display the test results, including latency, jitter, and packet loss.

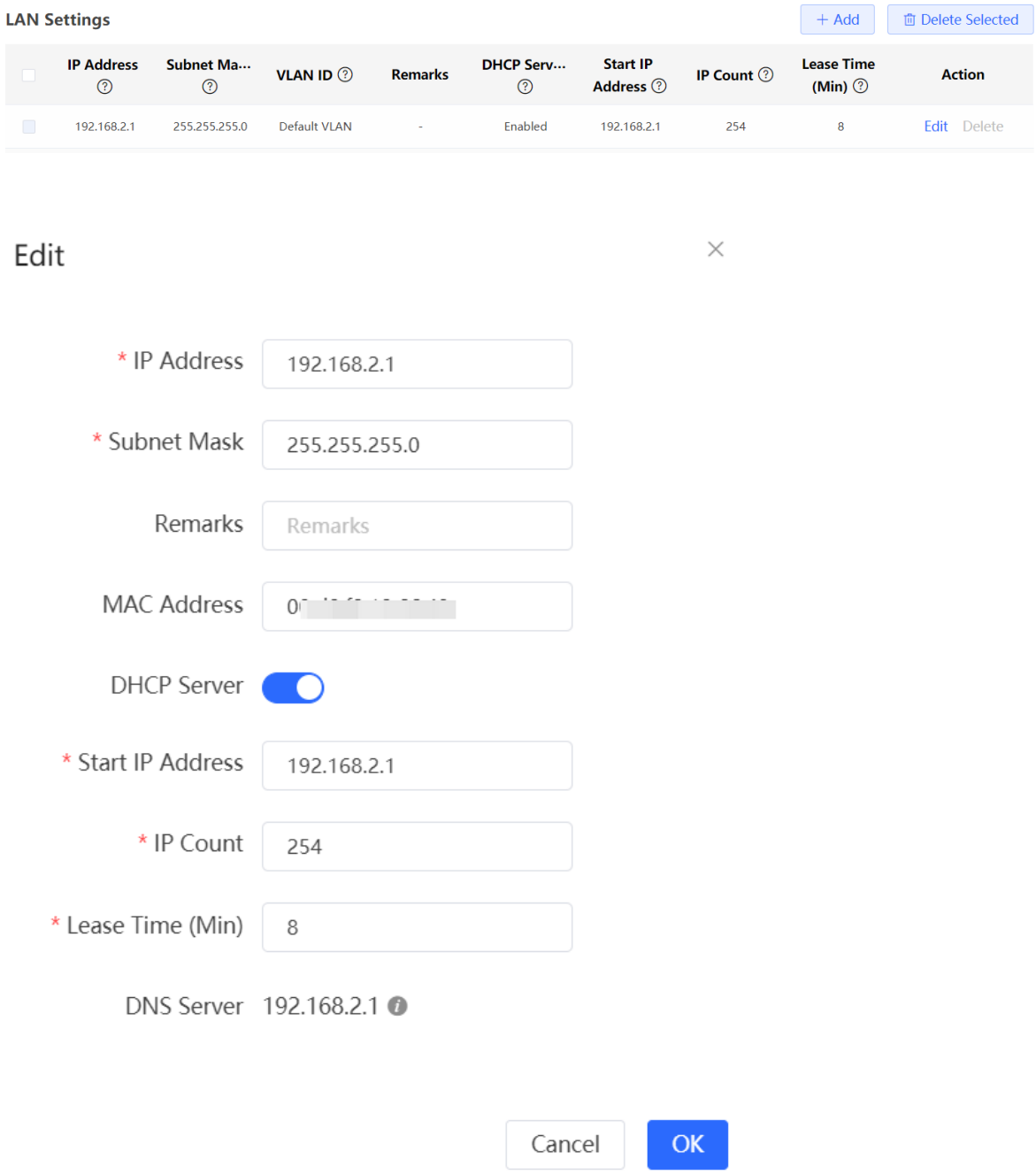



## 4.5 Configuring the LAN Ports

### 4.5.1 Modifying the LAN Port IP Address

Choose **One-Device** > **Gateway** > **Config** > **Network** > **LAN** > **LAN Settings**.

Click **Edit**. In the dialog box that appears, enter the IP address and subnet mask, and then click **OK**. After you modify the LAN port IP address, you need to enter the new IP address in the browser to log in to the device again before you can configure and manage this device.

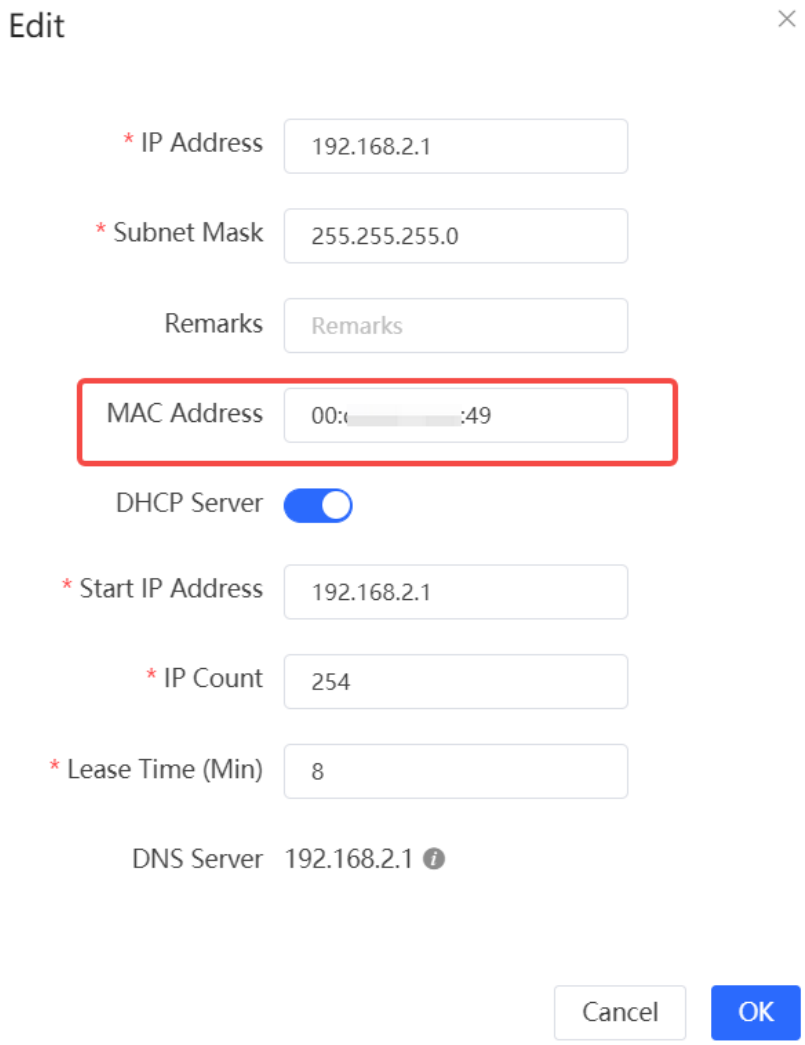



### 4.5.2 Modifying the MAC Address

Choose **One-Device** > **Gateway** > **Config** > **Network** > **LAN** > **LAN Settings**.

If a static Address Resolution Protocol (ARP) entry (binding between IP address and MAC address of the gateway) is configured to prevent ARP attacks to clients in the LAN, the gateway IP address remains unchanged but its MAC address changes when the gateway is replaced. As a result, the client may fail to learn the gateway MAC address. You can modify the static ARP entry of the client to prevent this problem. You can also change the LAN port MAC address of the new device to the MAC address of the original device to allow clients in the LAN to access the Internet normally.

Click **Edit**. In the dialog box that appears, enter the MAC address, and then click **OK**. You do not need to modify the default LAN port MAC address unless otherwise specified.




## 4.6 Configuring VLAN

### 4.6.1 VLAN Overview

Virtual Local Area Network (VLAN) is a communication technology that divides a physical LAN into multiple logical broadcast domains. Each VLAN has independent broadcast domains. Hosts in the same VLAN can directly communicate with each other, while hosts in different VLANs cannot as they are isolated at Layer 2. Compared with traditional Ethernet, VLAN has the following advantages:

- Control broadcast storms: Broadcast packets can only be forwarded inside a VLAN. This saves bandwidth as the performance of a VLAN is not affected by broadcast storms of other VLANs.
- Enhance LAN security: As a VLAN is divided into multiple broadcast domains, packets of different VLANs in a LAN are isolated. Different VLAN users cannot directly communicate, enhancing network security.
- Simplify network management: The VLAN technology can be used to divide the same physical network into different logical networks. When the network topology changes, you only need to modify the VLAN configuration, simplifying network management.

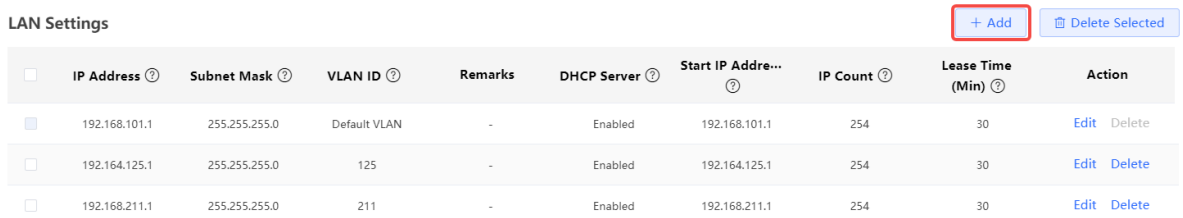
## 4.6.2 Creating a VLAN

**Note**

The RG-EG710XS, RG-EG406XS and RG-EG406XS-P support a maximum of 128 VLANs.

Choose **One-Device** > **Gateway** > **Config** > **Network** > **LAN** > **LAN Settings**.

A LAN can be divided into multiple VLANs. Click **Add** and create a VLAN.



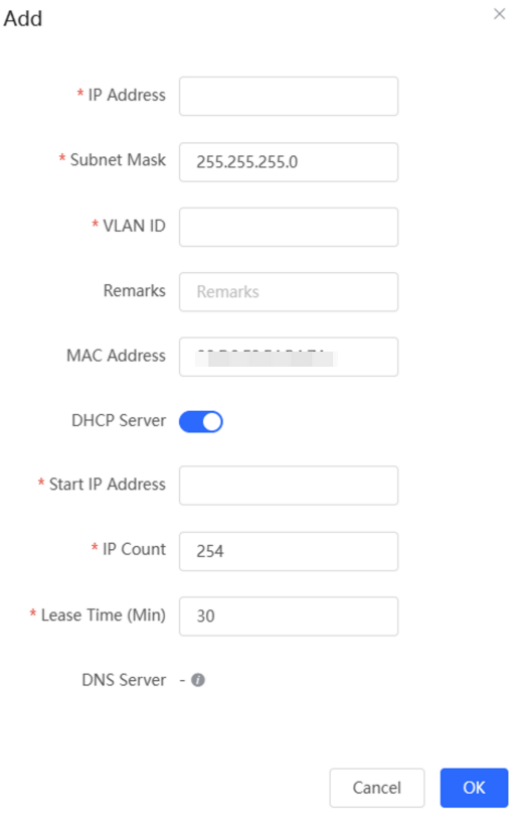




**Table 4-8 VLAN Configuration**

| Parameter | Description |
| --- | --- |
| IP Address | Configure an IP address for the VLAN interface. This IP address is used as the default gateway for the LAN devices that need to access the Internet. |

| Parameter | Description |
| --- | --- |
| Subnet Mask | Configure an IP address subnet mask for the VLAN interface. |
| VLAN ID | Configure the VLAN ID. |
| Remarks | Enter the VLAN description. |
| MAC Address | Configure an MAC address for the VLAN interface. |
| DHCP Server | Enable the DHCP server function. After this function is enabled, devices in the LAN can automatically obtain IP addresses. You also need to specify the start address for IP address allocation by the DHCP server, the number of IP addresses that can be allocated, and the address lease. You can also configure DHCP Options. For details, see Section 4.9.3 Configuring the DHCP Server. |

**Caution**

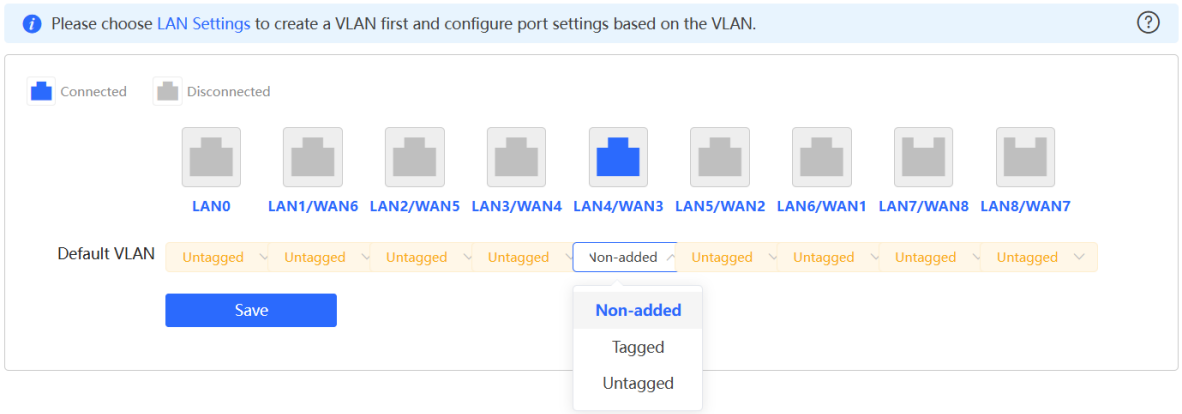
The VLAN configuration is associated with the uplink configuration. Exercise caution when you perform this operation.

### 4.6.3 Configuring a Port VLAN

Choose **One-Device** > **Gateway** > **Config** > **Network** > **Port VLAN**.

This page displays the VLAN division of the current port. Create VLANs on the **LAN Settings** page and then configure the port based on the VLANs on this page. For details, see Section 4.6.2 Creating a VLAN.

Click the check box under a port and select the relationship between VLAN and port from the drop-down list box.




- **Untagged**: Configure the VLAN as the native VLAN of the port. When the port receives packets from the specified VLAN, the port removes the VLAN ID before forwarding the packets. When the port receives packets without a VLAN ID, the port adds this VLAN ID to the packets before forwarding them. You can set only one VLAN of the port to **Untagged**.

- **Tagged**: Configure the port to allow packets with this VLAN ID to pass. This VLAN is not the native VLAN. When the port receives packets from the specified VLAN, it forwards the packets with the original VLAN ID.
- **Non-added**: Configure the port to deny packets with this VLAN ID to pass. For example, if you set VLAN 10 and VLAN 20 to **Non-added** for port 2, port 2 will not receive packets from VLAN 10 and VLAN 20.

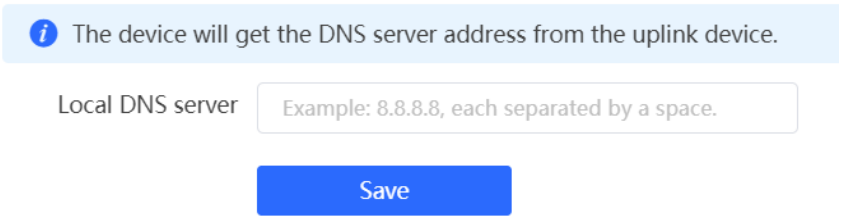
# 4.7 Configuring DNS

## 4.7.1 Local DNS

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **DNS** > **Local DNS**.

When the WAN interface runs DHCP or PPPoE protocol, the device automatically obtains the DNS server address. If the upper-layer device does not deliver the DNS server address or the DNS server needs to be changed, you can manually configure a new DNS server.

**Local DNS server**: Configure the DNS server address used by the local device. If multiple addresses exist, separate them with spaces.



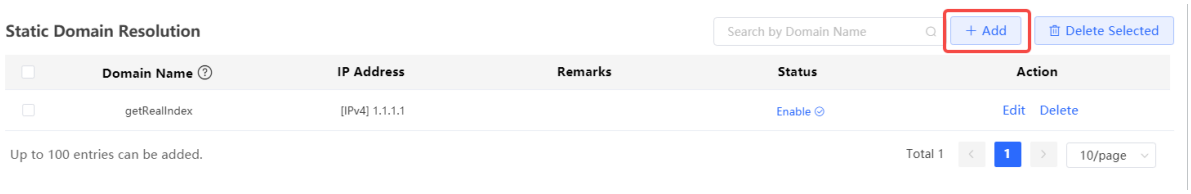

## 4.7.2 DNS Policy

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **DNS** > **DNS Policy**.

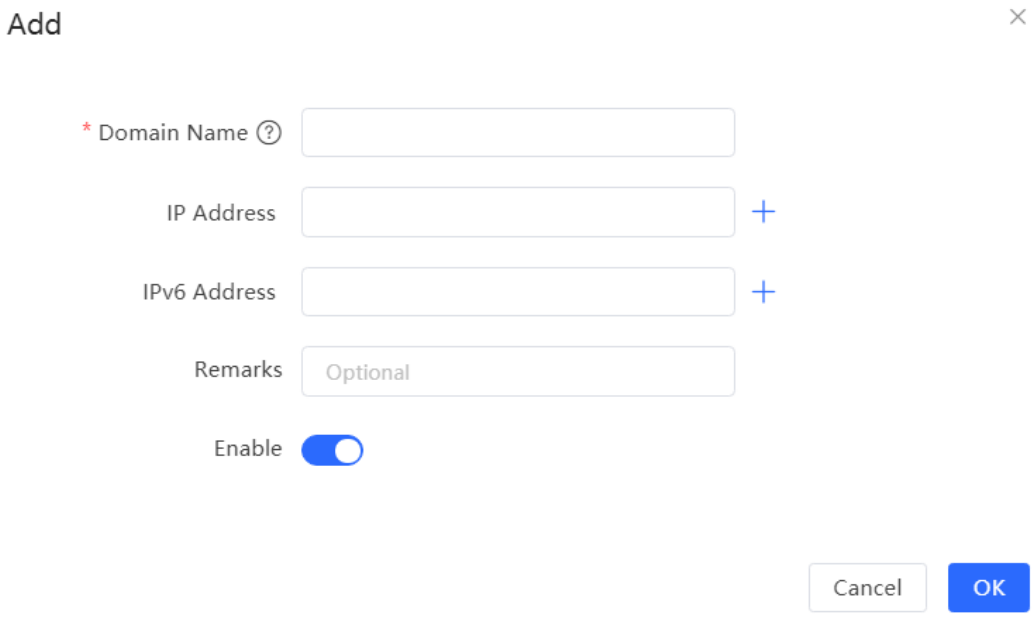
### 1. Static Domain Name Resolution

By configuring a DNS policy, you can resolve a specified domain name to the corresponding IP address, without relying on an external DNS server to perform domain name resolution. This can accelerate domain name resolution and mitigate security risks such as DNS hijacking.

(1) In the Static Domain Resolution section, click +Add.




(2) In the pop-up window that is displayed, enter the domain name and IP address.




(3) Toggle on **Enable**, and click **OK**.

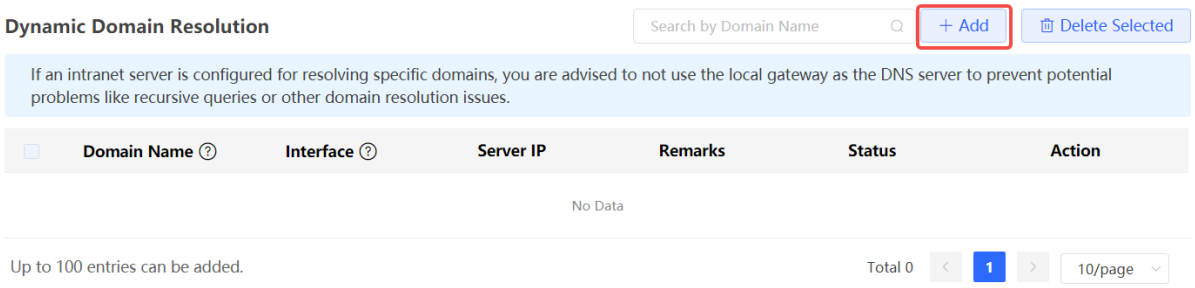
### 2. Dynamic Domain Name Resolution

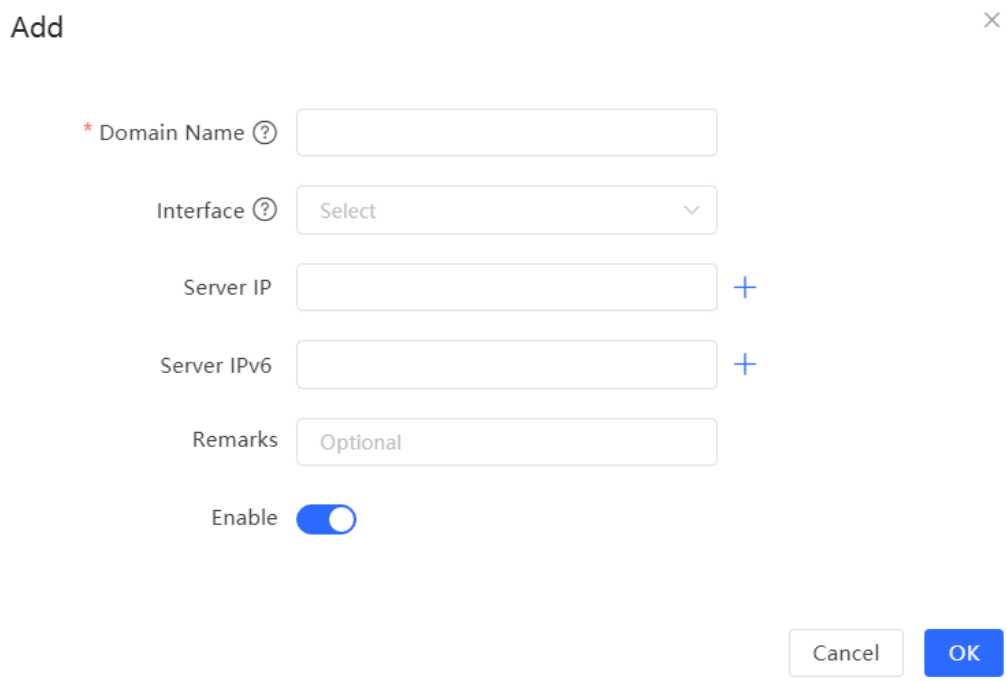
After a DNS server is configured, the specified interface uses the configured DNS server to resolve domain names.

In the **Dynamic Domain Resolution** section, click **+Add**. In the pop-up window that is displayed, enter the domain name, and select the interface. Enter the DNS server IP address and remarks if necessary, toggle on **Enable**, and click **OK**.

Caution

If an intranet server is configured for resolving specific domains, you are advised to not use the local gateway as the DNS server to prevent potential problems like recursive queries or other domain resolution issues.





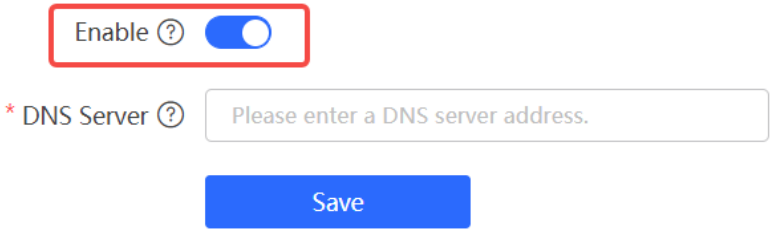

### 4.7.3 DNS Proxy

DNS proxy is optional configuration. By default, the device obtains the DNS server address from the upper-layer device.

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **DNS** > **DNS Proxy**.

**DNS Proxy**: By default, the DNS proxy is disabled, and the DNS address delivered by the ISP is used. If the DNS configuration is incorrect, the device may fail to parse domain names and network access will fail. It is recommended to keep the DNS proxy disabled.

**DNS Server**: Enable clients to access the Internet by using the DNS server address delivered by the upper-layer device. The default settings are recommended. After the DNS proxy is enabled, you need to enter the DNS server IP address. The DNS settings vary with the region. Consult the local ISP for details.




## 4.8 Configuring IPv6

### 4.8.1 IPv6 Overview

Internet Protocol Version 6 (IPv6) is the next-generation IP protocol designed by Internet Engineering Task Force (IETF) to substitute IPv4. It is used to compensate insufficient IPv4 network addresses.

## 4.8.2 IPv6 Basics

### 1. IPv6 Address Format

IPv6 extends 32-bit IPv4 address into 128 bits, providing wider address space than IPv4.

The basic format of an IPv6 address is X:X:X:X:X:X:X:X. It is represented as eight groups of four hexadecimal digits (0-9, A-F), each group representing16 bits. The groups are separated by colons (:). In this format, each X represents a group of four hexadecimal digits.

Samples of IPv6 addresses are 2001:ABCD:1234:5678:AAAA:BBBB:1200:2100, 800:0:0:0:0:0:0:1, and 1080:0:0:0:8:800:200C:417A.

The digit 0 in an IPv6 address can be suppressed as follows:

- Leading zeros in each 16-bit field are suppressed. For example, 2001:00CD:0034:0078:000A:000B:1200:2100 can be suppressed to 2001:CD:34:78:A:B:1200:2100.
- The long sequence of consecutive all-zero fields in some IPv6 addresses can be replaced with two colons (::). For example, 800:0:0:0:0:0:0:1 can be represented as 800::1. The two colons (::) can be used only when all the 16 bits in a group are 0s, and it can appear only once in an IPv6 address.

### 2. IPv6 Prefix

IPv6 addresses are typically composed of two logical parts:

- Network prefix: *n* bits, corresponding to the network ID in IPv4 addresses
- interface ID: (128 – *n*) bits, corresponding to the host ID in IPv4 addresses

A slash (/) is used to separate the length of network prefix from an IPv6 address. For example, 12AB::CD30:0:0:0:0/60 indicates that the 60-bit network prefix in the address is used for route selection. IPv6 prefixes can be obtained from the IPv6 DHCP server, along with IPv6 addresses. A downlink DHCP server can also automatically obtain IPv6 prefixes from its uplink DHCP server.

### 3. Special IPv6 Addresses

There are some special IPv6 addresses:

fe80::/8: loopback address, similar to the IPv4 address 169.254.0.0/16

fc00::/7: local address, similar to IPv4 addresses 10.0.0.0/8, 172.16.0.0/16, and 192.168.0.0/16

ff00::/12: multicast address, similar to the IPv4 address 224.0.0.0/8

### 4. NAT66

IPv6-to-IPv6 Network Address Translation (NAT66) is a process of converting the IPv6 address in the IPv6 data packet header into another IPv6 address. NAT66 can be implemented by converting the prefix in an IPv6 address in an IPv6 data packet header into another IPv6 address prefix. NAT66 enables mutual access between an internal network and an external public network.

## 4.8.3 IPv6 Address Allocation Modes

- Manual configuration: IPv6 addresses, prefixes, and other network parameters are configured manually.
- Stateless Address Autoconfiguration (SLAAC): The link-local address is generated based on the interface ID, and the IPv6 address is automatically allocated based on the prefix information in the Router Advertisement (RA) packet.

- Stateful address allocation (DHCPv6): Two DHCPv6 allocation methods are as follows:
  - Automatic DHCPv6 allocation: The DHCPv6 server automatically allocates IPv6 addresses, prefixes, and other network parameters.
  - Automatic allocation of DHCPv6 Prefix Delegations (PDs): The lower-layer network device submits a prefix allocation application to the upper-layer network device. The upper-layer network device allocates an appropriate address prefix to the lower-layer device. The lower-layer device further divides the obtained prefix (usually less than 64 bits) into 64-bit prefixed subnet segments and advertises the address prefixes to the user link directly connected to the IPv6 host through the RA packet, implementing automatic address configuration for hosts.

### 4.8.4 Enabling the IPv6 Function

Choose **One-Device > Gateway > Config > Network > IPv6 Address**.

Toggle on **Enable** to enable the IPv6 function.




### 4.8.5 Configuring an IPv6 Address for the WAN Interface

Choose **One-Device** > **Gateway** > **Config** > **Network** > **IPv6 Address** > **WAN Settings**.

**Caution**

- When IPv6 is enabled, the MTU of the IPv4 WAN interface must be greater than 1280.
- If NAT66 is disabled, a public IPv6 address can access clients using the public IPv6 address on the intranet.

After you enable the IPv6 function, you can set related parameters on the **WAN Settings** tab. The number of **WAN** tabs indicates the number of WAN interfaces on the current device.

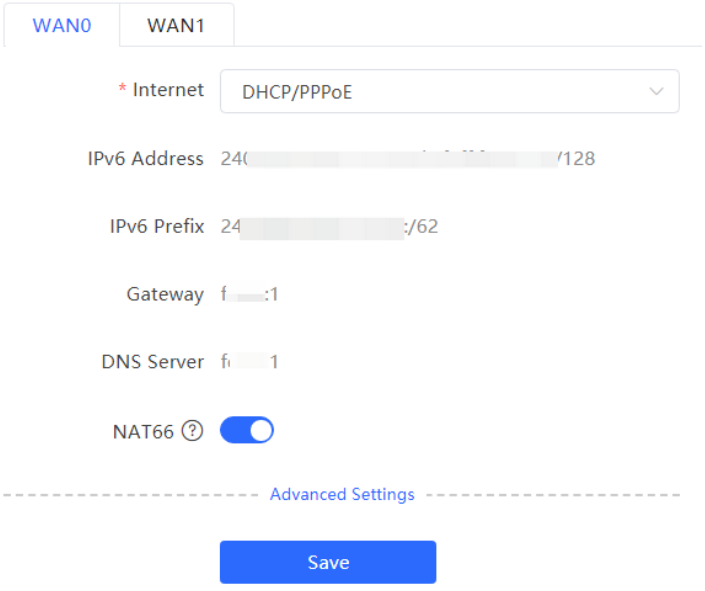


**Table 4-9 IPv6 address configuration for WAN interface**

| Parameter | Description |
| --- | --- |
| Internet | Configure a method for the WAN interface to obtain an IPv6 address.<br>● **DHCP/PPPoE**: The current device functions as the DHCPv6 client, and it applies for an IPv6 address and prefix from the uplink network device.<br>● **Static IP**: You need to manually configure a static IPv6 address, gateway address, and DNS server.<br>● **Null**: The IPv6 function is disabled on the WAN interface. |
| IPv6 Address | When **Internet** is set to **DHCP/PPPoE**, the automatically obtained IPv6 address is displayed.<br>When **Internet** is set to **Static IP**, you need to configure this parameter manually. |
| IPv6 Prefix | When **Internet** is set to **DHCP/PPPoE,** the IPv6 address prefix automatically obtained by the current device is displayed. |
| Gateway | When **Internet** is set to **DHCP/PPPoE**, the automatically obtained gateway address is displayed.<br>When **Internet** is set to **Static IP**, you need to configure this parameter manually. |
| DNS Server | When **Internet** is set to **DHCP/PPPoE**, the automatically obtained DNS server address is displayed.<br>When **Internet** is set to **Static IP**, you need to configure this parameter manually. |
| NAT66 | If the current device cannot access the Internet through **DHCP/PPPoE** or cannot obtain the IPv6 prefix, you need to enable the NAT66 function to allocate IPv6 addresses to clients on the internal network. |
| Default Preference | Set the default route preference for the current line. A smaller value indicates a higher preference. For the same destination address, the route with the highest preference is selected as the optimal route. |

### 4.8.6 Configuring an IPv6 Address for the LAN Port

Choose **One-Device** > **Gateway** > **Config** > **Network** > **IPv6 Address** > **LAN Settings**.

When the device accesses the Internet through DHCP, it can obtain LAN port IPv6 addresses from the uplink device and allocate IPv6 addresses to the clients in the LAN based on the IPv6 address prefix. If the uplink device cannot allocate an IPv6 address prefix to the device, you need to manually configure an IPv6 address prefix for the LAN port and enable the NAT66 function to allocate IPv6 addresses to the clients in the LAN. For details, see Section 4.8.5 Configuring an IPv6 Address for the WAN Interface.

Click **Add** and configure a rule for assigning IPv6 addresses to clients in the VLAN.

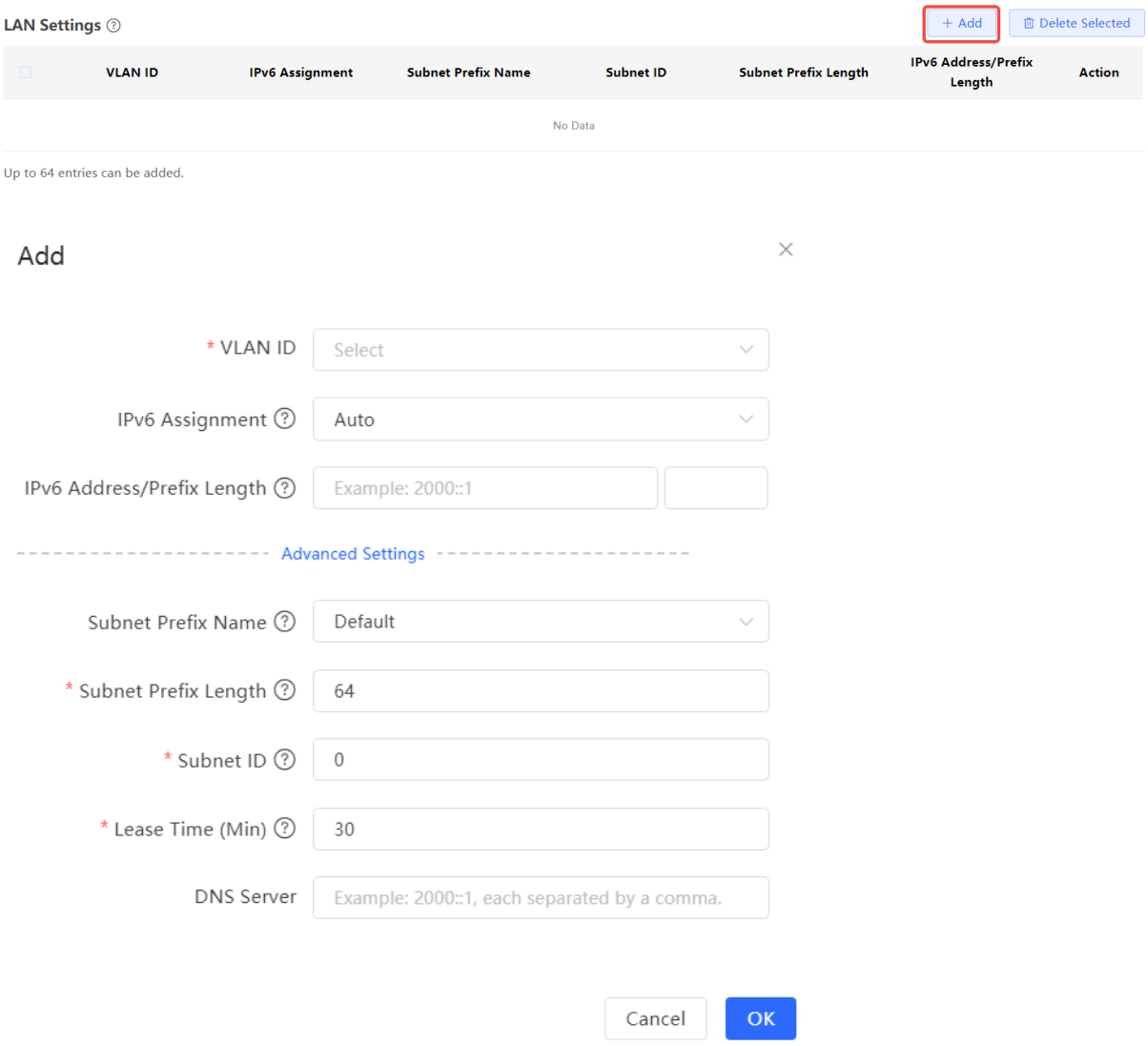



**Table 4-10 IPv6 address configuration for LAN port**

| Parameter | Description |
|---|---|
| VLAN ID | Configure a VLAN to which the rule applies. You can click the drop-down list box and select an existing VLAN. For details about how to create a VLAN, see Section 4.6 Configuring VLAN. |
| IPv6 Assignment | You can use either of the following methods to allocate IPv6 addresses to clients:<br>● **Auto**: Allocate IPv6 addresses to clients in DHCPv6 or SLAAC mode.<br>● **DHCPv6**: Allocate IPv6 addresses to clients through DHCPv6.<br>● **SLAAC**: Allocate IPv6 addresses to clients through SLAAC.<br>● **Null**: Do not allocate addresses to clients.<br>You should select an allocation method based on the protocol supported by clients on the internal network. If you are not sure about the supported protocol, select **Auto**. |

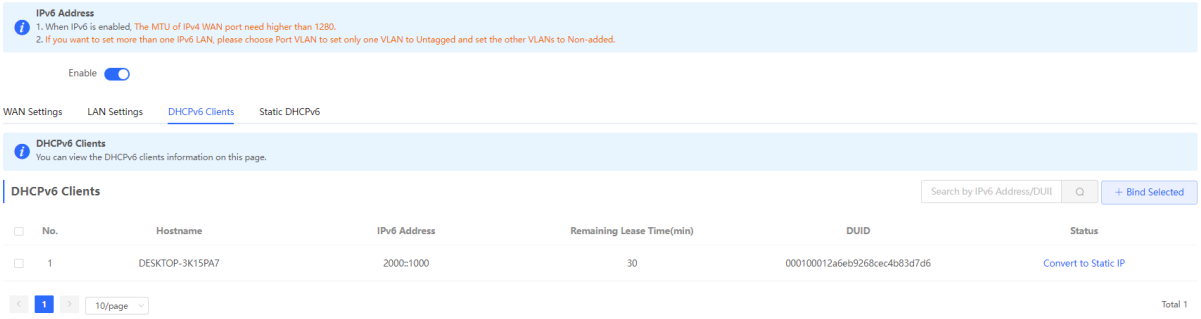
| Parameter | Description |
| --- | --- |
| IPv6 Address/Prefix Length | Configure the IPv6 address and length for the VLAN. If the address length ranges from 48 to 64 bits, the address will also be used as the IPv6 address prefix. |
| Subnet Prefix Name | Configure the interface from which the prefix is obtained, for example, **WAN_V6**. The default value is all interfaces. If **Disable** is selected, the **IPv6 Address/Prefix Length** field must be configured to assign IP addresses to hosts on the LAN. |
| Subnet Prefix Length | Specify the length of the subnet prefix. The value is in the range of 48 to 64. |
| Subnet ID | Configure the subnet ID in the hexadecimal format. The value 0 indicates auto increment. |
| Lease Time(Min) | Set the lease of the IPv6 address, in minutes. |
| DNS Server | Configure the IPv6 DNS server address. |

### 4.8.7 Viewing the DHCPv6 Client

Choose **One-Device** > **Gateway** > **Config** > **Network** > **IPv6 Address** > **DHCPv6 Clients**.

When the device functions as a DHCPv6 server to allocate IPv6 addresses to clients, you can view the information about the client that obtains an IPv6 address from the device on the current page. The client information includes the host name, IPv6 address, remaining lease time, and DHCPv6 Unique Identifier (DUID).

Enter the DUID in the search bar and click  to quickly find relative information of the specified DHCPv6 client.

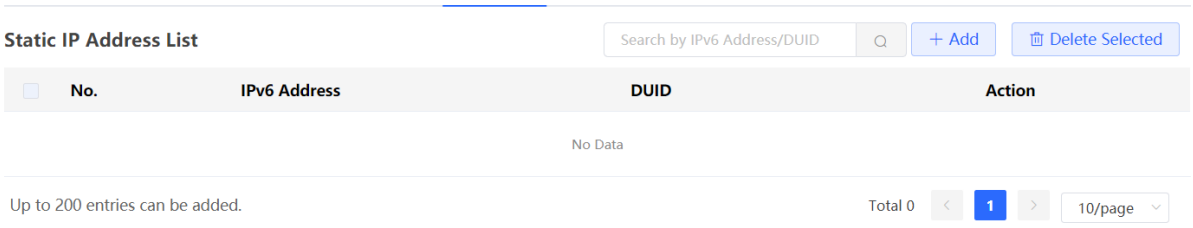



- Click **Convert to Static IP** to convert the IP binding of a client with an IP address to static binding. Then the DHCP server assigns a static IP address to the client.
- Click **Bind Selected** to convert the IP binding of multiple clients with IP addresses to static binding. Then the DHCP server assigns static IP addresses to the clients.

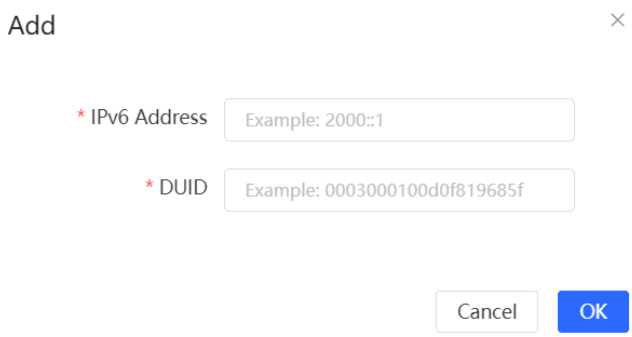
### 4.8.8 Configuring the Static DHCPv6 Address

Configure the IPv6 address statically bound to the DUID of a client so that the client can obtain the specified address each time.

Choose **One-Device** > **Gateway** > **Config** > **Network** > **IPv6 Address** > **Static DHCPv6**.




(1) Click **Add**.



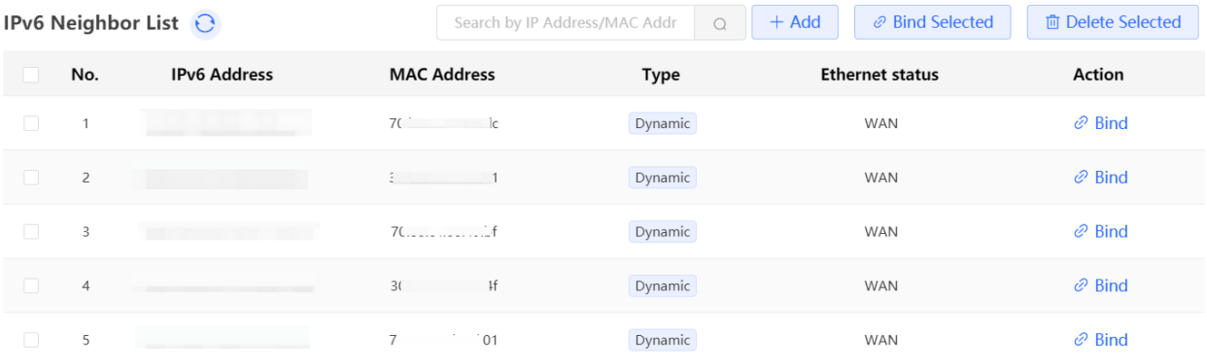

(2) Enter the IPv6 address and DUID.

(3) Click **OK**.

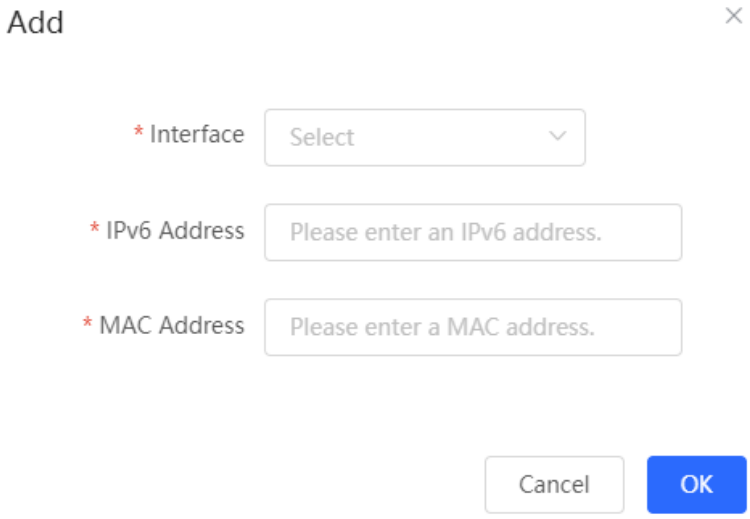
### 4.8.9 Configuring the IPv6 Neighbor List

In IPv6, Neighbor Discovery Protocol (NDP) is an important basic protocol. NDP replaces the ARP and ICMP route discovery protocols of IPv4, and supports the following functions: address resolution, neighbor status tracking, duplicate address detection, router discovery, and redirection.

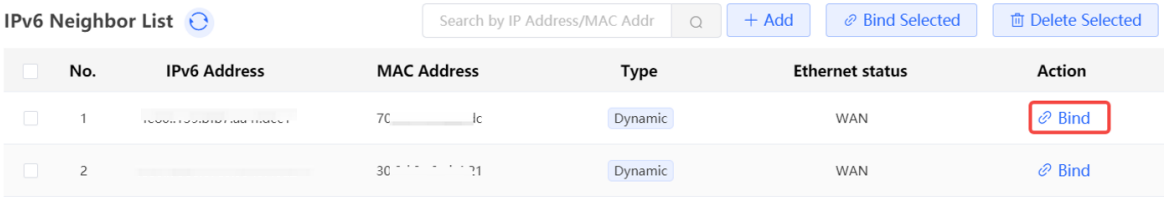
Choose **One-Device** > **Gateway** > **Config** > **Security** > **IPv6 Neighbor List**.




(1) Click **Add** and manually add the interface, IPv6 address and MAC address of the neighbor.




(2) Select the MAC address and IP address to be bound, and click **Bind** in the **Action** column to bind the IP address to the MAC address to prevent ND attacks.




## 4.9 Configuring a DHCP Server

### 4.9.1 DHCP Server Overview

After the DHCP server function is enabled in the LAN, the device can automatically deliver IP addresses to clients, so that clients connected to the LAN ports of the device or connected to Wi-Fi can access the Internet using the obtained addresses.

See Section 4.8.6 Configuring an IPv6 Address for the LAN Port for more information about the DHCPv6 server function.

### 4.9.2 Address Allocation Mechanism

The DHCP server allocates an IP address to a client in the following way:

(1) When the device receives an IP address request from a DHCP client, the device searches the DHCP static address allocation list. If the MAC address of the DHCP client is in the DHCP static address allocation list, the device allocates the corresponding IP address to the DHCP client.

(2) If the MAC address of the DHCP client is not in the DHCP static address allocation list or the IP address that the DHCP client applies is not in the same network segment as the LAN port IP address, the device selects an IP address not used from the address pool and allocates the address to the DHCP client.

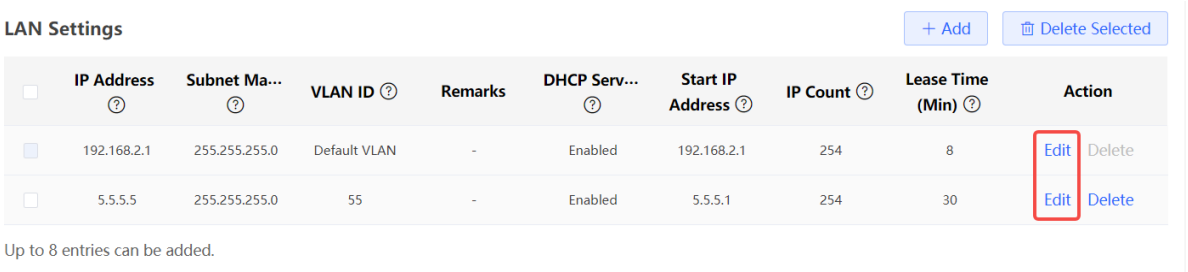
(3) If no IP address in the address pool is allocable, the client will fail to obtain an IP address.

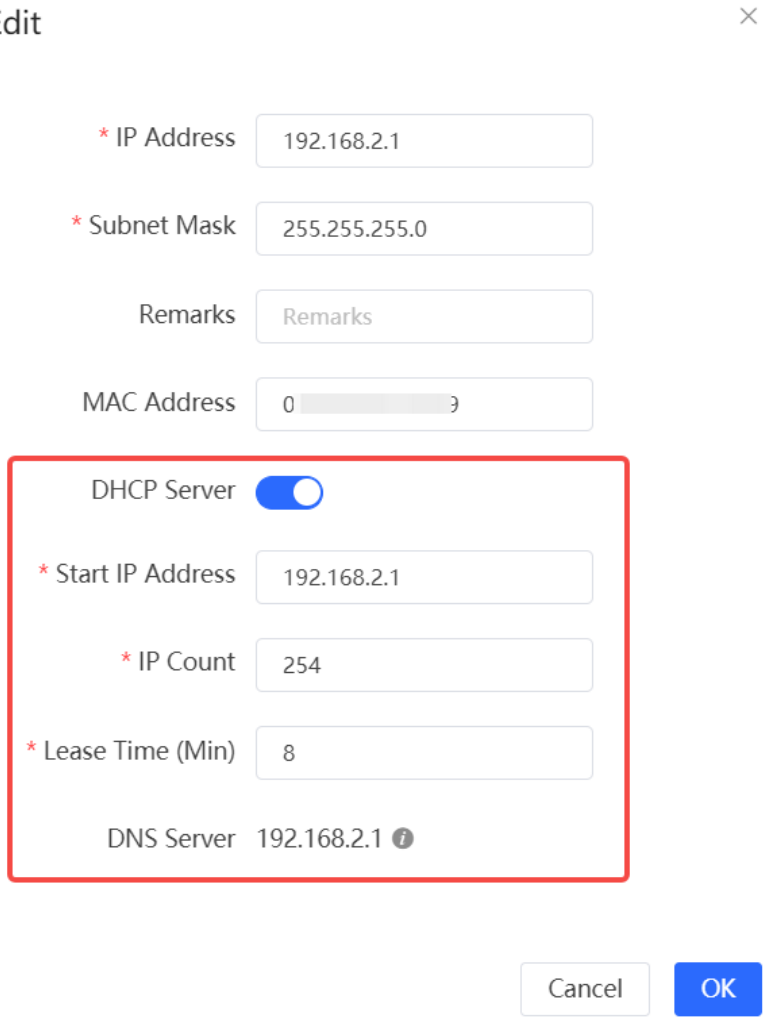
## 4.9.3 Configuring the DHCP Server

### 1. Configuring Basic Parameters

Choose **One-Device > Gateway > Config > Network > LAN > LAN Settings.**

Select the VLAN to which the DHCP function needs to be configured and click **Edit**.




**DHCP Server**: The DHCP server function is enabled by default in the router mode. You are advised to enable the function if the device is used as the sole router in the network. When multiple routers are connected to the upper-layer device through LAN ports, disable this function.

**Caution**

If the DHCP server function is disabled on all devices in the network, clients cannot automatically obtain IP addresses. You need to enable the DHCP server function on one device or manually configure a static IP address for each client for Internet access.

**Start IP Address**: Enter the start IP address of the DHCP address pool. A client obtains an IP address from the address pool. If all the addresses in the address pool are used up, no IP address can be obtained from the address pool.

**IP Count**: Enter the number of IP addresses in the address pool.

**Lease Time (Min)**: Enter the address lease term. When a client is connected, the leased IP address is automatically renewed. If a leased IP address is not renewed due to client disconnection or network instability, the IP address will be reclaimed after the lease term expires. After the client connection is restored, the client can request an IP address again. The default lease term is 30 minutes.

### 2. Configuring DHCP Option

Choose **One-Device** > **Gateway** > **Config** > **Network** > **LAN** > **DHCP**.

The DHCP Option configuration is shared by all LAN ports. You can configure DHCP Option based on actual needs.

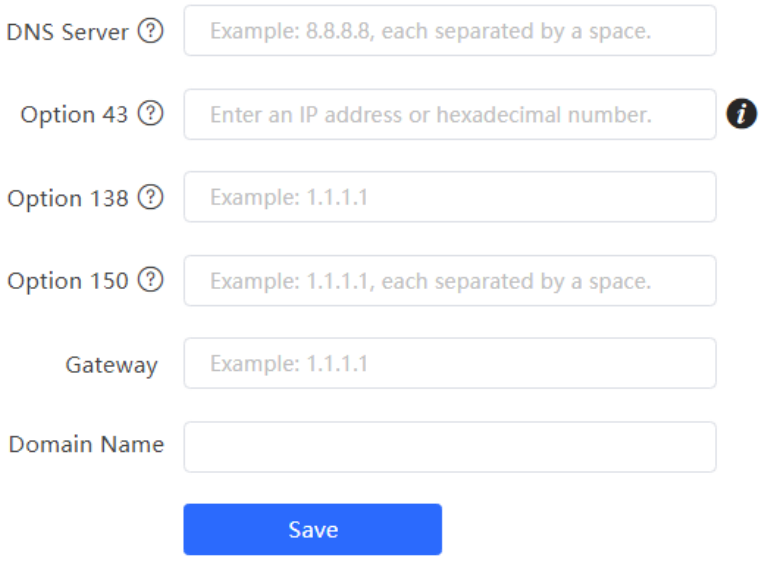



**Table 4-11 DHCP Option configuration**

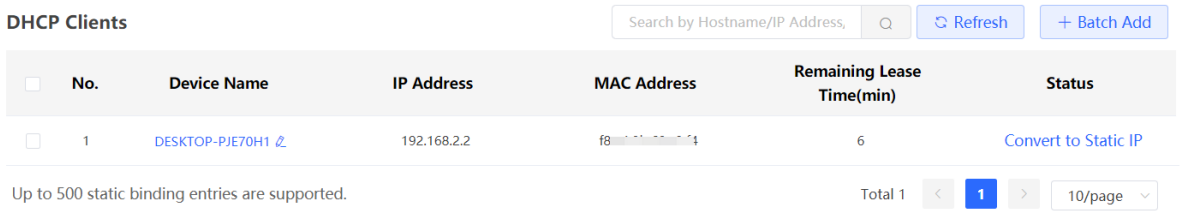
| Parameter | Description |
|---|---|
| DNS Server | Enter the DNS server address provided by the ISP. |

| Parameter | Description |
| --- | --- |
| Option 43 | When the AC (wireless controller) and the AP are not in the same LAN, the AP cannot discover the AC through broadcast after obtaining an IP address from the DHCP server. To enable the AP to discover the AC, you need to configure Option 43 carried in the DHCP response packet on the DHCP server. |
| Option 138 | Enter the IP address of the AC. Similar to Option 43, when the AC and AP are not in the same LAN, you can configure Option 138 to enable the AP to obtain the IPv4 address of the AC. |
| Option 150 | Enter the IP address of the TFTP server. The TFTP server allocates addresses to clients. |
| Gateway | Configure the IP address of the default gateway or default route that the DHCP server assigns to clients. The default gateway is the next hop address used by a client to send data packets to an external network. It is responsible for forwarding the data packets to the target network. |
| Domain Name | When deploying a server on the internal network, you can set a domain name to allow intranet clients to access the server. After the configuration is completed, intranet clients can access the server by using the host name and domain name, thereby avoiding access failure due to changes in the server's IP address. |

### 4.9.4 Viewing the DHCP Client

Choose **One-Device** > **Gateway** > **Config** > **Network** > **LAN** > **DHCP Clients**.

View the client addresses automatically allocated by thorough DHCP. Find the target client and click **Convert to Static IP** in the **Status** column, or select desired clients and click **Batch Add**. The dynamic address allocation relationship is added to the static address allocation list, so that the host can obtain the bound IP address for each connection. For details on how to view the static address allocation list, see Section 4.9.5 Configuring Static IP Addresses.

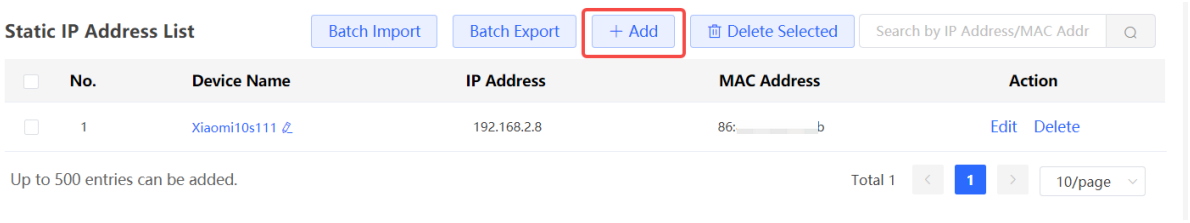


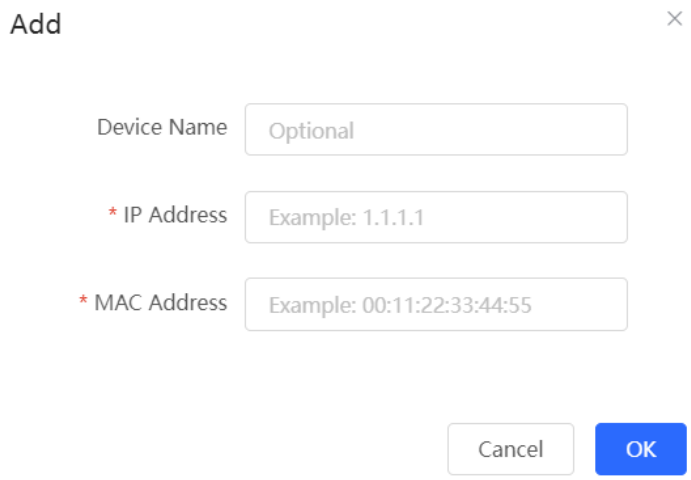

### 4.9.5 Configuring Static IP Addresses

Choose **One-Device** > **Gateway** > **Config** > **Network** > **LAN Static IP Addresses**.

The page displays all configured static IP addresses.

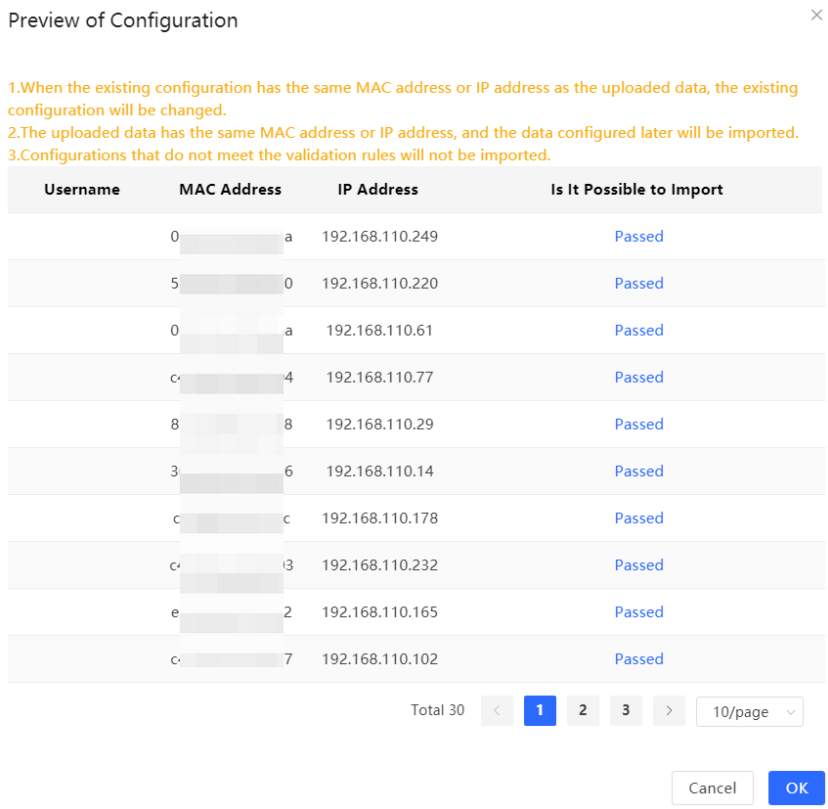
Click **Add**. In the pop-up window, enter the device name, MAC address and IP address of the client to be bound, and click **OK**. After a static IP address is bound, the bound IP address will be obtained each time the client connects to the network.




Click **Batch Export** to export all existing static IP addresses.

Click **Batch Import** to import static IP addresses in the file to the device. The entries with the same MAC address as those in the list will be overwritten by the configurations in the file, and the other configurations in the list will not be changed. The other configurations in the file will be added to the list in the form of new entries.




# 4.10 Configuring Routes

## 4.10.1 Configuring Static Routes

Static routes are manually configured by the user. When a data packet matches a static route, the packet will be forwarded according to the specified forwarding mode.

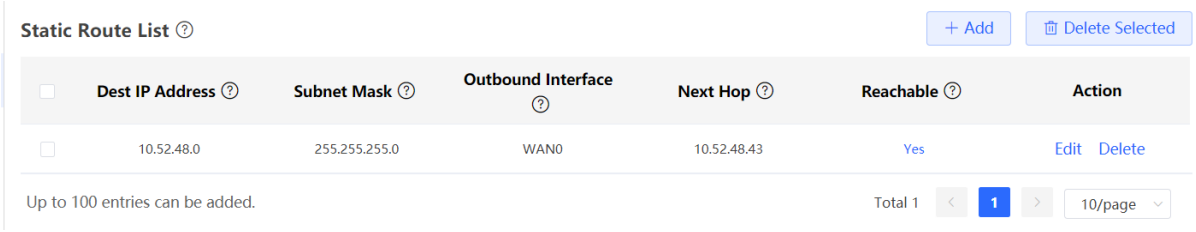
**Caution**

Static routes cannot automatically adapt to changes of the network topology. When the network topology changes, you need to reconfigure the static routes.

### 1. Configuring IPv4 Static Routing

Choose **One-Device > Gateway > Config > Advanced** > **Routing** > **Static Routing**.

Click **Add**. In the dialog box that appears, enter the destination address, subnet mask, outbound interface, and next-hop IP address to create a static route.



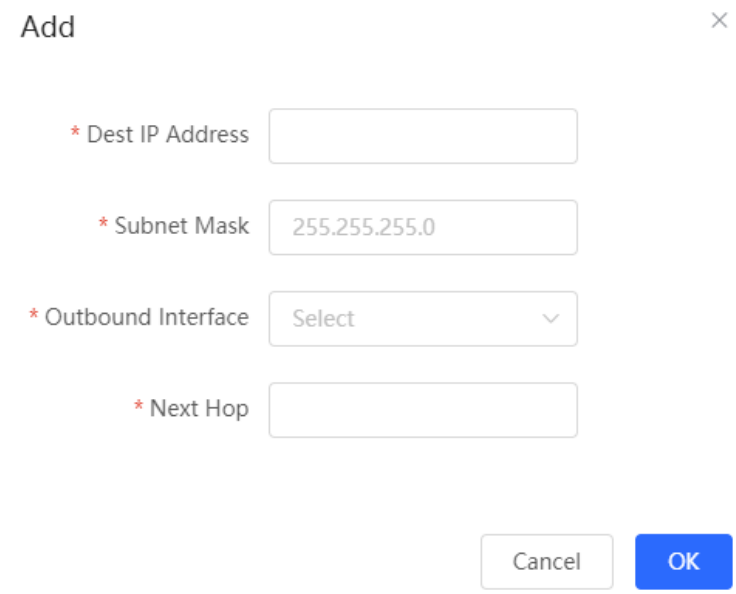
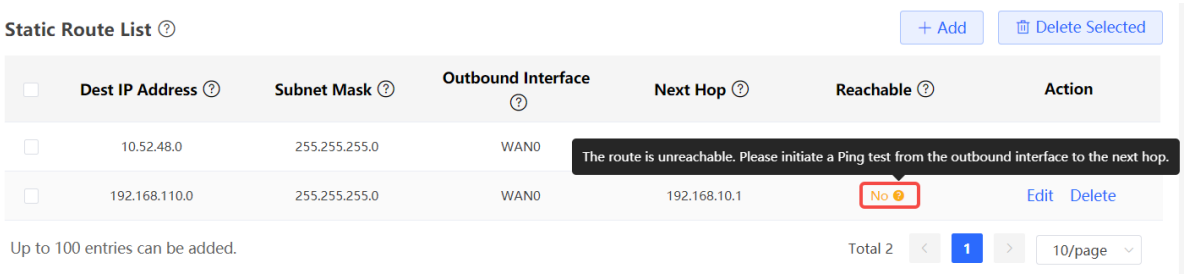



**Table 4-12 Static route configuration**

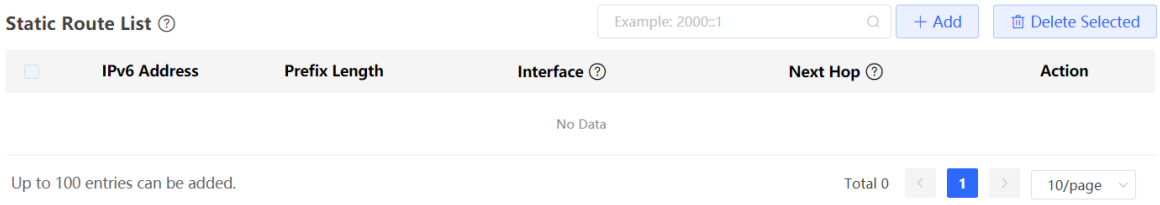
| Parameter | Description |
|---|---|
| Dest IP Address | Specify the destination network to which the data packet is to be sent. The device matches the data packet based on the destination address and subnet mask. |
| Subnet Mask | Specify the subnet mask of the destination network. The device matches the data packet based on the destination address and subnet mask. |
| Outbound Interface | Specify the interface that forwards the data packet. |
| Next Hop | Specify the IP address of the next hop in the route for the data packet. If the outbound interface accesses the Internet through PPPoE dialing, you do not need to configure the next-hop address. |

After a static route is created, you can find the relevant route configuration and reachability status in the static route list. The **Reachable** parameter specifies whether the next hop is reachable, based on which you can determine whether the route takes effect. If the value is **No**, check whether the outbound interface in the current route can ping the next-hop address.

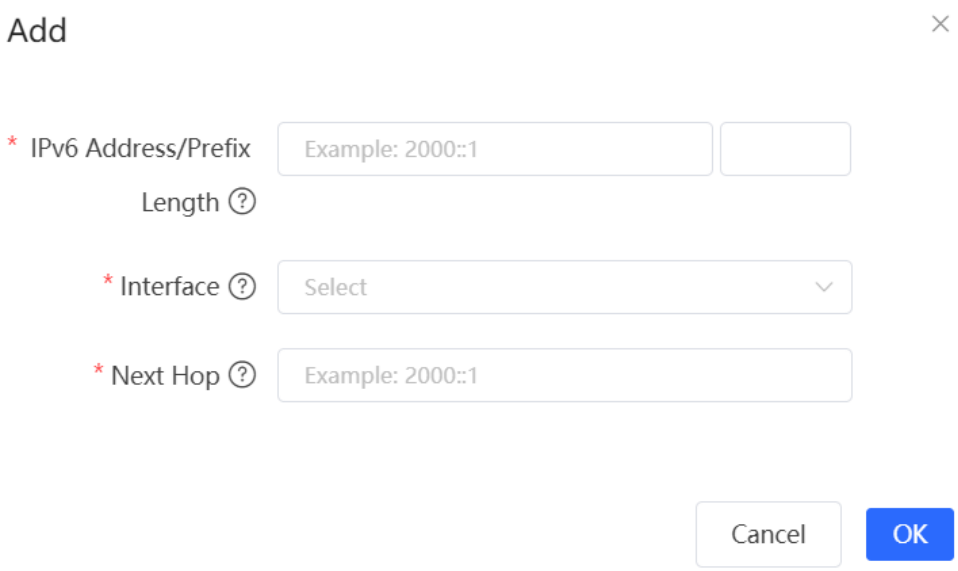


### 2. Configuring the IPv6 Static Route

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **IPv6 Static Routing**.




(1) Click **Add**.




(2) Configure an IPv6 static route of the device.

**Table 4-13 Description of IPv6 Static Routing Configuration Parameters**

| Parameter | Description |
|---|---|
| IPv6 Address/Prefix Length | Destination network of the packet. The destination address of the packet is matched according to the IPv6 address and prefix length. |
| Outbound Interface | Interface that forwards the packet. |
| Next Hop | IP address of the next routing node to which the packet is sent. |

(3) Click **OK**.

## 4.10.2 Configuring PBR

Policy-based routing (PBR) is a mechanism for routing and forwarding based on user-specified policies. When a router forwards data packets, it filters the packets according to the configured rules, and then forwards the matched packets according to the specified forwarding policy. The PBR feature enables the device to formulate

rules according to specific fields (source or destination IP address and protocol type) in the data packets, and forward the data packets from a specific interface.

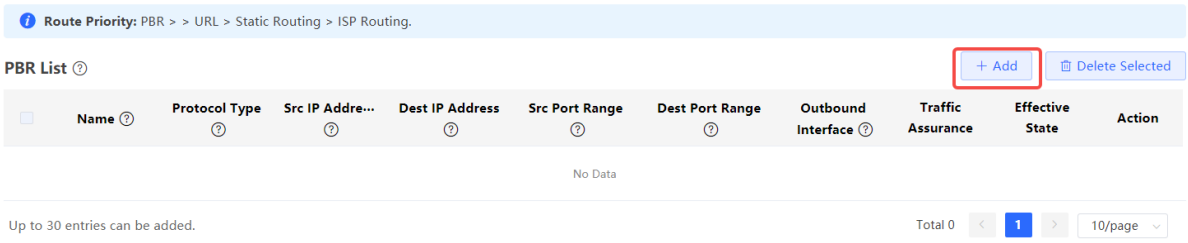
In a multi-line scenario, if the device is connected to the Internet and the internal network through different lines, the traffic will be evenly routed over the lines if no routing settings are available. In this case, access data to the internal network may be sent to the external network, or access data to the external network may be sent to the internal network, resulting in network exceptions. To prevent these exceptions, you need to configure PBR to control data isolation and forwarding on the internal and external networks.

The device can forward data packets using either of the following three policies: PBR, address-based routing, and static routing. When all the policies exist, PBR, static routing, and address-based routing have descending order in priority. For details on address-based routing, see Section 4.3.7 Configuring the Multi-Line Load Balancing Mode.

### 1. Configuring IPv4 PBR

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **PBR**.

Click **Add** to add a PBR rule.



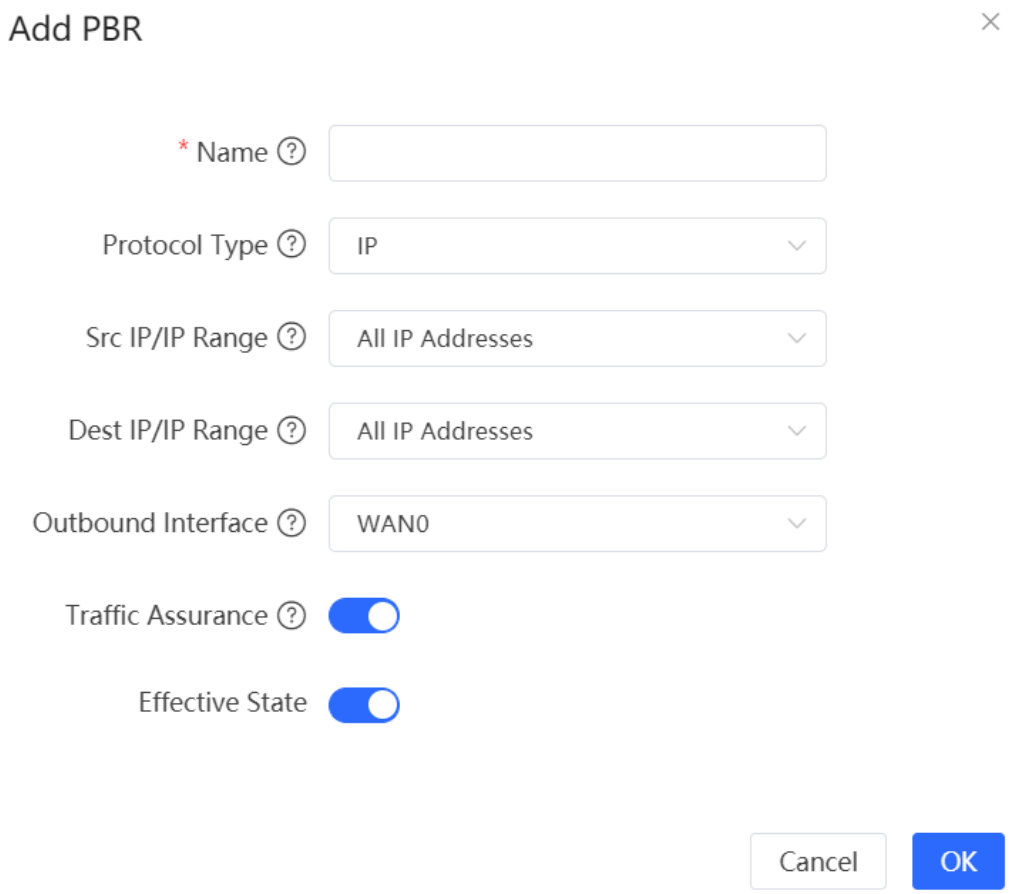



**Table 4-14 Description of IPv4 PBR Configuration Parameters**

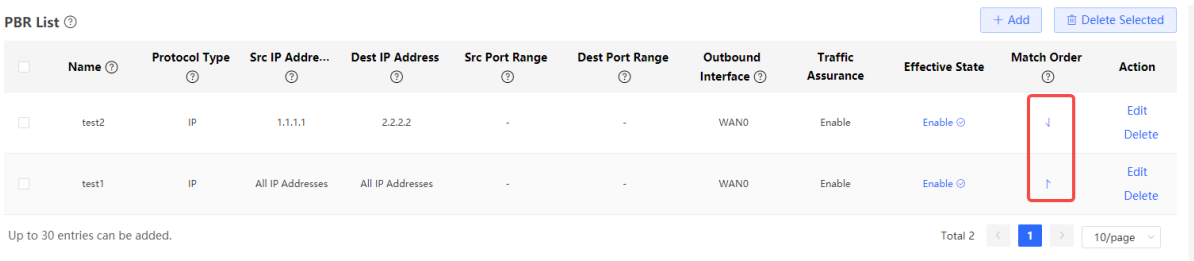
| Parameter | Description |
|---|---|
| Name | Specify the name of the PBR rule, which uniquely identifies a PBR rule. The name must be unique for each rule. |
| Protocol Type | Specify the protocol to which the PBR rule is effective. You can set this parameter to **IP**, **ICMP**, **UDP**, **TCP**, or **Custom**. |
| Protocol Number | When **Protocol Type** is set to **Custom**, you need to enter the protocol number. |
| Src IP/IP Range | Configure the source IP address or IP address range for matching PBR entries. The default value is All IP Addresses.<br>● **All IP Addresses**: Match all the source IP addresses.<br>● **Custom**: Match the source IP addresses in the specified IP range. |
| Custom Src IP | When Src IP/IP Range is set to **Custom**, you need to enter a single source IP address or a source IP range. |

| Parameter | Description |
| --- | --- |
| Dest IP/IP Range | Configure the destination IP address or IP address range for matching PBR entries. The default value is All IP Addresses.<br>● **All IP Addresses**: Match all the destination IP addresses.<br>● **Custom**: Match the destination IP addresses in the specified IP range. |
| Custom Dest IP | When Dest IP/IP Range is set to Custom, you need to enter a destination source IP address or a destination IP range. |
| Src Port Range | This parameter is available only when Protocol Type is set to TCP or UDP. This parameter specifies the source port range for packet matching using PBR. |
| Dest Port Range | This parameter is available only when Protocol Type is set to TCP or UDP. This parameter specifies the destination port range for packet matching using PBR. |
| Outbound Interface | Specify the interface that forwards the data packet based on the hit PBR rule. |
| Traffic Assurance | When an outbound interface is unreachable, the traffic will be automatically routed to other reachable outbound interfaces. |
| Effective State | Turn on **Effective State** to specify whether to enable the PBR rule. If **Effective State** is turned off, this rule does not take effect. |

**Note**

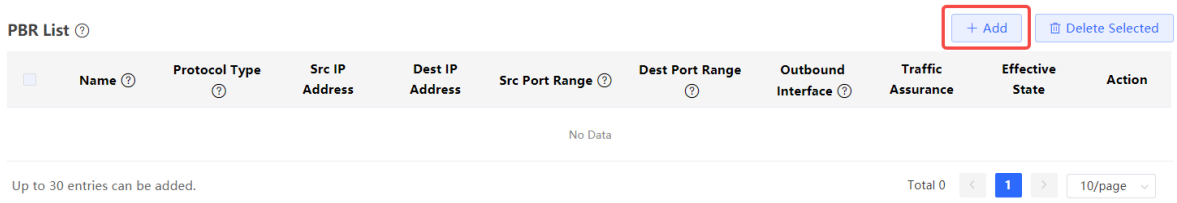
If you want to restrict the access device to access only the specified internal network, you can set the outbound interface in the corresponding route to the WAN interface in the private line network. For details on how to set the private line network, see Section 4.3.4 Configuring the Private Line.

All the created PBR policies are displayed in the PBR list, with the latest policy listed on the top. The device matches the policies according to their sorting in the list. You can manually adjust the policy matching sequence by clicking or in the **Match Order** column.




## 2. Configuring IPv6 PBR

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **IPv6 PBR**.




Click **Add** to add a PBR rule.

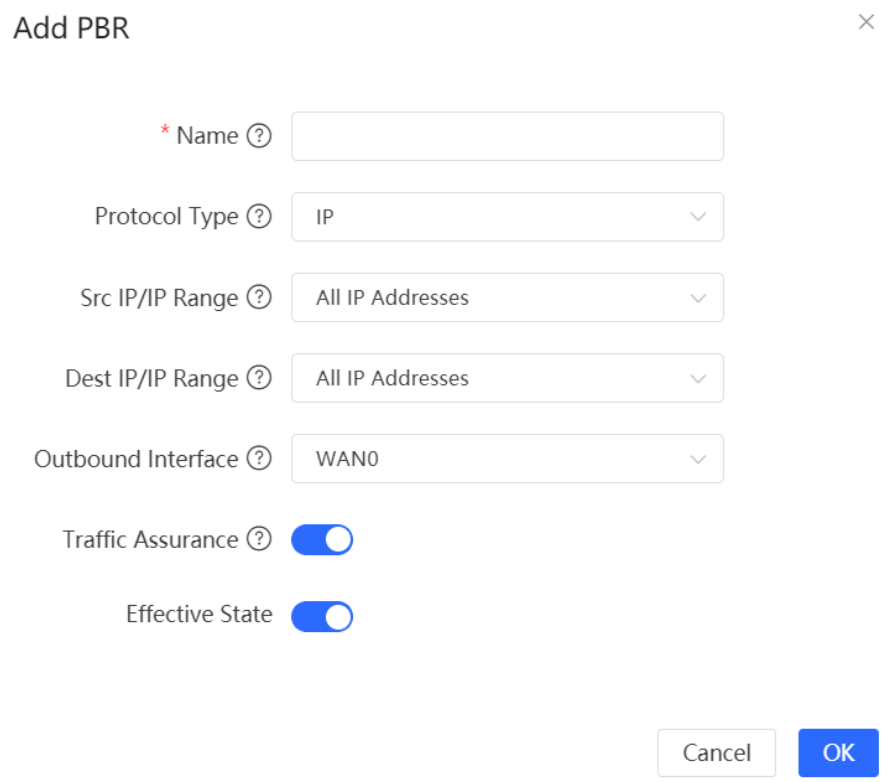



**Table 4-15 Description of IPv6 PBR Configuration Parameters**

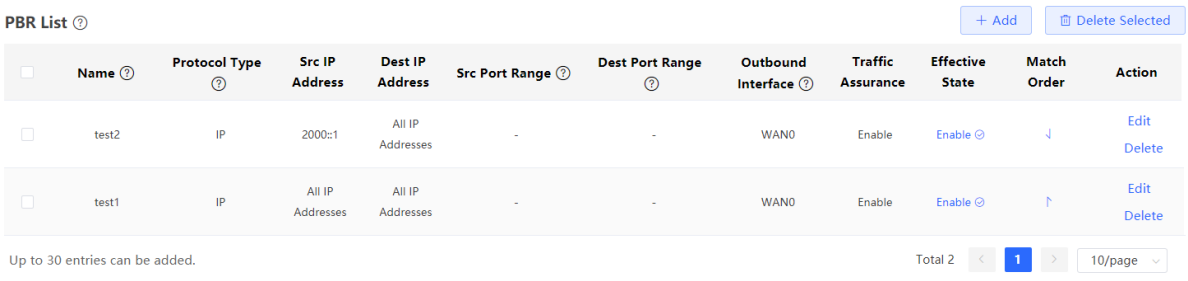
| Parameter | Description |
|---|---|
| Name | Specify the name of the PBR rule, which uniquely identifies a PBR rule. The name must be unique for each rule. |
| Protocol Type | Specify the protocol to which the PBR rule is effective. You can set this parameter to **IP**, **ICMPv6**, **UDP**, **TCP**, or **Custom**. |
| Protocol Number | When **Protocol Type** is set to **Custom**, you need to enter the protocol number. |
| Src IP/IP Range | Configure the source IP address or IP address range for matching PBR entries. The default value is All IP Addresses.<br>● **All IP Addresses**: Match all the source IP addresses.<br>● **Custom**: Match the source IP addresses in the specified IP range. |

| Parameter | Description |
| --- | --- |
| Custom Src IP | When Src IP/IP Range is set to **Custom**, you need to enter a single source IP address or a source IP range. |
| Dest IP/IP Range | Configure the destination IP address or IP address range for matching PBR entries. The default value is All IP Addresses.<br>● **All IP Addresses**: Match all the destination IP addresses.<br>● **Custom**: Match the destination IP addresses in the specified IP range. |
| Custom Dest IP | When Dest IP/IP Range is set to Custom, you need to enter a destination source IP address or a destination IP range. |
| Src Port Range | This parameter is available only when Protocol Type is set to TCP or UDP. This parameter specifies the source port range for packet matching using PBR. |
| Dest Port Range | This parameter is available only when Protocol Type is set to TCP or UDP. This parameter specifies the destination port range for packet matching using PBR. |
| Outbound Interface | Specify the interface that forwards the data packet based on the hit PBR rule. |
| Traffic Assurance | When an outbound interface is unreachable, the traffic will be automatically routed to other reachable outbound interfaces. |
| Effective State | Turn on **Effective State** to specify whether to enable the PBR rule. If **Effective State** is turned off, this rule does not take effect. |

**Note**

If you want to restrict the access device to access only the specified internal network, you can set the outbound interface in the corresponding route to the WAN interface in the private line network. For details on how to set the private line network, see Section 4.3.4 Configuring the Private Line.

All the created PBR policies are displayed in the PBR list, with the latest policy listed on the top. The device matches the policies according to their sorting in the list. You can manually adjust the policy matching sequence by clicking or in the **Match Order** column.



### 3. Typical Configuration Example

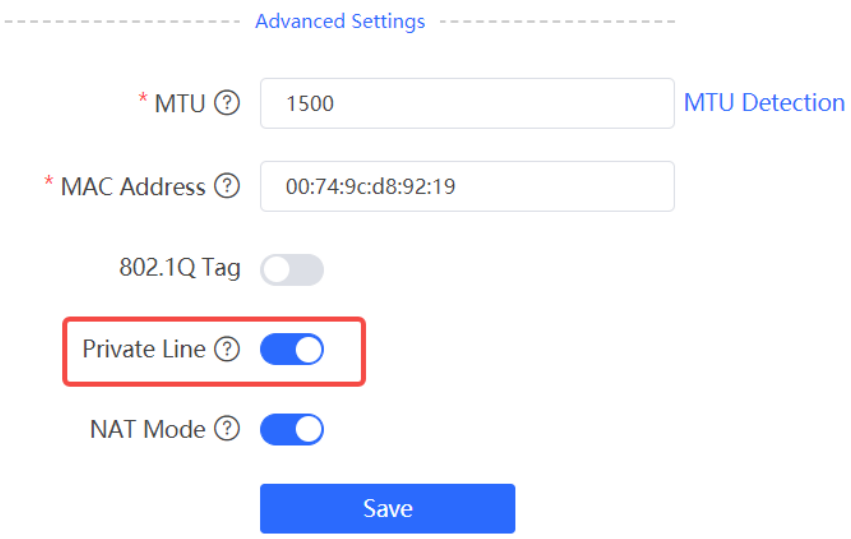
- Networking Requirements

Two lines with different bandwidths are deployed for an enterprise. Line A (WAN 1) is used for access to the Internet and Line B (WAN 2) is used for access to the specific internal network (10.1.1.0/24). The enterprise wants to configure PBR to guarantee correct data flows between the internal and external networks, isolate devices in the specified address range (172.26.31.1 to 172.26.31.200) from the external network, and allow these devices to access the specific internal network only.

- Configuration Roadmap
- Configure the private line.
- Add a PBR policy for access to the internal network.
- Add a PBR policy for access to the external network.
- Add a PBR policy to restrict specific devices to access the internal network only.
- Configuration Steps

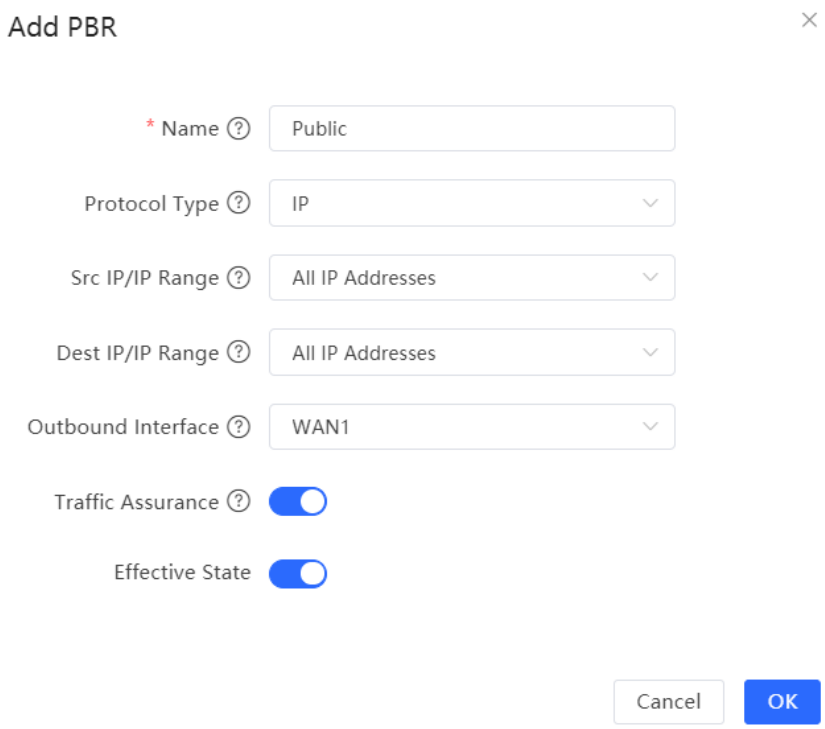
(1) Configure WAN 2 as the private line for the internal network.

When you configure networking parameters for WAN 2 port, click **Advanced Settings**, turn on **Private Line**, and click **Save**. For details, see Section 4.3.4 Configuring the Private Line.



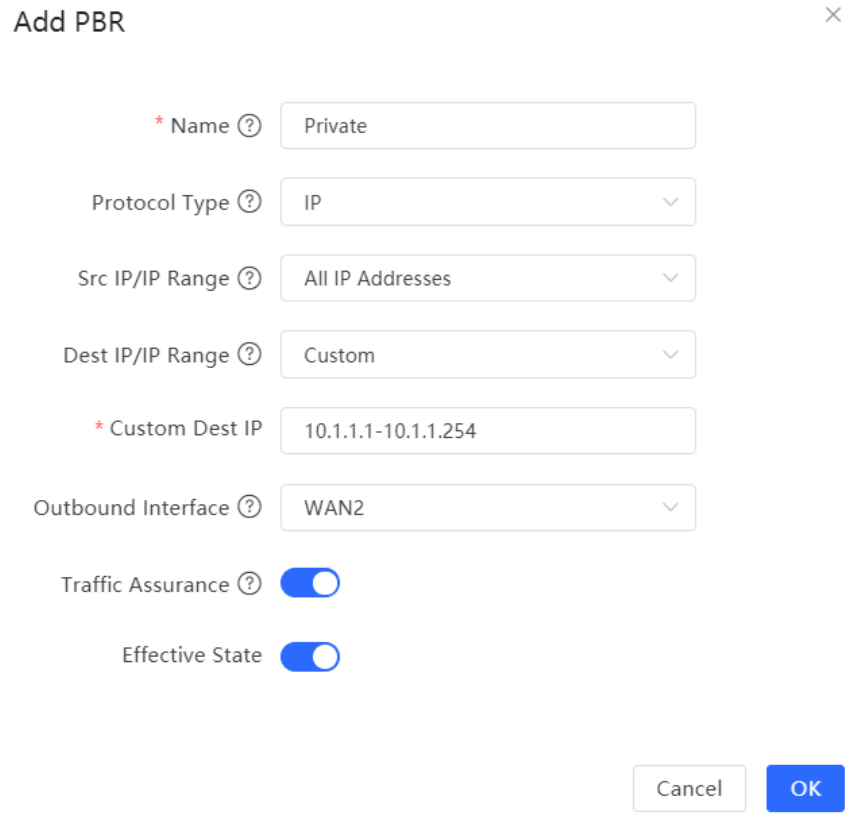

(2) Add a PBR policy to forward data packets destined to the external network through WAN 1 port.

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **PBR** and click **Add**. In the dialog box that appears, create a PBR policy and set **Outbound Interface** to **WAN1**.



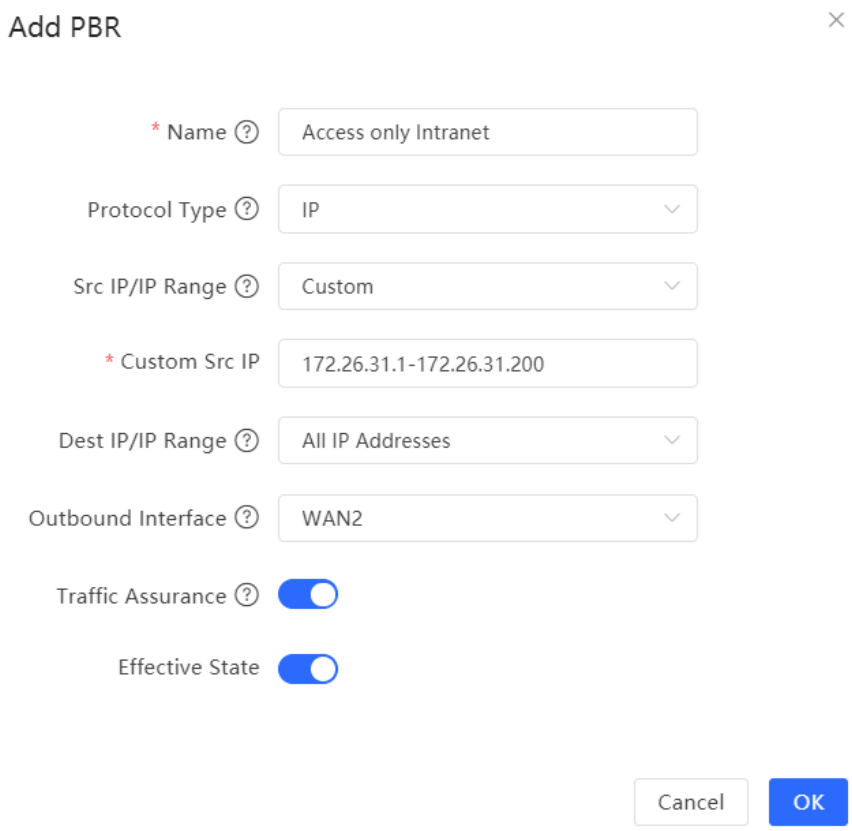

(3) Add a PBR policy to forward data packets destined to the internal network through WAN 2 port.

In this policy, set **Custom Dest IP** to 10.1.1.1-10.1.1.254 and **Outbound Interface** to WAN2.



(4) Add a PBR policy to restrict devices in the IP range 172.26.31.1 to 172.26.31.200 to access the internal private line only.

In this policy, set **Src IP/IP Range** to **Custom**, **Custom Src IP** to 172.26.31.1-172.26.31.200, and **Outbound Interface** to WAN2.



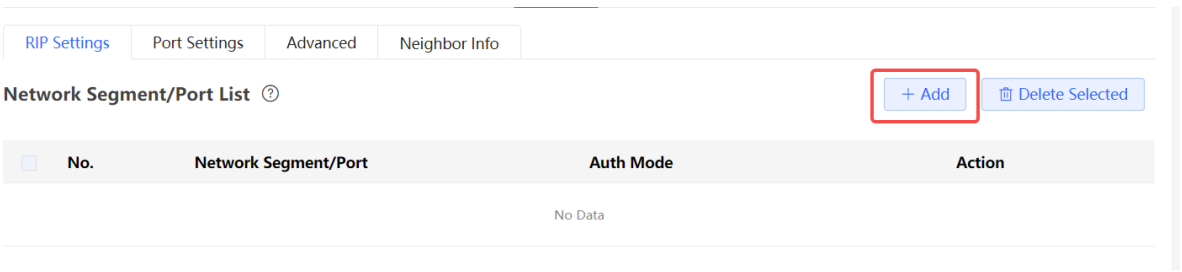

## 4.10.3 Configuring RIP

Routing Information Protocol (RIP) is applicable to small and medium-sized networks and is a dynamic routing protocol that is easy to configure. RIP measures the network distance based on the number of hops and selects a route based on the distance. RIP uses UDP port 520 to exchange the routing information.

### 1. Configuring RIP Basic Functions

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings**

Click **Add** and configure the network segment and interface.



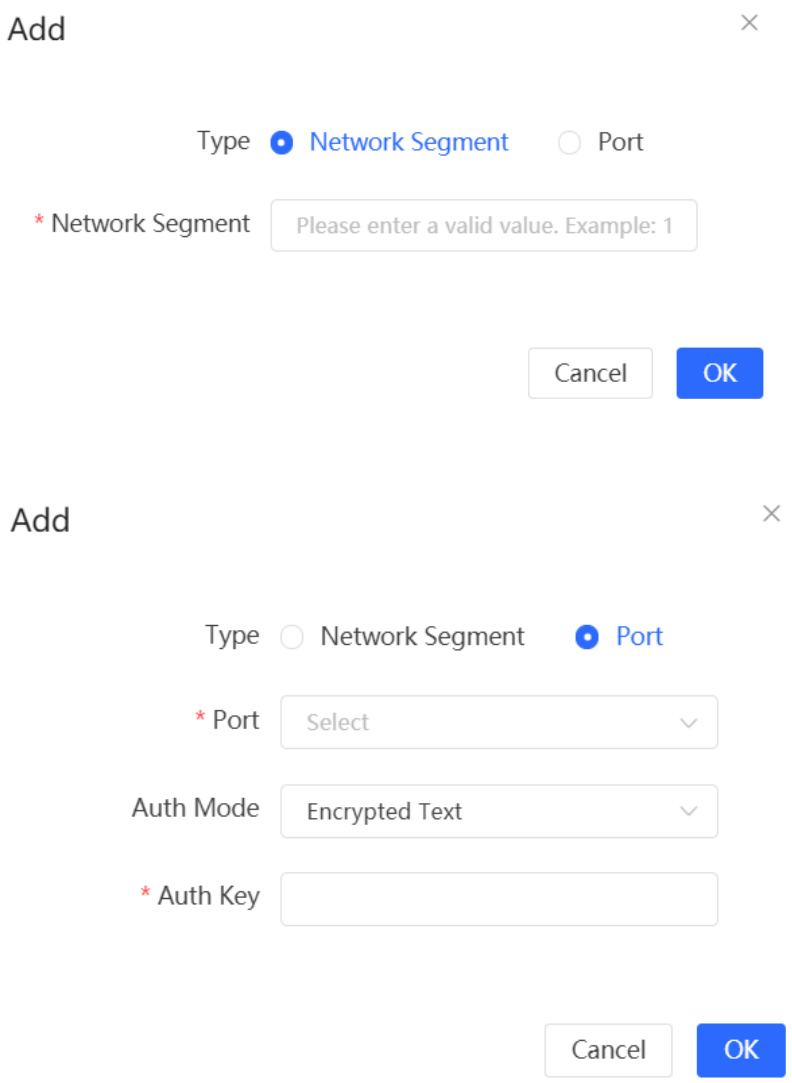






**Table 4-16 RIP Configuration Parameters**

| Parameter | Description |
|---|---|
| Type | ● **Network Segment**: Enable RIP in the specified network segment. The IP addresses of this network segment are added to the RIP routing table. The device and its RIP-enabled neighbor devices learn the routing table from each other.<br>● **Port**: Enable RIP on the specified port. All the IP addresses of this port are added to the RIP routing table. The device and its RIP-enabled neighbor devices learn the routing table from each other. |
| Network Segment | Enter the network segment, for example, **10.1.0.0/24**, when **Type** is set to **Network Segment**.<br>RIP will be enabled on all interfaces of the device covered by this network segment. |
| Port | Select a VLAN interface or physical port when **Type** is set to **Port**. |
| Auth Mode | ● **No Authentication**: The protocol packets are not authenticated. |

| Parameter | Description |
| --- | --- |
| | ● **Encrypted Text**: The protocol packets are authenticated, and the authentication key is transmitted with the protocol packets in the form of encrypted text.<br>● **Plain Text**: The protocol packets are authenticated, and the authentication key is transmitted with the protocol packets in the form of plain text. |
| Auth Key | Enter the authentication key to authenticate protocol packets when **Auth Mode** is set to **Encrypted Text** or **Plain Text**. |

### 2. Configuring the RIP Port

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings** > **Port Settings**

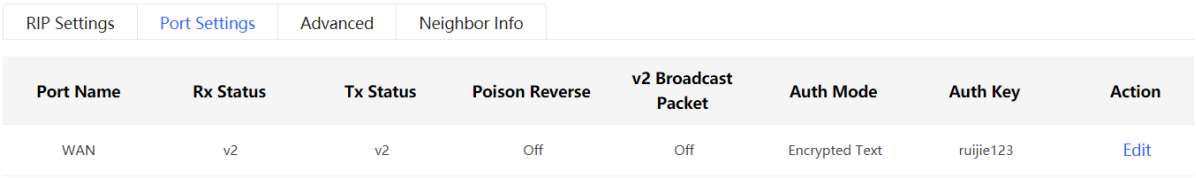


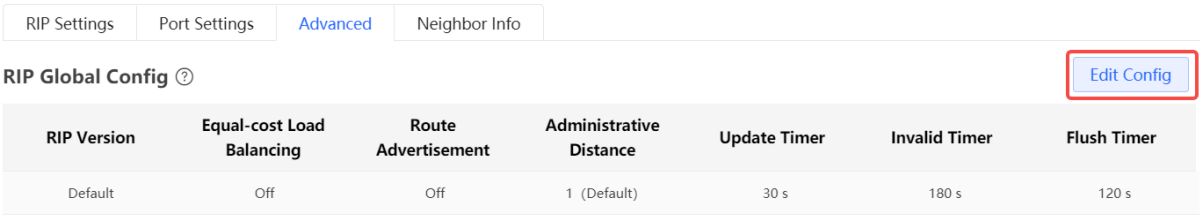

**Table 4-17 Configuration Parameters in the Port List**

| Parameter | Description |
| --- | --- |
| Port Name | Name of the port where RIP is enabled. |
| Rx Status | RIP version of packets currently received. |
| Tx Status | RIP version of packets currently transmitted. |
| Poison Reverse | After the port learns the route, the route overhead is set to **16** (indicating that the route is unreachable), and the route is sent back to the neighbor from the original port to avoid a loop. |
| v2 Broadcast Packet | When a neighbor does not support multicast, broadcast packets can be sent.<br>You are advised to disable RIPv2 broadcast packets to improve network performance. |
| Auth Mode | **No Authentication**: The protocol packets are not authenticated.<br>**Encrypted Text**: The protocol packets are authenticated, and the authentication key is transmitted with the protocol packets in the form of encrypted text.<br>**Plain Text**: The protocol packets are authenticated, and the authentication key is transmitted with the protocol packets in the form of plain text. |
| Auth Key | Enter the authentication key to authenticate protocol packets when **Auth Mode** is set to **Encrypted Text** or **Plain Text**. |

| Parameter | Description |
| --- | --- |
| Action | Click **Edit** to modify RIP settings of the port. |

### 3. Configuring the RIP Global Configuration

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings** > **Advanced,** click **Edit Config**, and configure RIP global configuration parameters.



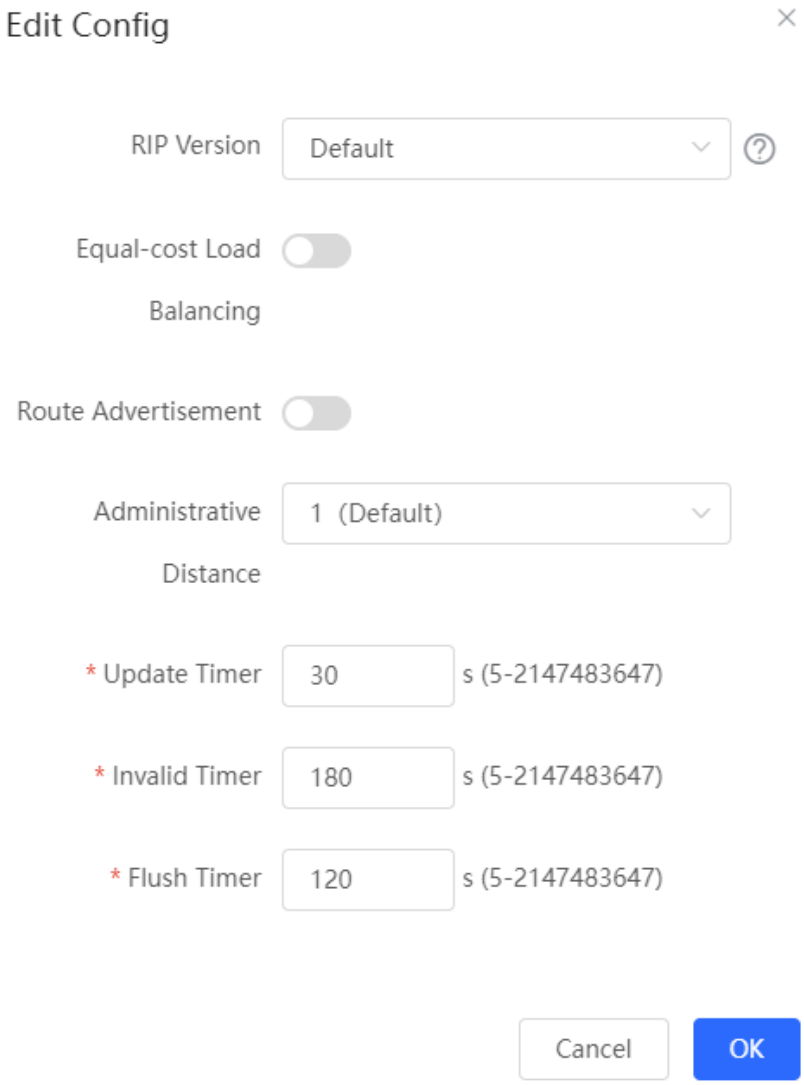



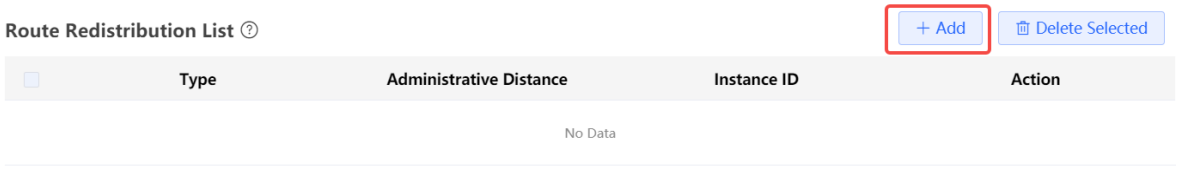
**Table 4-18 RIP Global Configuration Parameters**

| Parameter | Description |
| --- | --- |
| RIP Version | ● **Default**: Select RIPv2 for sending packets and RIPv1/v2 for receiving packets.<br>● **V1**: Select RIPv1 for sending and receiving packets.<br>● **V2**: Select RIPv2 for sending and receiving packets. |
| Route Advertisement | After route advertisement is enabled, the current device generates a default route and sends it to the neighbor. |
| Administrative Distance | Redistribute routes of other protocols to the RIP domain so that RIP can interwork with other routing domains. |
| Update Timer | RIP update cycle. The routing information is updated every 30 seconds by default. |
| Invalid Timer | If no update is received before a route becomes invalid, the route is considered unreachable. The default value is 180 seconds. |
| Flush Timer | If no update is received before the flush timer of an invalid route expires, the route is completely deleted from the RIP routing table. The default value is 120 seconds. |

### 4. Configuring the RIP Route Redistribution List

Redistribute routes of other protocols to the RIP domain so that RIP can interwork with other routing domains.

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings** > **Advanced**, click **Add** in **Route Redistribution List**, and select the type and administrative distance.



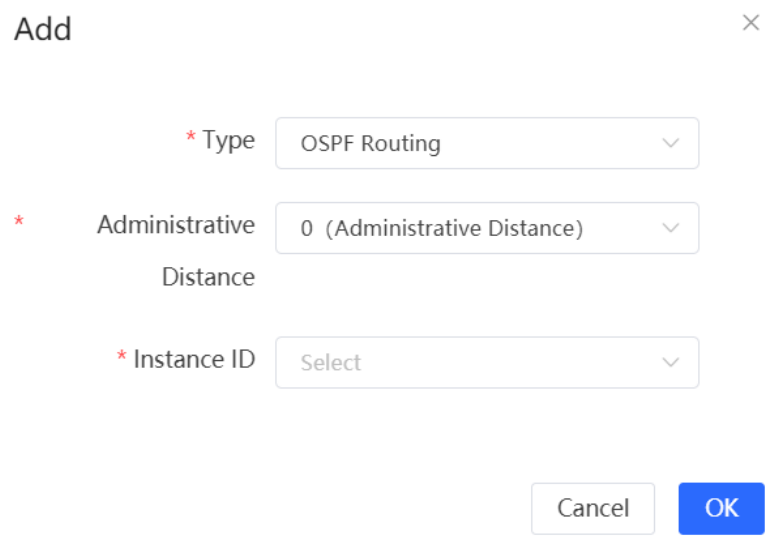


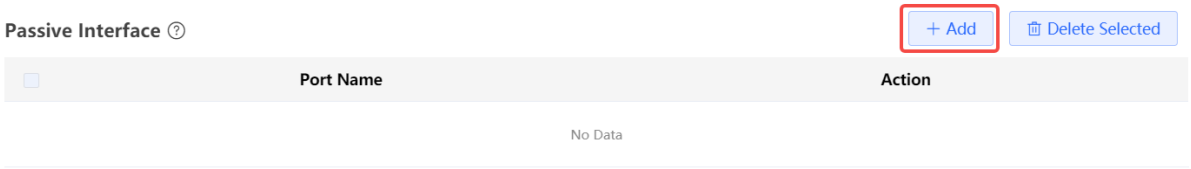

**Table 4-19 RIP Route Redistribution Parameters**

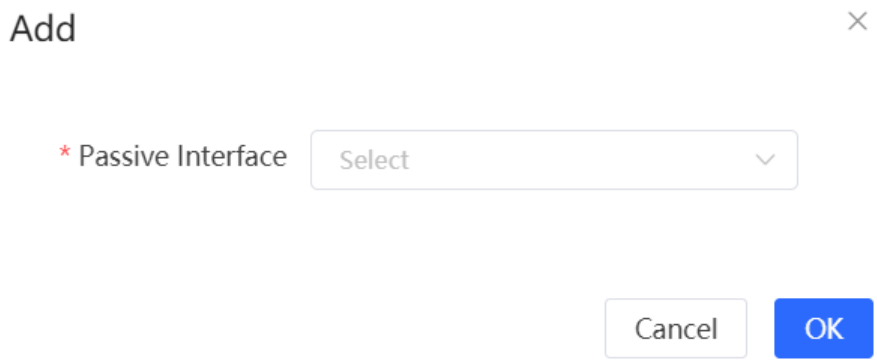
| Parameter | Description |
|---|---|
| Type | Configure the type of routes that are learned by a routing protocol and then redistributed to RIP. The types include direct routes, OSPF routes, and static routes. |
| Administrative Distance | The device converts the metric of the routes learned from other routing protocols into the metric used by the target protocol so that the target protocol can select the optimal route. A smaller administrative distance indicates a higher priority. The default value is 0. The value ranges from 0 to 16. |
| Instance ID | Select the instance ID of OSPF that needs to be redistributed. OSPFv2 needs to be enabled on the local device. |

### 5. Configuring the Passive Interface

If an interface is configured as a passive interface, it will suppress RIP update packets. If the connected peer device does not run RIP, you are advised to enable the passive interface.

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings** > **Advanced,** click **Add** in **Passive Interface** and select a passive interface.

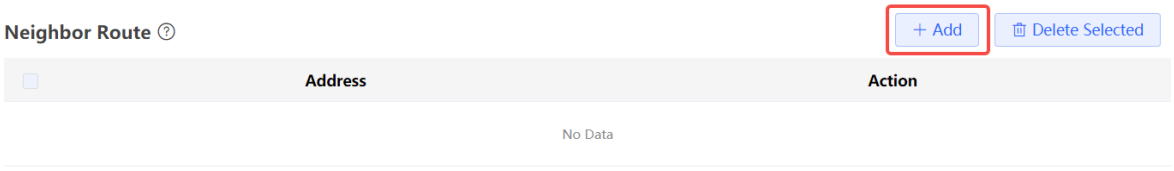


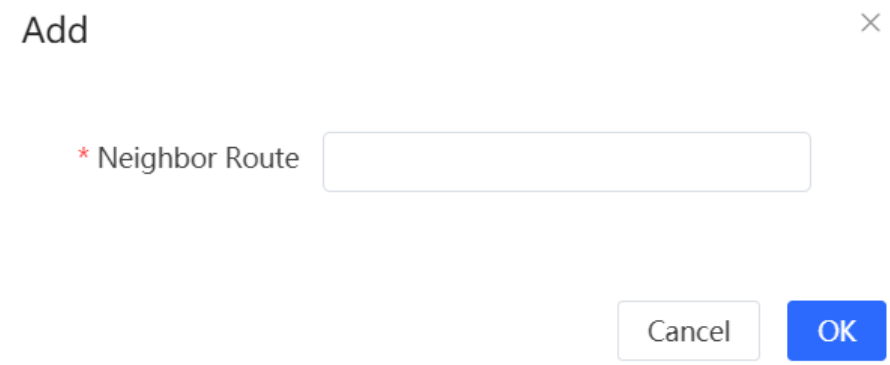



### 6. Configuring the Neighbor Route

When the router cannot process broadcast packets, another router can be designated as the neighbor to establish a RIP direct link.

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings** > **Advanced,** click **Add** in **Neighbor Route**, and enter the IP address of the neighbor router.

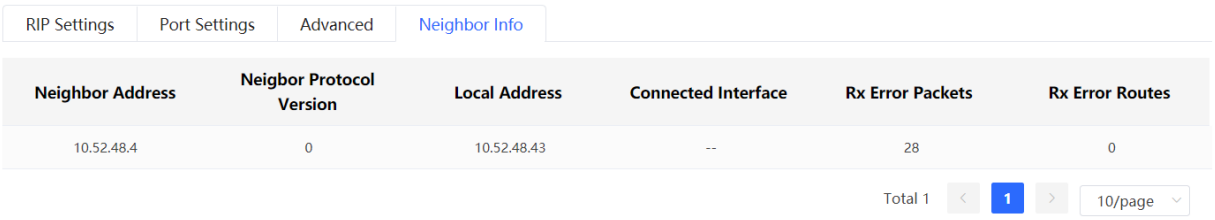



### 7. Viewing the Neighbor Information

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings** > **Neighbor Info**.

The neighbor list displays information about neighbors of the device, including the neighbor address, neighbor protocol version, local address, connected interface, number of received error packets, and number of received error routes.




## 4.10.4 Configuring RIPng

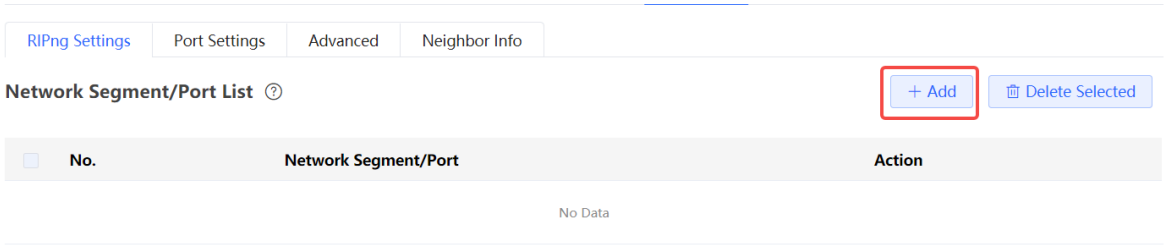
RIP Next Generation (RIPng) provides the routing function for IPv6 networks.

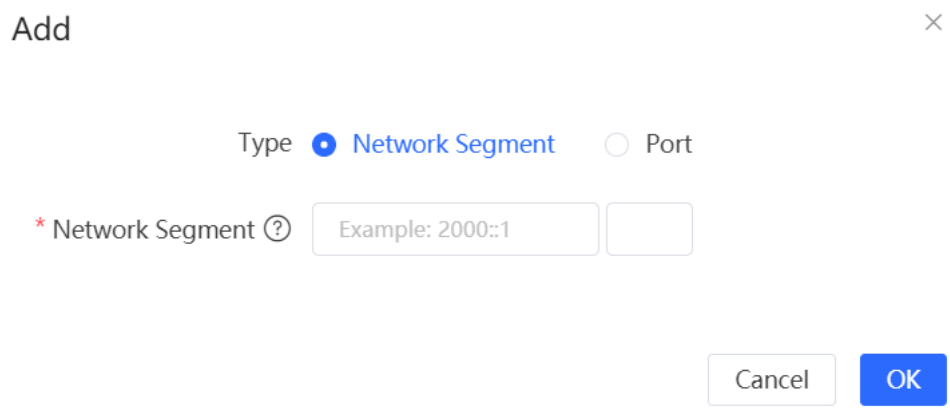
RIPng uses UDP port 512 to exchange the routing information.

### 1. Configuring RIPng Basic Functions

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIPng Settings**

Click **Add**, set **Type** to **Network Segment** or **Port**, and specify the network segment or port accordingly.



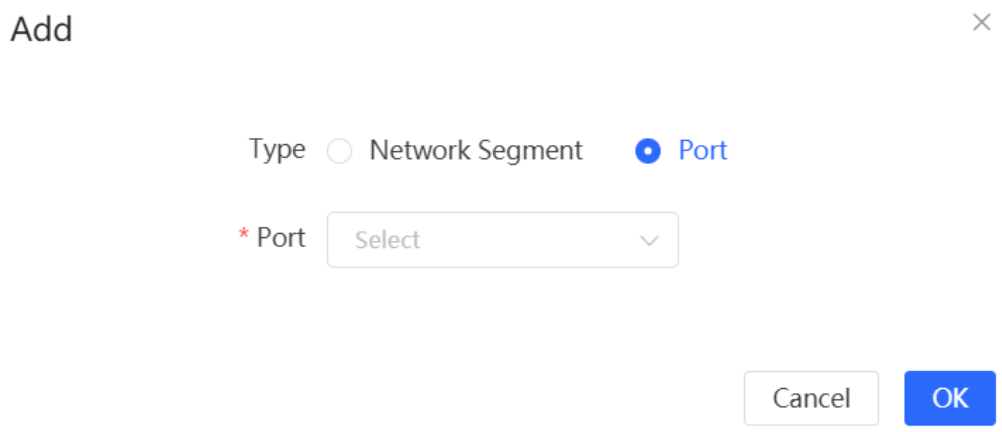


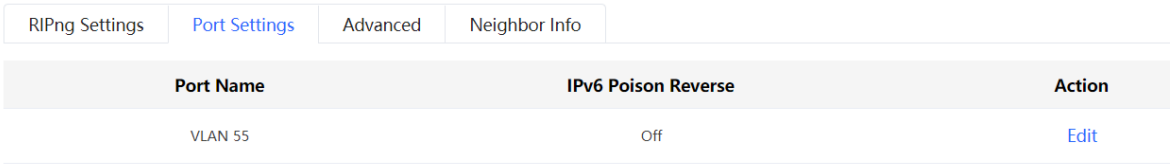

**Table 4-20 RIPng Configuration Parameters**

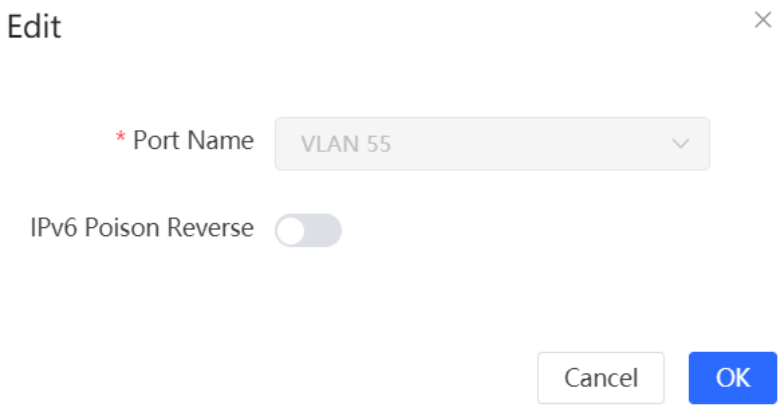
| Parameter | Description |
|---|---|
| Type | ● **Network Segment**: Enable RIP in the specified network segment. The IP addresses of this network segment are added to the RIP routing table, and the device and its RIP-enabled neighbor devices learn the routing table from each other.<br>● **Port**: Enable RIP on the specified port. All the IP addresses of this port are added to the RIP routing table, and the device and its RIP-enabled neighbor devices learn the routing table from each other. |
| Network Segment | Enter the IPv6 address and prefix length when **Type** is set to **Network Segment**.<br>RIPng will be enabled on all interfaces of the device covered by this network segment. |
| Port | Select a VLAN interface or physical port when **Type** is set to **Port**. |

### 2. Configuring the RIPng Port

RIPng poison reverse: After the port learns the route, the route overhead is set to **16** (indicating that the route is unreachable), and the route is sent back to the neighbor from the original port to avoid a loop.

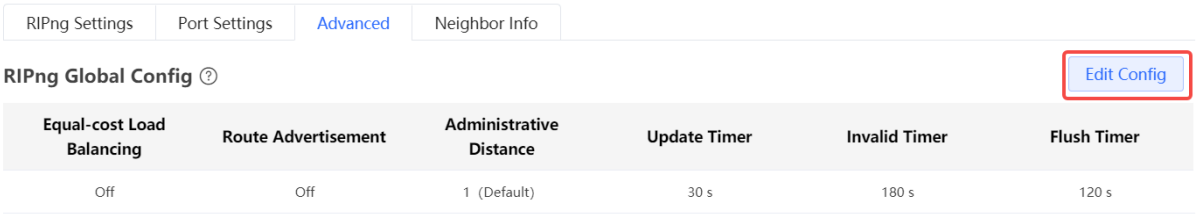
Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIPng Settings** > **Port Settings,** click **Edit**, and enable IPv6 poison reverse.






### 3. Configuring the RIPng Global Configuration

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIPng Settings** > **Advanced**, click **Edit Config** in **RIPng Global Config**, and configure RIPng global configuration parameters.



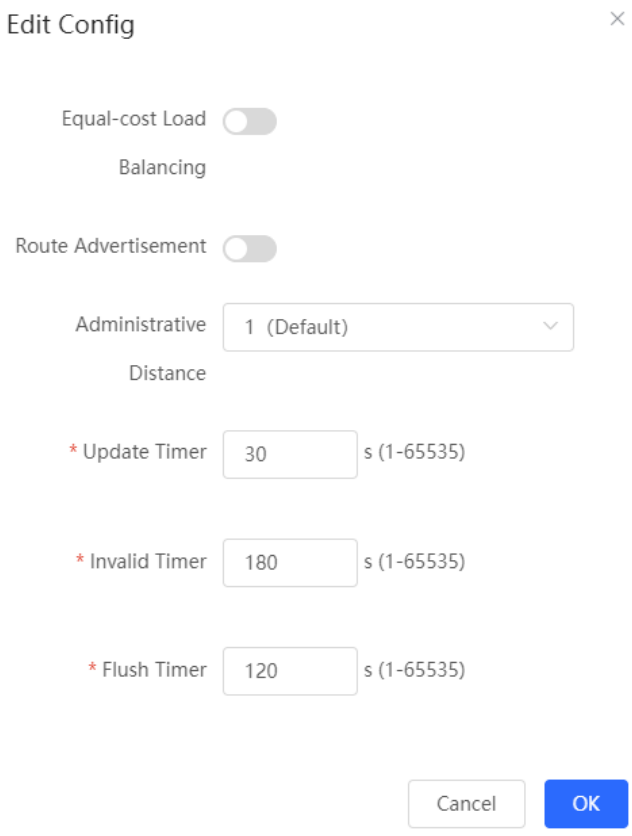



**Table 4-21 RIPng Global Configuration Parameters**

| Parameter | Description |
| --- | --- |
| Equal-cost Load Balancing | After this function is enabled, equal-cost routes are automatically balanced and forwarded with a weight of 1:1. |
| Route Advertisement | After this function is enabled, the current device generates a default route and sends it to the neighbor. |
| Administrative Distance | Routes of other protocols are redistributed to the RIP domain so that RIP can communicate with other routing domains. |
| Update Timer | RIP update cycle. The routing information is updated every 30 seconds by default. |
| Invalid Timer | If no update is received before a route becomes invalid, the route is considered unreachable. The default value is 180 seconds. |
| Flush Timer | If no update is received before the flush timer of an invalid route expires, the route is completely deleted from the RIP routing table. The default value is 120 seconds. |

### 4. Configuring the RIPng Route Redistribution List

Redistribute routes of other protocols to the RIPng domain to interwork with other routing domains.

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIPng Settings** > **Advanced**, click **Add** in **Route Redistribution List**, and configure RIPng route redistribution.

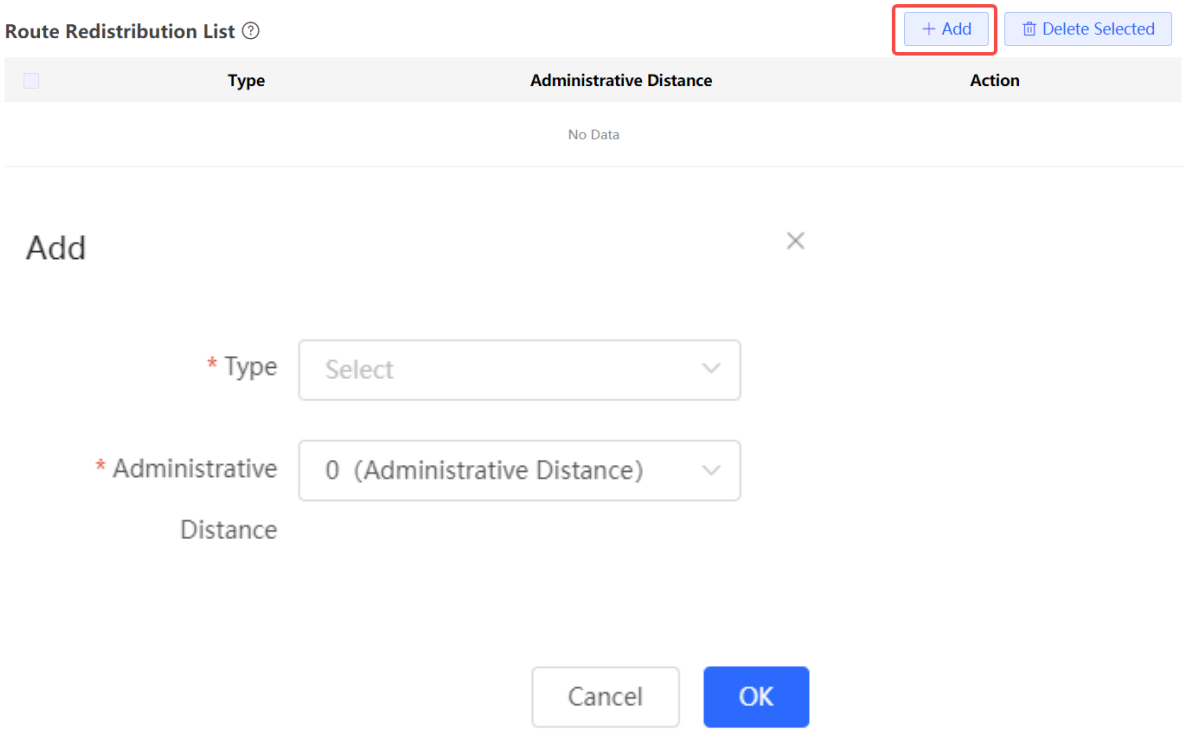


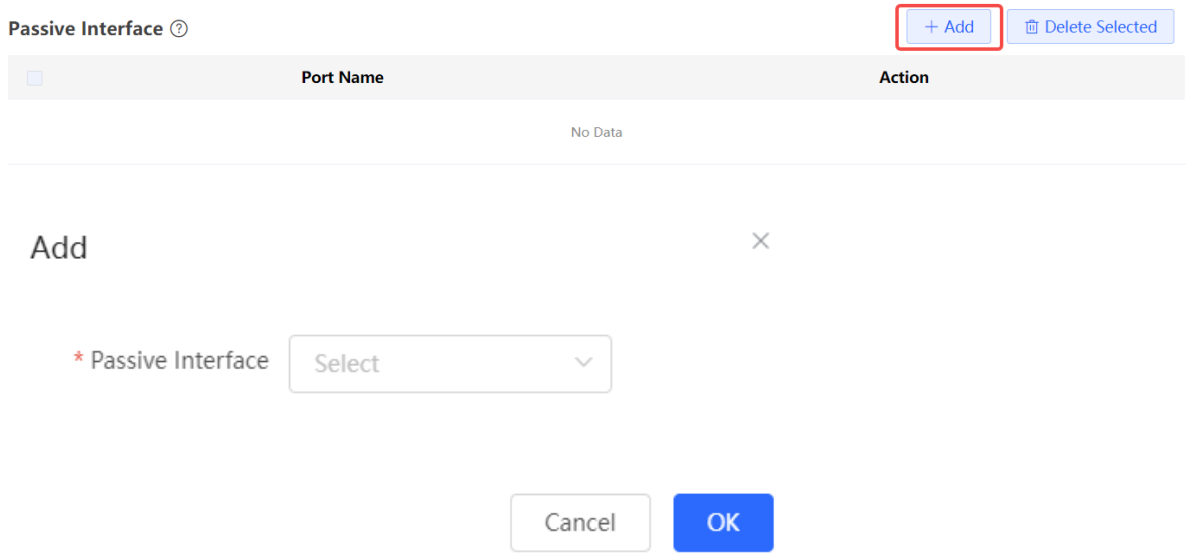
**Table 4-22 RIP Route Redistribution Parameters**

| Parameter | Description |
| --- | --- |
| Type | Configure the type of routes that are learned by a routing protocol and then redistributed to RIP. The types include direct routes, OSPF routes, and static routes. |
| Administrative Distance | The device converts the metric of the routes learned from other routing protocols into the metric used by the target protocol so that the target protocol can select the optimal route. A smaller administrative distance indicates a higher priority. The default value is 0. The value ranges from 0 to 16. |

### 5. Configuring the RIPng Passive Interface

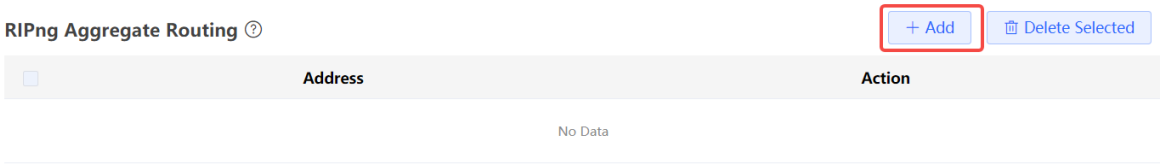
If an interface is configured as a passive interface, it will suppress RIPng update packets. If the connected peer device does not run RIP, you are advised to enable the passive interface.

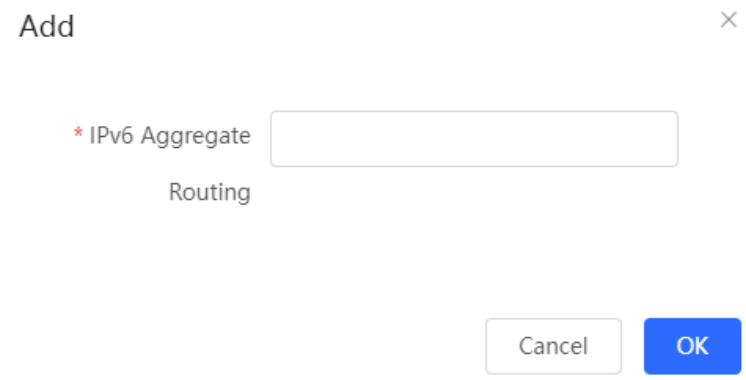
Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIPng Settings** > **Advanced,** click **Add** in **Passive Interface**, and select a passive interface.




### 6. Configuring the IPv6 Aggregate Route

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIPng Settings** > **Advanced**, click **Add** in **RIPng Aggregate Routing**, and enter the IPv6 address or length. The length of IPv6 address prefix ranges from 0 bit to 128 bits.

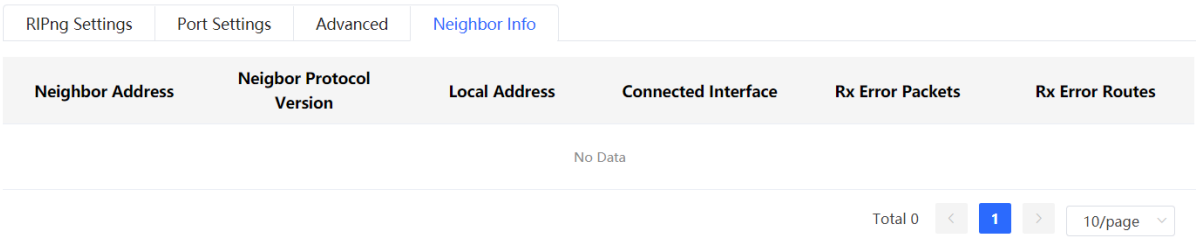





### 7. Viewing the Neighbor Information

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **RIP Settings** > **Neighbor Info**.

The neighbor list displays information about neighbors of the device, including the neighbor address, neighbor protocol version, local address, connected interface, number of received error packets, and number of received error routes.



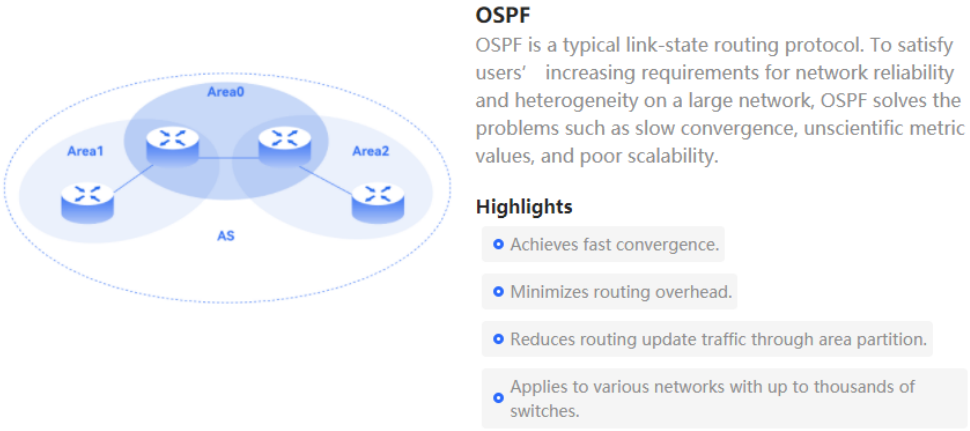

## 4.10.5 OSPFv2

Open Shortest Path First (OSPF) can be applied to large-scale networks. IPv4 uses OSPFv2, and IPv6 uses OSPFv3.

OSPF is a typical link-state routing protocol, which can solve the problems of slow route update, inaccurate measurement, and poor scalability in large networks. It is suitable for networks of various sizes, and even a network with up to thousands of devices.

### 1. Configuring OSPFv2 Basic Parameters

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV2**, click **Start Setup**, and then configure an instance and an interface respectively.




- Configure an instance

(1) Configure basic parameters for an instance.

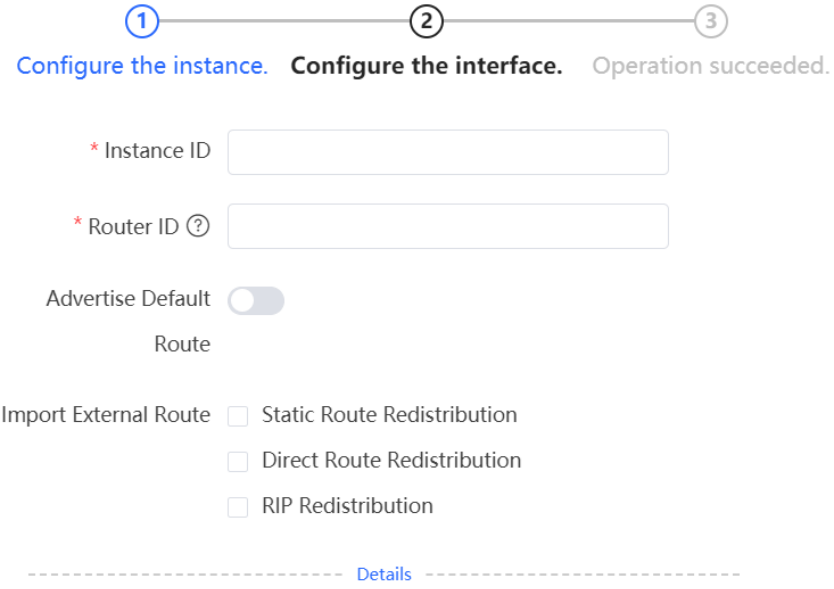



**Table 4-23 Description of Basic OSPF Instance Configuration Parameters**

| Parameter | Description |
| --- | --- |
| Instance ID | Create an OSPF instance based on the service type.<br>The instance only takes effect locally, and does not affect packet exchange with other devices. |

| Parameter | Description |
| --- | --- |
| Router ID | It identifies a router in an OSPF domain.<br>**Caution**<br>Router IDs within the same domain must be unique. The same configuration may cause neighbor discovery failures. |
| Advertise Default Route | Generate a default route and send it to the neighbor.<br>After this function is enabled, you need to enter the metric and select a type. The default metric is **1**.<br>● Type 1: The metrics displayed on different routers vary.<br>● Type 2: The metrics displayed on all routers are the same. |
| Import External Route | Redistribute routes of other protocols to the OSPF domain to interwork with other routing domains.<br>● If **Static Route Redistribution** is selected, enter the metric, which is **20** by default.<br>● If **Direct Route Redistribution** is selected, enter the metric, which is **20** by default.<br>● If **RIP Redistribution** is selected, enter the metric, which is **20** by default. |

(2) Click **Details** to display detailed configurations.

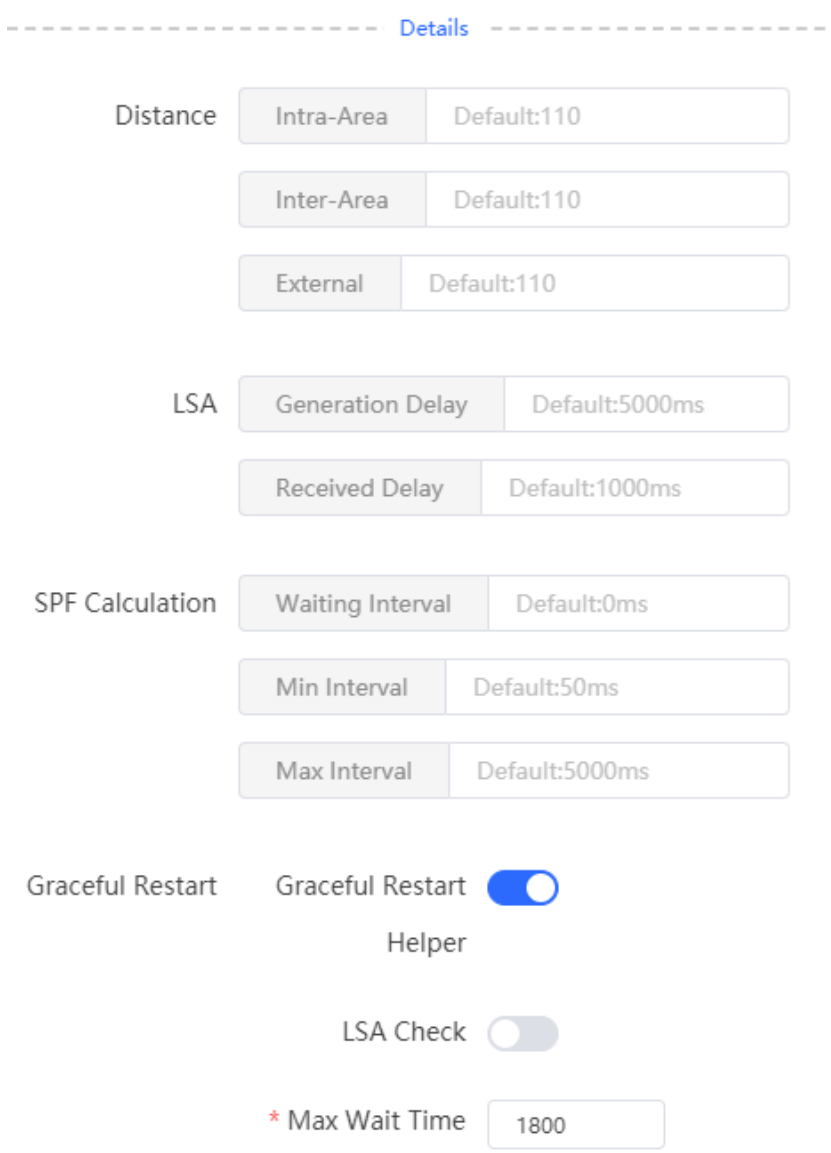



**Table 4-24 Description of Detailed OSPF Instance Configuration Parameters**

| Parameter | Description |
|---|---|
| Distance | It is used for protocol selection. By default, the intra-area, inter-area, and external distances are all **110**. |
| LSA | Frequent network changes and route flapping may occupy too much network bandwidth and device resources. The LSA generation and reception delays are specified in OSPF by default.<br>The default value is 1000 ms. |

| Parameter | Description |
| --- | --- |
| SPF Calculation | When the link state database (LSDB) changes, OSPF recalculates the shortest path, and sets the interval to prevent frequent network changes from occupying a large number of resources<br>● **Waiting Interval**: When the state changes, the timer is triggered. The delay is calculated for the first time after the timer expires. The default value is 0 ms.<br>● **Min Interval**: As the number of changes increases, the time of each interval will increase according to the algorithm, and the default value is 50 ms.<br>● **Max Interval**: When the calculated interval reaches the maximum interval, the subsequent interval is always equal to the maximum interval. If the time from the last calculation exceeds the maximum interval and the LSDB is not updated, the timer is disabled. |
| Graceful Restart | Graceful Restart (GR) can avoid route flapping caused by traffic interruption and active/standby board switchover, thus ensuring the stability of key services.<br>● **Graceful Restart Helper**: The Graceful Restart Helper function is enabled when this switch is turned on.<br>● **LSA Check**: LSA packets outside the domain are checked when this switch is turned on.<br>● **Max Wait Time**: Timing starts after the device receives the GR packet from the peer device. If the peer device does not complete GR within **Max Wait Time**, the device exits the GR Helper mode. The default value is 1800 seconds. |

- Configure an interface

(1) Configure basic parameters for an OSPFv2 interface.

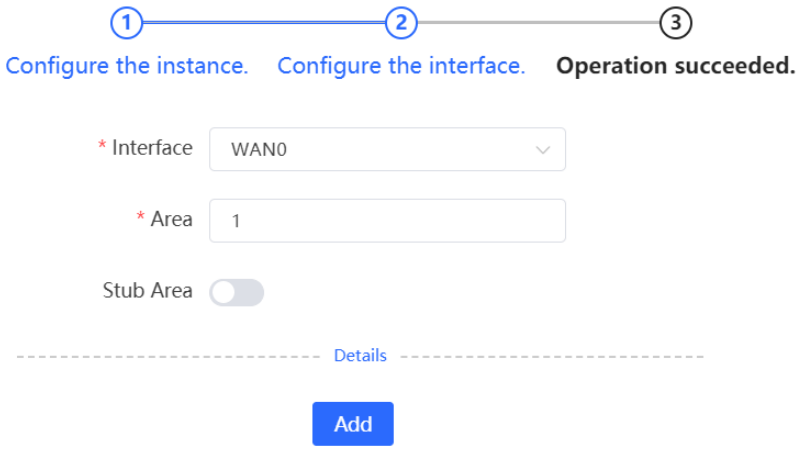



**Table 4-25 Description of Basic OSPFv2 Interface Configuration Parameters**

| Parameter | Description |
| --- | --- |
| Interface | Select the OSPF-enabled L3 interface. |
| Area | Configure the area ID. Value range: 0-4294967295 |

| Parameter | Description |
| --- | --- |
| Stub Area | If **Stub Area** is enabled, you need to configure the **Area Type** and **Inter-Route Isolation**<br>● **Area Type**<br>○ Stub area: Routers at the edge of the area do not advertise routes outside the area, and the routing table in the area is small.<br>○ Not-So-Stubby Area (NSSA): A few external routes can be imported.<br>● **Inter-Route Isolation**<br>After this function is enabled, inter-area routes will not be imported to this area. |

(2) Click **Details** to display detailed configurations.

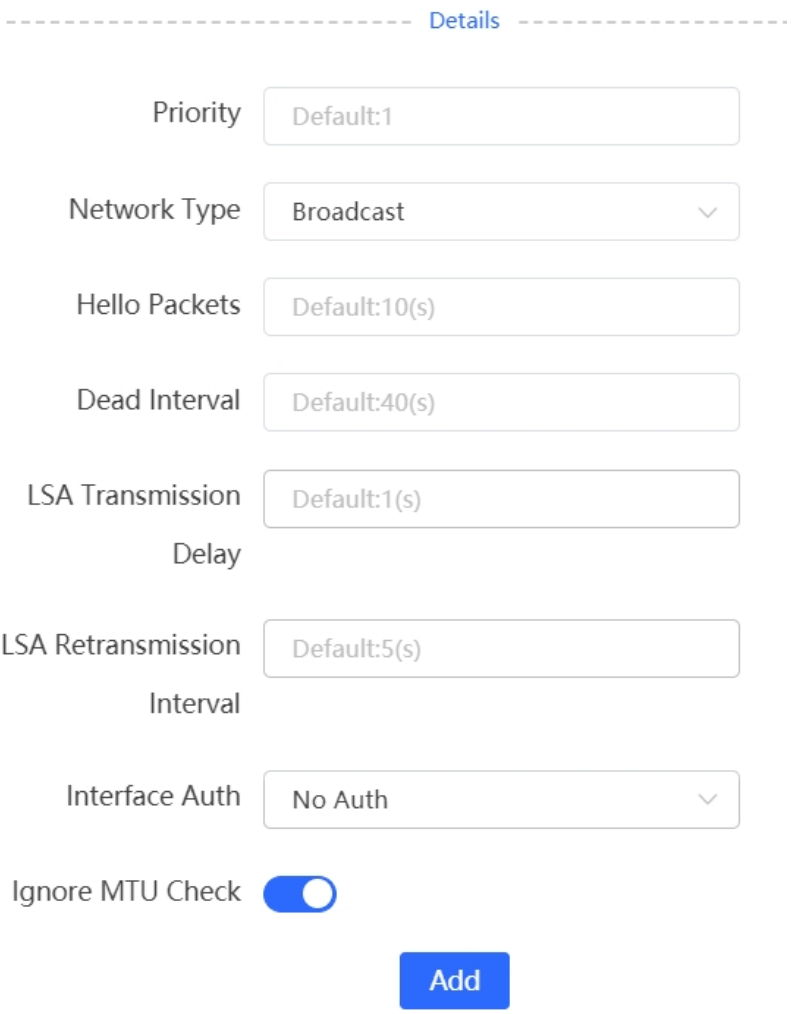
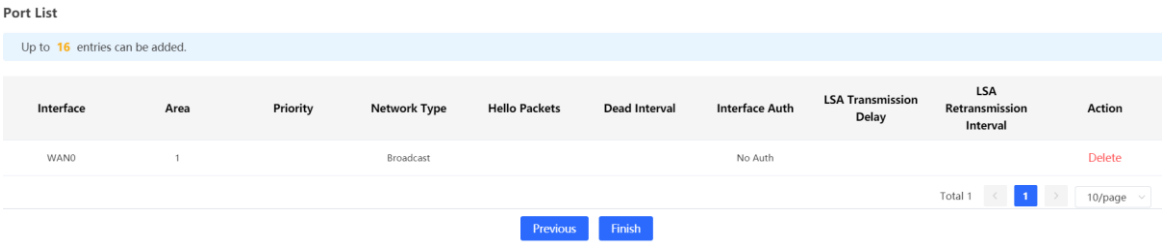


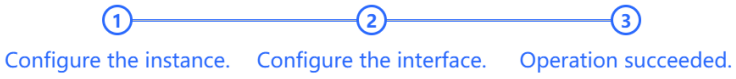
**Table 4-26 Description of Detailed OSPFv2 Interface Configuration Parameters**

| Parameter | Description |
|---|---|
| Priority | A higher priority value indicates a greater chance of being elected as the DR or BDR. The default value is 1. |
| Network Type | OSPFv2 defines different network types, which affect the establishment of OSPF neighbor relationships, route update, and network convergence. The supported network types include broadcast, unicast, multicast, and non-broadcast multi-access (NBMA). |
| Hello Packets | Interval for periodic transmission, which is used to discover and maintain OSPF neighbor relationship. The default value is 10 seconds. |
| Dead Interval | Time after which the neighbor becomes invalid. The default value is 40 seconds. |
| LSA Transmission Delay | LSA transmission delay of the interface. The default value is 1 second. |
| LSA Retransmission Interval | Time after which LSA is retransmitted after LSA is lost. The default value is 5 seconds. |
| Interface Auth | ● **No Auth**: The protocol packets are not authenticated. It is the default value.<br>● **Plain Text**: The protocol packets are authenticated, and the authentication key is transmitted with the protocol packets in the form of plain text.<br>● **MD5**: The protocol packets are authenticated, and the authentication key is MD5 encrypted and then transmitted with the protocol packets. |
| Ignore MTU Check | The purpose of ignoring MTU check is to ensure that OSPF-enabled routers can update routing information in time when the network topology changes. This function is enabled by default. |

(3) Click **Add** to add an interface to **Interface List**.



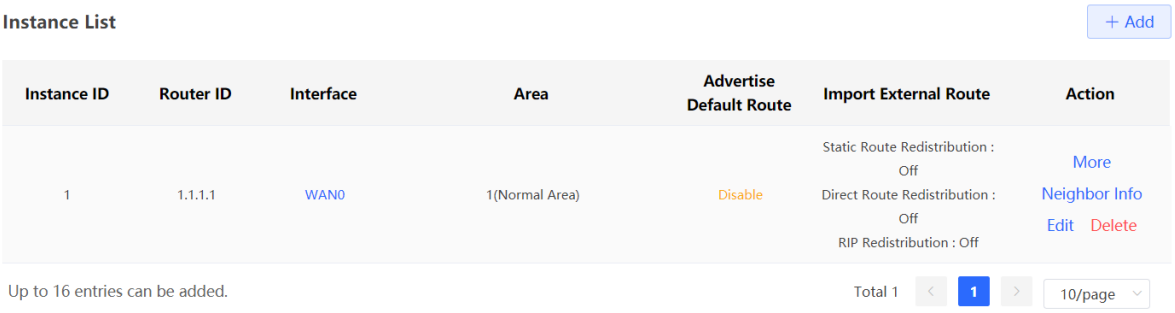

(4) Click **Finish**.





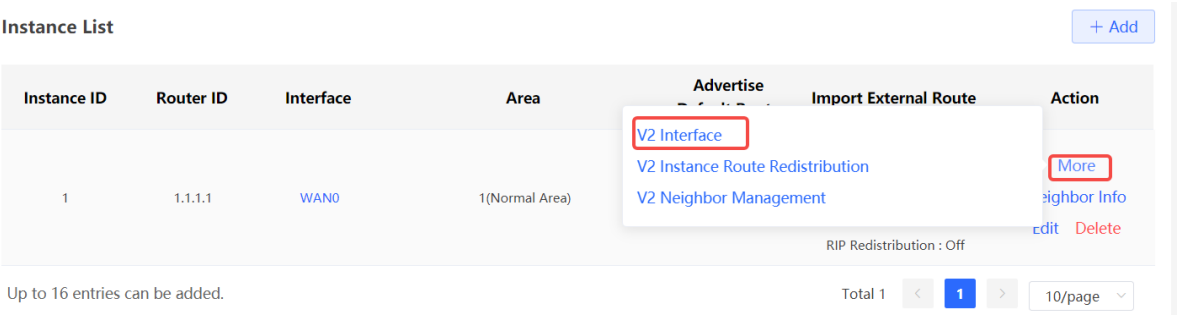

**Operation succeeded.**

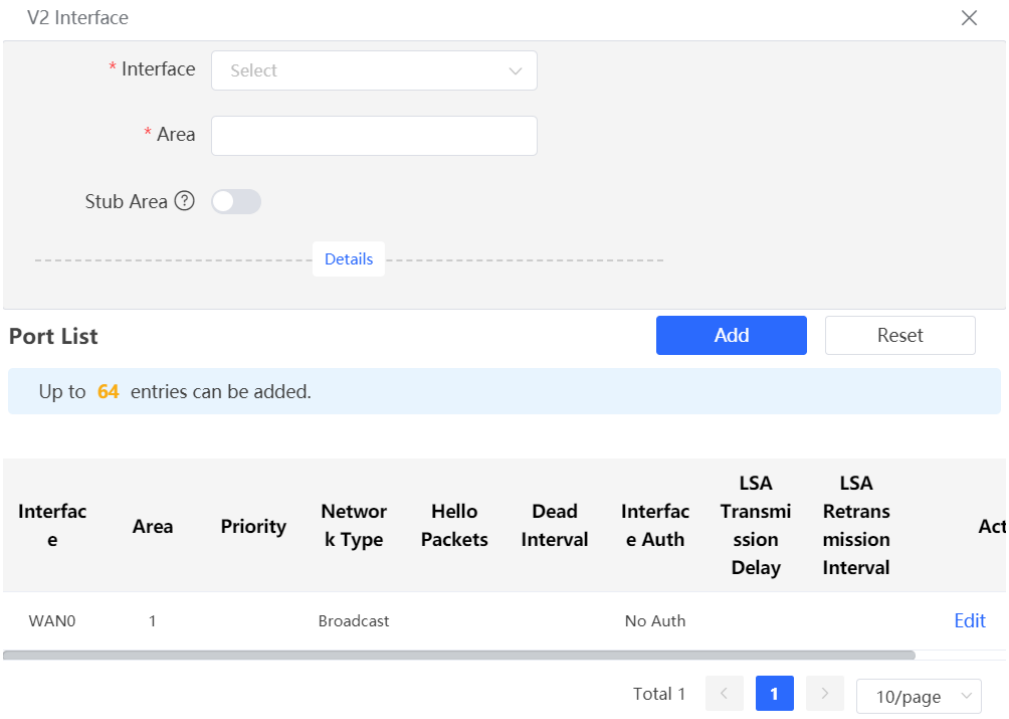
After you create an instance and an interface, choose **One-Device > Gateway > Advanced** > **Routing** > **OSPFV2** to check the current **Instance List**.




## 2. Adding an OSPFv2 Interface

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV2**, select the instance to be configured in **Instance List**, and choose **More** > **V2 Interface**.



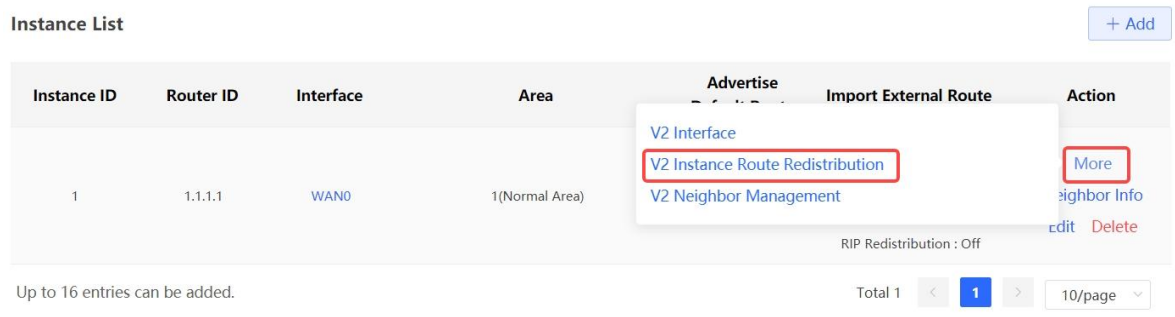


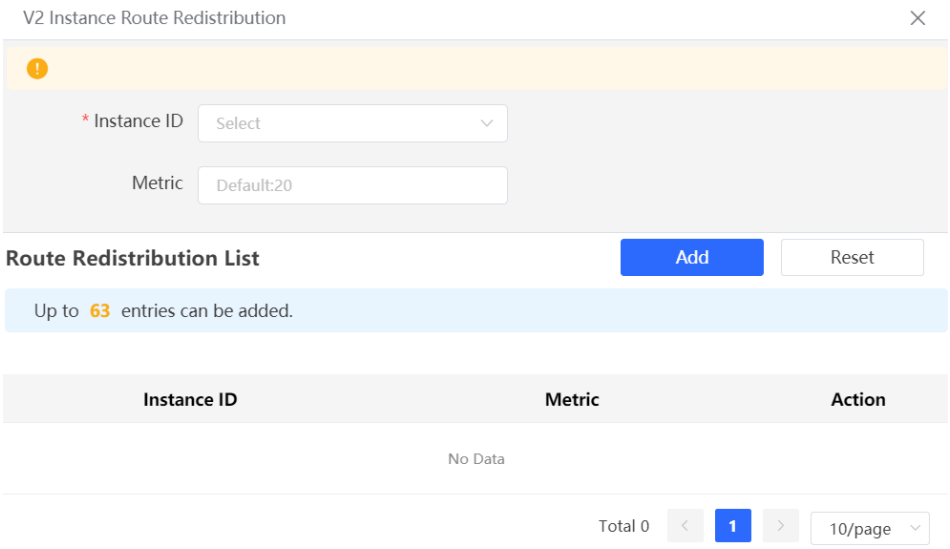

### 3. Redistributing OSPFv2 Instance Routes

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV2**, select the instance to be configured in **Instance List**, and choose **More** > **V2 Instance Route Redistribution**.

**Caution**

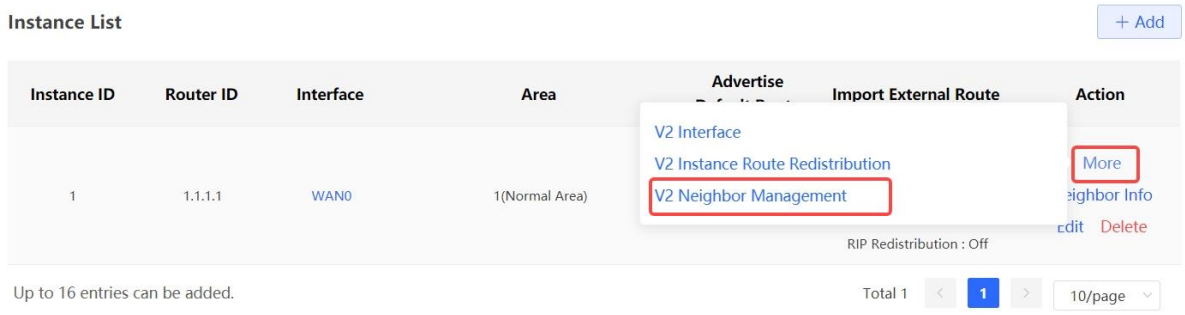
The instance ID cannot be selected for route redistribution.

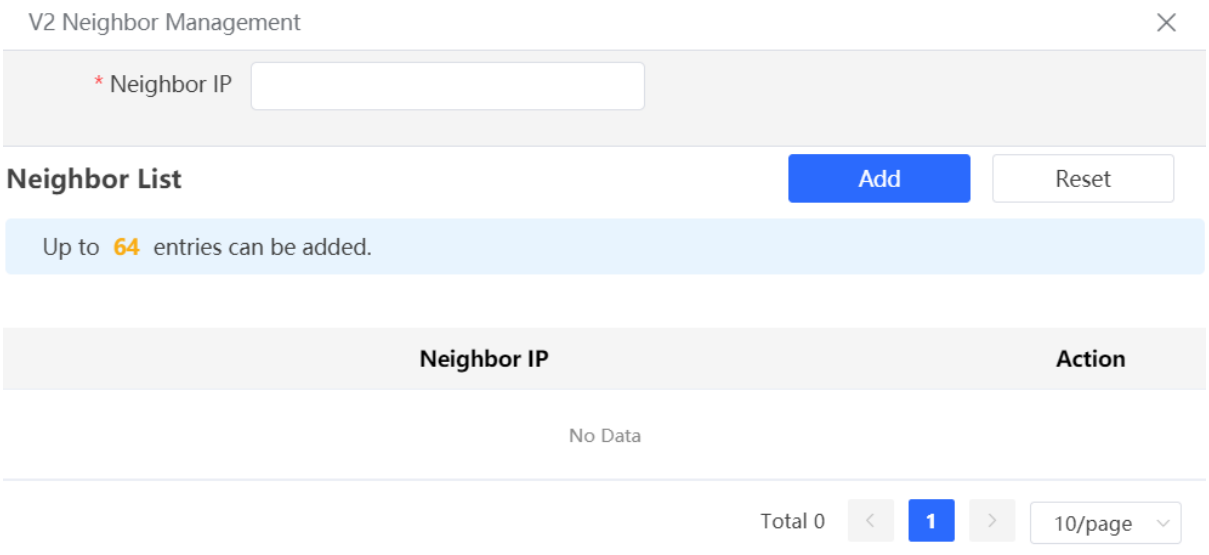





### 4. Managing OSPFv2 Neighbors

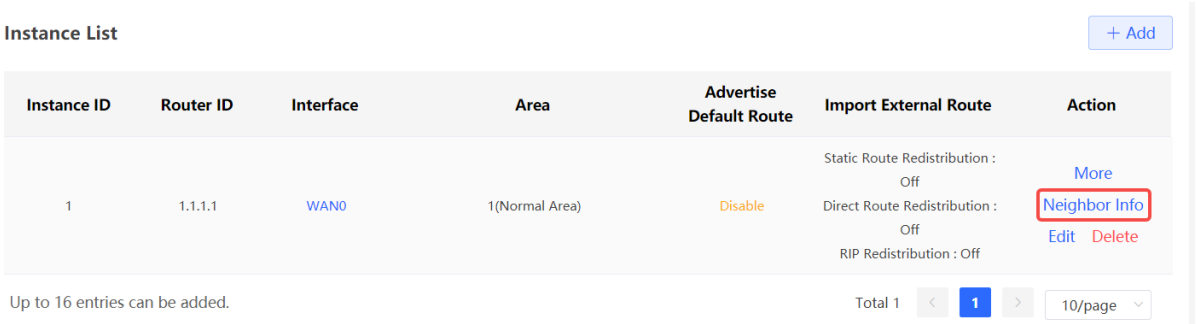
Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV2**, select the instance to be configured in **Instance List**, and choose **More** > **V2 Neighbor Management**.

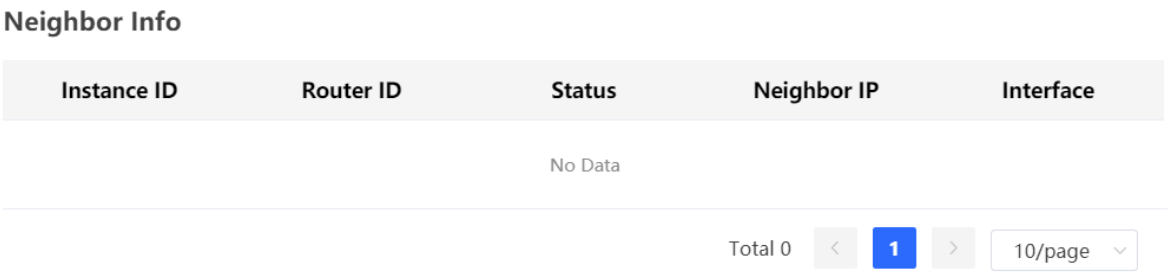


### 5. Viewing OSPFv2 Neighbor Information

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV2**, select the instance to be configured in **Instance List**, and click **Neighbor Info**.



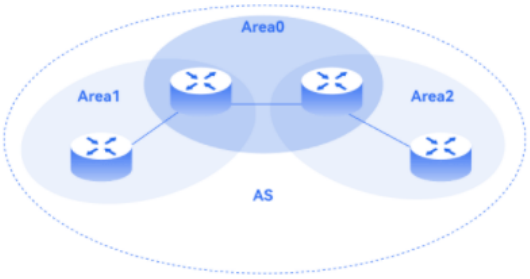




## 4.10.6 OSPFv3

Open Shortest Path First (OSPF) can be applied to large-scale networks. IPv4 uses OSPFv2, and IPv6 uses OSPFv3.

### 1. Configuring OSPFv3 Basic Parameters

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV3**, click **Start Setup**, and then configure an instance and an interface respectively.




**OSPF**

OSPF is a typical link-state routing protocol. To satisfy users' increasing requirements for network reliability and heterogeneity on a large network, OSPF solves the problems such as slow convergence, unscientific metric values, and poor scalability.

**Highlights**

- Achieves fast convergence.
- Minimizes routing overhead.
- Reduces routing update traffic through area partition.
- Applies to various networks with up to thousands of switches.

Start Setup

- Configure an instance

(1) Configure basic parameters for an instance.

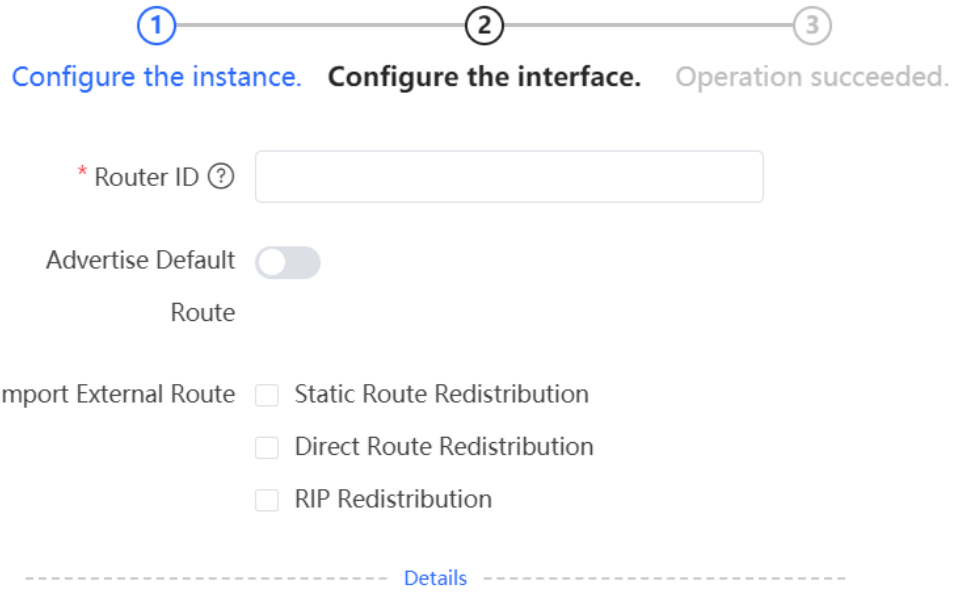


**Table 4-27 Description of Basic OSPF Instance Configuration Parameters**

| Parameter | Description |
| --- | --- |
| Router ID | It identifies a router in an OSPF domain.<br>**Caution**<br>Router IDs within the same domain must be unique. The same configuration may cause neighbor discovery failures. |
| Advertise Default Route | Generate a default route and send it to the neighbor.<br>After this function is enabled, you need to enter the metric and select a type. The default metric is **1**.<br>● Type 1: The metrics displayed on different routers vary.<br>● Type 2: The metrics displayed on all routers are the same. |
| Import External Route | Redistribute routes of other protocols to the OSPF domain to interwork with other routing domains.<br>● If **Static Route Redistribution** is selected, enter the metric, which is **20** by default.<br>● If **Direct Route Redistribution** is selected, enter the metric, which is **20** by default.<br>● If **RIP Redistribution** is selected, enter the metric, which is **20** by default. |

(2) Click **Details** to display detailed configurations.

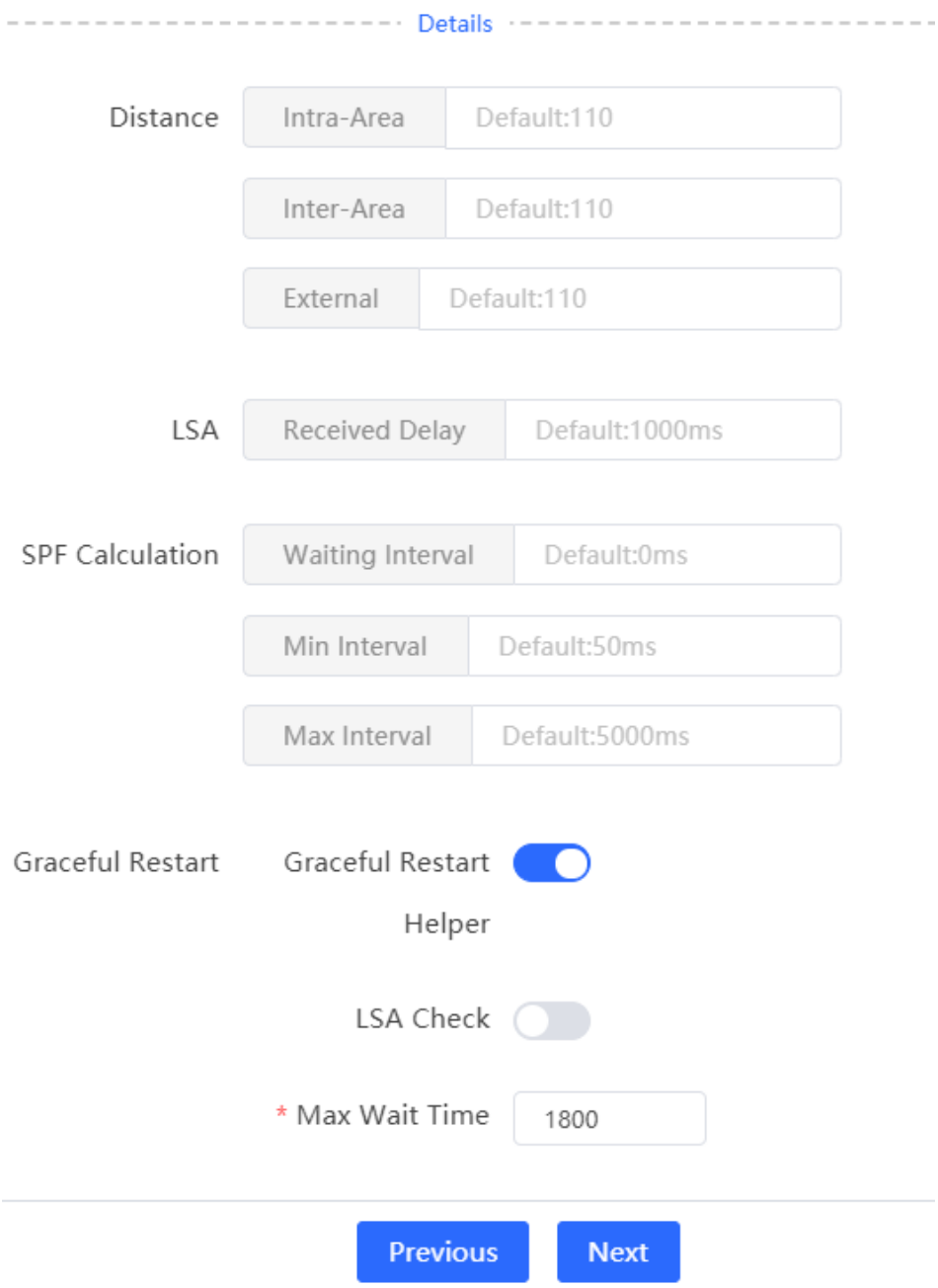



**Table 4-28 Description of Detailed OSPF Instance Configuration Parameters**

| Parameter | Description |
|---|---|
| Distance | It is used for protocol selection. By default, the intra-area, inter-area, and external distances are all **110**. |
| LSA | Frequent network changes and route flapping may occupy too much network bandwidth and device resources. The LSA generation and reception delays are specified in OSPF by default.<br>The default value is 1000 ms. |

| Parameter | Description |
| --- | --- |
| SPF Calculation | When the link state database (LSDB) changes, OSPF recalculates the shortest path, and sets the interval to prevent frequent network changes from occupying a large number of resources<br>● **Waiting Interval**: When the state changes, the timer is triggered. The delay is calculated for the first time after the timer expires. The default value is 0 ms.<br>● **Min Interval**: As the number of changes increases, the time of each interval will increase according to the algorithm, and the default value is 50 ms.<br>● **Max Interval**: When the calculated interval reaches the maximum interval, the subsequent interval is always equal to the maximum interval. If the time from the last calculation exceeds the maximum interval and the LSDB is not updated, the timer is disabled. |
| Graceful Restart | Graceful Restart (GR) can avoid route flapping caused by traffic interruption and active/standby board switchover, thus ensuring the stability of key services.<br>● **Graceful Restart Helper**: The Graceful Restart Helper function is enabled when this switch is turned on.<br>● **LSA Check**: LSA packets outside the domain are checked when this switch is turned on.<br>● **Max Wait Time**: Timing starts after the device receives the GR packet from the peer device. If the peer device does not complete GR within **Max Wait Time**, the device exits the GR Helper mode. The default value is 1800 seconds. |

- Configure an interface

(1) Configure basic parameters for an interface.

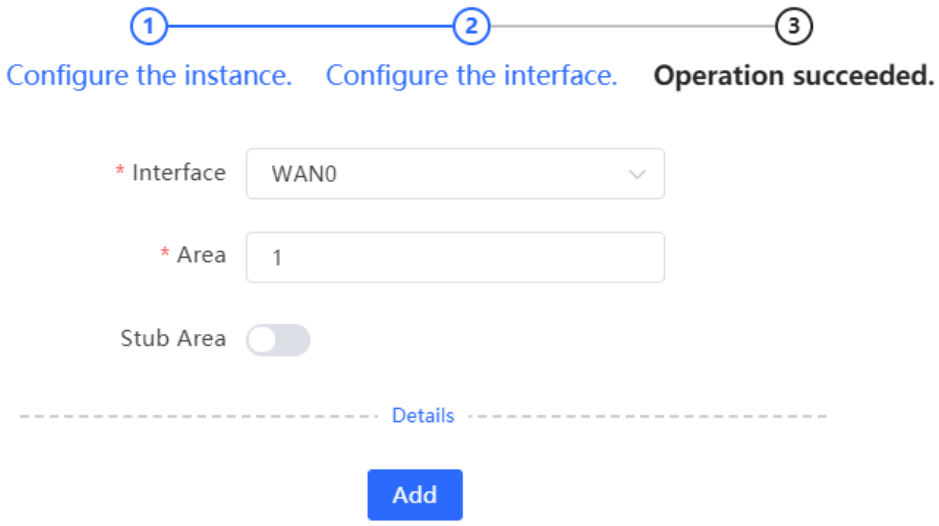



**Table 4-29 Description of Basic OSPF Interface Configuration Parameters**

| Parameter | Description |
| --- | --- |
| Interface | Select the OSPF-enabled L3 interface. |
| Area | Configure the area ID. Value range: 0-4294967295 |

| Parameter | Description |
| --- | --- |
| Stub Area | If **Stub Area** is enabled, you need to configure the **Area Type** and **Inter-Route Isolation**<br>● **Area Type**<br>○ Stub area: Routers at the edge of the area do not advertise routes outside the area, and the routing table in the area is small.<br>○ Not-So-Stubby Area (NSSA): A few external routes can be imported.<br>● **Inter-Route Isolation**<br>After this function is enabled, inter-area routes will not be imported to this area. |

(2) Click **Details** to display detailed configurations.

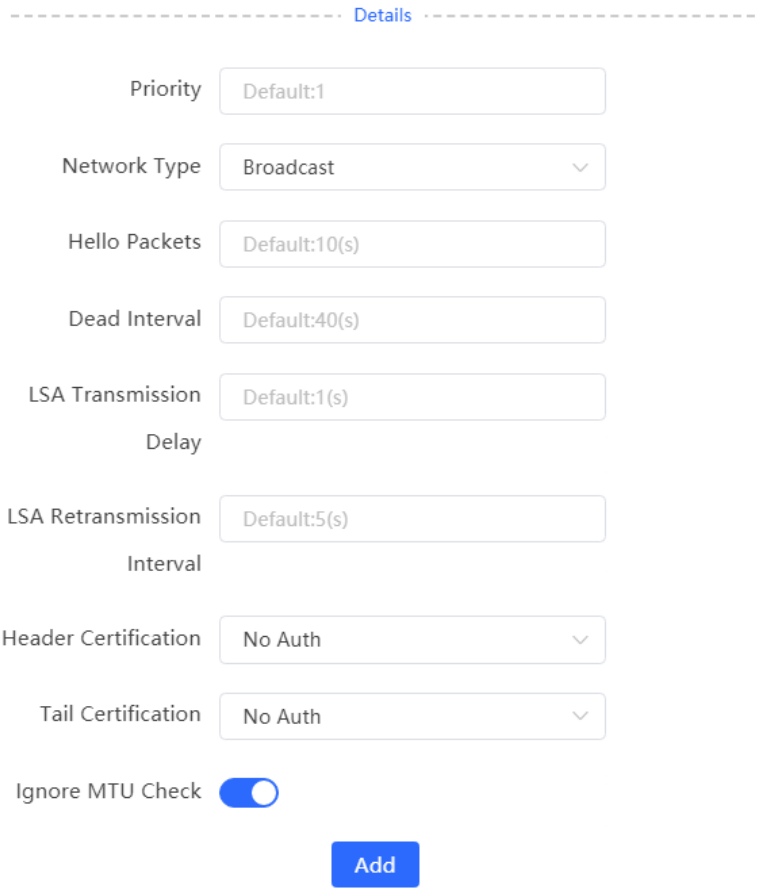
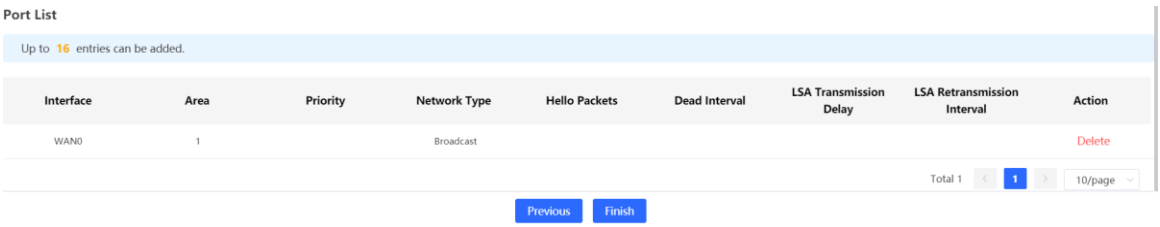



**Table 4-30 Description of Detailed OSPF Interface Configuration Parameters**

| Parameter | Description |
| --- | --- |
| Priority | A higher priority value indicates a greater chance of being elected as the DR or BDR. The default value is 1. |

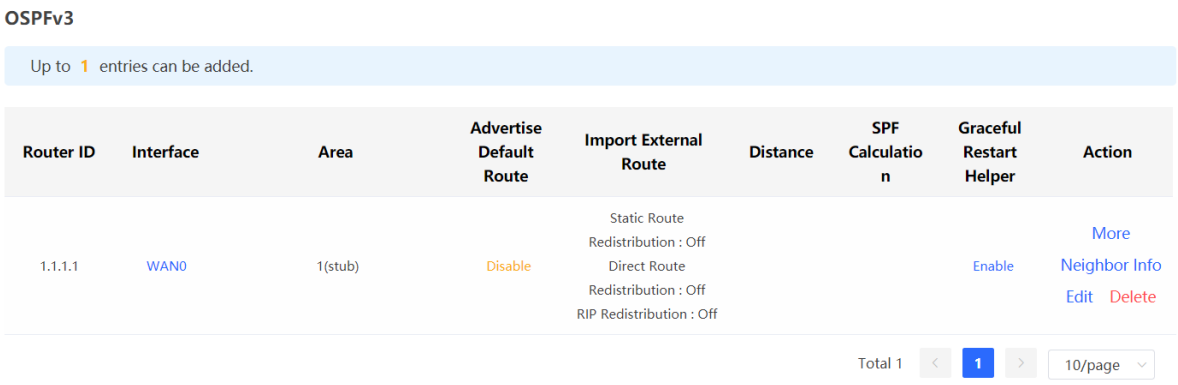
| Parameter | Description |
| --- | --- |
| Network Type | OSPFv3 defines different network types, which affect the establishment of OSPF neighbor relationships, route update, and network convergence. The supported network types are broadcast and unicast. |
| Hello Packets | Interval for periodic transmission, which is used to discover and maintain OSPF neighbor relationship. The default value is 10 seconds. |
| Dead Interval | Time after which the neighbor becomes invalid. The default value is 40 seconds. |
| LSA Transmission Delay | LSA transmission delay of the interface. The default value is 1 second. |
| LSA Retransmission Interval | Time after which LSA is retransmitted after LSA is lost. The default value is 5 seconds. |
| Header Certification | The authentication field in the header of an OSPFv3 packet for verifying the integrity of the packet, including the header and payload. The supported authentication modes are as follows:<br>● **No Auth**: No authentication is performed by default.<br>● **MD5 Auth**: MD5 HMAC<br>● **SHA1 Auth**: SHA-1 HMAC<br>● **SHA256 Auth**: SHA-256 HMAC |
| Tail Certification | The authentication field added to the trailer of an OSPFv3 packet for verifying the authenticity of the packet and ensure that the packet is sent by an authorized sender and is not tampered with during transmission. The supported authentication modes are as follows:<br>● **No Auth**: No authentication is performed by default.<br>● **MD5 Auth**: MD5 HMAC<br>● **SHA256 Auth**: SHA-256 HMAC |
| Ignore MTU Check | The purpose of ignoring MTU check is to ensure that OSPF-enabled routers can update routing information in time when the network topology changes. This function is enabled by default. |

(3) Click **Add** to add an interface to **Interface List**.



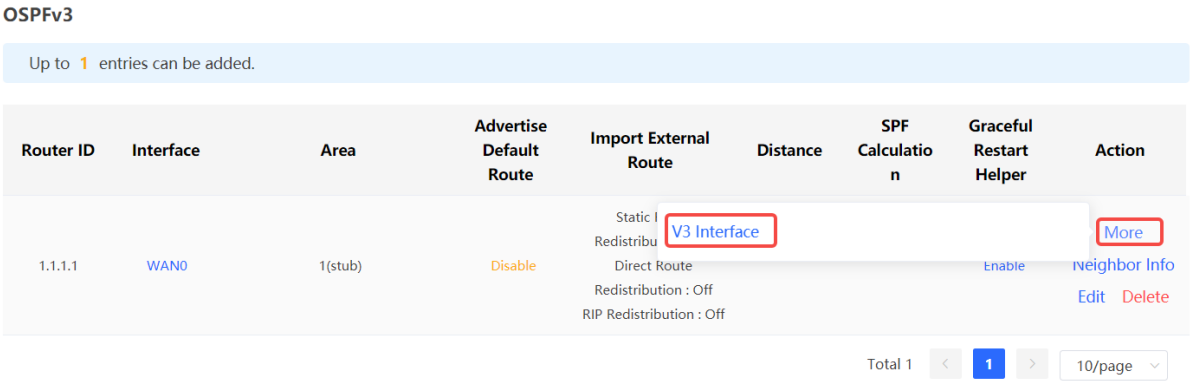

(4) Click **Finish**.

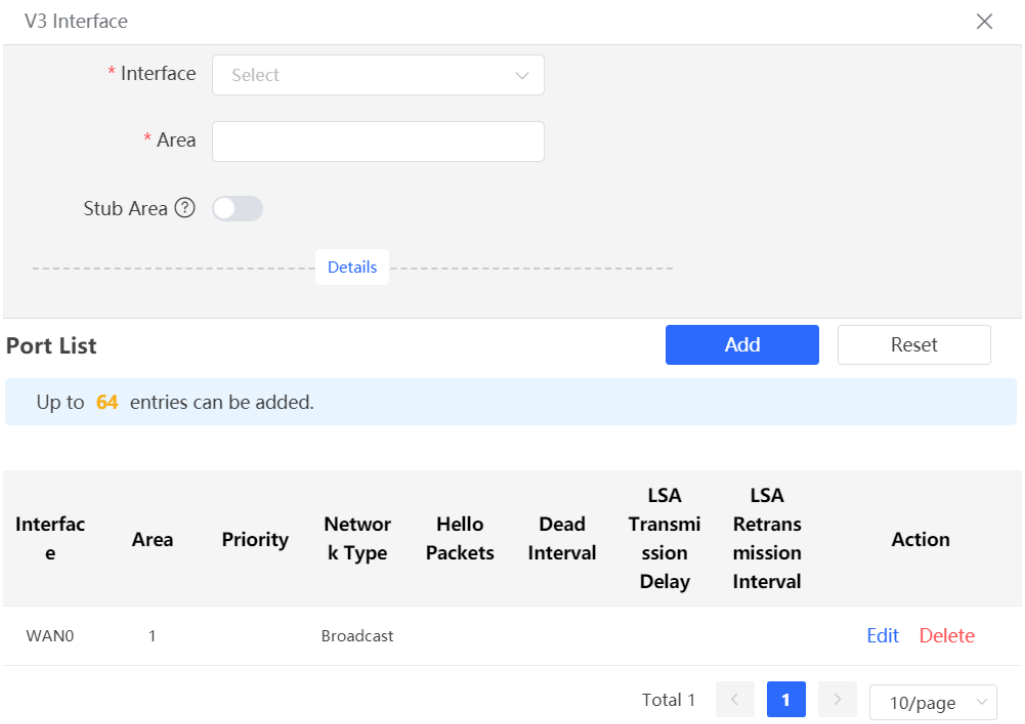
After you complete configuration, choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV3** to check **Instance List**.




## 2. Adding an OSPFv3 Interface

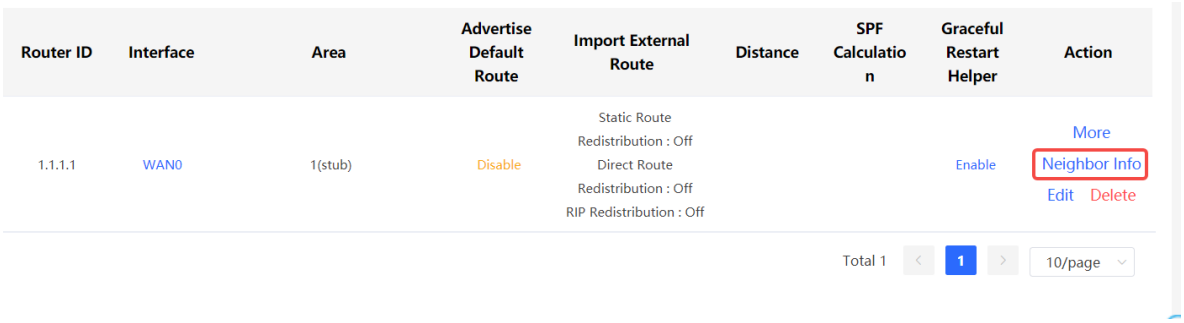
Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV3**, select the instance to be configured in **Instance List**, and choose **More** > **V3 Interface**.

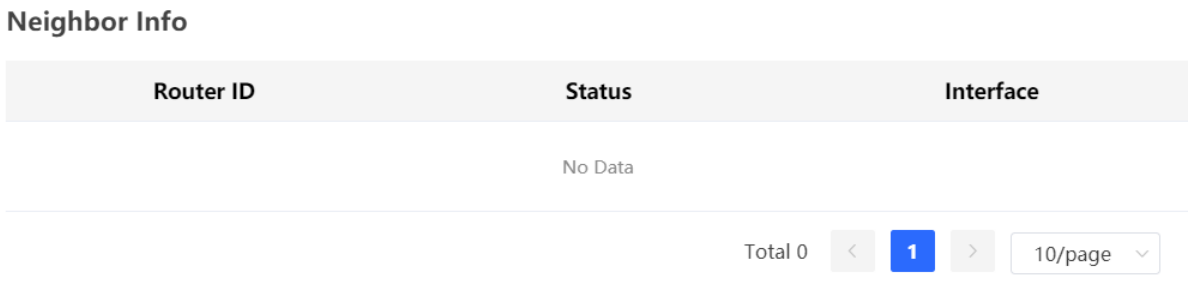





### 3. Viewing OSPFv3 Neighbor Information

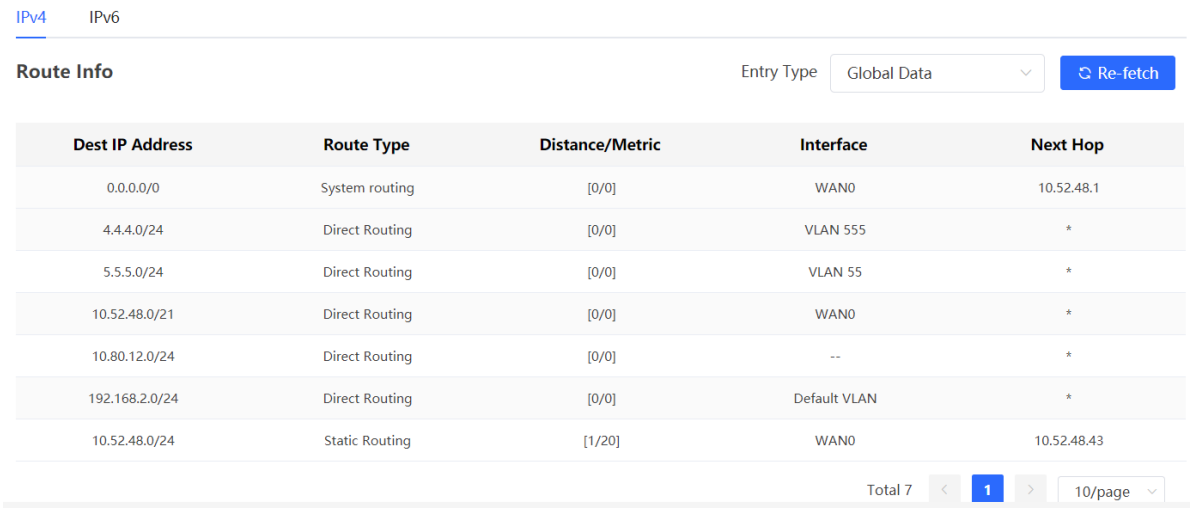
Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **OSPFV3**, select the instance to be configured in **Instance List**, and click **Neighbor Info**.

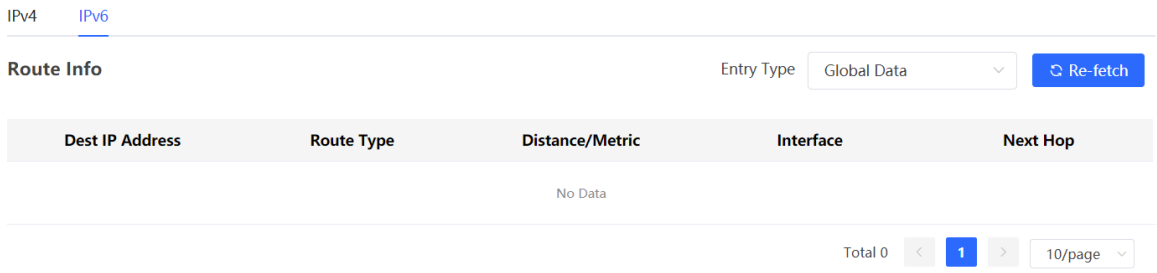


## 4.10.7 Viewing Routing Tables

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing** > **Routing Table Info** to view IPv4 and IPv6 routing table details.

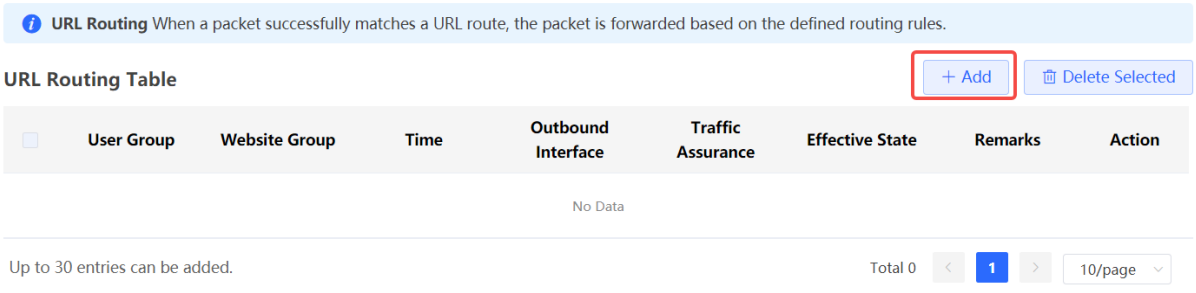



## 4.10.8 Setting URL Routes

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing Settings** > **URL Routing**.

Configure the outbound interface for accessing a website URL. When a data packet matches the URL route, the data packet is forwarded in the specified mode.




Click **Add**. In the dialog box that appears, set the type, website group, outbound interface, and managed time range, and then click Add to create a URL route.

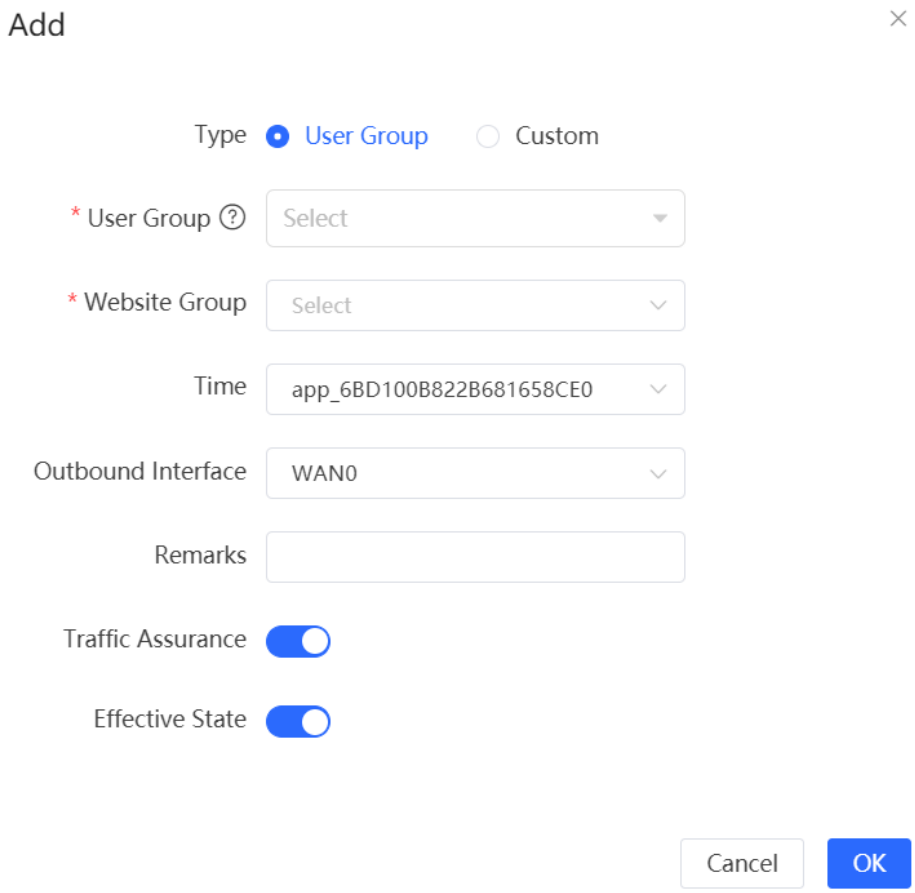



**Table 4-31 URL Routing Configuration Parameters**

| Parameter | Description |
|---|---|
| Type | URL route type, which can be:<br>● **User group**: select the user group to which the route-policy applies.<br>● **Custom**: apply the route to users with IP addresses in the specified IP address range. You need to manually enter the IP address range. |
| User group | This parameter is required when type is set to user group.<br>Select users to which the URL route applies from the user group list. The user group list is available in 9.2 User Management. If all members in a user group are selected, the configuration takes effect on the entire user group (including members added to the user group later). |
| IP Address Group | Configure this information when type is set to custom.<br>Enter the IP address range managed by URL routing. |
| Website group | Set the website type for which URL routes need to be configured. Select a website group from the created website groups. For details on how to create or modify a website group, see Section 9.5 Website Management. |
| Managed time period | During the controlled period, when the managed client accesses the application in the website group, the packets are forwarded through the outbound interface. Select |

| Parameter | Description |
| --- | --- |
| | from the drop-down list. Time range defined in 9.3 Time Management, or select custom and manually configure a time range. |
| Outgoing interface | Specify the interface that forwards the data packet based on the hit PBR rule. |
| Remarks | Configuring the description of a URL route |
| Network disconnection protection | After this function is enabled, if the outbound interface is unreachable, traffic is automatically switched to another reachable outbound interface. |
| Effective status | Turn on status to specify whether to enable the PBR rule. If status is turned off, this rule does not take effect. |

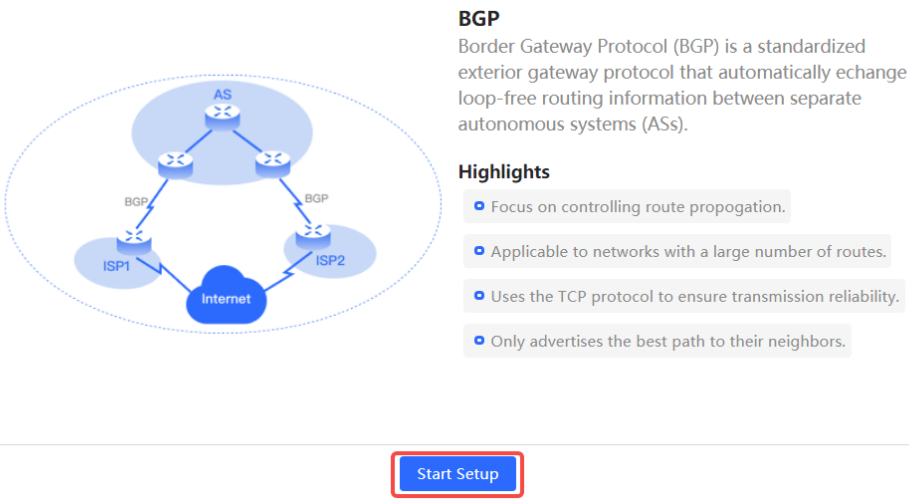
### 4.10.9 Configuring BGP Routes

The Internet consists of many autonomous systems (ASs) globally. Each AS may be an Internet service provider (ISP) network, large enterprise network, or education network. Border Gateway Protocol (BGP) is the core routing protocol on the Internet and is used to exchange routing information between ASs. For example, an ISP needs to connect to multiple other ISPs to allow its users to access network resources worldwide. Based on the path vector protocol, BGP enables ASs to select the optimal data transmission path, ensuring network connectivity and performance optimization.

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing Settings** > **BGP**.

#### 1. Configuring BGP Basic Parameters

(1) Click **Start Setup**.




(2) Set parameters in **Basic Configuration** and click **Next**.

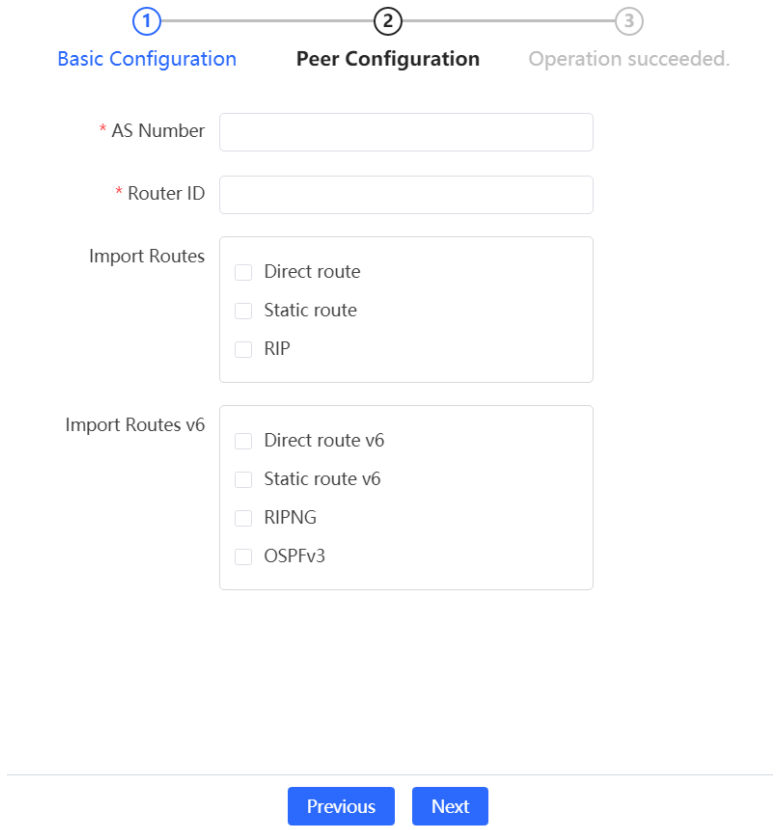


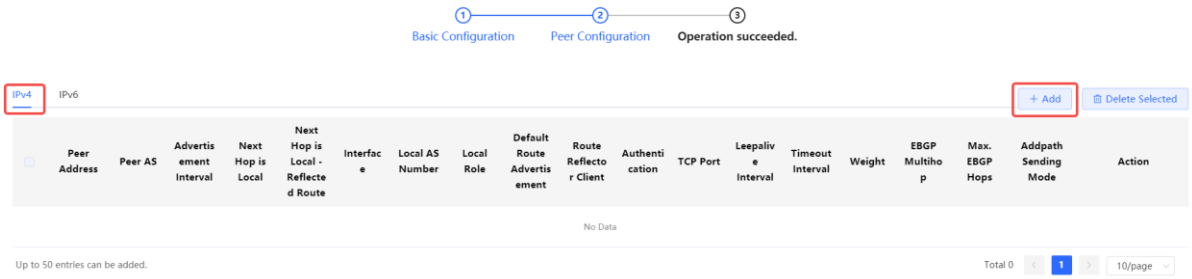

**Table 4-32 BGP Basic Configuration Parameters**

| Parameter | Description |
| --- | --- |
| AS Number | AS numbers are used to distinguish different ASs and are the basis of BGP communication. A device supports 4-byte AS numbers by default. Numbers from 1 to 41999999999 are public AS numbers, and numbers from 4200000000 to 4294967294 are private AS numbers. Private AS numbers are used to classify ASs in an AS confederation. |
| Router ID | The router ID uniquely identifies a BGP device. |
| Import Routes | Import IPv4 routes into a BGP routing table. Select the types of routes to be imported and set the metric. The metric is a numerical value used in BGP path selection to measure the cost of reaching a destination. A smaller metric value indicates a better path. The default value is 20. |
| Import Routes v6 | Import IPv6 routes into a BGP routing table. Select the types of routes to be imported and set the metric. The metric is a numerical value used in BGP path selection to measure the cost of reaching a destination. A smaller metric value indicates a better path. The default value is 20. |

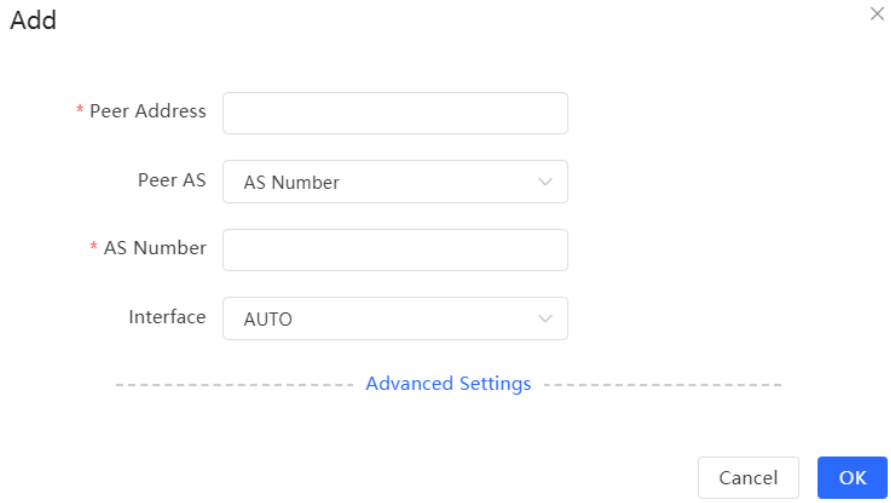
### 2. Configuring BGP Peers

- Configure an IPv4 peer.

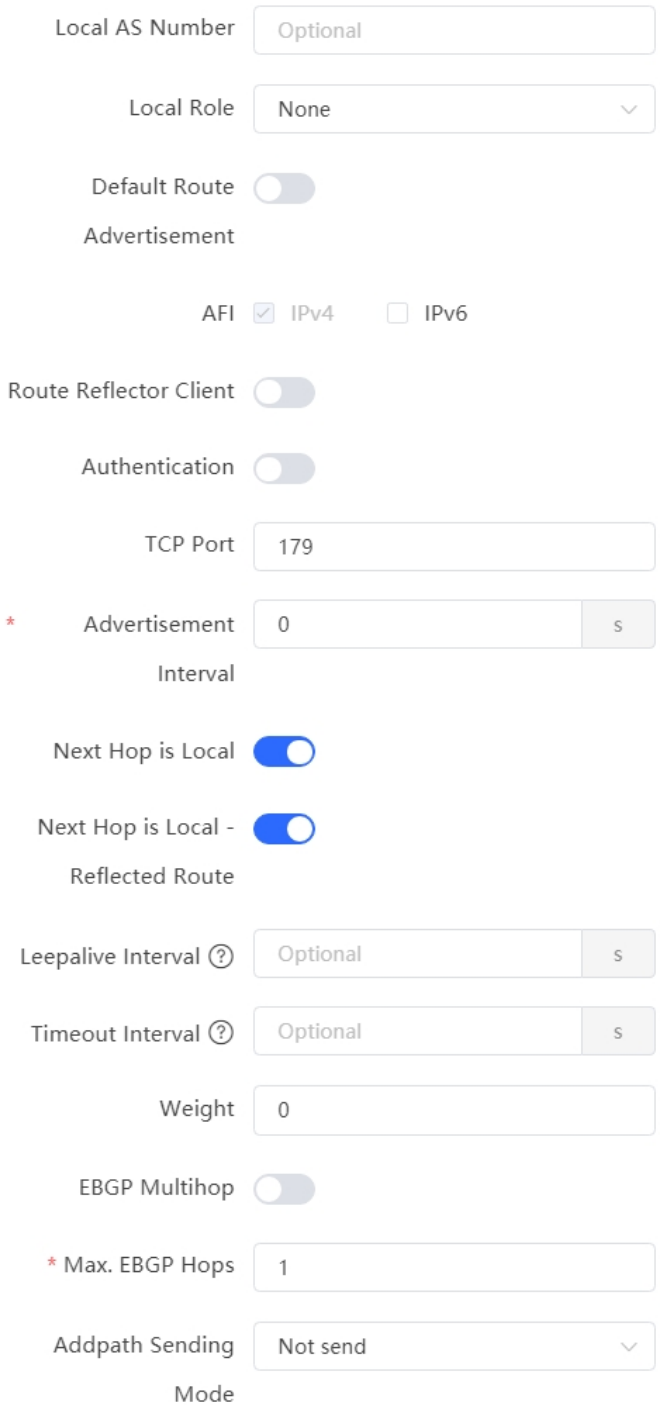
(1) Click the **IPv4** tab and click **Add**.




(2) Configure parameters related to the IPv4 peer. For details about the parameters, see Table 4-33 BGP Peer Configuration Parameters.



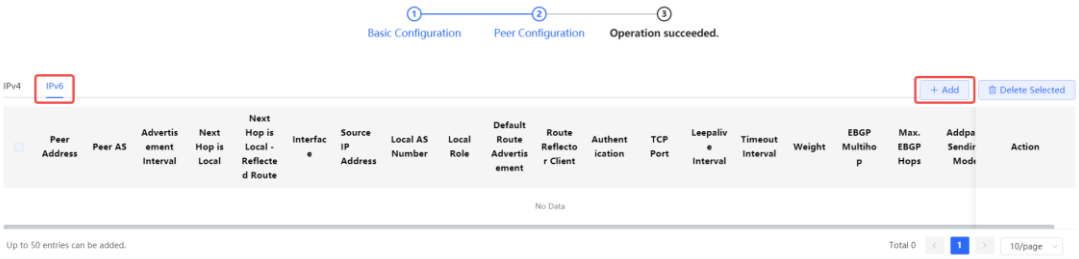

(3) Click **Advanced Settings** and configure advanced parameters. For details about the parameters, see Table 4-33 BGP Peer Configuration Parameters.



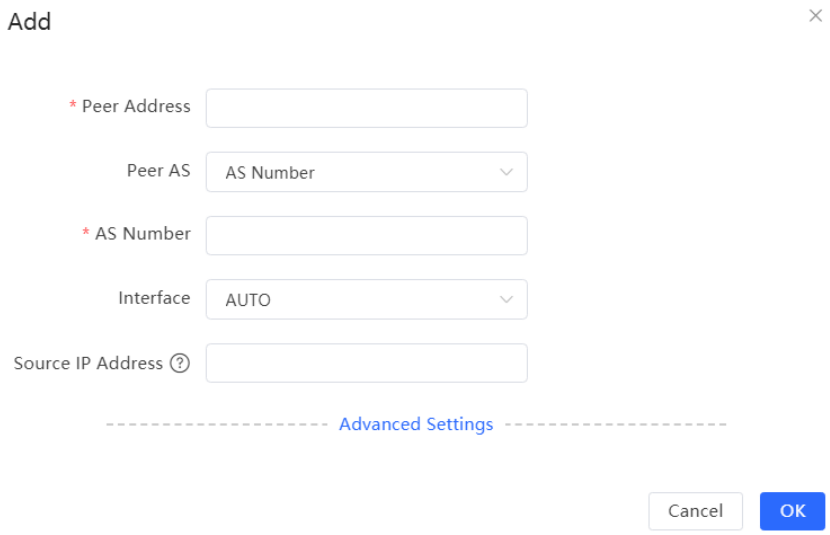

(4) Click **Finish**.

- Configure an IPv6 peer.

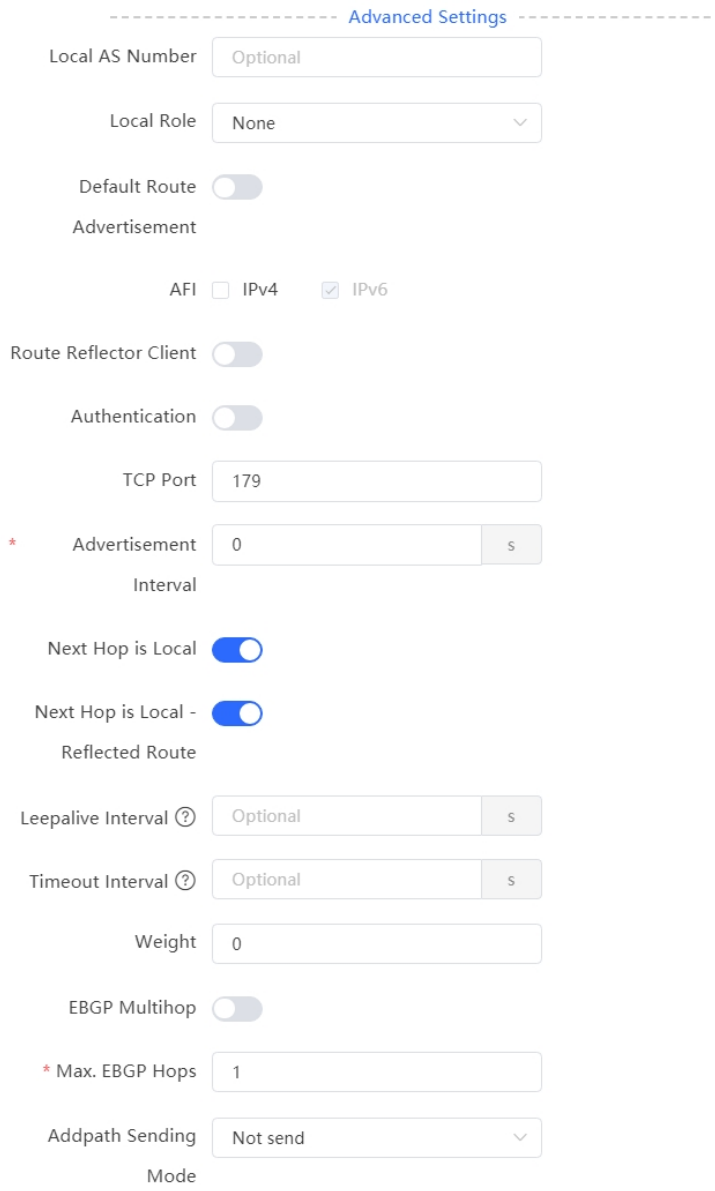
(1) Click the **IPv6** tab and click **Add**.




(2) Configure parameters related to the IPv6 peer. For details about the parameters, see Table 4-33 BGP Peer Configuration Parameters.




(3) Click **Advanced Settings** and configure advanced parameters. For details about the parameters, see Table 4-33 BGP Peer Configuration Parameters.

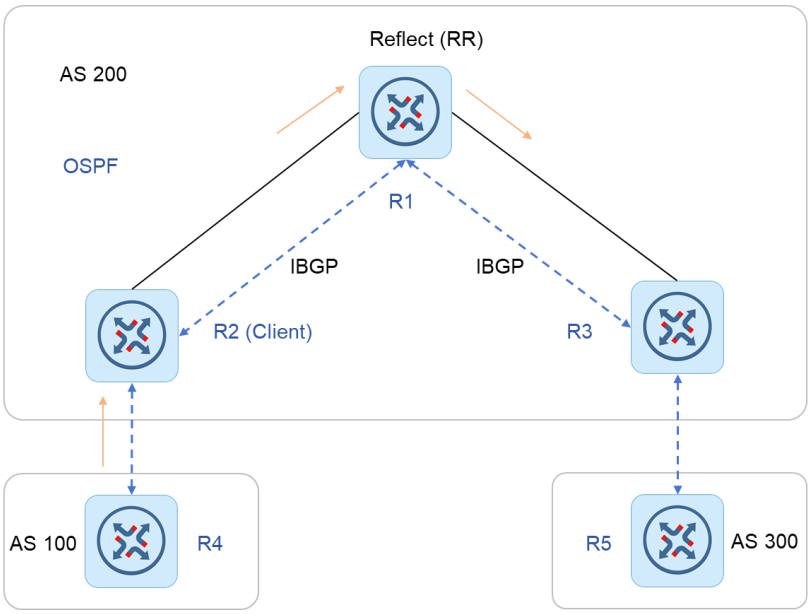
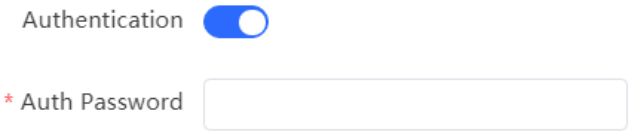



(4) Click **Finish**.

**Table 4-33 BGP Peer Configuration Parameters**

| Parameter | Description |
|---|---|
| Peer Address | Specify the IP address of a BGP peer router. The IP address is used to establish a TCP connection. |
| Peer AS | Specify the AS number of a BGP peer. The number is used to determine the AS to which a peer belongs.<br>● External AS Peer: When the peer AS is different from the local AS, select this option to establish a direct connection.<br>● Internal AS Peer: When the peer AS is the same as the local AS, select this option to establish a direct connection.<br>● AS Number: When establishing a peer relationship with another network, enter the AS number of the other network. |

| Parameter | Description |
| --- | --- |
| AS Number | This parameter needs to be configured when **Peer AS** is set to **AS Number**. The parameter is used to determine the AS to which the peer belongs. |
| Interface | Specify the local network interface for communicating with a BGP peer. The parameter is set to **AUTO** by default, that is, the system automatically selects an interface. Note that in the multi-WAN interface scenario, IP addresses of different WAN interfaces may be on the same network segment. As a result, you need to specify the interface. |
| Source IP Address | A device may learn multiple IPv6 addresses on the same interface. In this case, you can specify a source address to establish a BGP connection.<br>**Note**<br>This parameter can be set only when IPv6 peers are configured. |
| Local AS Number | When establishing a BGP connection with a peer, you can configure a local AS number, which can replace the global AS number. After the configuration is complete, the local device can be replaced smoothly without modifying the configuration of the peer device. |
| Local Role | You can configure the BGP local role to determine whether to advertise and learn routes when the local device connects to a peer device. The configuration is valid only in EBGP sessions.<br>● None: If no role is specified, the device can learn routes from all other roles.<br>● Customer: The local AS is a customer of the remote AS, and **Remote AS Role** is set to **Provider**.<br>● Peer: The local AS and remote AS establish a peer relationship, and **Remote AS Role** is set to **Peer**.<br>● Provider: The local AS is a provider of the remote AS, and **Remote AS Role** is set to **Customer**.<br>● Rs-Client: The local AS is a client of the route server, and **Remote AS Role** is set to **Route Server**.<br>● Rs-Server: The local AS is a route server, and **Remote AS Role** is set to **Rs-Client**. |
| Default Route Advertisement | Whether to advertise default routes to neighbors. |
| AFI | AFI specifies an address family, such as IPv4 or IPv6, to be processed in a BGP session. |

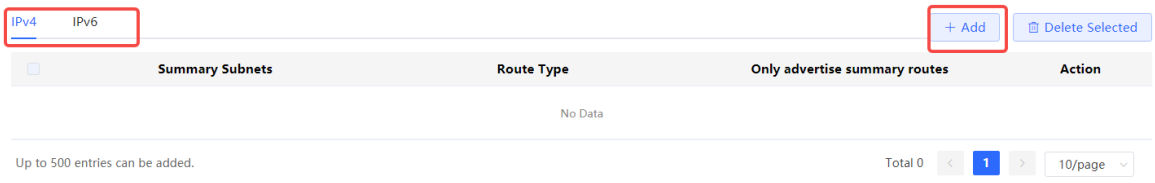
| Parameter | Description |
| --- | --- |
| Route Reflector Client | Whether to specify a neighbor as the client of a route reflector (RR). The RR advertises routes learned from IBGP peers to other specific IBGP peers. As shown in the figure, configure R2 and R3 as RR clients on R1 to implement the route reflection function. Note that this function can reflect only the routes of IBGP neighbors.<br> |
| Authentication | Specify the BGP session authentication. If you toggle on this parameter, you need to set **Auth Password**.<br> |
| TCP Port | Specify the TCP server port number of a BGP peer. The port number of the local server is fixed to 179. |
| Advertisement Interval | For learned routes, you can configure a route advertisement delay. Routes learned by default are advertised immediately. |
| Next Hop is Local | After this parameter is toggled on, the next hop address of an advertised route is that of the local device. |
| Next Hop is Local - Reflected Route | After this parameter is toggled on, the next hop address of an advertised reflected route is that of the local device. |
| Keepalive Interval | Specify the interval at which BGP keepalive messages are sent, which is used to maintain the BGP session. (The global configuration prevails by default.) |
| Timeout Interval | Specify the BGP session timeout time. If no keepalive message is received within this period, the session is considered to be disconnected. (The global configuration prevails by default.) |

| Parameter | Description |
| --- | --- |
| Weight | Configure the weight of routes learned from a neighbor. A greater weight indicates a higher priority. |
| EBGP Multihop | After this parameter is toggled on, the multiple-hop communication between EBGP peers is allowed. |
| Max. EBGP Hops | Configure the maximum number of hops that an EBGP route can pass through. |
| Addpath Sending Mode | This feature allows the use of add-path to advertise paths to neighbors. The parameter can be set to the following options.<br>● Not send: Indicate the default value.<br>● Send all paths: Send all paths to neighbors.<br>● Only send the best path: Send the optimal path to neighbors.<br>● Send the best path of each neighbor: Send the optimal paths of neighbors to other neighbors. |

### 3. Configuring Route Aggregation

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing Settings** > **BGP > Route Aggregation**.

(1) Click the **IPv4** or **IPv6** tab to aggregate IPv4 or IPv6 routes, respectively. Then click **Add**.




(2) Configure the parameters.

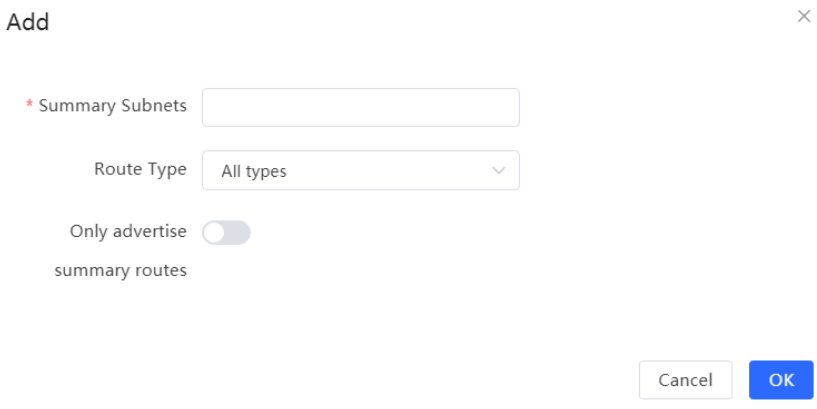


**Table 4-34 BGP Route Aggregation Parameters**

| Parameter | Description |
| --- | --- |
| Summary Subnets | Specify the subnets to be summarized. In the BGP route summarization configuration, you need to aggregate a series of IP addresses with the same prefix into a larger network segment and advertise the network segment to other BGP peers. For example, if subnets 10.1.1.0/24 and 10.1.2.0/24 exist, you can set **Summary Subnets** to 10.1.0.0/16 to represent the subnets.<br>**Caution**<br>The mask length cannot be set to 0 or 32 for IPv4 route summarization, or to 0 or 128 for IPv6 route summarization. If no post-summarization route network segment exists on the local device, a static black hole route of the network segment will be generated on the local device. |
| Route Type | Specify the route types, including **All types**, **EGP types**, **IGP types**, and **Import Route Types**. |
| Only advertise summary routes | Whether to advertise only aggregated routes. After this parameter is toggled on, a BGP router advertises only aggregated routes to peers, but not specific subnet routes. |

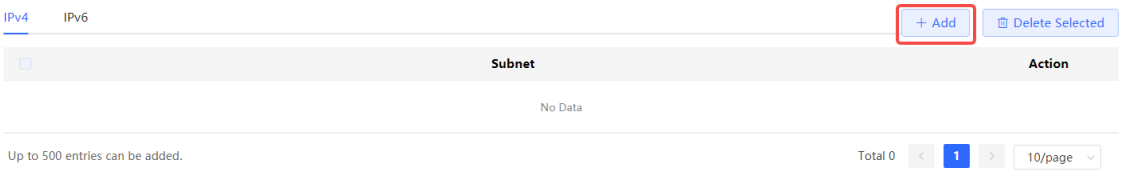
(3) Click **OK**.

### 4. Configuring Route Advertisement

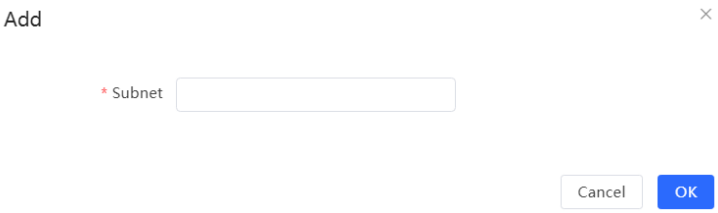
Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing Settings** > **BGP > Route Advertisement**.

You can directly advertise a subnet route to the peer. Note that if the network segment does not exist on the local device, you need to toggle off **Route Advertisement Detection** in **Advanced**.

(1) Click the **IPv4** or **IPv6** tab to advertise IPv4 or IPv6 routes, respectively. Then click **Add**.




(2) Enter the subnet address and click **OK**.



### 5. Configuring the Advanced Functions

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Routing Settings** > **BGP > Advanced**.

(1) Configure the parameters.

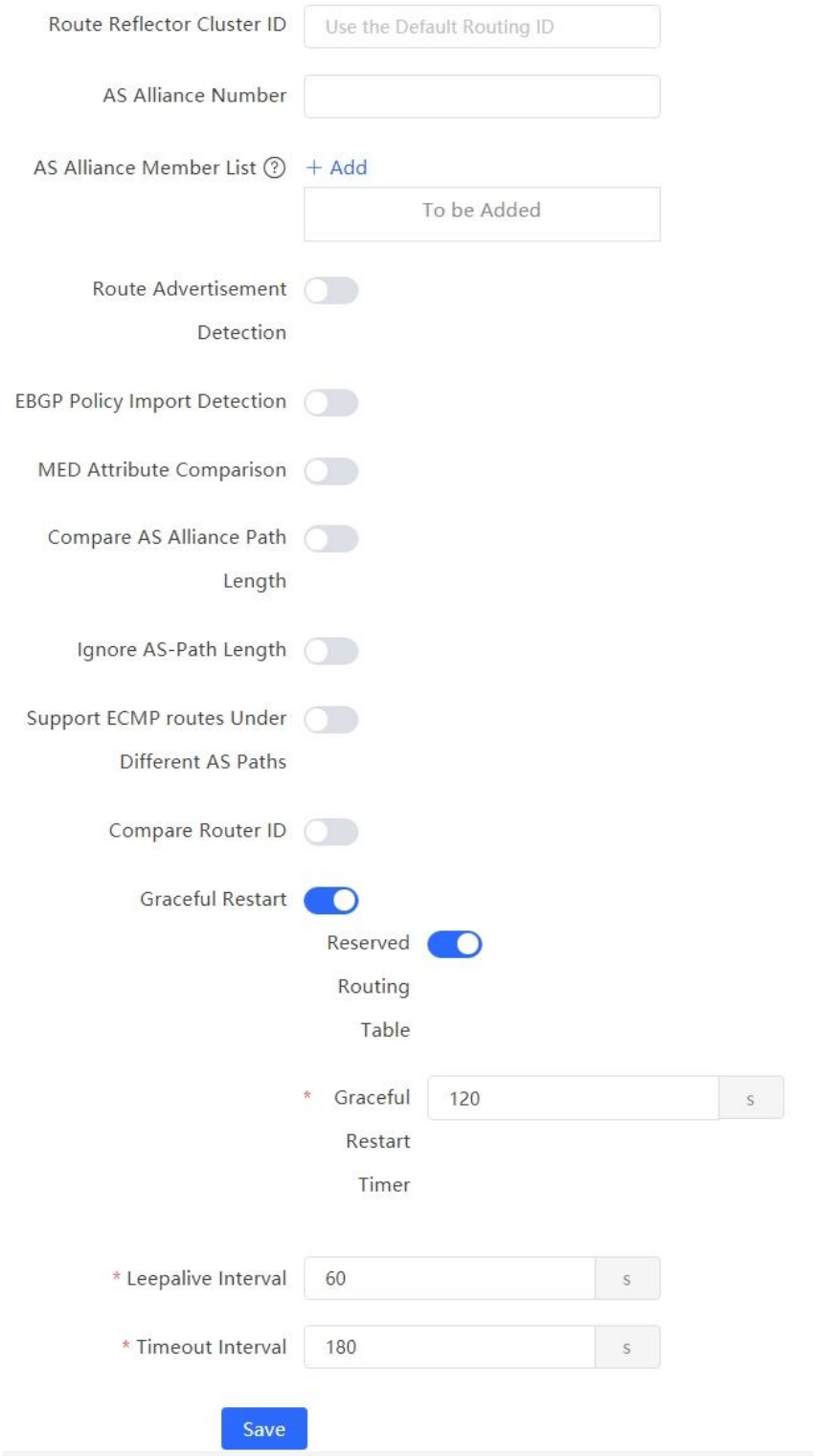


**Table 4-35 BGP Advanced Parameters**

| Parameter | Description |
| --- | --- |
| Route Reflector Cluster ID | Configure the RR ID, which is used to identify a cluster in RR scenarios. In BGP, an RR allows indirectly connected BGP peers to exchange routing information. The router ID is used as the RR ID by default. |
| AS Alliance Number | Specify the number of an AS confederation to which ASs belong to. In a confederation, a large AS is divided into multiple smaller ASs to simplify route management. |
| AS Alliance Member List | Specify the numbers of all member ASs in an AS confederation. This helps define which ASs are part of the confederation and considers AS paths inside a confederation during route calculation. Click **Add** to add members to the AS confederation. |
| Route Advertisement Detection | Whether to advertise routes. If the parameter is toggled on, the device will detect whether the route exists, and advertise it only if it exists. |
| EBGP Policy Import Detection | Specify the External BGP (EBGP) policy import detection, which is used to apply a specific policy before EBGP routes are imported to the local routing table. Toggling on this parameter affects the establishment of EBGP peer relationships and route learning. |
| MED Attribute Comparison | MED is a BGP path attribute that influences path selection and helps distribute traffic more evenly. |
| Compare AS Alliance Path Length | Whether to compare the path length of an AS confederation in BGP path selection. This helps in choosing between paths within and outside a confederation. |
| Ignore AS-Path Length | Whether to configure BGP to ignore the AS path length during path selection. This can be used to ignore path preference based on AS hop count, and may be applied in specific routing policies. |
| Support ECMP routes Under Different AS Paths | Equal-cost multi-path routing (ECMP) can be used across different AS paths. This allows routers to balance traffic among multiple paths. |
| Compare Router ID | Whether to enable BGP to compare router IDs during path selection. When ECMP exists, the path with a larger router ID is preferred. |

| Parameter | Description |
| --- | --- |
| Graceful Restart | After this parameter is toggled on, nonstop routing and no impact on traffic forwarding can be ensured after BGP restarts due to an unexpected shutdown. In addition, the device can function as a GR helper to help neighbors restart gracefully. After this parameter is toggled on, configure the following parameters:<br>● Reserved Routing Table: After this parameter is toggled on, routing flapping does not occur on a neighbor when the connection with the neighbor is reestablished during BGP restart in case of an unexpected BGP shutdown.<br>● Graceful Restart Timer: Timer for assisting the neighbor restart as a GR helper. After the renegotiation process times out, the originally learned routes will be deleted. |
| Leepalive Interval | Specify the interval at which BGP keepalive messages are sent, which is used to maintain the BGP session. |
| Timeout Interval | Specify the BGP session timeout time. If no keepalive message is received within this period, the session is considered to be disconnected. |

(2) Click **Save**.

# 4.11 Configuring ARP Binding and ARP Guard

## 4.11.1 Overview

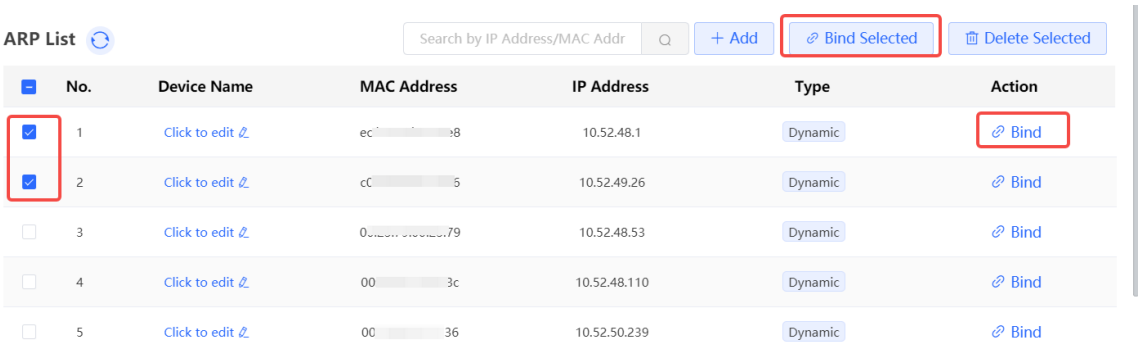
The device learns the IP address and MAC address of the network devices connected to its interfaces and generates the corresponding ARP entries. You can enable ARP guard and configure IP-MAC binding to restrict Internet access of LAN hosts and improve network security.

## 4.11.2 Configuring ARP Binding

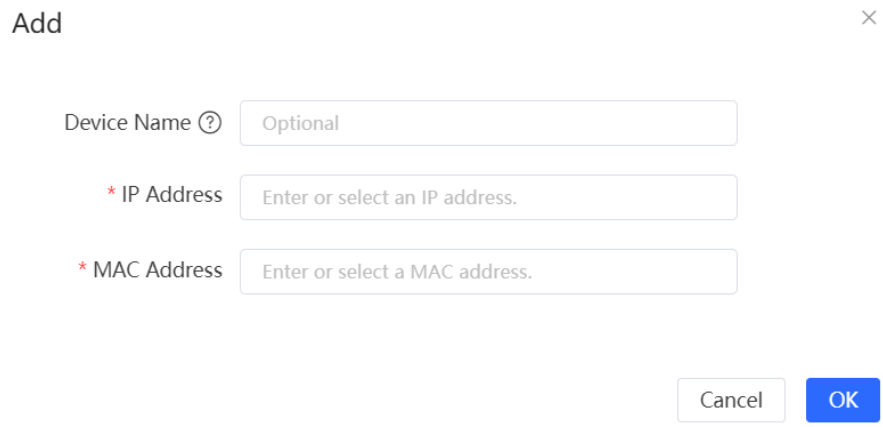
Choose **One-Device** > **Gateway** > **Config** > **Security** > **ARP List**.

Before you enable ARP guard, you must configure the binding between IP addresses and MAC addresses in either of the following ways:

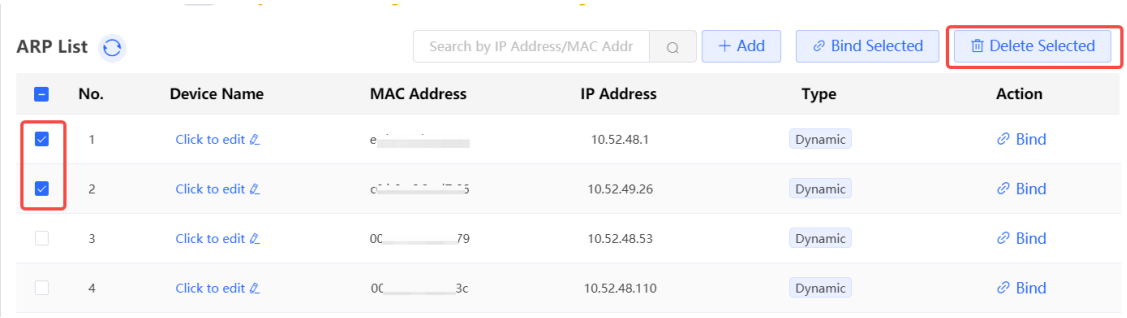
(1) Select a dynamic ARP entry in the ARP list and click **Bind**. You can select multiple entries to be bound at one time and click **Bind Selected** to bind them.



(2) Click **Add**, enter the device name, IP address and MAC address to be bound, and click **OK**. The input box can display existing address mappings in the ARP list. You can click a mapping to automatically enter the address mapping.




To remove the binding between a static IP address and a MAC address, click **Delete** in the **Action** column.

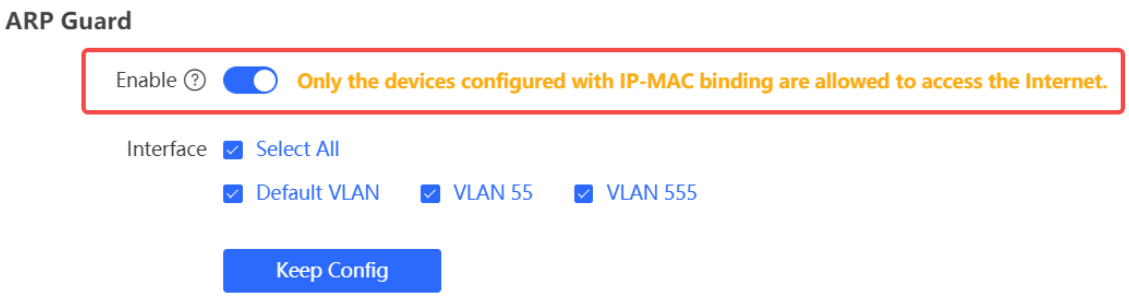



## 4.11.3 Configuring ARP Guard

After ARP guard is enabled, only LAN hosts with IP-MAC binding can access the external network. For details on how to configure ARP binding, see Section 4.11.2 Configuring ARP Binding.

(1) Choose **One-Device** > **Gateway** > **Config** > **Security** > **ARP List**.

(2) Turn on **Enable** in the **ARP Guard** section to enable ARP guard.




(3) Set the range for the function to take effect.

If you select **Select All**, the ARP guard function will take effect on all clients on the LAN. If you select a specified port, the ARP guard function will take effect only on clients connected to the port.

# 4.12 Configuring MAC Address Filtering

## 4.12.1 Overview

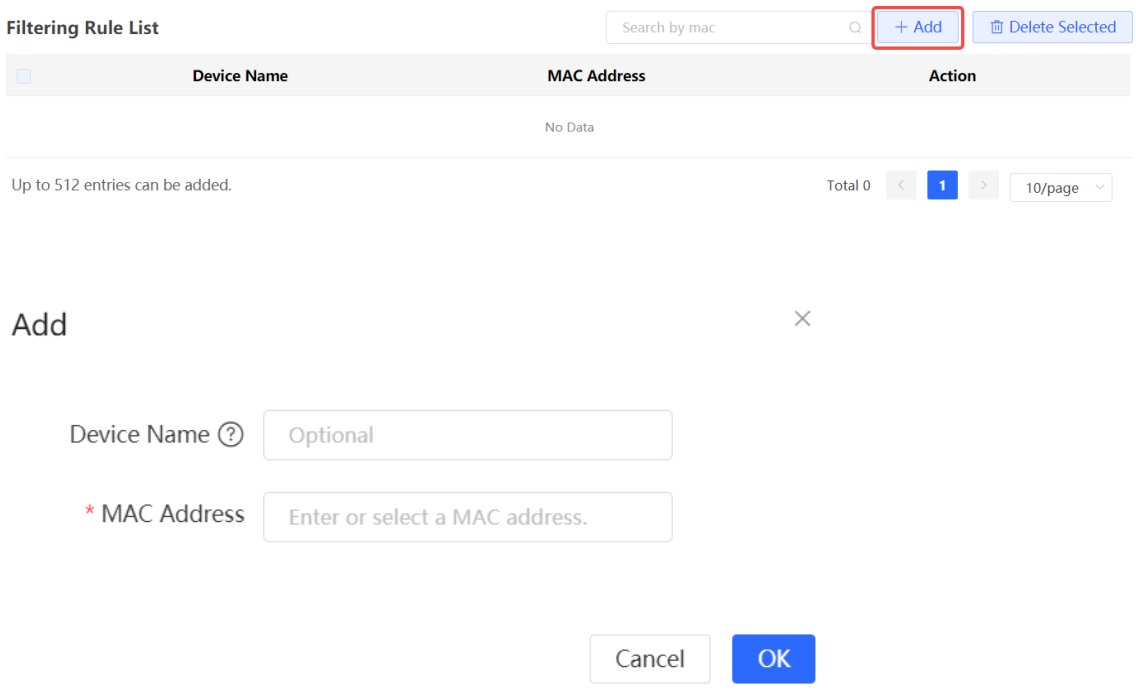
You can enable MAC address filtering and configure an **Allowlist** or **Blocklist** to effectively control Internet access from LAN hosts.

- **Allowlist**: Allow only hosts whose MAC addresses are in the filter rule list to access the Internet.
- **Blocklist**: Deny hosts whose MAC addresses are in the filter rule list from accessing the Internet.

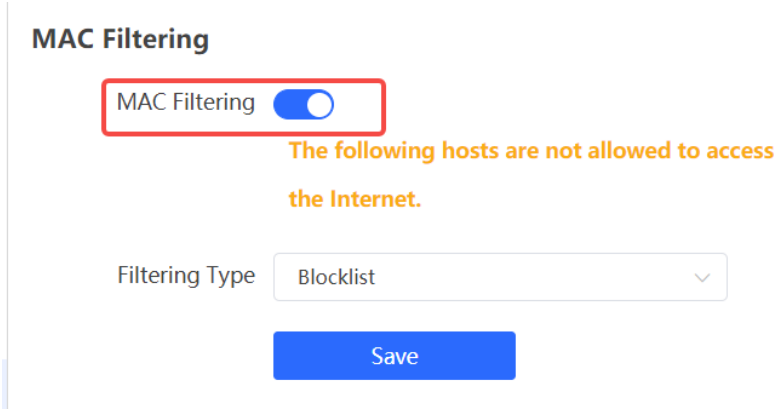
## 4.12.2 Configuration Steps

Choose **One-Device > Gateway > Config > Security > MAC Filtering**.

(1) In the Filtering Rule List pane, click **Add**. In the dialog box that appears, enter the MAC address and remarks. The input box can display existing address mappings in the ARP list. You can click a mapping to automatically enter the MAC address. Click **OK**. A filter rule is created.




(2) Turn on **MAC Filtering**, set **Filtering Type**, and click **Save**.




# 4.13 Port Mapping

## 4.13.1 Overview

### 1. Port Mapping

The port mapping function can establish a mapping relationship between the IP address and port number of a WAN interface and the IP address and port number of a server in the LAN, so that all access traffic to a service port of the WAN interface will be redirected to the corresponding port of the specified LAN server. This function enables external users to actively access the service host in the LAN through the IP address and port number of the specified WAN interface.

Application scenario: Port mapping enables users to access the cameras or computers in their home network when they are in the enterprise or on a business trip.

### 2. NAT-DMZ

When an incoming data packet does not hit any port mapping entry, the packet is redirected to the LAN server according to the Demilitarized Zone (DMZ) rule. All data packets actively sent from the Internet to the device are forwarded to the designated DMZ host, thus realizing LAN server access of external network users. DMZ not only realizes the external network access service, but also ensures the security of other hosts in the LAN.

Application scenario: Configure port mapping or DMZ when an external network user wants to access the LAN server, for example, access a server deployed in the home network when the user is in the enterprise or on a business trip.

## 4.13.2 Getting Started

- Confirm the intranet IP address of the mapping device on the LAN and the port number used by the service.
- Confirm that the mapped service can be normally used on the LAN.

## 4.13.3 Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Port Mapping** > **Port Mapping**.

Click **Add**. In the dialog box that appears, enter the rule name, service type, protocol type, external port/range, internal server IP address, and internal port/range. You can create a maximum of 50 port mapping rules.

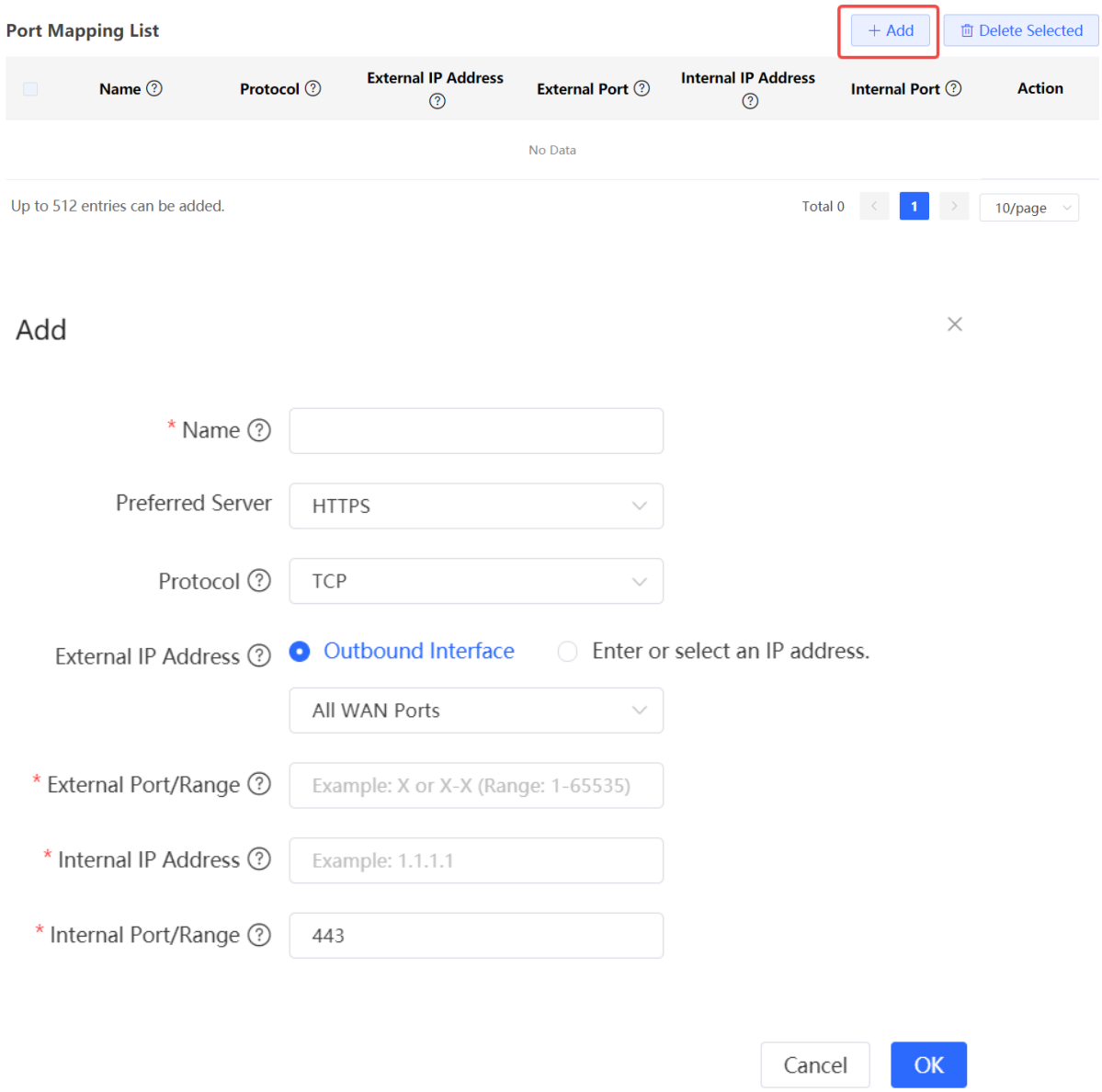



**Table 4-36 Port mapping configuration**

| Parameter | Description |
|---|---|
| Name | Enter the description of the port mapping rule, which is used to identify the rule. |
| Preferred Server | Select the type of service to be mapped, such as HTTP or FTP. The internal port number commonly used by the service is automatically entered. If you are not sure about the service type, select **Custom**. |
| Protocol | Select the transmission layer protocol type used by the service, such as **TCP** or **UDP**. The value **ALL** indicates that the rule applies to both protocols. The value must comply with the client configuration of the service. |

| Parameter | Description |
| --- | --- |
| External IP Address | Specify the host address used for accessing the external network. You can set it to the following:<br>● **Outbound Interface**: You can select **All WAN Ports** or specify a WAN interface.<br>● **Enter or select an IP address**: Select or enter the IP address of a WAN interface. |
| External Port/Range | Specify the port number used for Internet access. You need to confirm the port number in the client software, such as the camera monitoring software. You can enter a port number or a port range, such as 1050-1060. If you enter a port range, the value of **Internal Port/Range** must also be a port range. |
| Internal IP Address | Specify the IP address of the internal server to be mapped to the WAN interface, that is, the IP address of the LAN device that provides Internet access, such as the IP address of the network camera. |
| Internal Port/Range | Specify the service port number of the internal server to be mapped to the WAN interface, that is, the port number of the application that provides Internet access, such as port 8080 of the Web service.<br>You can enter a port number or a port range, such as 1050-1060. If you enter a port range, the number of ports must be the same as that specified in **External Port/Range**. |

### 4.13.4 Verification and Test

Check whether the external network device can access services on the destination host using the external IP address and external port number.

### 4.13.5 Solution to Test Failure

(1) Modify the value of **External Port/Range** and use the new external port number to perform the test again. The possible cause is that the port is blocked by the firewall.

(2) Enable the remote access permission on the server. The possible cause is that remote access is displayed on the server, resulting in normal internal access but abnormal access across network segments.

(3) Configure DMZ rules. For details, see Section 4.13.6 Configuration Steps (DMZ). The possible cause is that the specified ports are incorrect or incomplete.

### 4.13.6 Configuration Steps (DMZ)

Choose **One-Device > Gateway > Config > Advanced > Port Mapping > NAT-DMZ**.

Click **Add**. Enter the rule name and internal server IP address, select the interface to which the rule applies, specify the rule status, and click **OK**. You can configure only one DMZ rule for an outbound interface.

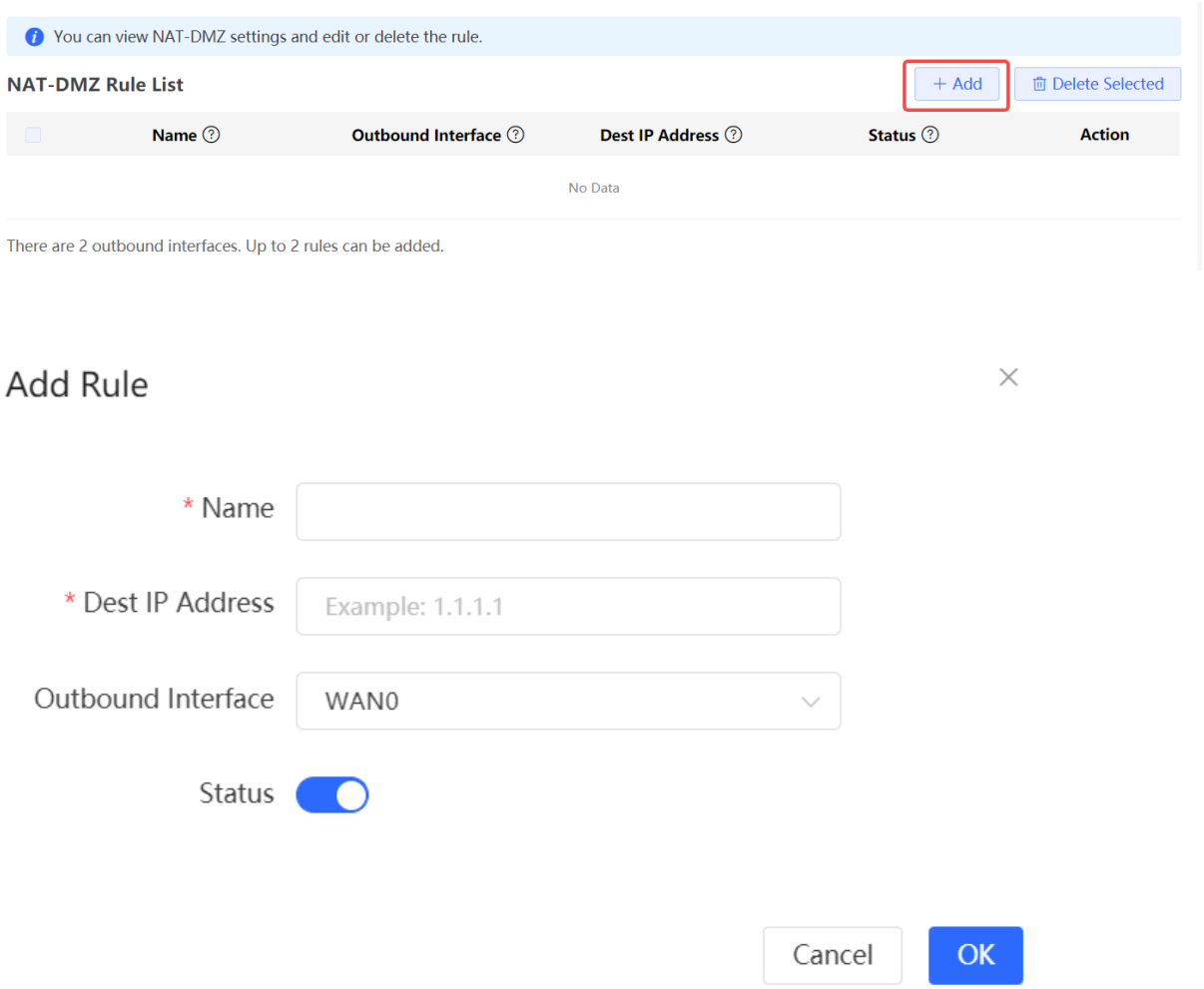



**Table 4-37 DMZ rule configuration**

| Parameter | Description |
|---|---|
| Name | Enter the description of the mapping rule, which is identify the DMZ rule. |
| Dest IP Address | Specify the IP address of the DMZ host to which packets are redirected, that is, the IP address of the internal server that can be accessed from the Internet. |
| Outbound Interface | Specify the WAN interface in the DMZ rule. You can configure only one rule for a WAN interface. |
| Status | Specify whether the rule is effective. The rule is effective after you turn on **Status**. |

# 4.14 UPnP

## 4.14.1 Overview

After the Universal Plug and Play (UPnP) function is enabled, the device can change the port used by the Internet access service according to the client request, implementing NAT. When a client on the Internet wants to access the internal resources on the LAN device, the device can automatically add port mapping entries to realize traversal of some services between internal and external networks. The following commonly used programs support the UPnP protocol: MSN Messenger, Thunder, BT, and PPLive.

Before you use the UPnP service, note that clients (PCs and mobile phones) used in combination also support UPnP.

**Note**

To implement automatic port mapping using UPnP, the following conditions must be met:

- UPnP is enabled on the device.
- The operating system of the LAN host supports UPnP and has UPnP enabled.
- The programs support UPnP and have UPnP enabled.

## 4.14.2 Configuring UPnP

Choose **One-Device > Gateway > Config > Advanced > UPnP**.

Turn on Enable to enable the UPnP function. Select a port from the drop-down list box of **Default Interface**. Click **Save** to make the configuration take effect.

If any relevant program converts the port automatically, the information is displayed in the **UPnP List** section.

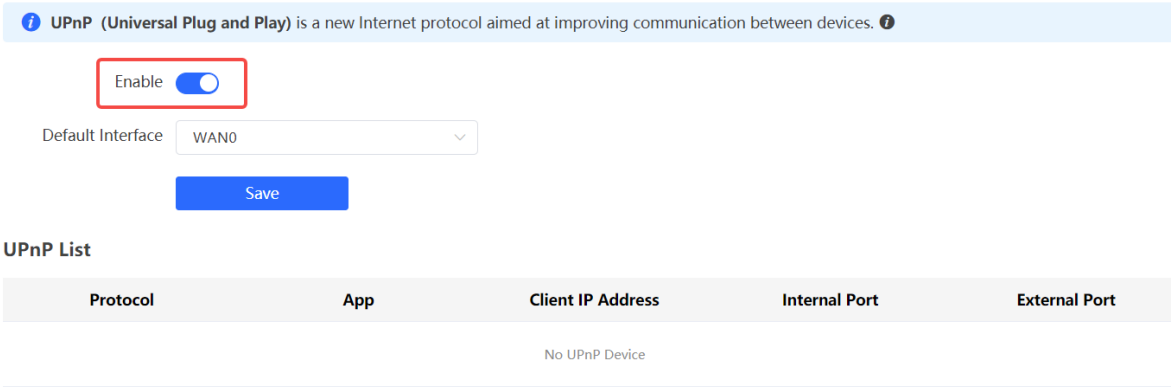



**Table 4-38 UPnP configuration**

| Parameter | Description |
|---|---|
| Enable | Specify whether to enable UPnP. By default, UPnP is disabled. |

| | |
|---|---|
| Default Interface | Specify the WAN interface address bound to the UPnP service. By default, the default interface is a WAN interface. On the device with multiple WAN interfaces, you can manually select the WAN interface to bind or set this parameter to **Auto** to allow the device to select a WAN interface automatically. |

### 4.14.3 Verifying Configuration

After the UPnP service is enabled, open a program that supports the UPnP protocol (such as Thunder or BitComet) on the client used with the device, and refresh the Web page on the device. If a UPnP entry is displayed in the UPnP list, a UPnP tunnel is created successfully.

## 4.15 Dynamic DNS

### 4.15.1 Overview

After the Dynamic Domain Name Server (DDNS) service is enabled, external users can use a fixed domain name to access service resources on the device over the Internet at any time, without the need to search for the WAN interface IP address. You need to register an account and a domain name on the third-party DDNS service provider for this service. The device supports No-IP DNS and Other DNS.

### 4.15.2 Getting Started

Before you use the DDNS service, register an account and a domain name on the DDNS or No-IP official website.

### 4.15.3 Configuring DDNS

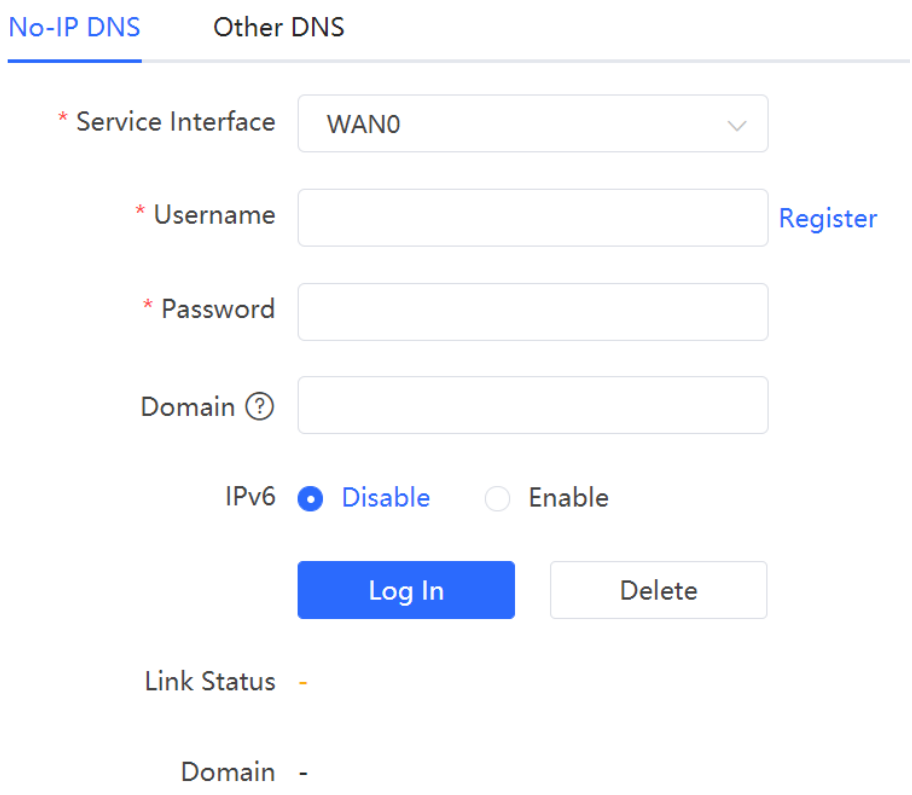
**1. No-IP DNS**

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Dynamic DNS** > **No-IP DNS**.

Enter the registered username and password and click Log In to initiate a connection request to the server. The binding between the domain name and WAN interface IP address of the device takes effect.

**Click Delete** to clear all the entered information and remove the server connection relationship.

The **Link Status** parameter specifies whether the server connection is established successfully. If you do not specify the domain name upon login, the domain name list of the current account is displayed after successful connection. All the domain names of this account are parsed to the WAN interface IP address.




**Note**

- Both No-IP DNS and other DNS support IPv6 connectivity.
- To ensure compatibility with the IPsec VPN functionality, you are advised to enable IPv6 when IPv6 is used for IPsec VPN connection.

**Table 4-39 DDNS login information**

| Parameter | Description |
|---|---|
| Service Interface | One domain name can be parsed to only one IP address. Therefore, you need to specify the WAN interface bound to the domain name when multiple WAN interfaces are available. By default, the service interface is a WAN interface. |
| Username / Password | Enter the username and password of the account registered on the official website. If no registered account is available, click **Register** to switch to the official website and create a new account. |

| Parameter | Description |
| --- | --- |
| Domain | Specify the domain name bound to the service interface IP address.<br>This parameter is optional for No-IP DNS. One account can be bound to multiple domain names. You can choose to bind only one domain name to the IP address of the current service interface. Only the selected domain name is parsed to the WAN interface IP address. If no domain name is specified, all the domain names of the current account are parsed to the WAN interface IP address. |

### 2. Other DNS

Choose **One-Device > Gateway > Config > Advanced > Dynamic DNS > Other DNS**.

Select the service provider and service interface, enter the username and password for login, and click **Log In** to initiate a connection request to the server to make the binding relationship between the domain name and the device WAN interface IP address effective.

Clicking **Delete** will clear all input information and disconnect from the server.

The connection status indicates whether a connection has been successfully established with the server.

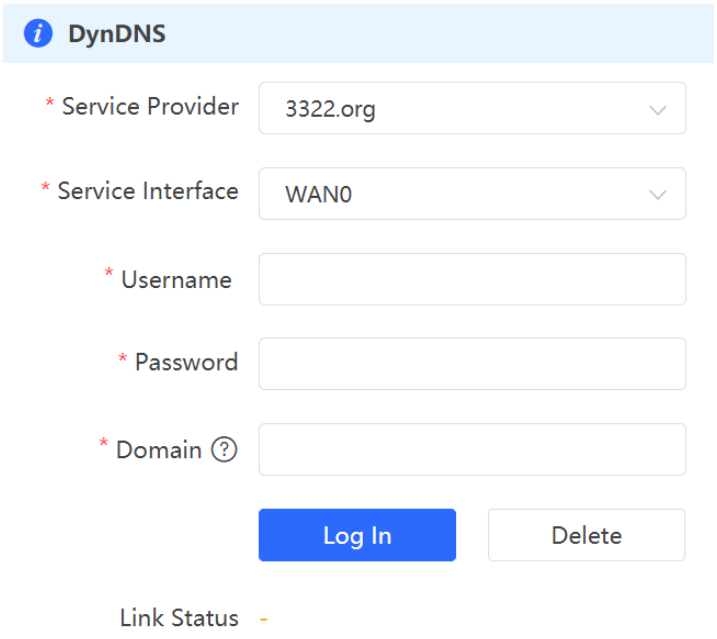



**Table 4-40 DDNS Login Information**

| Parameter | Description |
| --- | --- |
| Service provider | An organization that provides dynamic domain name services, such as 3322.2org, cloudflare. com v4, and aliyun. |

| Parameter | Description |
| --- | --- |
| Service Interface | One domain name can be parsed to only one IP address. Therefore, you need to specify the WAN interface bound to the domain name when multiple WAN interfaces are available. By default, the service interface is a WAN interface. |
| Username / Password | Enter the username and password of the account registered on the official website. |
| Domain | Specify the domain name bound to the service interface IP address. |

**Note**

- Both No-IP DNS and other DNS support IPv6 connectivity.
- To ensure compatibility with the IPsec VPN functionality, you are advised to enable IPv6 when IPv6 is used for IPsec VPN connection.

**3. Verifying Configuration**

If **Link Status** is displayed as **Connected**, the server connection is established successfully. After the configuration is completed, ping the domain name from the Internet. The ping succeeds and the domain name is parsed to the WAN interface IP address.

## 4.16 Connecting to IPTV

**Caution**

To connect to IPTV in the Chinese environment, switch the system language. For details, see Section 13.14 Switching System Language.

IPTV is a network television service provided by the ISP.

### 4.16.1 Getting Started

- Confirm that the IPTV service is activated.
- Check the local IPTV type: VLAN or IGMP. If the type is VLAN, confirm the VLAN ID. If you cannot confirm the type or VLAN ID, contact the local ISP.

### 4.16.2 Configuration Steps (VLAN Type)

Choose **One-Device > Gateway > Config > Network > IPTV > IPTV/VLAN**.

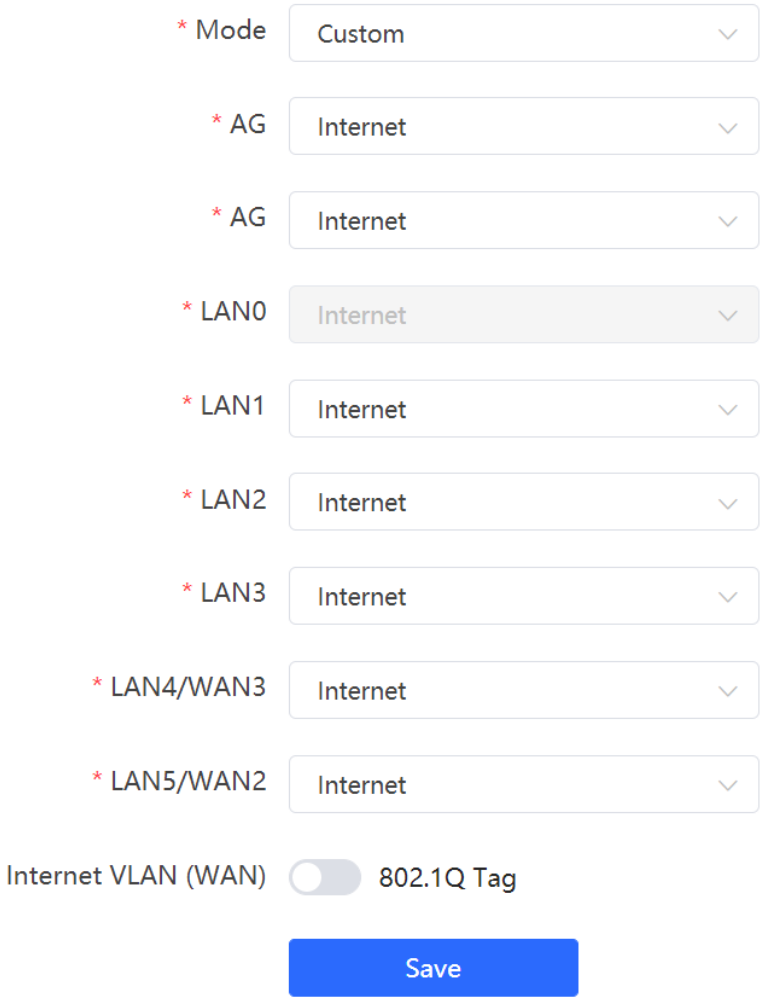
Select a proper mode based on your region, click the drop-down list box next to the interface to connect and select **IPTV**, and enter the VLAN ID provided by the ISP. For example, when you want to connect the IPTV set top box to LAN 3 port of the device and the VLAN ID is 20, the configuration UI is as follows.

**Internet VLAN**: If you need to set a VLAN ID for the Internet access service, turn on this parameter and enter the VLAN ID. By default, the VLAN tag function is disabled. You are advised to keep the VLAN tag function disabled unless otherwise specified.

After the configuration is completed, confirm that the IPTV set top box is connected to the correct port, for example, LAN 3 in the example.

**Caution**

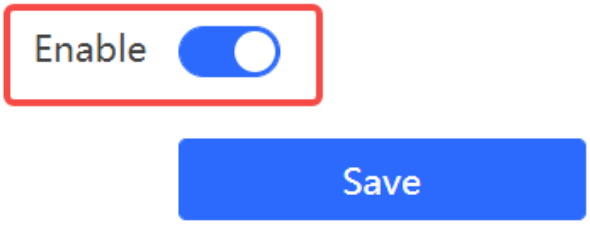
Enabling this function may lead to network disconnection. Exercise caution when performing this operation.




### 4.16.3 Configuration Steps (IGMP Type)

Choose **One-Device > Gateway > Config > Network > IPTV > IPTV/IGMP**.

The IGMP type is applicable to the ISP FPT. After you enable IPTV connection, connect the IPTV set top box to any LAN port on the router.

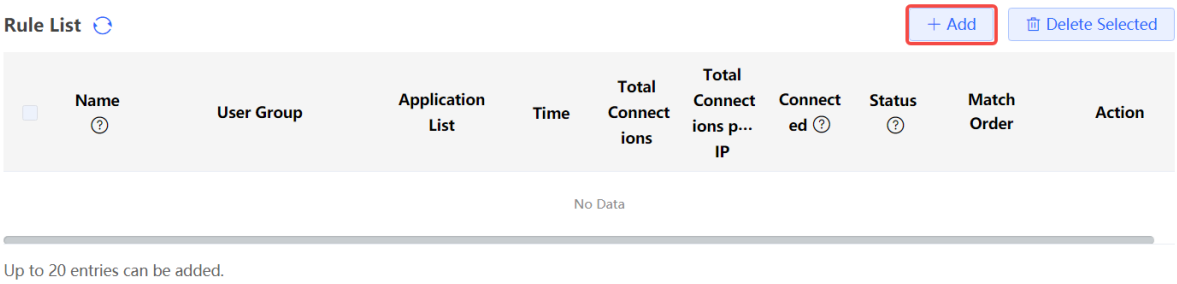


# 4.17 Limiting the Number of Connections

Choose **One-Device > Gateway > Config > Advanced > Session Limit**.

This function is used to control the maximum number of connections per IP address.

Click **Add** to add an IP session limit rule.



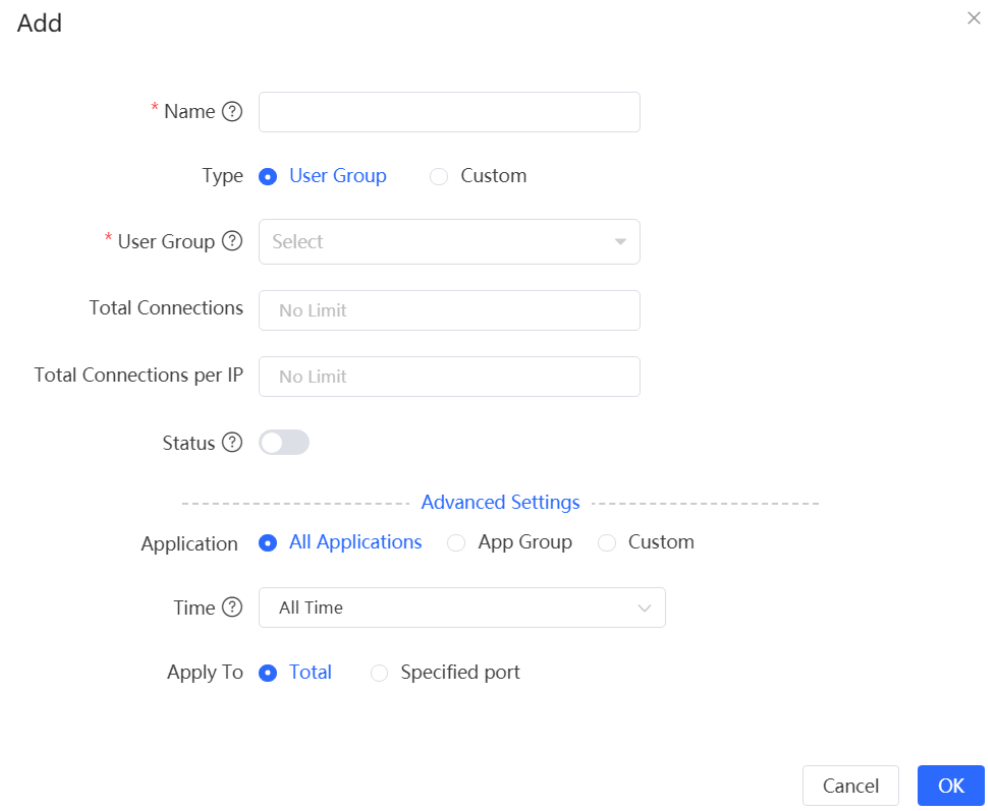




**Table 4-41 IP session limit rule information**

| Parameter | Description |
|---|---|
| Name | Enter the name of the IP session limit rule. |

| Parameter | Description |
| --- | --- |
| Type | Select the rule type:<br>● **User Group**: The rule takes effect on the specified user group.<br>● **Custom**: The rule takes effect on the custom IP address range. |
| User Group | Select the user group from the list. For details about the user group list, see Section 9.2.2 User Group.<br>If all members of the user group are selected, the rule applies to the entire user group, including future members added to the group.<br>Note: This field is required only when the rule **Type** is set to **User Group**. |
| Start IP Address | Enter the start IP address for session matching in the rule. |
| End IP Address | Enter the end IP address for session matching in the rule. |
| Total Connections | Specify the total number of sessions for all IP addresses matching this rule. |
| Total Connections per IP | Specify the maximum number of sessions per IP address for all IP addresses matching this rule. |
| Status | Specify whether the rule is effective. The rule takes effect after you turn on this parameter. |
| Application | After an application is selected, the rule will take effect on the specified application.<br>● **All Applications**: The rule takes effect on all applications.<br>● **App Group**: Select an application group defined in9.4.4 Custom Application Group from the drop-down list box. The rule takes effect on applications in the selected application group.<br>● **Custom**: The rule takes effect on specified applications in the application list. |
| Time | The rule is effective in the selected time period. Select a time period from the time periods defined in 9.3 Time Management from the drop-down list, or select **Custom** to manually configure a time period. |
| Apply To | Set the application scope of the rule:<br>● **Total**: The rule applies to the entire device.<br>● **Specified port**: Select the interfaces to which the session count limit will be applied. The rule will be applied to the selected interfaces only. |

# 4.18 Configuring Local Security

## 4.18.1 Configuring an Admin IP Address

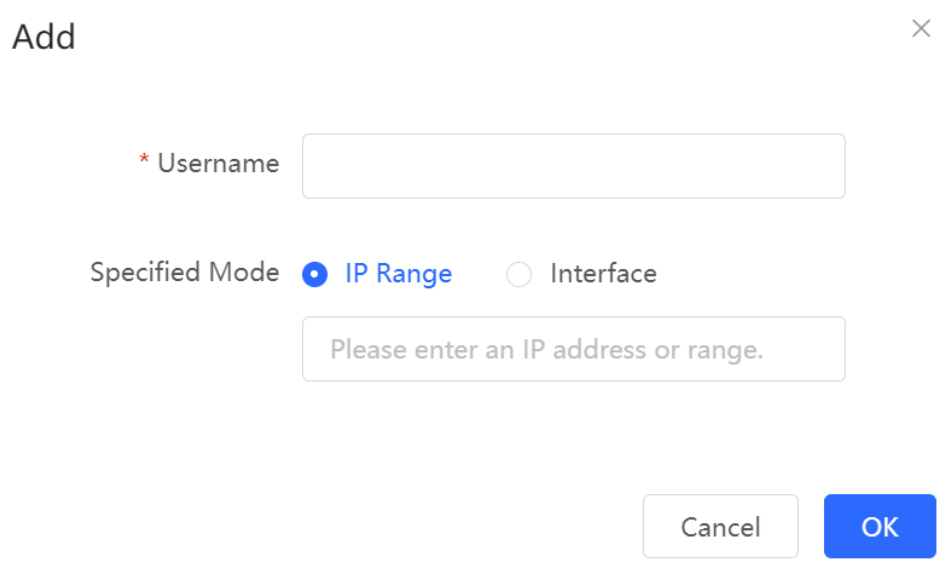
Admin IP addresses are exempt from the ping prohibition function. Packets sent from admin IP addresses can pass through and will not be discarded.

Choose **One-Device > Gateway > Config > Security > Local Security > Security Zone.**

Click **Add**. Then, you can configure admin IP address information.




### 1. Configuring an Admin IP Address (Based on an IP Address)




(1) Configure a name for the admin IP address.

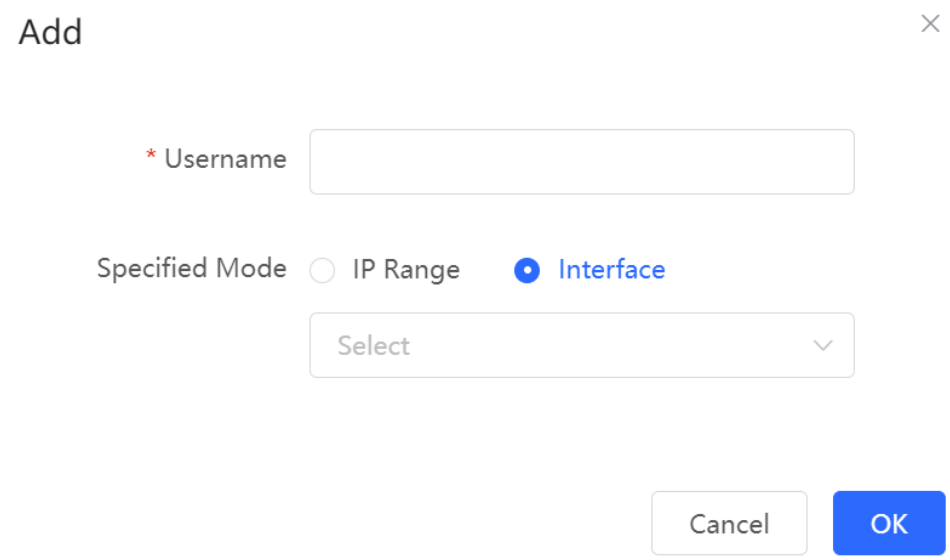
The name is a string of 1–32 characters.

(2) Set **Specific Mode** to **IP Range**.

(3) Configure an IP address.

You can specify a single IP address or an IP address range.

### 2. Configuring an Admin IP Address (Based on a Port)




(1) Configure a name for the admin IP address.

The name is a string of 1–32 characters.

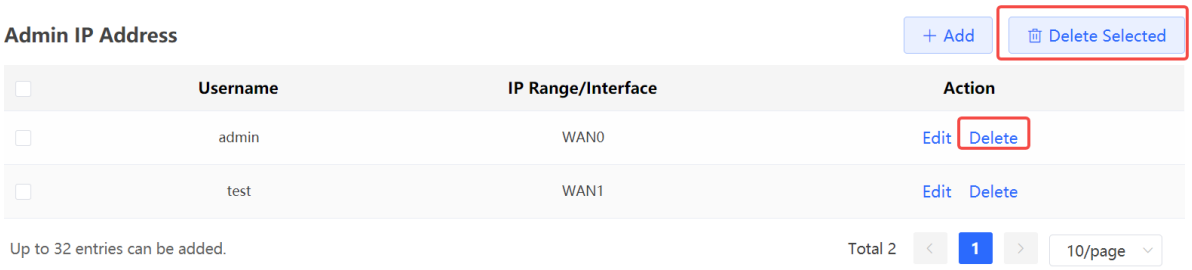
(2) Set **Specific Mode** to **Interface**.

(3) Specify the port.

You can select a LAN port or WAN interface as the interface.

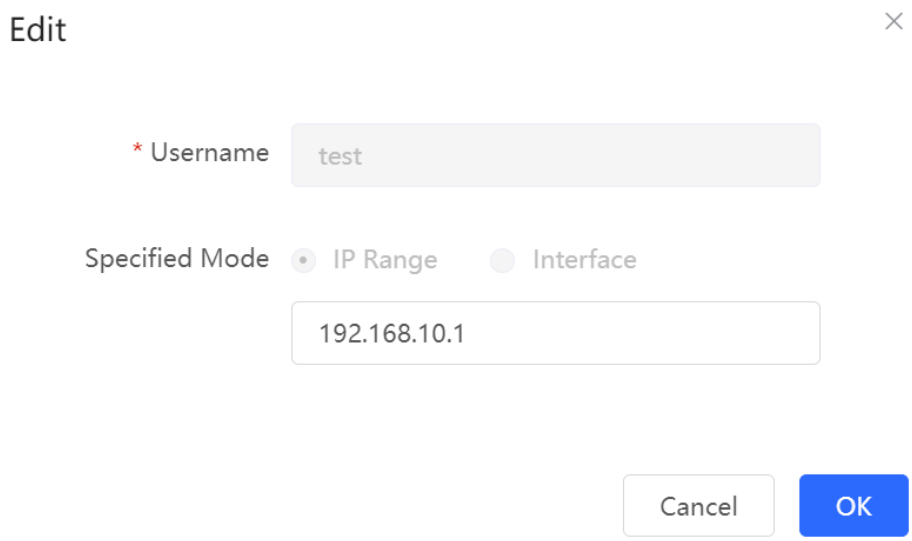
### 3. Deleting an Admin IP Address

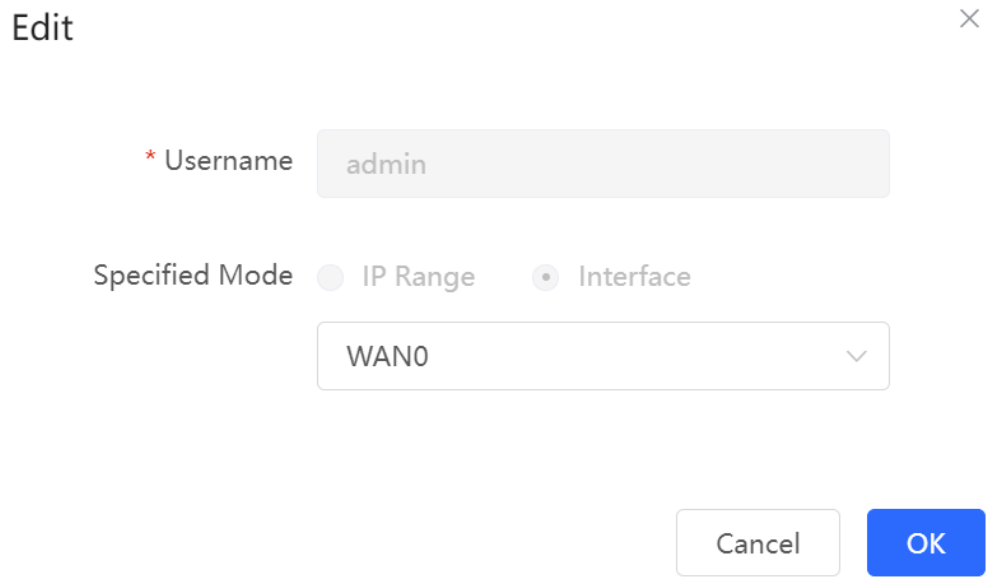
- Select an entry and click **Delete** to delete information about the admin IP address.
- Select multiple entries and click **Delete Selected** to bulk delete selected entries.




### 4. Editing Information About an Admin IP Address

You cannot modify the name and specified mode of an admin IP address but modify the IP address range or port in the specified mode.




### 4.18.2 Configuring Security Zones

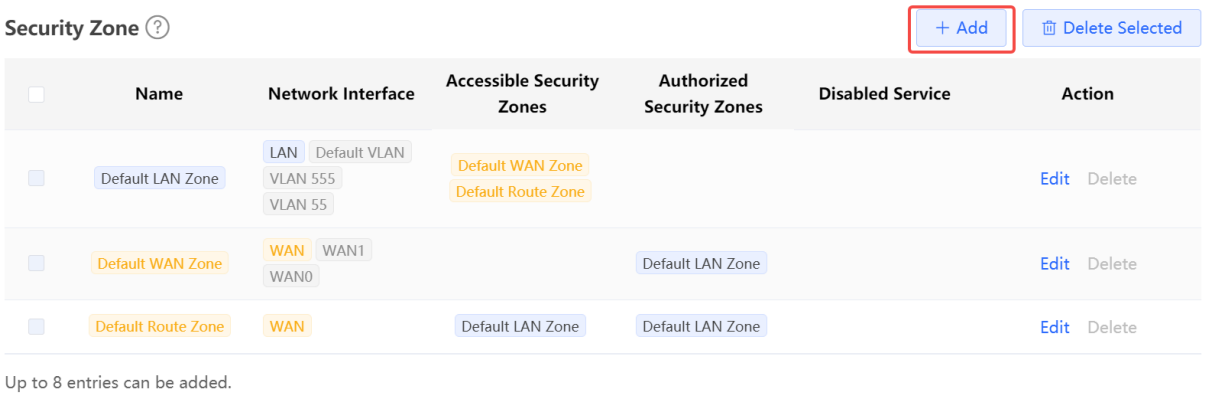
**Note**

For devices that do not support SNMP, the SNMP service cannot be disabled in a LAN zone.

A security zone is a logical zone consisting of a group of systems that trust each other and share the same security protection requirements. Generally, a security zone consists of a group of interfaces. Networks formed by interfaces in the same security zone share the same security attributes. Each interface can only belong to one security zone.

- Up to eight security zones can be added.
- Pre-defined security zones include:
  - Pre-defined LAN zone: By default, all VLANs are mapped to the pre-defined LAN zone.
  - Pre-defined WAN zone: By default, all WAN interfaces are mapped to the pre-defined WAN zone.

Choose **One-Device > Gateway > Config > Security > Local Security > Security Zone.**




(1) Click **Add**.

(2) Configure parameters for the security zone.

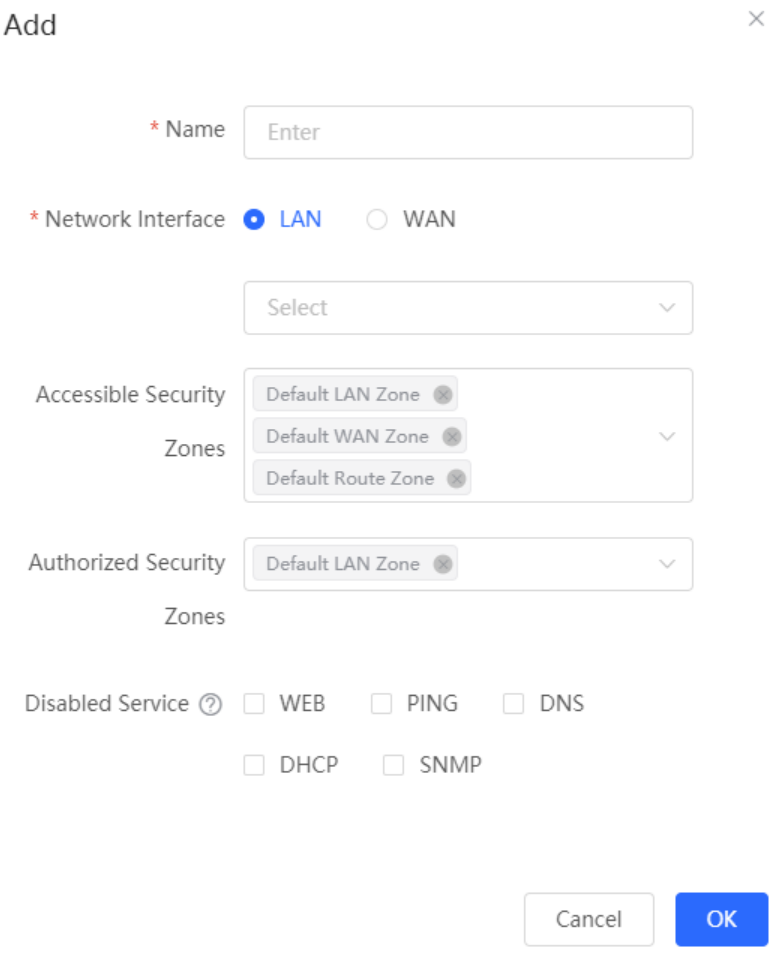


**Table 4-42 Description of Security Zone Configuration Parameters**

| Parameter | Description |
|---|---|
| Name | Name of the security zone. |
| Network Interface | Interfaces mapped to the security zone, including LAN and WAN.<br>LAN refers to VLAN, and WAN refers to WAN interfaces.<br>Note: After a new security zone is created and VLANs or WAN interfaces are mapped to this new security zone, the VLANs or WAN interfaces will be removed from the pre-defined LAN zone or pre-defined WAN zone. |
| Accessible Security Zones | Other security zones to which this security zone can access. |
| Authorized Security Zones | Other security zones that can access this security zone. |
| Disabled Service | Services prohibited in this security zone:<br>● If PING is selected, clients in the security zone cannot ping the local device.<br>● If Web is selected: clients in the security zone cannot access the local web page.<br>● If DNS is selected, the address of the DNS server used by clients in the security zone is the local IP address, and web pages cannot be accessed normally.<br>● If DHCP is selected, clients in the security zone cannot obtain IP addresses.<br>● If SNMP is selected, clients in the security zone cannot use the SNMP service of the device. |

(3) Click **OK**.

## 4.18.3 Configuring Session Attack Prevention

### 1. Overview

- Session Attack Prevention

In a session attack, an attacker sends heavy traffic to the device. In this case, the device has to consume many resources when creating connections. To reduce the impact of the attack, you can limit the rate of creating sessions.

- DDoS Attack Prevention

In a DDoS Attack, an attacker sends tremendous abnormal packets to a device. As a result, the device uses a large amount of resources to handle the packets. This causes the device performance to deteriorate or the system to break down.

If the value of TCP SYN and other TCP Flood parameters is too small, the authentication function and access to local web pages will be affected.

If the value of UDP Flood parameter is too small, the DHCP address allocation, DNS domain name resolution, and VPN functionalities will be affected.

You are advised to set the value to be greater than the load capacity of the local device.

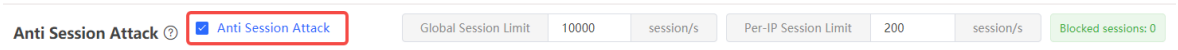
- Suspicious Packet Attack Prevention

In a suspicious packet attack, an attacker sends tremendous error packets to the device. When the host or server handles the error packets, its system will crash.

### 2. Configuring Session Attack Prevention

Choose **One-Device** > **Gateway** > **Config** > **Security** > **Local Security** > **Attack Defense**.

(1) Enable **Anti Session Attack**.



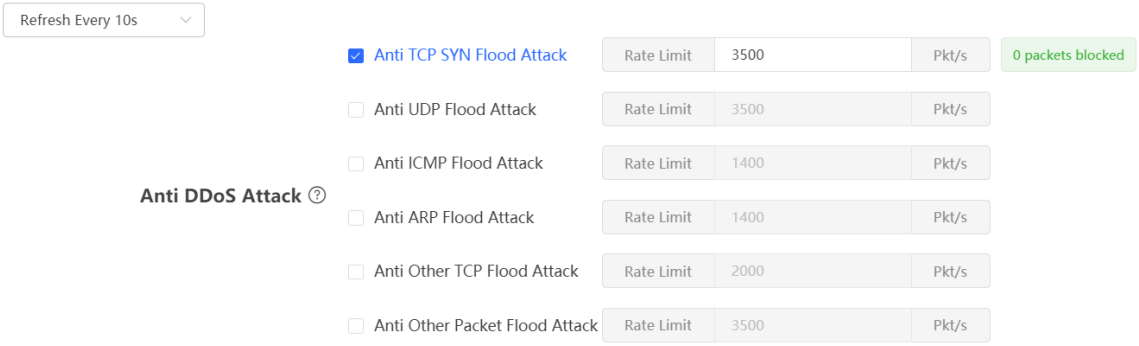

(2) Configure the session creation rate limit, including global and per-IP values.

(3) Click **Save**.

### 3. Configuring DDoS Attack Prevention

Choose **One-Device** > **Gateway** > **Config** > **Security** > **Local Security** > **Attack Defense**.

(1) Select required attack prevention types and enable this feature.



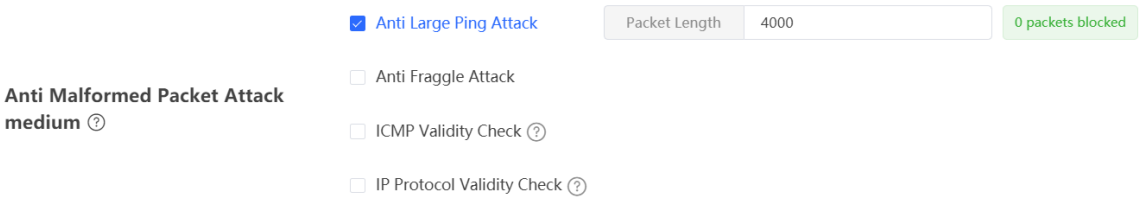

(2) Configure rate limiting.

(3) Click **Save**.

### 4. Configuring Suspicious Packet Attack Prevention

Choose **One-Device** > **Gateway** > **Config** > **Security** > **Local Security** > **Attack Defense**.

(1) Select required attack prevention types and validity check types to enable this feature.



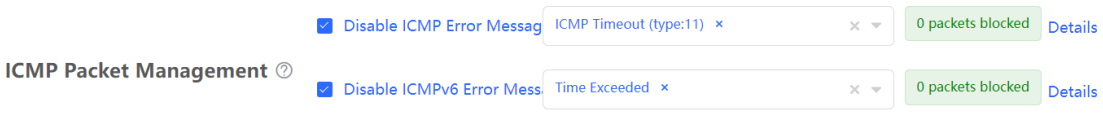

(2) To enable large ping attack prevention, enter the packet length.

(3) Click **Save**.

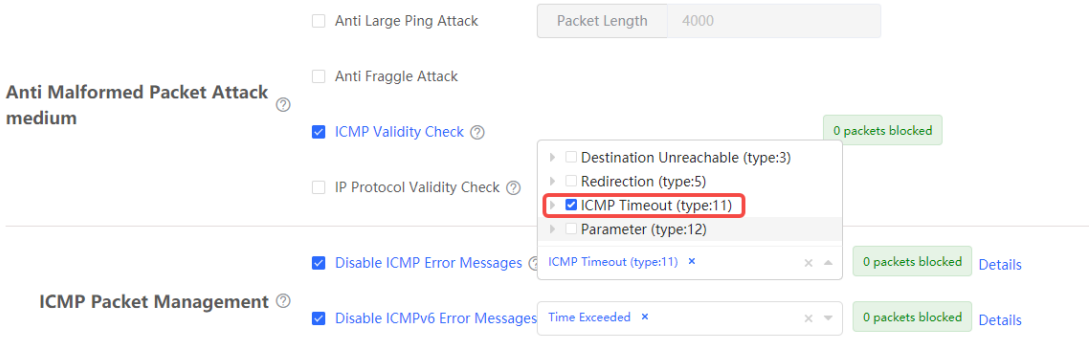
### 5. Configuring Packet Receiving and Sending Control

Choose **One-Device** > **Gateway** > **Config** > **Security** > **Local Security** > **Attack Defense**.

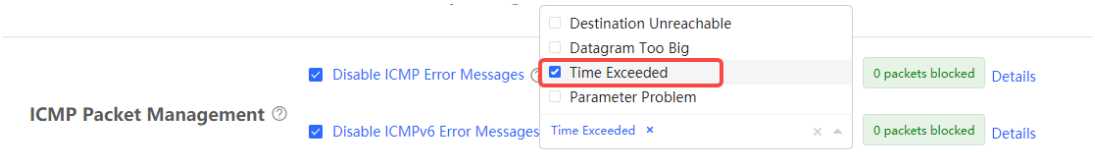
(1) Select the packet types that are prohibited from being sent by the device. Select at least one packet type.




- Enable **Disable ICMP Error Messages**. You can select **ICMP Timeout**, **Destination Unreachable**, **Redirection**, and **Parameter**.




- Enable **Disable ICMPv6 Error Message**. You can select **Destination Unreachable**, **Datagram too Big**, **Time Exceeded**, and **Parameter Problem**.

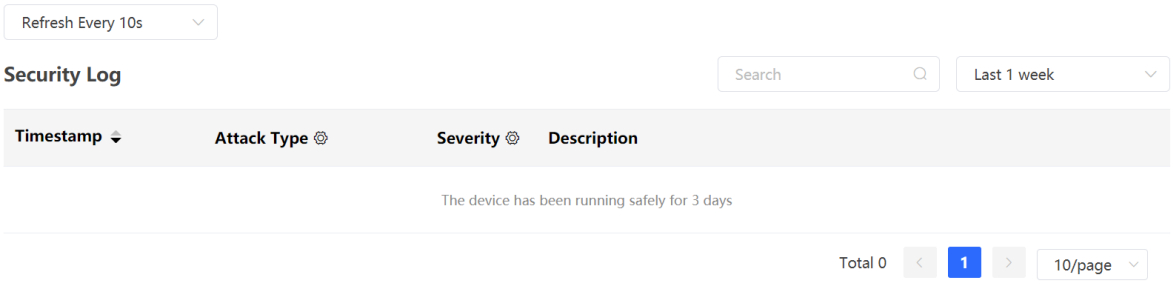



(2) Click **Save**.

## 4.18.4 Checking the Security Log

Choose **One-Device** > **Gateway** > **Config** > **Security** > **Local Security** >**Security Log**.

Check defense results of the device against various attacks on the **Security Log** page.



# 4.19 Configuring TTL Rules

## 4.19.1 Overview

Time to live (TTL) aims to prevent unauthorized connections. It limits the number of devices that can transmit data packets in the network by limiting the existence time of the data packets in the computer network, so as to prevent infinite transmission of data packets in the network and the waste of resources.

When TTL is set to 1 and is valid for LANs, packets are directly discarded when passing through the next router. If a user connects a router to Ruijie device without permission and connects a client to the router, packets cannot pass through the client, either. This restriction prevents users from connecting routers without permission.

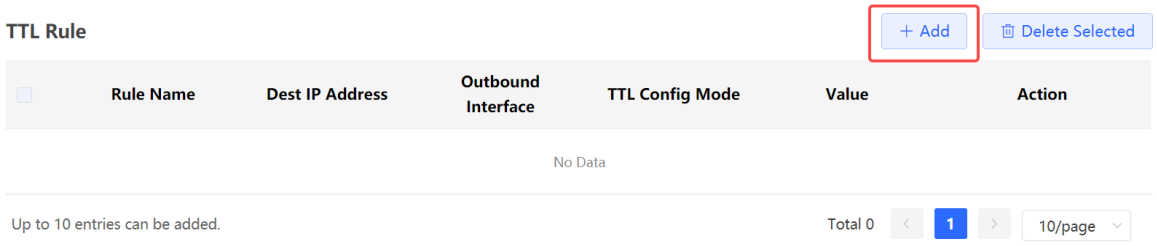
**Note**

- Changing the TTL affects packet forwarding on the network.
- The following data packets are not affected by this function: data packets forwarded by the express forwarding function of the device, data packets used by Wi-Fi cracking software (Cheetah Wi-Fi) to implement hotspot sharing, data packets forwarded at L2, and data packets passing through devices with TTL changed.

## 4.19.2 Configuring TTL Rules

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **TTL Rule**.

This operation allows you to change the TTL value in packets forwarded to a specified IP address range or a specified port.



### 1. Configuring a TTL Rule

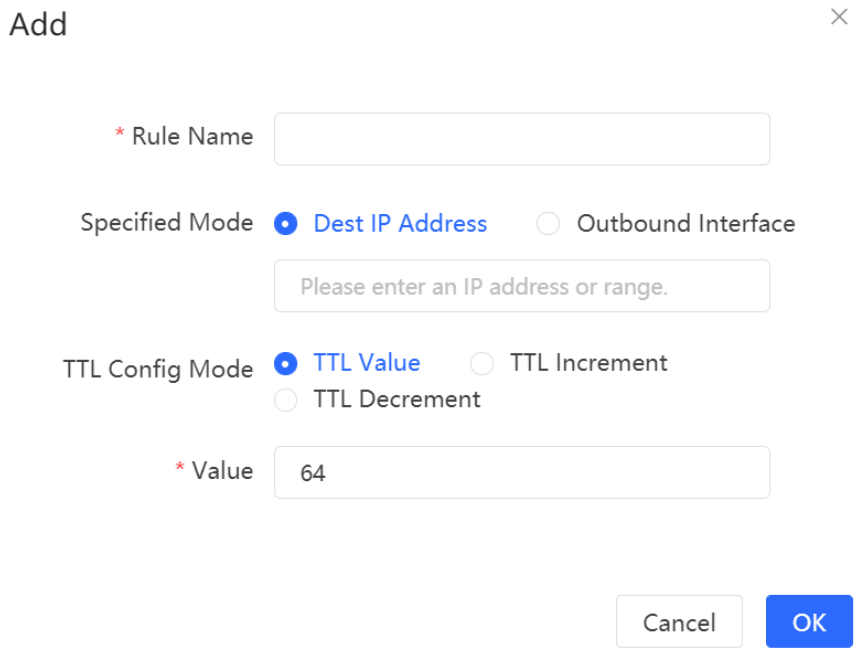
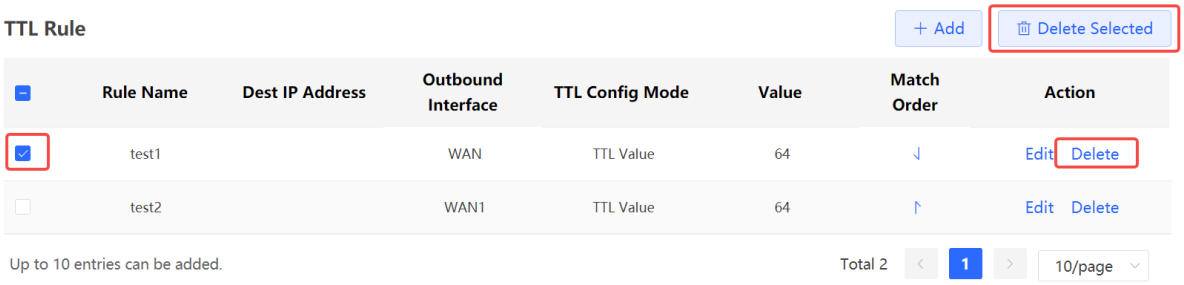



**Table 4-43 Description of TTL Rule Configuration**

| Parameter | Description |
|---|---|
| Rule Name | Specify the name of a TTL rule. |
| Specified Mode | Specify the range for the rule to take effect:<br>● **Dest IP Address**: Indicates that the TTL rule takes effect on a specified IP address or range.<br>● **Outbound Interface**: Indicates that the TTL rule takes effect on a specified outbound interface. |
| TTL Config Mode | Configure a rule for TTL values in packets.<br>● **TTL Value**: Specifies the value, to which the TTL value is changed, after a data packet passes through the device.<br>● **TTL Increment**: Specifies the increment of the TTL value on the basis of the original value after a data packet passes through the device.<br>● **TTL Decrement**: Specifies the decrement of the TTL value on the basis of the original value after a data packet passes through the device. |
| Value | Configure the TTL value in packets. The value range is from 1 to 255. |

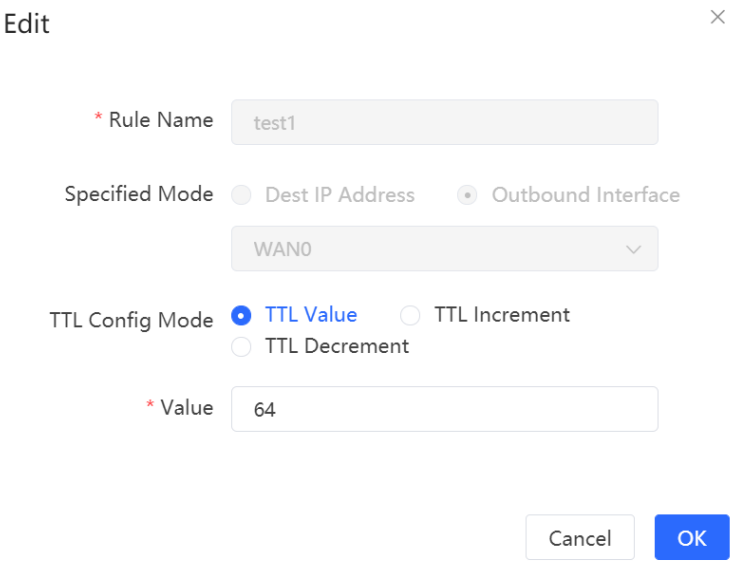
### 2. Deleting a TTL Rule

- Click **Delete** to delete the configuration of a specified entry.
- Select multiple entries and click **Delete Selected** to bulk delete selected entries.



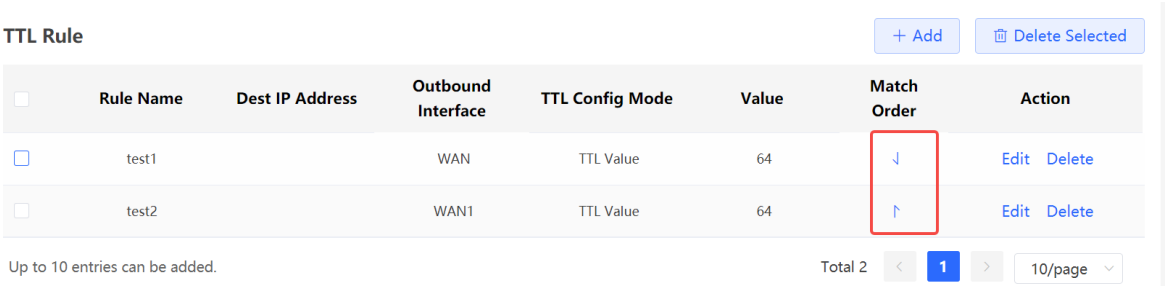

### 3. Editing a TTL Rule

Click **Edit**. Change the TTL rule configuration mode and TTL value.




### 4. Adjusting the Sequence of TTL Rules

After configuring multiple TTL rules, you can adjust their sequence to specify the rule matching sequence. TTL rules in front rows are matched first, and those in back rows are matched later. If the ranges of rules overlap, the final effect is the superposition of multiple matching results.



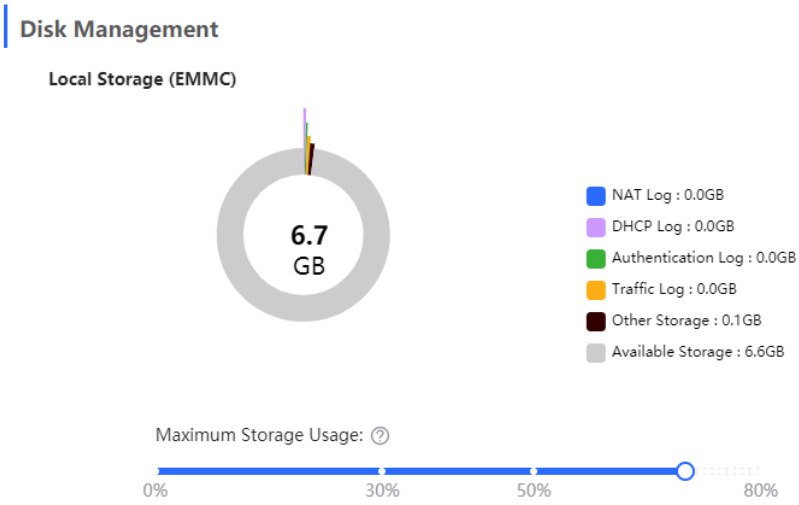

## 4.20 Disk Management

### 4.20.1 Configuring Local Storage Settings

Choose **Local Device** > **Advanced** > **Disk Management**.

On the **Local Storage** pane, you can view the usage of the local storage, along with usage details of NAT logs, DHCP logs, authentication logs, traffic logs, other storage space, and available storage space.

To set the maximum storage usage of an eMMC, simply drag the scroll bar and click **Save**.




**Caution**

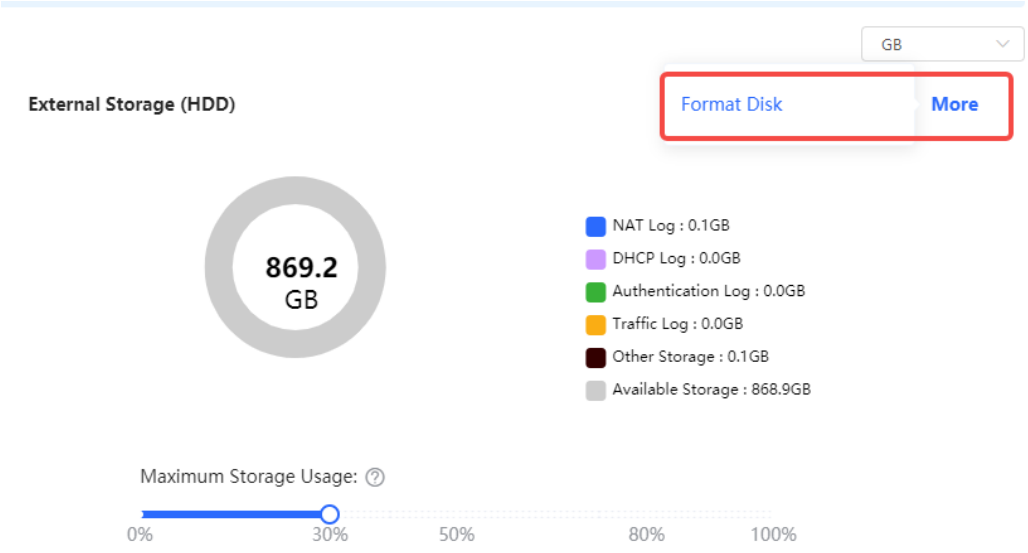
- If the actual space used for log storage exceeds the maximum storage usage limit, the oldest log entries will be overwritten. You are advised to set a proper maximum storage usage to prevent the deletion of critical logs.
- To prolong the service life of the eMMC, you are advised to set the maximum storage usage to 80% or below.

## 4.20.2 Configuring External Storage Settings

Choose **Local Device** > **Advanced** > **Disk Management**.

On the **External Storage** pane, you can view the usage of the external storage, along with usage details of NAT logs, DHCP logs, authentication logs, traffic logs, other storage space, and available storage space. To set the maximum storage usage of a hard disk drive, simply drag the scroll bar and click **Save**.

Click **More** to find the **Format Disk** option. You can format the hard disk drive using this option.



**Caution**

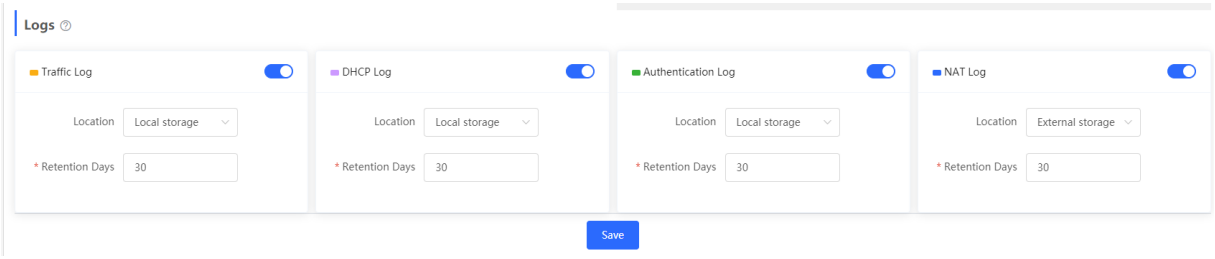
- If the actual space used for log storage exceeds the maximum storage usage limit, some logs will be deleted. You are advised to set a proper maximum storage usage to prevent the deletion of critical logs.
- Formatting the hard disk drive will cause data loss. Exercise caution when performing this operation.

### 4.20.3 Configuring Log Settings

Choose **Local Device** > **Advanced** > **Disk Management** > **Logs**.

The **Logs** feature enables you to manage the storage of various logs, including traffic logs, DHCP logs, authentication logs, and NAT logs. You can choose the specific types of logs to store, set the storage location, and define the log retention days. Then, click **Save** to apply the settings.

After the configuration is complete, you can access and query NAT logs, DHCP logs, and authentication logs stored on the device by going to **Local Device** > **Network** > **Audit Log Reports**. For traffic logs, you can query them under **Local Device** > **Device Overview** > **Traffic History**.




**Caution**

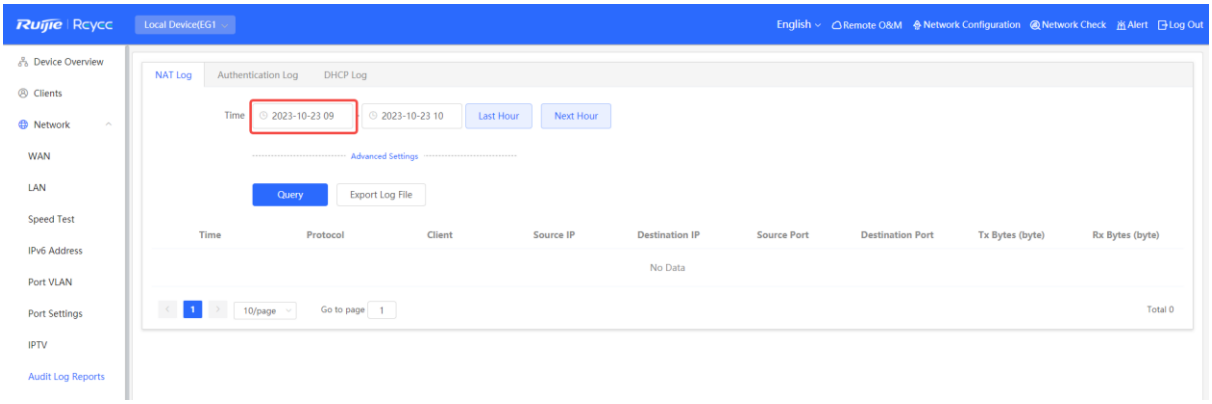
Exercise caution when setting the log retention period, as logs older than the specified duration will be overwritten.

## 4.21 Audit Log Reports

### 4.21.1 NAT Log

Choose **Local Device** > **Network** > **Audit Log Reports** > **NAT Log**.

- View log details
  - Select the date and time range to view NAT logs within that period. The logs will include information such as time, protocol, client, source IP, destination IP, source port, destination port, Tx bytes, and Rx bytes.
  - Click **Last Hour** or **Next Hour** to quickly retrieve NAT information from the hour before or after the current time.

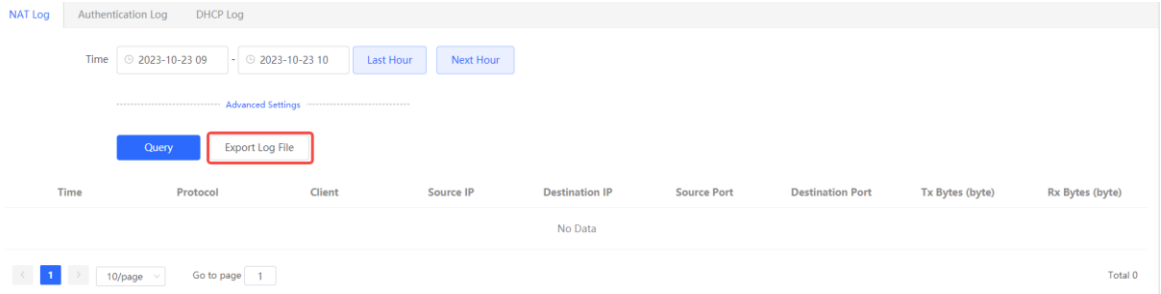



**Note**

The maximum log query interval is 12 hours.

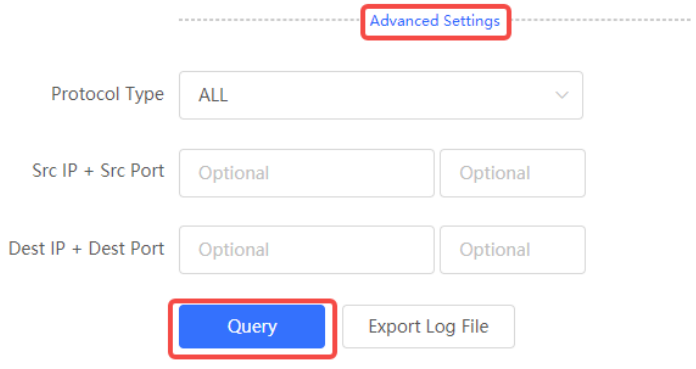
- Export log file

  Click **Export Log File** to export NAT logs within the selected period.




- Query NAT logs

  Click **Advanced Settings** to query NAT logs based on protocol type, source IP + source port, or destination IP + destination port.

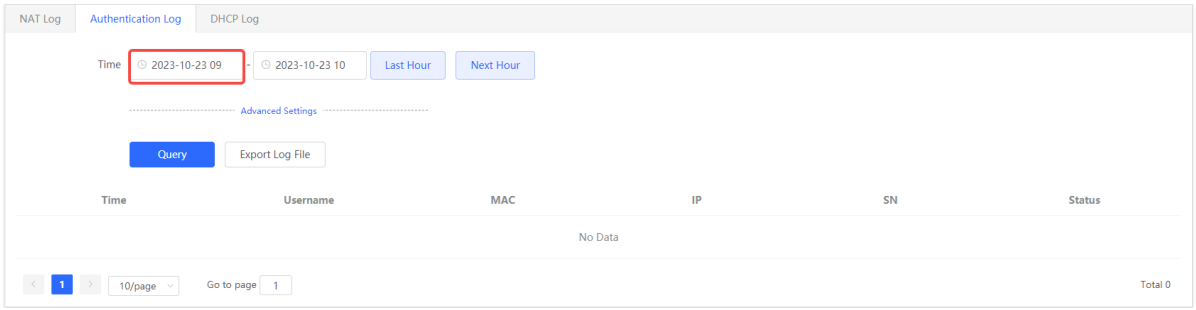



## 4.21.2 Authentication Log

Choose **Local Device** > **Network** > **Audit Log Reports** > **Authentication Log**.

- View log details
  - Select the date and time range to view authentication logs within that period. The logs will include information such as time, username, MAC address, IP address, device SN and status.
  - Click **Last Hour** or **Next Hour** to quickly retrieve authentication information from the hour before or after

the current time.

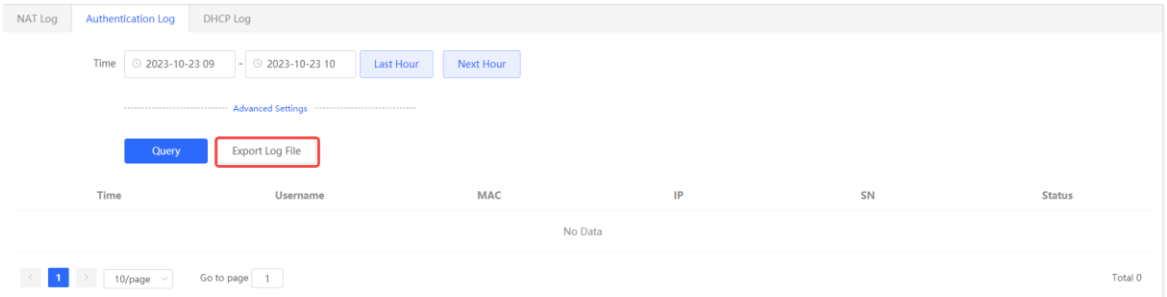



**Note**

The maximum log query interval is 12 hours.

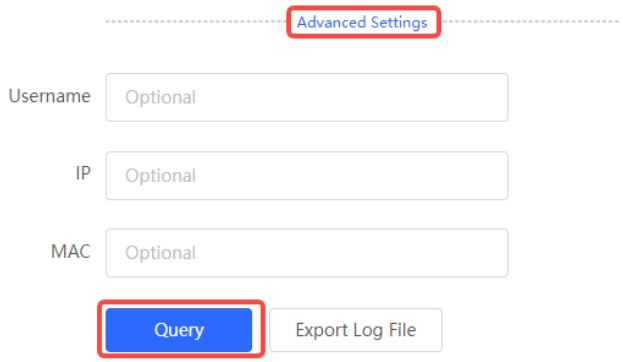
- Export log file

  Click **Export Log File** to export authentication logs within the selected period.




- Query authentication logs

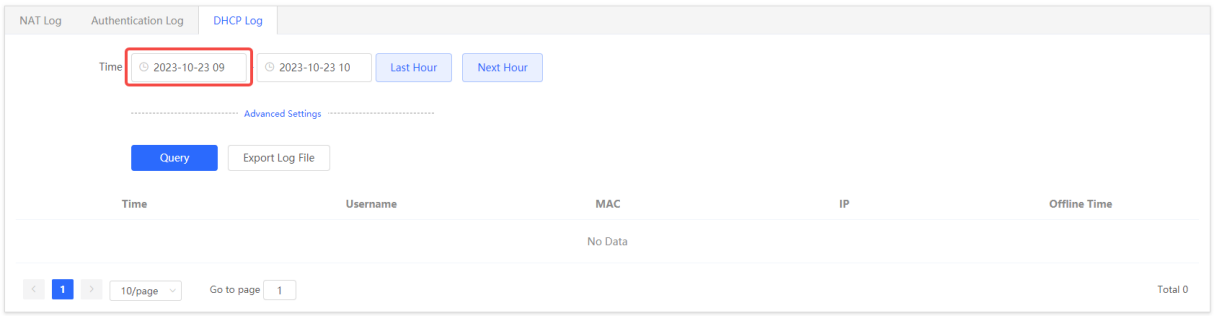
  Click **Advanced Settings** to query authentication logs based on username, IP address, or MAC address.




### 4.21.3 DHCP Log

Choose **Local Device** > **Network** > **Audit Log Reports** > **DHCP Log**.

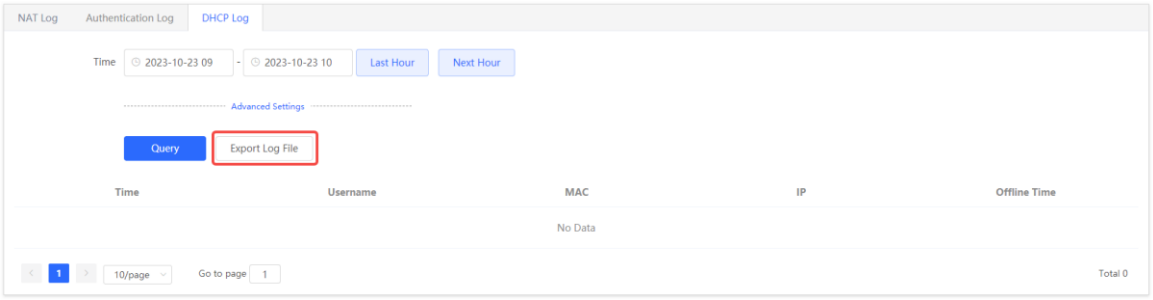
- View log details
  - Select the date and time range to view DHCP logs within that period. The logs will include information such as time, username, MAC address, IP address, and offline time.
  - Click **Last Hour** or **Next Hour** to quickly retrieve DHCP information from the hour before or after the current time.




**Note**

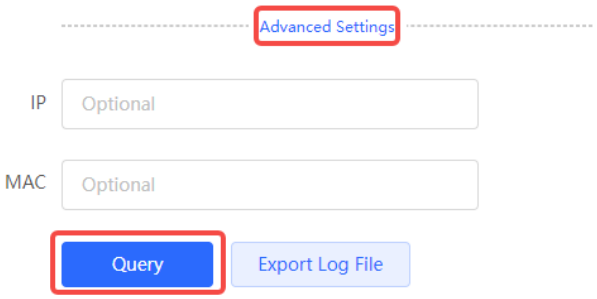
The maximum log query interval is 12 hours.

- Export log file
  Click **Export Log File** to export DHCP logs within the selected period.




- Query DHCP logs

  Click **Advanced Settings** to query DHCP logs based on IP address or MAC address.

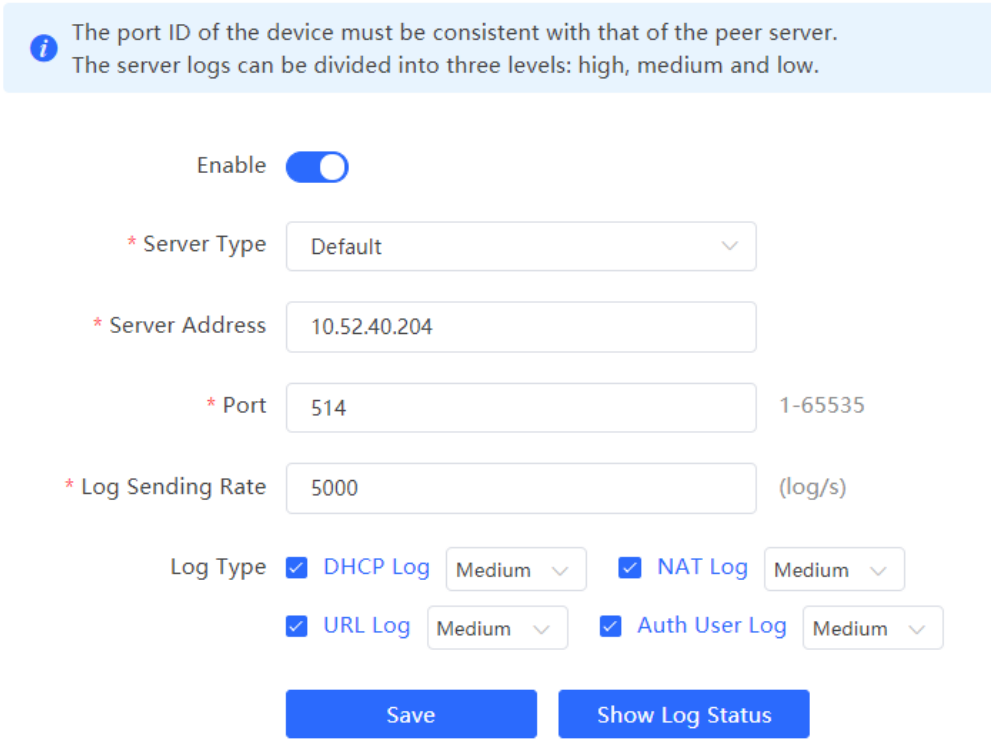



## 4.22 Configuring Audit Log

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Audit Log**.

After the **Audit Log** function is enabled and configured, the system uploads audit logs of the selected log type to the specified server.

(1) Toggle on **Enable** to enable the **Audit Log** function.



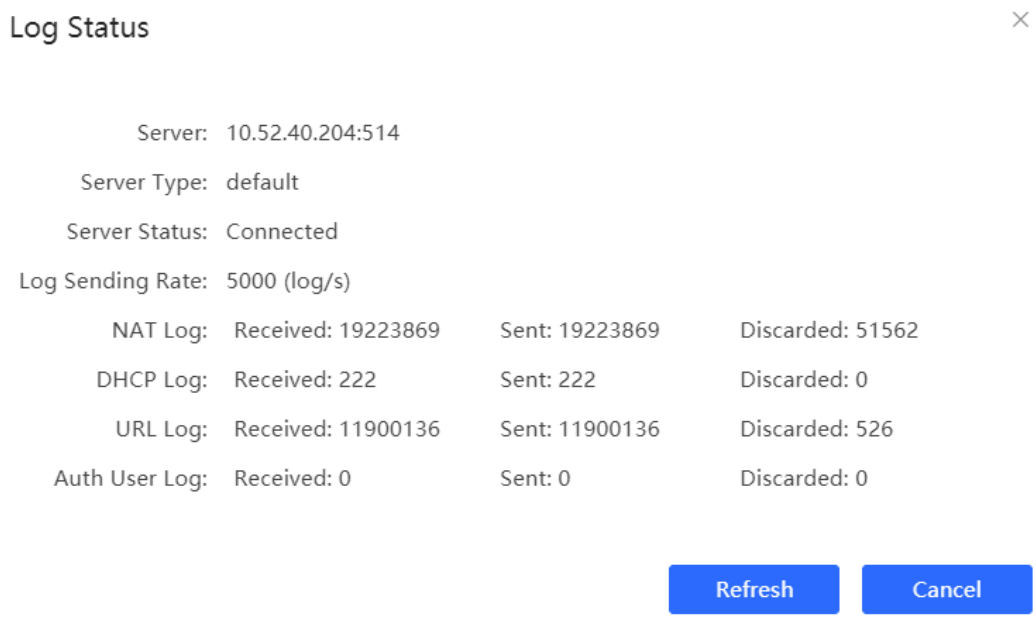

(2) Configure parameters of the **Audit Log** function.

**Table 4-44 Audit Log Configuration Parameters**

| Parameter | Description |
|---|---|
| Server Type | Server type. The device supports the following three server types:<br>● Default: Default server type.<br>● turkiye-5651: Local server in Türkiye.<br>● Thailand: Local server in Thailand. |
| Server Address | Address of the log server. It can be a domain name and an IPv4 address. |
| Port | Port number of the server, which can be a custom port number. The default port number is 514. |
| Log Sending Rate | Rate at which the device sends audit logs to the server. The default rate is 5000 logs per second. The value ranges from 1 log per second to 10000 logs per second. |
| Log Type | Types of logs to be sent to the server, including DHCP logs, NAT logs, URL logs, and authentication user logs. Priority of sending audit logs: **High**, **Medium**, and **Low**. When the device resources are limited, audit logs with higher priority are sent to the server first. |

(3) Click **Save**.

Click **Show Log Status** to view the status of the **Audit Log** function, including the server address, server connection status, and the sending history of each log type (including received, sent, and discarded logs).




## 4.23 Other Settings

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Other Settings**.

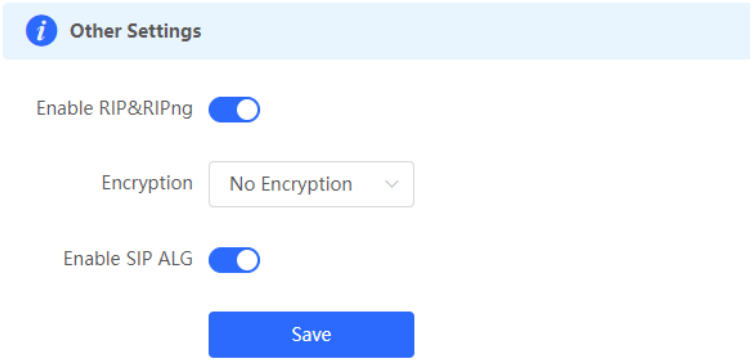
You can set some functions not frequently used on the Other Settings page. By default, all the functions on this page are disabled.

**Note**

**Enable RIP&RIPng** is only available on devices that do not support the OSPF protocol. The actual product version prevails.

**Enable RIP&RIPng**: After this function is enabled, LAN and WAN interfaces support dynamic routing protocols Routing Information Protocol (RIP) and RIP next generation (RIPng) and can automatically synchronize route information from other RIP-enabled routers in the network.

**Enable SIP ALG**: Some voice communication uses the Session Initiation Protocol (SIP) protocol. If the server is connected to a WAN interface, SIP packets may become unavailable after NAT. After you enable this function, SIP packets are converted by the application-level gateway (ALG). You can enable or disable this function based on actual needs.


Other Settings
Enable RIP&RIPng
Encryption
No Encryption
Enable SIP ALG
Save

# 5 AP Management

**Note**

- To manage the downlink AP, please enable self-organizing network discovery. For details, see Section 4.1 Switching the Work Mode. The wireless settings are synchronized to all wireless devices in the network by default. You can configure groups to limit the device scope under wireless management. For details, see Section 5.1 Configuring AP Groups.
- The device does not emit the Wi-Fi signals. Deliver the wireless settings to the downlink AP to take effect.

## 5.1 Configuring AP Groups

### 5.1.1 Overview

After self-organizing network discovery is enabled, the device can function as the master AP/AC to batch configure and manage its downlink APs by group. Before you configure the APs, divide them to different groups.

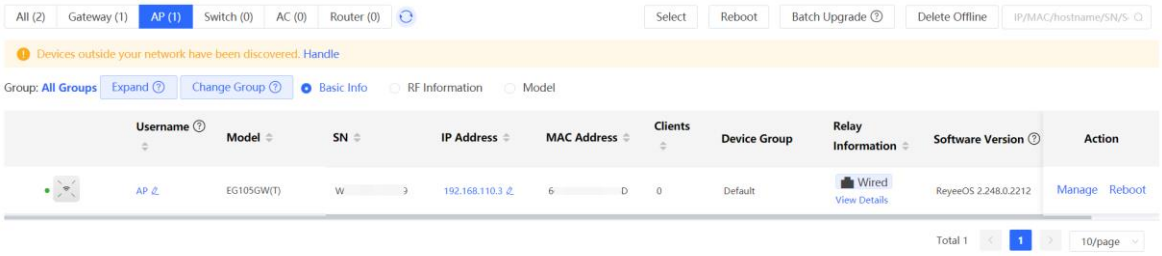
**Note**

If you specify groups when configuring the wireless network, the configuration takes effect on wireless devices in the specified groups.

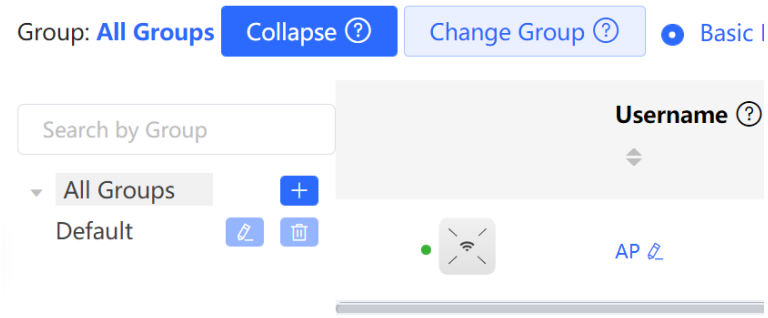
### 5.1.2 Configuration Steps

Choose **Network-Wide > Devices > AP**.

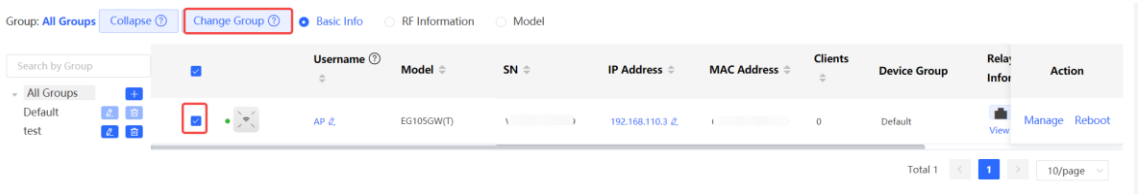
(1) View the information of all APs in the current network, including the basic information, RF information, and model. Click the SN of an AP to configure the AP separately.

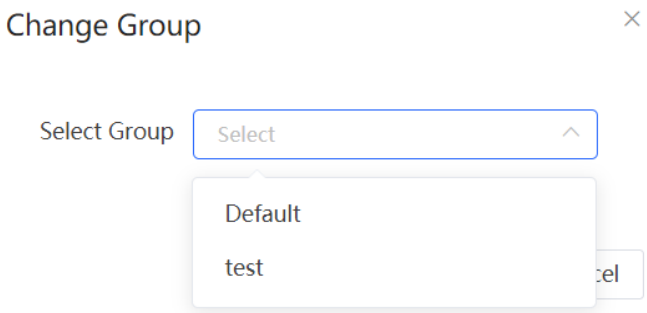



(2) Click **Expand**. Information of all the current groups is displayed to the left of the list. Click + to create a group. You can create a maximum of eight groups. Select the target group and click to modify the group name or click to delete the group. You cannot modify the name of the default group or delete the default group.




(3) Click a group name in the left. All devices in the group are displayed. One device can belong to only one group. By default, all devices belong to the default group. Select a record in the device list and click **Change Group** to migrate the selected device to the specified group. After a device is moved to the specified group, the device will use the configuration for the new group. Click **Delete Offline Devices** to remove offline devices from the list.

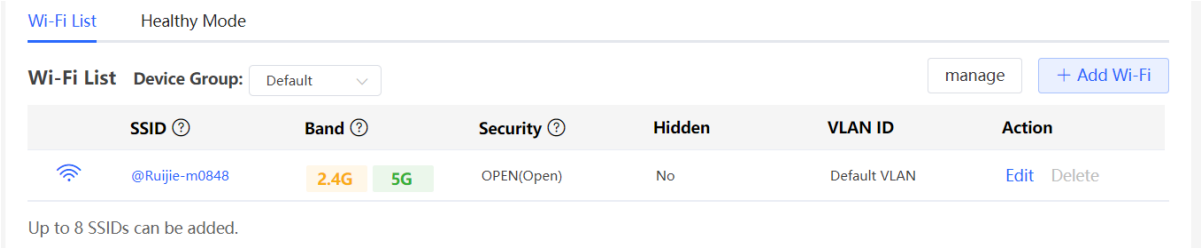



## 5.2 Configuring Wi-Fi

### 5.2.1 Adding a Wi-Fi Network

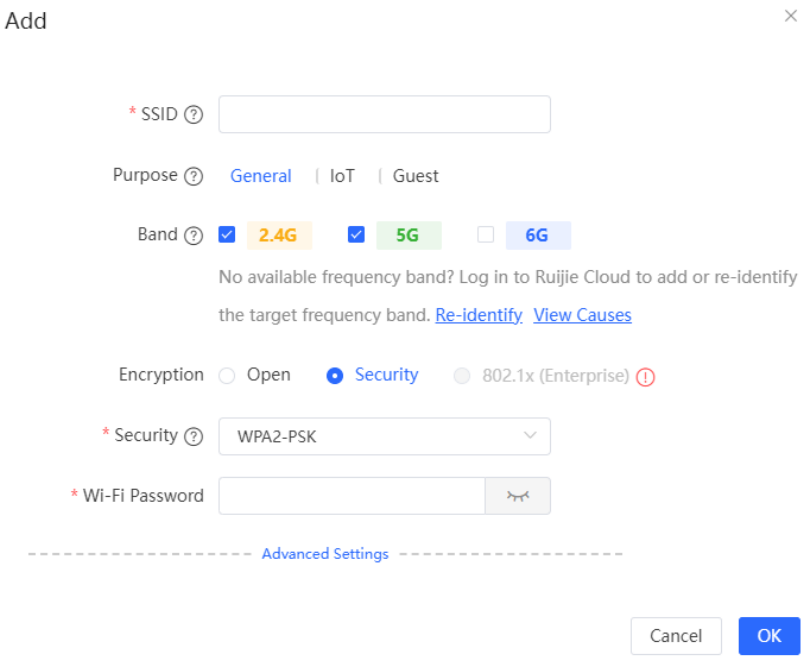
Choose **Network-Wide** > **Workspace** > **Wireless** > **Wi-Fi** > **Wi-Fi List**.



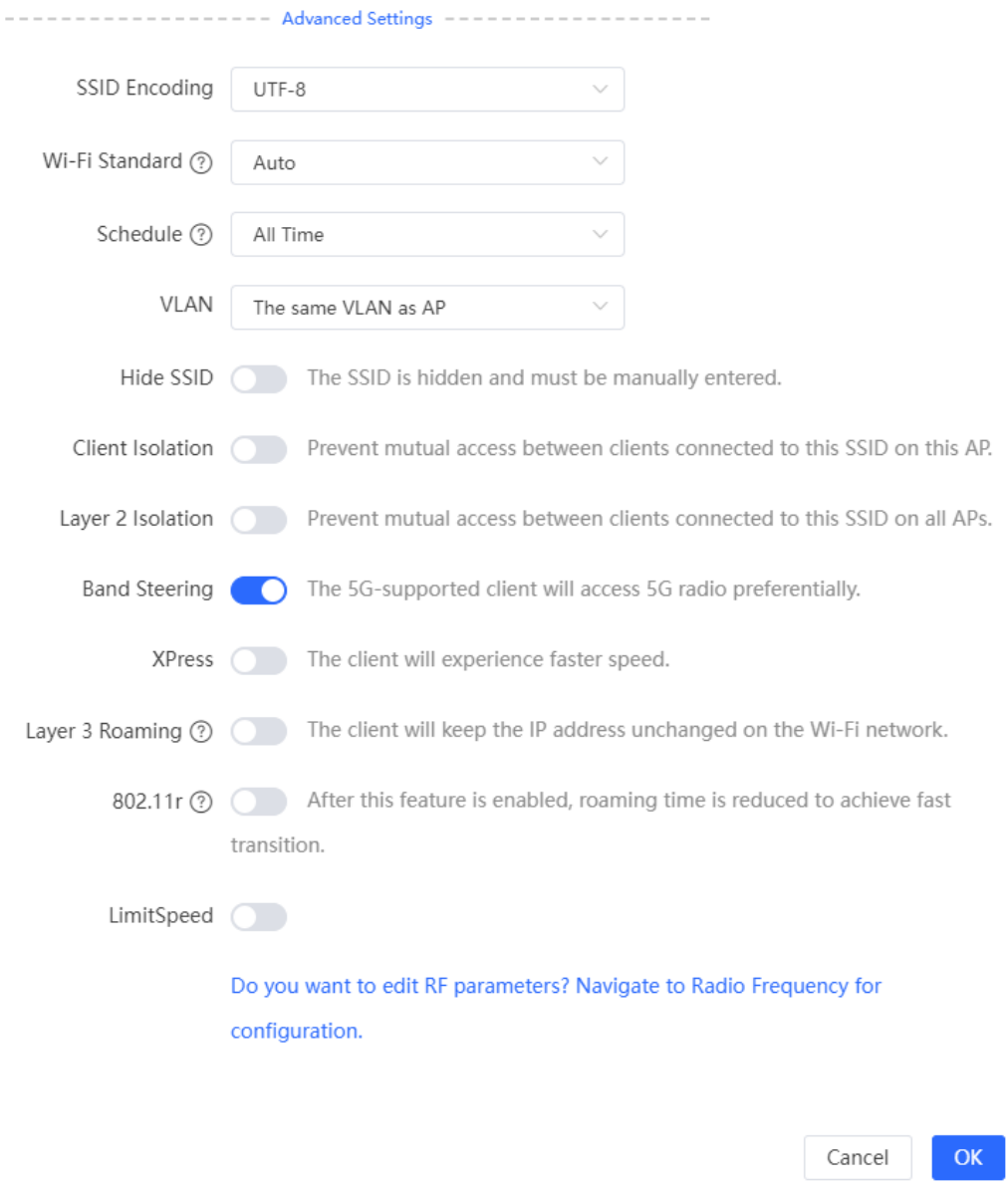
**Caution**

Modification will cause restart of the wireless configuration, resulting in logout of connected clients. Exercise caution when performing this operation.

(1) Click **Add Wi-Fi**, enter the SSID and Wi-Fi password, select purpose and a frequency band.




(2) Click **Advanced Settings** to configure more Wi-Fi parameters.




(3) Click **OK**.

**Table 5-1 Wireless network configuration**

| Parameter | Description |
|---|---|
| SSID | Enter the name displayed when a wireless client searches for a wireless network. |
| Purpose | Set the Wi-Fi usage scenario. The options include **General**, **IoT**, and **Guest**. The system will recommend different Wi-Fi parameter combinations based on the selected purpose. |

| Parameter | Description |
| --- | --- |
| Band | Set the band used by the Wi-Fi signal. The options are 2.4 GHz, 5 GHz and 6 GHz.<br>The 5 GHz band provides faster network transmission rate and less interference than the 2.4 GHz band, but is inferior to the 2.4 GHz band in terms of signal coverage range and wall penetration performance.<br>The 6 GHz band has a higher network transmission rate and less interference compared to the 2.4 GHz and 5 GHz bands, but it is usually not as good as the 2.4 GHz and 5 GHz frequency bands in terms of signal coverage and wall penetration.<br>Select a proper band based on actual needs. The default value is **2.4G + 5G**, indicating that the device provides signals at both 2.4 GHz and 5 GHz bands.<br>**Note**<br>In networks with APs supporting the 6 GHz frequency band, you'll see an additional '6G' option in the frequency settings. The 6 GHz-band provides faster data transmission rates, but it's worth noting that-not all access devices may fully support this band. The RG-RAP73HD supports the 6 GHz band. |
| Encryption | The encryption options for a Wi-Fi network include **Open**, **Security**, and **802.1x (Enterprise)**. |
| Wi-Fi Password | When the **Encryption** is set to **Security**, you need to set the password for connecting to the wireless network. The password is a string of 8 to 63 characters. |
| Select server group | When the **Encryption** is set to **802. 1x (Enterprise)**, you need to configure a remote server set for authentication and authorization. |
| SSID Encoding | The SSID encoding standard is set to "UTF-8" by default when Chinese characters are included in the SSID. If the Chinese characters are garbled, you can choose GB2312 as the SSID encoding standard. |
| Wi-Fi Standard | The Wi-Fi standards include **802.11be (Wi-Fi 7)**, **802.11ax (Wi-Fi 6)**, **Compatibility Mode**, or **Auto**. The final effective Wi-Fi standard depends on the support of Wi-Fi standards on each device. The latest standard is recommended. If there is a compatibility issue, try use an older standard. However, an old standard setting will affect the bandwidth. |
| Wireless Schedule | Specify the time periods during which Wi-Fi is enabled. After you set this parameter, users cannot connect to Wi-Fi in other periods. |

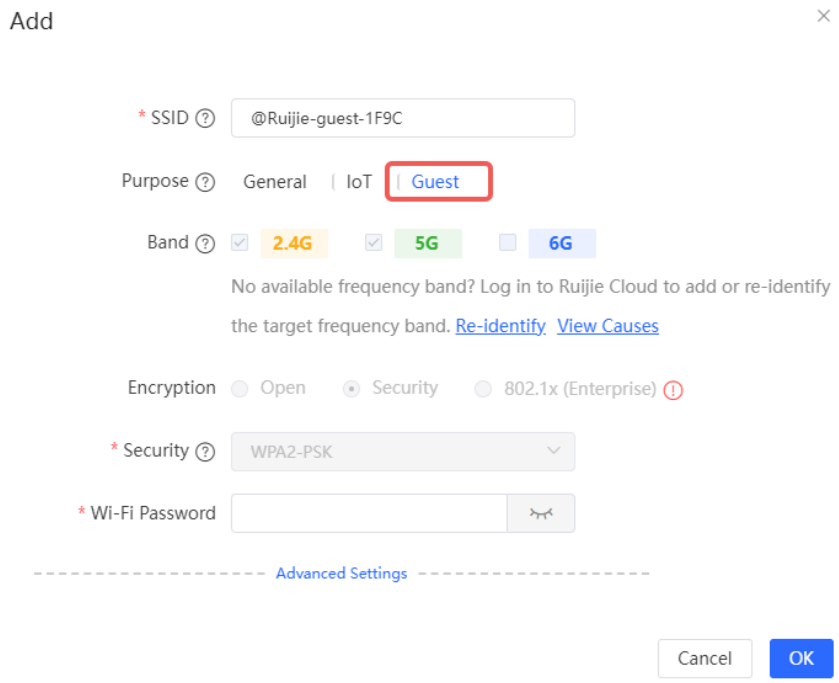
| Parameter | Description |
| --- | --- |
| VLAN | Set the VLAN to which the Wi-Fi signal belongs. You can choose from the available VLANs or click **Add New VLAN**, and go to the **LAN Settings** page to add a VLAN. |
| Hide SSID | Enabling the hide SSID function can prevent unauthorized user access to Wi-Fi, improving security. However, mobile phones or computers cannot find the SSID after this function is enabled. You must manually enter the correct name and password to connect to Wi-Fi. Record the current SSID before you enable this function. |
| Client Isolation | When enabled, devices connected to this Wi-Fi network under the same access point (AP) will be isolated from each other. This prevents end users from accessing other users on the same subnet, thereby enhancing security. |
| Layer 2 Isolation | When enabled, clients connected to this SSID are isolated from each other, and cannot access other clients connected to this SSID on all APs on Layer 2, thereby improving security. |
| Band Steering | After this function is enabled, 5G-capable clients select 5G Wi-Fi preferentially. You can enable this function only when **Band** is set to **2.4G + 5G**. |
| XPress | After this function is enabled, the device sends game packets preferentially, providing more stable wireless network for games. |
| Layer-3 Roaming | After this function is enabled, clients keep their IP addresses unchanged when associating with the same Wi-Fi. This function improves the roaming experience of users in the cross-VLAN scenario. |
| 802.11r | Enabling the 802. 11r function can shorten the roaming handover time. The 802. 11r function is supported only when **Encryption** is set to **Security** or **802. 1x (Enterprise)**. Once 802. 11r is enabled, the encryption type can only be WPA2-PSK or WPA2-802. 1X.<br>**Note**<br>Only in networks with Wi-Fi 7 Products, Wi-Fi 6 Products and 16M Wi-Fi 5 Products supporting the 802.11r. |
| LimitSpeed | After enabling Wi-Fi rate limiting, you can set the uplink and downlink rate limits for users.<br>● Rate Limit Per User: The rate limit applies to all clients connected to the SSID.<br>● Rate Limit All Users: All clients connected to the SSID share the configured rate limit equally. The rate limit of each client changes dynamically with the number of clients connected to the SSID. |

### 5.2.2 Configuring Guest Wi-Fi

Guest Wi-Fi, the Wi-Fi service provided for guests, is disabled by default. By default, user isolation is enabled for the guest Wi-Fi. That is, users connected to the guest Wi-Fi are isolated from each other and can only access the Internet through the Wi-Fi network, which improves security. Guest Wi-Fi can be disabled at a scheduled time. When the scheduled time arrives, the guest Wi-Fi is automatically disabled.

Choose **Network-Wide** > **Workspace** > **Wireless** > **Wi-Fi** > **Wi-Fi List.**

Click **Add Wi-Fi**, set the **Purpose** to **Guest**, and configure the Wi-Fi name and password. Click **Advanced Settings** to configure the effective time of the guest Wi-Fi and other Wi-Fi parameters. After the settings are saved, guests can connect to the Internet through the SSID and password. For details, see Section 5.2.1 Adding a Wi-Fi Network.



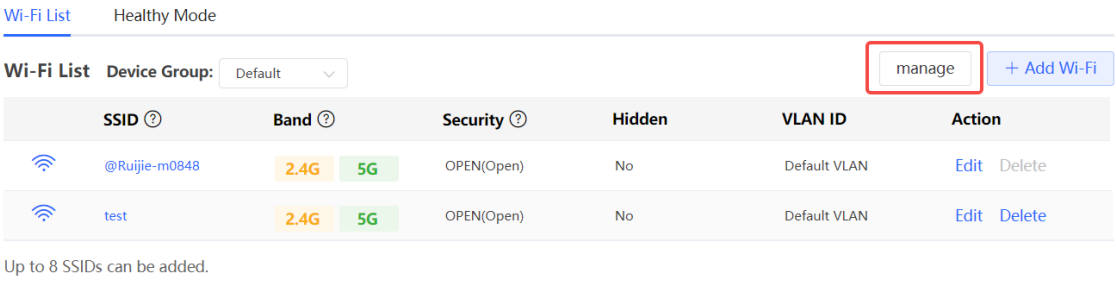

**Note**

In networks with APs supporting the 6 GHz frequency band, you'll see an additional '6G' option in the frequency settings. The RG-RAP73HD supports the 6 GHz band.

### 5.2.3 Managing Wi-Fi Networks

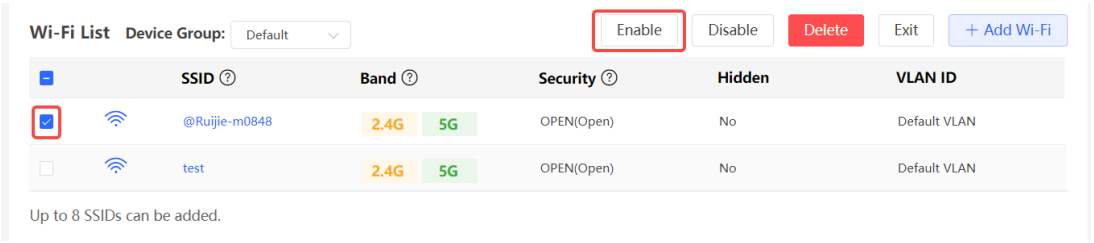
Choose **Network-Wide** > **Workspace** > **Wireless** > **Wi-Fi** > **Wi-Fi List.**

(1) Click **manage** to batch manage Wi-Fi networks.

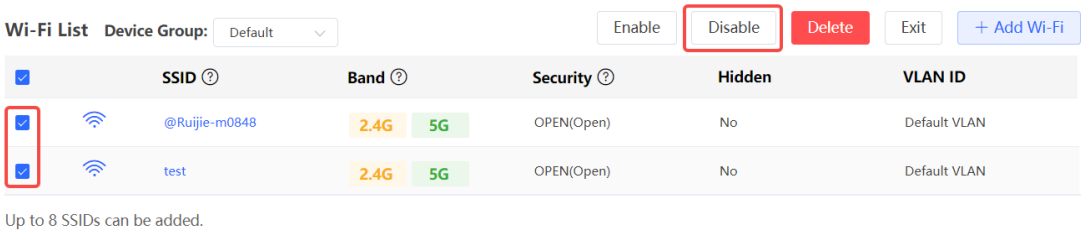



(2) Batch manage Wi-Fi networks.

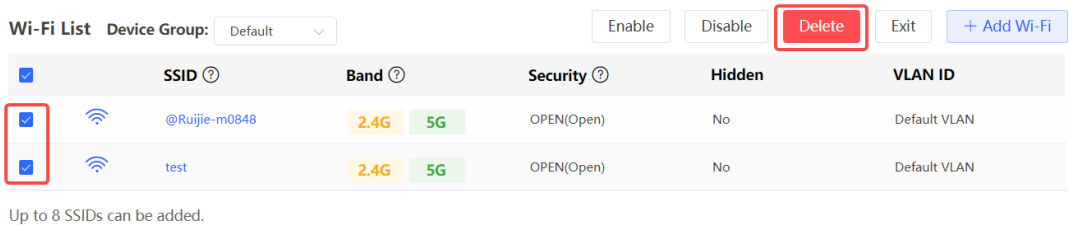
- Batch enable Wi-Fi networks: Select the desired Wi-Fi networks, and click **Enable**.



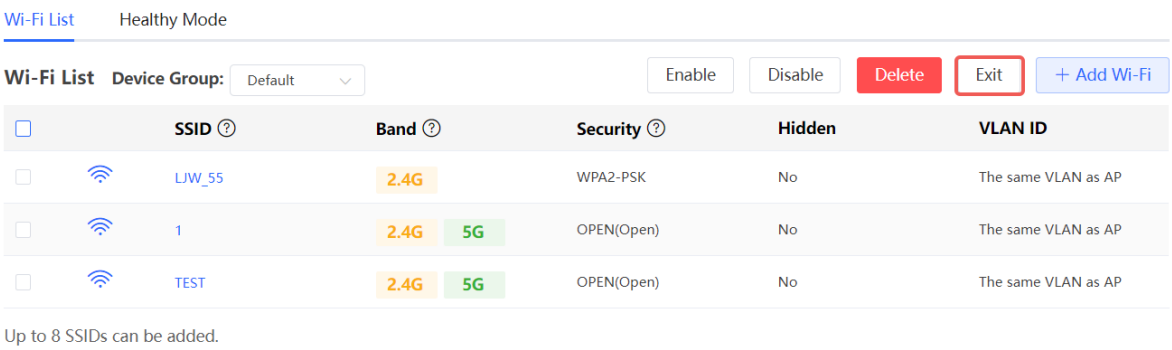

- Batch disable Wi-Fi networks: Select the desired Wi-Fi networks, and click **Disable**.




- Batch delete Wi-Fi networks: Select the desired Wi-Fi networks, and click **Delete**.




(3) Click **Exit** to exit Wi-Fi network batch management.

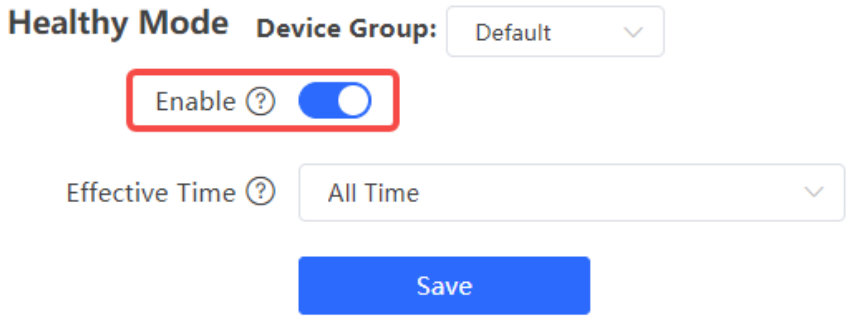


## 5.3 Healthy Mode

Choose **Network-Wide** > **Workspace** > **Wireless** > **Wi-Fi** > **Healthy Mode**.

Turn on healthy mode and select a wireless schedule for the mode.

After the healthy mode is enabled, the RF transmit power and Wi-Fi coverage range of the device are reduced in the schedule. This may lead to weak signals and network freezing. You are advised to disable healthy mode or set the wireless schedule to the idle periods.



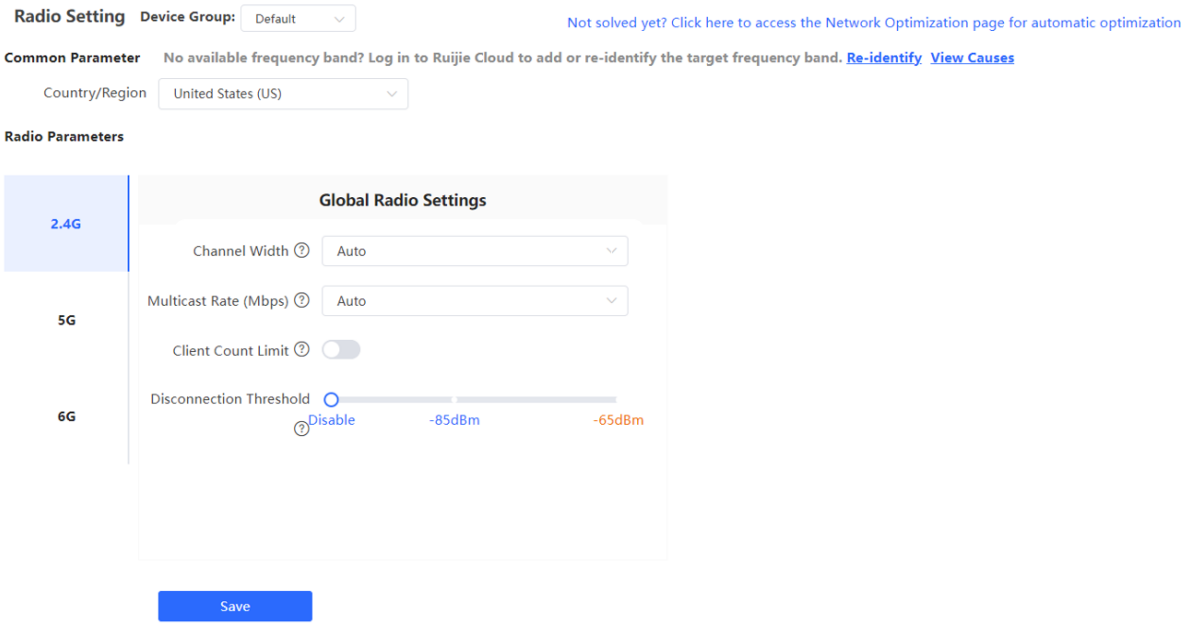

## 5.4 RF Settings

Choose **Network-Wide** > **Workspace** > **Wireless** > **Radio Setting**.

The device can detect the surrounding wireless environment upon power-on and select proper configuration. However, network freezing caused by wireless environment changes cannot be prevented. You can analyze the wireless environment around the APs and routers and manually select proper parameters.

**Caution**

Modification will cause restart of the wireless configuration, resulting in logout of connected clients. Exercise caution when performing this operation.




**Note**

In networks with APs supporting the 6 GHz frequency band, you'll see an additional '6G' option in the frequency settings. The RG-RAP73HD supports 6 GHz band.

**Table 5-2 RF configuration**

| Parameter | Description |
|---|---|
| Country/Region | The Wi-Fi channels stipulated by each country may be different. To ensure that clients can find the Wi-Fi signal, select the country or region where the device is located. |
| 2.4G/5G/6G Channel Width | A lower bandwidth indicates more stable network, and a higher bandwidth indicates easier interference. In case of severe interference, select a relatively low bandwidth to prevent network freezing to certain extent. The 2.4 GHz band supports the 20 MHz and 40 MHz bandwidths. The 5 GHz band supports the 20 MHz, 40 MHz, 80 MHz and 160 MHz bandwidths. The 6 GHz band supports the 20 MHz, 40 MHz, 80 MHz, 160 MHz and 320 MHz bandwidths.<br>By default, the value is **Auto**, indicating that the bandwidth is selected automatically based on the environment. |
| Multicast Rate (Mbps) | Select the data rate of broadcast and multicast packets.<br>● Tip: A higher multicast rate may lead to a higher multicast packet loss rate. A lower multicast rate may cause heavier traffic on the wireless air interface.<br>● Suggestion: Use a high rate in the case of severe network congestion and a medium rate in the case of mild network lag. |

| Parameter | Description |
| --- | --- |
| Client Count Limit | If a large number of users access the AP or router, the wireless network performance of the AP or router may be degraded, affecting users' Internet access experience. You can toggle on the **Client Count Limit** toggle switch to set a client limit. After you set this parameter, new user access is prohibited when the number of access users reaches the specified value. If the clients require high bandwidth, you can adjust this parameter to a smaller value. You are advised to keep the default value unless otherwise specified. |
| Disconnection Threshold | When multiple Wi-Fi signals are available, you can set this parameter to optimize the wireless signal quality to some extent. When a client is far away from the wireless device, the Wi-Fi connection is disconnected when the wireless signal strength of the end user is lower than the kick-off threshold. In this case, the client has to select a nearer wireless signal.<br>The client is prone to be kicked off if the kick-off threshold is high. To ensure that the client can normally access the Internet, you are advised to set this parameter to **Disable** or a value smaller than –75 dBm. |

**Note**

- Wireless channels available for your selection are determined by the country/region code. Select the country/region code based on the country or region of your device.
- Channel, transmit power, and roaming sensitivity cannot be set globally. Please perform the configurations on the devices separately.

## 5.5 Configuring Wi-Fi Blocklist or Allowlist

### 5.5.1 Overview

You can configure the global or SSID-based blocklist and allowlist. The MAC address supports full match and OUI match.

**Wi-Fi blocklist**: Clients in the Wi-Fi blocklist are prevented from accessing the Internet. Clients that are not added to the Wi-Fi blocklist are free to access the Internet.

**Wi-Fi allowlist**: Only clients in the Wi-Fi allowlist can access the Internet. Clients that are not added to the Wi-Fi allowlist are prevented from accessing the Internet.

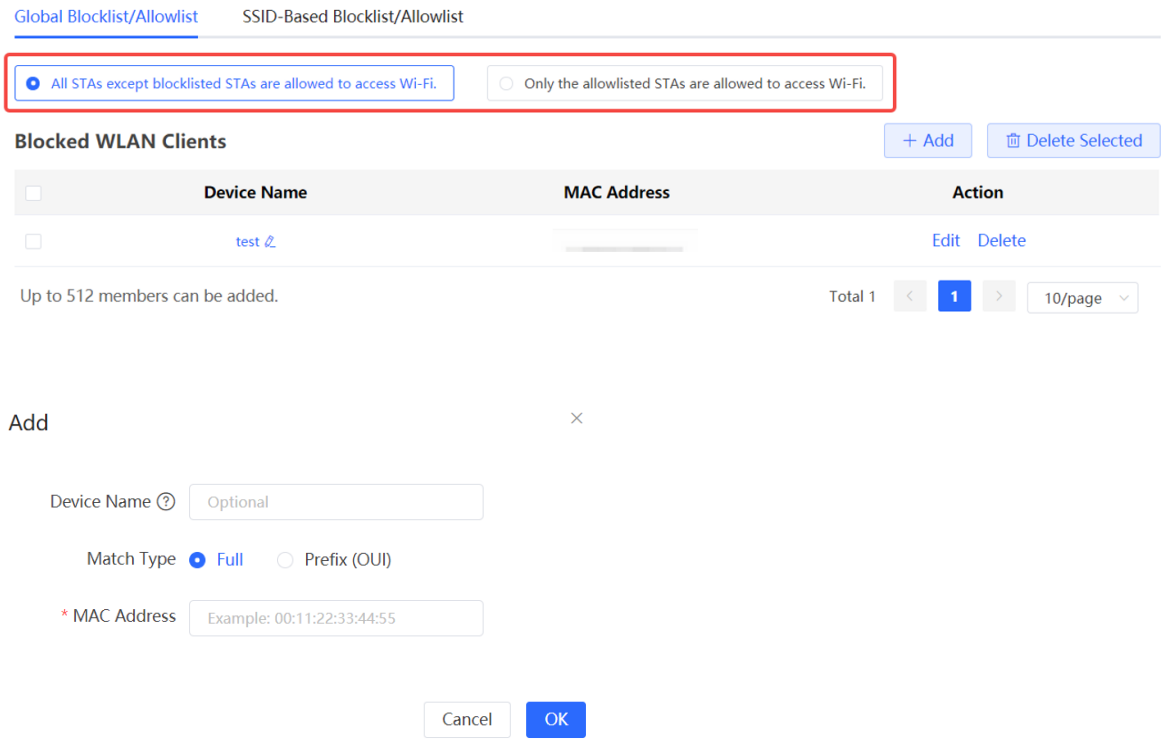
**Caution**

If the allowlist is empty, the allowlist does not take effect. In this case, all clients are allowed to access the Internet.

### 5.5.2 Configuring a Global Blocklist/Allowlist

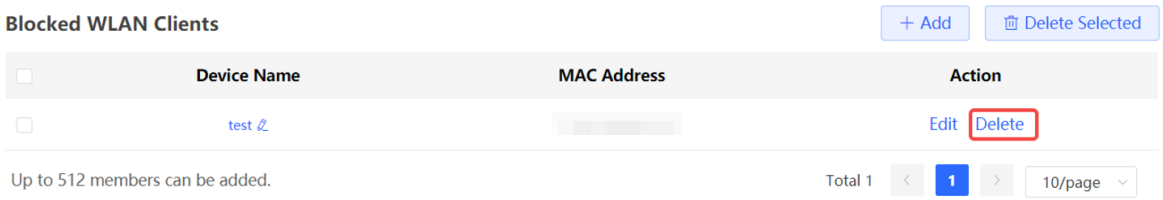
Choose **Network-Wide** > **Workspace** > **Wireless** > **Blocklist and Allowlist** > **Global Blocklist/Allowlist**.

Select the blocklist or allowlist mode and click **Add** to configure a blocklist or allowlist client. In the **Add** dialog box, enter the **Device Name**, **Match Type** and **MAC Address** of the target client and click **OK**. If a client is already associated with the router, its MAC address will pop up automatically. Click the MAC address directly for automatic input. All clients in the blocklist will be forced offline and not allowed to access the Wi-Fi network. The global blocklist and allowlist settings take effect on all Wi-Fi networks of the router.




If you delete a client from the blocklist, the client will be allowed to connect to the Wi-Fi network.

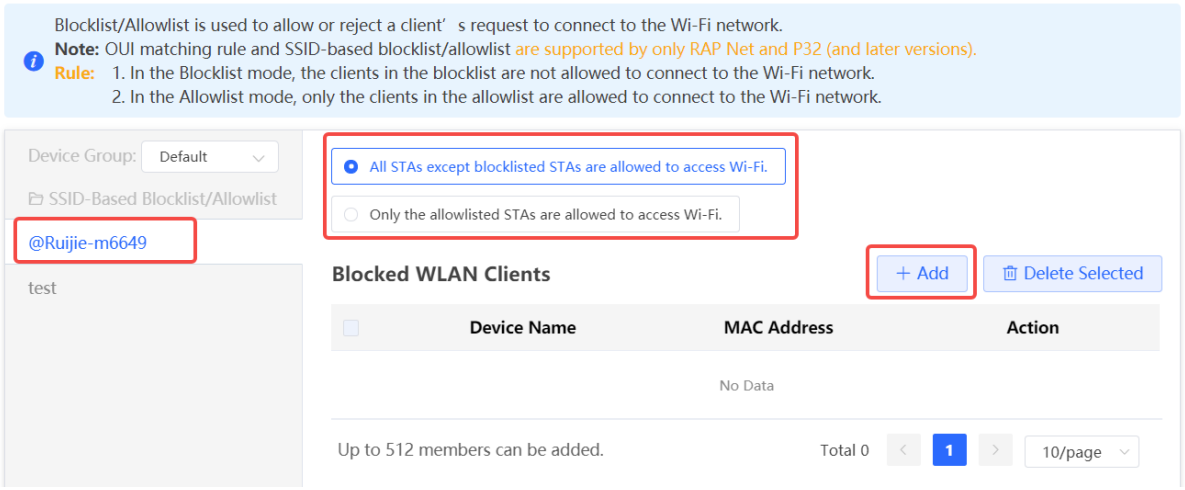
If you delete a client from the allowlist, the client will be forced offline and denied access to the Wi-Fi network.




### 5.5.3 Configuring an SSID-based Blocklist/Allowlist

Choose **Network-Wide** > **Workspace** > **Wireless** > **Blocklist and Allowlist** > **SSID-Based Blocklist/ Allowlist**.

Select a target Wi-Fi network from the left column, select the blocklist or allowlist mode, and click **Add** to configure a blocklist or allowlist client. The SSID-based blocklist and allowlist will restrict the client access to the specified Wi-Fi.




# 5.6 Configuring AP Load Balancing

## 5.6.1 Overview

The AP load balancing function is used to balance the load of APs in the wireless network. When APs are added to a load balancing group, clients will automatically associate with the APs with light load when the APs in the group are not load balanced. AP load balancing supports two modes:

- **Client Load Balancing**: The load is balanced according to the number of associated clients. When a large number of clients have been associated with an AP and the count difference to the AP with the lightest load has reached the specified value, the client can only associate with another AP in the group.
- **Traffic Load Balancing**: The load is balanced according to the traffic on the APs. When the traffic on an AP is large and the traffic difference to the AP with the lightest load has reached the specified value, the client can only associate with another AP in the group.

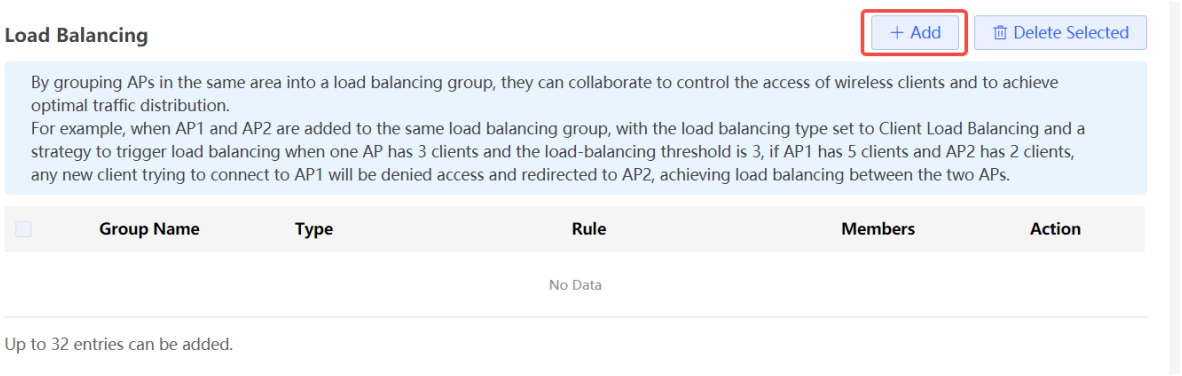
Example: Add AP1 and AP2 into a group and select client load balancing. Set both the client count threshold and difference to 3. AP1 is associated with 5 clients and AP2 is associated with 2 clients, triggering load balancing. New clients' attempt to associate to AP1 will be denied, and therefore they can associate only with AP2.

After a client request is denied by an AP and it fails to associate with another AP in the group, the client will keep trying to associate with this AP. If the client attempts reach the specified value, the AP will permit connection of this client, ensuring that the user can normally access the Internet.

## 5.6.2 Configuring Client Load Balancing

Choose **Network-Wide** > **Workspace** > **Wireless** > **Load Balancing**.

Click **Add**. In the dialog box that appears, set **Type** to **Client Load Balancing**, and configure **Group Name**, **Members**, and **Rule**.



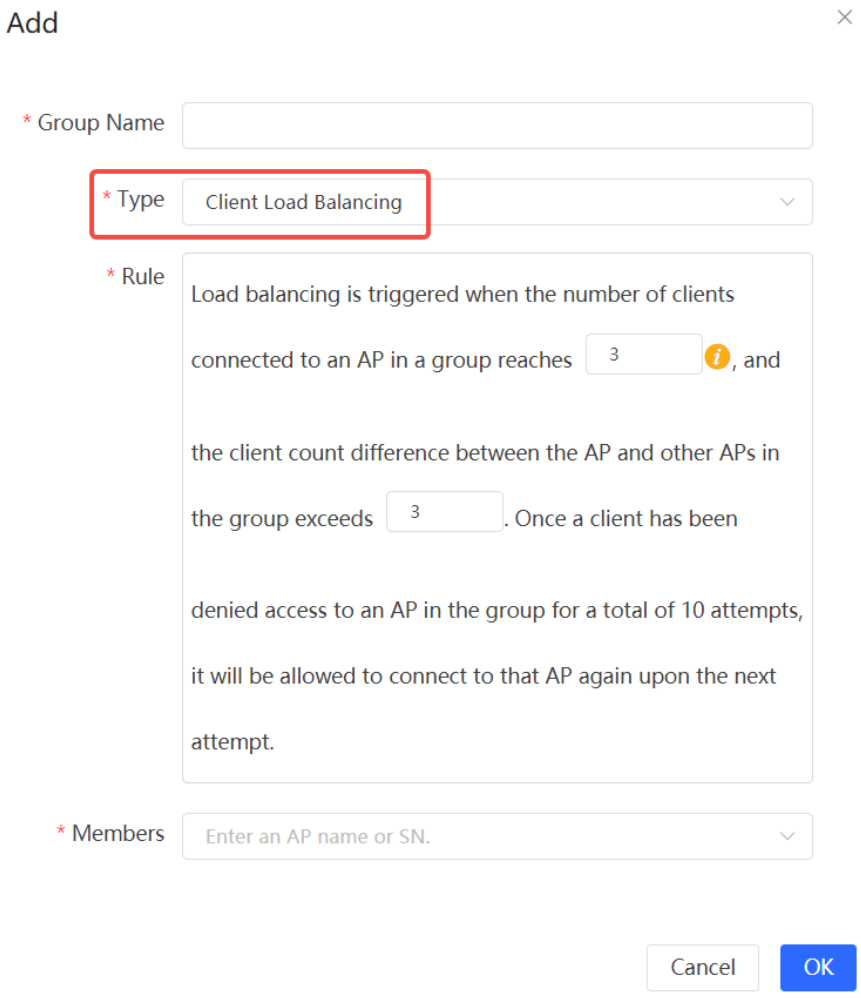




**Table 5-3 Client load balancing configuration**

| Parameter | Description |
|---|---|
| Group Name | Enter the name of the AP load balancing group. |
| Type | Select **Client Load Balancing**. |

| Parameter | Description |
| --- | --- |
| Rule | Configure a detailed load balancing rule, including the maximum number of clients allowed to associate with an AP, the difference between the currently associated client count and client count on the AP with the lightest load, and the number of attempts to the AP with full load.<br>By default, when an AP is associated with 3 clients and the difference between the currently associated client count and client count on the AP with the lightest load reaches 3, clients can associate only to another AP in the group. After a client association is denied by an AP for 10 times, the client will be allowed to associate to the AP upon the next attempt. |
| Members | Specify the APs to be added to the AP load balancing group. |

### 5.6.3 Configuring Traffic Load Balancing

Choose **Network-Wide** > **Workspace** > **Wireless** > **Load Balancing**.

Click **Add**. In the dialog box that appears, set **Type** to **Traffic Load Balancing**, and configure **Group Name**, **Members**, and **Rule**.



**Table 5-4 Traffic load balancing configuration**

| Parameter | Description |
|---|---|
| Group Name | Enter the name of the AP load balancing group. |
| Type | Select **Traffic Load Balancing**. |
| Rule | Configure a detailed load balancing rule, including the maximum traffic allowed on an AP, the difference between the current traffic and the traffic on the AP with the lightest load, and the number of attempts to the AP with full load.<br>By default, when the traffic load on an AP reaches 500 Kbit/s and the difference between the current traffic and the traffic on the AP with the lightest load reaches 500 Kbps, clients can associate only to another AP in the group. After a client association is denied by an AP for 10 times, the client will be allowed to associate to the AP upon the next attempt. |
| Members | Specify the APs to be added to the AP load balancing group. |

# 5.7 Configuring Wireless Rate Limiting

## 5.7.1 Overview

The device supports four rate limiting modes: client-based rate limiting, SSID-based rate limiting, AP-based rate limiting, and packet-based rate limiting. For the same client, if multiple rate limiting modes are configured, the priority order is as follows: client-based rate limiting > SSID-based rate limiting > AP-based rate limiting.

- Client-based rate limiting: This function allows you to limit the rate based on the MAC address of the client, so as to limit or guarantee the bandwidth required by specific clients.
- SSID-based rate limiting: This function provides two rate limiting modes for a specified SSID: Rate Limit Per User and Rate Limit All Users. Rate Limit Per User means that all clients connected to the SSID use the same rate limit. Rate Limit All Users means that the configured rate limit value is evenly allocated to all clients connected to the SSID. The rate limit value of each client dynamically changes with the number of clients connected to the SSID.
- AP-based rate limiting: This function limits the client rates based on the whole network. All clients connected to the network will work according to the configured rate limit value.
- Packet-based rate limiting: This function limits the client rates based on the downlink broadcast and multicast packets. The device supports rate limiting for specific broadcast packets (such as ARP and DHCP), multicast packets (such as MDNS and SSDP), or all types of broadcast and multicast packets. If network stalling remains during network access and there is no client with large traffic, you are advised to adjust the rate between 1 Kbps and 512 Kbps.

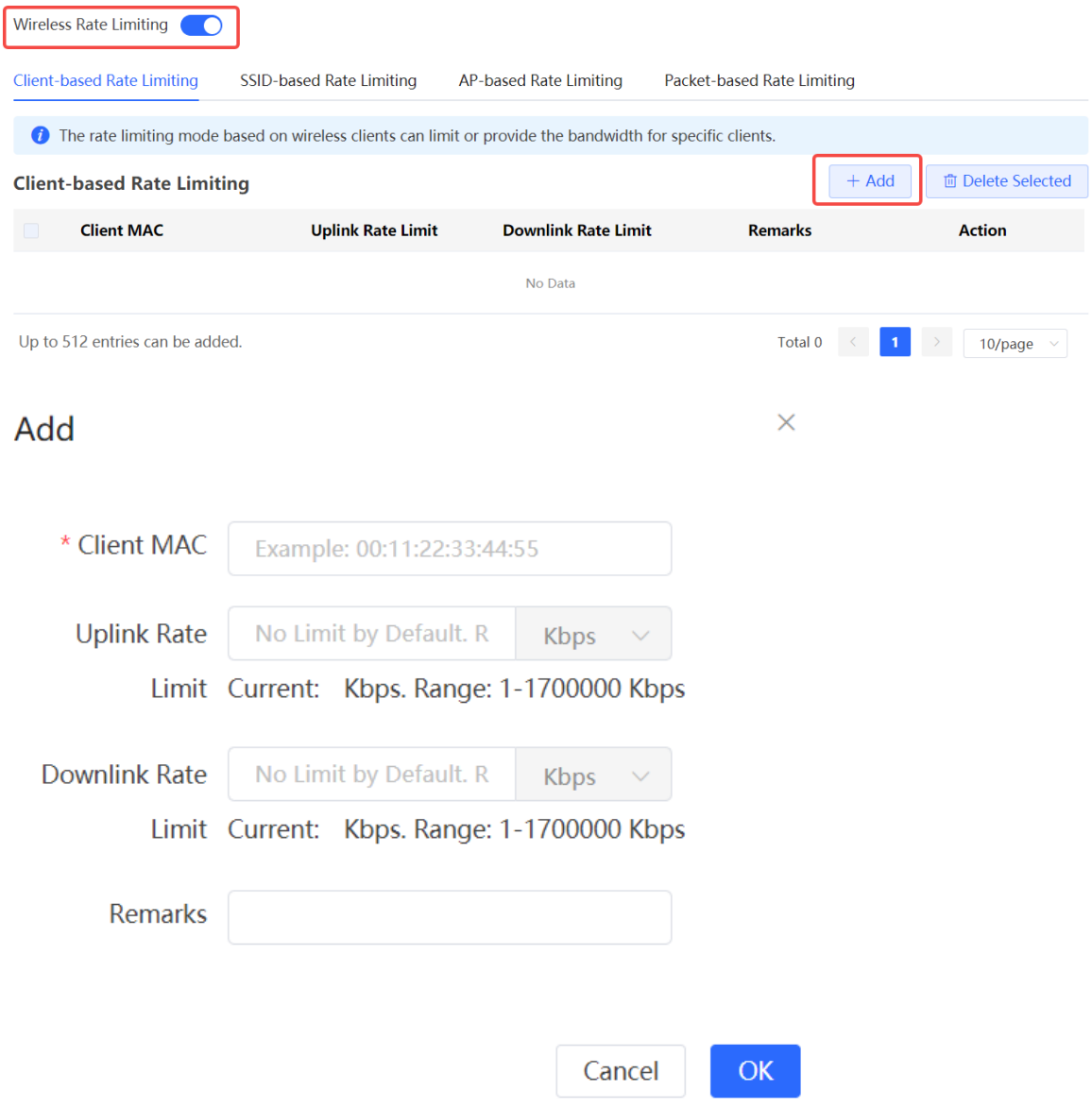
## 5.7.2 Configuration Steps

### 1. Configuring Client-based Rate Limiting

Choose **Network-Wide** > **Workspace** > **Wireless** > **Rate Limiting** > **Client-based Rate Limiting**.

(1) Enable Wireless Rate Limiting.

(2) Click **Add**. In the dialog box that appears, set the MAC address and uplink and downlink rate limit values of the client, and click **OK**.

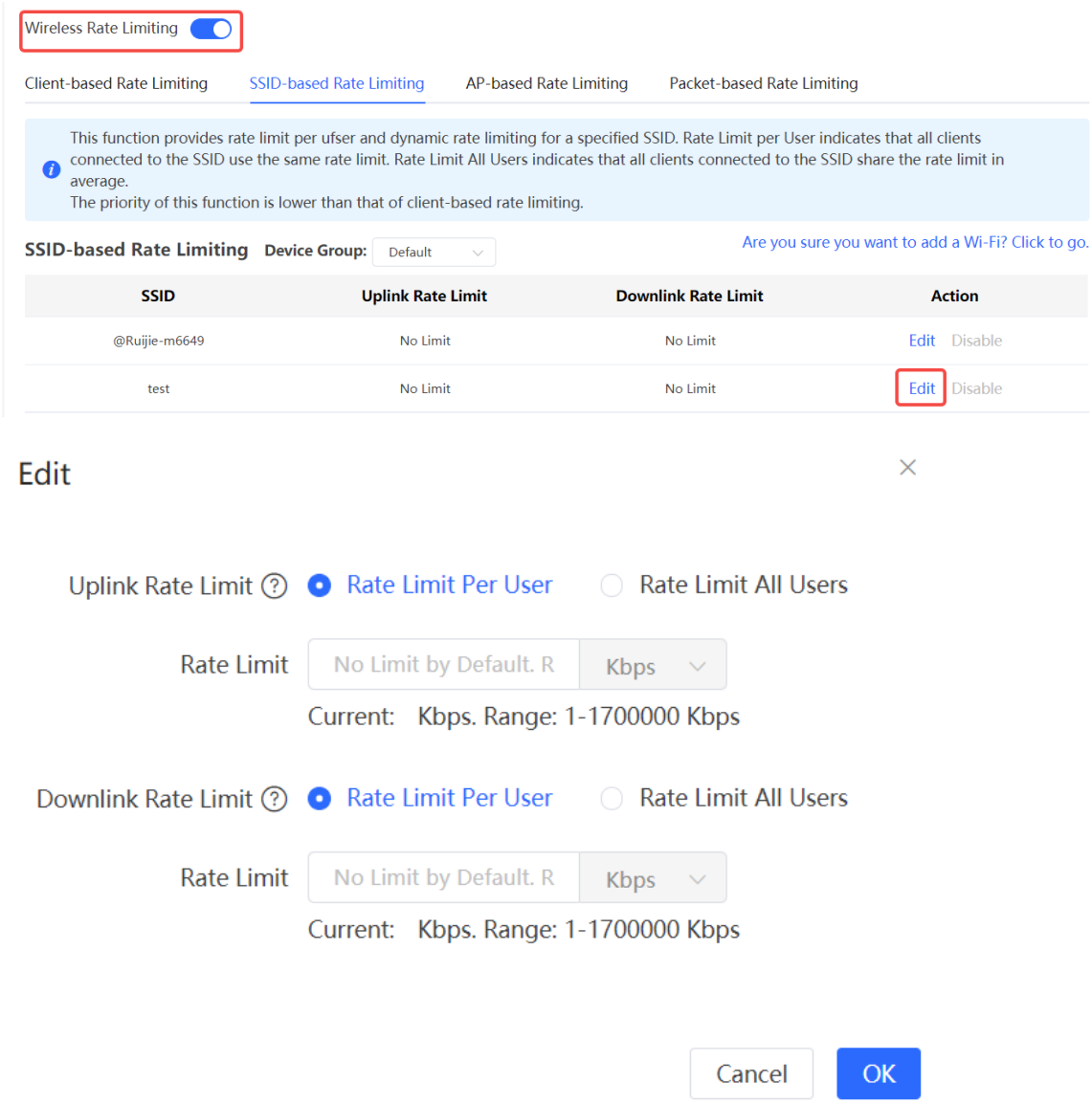



### 2. Configuring SSID-based Rate Limiting

Choose **Network-Wide** > **Workspace** > **Wireless** > **Rate Limiting** > **SSID-based Rate Limiting**.

(1) Enable Wireless Rate Limiting.

(2) Click **Edit** in the **Action** column of the target SSID. In the dialog box that appears, set the uplink and downlink rate limit modes and values, and click **OK**.





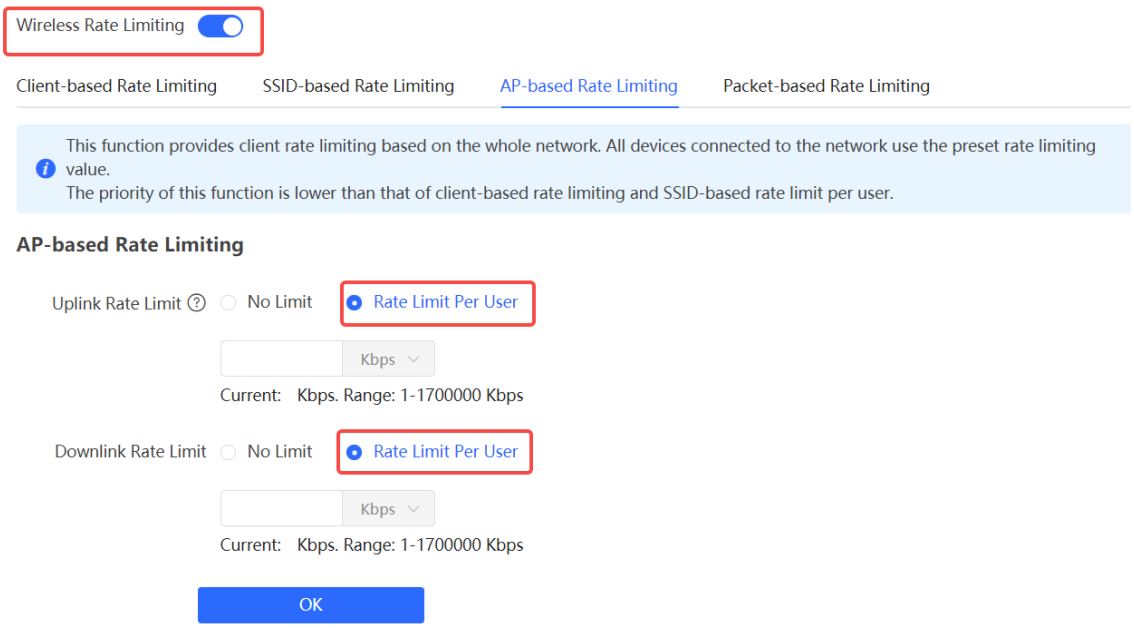


### 3. Configuring AP-based Rate Limiting

Choose **Network-Wide** > **Workspace** > **Wireless** > **Rate Limiting** > **AP-based Rate Limiting**.

(1) Enable Wireless Rate Limiting.

(2) Set the uplink and downlink rate limit modes to **Rate Limit Per User**, configure the rate limit values, and click **OK**.

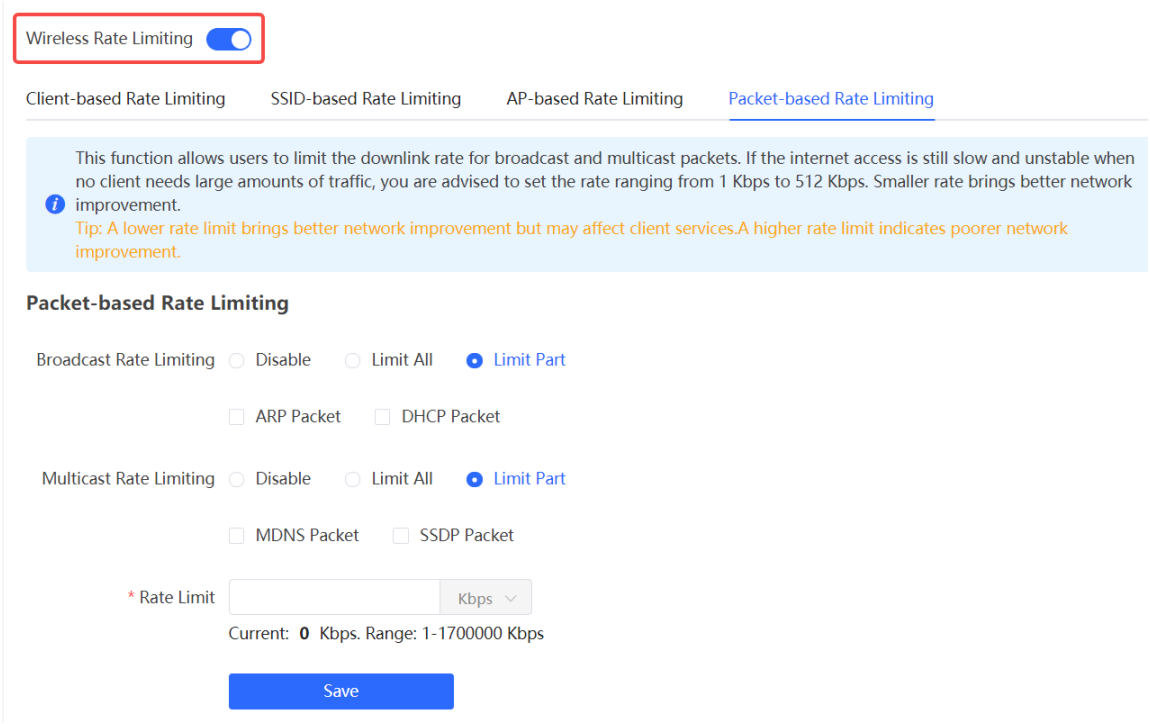



## 4. Configuring Packet-based Rate Limiting

Choose **Network-Wide** > **Workspace** > **Wireless** > **Rate Limiting** > **Packet-based Rate Limiting**.

(1) Enable Wireless Rate Limiting.

(2) Select the specific type of packets for rate limiting, configure the rate limit value, and click **Save**.



# 5.8 Wireless Network Optimization

## 5.8.1 One-Click Wireless Optimization

Select the optimization mode, the system automatically optimize the wireless network.

**Caution**

- WIO is supported only in the self-organizing network mode.
- The client may be offline during the optimization process. The configuration cannot be rolled back once optimization starts. Therefore, exercise caution when performing this operation.

Choose **Network-Wide** > **Workspace** > **WLAN Optimization** > **Network Optimization**.

(1) Select the optimization mode. Then, click **OK** to optimize the wireless network.

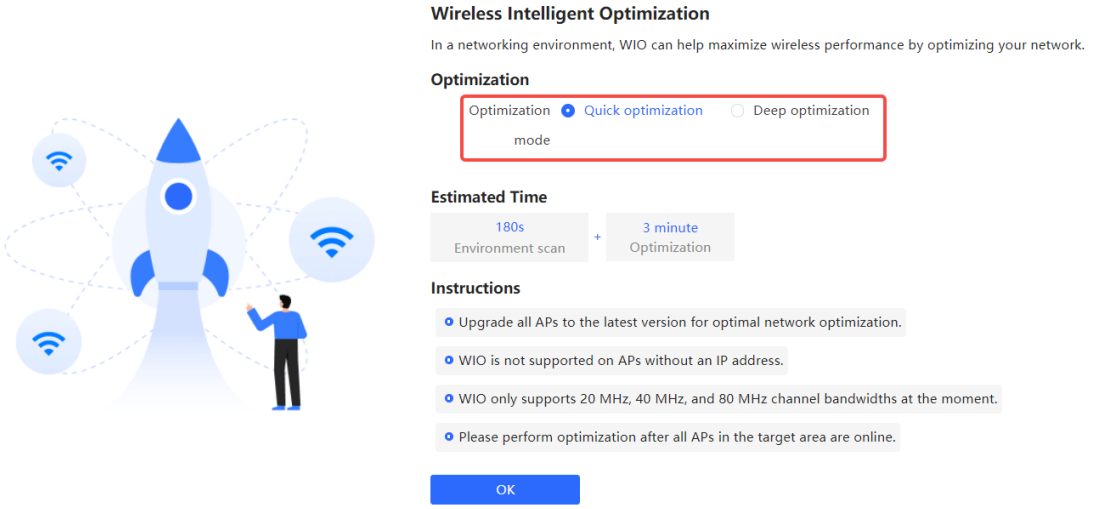
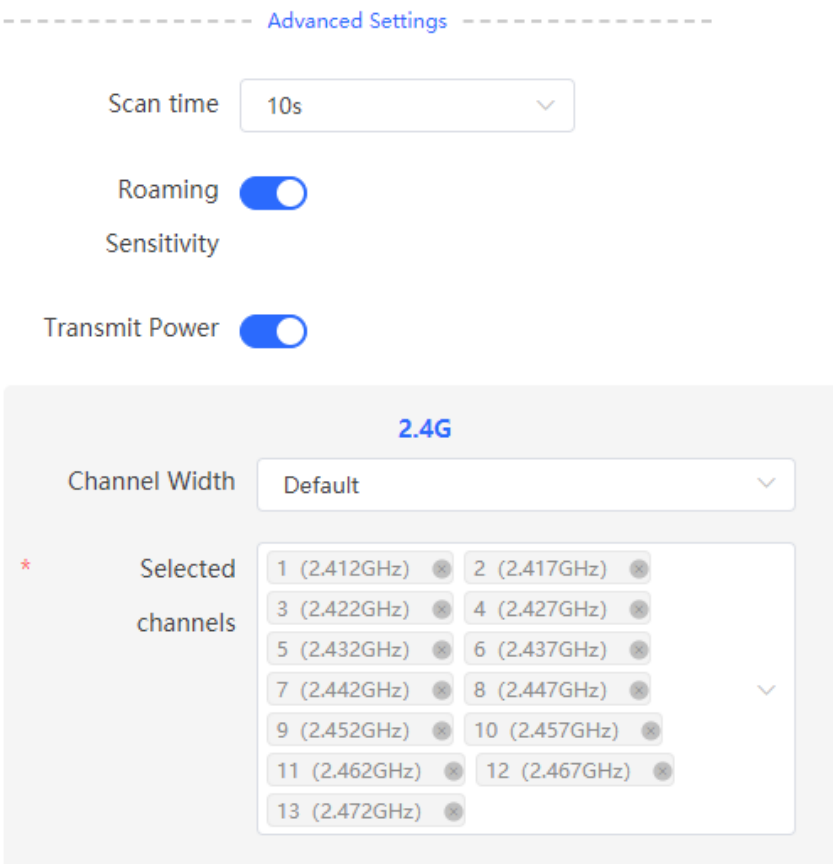


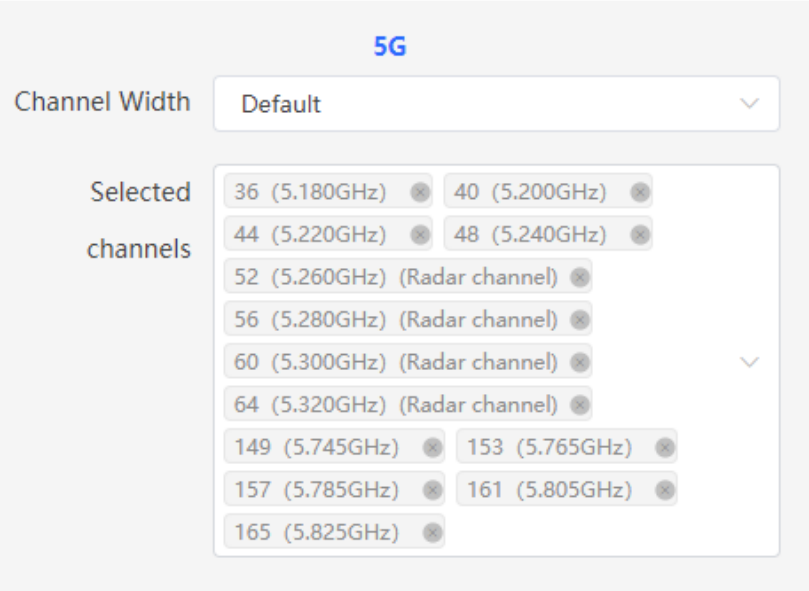

**Table 5-5 Description of Tuning Mode**

| Parameter | Description |
|---|---|
| Quick tuning | In this mode, external interference and bandwidth are not considered. A quick optimization is performed to optimize channel, power, and management frame power. |

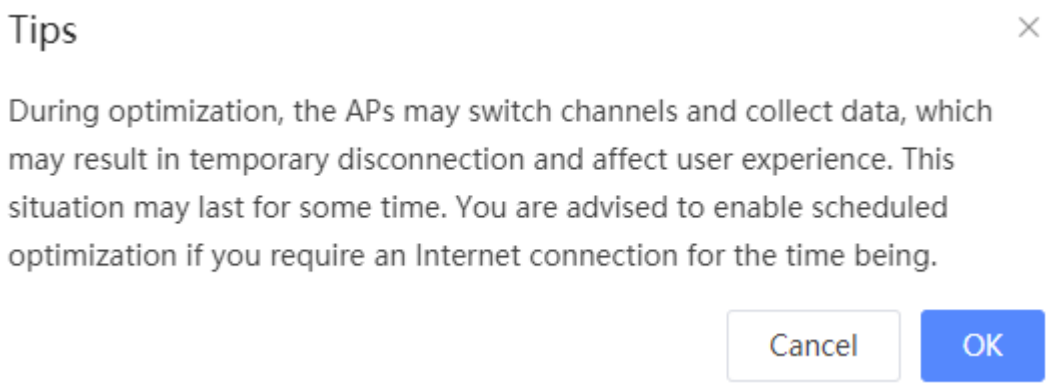
| Parameter | Description |
| --- | --- |
| Deep tuning | In this mode, external interference and bandwidth are considered. A deep optimization is performed to optimize channel, power, and management frame power. Click to expand **Advanced Settings** to configure the **Scan Time**, **Roaming Sensitivity**, **Transmit Power**, **Channel Width** and **channels**.<br>● Scan Time: Indicates the time for scanning channels during the optimization.<br>● Roaming Sensitivity: You can adjust the roaming sensitivity to balance the roaming performance and connection stability of the device during roaming.<br>● Transmit Power: You can adjust the transmit power of wireless devices to optimize the performance and coverage of the Wi-Fi network.<br>● 2.4G<br>○ Channel Width: Indicates the channel bandwidth. The channel bandwidth will be calculated by the system if Default is selected.<br>○ Selected channels: Indicates the channels to be optimized.<br>● 5G<br>○ Channel Width: Indicates the channel bandwidth. The channel bandwidth will be calculated by the system if Default is selected.<br>○ Selected channels: Indicates the channels to be optimized. |

(2) (Optional) When the **Optimization Mode** is configured as **Deep optimization**, expand the **Advanced Settings** to set the scan time, roaming sensitivity, transmit power, channel width and channels.



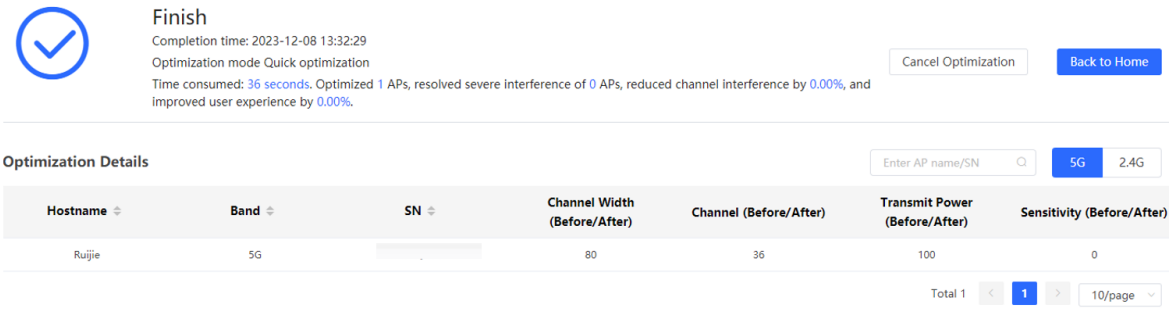



(3) Confirm the tips, and Click **OK**.




(4) After optimization starts, please wait patiently until optimization is complete. After optimization is complete, you can click **Cancel Optimization** to restore the radio parameters to the default values.

The **Channel Width**, **Channel**, and **Transmit Power** columns in the **Optimization Details** section show the changes in the bandwidth, channel, and transmit power of the AP before and after optimization.




(5) Click **Optimization Record** Tab to view details of the latest optimization.



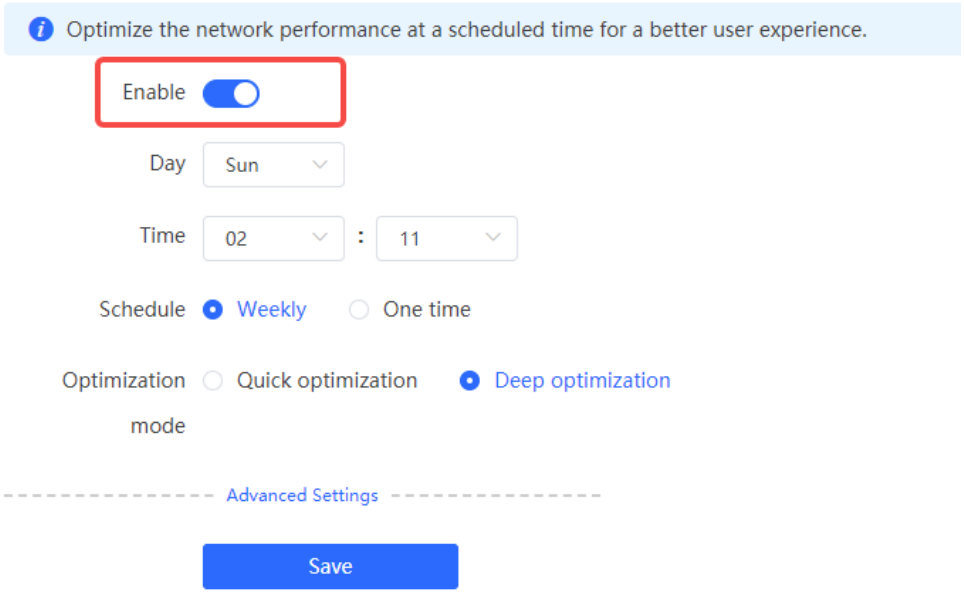

## 5.8.2 Scheduled Wireless Optimization

You can configure scheduled optimization to optimize the network at the specified time. You are advised to set the scheduled optimization time to daybreak or the idle periods.

**Caution**

Clients may be kicked offline during optimization and the configuration cannot be rolled back after optimization starts. Exercise caution when performing this operation.

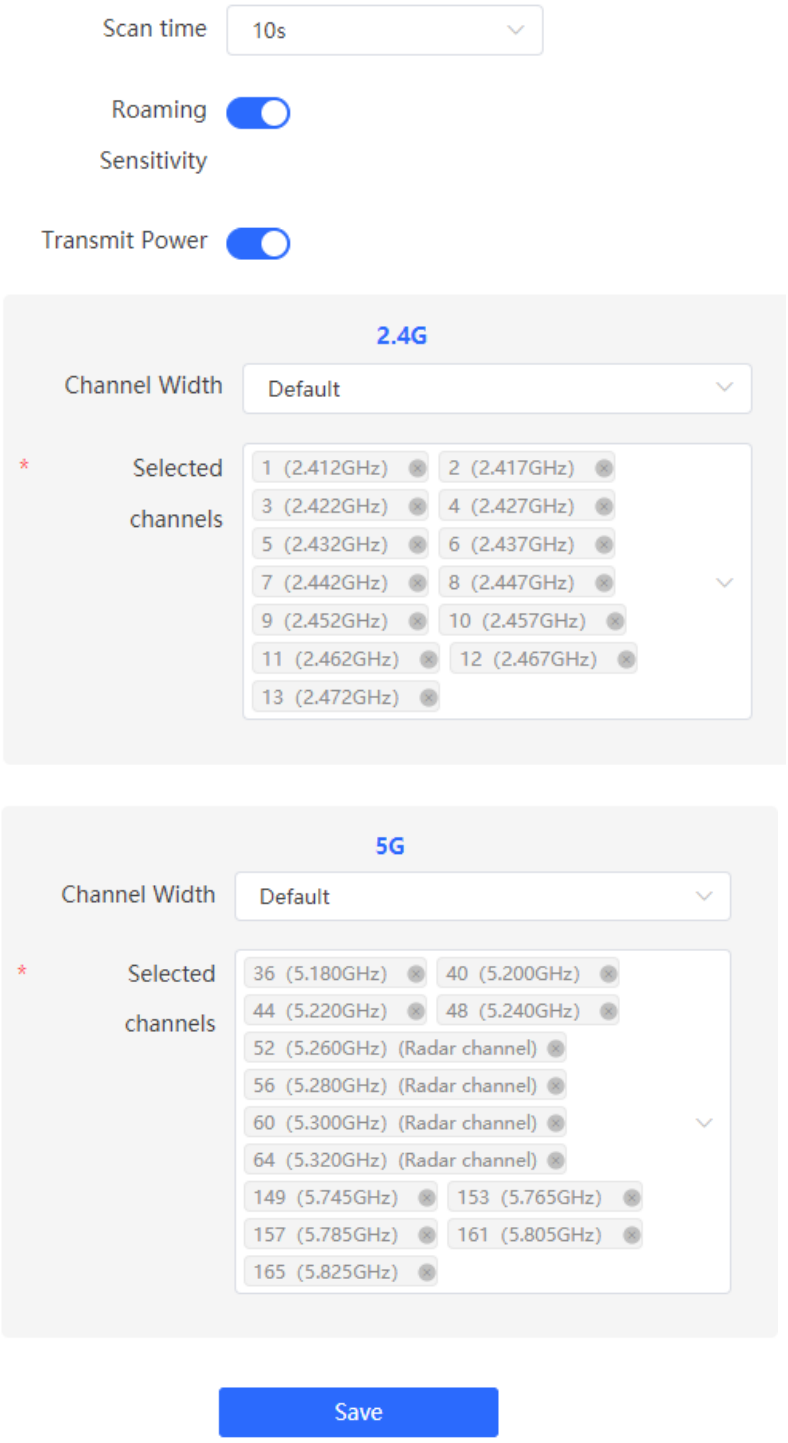
Choose **Network-Wide** > **Workspace** > **WLAN Optimization** > **Scheduled Optimization**.




(1) Configure the scheduled time.

(2) Select the Optimization mode.

(3) (Optional) When the **Optimization Mode** is configured as **Deep optimization**, expand the **Advanced Settings** to set the scan time, roaming sensitivity, transmit power, channel bandwidth and selected channels.



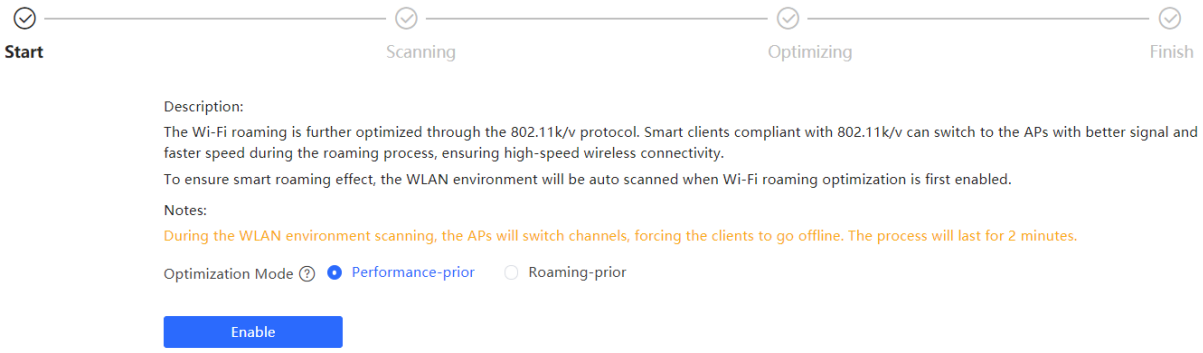

(4) Click **Save**.

### 5.8.3 Wi-Fi Roaming Optimization (802.11k/v)

Wi-Fi roaming is further optimized through the 802.11k/802.11v protocol. Smart endpoints compliant with IEEE 802.11k/v can switch association to the access points with better signal and faster speed, thereby ensuring high-speed wireless connectivity.

To ensure high quality of smart roaming service, the WLAN environment will be automatically scanned when Wi-Fi roaming optimization is first enabled.

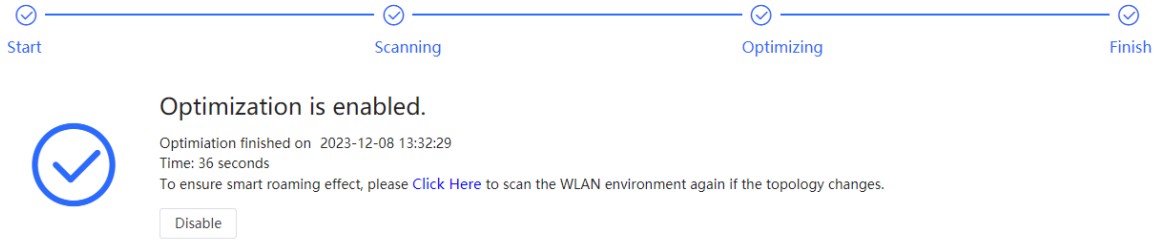
Choose **Network-Wide** > **Workspace** > **WLAN Optimization** > **802.11k/v Roaming Optimization**.




**Caution**

During the optimization, the clients may be forced offline. Please proceed with caution.

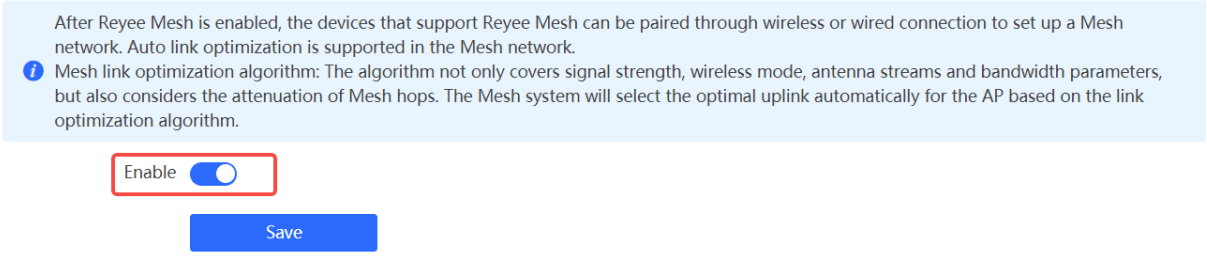
Select **Optimization Mode** and click **Enable**, then the optimization starts.




## 5.9 Reyee Mesh Settings

**Specification**

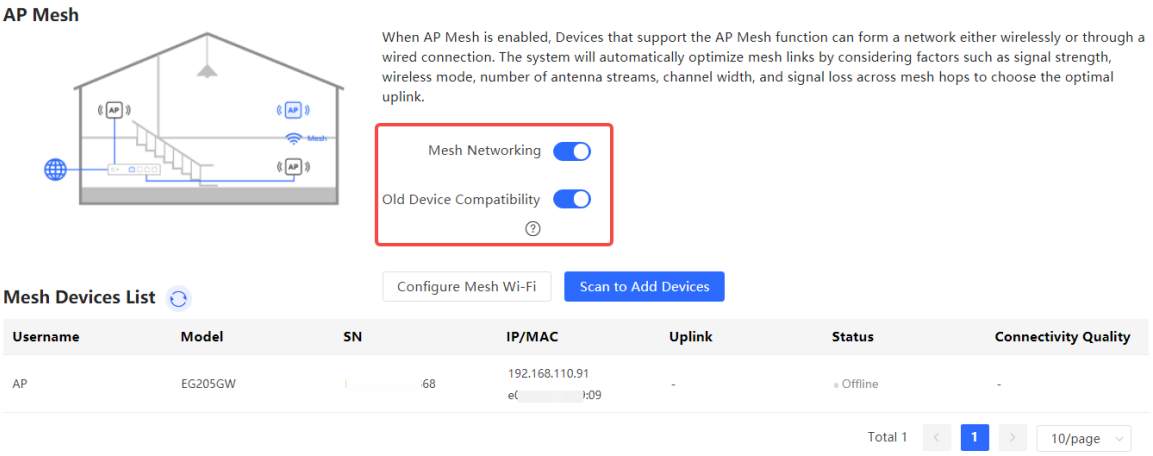
This feature is supported only in ReyeeOS version 2.320 and later. The following figure shows the configuration page for versions prior to ReyeeOS 2.320.




Choose **Network-Wide** > **Workspace** > **Wireless** > **AP Mesh**.

After Reyee Mesh is enabled, you can set up a Mesh network through Mesh pairing between the devices that support Reyee Mesh. You can press the **Mesh** button on the device to automatically discover a new device for Mesh pairing or log in to the management page to select a new device for Mesh pairing. Reyee Mesh is enabled on the device by default.

**Old Device Compatibility**: If there are devices running software versions older than ReyeeOS 2.320 in the environment to form a Mesh network, you are advised to enable **Old Device Compatibility**. When this feature is enabled, devices with software versions prior to ReyeeOS 2.320 can join the mesh network through the fixed Mesh Wi-Fi network.




## 5.10 Configuring the LAN Port of Downlink Access Point

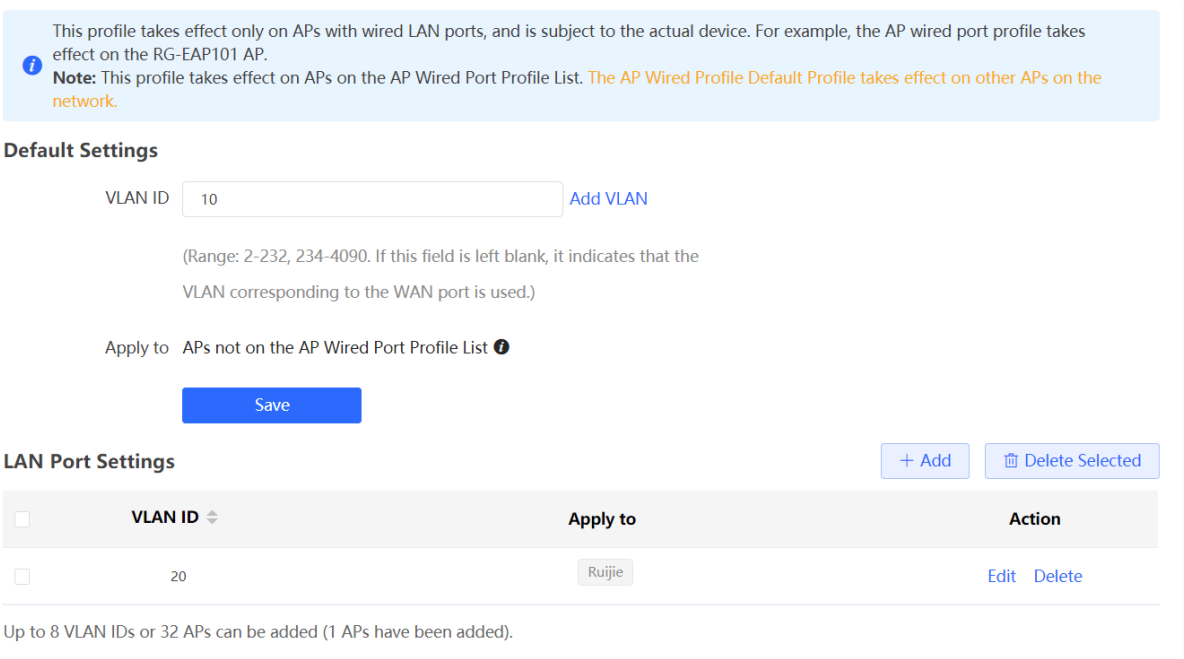
**Caution**

The configuration takes effect only for a downlink access point with a wired LAN port.

Choose **Network-Wide** > **Workspace** > **Wireless** > **LAN Ports**.

Enter the VLAN ID and click **Save** to configure the VLAN, to which the AP wired ports belong. If the VLAN ID is null, the wired ports and WAN interface belong to the same VLAN.

In self-organizing network mode, the AP wired port configuration applies to all APs having wired LAN ports on the current network. The configuration applied to APs in **LAN Port Settings** takes effect preferentially. Click **Add** to add the AP wired port configuration. For APs, to which no configuration is applied in **LAN Port Settings**, the default configuration of the AP wired ports will take effect on them.

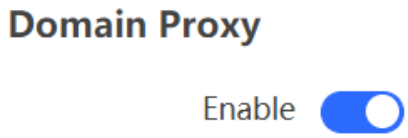



## 5.11 Configuring Domain Proxy

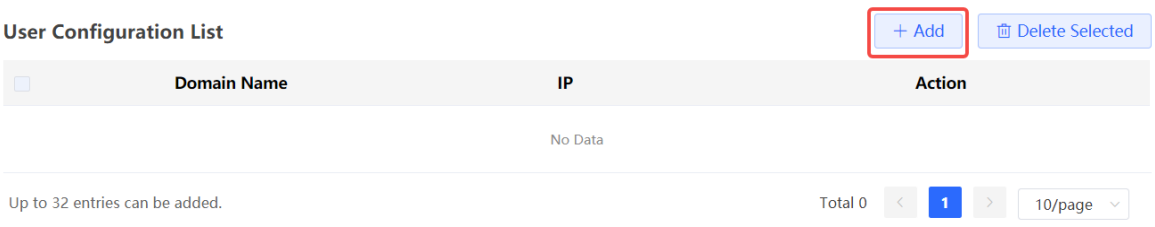
Choose **Network-Wide** > **Workspace** > **Wireless** > **Domain Proxy**.

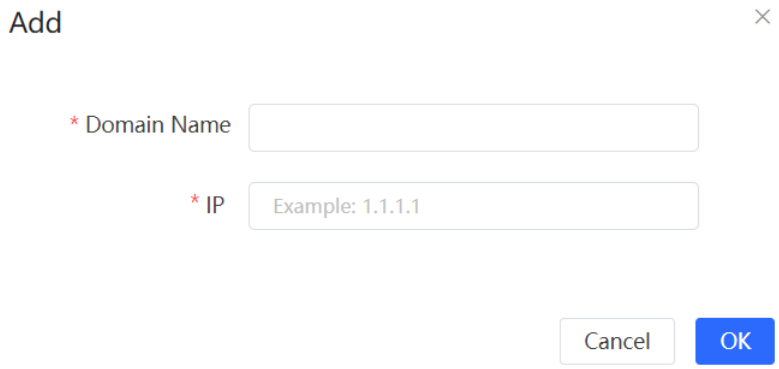
When a client accesses a Wi-Fi network, the message "No Internet connection" or "The Wi-Fi is not connected to the Internet" may be displayed. The possible cause is that the client's operating system introduces an Internet detection mechanism. Generally, the detection mechanism sends a probe packet to a specified domain name and evaluates whether the wireless network can access the Internet based on the detection result. If the DNS server takes a long time to parse a domain name or returns a probe node with a long delay, the probe may be deemed unreachable, causing a false network unavailability.

After the **Domain Proxy** function is enabled, the device returns the preset domain name node to the client, reducing the misjudgment of network unavailability of the client.




Click **+Add**, enter the preset domain name and IP address, and click **OK**.






## 5.12 Client Association

### 5.12.1 Configuring Intelligent Association

Choose **Network-Wide** > **Workspace** > **Wireless** > **Client Association**.

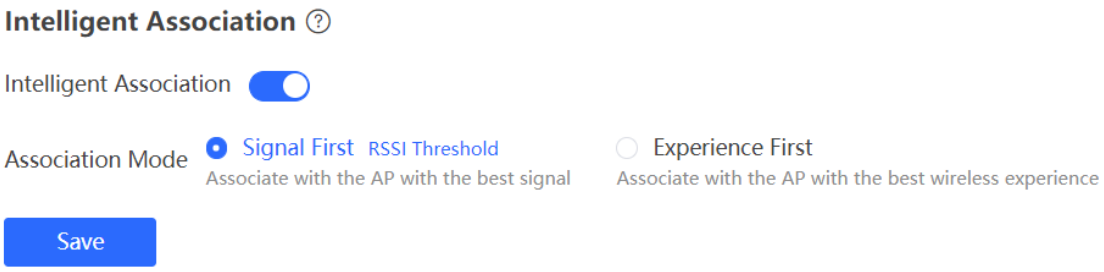
**Note**

Intelligent association is not supported by Wi-Fi 5 APs. Enabling it on Wi-Fi 5 APs may lead to suboptimal performance.

After certain smart home devices are associated with a remote AP, they are unable to re-associate with a nearby AP, resulting in poor user experience and significant delays.

With the Intelligent Association feature enabled, clients can dynamically select the access point for association, eliminating issues related to poor user experience caused by remote associations.

Toggle on the **Intelligent Association** switch, select the association mode, and click **Save**.



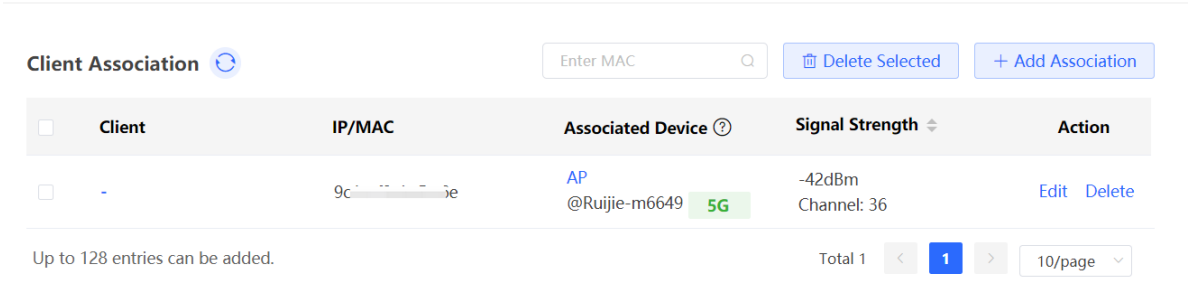

- Signal First

  Associate with the AP that broadcasts strongest signal.
- Experience First

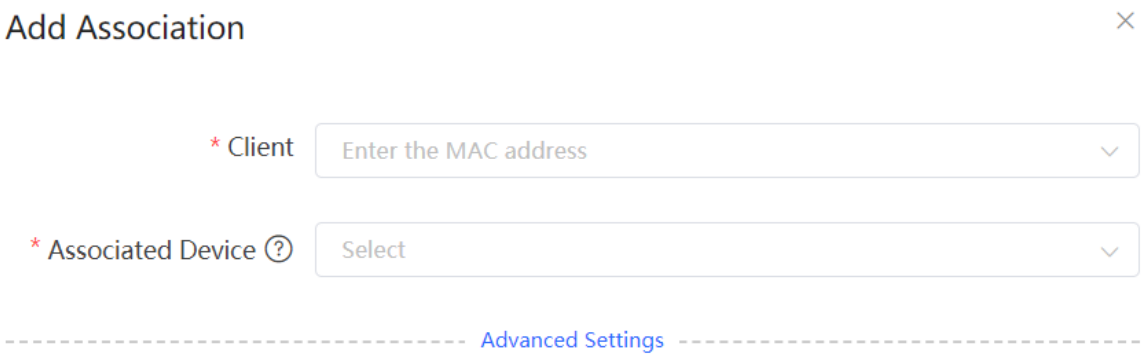
  Associate with the AP that delivers a better wireless experience.

### 5.12.2 Configuring Client Association

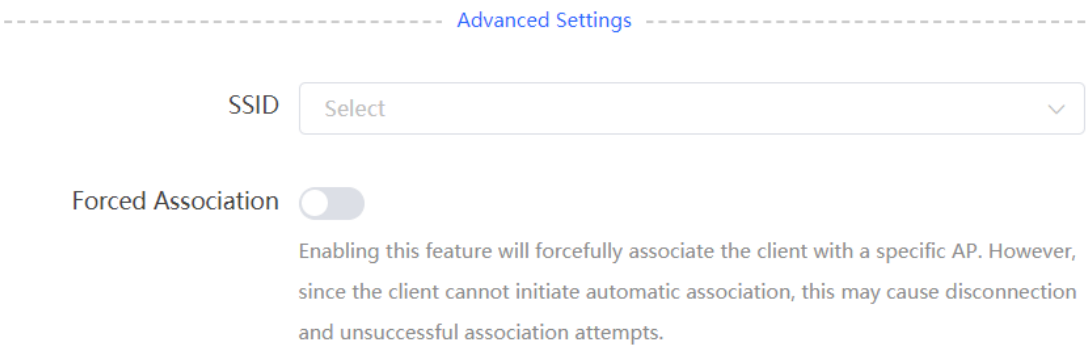
Choose **Network-Wide** > **Workspace** > **Wireless** > **Client Association**.




Click **Add Association**. Select the client and the associated device. You can associate the client with a specified AP on the network to reduce remote association and improve the wireless experience.




Click **Advanced Settings** to configure the SSID for client association and to enable **Forced Association**.




**Caution**

The **Forced Association** feature may cause the client to go offline or fail to associate with the AP. Therefore, exercise caution when performing this configuration.

# 6 Switch Management

## 6.1 Configuring RLDP

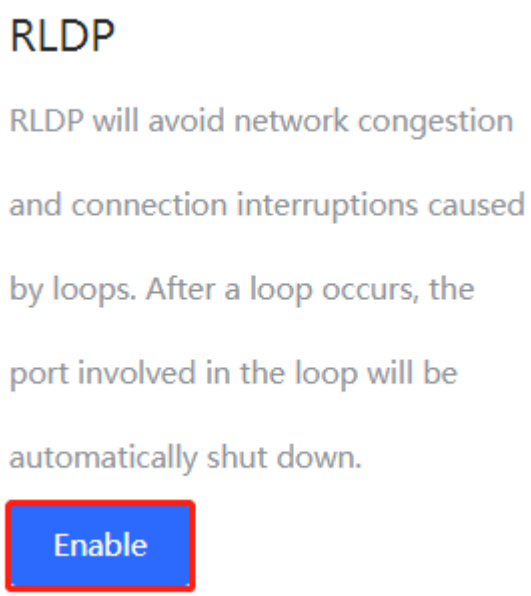
### 6.1.1 Overview

Rapid Link Detection Protocol (RLDP) is an Ethernet link fault detection protocol used to quickly detect link faults and downlink loop faults. RLDP can prevent network congestion and connection interruptions caused by loops. After a loop occurs, the port on the access switch involved in the loop will shut down automatically.

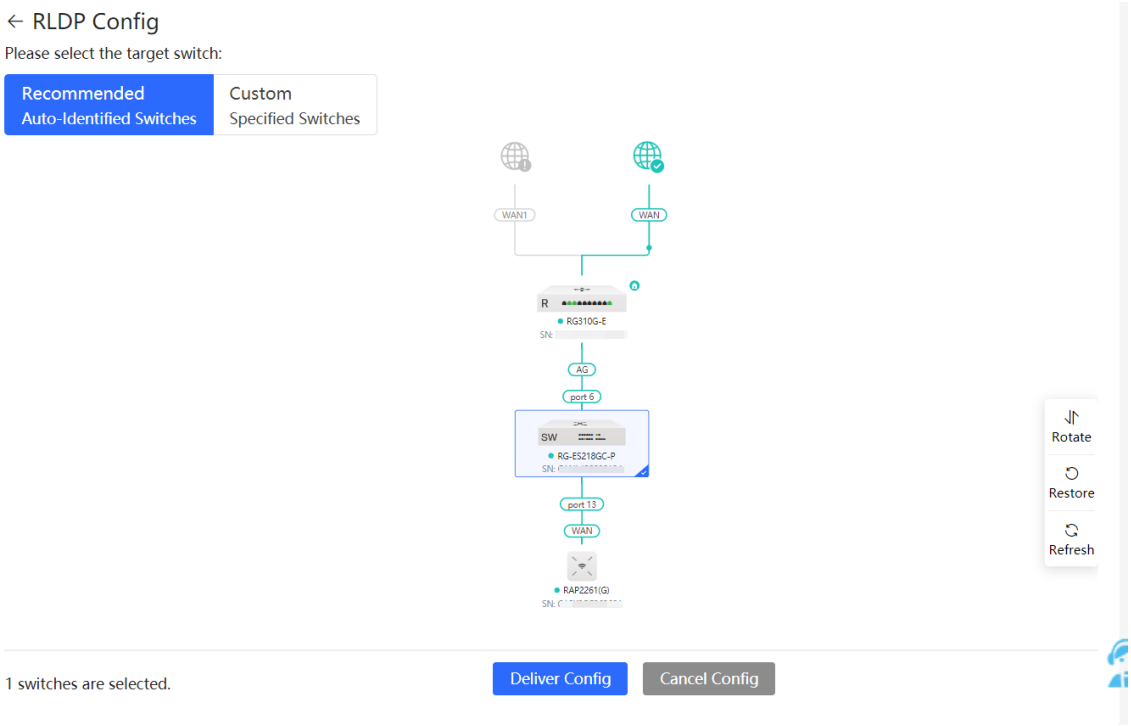
### 6.1.2 Configuration Steps

Choose **Network-Wide** > **Workspace** > **Wired** > **RLDP**.

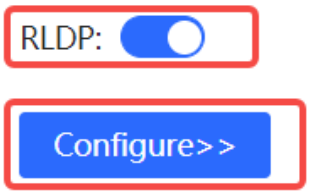
(1) Click **Enable** to access the **RLDP Config** page.




(2) In the networking topology, you can select the access switches on which you want to enable RLDP in either recommended or custom mode. If you select the recommended mode, all access switches in the network are selected automatically. If you select the custom mode, you can manually select the desired access switches. Click **Deliver Config**. RLDP is enabled on the selected switches.




(3) After the configuration is delivered, if you want to modify the effective range of the RLDP function, click **Configure** to select desired switches in the topology again. Turn off **RLDP** to disable RLDP on all the switches with one click.




## 6.2 Configuring DHCP Snooping

### 6.2.1 Overview

DHCP Snooping implements recording and monitoring the usage of client IP addresses through exchange of DHCP packets between the server and client. In addition, this function can filter invalid DHCP packets to ensure that clients can obtain network configuration parameters only from the DHCP server in the controlled range. DHCP Snooping will prevent rogue DHCP servers offering IP addresses to DHCP clients to ensure the stability of the network.

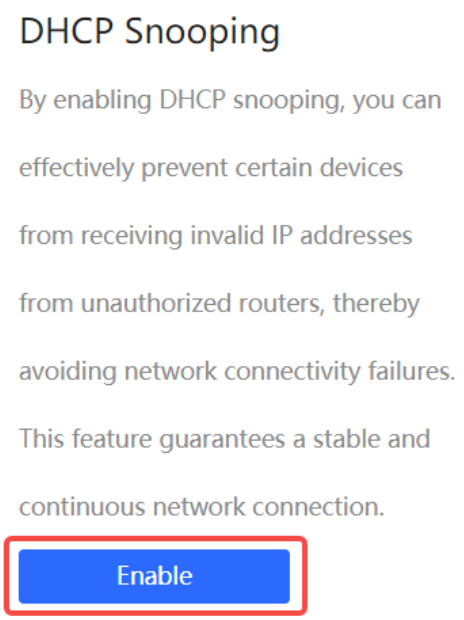
**Caution**

After DHCP Snooping is enabled on the switch, the switch does not forward invalid DHCP packets. However, if a client directly connects to a rogue DHCP server, it cannot access the Internet as the obtained IP address is incorrect. In this case, you need to find the rogue router and disable DHCP on it, or use the WAN interface for uplink connection.

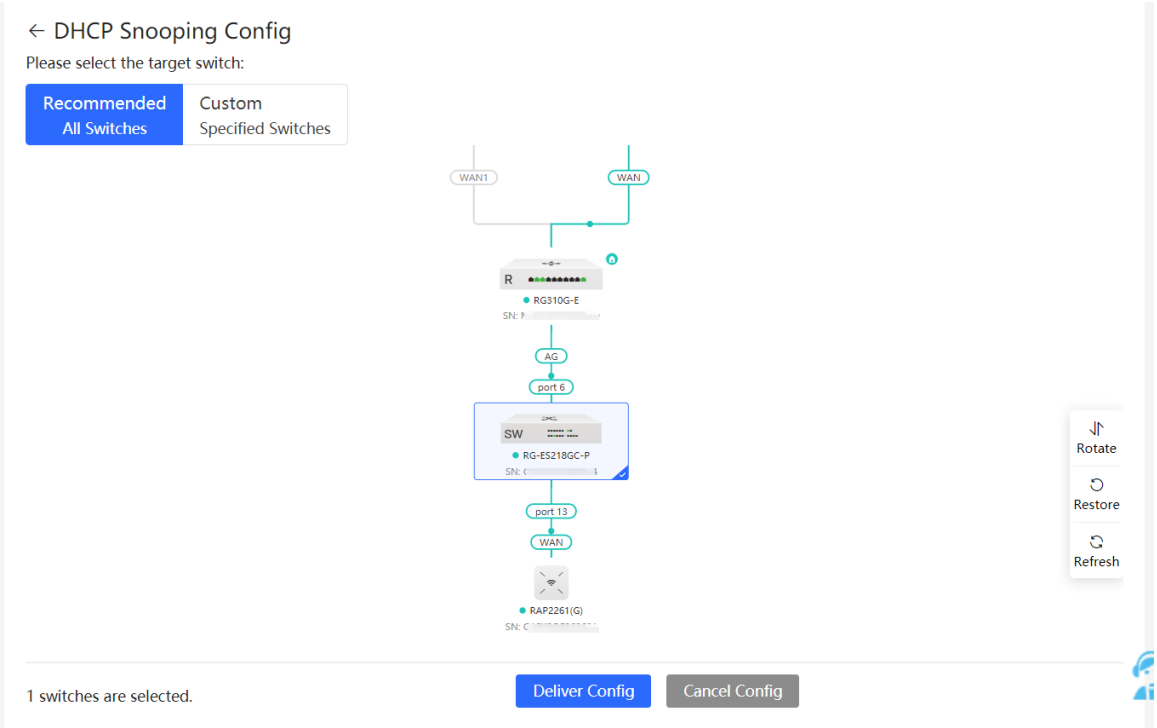
### 6.2.2 Configuration Steps

Choose **Network-Wide** > **Workspace** > **Wired** > **DHCP Snooping**.

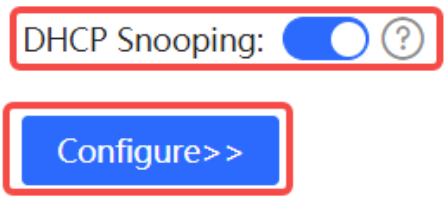
(1) Click **Enable** to access the **DHCP Snooping Config** page.




(2) In the networking topology, you can select the access switches on which you want to enable DHCP Snooping in either recommended or custom mode. If you select the recommended mode, all switches in the network are selected automatically. If you select the custom mode, you can manually select the desired switches. Click **Deliver Config**. DHCP Snooping is enabled on the selected switches.



(3) After the configuration is delivered, if you want to modify the effective range of the DHCP Snooping function, click **Configure** to select desired switches in the topology again. Turn off **DHCP Snooping** to disable DHCP Snooping on all switches with one click.




## 6.3 Batch Configuring Switches

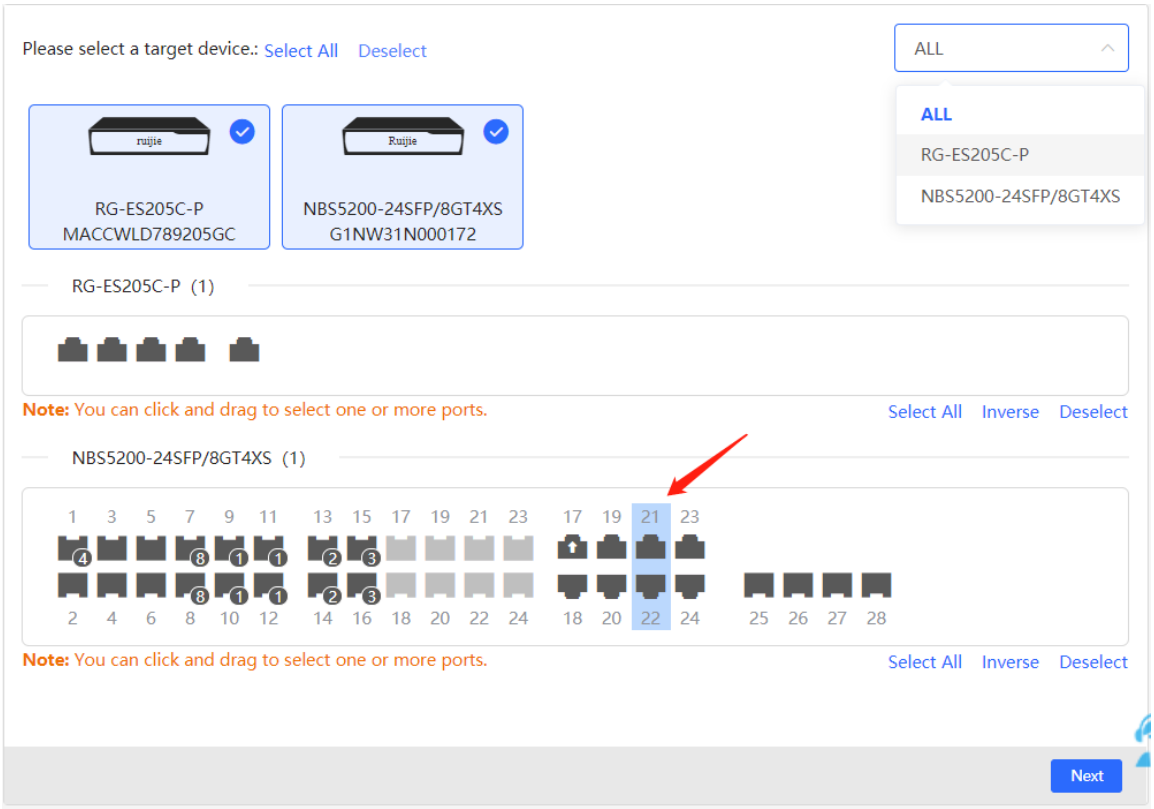
### 6.3.1 Overview

You can batch create VLANs, configure port attributes, and divide port VLANs for switches in the network.

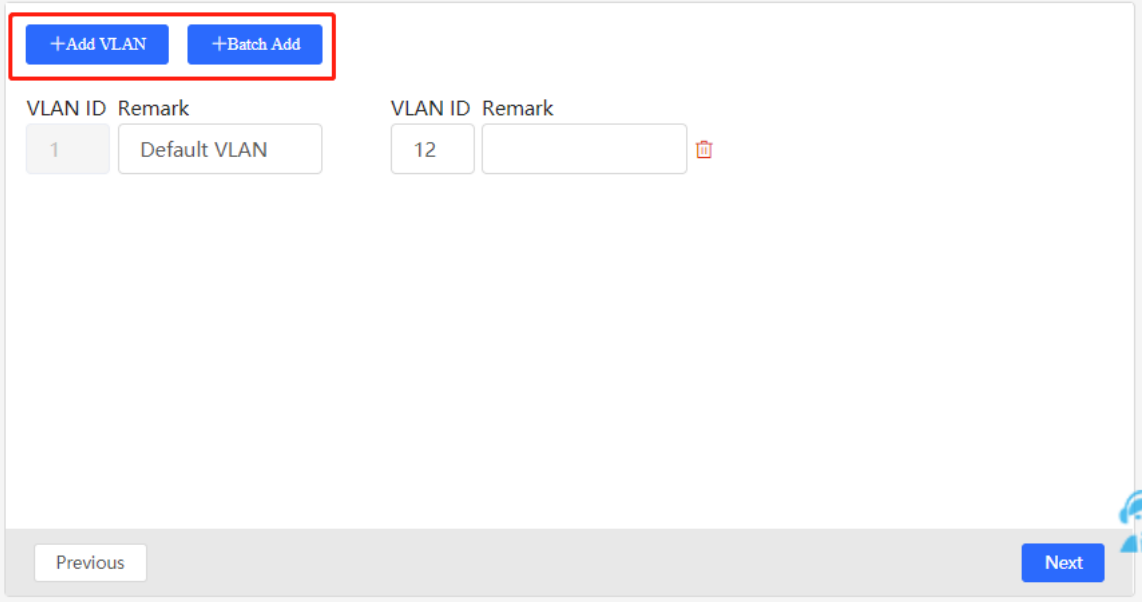
### 6.3.2 Configuration Steps

Choose **Network-Wide** > **Workspace** > **Wired** > **SW Config**.

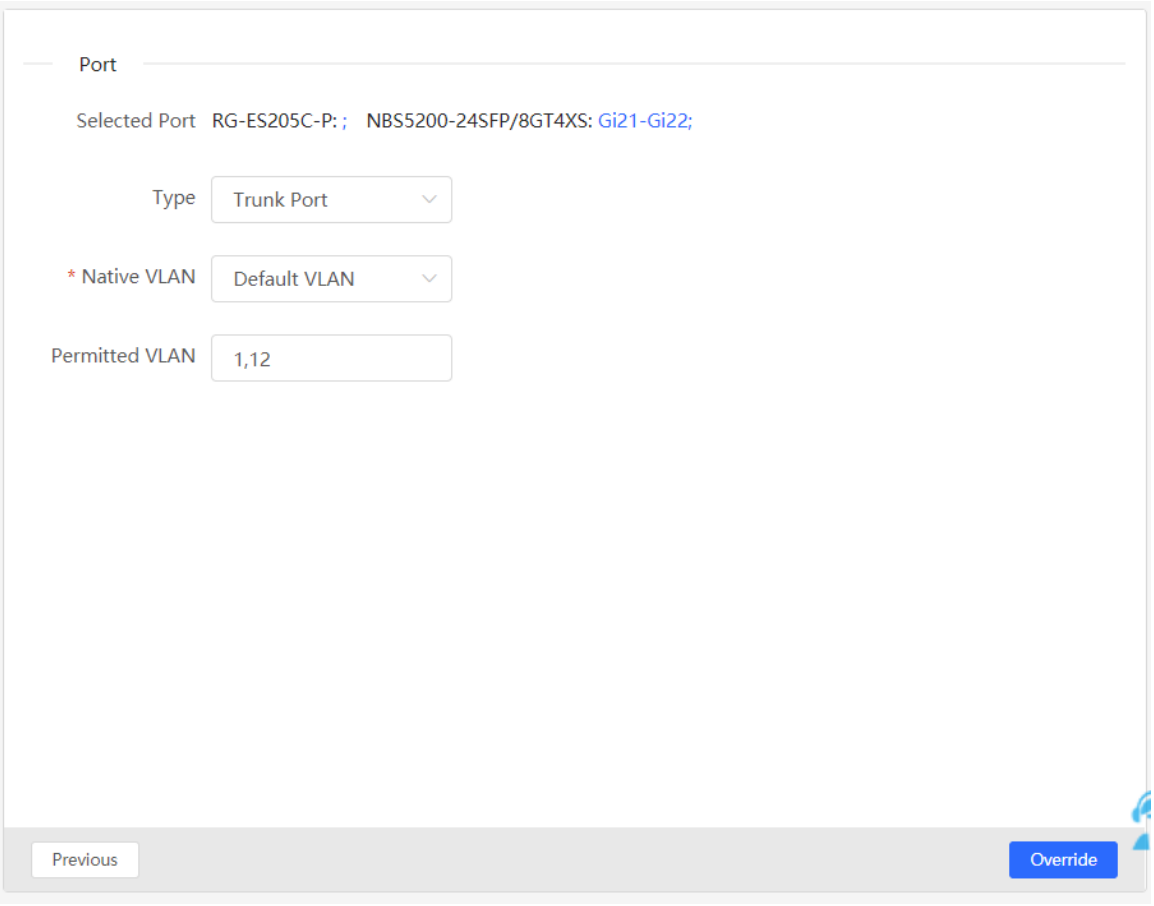
(1) The page displays all switches in the current network. Select the switches to configure, and then select the desired ports in the device port view that appears below. If there are a large number of devices in the current network, select a product model from the drop-down list box to filter the devices. After the desired devices and ports are selected, click **Next**.



(2) Click **Add VLAN** to create a VLAN for the selected devices in a batch. If you want to create multiple VLANs, click **Batch Add** and enter the VLAN ID range, such as 3-5,100. After setting the VLANs, click **Next**.

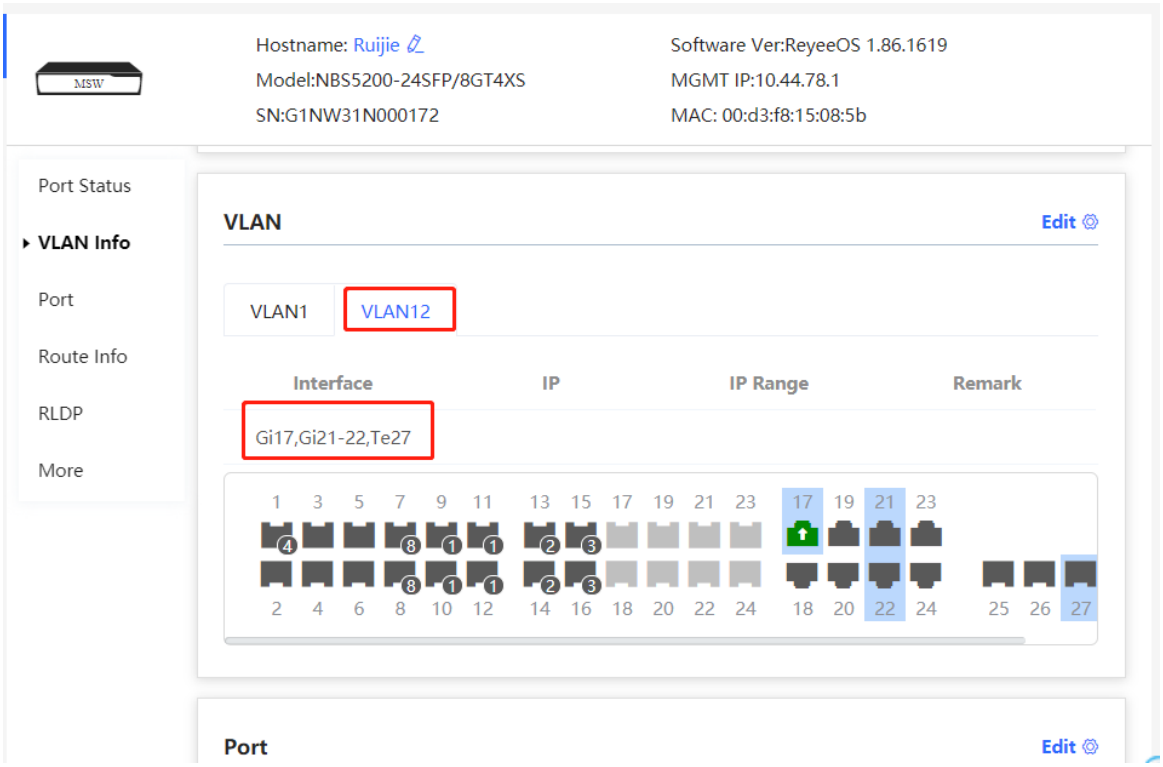



(3) Configure port attributes for the ports selected in Step 1 in a batch. Select a port type. If you set **Type** to **Access Port**, you need to configure **VLAN ID**. If you set **Type** to **Trunk Port**, you need to configure **Native VLAN** and **Permitted VLAN**. After setting the port attributes, click **Override** to deliver the batch configurations to the target devices.



### 6.3.3 Verifying Configuration

View the VLAN and port information of switches to check whether the batch configurations are successfully delivered.



# 7 Firewall Management

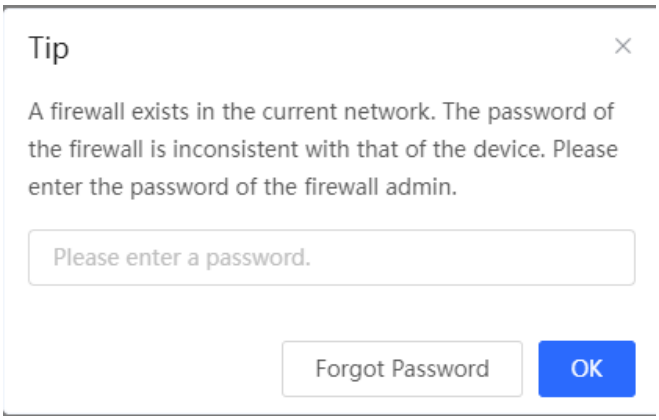
After a firewall is added to the network, you can manage and configure the firewall on the Web management system.

## 7.1 Viewing Firewall Information

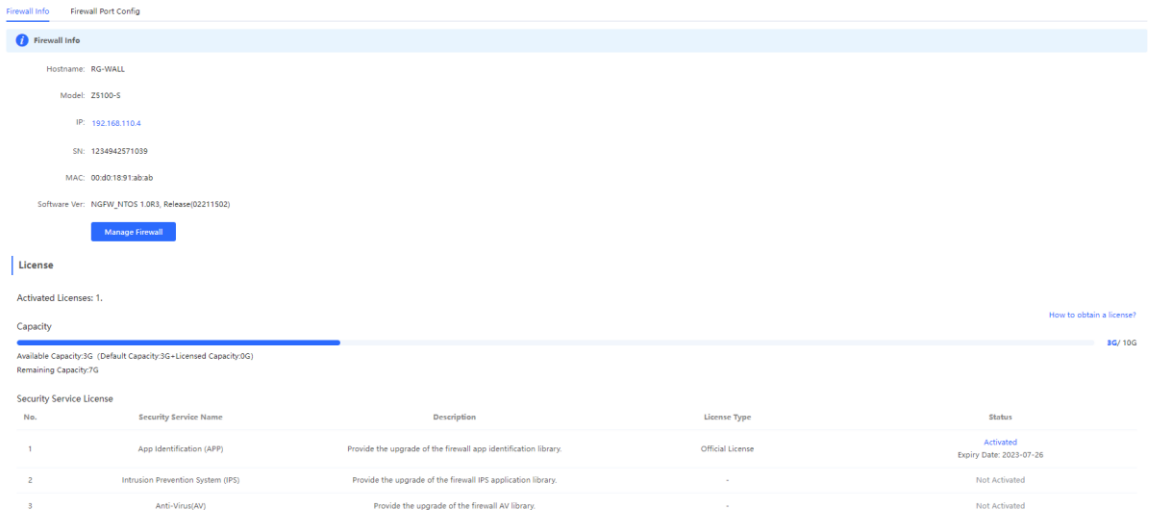
You can view the basic information and license of the firewall on the Web management system.

Choose **Network** > **Firewall**.

(1) If the password of the firewall is inconsistent with that of the gateway, please enter the management password of the firewall and click **OK**.



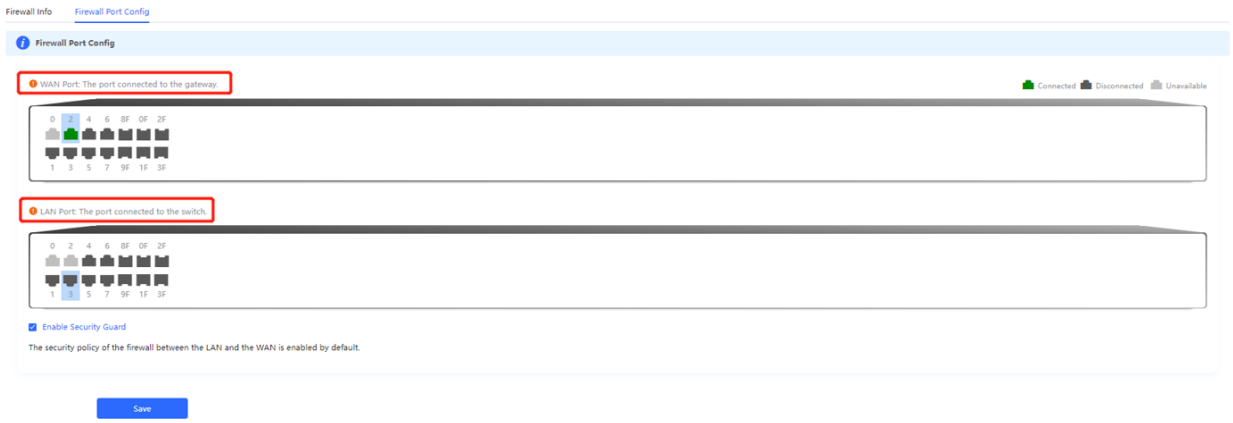

(2) The basic information, capacity, and security service license of the firewall are displayed on the Web management system.




Click **Manage Firewall** to go to the Web management interface of the firewall. Configure the security policy and license activation for the firewall. For details, see the Web-based configuration guide of the firewall.

## 7.2 Configuring Firewall Port

If the firewall is set to transparent mode, the **Firewall Port Config** page appears. You can select the WAN interface connected to the gateway or the LAN port connected to the switch and enable **Security Guard**.



# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
Ruijie Cloud's SD-WAN solution can effectively meet the above requirements and has the following advantages compared with traditional WAN solutions:

(1) **Networking without public IP addresses:** Networking without public IP addresses enables remote connectivity across any broadband connection. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=017d4b240fbc443c9b383d63c35c5aac.

(2) **Visualized monitoring:** Map-based network monitoring provides a clear, intuitive overview of the entire network, projects, and links, with one-click alarm analysis. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=d48a89fb844a4795bf0f3967245597fd.

(3) **Batch configuration:** A template can be applied across multiple projects, eliminating the need for repetitive operations. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=586ede226ec04f0f9fe32ce1fdb34f56.

(4) **Pre-configuration deployment:** Templates can be created beforehand, which are automatically delivered to devices upon network connection, facilitating zero-touch provisioning onsite. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=6436c96a5cf94b9c97b92f863ff8bf06.



# 8 Authentication Management

## 8.1 Web Authentication

### 8.1.1 Overview

With the popularity of wireless networks, Wi-Fi has become one of the marketing means for merchants. Customers can connect to the Wi-Fi provided by the merchants to surf the Internet after watching advertisements. In addition, to defend against security vulnerabilities, the wireless office network usually allows only employees to associate with Wi-Fi, so the identity of the clients needs to be verified.

The Wi-Fi authentication function of the device uses the Portal authentication technology to implement information display and user management. After users connect to Wi-Fi, the traffic will not be directly routed to the Internet. Wi-Fi users must pass authentication on the Portal authentication website, and only authenticated users are allowed to use network resources. Merchants or enterprises can customize Portal pages for identity authentication and advertisement display.

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(4) **Pre-configuration deployment:** Templates can be created beforehand, which are automatically delivered to devices upon network connection, facilitating zero-touch provisioning onsite. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=6436c96a5cf94b9c97b92f863ff8bf06.



## 8.1.2 Getting Started

(1) Before you enable Wi-Fi authentication, ensure that the wireless signal is stable and users can connect to Wi-Fi and surf the Internet normally. The wireless SSID used for authentication in the network should be set to the open state.

(2) If the IP address of an AP in the network is within the authentication scope, add the AP as the authentication-free user. For details, see Section 8.1.8 Authentication-Free.

- In a Layer 2 network, add the MAC address of the AP to the authentication-free MAC address allowlist.
- In a Layer 3 network, add the IP address of the AP to the authentication-free IP address Allowlist.

## 8.1.3 WiFiDog Authentication

### 1. Overview

The EG device is connected to the MACC authentication server on the cloud. After Wi-Fi users connect to Wi-Fi, a Portal page pops up. The users need to enter the account and password to pass authentication before they can

# 1 Configuration Guide SD-WAN

**Specification**

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Ruijie Cloud's SD-WAN solution can effectively meet the above requirements and has the following advantages compared with traditional WAN solutions:

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access the Internet. According to the authentication configuration on the MACC authentication server, you can set the authentication mode to SMS authentication, fixed account authentication, or account-free one-click login.

### 2. Getting Started

(1) WiFiDog is a Layer 2 protocol. Ensure that the authentication device can obtain the MAC addresses of the wireless users.

- The gateway address of the wireless users to be authenticated is deployed on the authentication device.
- If the gateway address is not deployed on the authentication device, the device functions as a DHCP server to allocate IP addresses to the wireless users and obtain MAC addresses of the wireless users. In this scenario, you need to set Network Type to Layer-3 Network.

(2) Complete the corresponding configuration on the Ruijie Cloud platform before you enable the authentication function on the device. If SMS authentication is used, you also need to configure the SMS gateway.

### 3. Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Cloud Auth**.

# 1 Configuration Guide SD-WAN

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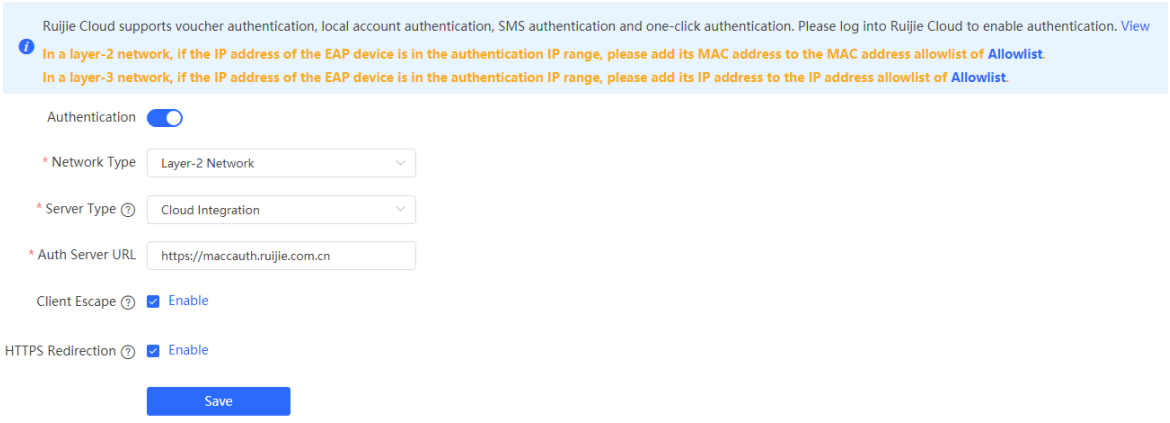
## System Management

(1) Turn on **Authentication**.

(2) Set **Server Type** to **Cloud Integration**, configure **Network Type**, **Auth Server URL**, **Client Escape** and **HTTPS Redirection**, and click **Save**.




(3) In the **Net List** area, click **Add**. In the displayed dialog box, enter the **VLAN** name and the **Auth IP / IP Range** to be authenticated and click **OK**.

# 1 Configuration Guide SD-WAN

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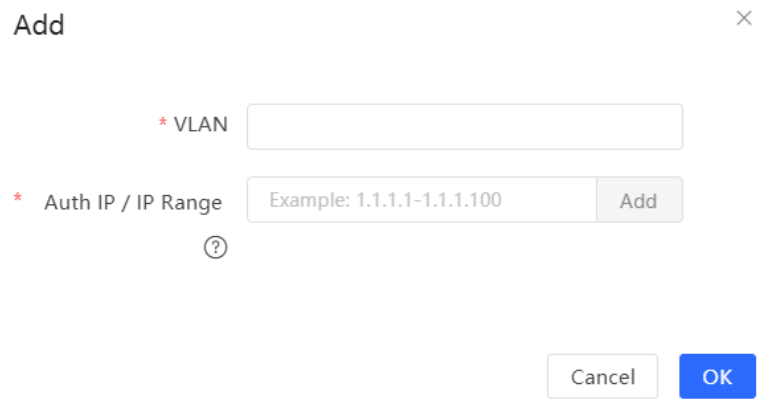
System Management



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System Management

**Table 8-1 Description of WiFiDog Authentication Configuration**

| Parameter | Description |
|---|---|
| Network Type | The default value is **Layer-2 Network**. Set the parameter based on the actual network environment. |
| Server Type | Select **Cloud Integration** from the drop-down list. |
| Auth Server URL | After completing the configuration at the server end, the Ruijie Cloud authentication server returns a URL. The device sends authentication requests to the URL during authentication. |
| Client Escape | After the client escape function is enabled, if an exception occurs on the authentication server, the device disables authentication to allow all clients to directly access the Internet. After the server recovers, the device automatically enables authentication. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
|---|---|
| HTTPS Redirection | Enabling HTTPS redirection ensures that user data transmission during the authentication process is encrypted, thereby enhancing the security of the authentication process. When HTTPS redirection is disabled, authentication requests can only be sent to HTTP pages. |
| VLAN | Specify the name of a Wi-Fi network, to which clients connect. A maximum of eight VLAN names can be configured. |
| Auth IP / IP Range | Specify the IP address range to be authenticated. You can enter a single IP address (such as 192.168.112.2) or an IP address range (such as 192.168.112.2–192.168.112.254). A maximum of five IP address ranges can be configured. |

### 4. Verifying Configuration

After a mobile phone connects to a specific Wi-Fi, the Portal authentication page pops up automatically.

# 1 Configuration Guide SD-WAN

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If the authentication mode configured on the Ruijie Cloud authentication server is SMS authentication, the user needs to enter the mobile number to obtain an Internet access password and enter the password to complete authentication.

If the authentication mode configured on the Ruijie Cloud authentication server is account-free one-click authentication, the user can directly access the Internet after clicking the corresponding button on the page.

If the authentication mode configured on the Ruijie Cloud authentication server is fixed account login, the user can access the Internet after entering the account and password configured on the cloud.

After successful connection, you can choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Online Clients** to view information about this authenticated user. For details, see Section 8.3 Online User Management.

### 8.1.4 Configuring Third-Party Authentication

#### 1. Overview

Reyee EG series gateway devices can interwork with WISPr-compliant external authentication servers. After a wireless client is connected to the Wi-Fi network, a Portal page pops up. The wireless client needs to be

# 1 Configuration Guide SD-WAN

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authenticated before it can access the Internet. Based on the services provided by different authentication servers, you can choose RADIUS authentication, local account authentication, or no authentication for third-party authentication.

### 2. Getting Started

- Ensure that the authentication server can obtain the MAC address of the wireless client:
  - The gateway address of the wireless client to be authenticated is deployed on the authentication server.
  - If the gateway address of the wireless client to be authenticated is not deployed on the authentication server, then the device must act as a DHCP server to assign an IP address to the wireless client in order to obtain its MAC address. In this scenario, the **Network Type** must be set to **Layer 3 Network**.
- Complete relevant configurations on the third-party authentication platform, and then enable the Wi-Fi authentication feature on the device. For specific configurations, see the configuration manual of relevant third-party authentication platforms.

### 3. Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Cloud Auth**.

# 1 Configuration Guide SD-WAN

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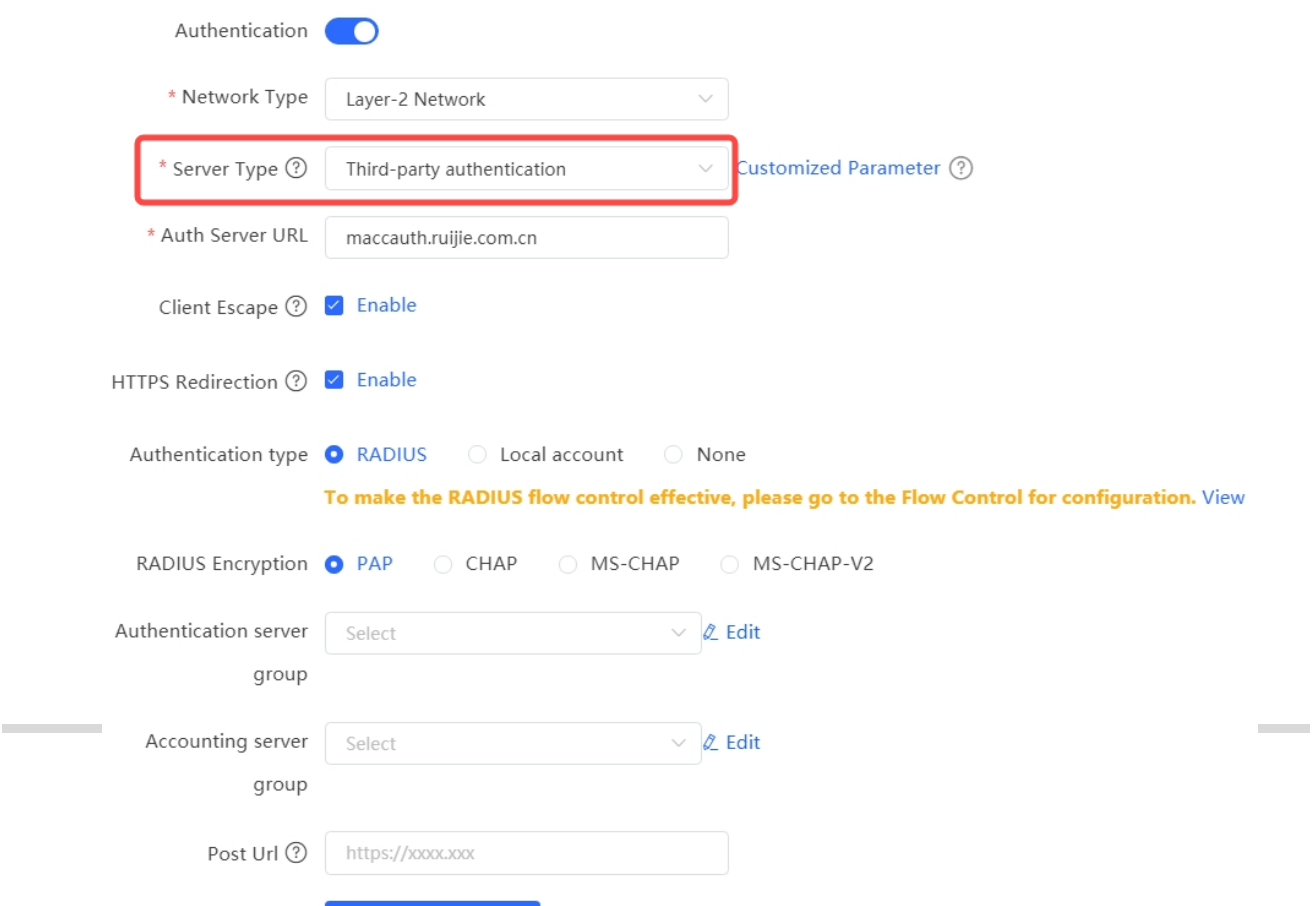
System Management



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System Management

(1) Toggle on **Authentication**.

(2) Set **Server Type** to **Third-party Authentication**, configure **Network Type**, **Auth Server URL**, **Client Escape, HTTPS Redirection**, **Authentication Type**, **Auth Server Group** and **Accounting Server Group**, and click **Save**.

**Table 8-2 Description of Third-Party Authentication Configuration Parameters**

| Parameter | Description |
|---|---|
| Network Type | The default value is **Layer-2 Network**. Set the parameter based on the actual network environment. |
| Server Type | Select **Third-party authentication** from the drop-down list. |
| Auth Server URL | After completing the configuration on the third-party authentication server, the third-party authentication server returns a URL. The device sends authentication requests to the URL during authentication. |

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System Management

| Parameter | Description |
|---|---|
| Client Escape | After the client escape function is enabled, if an exception occurs on the authentication server or the RADIUS server, the device disables authentication to allow all clients to directly access the Internet. After the server recovers, the device automatically enables authentication. |
| HTTPS Redirection | Enabling **HTTPS Redirection** ensures that data is encrypted during user authentication, thus improving the security of the authentication process.<br>When **HTTPS Redirection** is disabled, you will be redirected to HTTP pages only. |
| Authentication type | Types of third-party authentication, which include:<br>● **RADIUS**: The wireless client is authenticated by the RADIUS server.<br>● **Local account**: The wireless client is authenticated based on local username and password.<br>● **None**: No authentication is required for the wireless client. |

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System Management

| Parameter | Description |
| --- | --- |
| RADIUS Encryption | When **Authentication Type** is set to **RADIUS**, you need to configure the encryption mode for RADIUS authentication:<br>● **RAP**: This mode has low security. Passwords are transmitted in plain text, posing a risk of interception.<br>● **CHAP**: The server sends a random CHAP challenge to the client, and the client uses the password to calculate and returns a response.<br>● **MS-CHAP**: Functions such as password change and failed attempt count are supported. This mode is more secure and flexible than CHAP.<br>● **MS-CHAPv2**: As an improved version of MS-CHAP, this mode provides higher security and better encryption. |

# 1 Configuration Guide SD-WAN

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System Management

| | |
|---|---|
| Authentication server group | Select a RADIUS authentication server group from the drop-down list box.<br>This parameter is mandatory when the **Authentication Type** is set to **RADIUS**.<br>You can click **Edit** next to the input box to create or modify a RADIUS authentication server group in the pop-up box. For details, see Section 13.6.3 Configuring the RADIUS Server. |

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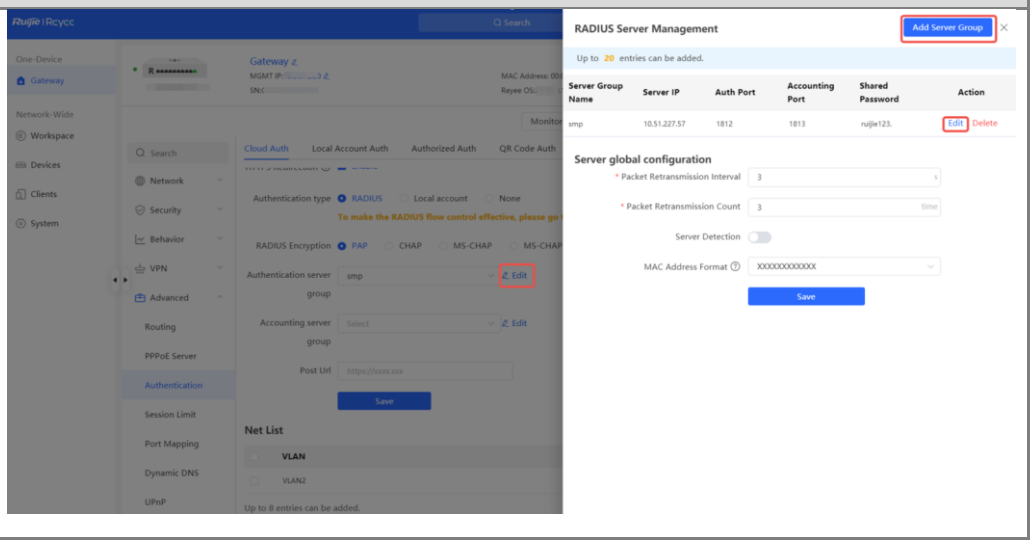
System Management

| Parameter | Description |
| --- | --- |
| |  |

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

| | |
|---|---|
| Accounting server group | Select a RADIUS accounting server group from the drop-down list box.<br>This parameter is mandatory when the **Authentication Type** is set to **RADIUS**.<br>You can click **Edit** next to the input box to create or modify a RADIUS accounting server group in the pop-up box. For details, see Section 13.6.3 Configuring the RADIUS Server. |

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System Management

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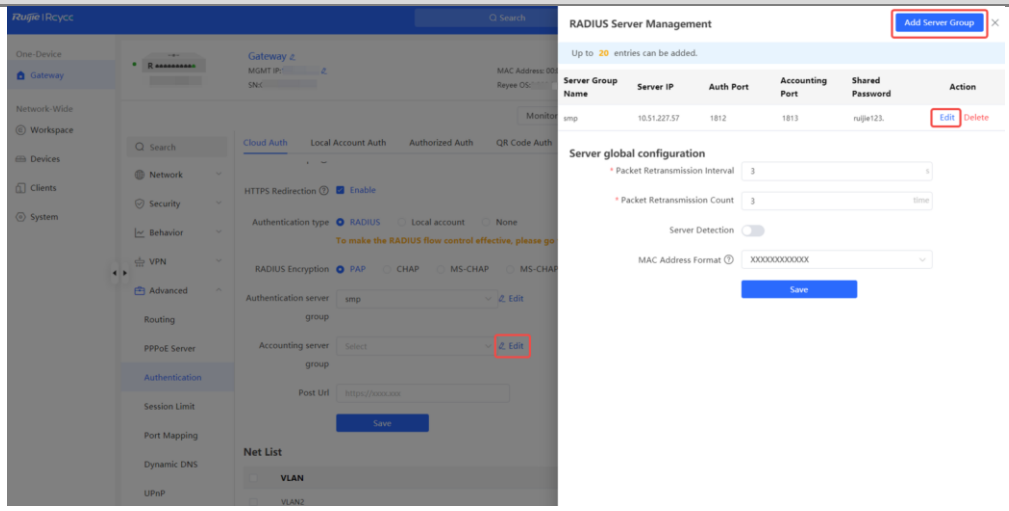
| |  |
| Post URL | The URL to which the user will be redirected after authentication. |

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System Management

| Parameter | Description |
|---|---|
| VLAN | Specify the name of a Wi-Fi network, to which clients connect. A maximum of eight VLAN names can be configured. |
| Auth IP / IP Range | Specify the IP address range to be authenticated. You can enter a single IP address (such as 192.168.112.2) or an IP address range (such as 192.168.112.2–192.168.112.254). A maximum of five IP address ranges can be configured. |

(3) (Optional) Considering the different HTTP parameters and request methods required by different third-party authentication platforms. To configure custom third-party authentication parameters, you can click **Customized Parameter** next to **Server Type** and set **Parameter template** to **Custom**.

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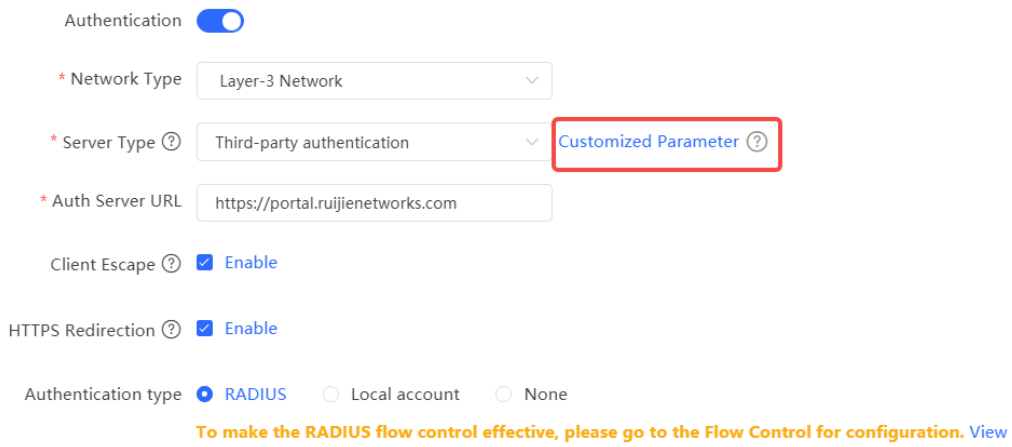
System Management



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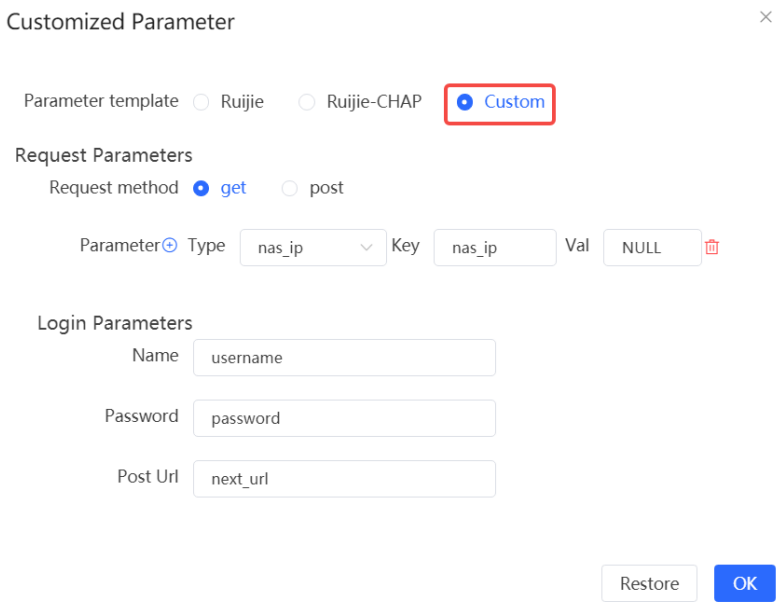
System Management



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System Management

**Table 8-3 Description of Custom Third-Party Authentication Parameters**

| Parameter | Description |
|---|---|
| Parameter template | The built-in parameter template.<br>Default parameters are used when the **Parameter Template** is set to **Ruijie** or **Ruijie-CHAP**.<br>When the **Parameter Template** is set to **Custom**, the parameters can be customized. |
| Request method | The HTTP request methods used for requesting the portal page. |

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System Management

| | |
|---|---|
| Parameter | Parameters in the parameter template for requesting the portal page:<br>● When the parameter type is not **other**, the **Val** field is invalid, and the default value **NULL** can be used. The Reyee EG gateway device will automatically populate the value of this parameter.<br>● When the parameter type is **other**, you need to enter a value in the **Val** field.<br><br>Parameters include:<br>● nas_ip: IP address of the Reyee EG series gateway device. Example: 10.52.48.7.<br>● nas_mac: MAC address of the Reyee EG series gateway device. Example: 11:22:33:44:55:66.<br>● client_ip: IP address of the wireless client to be authenticated. Example: 192.168.110.5.<br>● client_mac: MAC address of the wireless client to be authenticated. Example: 11:22:33:44:55:66.<br>● orig_url: Original URL accessed by the wireless client to be authenticated. Example: https://www.baidu.com.<br>● login_url: Login interface received by the Reyee EG series gateway device from the third-party authentication platform. Example: http://192.168.110.1:2060/ext_login. |

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System Management

| Parameter | Description |
| --- | --- |
| | ● logout_url: Logout interface received by the Reyee EG series gateway device from the third-party authentication platform. Example: http://192.168.110.1:2060/ext_logout.<br>● ssid: SSID or VLAN name associated with the wireless client to be authenticated. Example: VLAN233.<br>● sn: SN of the gateway.<br>● identity: ID of the gateway.<br>● chap_id: Identifier or session ID stored during CHAP authentication.<br>● chap_challenge: The challenge string used in the CHAP authentication process.<br>● interface_name: Name of the interface through which the wireless client accesses the network.<br>● login_host: IP address of the login interface on the Reyee EG series gateway device. Example: 192.168.110.1:2060.<br>● other: other custom field. Multiple custom fields are supported. |

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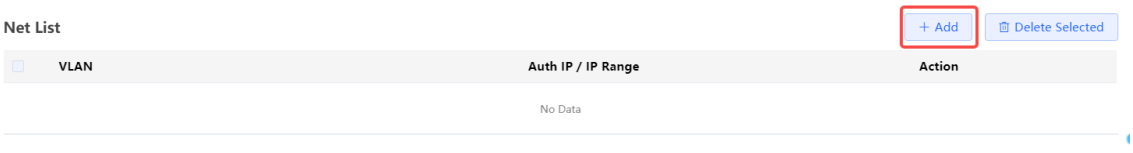
System Management

| Parameter | Description |
| --- | --- |
| Login Parameters | Custom fields of the login interface received by the Reyee EG series gateway devices from the third-party authentication platform, including:<br>● **Name**: username.<br>● **Password**: password.<br>● **Post Url**: URL to which the wireless client is redirected after successful authentication. |

(4) In the **Net List** area, click **Add**. In the displayed dialog box, enter the **VLAN** name and the **Auth IP / IP Range** to be authenticated and click **OK**.



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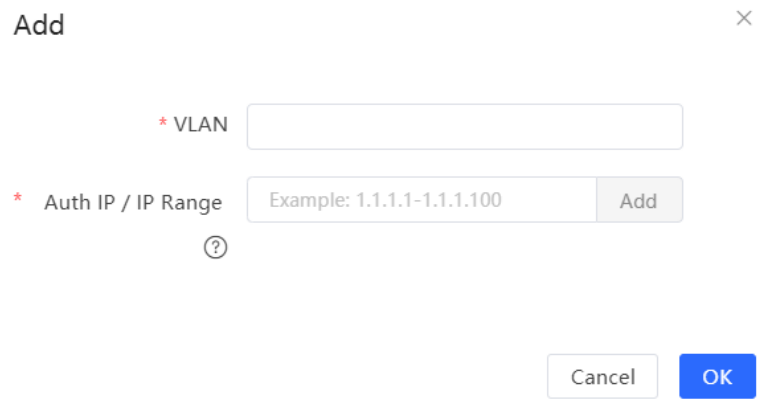


### 4. Verifying Configuration

Connect your smartphone to the specific Wi-Fi network to verify that the portal page pops up automatically.

Connect to different authentication platforms to view services provided by these authentication platforms.

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System Management

After successful connection, you can choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Online Clients** to view information about this authenticated user. For details, see Section 8.3 Online User Management.

### 8.1.5 Local Account Authentication

#### 1. Overview

The device is connected to the local authentication server, and user identity is verified based on the account and password. Local account authentication is applicable to the wireless office network environment.

#### 2. Getting Started

Ensure that the device with the authentication function enabled has been connected to the Internet. Otherwise, the authentication page does not pop up when a client associates with Wi-Fi.

#### 3. Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Local Account Auth**.

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## System Management

(1) Enable account authentication.

Turn on **Local Account Auth**, enter the IP address range of clients to be authenticated, and click **Save**. After account authentication is enabled, clients in the specified IP address range can access the Internet only after passing authentication.

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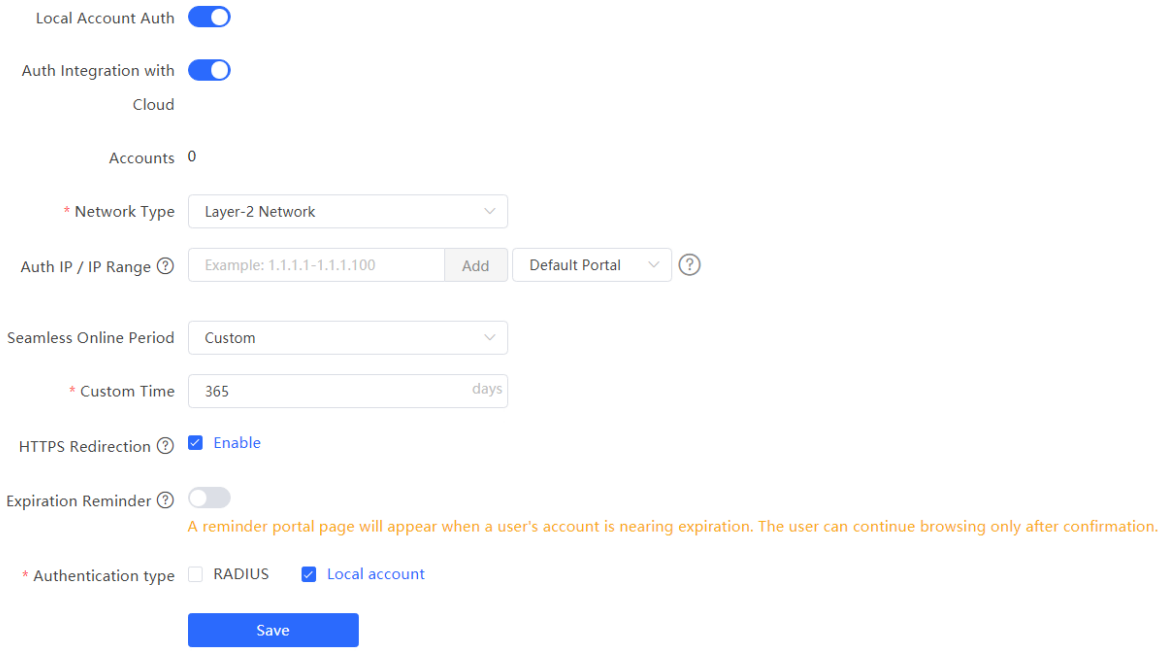
System Management



# 1 Configuration Guide SD-WAN

**Specification**

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System Management

**Table 8-4 Description of Local Account Authentication Configuration Parameters**

| Parameter | Description |
|---|---|
| **Auth Integration with Cloud** | Use the authentication service integrated in Ruijie Cloud. |
| **Accounts** | The number of created authentication accounts. |
| **Network Type** | The default value is **Layer-2 Network**. Set the parameter based on the actual network environment. |
| **Auth IP / IP Range** | Specify the IP address range to be authenticated. You can enter a single IP address (such as 192.168.112.2) or an IP address range (such as 192.168.112.2–192.168.112.254). A maximum of five IP address ranges can be configured.<br>After setting the IP address or IP address range, select the portal page for this IP address or IP address range from the drop-down list box on the right. For details about the configuration of the portal page, see Section 8.1.9 Custom Portal Page. |

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System Management

| Parameter | Description |
|---|---|
| **Seamless Online Period** | Set the validity period of seamless authentication. After a user is authenticated successfully for the first time, the user will be automatically authenticated when connecting to the Wi-Fi network within the validity period. |
| **HTTPS Redirection** | Enabling **HTTPS Redirection** ensures that data is encrypted during user authentication, thus improving the security of the authentication process.<br>When **HTTPS Redirection** is disabled, you will be redirected to HTTP pages only. |
| **Expiration Reminder** | When an account is about to expire, a reminder portal page will appear. The user can continue to access the Internet only after confirmation. |
| **Authentication type** | Types of local account authentication, which include:<br>● RADIUS: The wireless client is authenticated by the RADIUS server.<br>● Local account: The wireless client is authenticated based on local username and password. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
|---|---|
| **RADIUS Encryption** | When **Authentication Type** is set to **RADIUS**, you need to configure the encryption mode for RADIUS authentication:<br>● **RAP**: This mode has low security. Passwords are transmitted in plain text, posing a risk of interception.<br>● **CHAP**: The server sends a random CHAP challenge to the client, and the client uses the password to calculate and returns a response.<br>● **MS-CHAP**: Functions such as password change and failed attempt count are supported. This mode is more secure and flexible than CHAP.<br>● **MS-CHAP-V2**: As an improved version of MS-CHAP, this mode provides higher security and better encryption. |
| **Authentication server group** | Select a RADIUS authentication server group from the drop-down list box.<br>This parameter is mandatory when the **Authentication Type** is set to **RADIUS**.<br>You can click **Edit** next to the input box to create or modify a RADIUS authentication server group in the pop-up box. For details, see Section 13.6.3 Configuring the RADIUS Server. |

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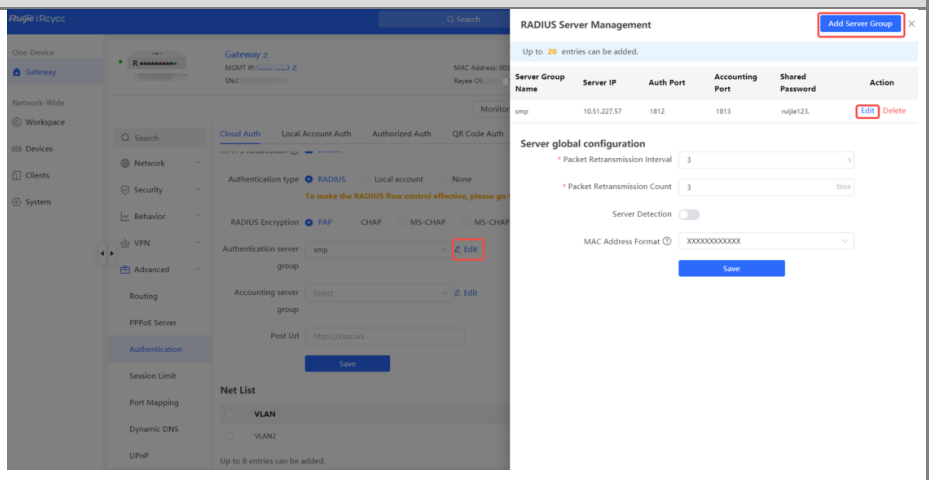
System Management

| Parameter | Description |
| --- | --- |
| |  |
| **Authentication server group** | Select a RADIUS accounting server group from the drop-down list box.<br>This parameter is mandatory when the **Authentication Type** is set to **RADIUS**. |

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System Management

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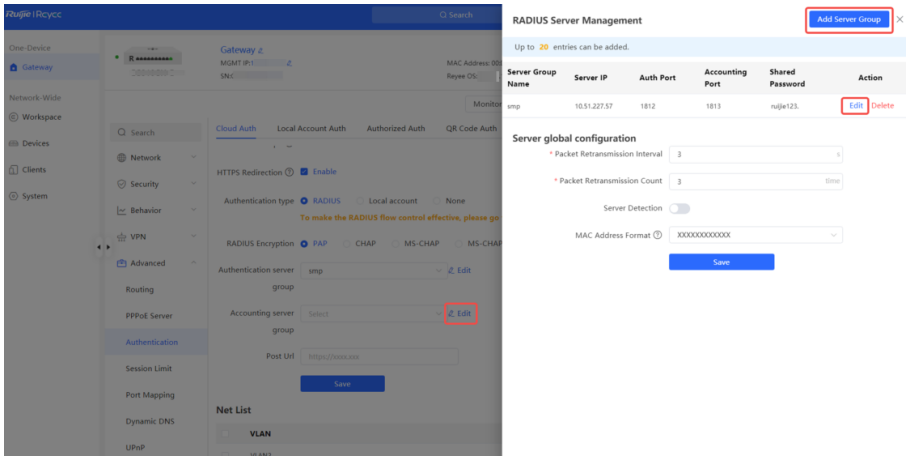
| | You can click **Edit** next to the input box to create or modify a RADIUS accounting server group in the pop-up box. For details, see Section 13.6.3 Configuring the RADIUS Server.<br> |

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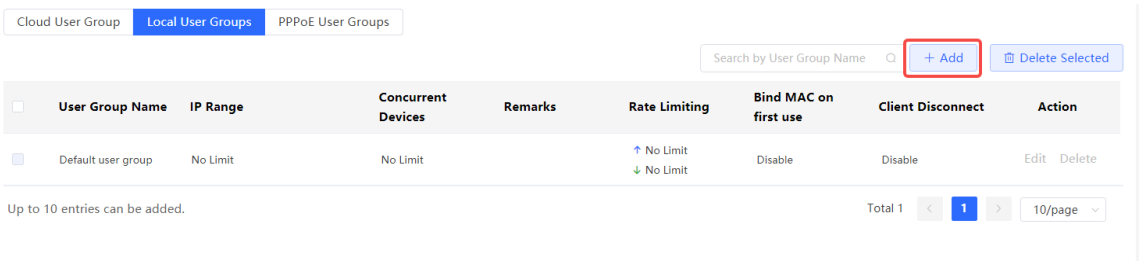
## System Management

(2) Configure local user groups.

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Account** > **User Groups**.

Configuring local user groups can limit the network segment for user authentication and Internet access rate. For example, on a campus network, you can configure different local user groups for teachers and students, which limits network segments for their authentication and isolates users.

Click the **Local User Groups** tab and click **Add** to set parameters. After the configuration is complete, the user group can be associated with a local authentication account.



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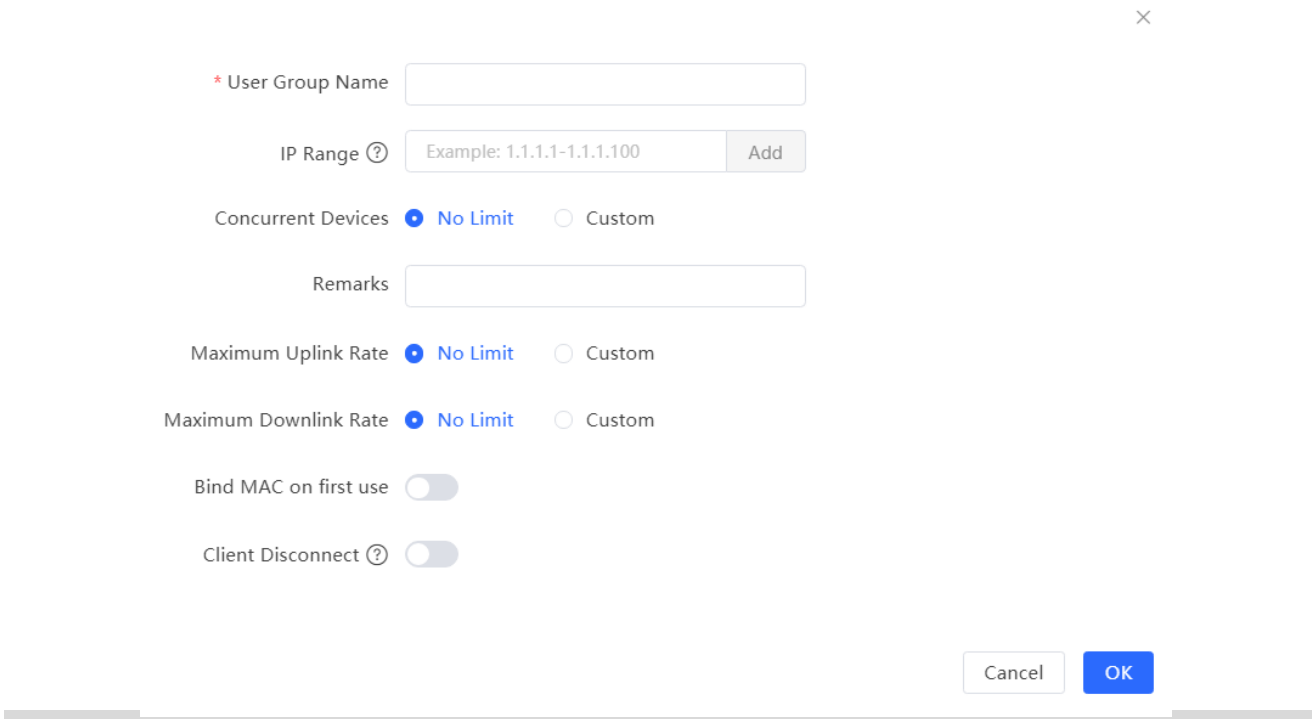
System Management



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System Management

**Table 8-5 Configuration of Local User Groups**

| Parameter | Description |
| --- | --- |
| User Group Name | Specify the name of a user group. You can associate a local user group based on the name when configuring a local authentication account. |
| IP Range | Specify the IP address segment used to limit the local account authentication. An account associated with a user group can pass Internet access authentication only when the account initiates an authentication request from the corresponding network segment. Multiple associated network segments can be configured. |

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System Management

| Parameter | Description |
| --- | --- |
| Concurrent Devices | Multiple clients can access the Internet using the same username and password. You can set the parameter to limit the maximum number of clients that can access the Internet using the account associated with a user group. You can set **Concurrent Devices** to **Custom** and enter the maximum number of allowed online clients.<br>**Caution**<br>If this parameter is also configured for an authentication account, the configuration takes effect preferentially. |
| Remarks | Enter the user group description. |
| Maximum Uplink/Downlink Rate | Configure the uplink and downlink bandwidth limits for users associated with the user group. |
| Bind MAC on first use | After this parameter is toggled on and a client logs in for the first time, the local authentication server records the MAC address of the client. |

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System Management

| Parameter | Description |
| --- | --- |
| Client Disconnection | When the number of online clients using an account associated with a user group exceeds the configured **Concurrent Devices**, new clients cannot be onboarded. After the parameter is toggled on, new clients can choose to disconnect other clients, thereby gaining access to the Internet.<br>You are advised not to toggle on the parameter when **Bind MAC on first use** is toggled on. Otherwise, the bound MAC address may become invalid. |

(3) Configure an authentication account.

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Account** > **Accounts**.

Click the **Local Authentication Accounts** tab, and click **Add** to create a local account for web-based authentication. Set **Username** and **Password**. Multiple devices can access the Internet using the same username and password. You can set **Concurrent Users** to configure the maximum number of users who

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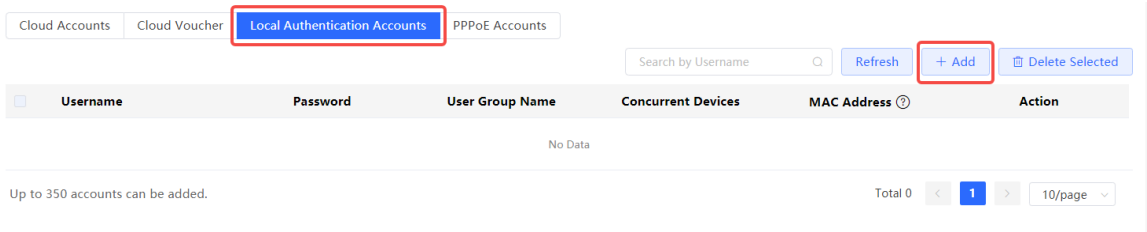

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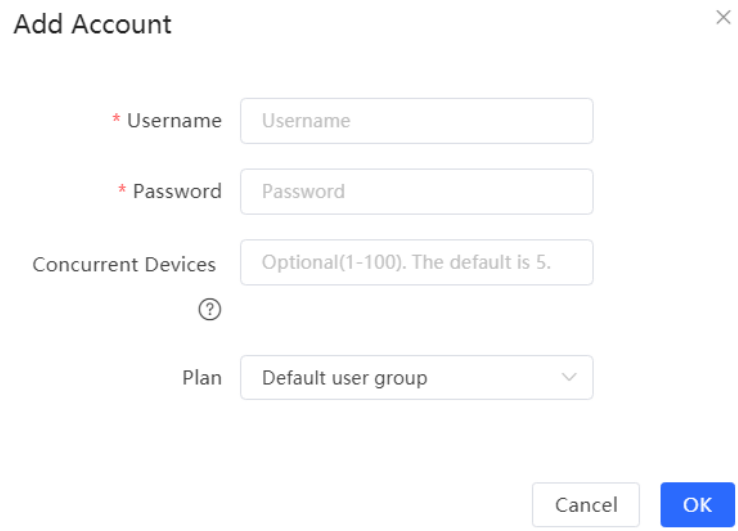


Click **Cloud Accounts** or **Cloud Voucher** to view the account and voucher information synchronized from Ruijie Cloud.

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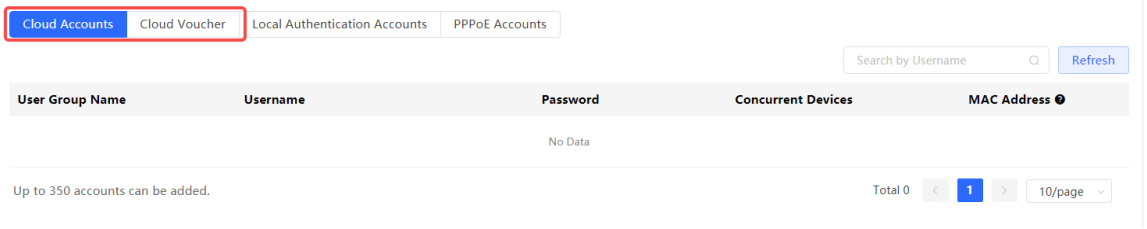
System Management




(4) Disconnect an online user.

When the number of concurrent users in a single account exceeds the limit, a prompt will appear when a new user attempts to connect. You can then choose to disconnect a specific user by clicking the Kick off button. After re-logging in, the user can access the network.

# 1 Configuration Guide SD-WAN

**Specification**

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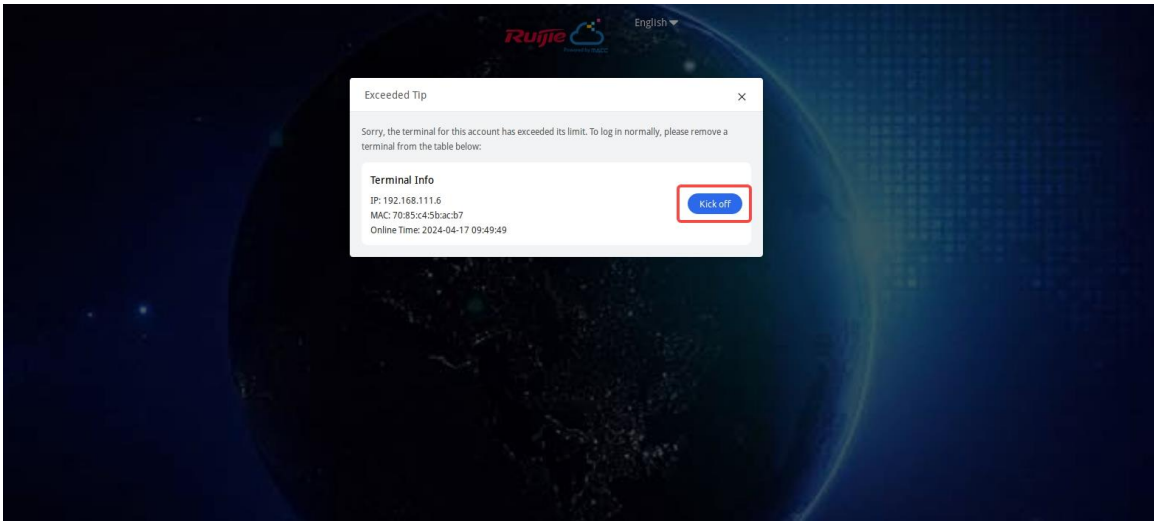
System Management




### 4. Verifying Configuration

After a client connects to the specific Wi-Fi, the authentication page pops up automatically. The user can normally access the Internet only after entering the account and password configured on the local server on the

# 1 Configuration Guide SD-WAN

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authentication page. You can choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Authentication** > **Online Clients** to view information about the successfully connected user. For details, see Section 8.3 Online User Management.

### 8.1.6 Authorized Guest Authentication

#### 1. Overview

The device is connected to the local authentication server. After a guest connects to Wi-Fi, the guest can access the Internet after the specified authorization IP user or account and password authentication user scans the QR code that pops up for guest authentication. For example, in the wireless office network, users in the employee network segment are authorized to scan the guest authentication QR code for users in the guest network segment.

#### 2. Getting Started

Ensure that the device with the authentication function enabled has been connected to the Internet. Otherwise, the authentication page does not pop up when a client associates with Wi-Fi.

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System Management

### 3. Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Authorized Auth**.

Turn on **Authorized Auth**, configure **Popup Message**, **Auth IP / IP Range**, **Authorization IP/IP Range**, **Limit Online Duration**, **HTTPS Redirection**, and click **Save**.

# 1 Configuration Guide SD-WAN

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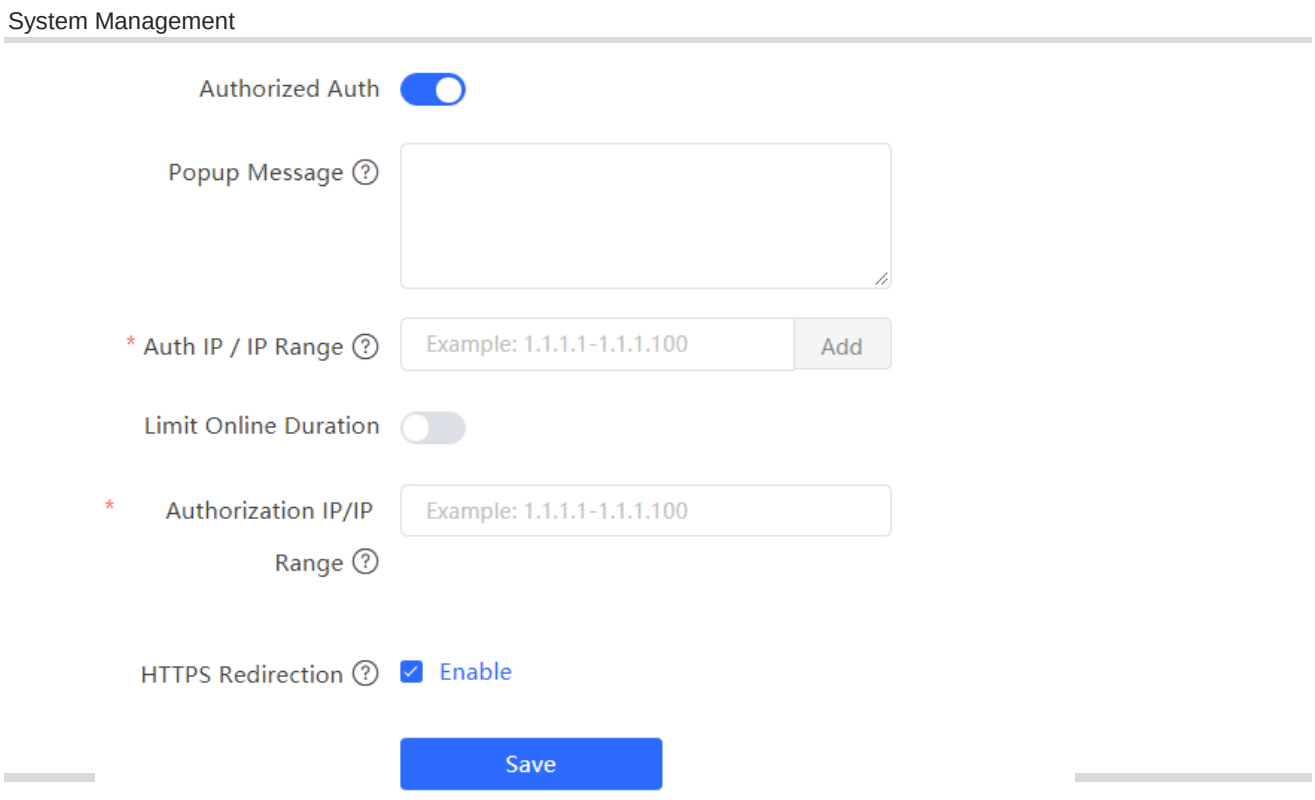

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System Management

**Table 8-6 Authorized guest authentication configuration**

| Parameter | Description |
|---|---|
| **Popup Message** | Specify the text to be displayed on the pop-up QR code page. |
| **Auth IP / IP Range** | Specify the IP address range for users to be authenticated. The value can be a single IP address (such as 192.168.110.2) or an IP address range (such as 192.168.110.2-192.168.110.254). Users in the specified IP address range can access the Internet only after passing authentication. |

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System Management

| Parameter | Description |
| --- | --- |
| **Limit Online Duration** | Specify whether to limit the online duration of guests. After you enable this function, you need to configure **Duration Limit**. If the online duration of a guest exceeds the specified value, the guest can continue Internet access only after re-authorization. By default, this function is disabled, indicating that guests can use Wi-Fi without limit on the online duration. |
| **Duration Limit** | Specify the maximum online duration of authorized guests. If the online duration of an authorized guest exceeds the specified value, the guest goes offline automatically and needs to be re-authorized for login again. |
| **Authorization IP/IP Range** | Specify the IP address range of authorization users. Users in this range can scan the QR code to authorize guests. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| **HTTPS Redirection** | Enabling HTTPS redirection ensures that user data transmission during the authentication process is encrypted, thereby enhancing the security of the authentication process. When HTTPS redirection is disabled, authentication requests can only be sent to HTTP pages. |

### 4. Verifying Configuration

After a guest connects to Wi-Fi, the QR code authentication page pops up. The guest can access the Internet after the specified authorization user scans this QR code. You can choose **One-Device** > **Gateway** > **Config** > After successful connection, you can choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Online Clients** to view information about this authenticated user. For details, see Section 8.3 Online User Management.

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## 8.1.7 Guest Authentication through QR Code Scanning

### 1. Overview

Guests scan the specified QR code to access the Internet. For example, in the wireless office network, guests scan the pasted QR code to access the Internet after they connect to Wi-Fi.

### 2. Getting Started

Ensure that the device with the authentication function enabled has been connected to the Internet. Otherwise, the authentication page does not pop up when a client associates with Wi-Fi.

### 3. Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **QR Code Auth**.

Turn on **QR Code Auth**, configure **Auth IP / IP Range**, **Limit Online Duration**, and **QR Code Generator**, and click **Save**.

# 1 Configuration Guide SD-WAN

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System Management

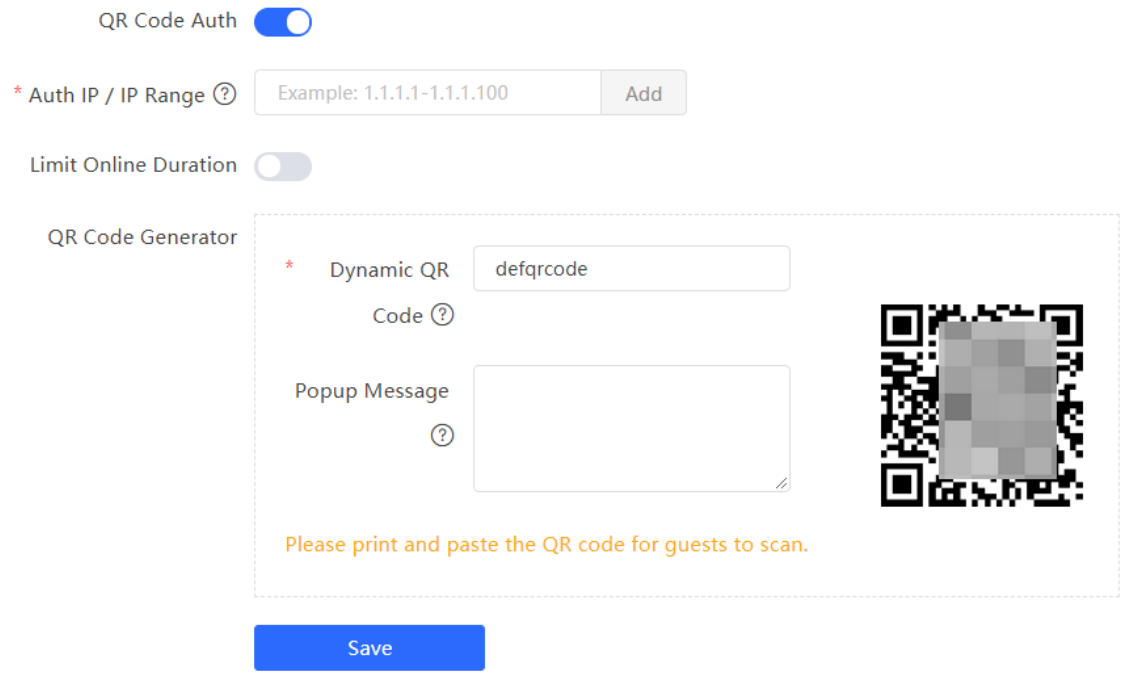

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**Table 8-7 Guest authentication through QR code scanning configuration**

| Parameter | Description |
| --- | --- |
| Auth IP / IP Range | Specify the IP address range for users to be authenticated. The value can be a single IP address (such as 192.168.110.2) or an IP address range (such as 192.168.110.2-192.168.110.254). Users in the specified IP address range can access the Internet only after passing authentication. |
| Limit Online Duration | Specify whether to limit the online duration of guests. After you enable this function, you need to configure **Duration Limit**. If the online duration of a guest exceeds the specified value, the guest needs to scan the QR code again before continuing Internet access. By default, this function is disabled, indicating that guests can use Wi-Fi without limit on the online duration. |

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System Management

| Parameter | Description |
|---|---|
| Duration Limit | Specify the maximum online duration of authorized guests. If the online duration of an authorized guest exceeds the specified value, the guest goes offline automatically and needs to be re-authenticated. |
| Dynamic QR Code | The dynamic QR code is used to generate a QR code image. After the dynamic QR code is updated, the QR code image changes and the previous image becomes invalid.<br>You can print and paste the generated QR code image, which can be scanned by guests to access the Internet. |
| Popup Message | Specify the QR code prompt message displayed on the page after a guest scans the QR code. |

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#### 4. Verifying Configuration

After a client connects to Wi-Fi, the guest can scan the QR code to pass authentication and access the Internet. You can choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Online Clients** to view information about the successfully connected user. For details, see Section 8.3 Online User Management.

### 8.1.8 Authentication-Free

#### 1. Overview

After IP addresses or MAC addresses are configured for authentication-free users, they can directly access the Internet without passing authentication. Traffic from all the users in the blocklist is blocked.

#### 2. Configuring an Authentication-Free Intranet User

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Allowlist**.

**Intranet User Allowlist:** Users in the specified IP address range can directly access the Internet without passing authentication.

# 1 Configuration Guide SD-WAN

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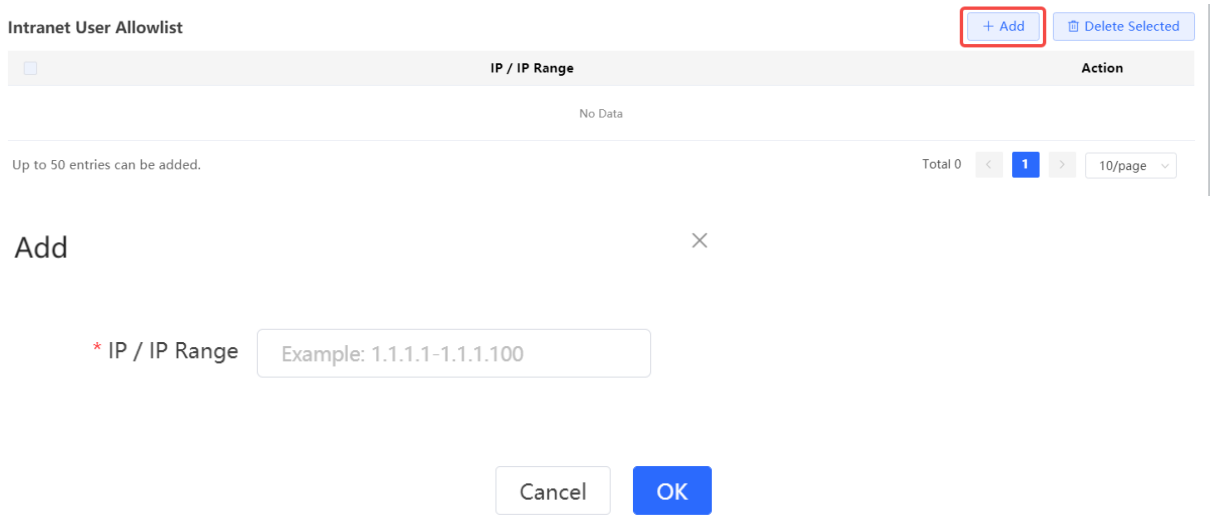
System Management

Click **Add** to configure the IP address range for authentication-free users. The value can be a single IP address (such as 192.168.110.2) or an IP address range (such as 192.168.110.2-192.168.110.254). A maximum of 50 entries are supported.



# 1 Configuration Guide SD-WAN

**Specification**

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Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
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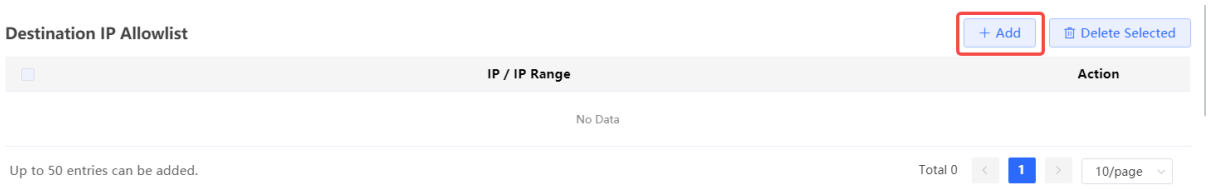
### 3. Configuring Destination IP Addresses for Authentication-Free

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Allowlist**.

**Destination IP Allowlist:** Specify the IP addresses that can be assessed by all users including unauthenticated users.

Click **Add** to configure extranet IP addresses that can be assessed by users without authentication. A maximum of 50 entries are supported.



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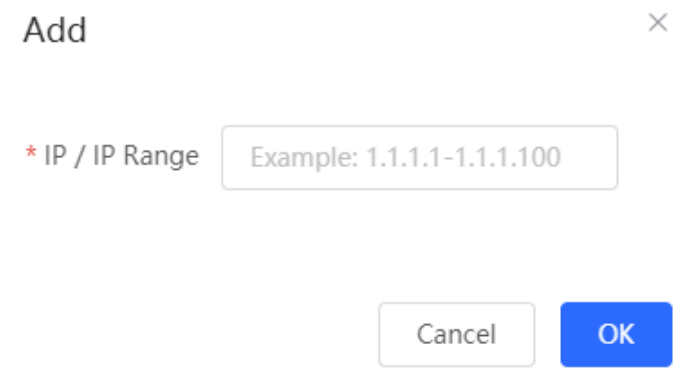


**4. Configuring a Domain Allowlist**

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Authentication** > **Allowlist** > **Domain Allowlist**.

**Domain Allowlist:** Specify the URLs that can be accessed without authentication.

# 1 Configuration Guide SD-WAN

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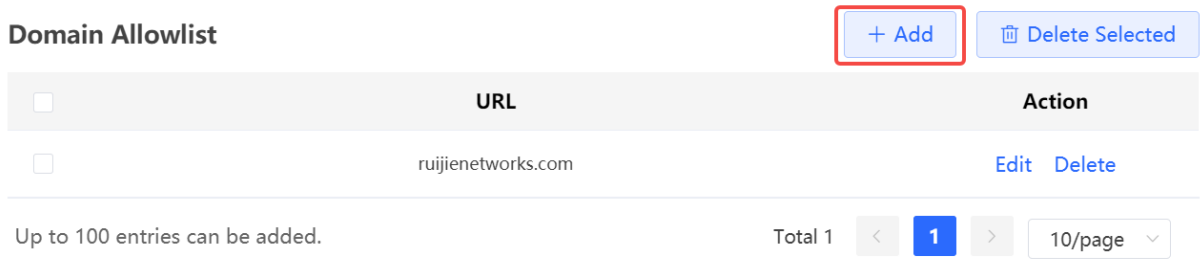
System Management

Click **Add**. In the dialog box that appears, enter the authentication-free URLs, and then click OK. When the destination URL of the user is in the **Domain Allowlist** traffic from the user will be permitted directly, regardless of whether the user passes authentication. A maximum of 100 entries are supported.



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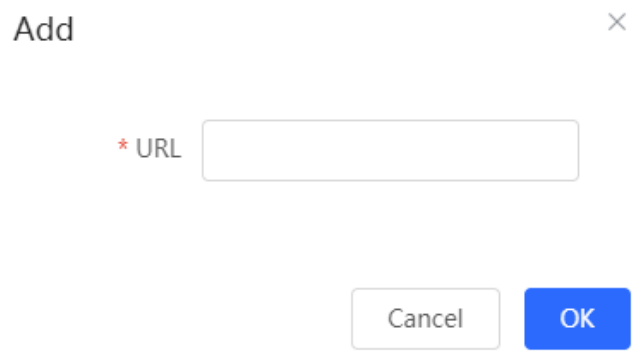


### 5. Configuring a User MAC Allowlist

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Authentication** > **Allowlist > MAC Allowlist.**

MAC **Allowlist**: Clients whose MAC addresses are in the **Allowlist** can access the Internet through Wi-Fi without the need for authentication.

# 1 Configuration Guide SD-WAN

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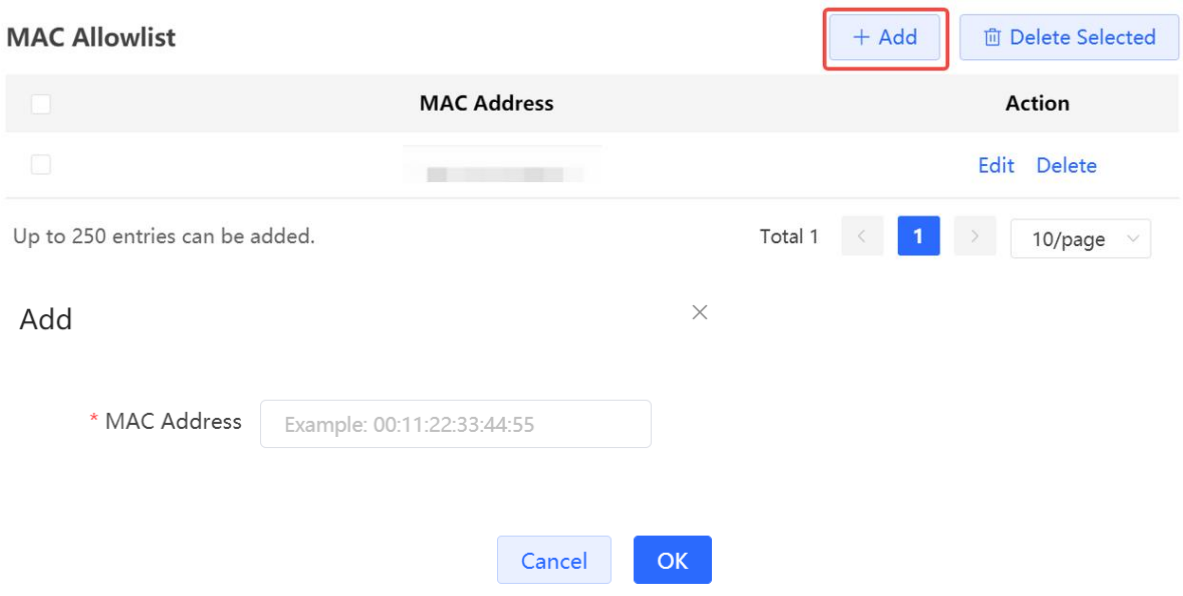
Click **Add**. In the dialog box that appears, enter the MAC addresses of authentication-free users, and then click **OK**. A maximum of 250 entries are supported.



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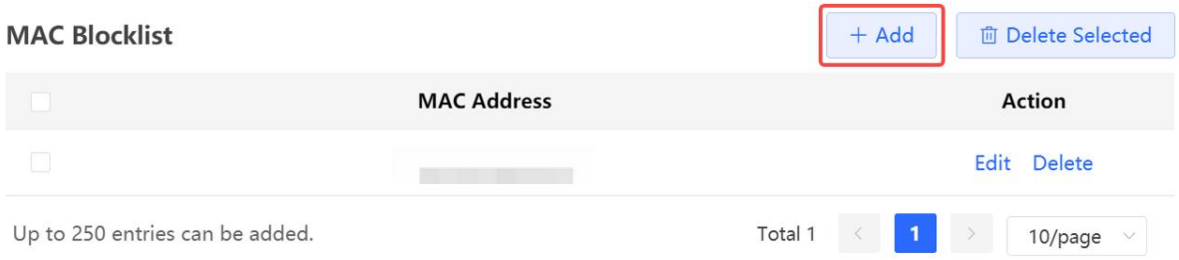
### 6. Configuring a User MAC Blocklist

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **Authentication** > **Allowlist > MAC Blocklist**.

User MAC Blocklist Clients whose MAC addresses are in the blocklist are prohibited from accessing the Internet.

Click **Add**. In the dialog box that appears, enter the MAC addresses of users in the blocklist, and then click **OK**. A maximum of 250 entries are supported.



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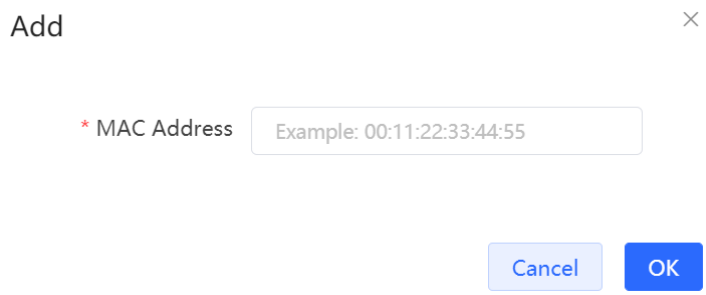


## 8.1.9 Custom Portal Page

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Customized Portal**.

**1. Customized Portal**

(1) On the **Customized Portal** page, click **Add**.

# 1 Configuration Guide SD-WAN

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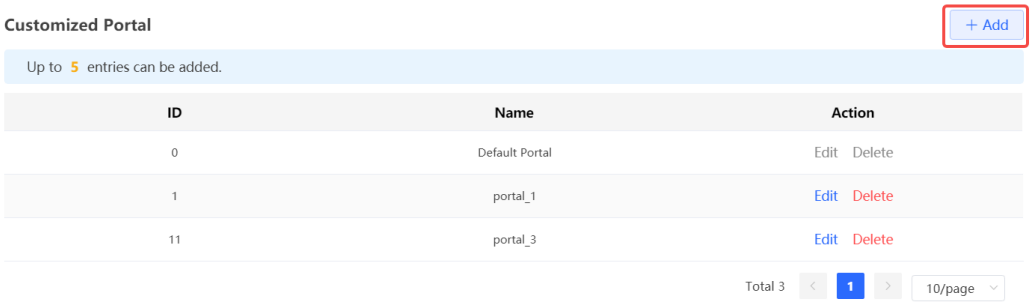
System Management




(2) Enter the portal page name and customize its content. The preview page will update in real-time as you enter the values.

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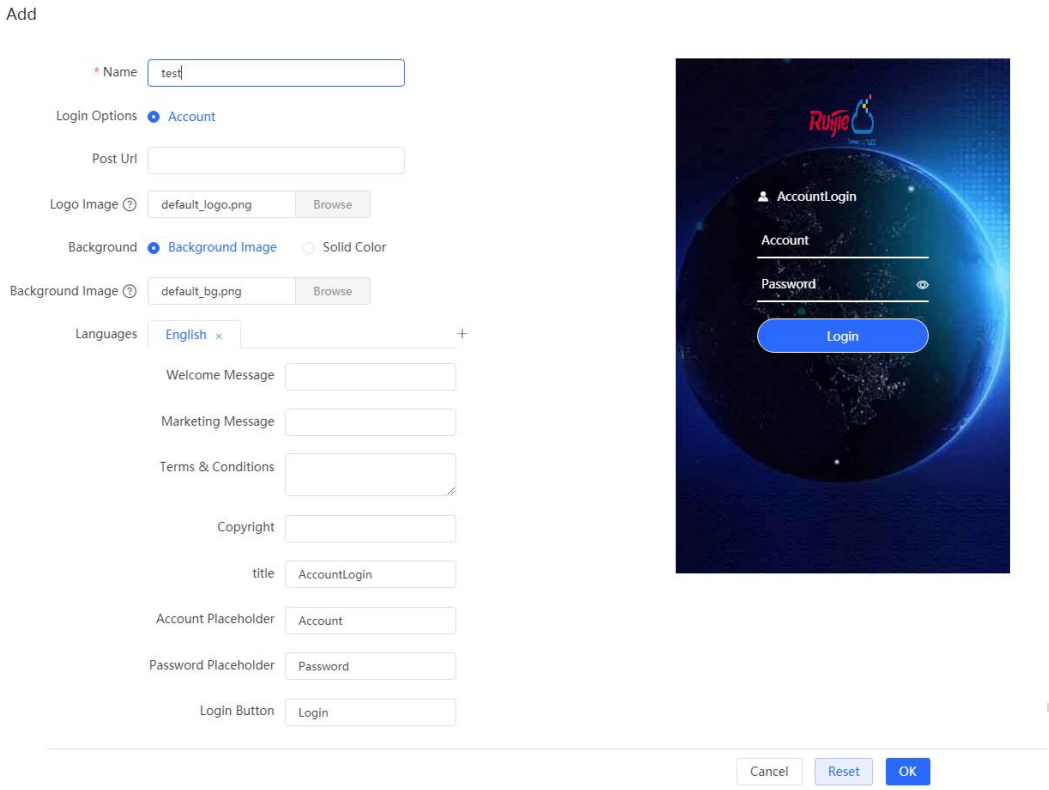
System Management



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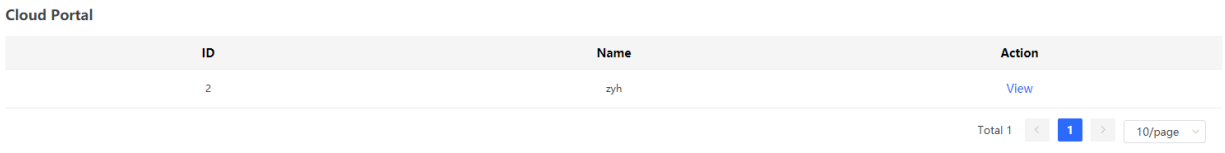
(3) Click **OK**.

**2. Cloud Portal**

In the **Cloud Portal** pane, the portal page configured in Ruijie Cloud is displayed. Click **View** to preview the page content.




## 8.1.10 Global Configuration

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Web Authentication** > **Global Config**.

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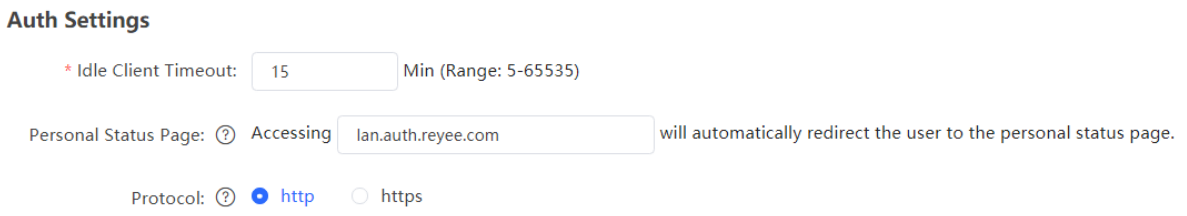
System Management

### 1. Authentication Configuration

You can configure the timeout period for an idle client. The default value is 15 minutes. If no traffic from an online user passes through the device within the specified period, the device will log out the user. The user can continue Internet access only after re-authentication.

You can set **Personal Status Page** to a domain name and **Protocol** to **http** or **https**. When a user accesses the domain name, you can view the online client information using the current account, including the IP address, MAC address, and uplink and downlink traffic of the client.



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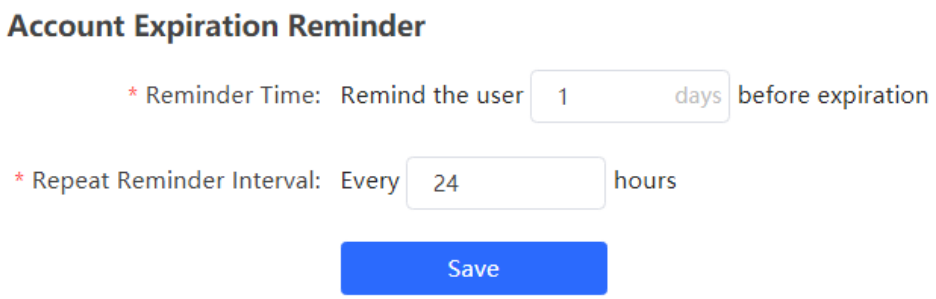
### 2. Account Expiration Reminder Settings

If a web-based authentication account is associated with a user group, you can configure the expiration reminder. The system will remind the user of renewal when the account is about to expire.



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## 8.2 Configuring the PPPoE Server

### 8.2.1 Overview

Point-to-Point Protocol over Ethernet (PPPoE) is a network tunneling protocol that encapsulates PPP frames inside Ethernet frames. When the router functions as a PPPoE server, it provides the access service to LAN users and supports bandwidth management.

### 8.2.2 Global Settings

Choose **One-Device > Gateway > Config > Authentication > PPPoE Server > Global Settings**.

Set **PPPoE Server** to **Enable** and configure PPPoE server parameters.

# 1 Configuration Guide SD-WAN

**Specification**

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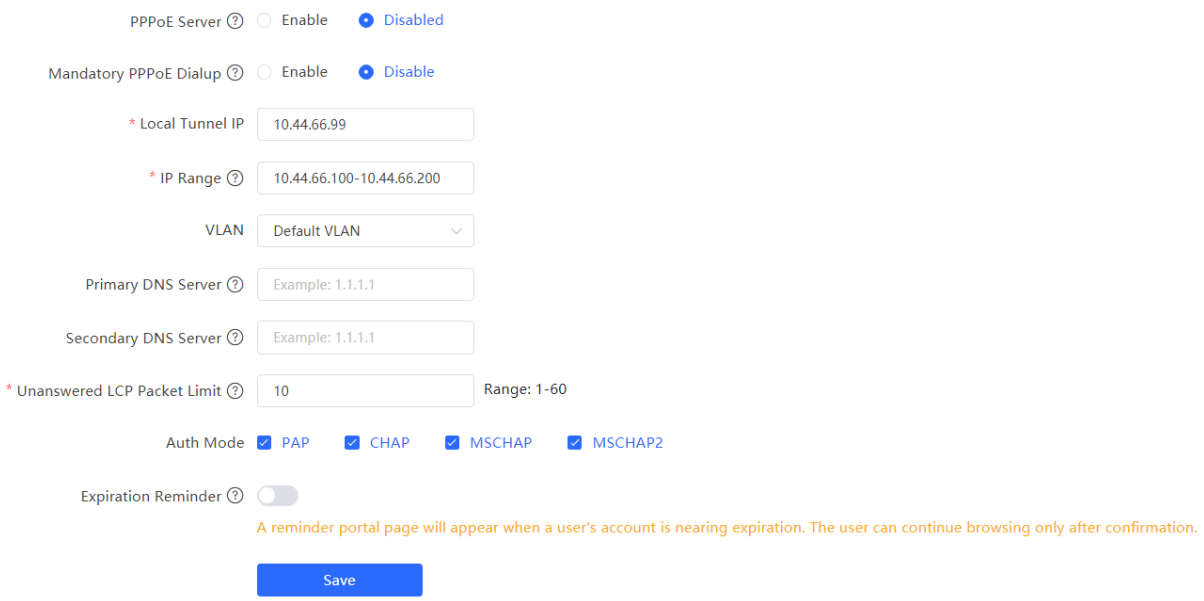
System Management



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System Management

**Table 8-8 PPPoE server configuration**

| Parameter | Description |
|---|---|
| PPPoE Server | Specify whether to enable the PPPoE server function. |
| Mandatory PPPoE Dialup | Specify whether LAN users must access the Internet through dialing. |
| Local Tunnel IP | Set the point-to-point address of the PPPoE server. |
| IP Range | Specify the IP address range that can be allocated by the PPPoE server to authenticated users. |
| VLAN | Set the VLAN of the current PPPoE server. |
| Primary/Secondary DNS Server | Specify the DNS server address delivered to authenticated users. |

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System Management

| Parameter | Description |
| --- | --- |
| Unanswered LCP Packet Limit | When the number of LCP packets not answered in one link exceeds the specified value, the PPPoE server automatically disconnects the link. |
| Auth Mode | Select at least one authentication mode from the following: PAP, CHAP, MSCHAP, and MSCHAP2. |
| Expiration Reminder | When an account is about to expire, a reminder portal page will appear. The user can continue to access the Internet only after confirmation. |

### 8.2.3 Configuring the PPPoE User Groups

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Account** > **User Groups**.

# 1 Configuration Guide SD-WAN

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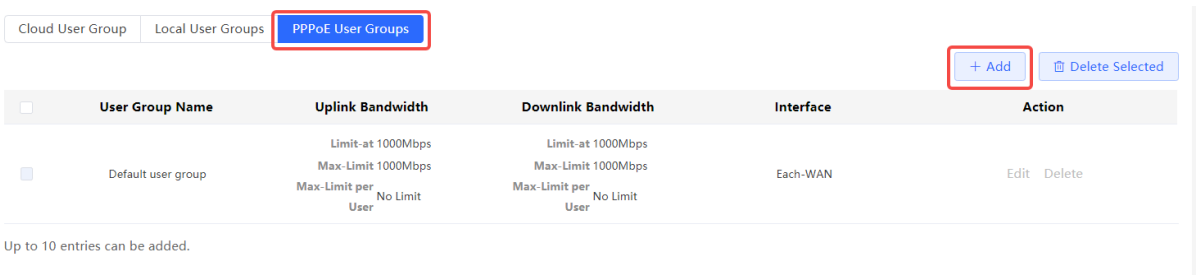
## System Management

If smart flow control is disabled, the configuration of the PPPoE user groups does not take effect. Before you configure a PPPoE user group, enable smart flow control first. For details on how to set smart flow control, see Section 9.6.2 Smart QoS.

Click the **PPPoE User Groups** tab and click **Add** to create a PPPoE user group. The currently created user groups for flow control are displayed in the user group list. You can modify or delete the user groups.



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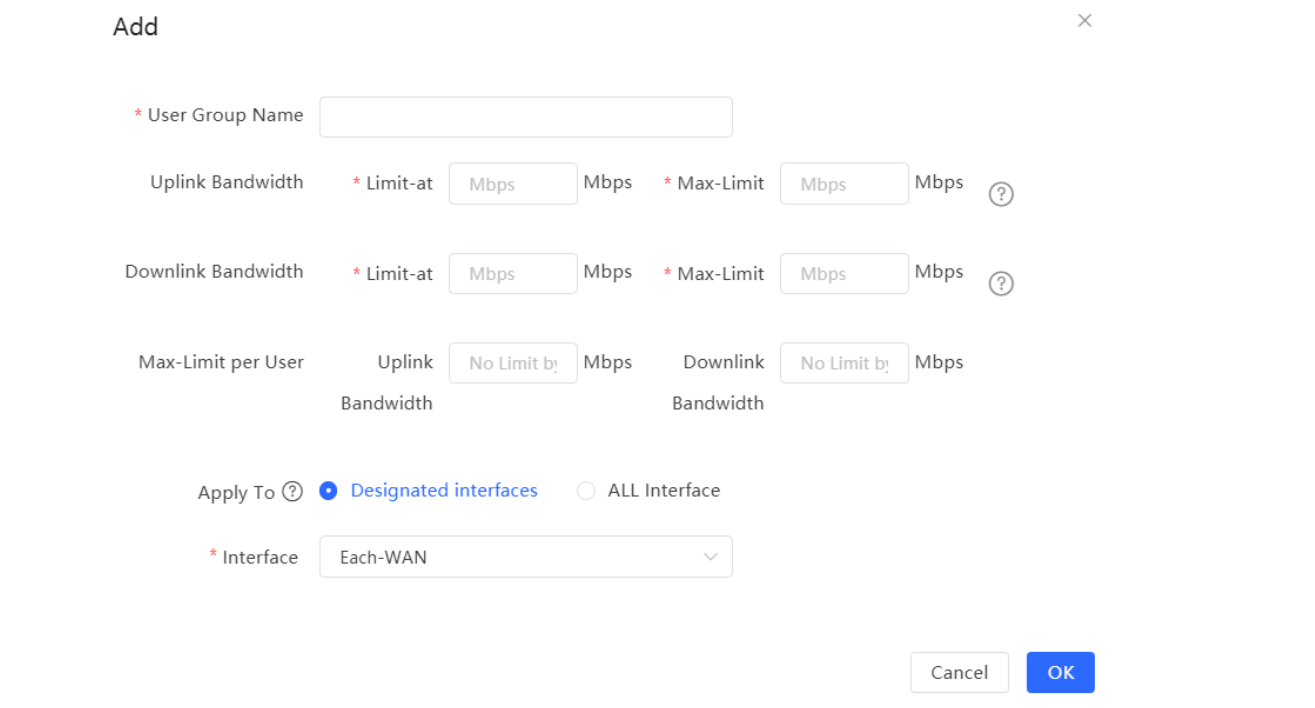
System Management



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System Management

**Table 8-9 PPPoE User Group Configuration**

| Parameter | Description |
|---|---|
| User Group Name | Set the name of a user group. When you configure an authentication account, you can select a user group based on the name. |
| Uplink Bandwidth | The following uplink bandwidth options can be configured, all measured in Mbps.<br>● Limit-at: Guaranteed available uplink bandwidth for authenticated users when bandwidth resources are limited.<br>● Max-Limit: Maximum available uplink bandwidth for authenticated users when bandwidth resources are sufficient.<br>● Max-Limit per User: Maximum available uplink bandwidth for each user. This parameter is optional and the default value is no limit. |

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System Management

| Parameter | Description |
| --- | --- |
| Downlink Bandwidth | The following downlink bandwidth options can be configured, all measured in Mbps.<br>● Limit-at: Guaranteed available downlink bandwidth for authenticated users when bandwidth resources are limited.<br>● Max-Limit: Maximum available downlink bandwidth for authenticated users when bandwidth resources are sufficient.<br>● Max-Limit per User: Maximum available downlink bandwidth for each user. This parameter is optional and the default value is no limit. |
| Apply To | ● Designated interfaces: You need to select a specified interface or interfaces. Assume that a device has three outbound interfaces, if each user is allowed to use up to 10 Mbps upstream bandwidth and **Interface** is set to **Each-WAN**, the bandwidth is limited to 10 Mbps per WAN port and a maximum of 30 Mbps bandwidth is available to the user.<br>● ALL Interface: The flow control policy applies to the entire device. Regardless of the number of WAN ports on the device, the maximum bandwidths available to each user are the values specified in the **Max-Limit per User** fields. |

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System Management

| Parameter | Description |
| --- | --- |
| Interface | Specify the interface to which the user group applies. |

## 8.2.4 Configuring a PPPoE User Account

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Account** > **Accounts**.

Click the **PPPoE Accounts** tab. Click **Add** to create a PPPoE authentication user account. The currently created PPPoE authentication user accounts are displayed in the **Account List** section. Find the target account and click **Edit** to modify the account information. Find the target account and click **Delete** to delete the account.

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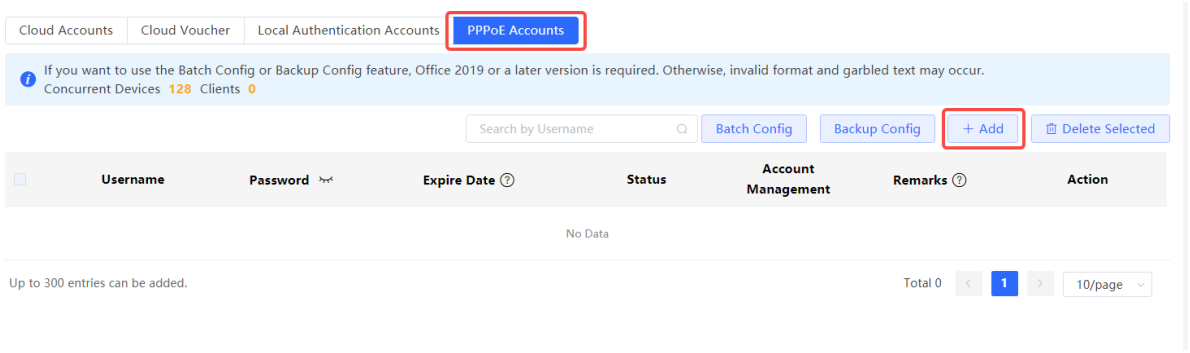

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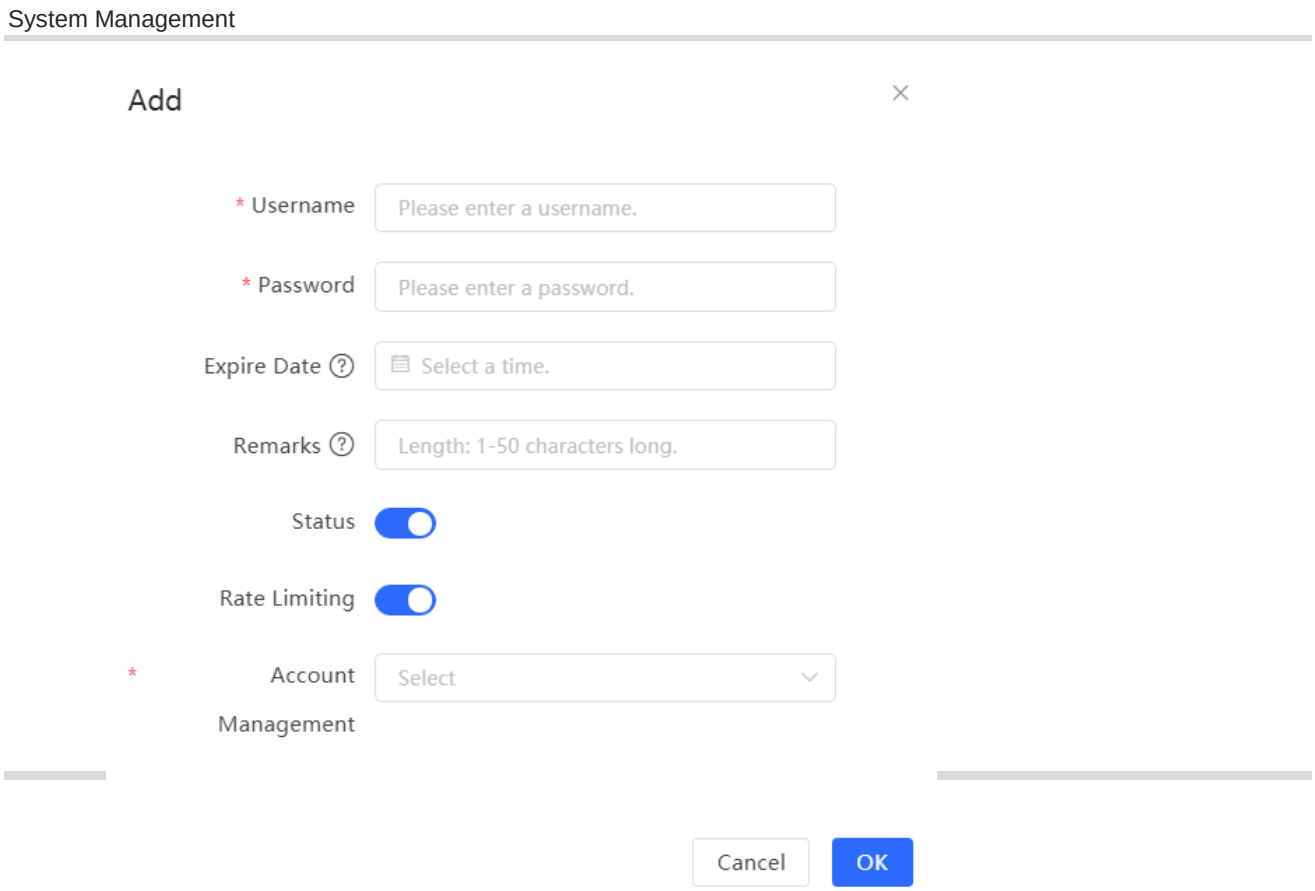

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System Management

**Table 8-10 PPPoE user account configuration**

| Parameter | Description |
|---|---|
| Username/Password | Set the username and password of the authentication account for Internet access through PPPoE dialing. |
| Expire Date | Set the expiration date of the authentication account. After the account expires, it can no longer be used for Internet access through PPPoE authentication. |
| Remark | Enter the account description. |
| Status | Specify whether to enable this user account. If the account is disabled, the account is invalid and cannot be used for Internet access through PPPoE authentication. |

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| Parameter | Description |
|---|---|
| Rate Limiting | Specify whether to apply flow control on the account. If flow control is enabled, you need to configure flow control policies for the PPPoE authentication user. If smart flow control is disabled, Rate Limiting must be turned off. To turn on Rate Limiting, enable smart flow control first. |
| Account Management | After **Rate Limiting** is toggled on, you need to associate a PPPoE user group with the current account to restrict the user bandwidth according to the user group. For details about the configuration of a PPPoE user group, see Section 8.2.3 Configuring the PPPoE User Groups. |

## 8.2.5 Configuring Exceptional IP Addresses

Choose **One-Device** > **Gateway** > **Config** > **Advanced** > **PPPoE Server** > **Exceptional IP Address**.

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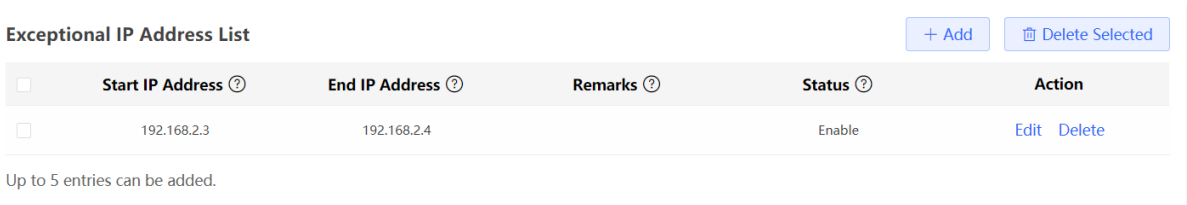
## System Management

When the PPPoE server is enabled, if you want to allow some IP addresses in a specific VLAN to access the Internet without passing account and password authentication, you can configure these IP addresses as exceptional IP addresses.

The currently created exceptional IP addresses are displayed in the **Exceptional IP Address List** section. Click **Edit** to modify the exceptional IP address. Click **Delete** to delete the exceptional IP address.



# 1 Configuration Guide SD-WAN

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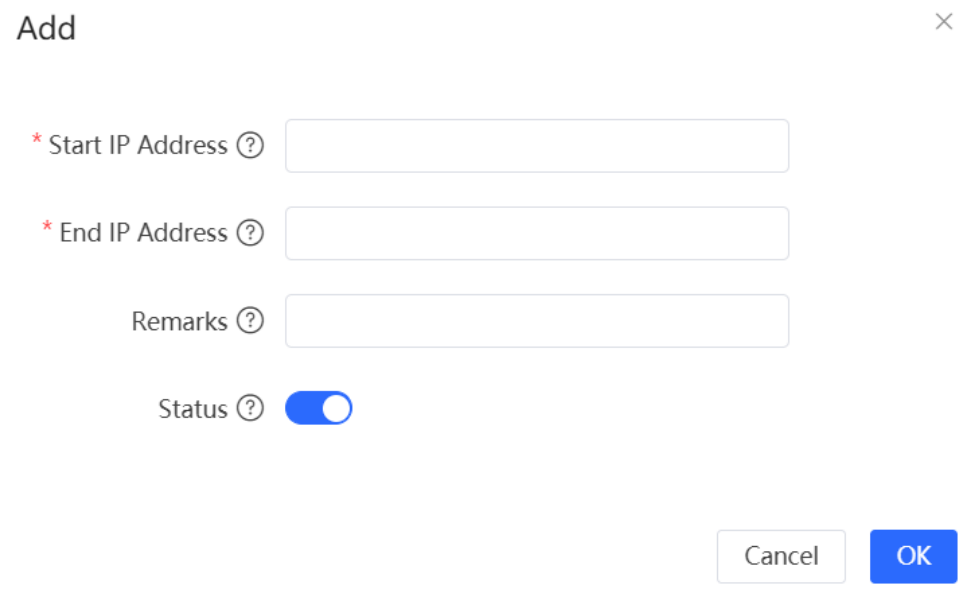


- **Start IP Address/End IP Address**: Start and end of exceptional IP addresses.
- **Remark**: Description of an exceptional IP address.

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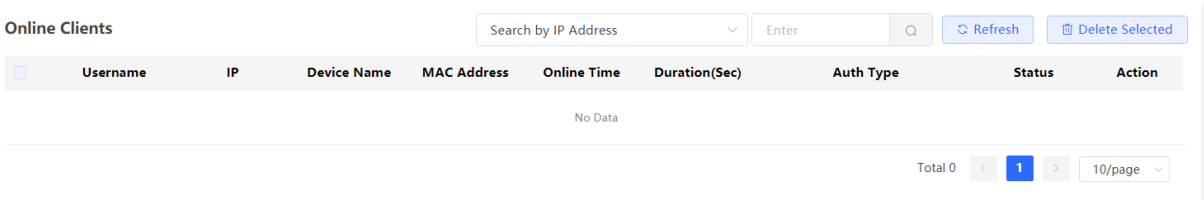
- **Status**: Whether the exceptional IP address is effective.

## 8.3 Online User Management

Choose **One-Device** > **Gateway** > **Config** > **Authentication** > **Online Clients**.

The online client list displays information about all the current online clients, including the client IP addresses, client MAC addresses, login time, and authentication modes. You can locate a client based on the IP address, MAC address, or username.



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# 9 Online Behavior Management

## 9.1 Overview

Online behavior management aims to block or prohibit specific Internet access behaviors of LAN users. Online behavior management functions are classified into five categories: app control, website filtering, QQ management, flow control, and access control. The effective range of each behavior management policy is flexibly controlled by the specified client IP address and effective time.

## 9.2 User Management

### 9.2.1 Overview

The management policy of online behavior needs to flexibly match with specific user groups. Please manage and classify users before the behavior management policy is configured, ensuring efficient configuration and

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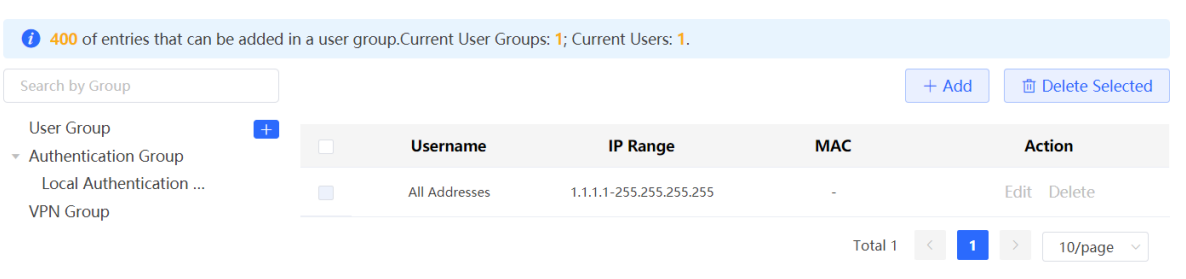
management. User management is used to maintain user information based on IP addresses. When managing online behaviors, you can limit the effective scope of application blocking, traffic auditing, flow control and other services by specifying created or authenticated users.

A user group contains three default root user groups: user group, authentication group, and VPN user group.

You can create and configure users and user groups in a user group.



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**Note**

- The system creates a VPN user group by default. The VPN accounts added in the system are automatically added to a VPN user group. You can select a VPN user group to control VPN accounts when you create a policy of application control, network management or flow control.
- The RG-EG710XS, RG-EG406XS and RG-EG406XS-P contain four default root user groups: user group, authentication group, client group, and VPN user group.

## 9.2.2 User Group

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **User Management**.

You can add new user groups or users below the first-level user group. Up to three levels of grouping is supported. If a user is a leaf node, no users or user groups can be created below this leaf node. A created user group can be used as a configuration item in a behavior management policy and is directly referenced by the user group name.

**All Addresses** client exists in the user group list by default. The IP range is from 1.1.1.1 to 255.255.255.255. This client cannot be edited or deleted.

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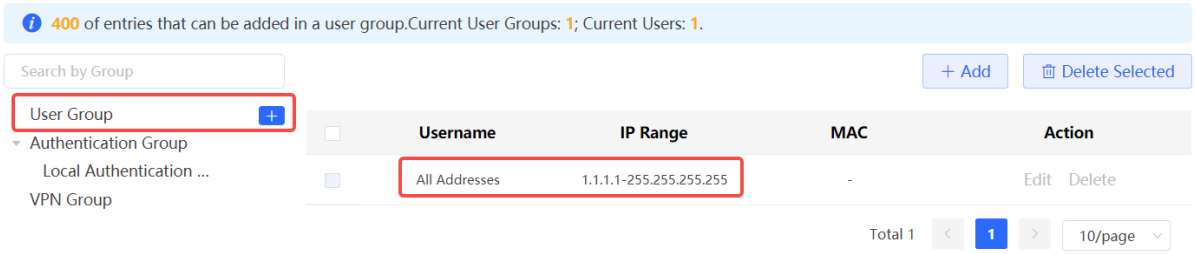
System Management




### 1. Creating a User Group

Click + near **User Group** or click **Add** at the upper right of the page. Select the type of **User Group** and enter the group name, and click **OK**. You can create a sub-user group below this user group.

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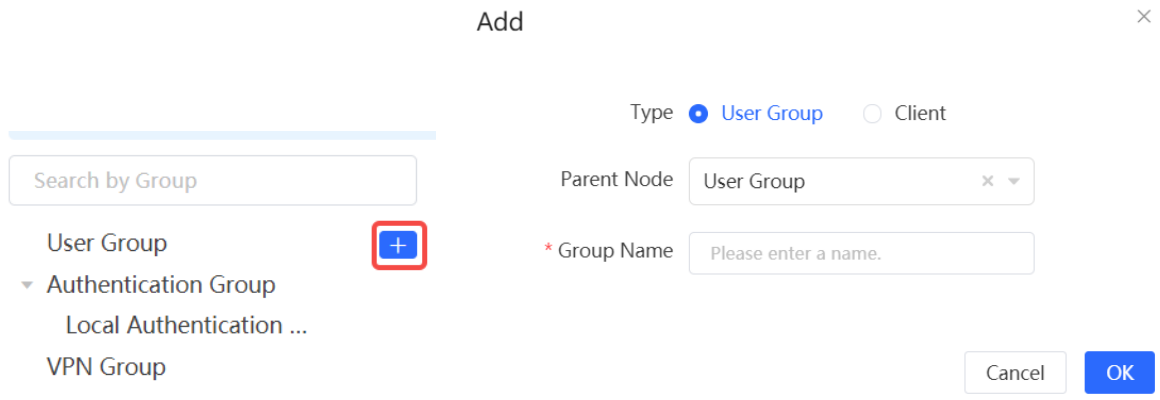

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System Management

**Table 9-1 Parameter Descriptions of User Group**

| Parameter | Description |
|---|---|
| Parent Node | Configure the parent group to which the created user group belongs. Up to three levels of groups are allowed below a user group currently (such as Root Node/R&D Center/R&D Section 1). No user groups are allowed below the third-level group. |
| Group Name | Configure the name of the user group. |

### 2. Creating a User

Click **User Group** to display the users in the current group. Click  or click **Add** at the upper right of the page. Select the type of **Client** and enter the user name and IP range, and click **OK**. You can create a user under the user group.

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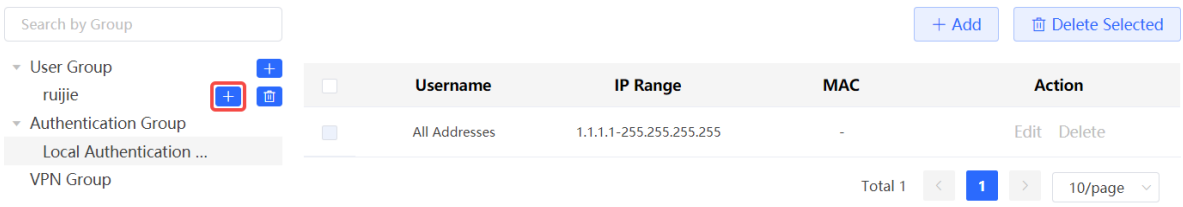

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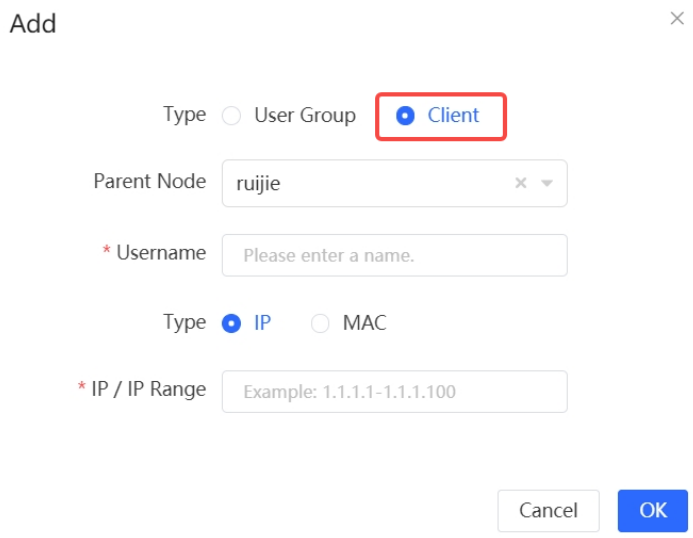

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**Table 9-2 Parameter Descriptions of User**

| Parameter | Description |
|---|---|
| Parent Node | Configure the group to which the created user belongs, Click the drop-down list box to display all the currently created user groups and click to select one group. |
| Username | Configure the name of the user. |
| IP /IP Range | Configure the IP address of the user. You can enter an IP address or IP range. If a rule is valid to this user, the rule takes effect in this IP range. |

### 3. Deleting a User Group or a User

Click  near **User Group** to delete the user group and its members. Click **Delete** in the **Action** bar in the user list to delete the specified user.

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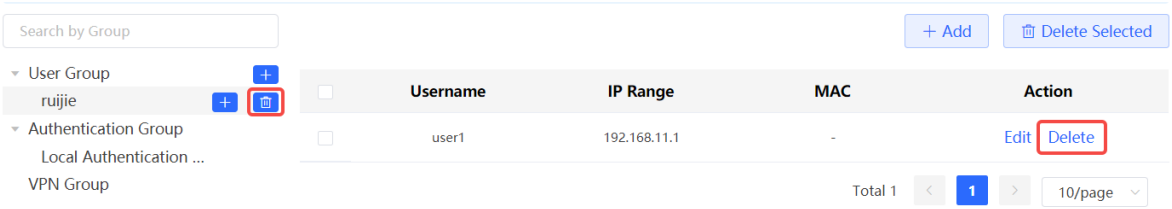


### 4. Verifying Configuration

(1) You can view the created user groups on the left part of the page after user groups and users are configured. Click **User Group** to view user details in this group.



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System Management

(2) When configuring the behavior management policy (such as adding an application control rule), you can view and select the created user groups and the members.

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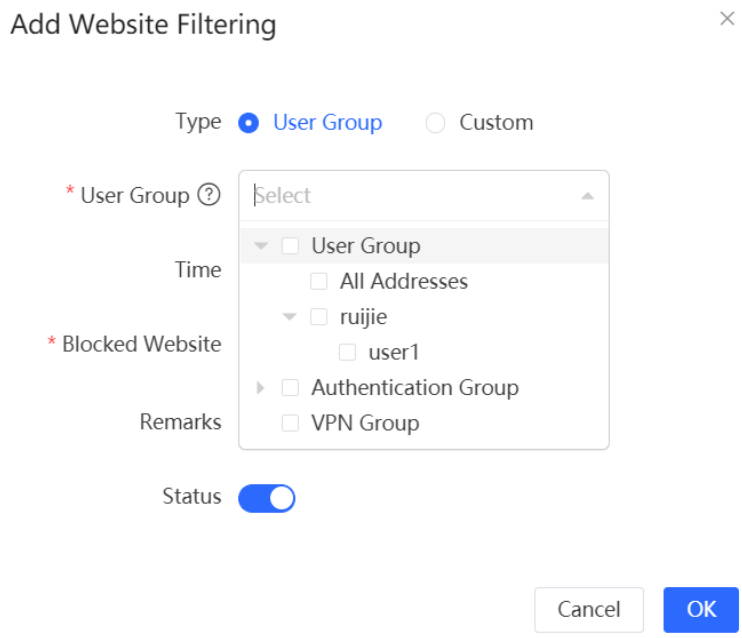
System Management



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## 9.2.3 Authentication Group

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **User Management**.

The users in the **Authentication Group** are synchronized from the authentication server to the **Authentication Group**. The local authentication account set by the device (See Section 8.1.5 Local Account Authentication for details.) is automatically synchronized to the **Local Authentication Group**.

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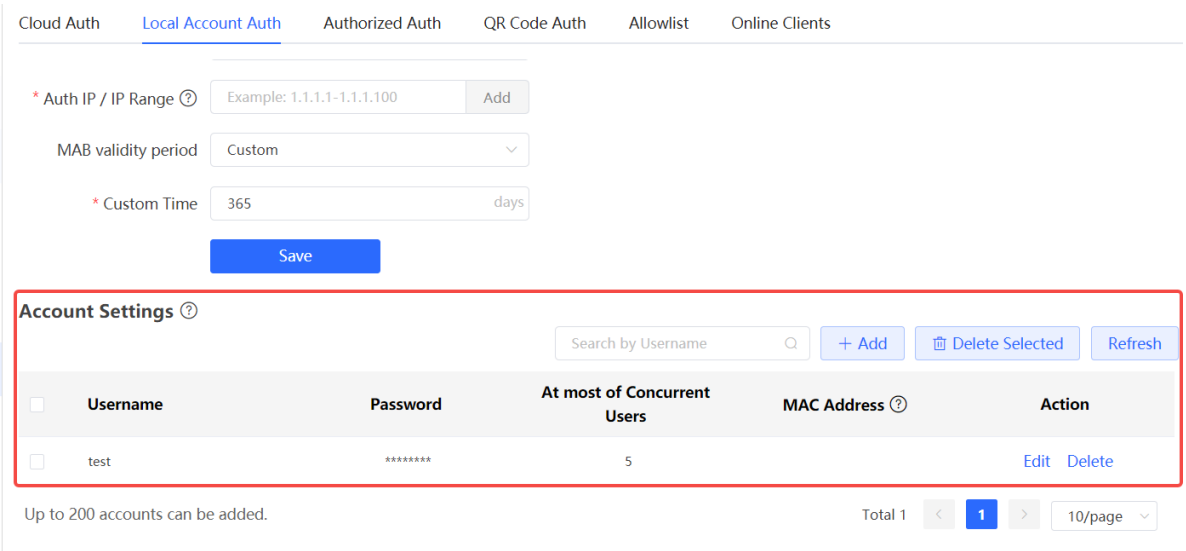

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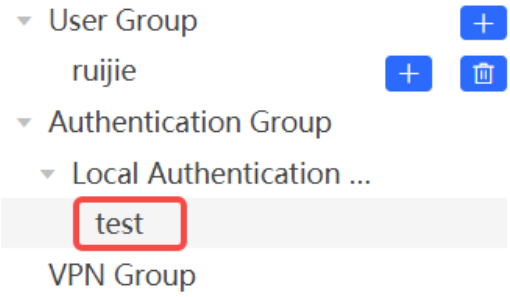


When configuring the behavior management policy (such as adding an application control rule), you can configure a policy to take effect in the specified authentication group. After an authenticated user goes online, the user automatically matches with the authentication group and then associates with the behavior management policy, enabling online behavior control over the authenticated user.

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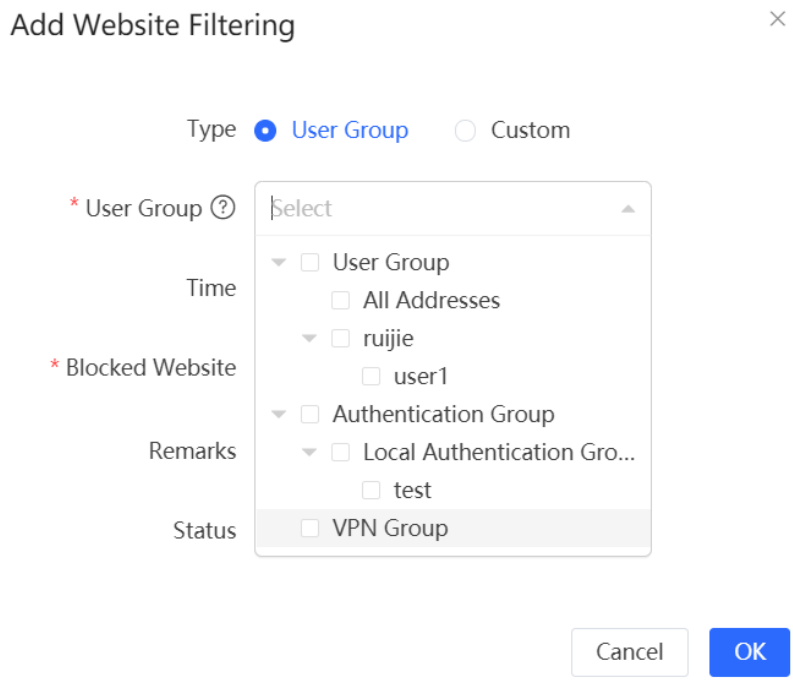

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## 9.3 Time Management

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Time Management**.

You can create time entries to classify time information. A created time entry can be used as a configuration item in a behavior management policy and is directly referenced by the time entry name.

All the created time entries are displayed in the time entry list. In the list, find the target time entry and click **Edit** to modify the time span. Find the target time entry and click **Delete** to delete it. By default, the time entries named **All Time**, **Weekdays**, and **Weekends** are available and they cannot be modified or deleted.

**Caution**

If a time entry is referenced in any policy, it cannot be deleted on the **Time Management** page. To delete the time entry, remove the reference relationship first.

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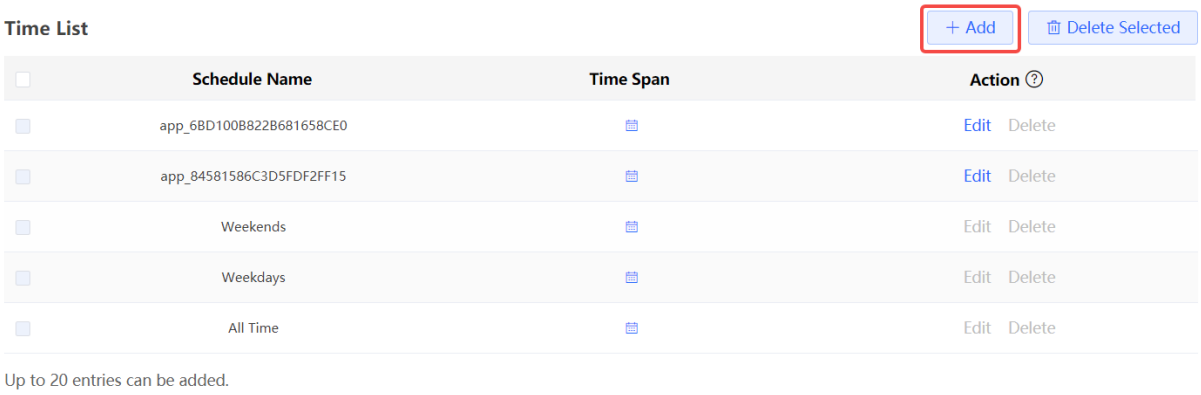
System Management



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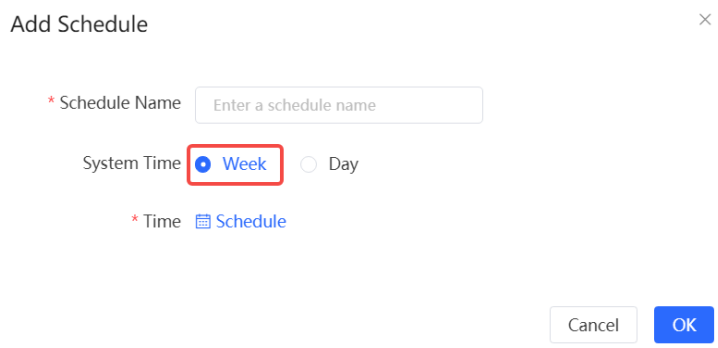
## 9.3.1 Configuring a Schedule by Week




(1) Click **+Add**. On the **Add Schedule** page that is displayed, enter the name of the schedule.

(2) Set **System Time** to **Week**.

(3) Click **Wireless Schedule** to set the time period. On the **Schedule** pop-up box, set the time period to be repeated every week and click **OK**.

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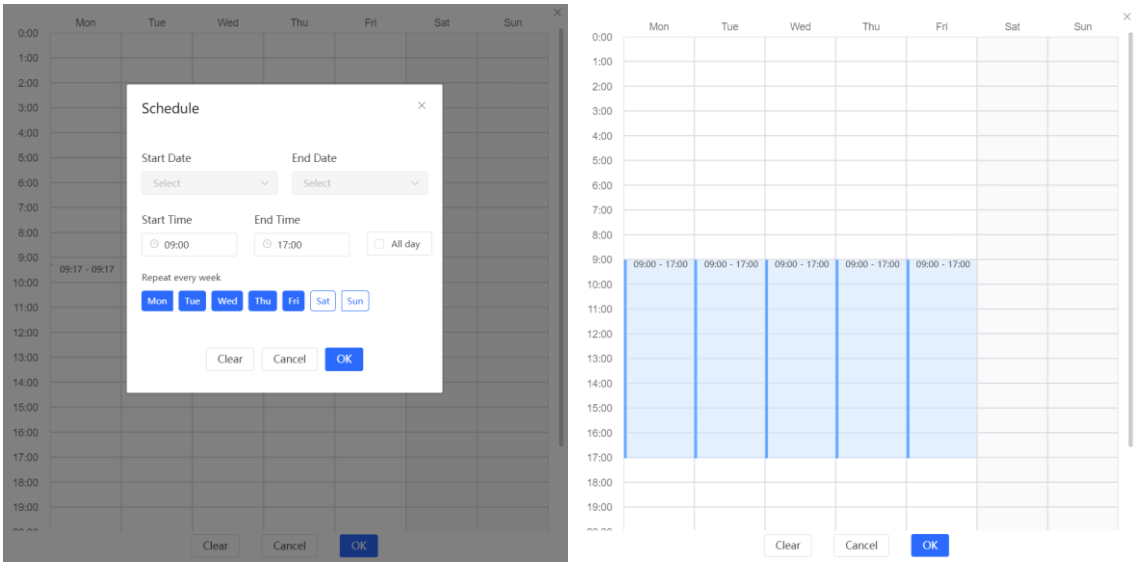


(4) Click **OK**.

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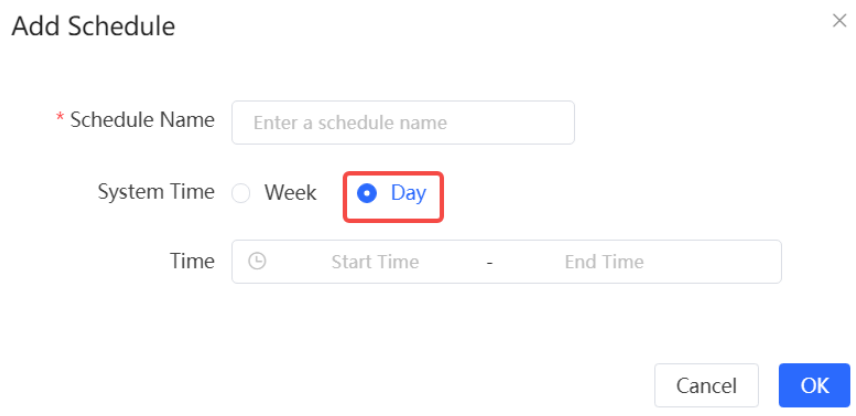
## 9.3.2 Configuring a Schedule by Date




(1) Click **+Add**. On the **Add Schedule** page that is displayed, enter the name of the schedule.

(2) Set **System Time** to **Day**.

(3) Choose the start and end dates, and click **OK**.

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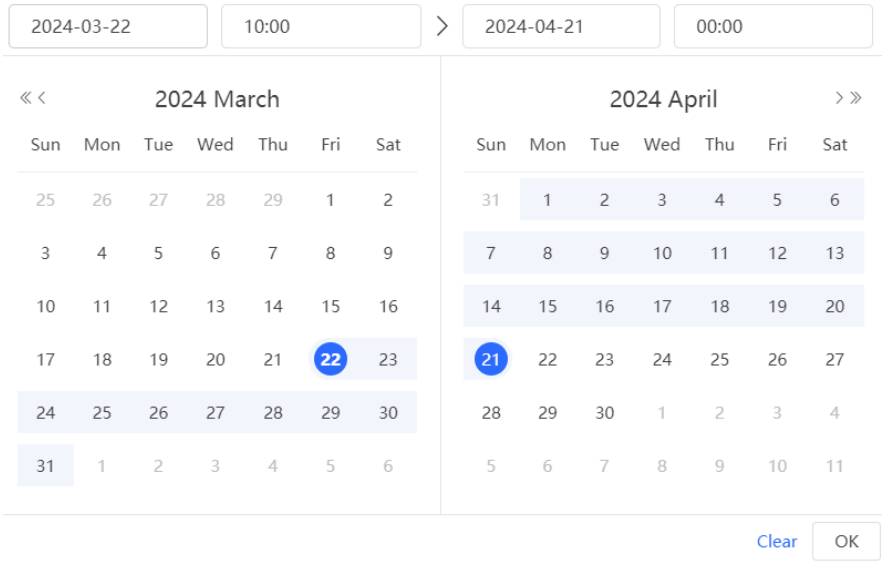


(4) Click **OK**.

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## 9.4 App Control

### 9.4.1 Overview

App control aims at controlling the range of specific apps that can be accessed by users. By default, users can access any app. After an app control policy is configured, users in the current network cannot access prohibited apps. App access can be prohibited based on the specified user group and time range. For example, employees in the office network are prohibited from accessing entertainment and game software during work periods to improve network security.

### 9.4.2 Configuring App Control

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **App Block > App Control**.

#### 1. Configuring App Control

Click **Add** to create an App control policy.

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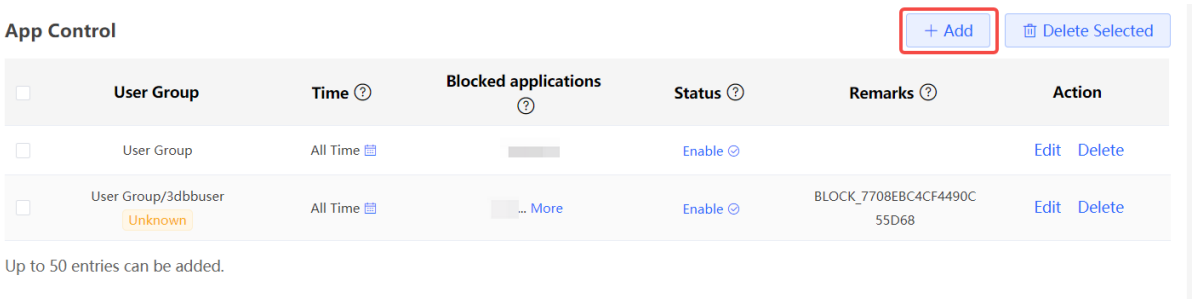

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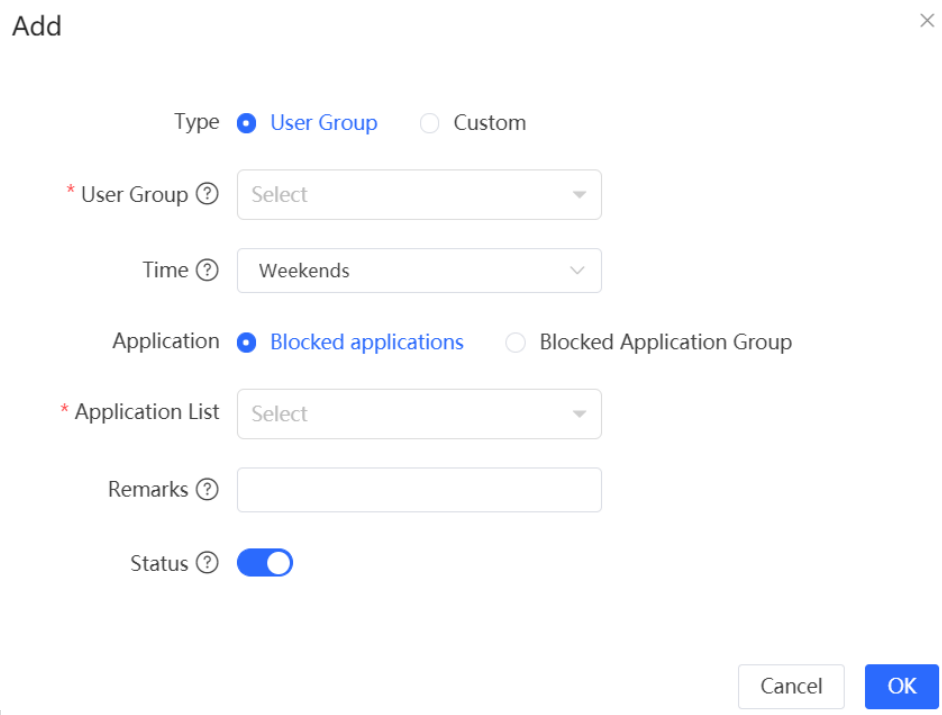

# 1 Configuration Guide SD-WAN

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**Table 9-3 App control policy configuration**

| Parameter | Description |
|---|---|
| Type | ● **User Group**: The policy is applicable to users in the specified user group. Please select the target user group.<br>● **Custom**: The policy is applicable to users in the specified IP range. Please manually enter the managed IP range. |
| User Group | Select the users managed by the policy from the list of user groups. For the configuration of the user group list, see Section 9.2 User Management.<br>If all members in the user group are selected, the policy takes effect on the user group and is also valid for new members added to this group. |
| IP Address Group | If the IP range is restricted by the APP control policy and the type of the policy is set to **Custom**, please enter the IP range manually. |

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System Management

| Parameter | Description |
|---|---|
| Time | Specify the time range under app control. In the specified time range, managed clients cannot access the selected apps in the list of prohibited apps. You can select a time range defined in Section 9.3 Time Management from the drop-down list box, or select **Custom** and manually enter the specific time range. |
| Application | Specify the applications or application groups to block. |
| Application List | When **Blocked applications** is selected, you can select the applications that need to be blocked. |
| App Group | When **Blocked Application Group** is selected, you can select the application groups that need to be blocked. |
| Remarks | Enter the policy description. |

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System Management

| Parameter | Description |
| --- | --- |
| Status | Specify whether to enable the app control policy. |

## 9.4.3 Custom App

### 1. Overview

Based on traffic packets of certain websites or apps that are captured by the device, users can analyze and extract 5-tuple information characteristics (protocol, source IP address, source port, destination IP address, and destination port) of the packets. You can define apps that are not in the default application list.

After custom apps are configured successfully, you can configure control policies for custom apps on the app control page to block users from accessing the custom apps on the current network.

### 2. Procedure

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **App Block** > **Custom**.

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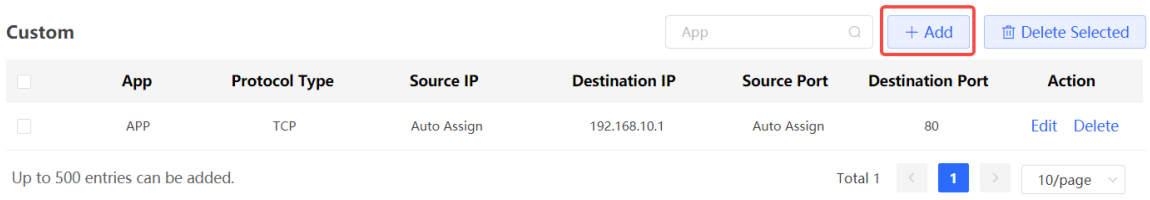
System Management

(1) Click **Add**. Enter information about a custom app.



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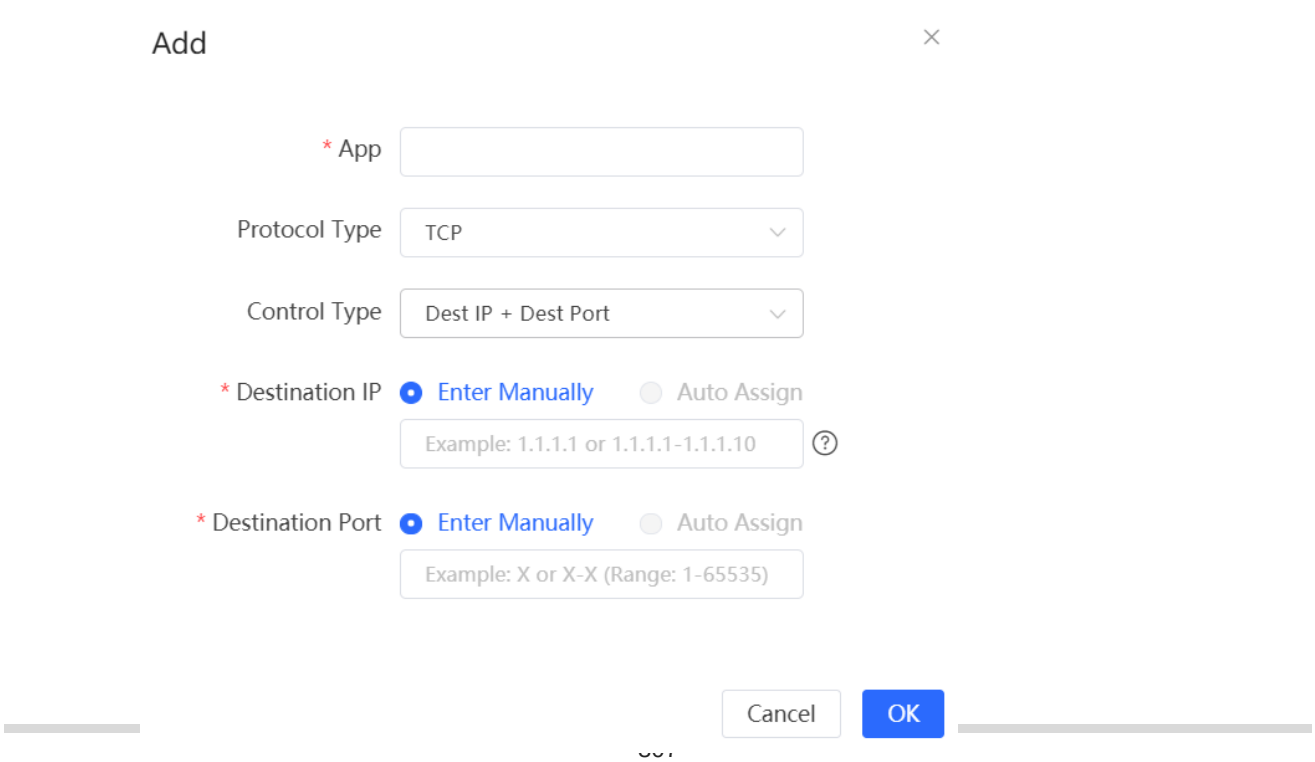

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**Table 9-4 Description of Custom App Configuration**

| Parameter | Description |
|---|---|
| App | Configure the app name (the name cannot be duplicated with a name in the app list). |
| Protocol Type | Select a protocol type based on the protocol used by captured packets. It can be set to **TCP**, **UDP**, or **IP**. |
| Control Type | Select a rule type based on 5-tuple information characteristics of extracted packets. It can be set to the following:<br>● Src IP + Src Port<br>● Dest IP + Dest Port<br>● Src IP+ Dest IP |
| Source/Destination IP | Enter a characteristic IP address. |
| Source/Destination Port | Enter a characteristic port number. |

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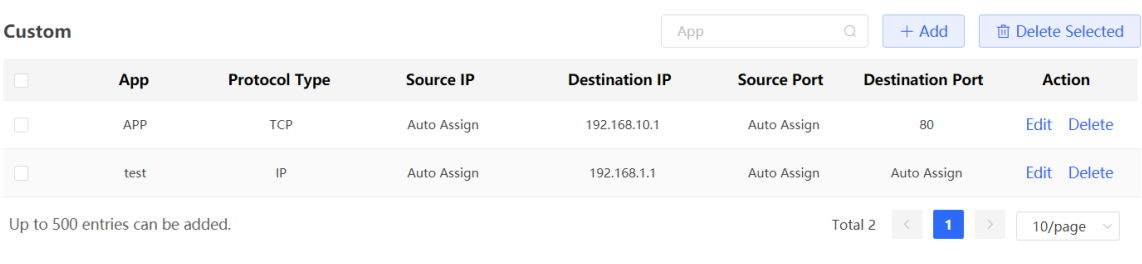
System Management

**Note**

- If **Control Type** is set to **Src IP + Src Port**, you need to set the source IP address and source port.
- If **Control Type** is set to **Dest IP + Dest Port**, you need to set the destination IP address and destination port.
- If **Control Type** is set to **Src IP + Dest IP**, you need to set the source and destination IP addresses. The source IP address can be also to **Auto Assign**.

(2) Click **OK**.



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## 9.4.4 Custom Application Group

### 1. Overview

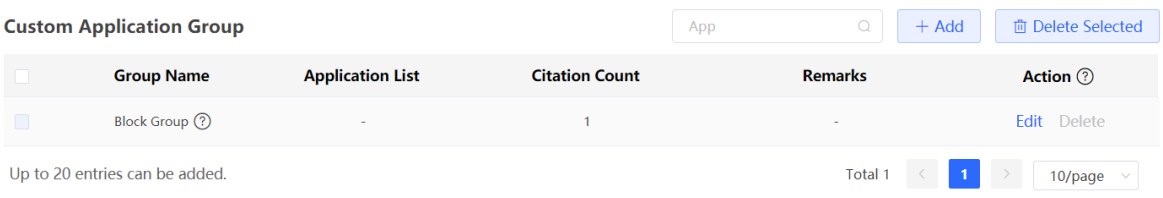
You can add multiple applications with the same features into a customer application group, which is a logical group. The custom application group can be used for policy.

The system has a default blocking group to block applications. (The blocking group is associated with relevant applications by default.) The applications added to the blocking group are directly blocked.

### 2. Procedure

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **App Block** > **Custom Application Group**.

(1) Click **Add** to configure the parameters for an application group.



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System Management

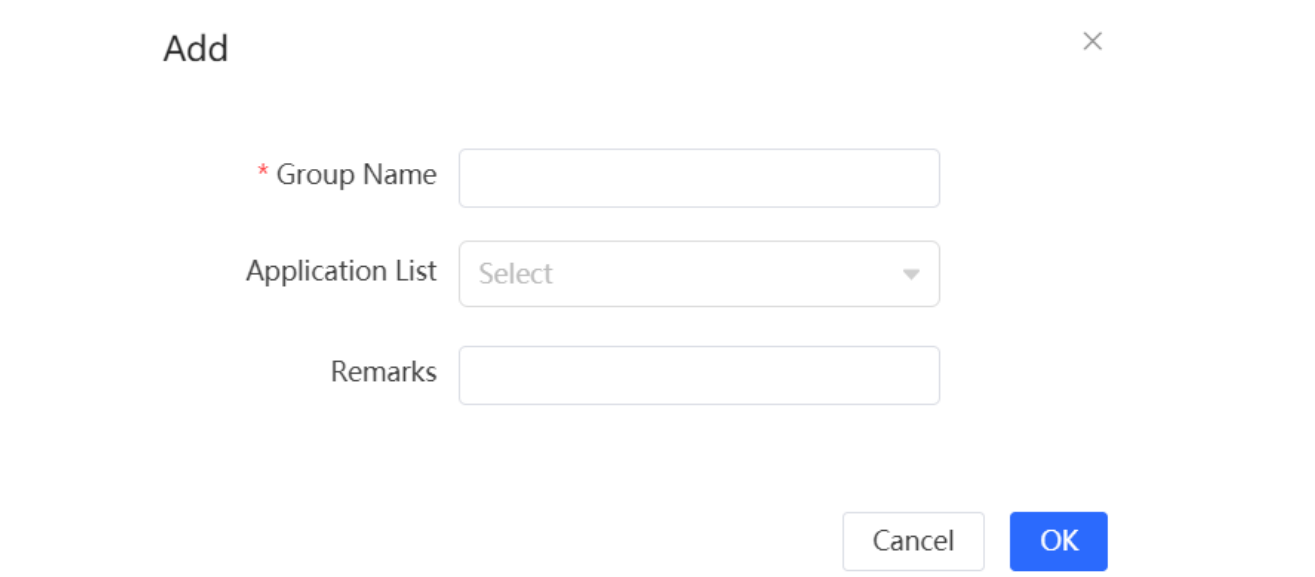

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**Table 9-5 Custom Application Group**

| Parameter | Description |
|---|---|
| Group Name | The application group name customized by a user. (The group name must differ from the application names in the group list.) |
| Application List | Multiple applications involved in an application group. |
| Remark | Description of an application group. |

(2) Click **OK**.

## 9.5 Website Management

### 9.5.1 Overview

Website management consists of website grouping and website filtering. Website grouping refers to the classification of website URLs. You can modify existing website groups or create new website groups. Website

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filtering refers to access control to existing website groups to prohibit user access to websites in specific groups. Website filtering can be applied based on the specified user group and time range. For example, employees in the office network are prohibited from accessing game websites during work periods to improve network security.

## 9.5.2 Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Website Management**.

### 1. Configuring Website Groups

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Website Management** > **Website Group**.

Click the **Website Group** tab. On the page that appears, all the created website groups are displayed in the list. Find the target group and click **More** in the **Member** column to view all the website URLs in the group. Find the target group and click **Edit** in the **Action** column to modify the member website URLs in the group. Find the target group and click **Delete** in the **Action** column to delete the group.

Click **Add** to create a new website group.

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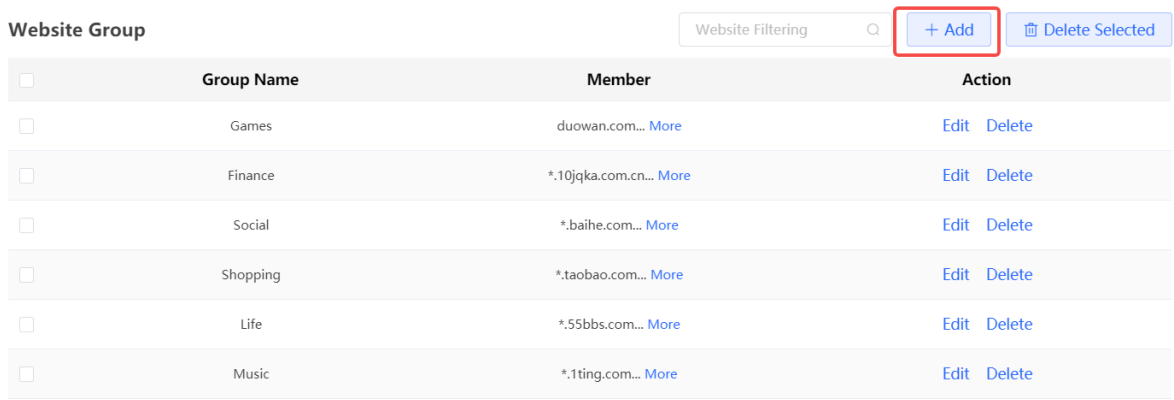
System Management

**Caution**

If a website filtering rule in a website group is being referenced, the group cannot be deleted from the website group list. To delete this group, modify the website filtering configuration to remove the reference relationship first.



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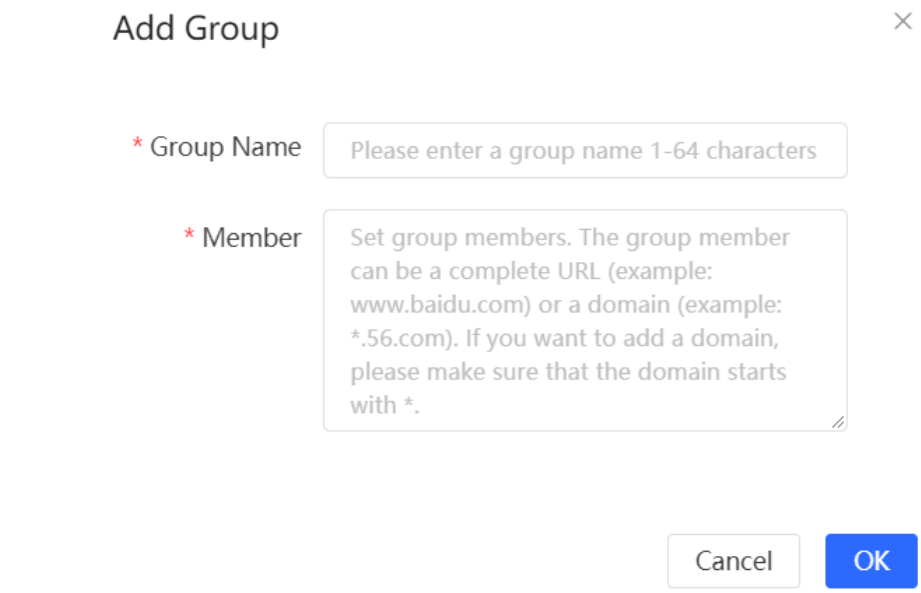

# 1 Configuration Guide SD-WAN

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**Table 9-6 Website group configuration**

| Parameter | Description |
|---|---|
| Group Name | Configure a unique name for the website group. The name can be a string of 1 to 64 characters. |
| Member | Specify members in the website group. You can enter multiple websites in a batch. The group member can be complete URL (such as www.baidu.com) or keywords in the URL (domain name with a wildcard in front, such as *.baidu.com). The wildcard can only appear at the beginning of a URL, and it cannot be in the middle or end of the domain name. |

**2. Configuring Website Filtering**

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Website Management** > **Website Filtering**.

# 1 Configuration Guide SD-WAN

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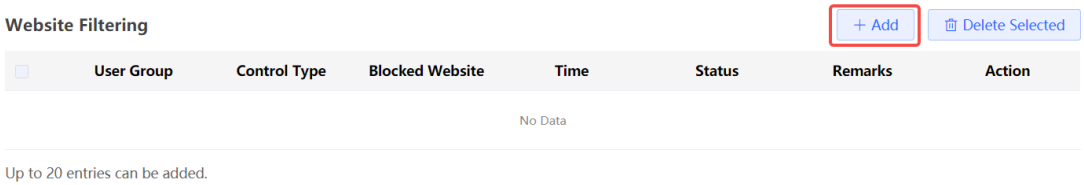
## System Management

(1) Click the **Website Filtering** tab. On the page that appears, all the created website filtering rules are displayed in the list.

(2) Click **Add** to create a website filtering rule.



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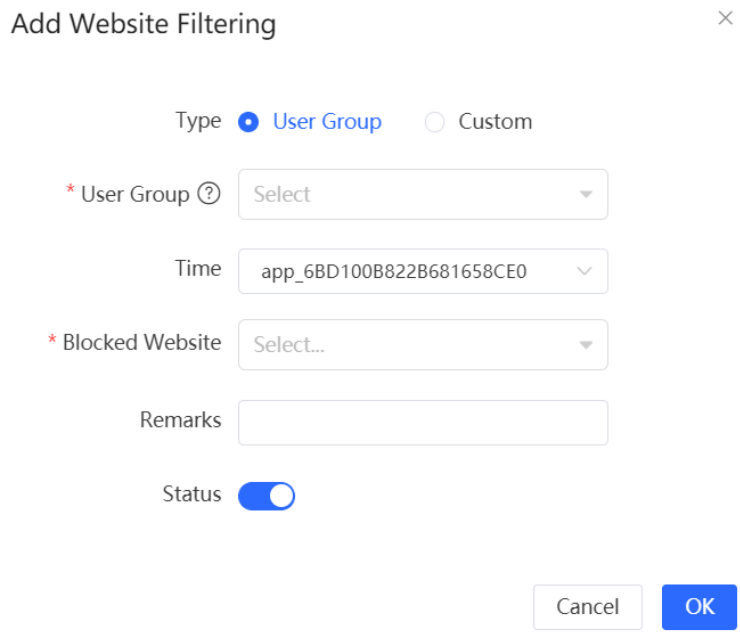

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**Table 9-7 Website filtering rule configuration**

| Parameter | Description |
|---|---|
| Type | ● **User Group**: The policy is applicable to users in the specified user group. Please select the target user group.<br>● **Custom**: The policy is applicable to users in the specified IP range. Please manually enter the managed IP range. |
| User Group | Select the users managed by the policy from the list of user groups. For the configuration of the user group list, see Section 9.2.2 User Group.<br>If all members in the user group are selected, the policy takes effect on the user group and is also valid for new members added to this group. |
| IP Address Group | If the IP range is restricted by the APP control policy and the type of the policy is set to **Custom**, please enter the IP range manually. |

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System Management

| Parameter | Description |
|---|---|
| Time | Specify the time range under website filtering control. In the specified time range, managed clients cannot access the prohibited websites. You can select a time range defined in Section 9.3 Time Management from the drop-down list box, or select **Custom** and manually enter the specific time range. |
| Blocked Website | Configure the type of websites to block. You can select an existing website group. After a website group is selected, users are prohibited from accessing all websites in this group. For details on how to create or modify a website group, see Section Configuring Website Groups. |
| Remarks | Enter the rule description. |
| Status | Specify whether to enable the website filtering rule. |

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After the website filtering rules are configured, click **Edit** to modify the rule information. Click **Delete** to delete the specific filtering rule.

## 9.6 QoS

### 9.6.1 Overview

QoS is a mechanism that classifies flows based on certain rules and processes flows using different policies based on their categories. You can configure QoS to guarantee key flows and suppress malicious flows. You can enable QoS when the bandwidth is insufficient or flows need to be distributed properly.

### 9.6.2 Smart QoS

#### 1. Overview

When you need to limit the uplink traffic and downlink traffic bandwidth of the device ports (such as WAN and WAN 1), you can enable the smart QoS function. After the line bandwidth is configured for a port, the uplink and

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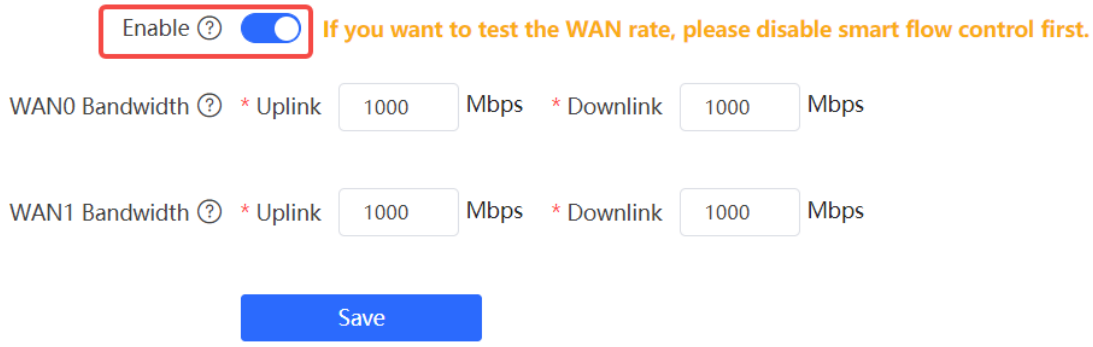
downlink traffic of the port will be limited within the specified range. In addition, the per user bandwidth should be intelligently adjusted according to the number of users to ensure that users fairly share the bandwidth.

### 2. Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **QoS** > **Smart QoS**.



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System Management

Turn on **Enable** on the **Smart QoS** tab and set the line bandwidth based on the bandwidth actually allocated by the ISP. If the device has multiple lines, you can set the bandwidth for these WAN interfaces separately. For details on the multi-line configuration, see Section 4.2 Port Settings.

Click **Save** to make the configuration take effect.

**Caution**

Enabling QoS will affect network speed testing. If you want to test the network speed, disable QoS first.

**Table 9-8 Smart QoS configuration**

| Parameter | Description |
| --- | --- |
| Enable | Specify whether to enable the smart QoS function. By default, smart QoS is disabled. |
| WAN Bandwidth | Set the uplink and downlink bandwidth limits for the WAN interfaces, in Mbit/s. |

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**Note**

Smart QoS can be used to control the line traffic in different networking modes, including bandwidth-based, static IP address, and dynamic IP address.

## 9.6.3 Custom Policies

### 1. Overview

Custom policies are used to restrict the traffic with specific IP addresses based on the smart QoS function, thereby meeting the bandwidth requirements of specific users or servers. When you create a custom QoS policy, you can flexibly configure the limited user range, the bandwidth limit, the limited application traffic, and the rate limit mode. When a custom policy is enabled, it takes precedence over the smart QoS configuration.

Custom policies fall into common policies and VPN policies.

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System Management

Common policies include the custom policies configured on the web interface or Ruijie Cloud and the QoS policies configured on Ruijie Cloud for authentication accounts. Common policies manage common traffic.

Common policies and VPN policies are used to manage common traffic and VPN traffic, respectively.

### 2. Getting Started

Before you configure a custom policy, enable smart QoS first. For details, see Section 9.6.2 Smart QoS.

### 3. Configuring a Normal Policy

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **QoS** > **Custom Policy**.

**Note**

The QoS policies configured on Ruijie Cloud and the web interface are displayed in the **Normal Policy** list. The QoS policies for authentication accounts configured on Ruijie Cloud cannot be edited or deleted on the web interface. You can only enable or disable these policies and change the priority of them.

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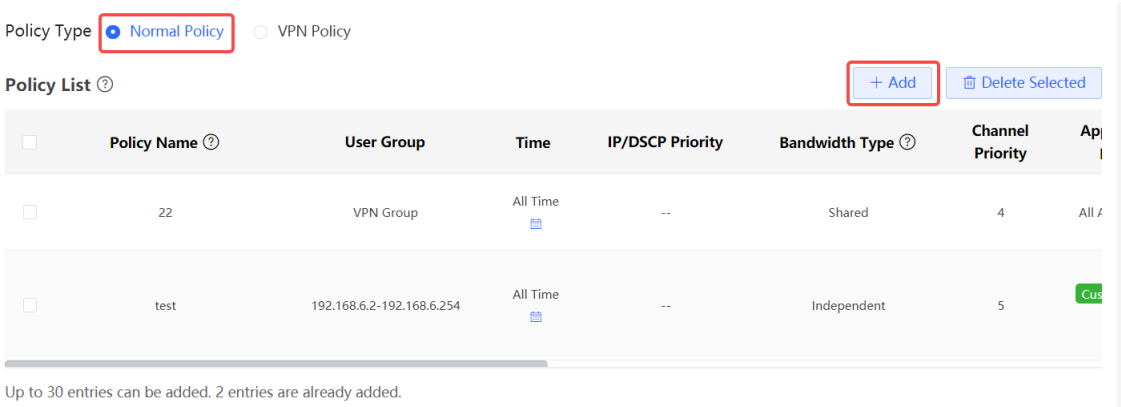
System Management

(1) Set **Policy Type** to **Normal Policy** and click **Add** to create a custom QoS policy.

You can set up to 30 custom common policies, including the custom policies configured on the web interface and Ruijie Cloud.

You can set up to 20 QoS policies for authentication accounts on Ruijie Cloud. The web interface only displays these policies.



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System Management

(2) Configure items related to a common policy.

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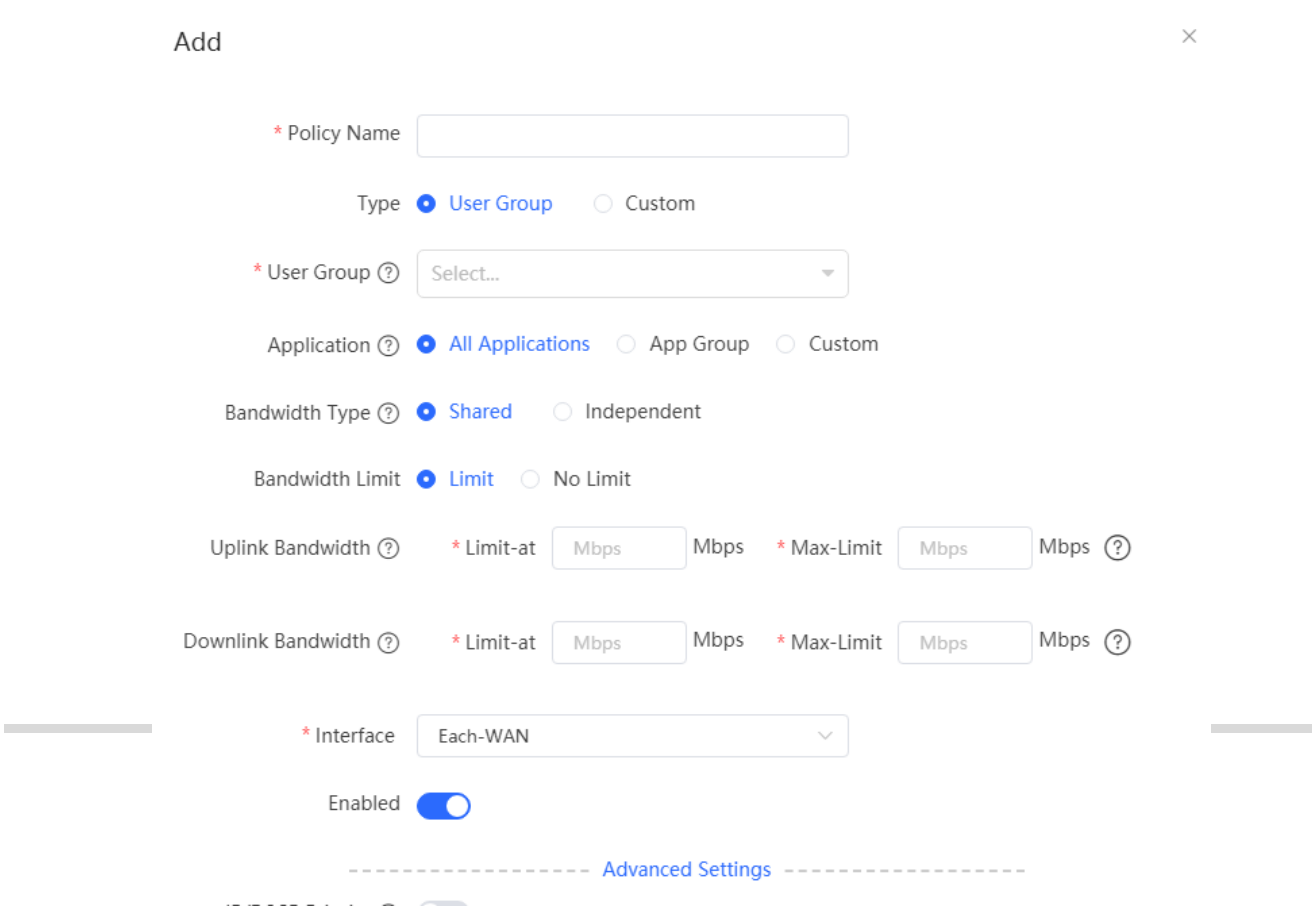

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## System Management

Starting from ReyeeOS 2.340, the system supports device-level traffic control. When the **Bandwidth Type** is set to **Independent**, you can limit the upload and download bandwidth for each user by applying the policy to **ALL Interface**.

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

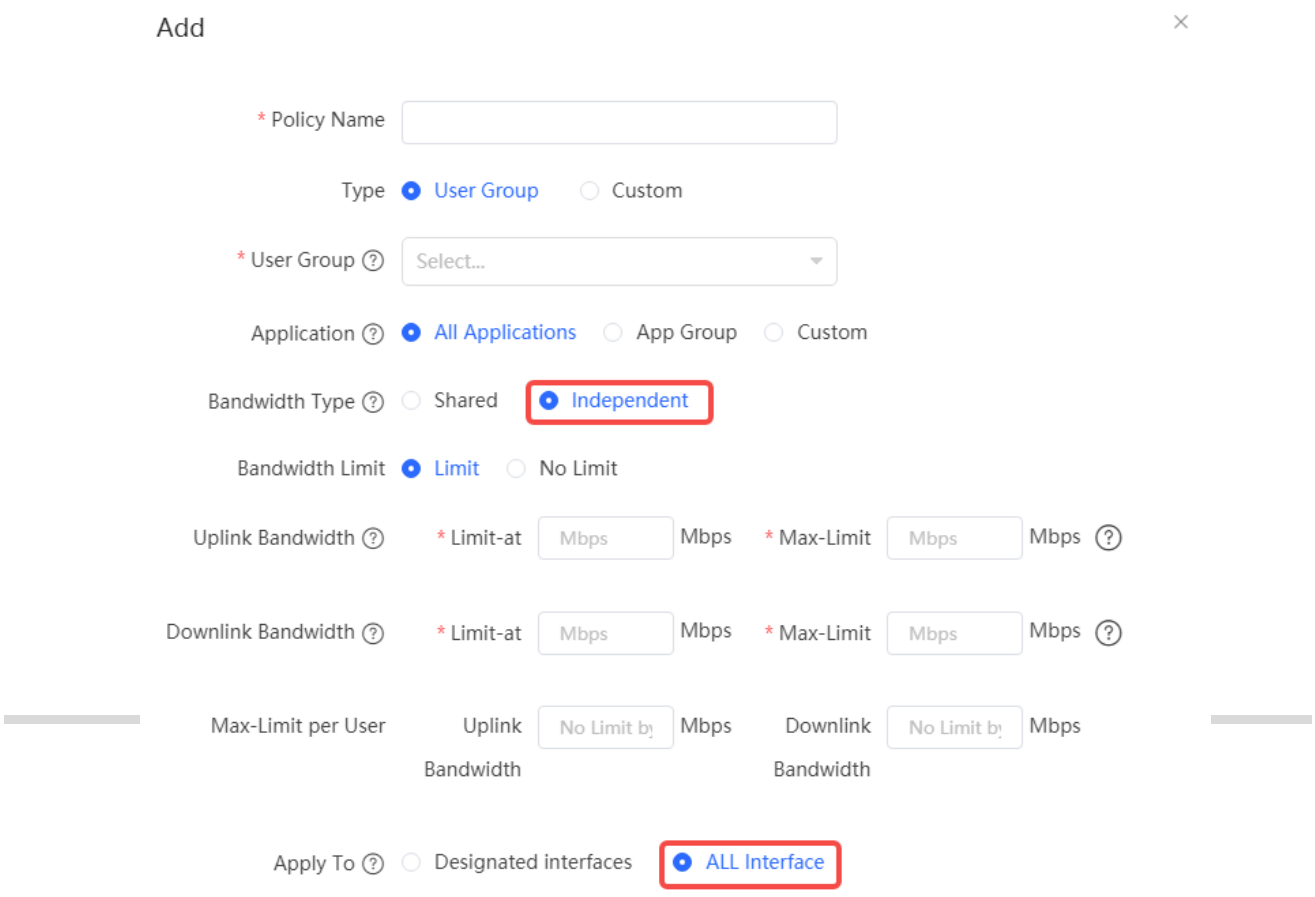

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**Table 9-9 Configuration of a Custom Policy**

| Parameter | Description |
|---|---|
| Policy Name | A policy name uniquely identifies a custom QoS policy. It cannot be modified. |
| Type | The type of a QoS policy can be set to the following:<br>● **User Group**: Indicates that the policy is applied to users in a specified user group. You need to select a user group to be managed.<br>● **Custom**: Indicates that the policy is applied to users in a specified IP address segment. You need to manually enter the IP address range to be managed. |
| User Group | Select a user to be managed by the policy from the user group list. For details about how to set the user group list, see Section 9.2 User Management.<br>If you select all members of a user group, the policy takes effect on the entire user group (it also takes effect on members added to the user group later).<br>This parameter is required when **Type** is set to **User Group**. |

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System Management

| Parameter | Description |
| --- | --- |
| IP/IP Range | Specify the IP address range for the QoS policy to take effect. When **Type** is set to **Custom**, enter the IP address manually. You can enter a single IP address or an IP address segment.<br>This parameter is required when **Type** is set to **Client**.<br>The IP address range must be within a LAN segment. You can choose **One-Device** > **Gateway > Monitor** > **Ethernet status** to check the network segment of the current LAN port. For example, the network segment of the LAN port shown in the figure below is 192.168.2.0/24.<br> |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| Application | When **Bandwidth Type** is set to **Shared**, the QoS policy can be configured to take effect only on specified applications.<br>● **All Applications**: Indicates that the QoS policy takes effect on all applications in the current application library.<br>● **Application Group**: Indicates that the QoS policy takes effect only on specified applications in the application list. For details about how to set the application group list, see Section 9.4.4 Custom Application Group.<br>● **Custom**: Indicates that the QoS policy takes effect only on specified applications in the application list.<br>When **Bandwidth Type** is set to **Independent**, some models do not support application selection and the QoS policy takes effect on all applications in the current application library by default.<br>For the models, contact technical support engineers. |

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System Management

| Parameter | Description |
|---|---|
| Application Group | When **Application** is set to **Application Group**, it specifies the application groups, on which the policy takes effect. The traffic of the selected application group is subject to the policy. |
| Application List | When **Application** is set to **Custom**, it specifies the applications, on which the policy takes effect. The traffic of the selected applications is subject to the policy. |
| Bandwidth Type | ● **Shared**: Indicates that all users in a user group (all IP addresses in an address range) share the configured uplink and downlink bandwidths, and the bandwidth of a single user is not limited.<br>● **Independent**: Indicates that all users in a user group (all IP addresses in an address range) share the configured uplink and downlink bandwidths, and the maximum bandwidth of a single user can be limited. |
| Bandwidth Limit | Configure whether to limit the bandwidth.<br>● **Limit**: You can set the uplink and downlink bandwidth limits as needed.<br>● **No Limit**: When the bandwidth is sufficient, the maximum bandwidth is not limited. When the bandwidth is insufficient, the minimum bandwidth cannot be guaranteed. |

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System Management

| Parameter | Description |
| --- | --- |
| Uplink/ Downlink Bandwidth | Configure the data transmission rate in uploading and downloading, in Mbps. It includes Limit-at, Max-Limit, and Max-Limit per User.<br>● **Limit-at**: Specifies the minimum bandwidth that can be shared by all users when the bandwidth is insufficient.<br>● **Max-Limit**: Specifies the total maximum bandwidth that can be occupied by all users when the bandwidth is sufficient.<br>● **Max-Limit per User**: Specifies the maximum bandwidth that can be occupied by each user when multiple users share the bandwidth. It is optional and can be configured only when **Bandwidth Type** is set to **Independent**. The rate is not limited by default. |

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System Management

| Parameter | Description |
|---|---|
| Apply To | In ReyeeOS 2.340 and later, when the **Bandwidth Type** is set to **Independent**, you can select the scope of application for the traffic policy.<br>● **Designated interfaces**: You need to select specific interfaces. For example, if the device has three WAN ports and each user is limited to a maximum of 10 Mbps upload bandwidth, selecting **Each-WAN** means the total available bandwidth will add up to 30 Mbps for the user.<br>● **ALL Interface**: The traffic control policy applies at device level. Each user's maximum bandwidth is limited to the value specified in Max-Limit per User, regardless of the number of WAN ports. |
| Interface | Specify the WAN interface, on which the policy takes effect. When it is set to **Each-WAN**, the policy will be applied to all WAN interfaces. |
| Enabled | Set whether to enable the QoS policy. If it is disabled, the policy does not take effect. |
| IP/DSCP Priority | Specifies the priority of packets to differentiate various types of traffic and allocate different levels of service quality. QoS policies are applied based on the IP/DSCP field in the packet. |

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System Management

| Parameter | Description |
|---|---|
| Channel Priority | Specify the traffic guarantee level. The value range is from 0 to 7. A smaller value indicates a higher priority and the value **0** indicates the highest priority.<br>Different traffic priority values correspond to different application groups in an application template. **2** indicates the key group, **4** indicates the normal group, and **6** indicates the suppression group. For the description of application groups in a priority template, see 9.6.4 Application Priority. |
| Time | Specifies the time period during which the rule takes effect. You can choose from existing time rules or create custom ones. |

(3) Click **OK**.

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**4. Configuring a VPN policy.**

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **QoS** > **Custom Policy**.

**Note**

The QoS policies configured on Ruijie Cloud and the web interface are displayed in the **Normal Policy** list. The QoS policies for authentication accounts configured on Ruijie Cloud cannot be edited or deleted on the web interface. You can only enable or disable these policies and change the priority of them.

(1) Set **Policy Type** to **VPN Policy** and click **Add** to create a custom VPN QoS policy.

A maximum of 10 VPN policies can be configured.

# 1 Configuration Guide SD-WAN

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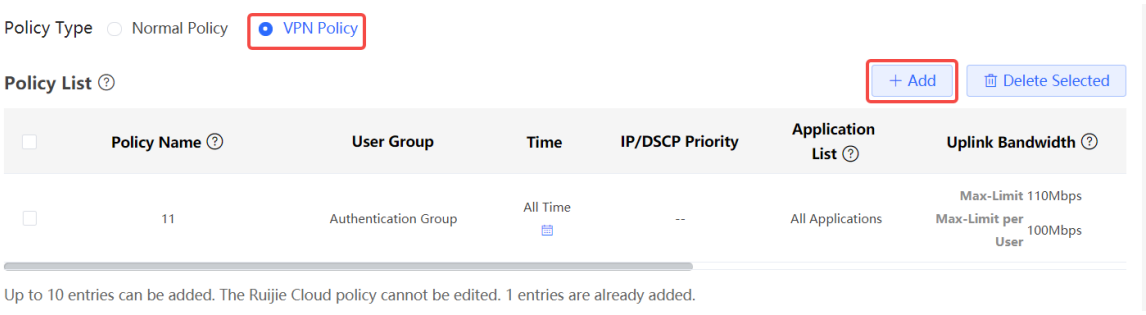
System Management




(2) Configure items related to a VPN policy.

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System Management

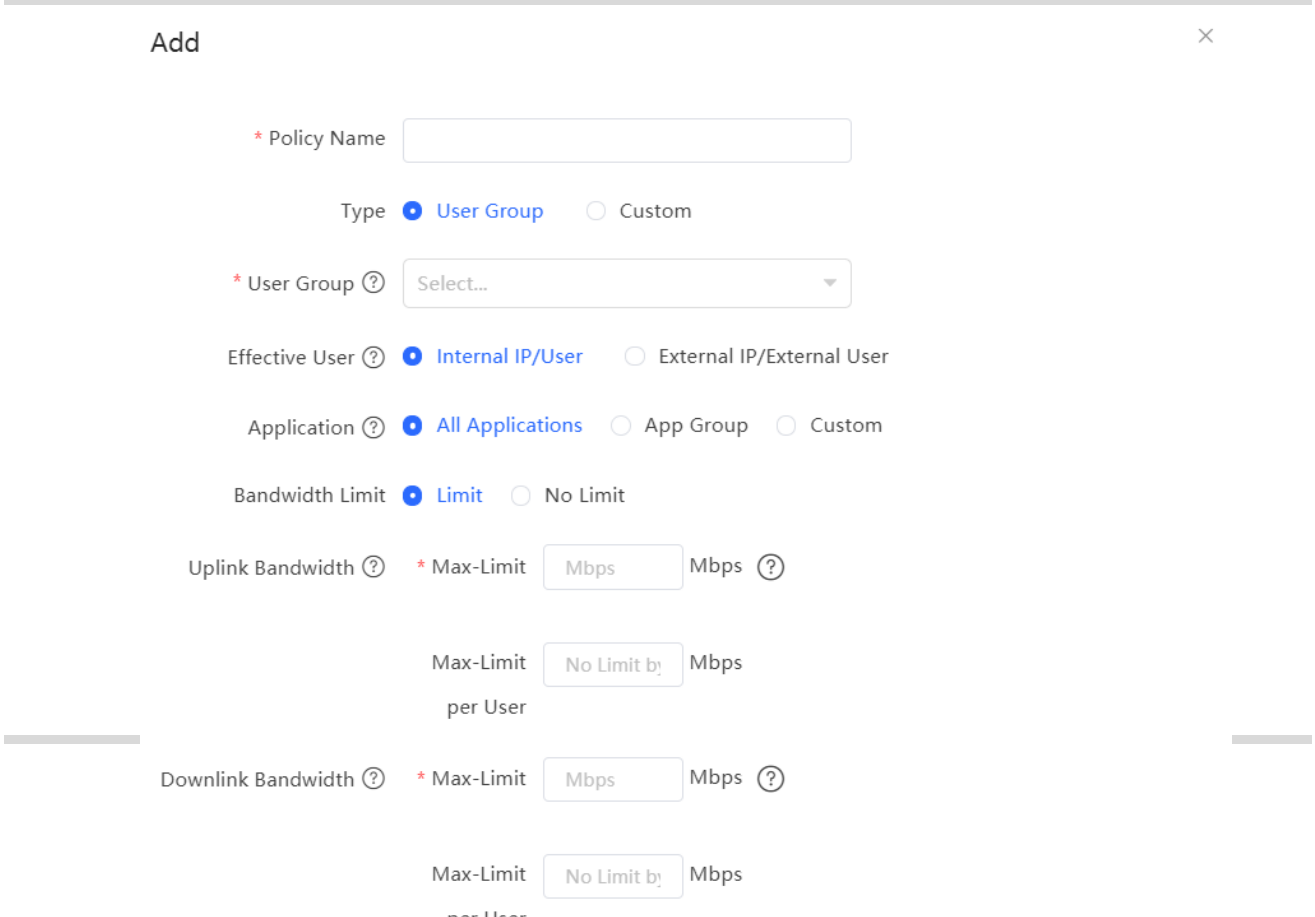

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**Table 9-10 Configuration of a Custom VPN Policy**

| Parameter | Description |
|---|---|
| Policy Name | A policy name uniquely identifies a custom QoS policy. It cannot be modified. |
| Type | The type of a QoS policy can be set to the following:<br>● **User Group**: Indicates that the policy is applied to users in a specified user group. You need to select a user group to be managed.<br>● **Custom**: Indicates that the policy is applied to users in a specified IP address segment. You need to manually enter the IP address range to be managed. |
| User Group | Select a user to be managed by the policy from the user group list. For details about how to set the user group list, see Section 9.2 User Management.<br>If you select all members of a user group, the policy takes effect on the entire user group (it also takes effect on members added to the user group later).<br>This parameter is required when **Type** is set to **User Group**. |

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System Management

| Parameter | Description |
| --- | --- |
| IP/IP Range | Enter an IP address or IP range manually.<br>This parameter is required when **Type** is set to **Client**. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| Effective User | Specify the type of effective users. It can be set to the following:<br>● **Internal IP/User**: For a gateway, IP addresses of clients connected to the gateway are internal IP addresses.<br>● **External IP/External User**: For a gateway, non-gateway internal IP addresses are external IP addresses.<br>The configuration suggestions are as follows:<br>● When clients are configured to control VPN traffic, select **Internal IP/ User** to control the traffic of internal network users. When the VPN server is configured to control the VPN traffic, select **External IP/External User** to control the traffic of external network users.<br>● For the VPN of the NAT model, the external IP address of the server must be in the IP address segment of the VPN address pool.<br>● For the VPN in router mode, the IP address segment must be set to IP addresses of restricted users. For the VPN in router mode, to configure QoS on internal IP addresses of clients, set internal IP addresses to the IP addresses of the QoS objects.<br>Note: The external IP address configured by the Open VPN server is the IP address of the address pool. The internal IP address configured by the client is the actual IP address of the client. |

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System Management

| Parameter | Description |
|---|---|
| Application | ● **All Applications**: Indicates that the QoS policy takes effect on all applications in the current application library.<br>● **Custom**: Indicates that the QoS policy takes effect only on specified applications in the application list.<br>● **Application Group:** Indicates that the QoS policy takes effect only on specified application groups. The traffic of applications involved in the application group is subject to the policy. For details about how to set the application group list, see Section 9.4.4 Custom Application Group. |
| Application List | When **Application** is set to **Custom**, it specifies the applications, on which the policy takes effect. The traffic of the selected applications is subject to the policy. |
| Application Group | When **Application** is set to **Application Group**, it specifies the application group, on which the policy takes effect. The traffic of the selected application group is subject to the policy. |

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System Management

| Parameter | Description |
| --- | --- |
| Bandwidth Limit | Configure whether to limit the bandwidth.<br>● **Limit**: You can set uplink and downlink bandwidth limits as needed.<br>● **No Limit**: When the bandwidth is sufficient, the maximum bandwidth is not limited. When the bandwidth is insufficient, the minimum bandwidth is not guaranteed. |
| Uplink/ Downlink Bandwidth | Configure the maximum uplink/downlink bandwidth shared by VPN users matching the policy in Mbps.<br>When the bandwidth is shared by multiple users, you can also set the maximum uplink/downlink bandwidth per user in Mbps. The uplink/downlink bandwidth is not limited by default. Note: The parameter is valid when **Bandwidth Limit** is set to **Limit**. |
| Interface | Specify the VPN port, on which the policy takes effect. When it is set to **All VPN Ports**, the policy will be applied to all VPN ports. |
| Enabled | Set whether to enable the QoS policy. If it is disabled, the policy does not take effect. |

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| Parameter | Description |
| --- | --- |
| IP/DSCP Priority | Specifies the priority of packets to differentiate various types of traffic and allocate different levels of service quality. QoS policies are applied based on the IP/DSCP field in the packet. |
| Time | Specifies the time period during which the rule takes effect. You can choose from existing time rules or create custom ones. |

(3) Click **OK**.

### 5. View Custom Policies

The current custom policies are displayed in the **Policy List** section. You can modify and delete a custom policy. To delete multiple custom policies in a batch, select the desired policies and click **Delete Selected**.

- Normal policy list

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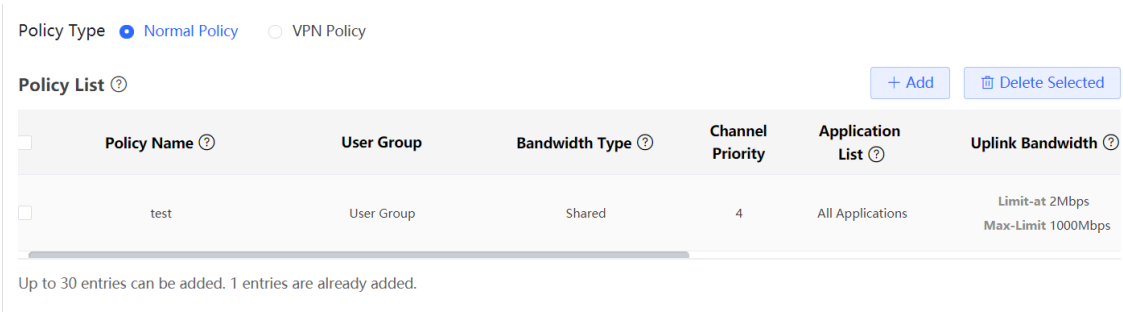
System Management




- VPN policy list

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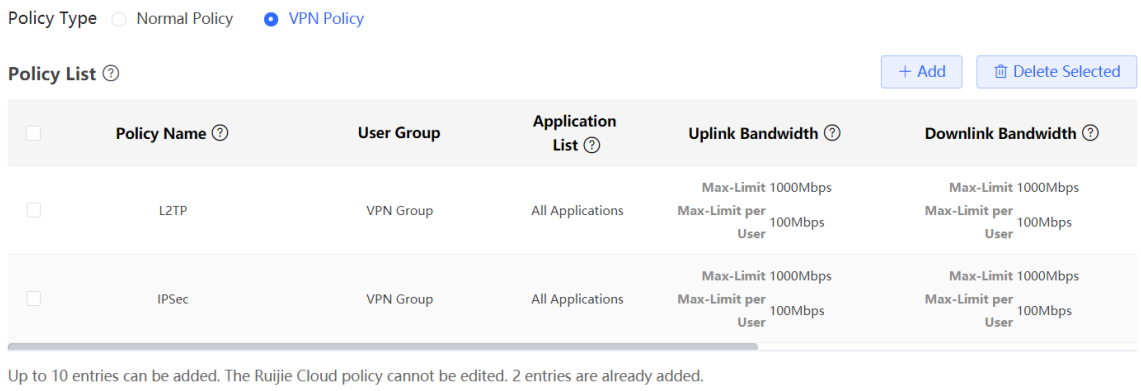
System Management



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System Management

**Table 9-11 Policy list information**

| Parameter | Description |
|---|---|
| Application List | The **Application List** contains the applications to which the policy is valid. If the **Application Library** matches with the **Application** that is set to **Custom** and supported by the policy, Custom is displayed in the **Application List**. If not, Custom is displayed. |
| Status | Indicate whether the current policy is enabled. You can click to edit the status. If the **Application Library** does not match with the **Application** that is set to **Custom** and supported by the policy, you cannot edit the **Status** directly. Please click **Edit** in the action bar to edit the policy. |

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System Management

| Parameter | Description |
| --- | --- |
| Effective State | Indicate whether the policy is effective in the current system. If **Inactive** is displayed, check whether the policy is enabled, whether the policy-enabled port exists, and whether the **Application Library** matches with the **Application** to which the policy is valid. |
| Match Order | All the created custom policies are displayed in the policy list, with the latest policy listed on the top. The device matches the policies according to their sorting in the list. You can manually adjust the policy matching sequence by clicking or in the list. |
| Action | You can modify and delete the custom policy. |

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## 9.6.4 Application Priority

### 1. Overview

After smart QoS is enabled, you can set the application priority to provide guaranteed bandwidth to applications with high priority and suppress the bandwidth for applications with low priority. You can predefine a list of applications whose bandwidth needs to be guaranteed preferentially and a list of applications whose bandwidth needs to be suppressed based on actual needs.

**Caution**

If one application exists in both the custom policy list and the application priority list, the custom policy prevails.

### 2. Getting Started

- Before you configure application priority, enable smart QoS first. For details, see Section 9.6.2 Smart .
- Confirm that the appropriate application library is selected on the **Custom Policy** page (See Section 9.6.3 Custom Policies for details.).

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System Management

### 3. Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **QoS** > **Application Priority**.

(1) Create an application priority template.

Select a template from the **Application Priority** drop-down list box.

Five application priority templates are predefined to meet the needs in different scenarios. You can switch among the templates based on actual needs.

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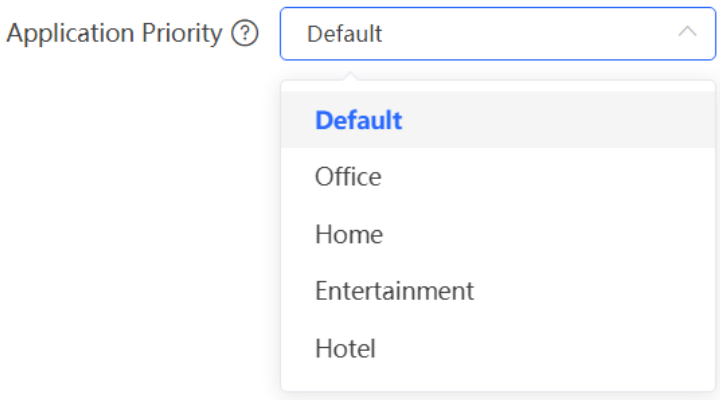


The application priority templates are as follows:

- **Default**: This template is used during device initialization. The traffic bandwidth is not guaranteed or suppressed for any application.
- **Office**: This template is designed for the office scenario, where the application traffic from the office network is guaranteed preferentially.

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System Management

- **Home**: This template is designed for the home scenario, where the application traffic from the home network is guaranteed preferentially.
- **Entertainment**: This template is designed for the entertainment scenario, where the application traffic from the entertainment network is guaranteed preferentially.
- **Hotel**: This template is designed for the hotel scenario, where the application traffic from the hotel network is guaranteed preferentially.

(2) Create an application group list.

Each default template has three application groups: key group, block group, and normal group. The application priority of the three groups decreases in the following order: key group, normal group, and block group.

- **Key Group**: The traffic from applications in the application list for this group is guaranteed preferentially.
- **Block Group**: The traffic from applications in the application list for this group is suppressed to preferentially guarantee the traffic from applications with higher priority.
- **Normal Group**: All the applications in the application library beyond the key group and block group are in this group. The traffic from applications in this group are guaranteed after that from the key group.

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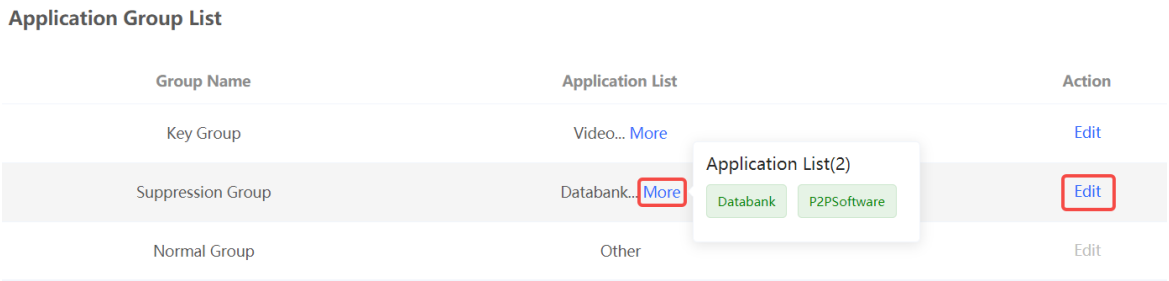
## System Management

After you select a template, three application groups **Key Group**, **Block Group**, and **Normal Group** and the application list for each group in the current template are displayed. You can click **More** to view the details of each application list.

You can click **Edit** in the **Action** column next to the key group and block group to edit the application list for the groups, allowing the traffic from these applications to be guaranteed or suppressed.



# 1 Configuration Guide SD-WAN

**Specification**

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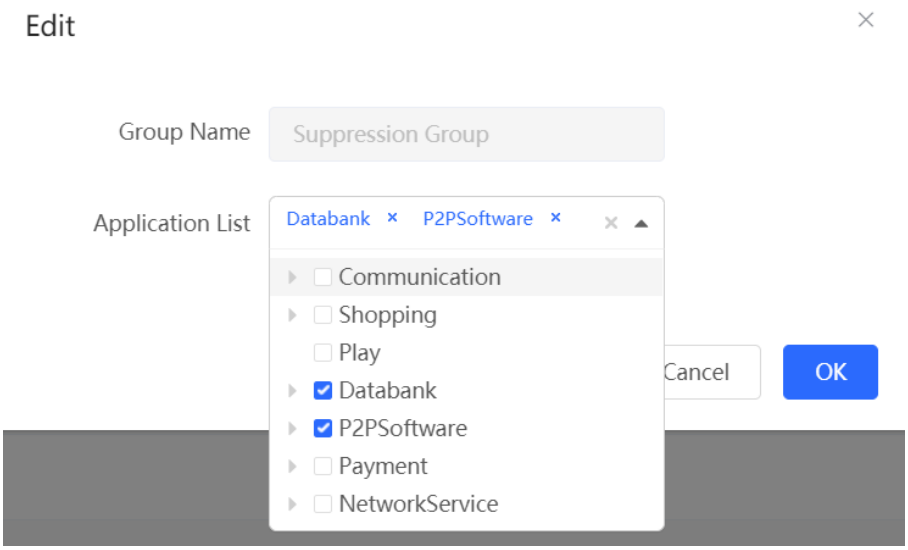
System Management



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## 9.7 Access Control

### 9.7.1 Overview

The access control function matches data packets passing through the device based on specific rules and permits or drops data packets in the specified time range. This function controls whether to permit LAN user access to the Internet and whether to block a specific data flow. The device matches packets based on the MAC address or IP address.

### 9.7.2 Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Access Control**.

The access control rule list displays the created access control rules. Click **Add** to add an access control rule.

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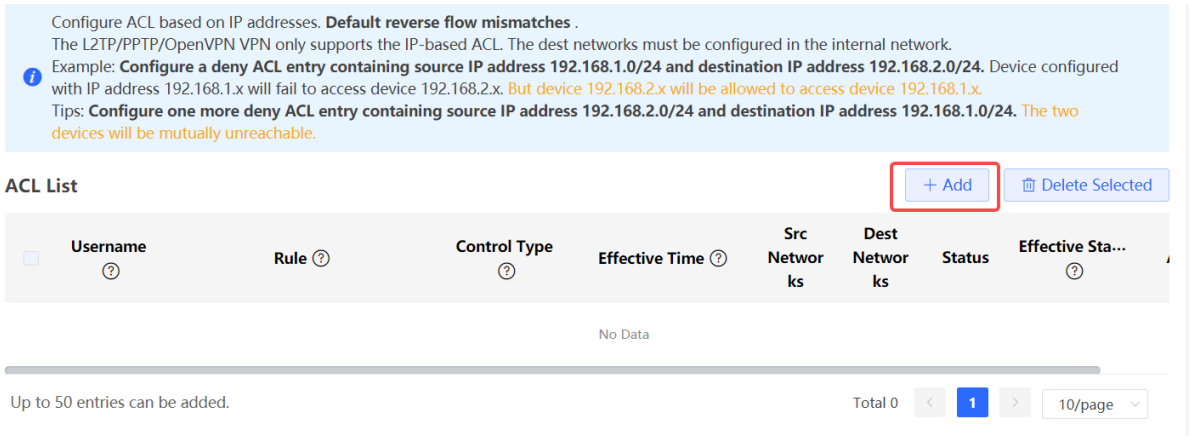

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System Management

**Table 9-12 Access Control Rule Information**

| Parameter | Description |
|---|---|
| Username | Identify the purpose of the rule. |
| Rule | Display a summary of the control information.<br>MAC-based: Display the MAC address matching the rule.<br>IP-based: Display the connection type, source IP address, destination IP address, and protocol type of packets matching the rule. |
| Control Type | Indicate how packets that match the rule are processed.<br>● Allow: Permit the packets that match the rule.<br>● Block: Discard the packets that match the rule. |
| Effective Time | Indicate the time period during which the rule takes effect. |

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System Management

| Parameter | Description |
|---|---|
| Src Networks | Indicate the source interface that matches the rule. If the rule is based on the MAC address, then this field is set to "All Intranets" by default. If the rule is based on IP addresses, then this field can be set to "All Networks", "All Extranets", "All Intranets", or a specific network. |
| Dest Networks | Indicate the destination interface that matches the rule. If the rule is based on the MAC address, then this field is set to "All Extranets" by default. If the rule is based on IP addresses, then this field can be set to "All Networks", "All Extranets", "All Intranets", or a specific network. |
| Status | Indicate whether the rule is enabled. You can click to switch the status. When this toggle switch is off, the rule will not take effect. |
| Effective State | Indicate whether the rule is effective. If **Ineffective** is displayed, it might be because the current system time is not within the designated effective period. You can hover the mouse over to view more details on the cause. |

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System Management

| Parameter | Description |
|---|---|
| Match Order | All the created rules are displayed in the ACL list, with the latest rule listed on the top. The device matches the rules according to their sorting in the list. You can manually adjust the rule matching sequence by clicking  or  in the list. |
| Action | You can modify or delete a rule. |

### 1. Configuring a MAC Address-based ACL Rule

MAC address-based ACL rules enable the device to match data packets based on the source MAC address, and are generally used to control Internet access from online users or specific clients.

Set **Based on MAC**, enter the MAC address of the client, select a rule type, set the effective time range, and click **OK**.

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System Management

**Note**

MAC address-based ACL rules are valid on WAN interfaces by default.

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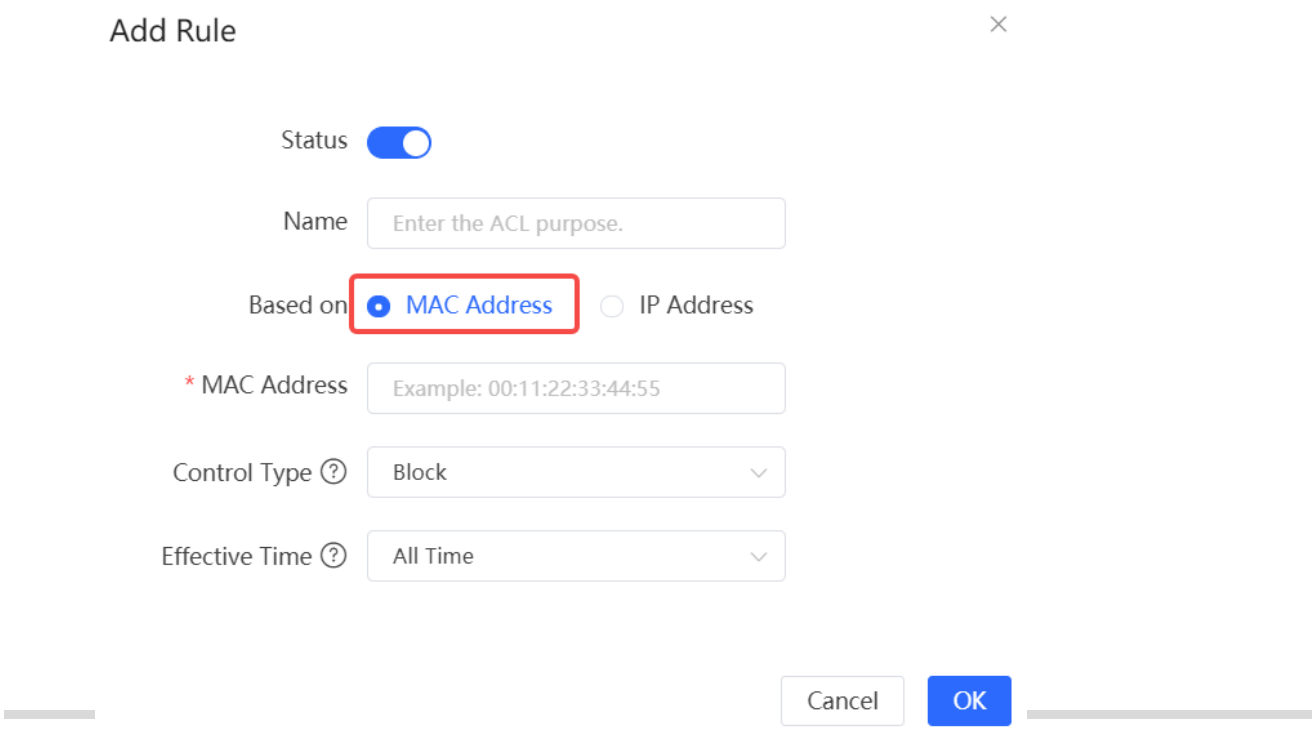

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**Table 9-13 MAC address-based ACL configuration**

| Parameter | Description |
|---|---|
| Status | Indicate whether the rule is enabled. You can click to switch the status. When this toggle switch is off, the rule will not take effect. |
| Name | Identify the rule. This field can be customized by the user. |
| MAC Address | Enter the target MAC address. When you click on the input box, the information of the user currently online will be displayed. By simply clicking on the displayed information, the corresponding MAC address will be automatically filled in for you. |
| Control Type | Indicate how packets that match the rule are processed.<br>● Allow: Permit the packets that match the rule.<br>● Block: Discard the packets that match the rule. |

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System Management

| Parameter | Description |
| --- | --- |
| Effective Time | Indicate the time period during which the rule takes effect. You can select a time range from the drop-down list in 9.3 Time Management, or select **Custom** to manually set a time range. |

### 2. Configuring an IP Address-based ACL Rule

IP address-based ACL rules enable the device to match data flows according to the source IP address, destination IP address, and protocol number.

Set **Based on IP**, click **IPv4** or **IPv6** next to the **Internet** parameter and enter the source IP address and port and destination IP address and port of the data flow, select the protocol type, rule type, effective time range, and effective port, and click **OK**.

**Caution**

- IP address-based ACL rules are effective in only one direction. For example, in a block rule, the source IP address segment is 192.168.1.0/24 and the destination IP address segment is 192.168.2.0/24. According

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to this rule, the device with the IP address 192.168.1.x cannot access the device with the IP address 192.168.2.x, but the device with the IP address 192.168.2.x can access the device with the IP address 192.168.1.x. To block bidirectional access in this network segment, you need to configure another block rule with the source IP address segment 192.168.2.0/24 and destination IP address segment 192.168.1.0/24.

- L2TP/PPTP VPN supports only IP address-based access control and the effective ports must be in the LAN.

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System Management

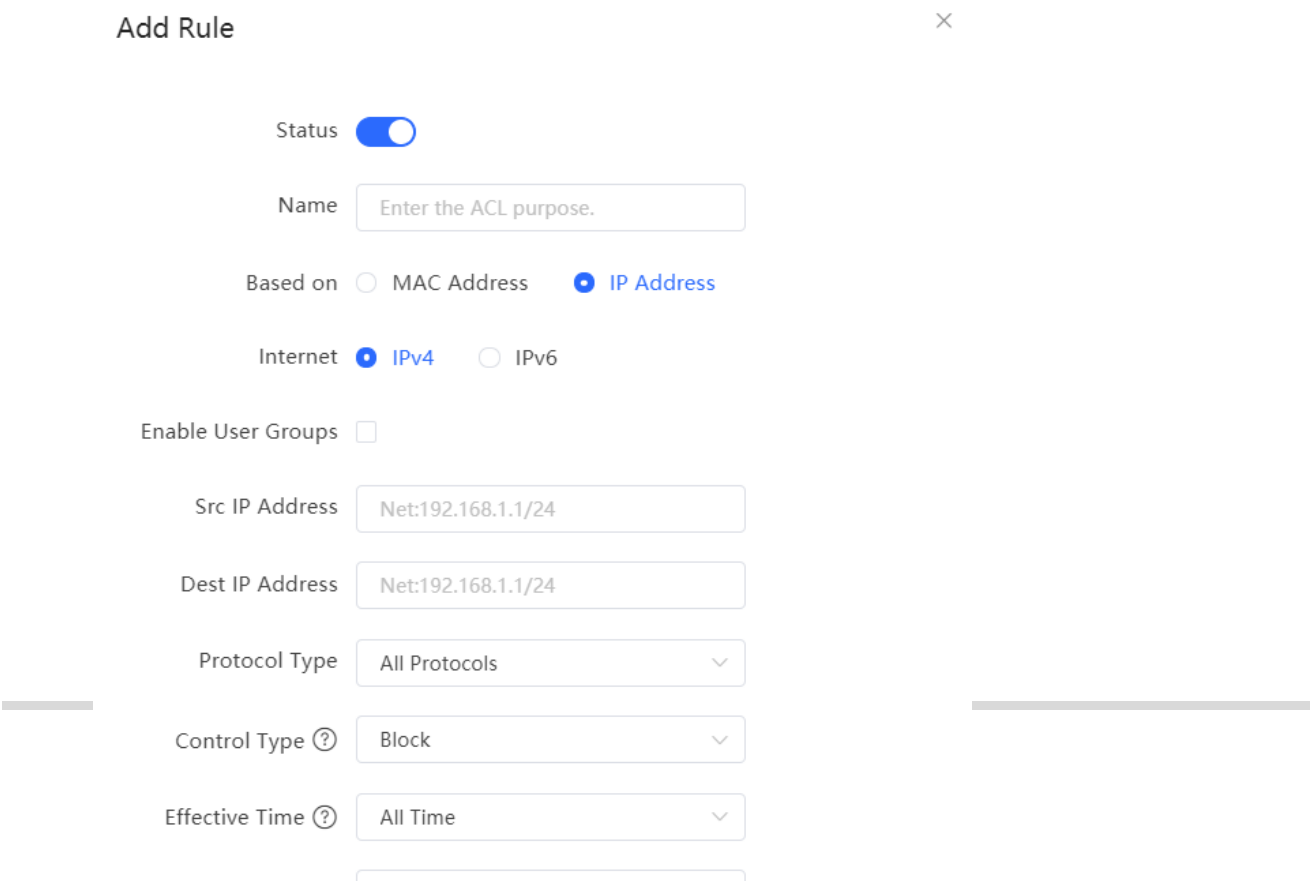

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**Table 9-14 IP address-based ACL configuration**

| Parameter | Description |
|---|---|
| Status | Indicate whether the rule is enabled. You can click to switch the status. When this toggle switch is off, the rule will not take effect. |
| Name | Identify the purpose of the rule, which can be customized by the user. |
| Internet | Format of the IP address. Both IPv4 and IPv6 address formats are supported. |

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System Management

| Parameter | Description |
| --- | --- |
| Src IP Address: Port | The source IP address and port of the packet. If this parameter is left empty, it means all IP addresses and ports.<br>If the Internet is set to IPv4, then the format of the IP address is IPv4. Example: 192.168.1.1/24.<br>If the Internet is set to IPv6, then the format of the IP address is IPv6. Example: 2000::1. |
| Dest IP Address: Port | The destination address and port of the packet. If this parameter is left empty, it means all IP addresses and ports.<br>If the Internet is set to IPv6, then the format of the IP address is IPv6. Example:192.168.1.1/24<br>If the Internet is set to IPv6, then the format of the IP address is IPv6. Example:2000::1 |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
|---|---|
| Protocol Type | Specify the protocol type for data packet matching. The options are TCP, UDP, and ICMP. |
| Control Type | Specify the method for processing data packets matching the conditions.<br>Allow: Permit the data packets matching the conditions.<br>Block: Drop the data packets matching the conditions. This rule is valid only in one direction, and does not block the reverse flow. |
| Effective Time | You can select a time range defined in Section 9.3 Time Management from the drop-down list box, or select Custom and manually enter the specific time range. |

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System Management

| Parameter | Description |
| --- | --- |
| Interface | Select the port on which the rule applies.<br>LAN: The rule takes effect on a LAN port to control data packets to the LAN.<br>WAN: The rule takes effect on a WAN interface to control data packets received from or sent to the Internet. |
| Src Networks | Indicate the source interface that matches the rule. If the rule is based on the MAC address, then this field is set to "All Intranets" by default. If the rule is based on IP addresses, then this field can be set to "All Networks", "All Extranets", "All Intranets", or a specific network. |

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System Management

| Parameter | Description |
| --- | --- |
| Dest Networks | Indicate the destination interface that matches the rule. If the rule is based on the MAC address, then this field is set to "All Extranets" by default. If the rule is based on IP addresses, then this field can be set to "All Networks", "All Extranets", "All Intranets", or a specific network. |

To limit the session state of packets matching the rule, you can click **Advanced Settings** and select one or more session states as required. These session states include New, Established, Related, and Invalid. Then, click **OK**.

**Note**

If no session state is selected, the rule matches all sessions by default.

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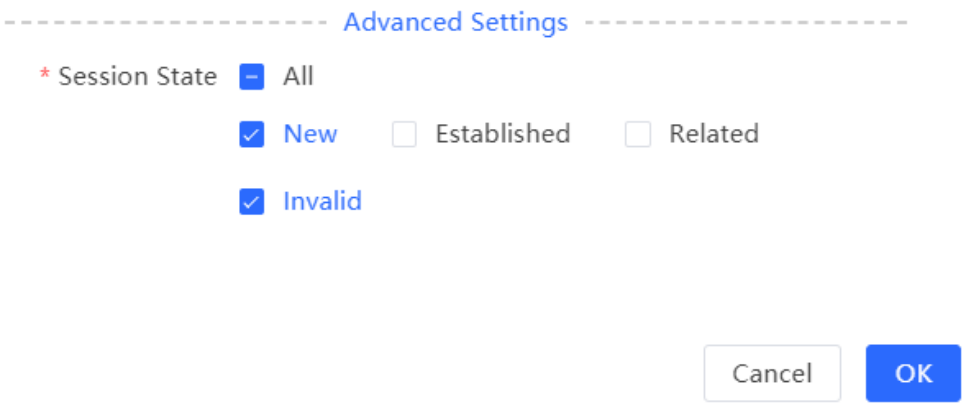


## 9.8 Clients Management

### 9.8.1 Managing Online Clients

The **Client List** page displays client information. You can create client groups based on identified client information.

# 1 Configuration Guide SD-WAN

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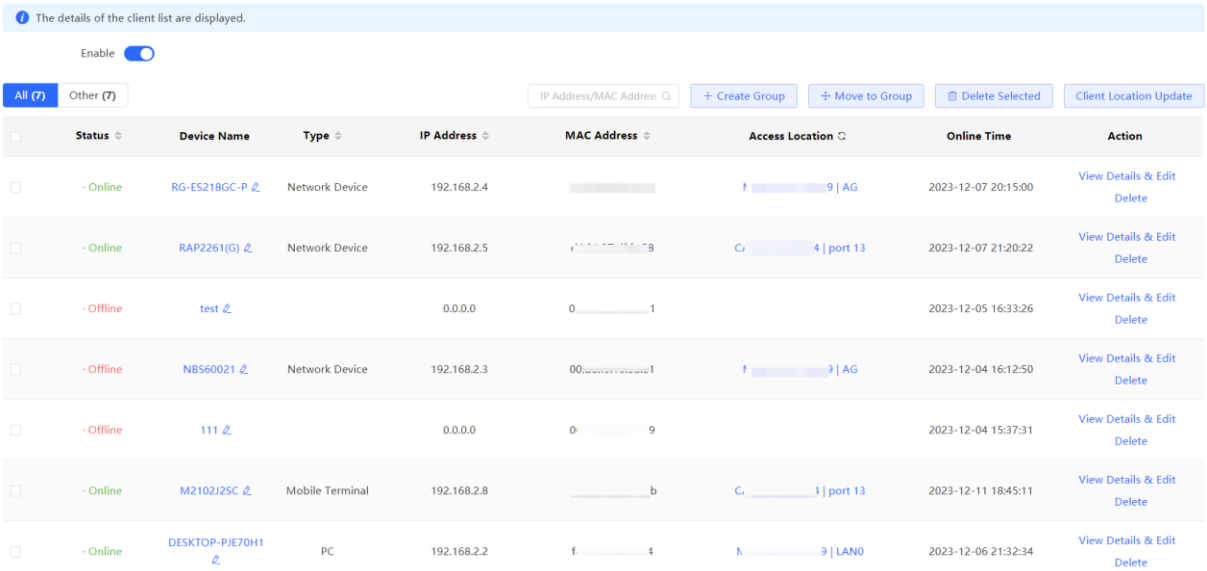
## System Management

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Clients Management**.



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System Management

### 1. Viewing and Editing Client Information

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Clients Management > Client List**.

(1) Select the client to view details on the **Client List** page.

(2) Click **View Details & Edit**. The system displays details of the client.

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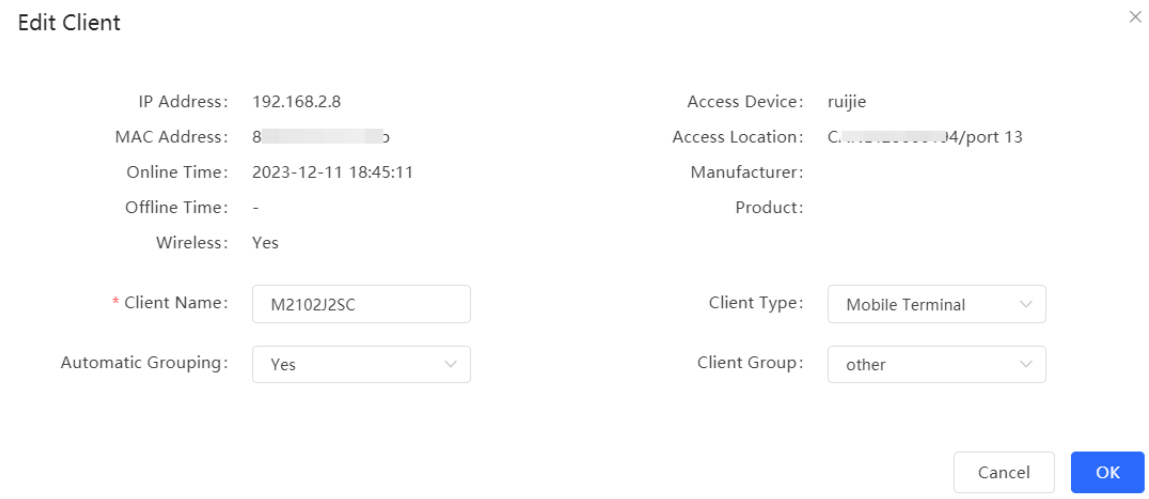
System Management




(3) Edit client information as required.

- **Client Name**: indicates the client name.
- **Client Type**: indicates the client type.

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- **Automatic Grouping**: indicates automatic client grouping.
- **Client Group**: indicates the client group.

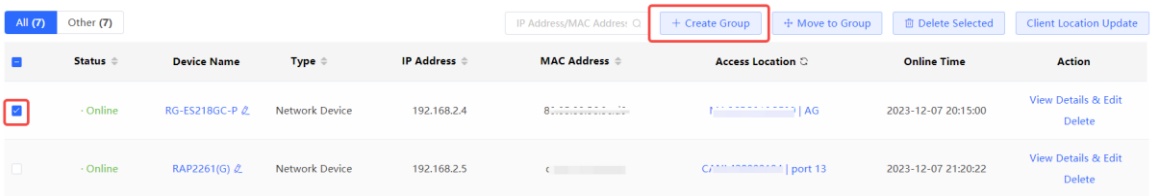
(4) Click **Save**.

### 2. Creating a Client Group

You can create a client group to manage multiple clients uniformly.

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Clients Management** > **Client List**.

(1) Select the clients to be grouped in **Client List** and click **Create Group**.




(2) The system identifies client rules automatically.

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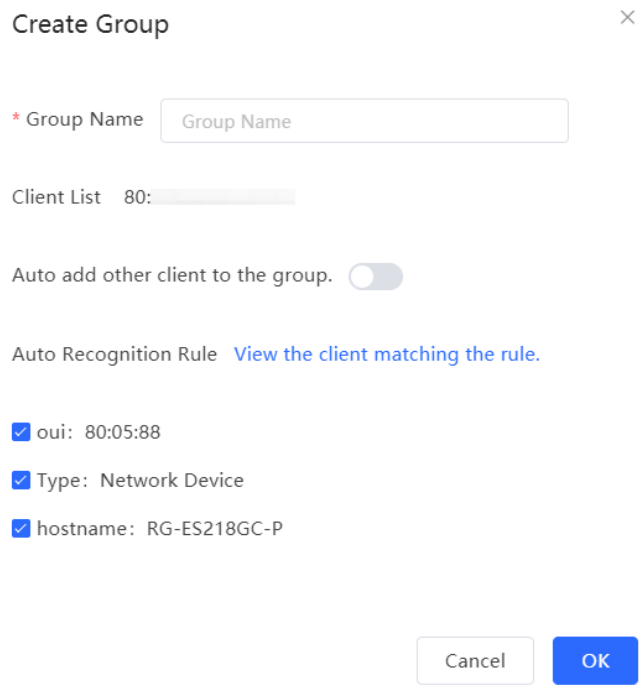
System Management



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(3) Set a group name.

(4) (Optional) Enable **Auto add other client to the group** to add other clients in **Client List** to the group.

(5) (Optional) Click **View the client matching the rule** to view the client list where all clients match the same rule based on **oui**, **type**, or **hostname**

(6) Click **Save** to create a client group.

### 3. Moving a Client to Another Group

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Clients Management** > **Client List**.

(1) Select the clients to be moved to another group and click **Move to Group**.

(2) Select a group from the **Group Name** drop-down list box to move the clients to the group.

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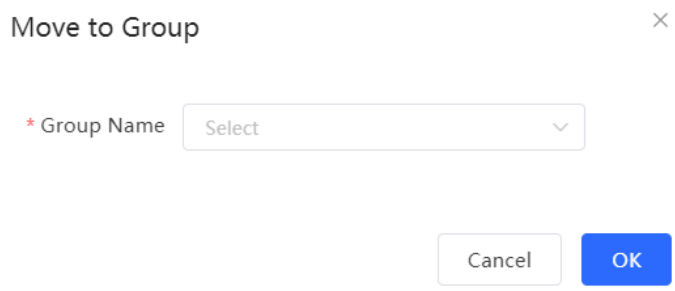


## 9.8.2 Managing Client Groups

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Clients Management > Client Group Config**.

You can specify client rules manually to create a client group and modify attributes of the client group.

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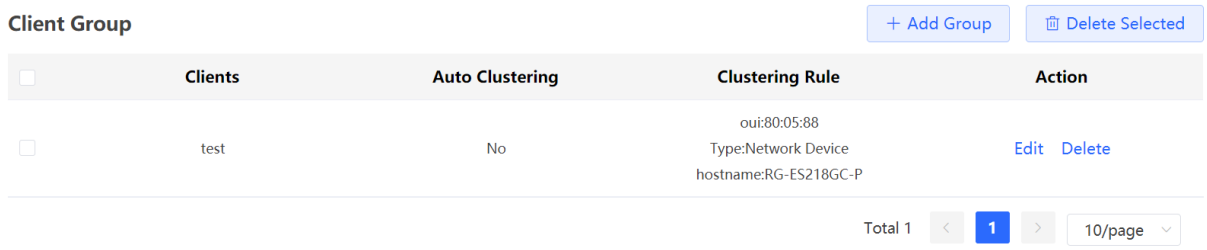
System Management




### 1. Creating a Client Group

(1) Click **Add Group**.

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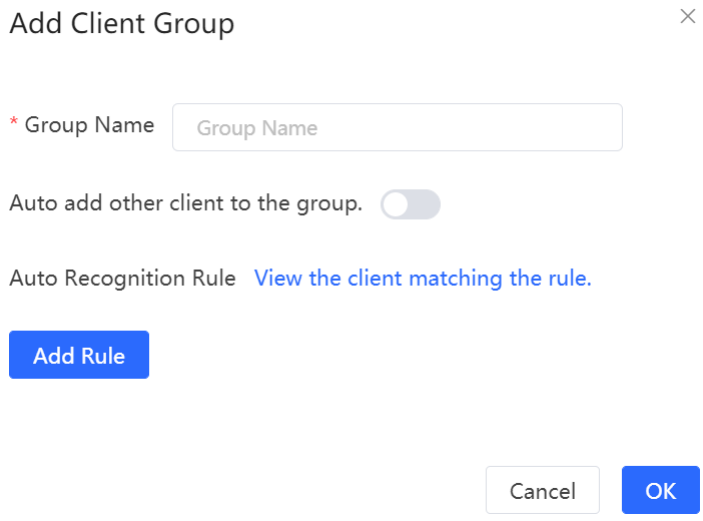


(2) Configure **Group Name**.

(3) Click **Add Rule** to create a client rule.

# 1 Configuration Guide SD-WAN

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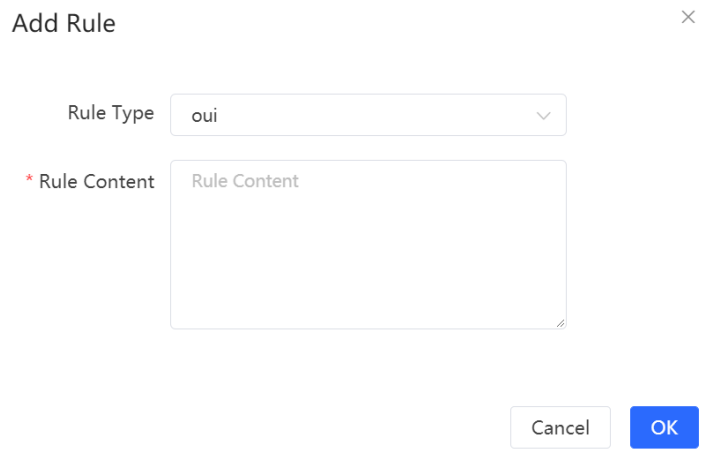


The system supports the following three types of rules.

- **oui:** indicates that the first three bytes of a MAC address is used as a grouping rule, such as 70:B5:E8.
- **Type**: indicates that the client type is used as a grouping rule. The client types include computers, mobile terminals, cameras, printers, servers, network devices, and monitors.

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System Management

- **hostname**: indicates that the hostname of a device is used as a grouping rule, such as DESKTOP-PJE70H1.

(4) Select at least one new rule.

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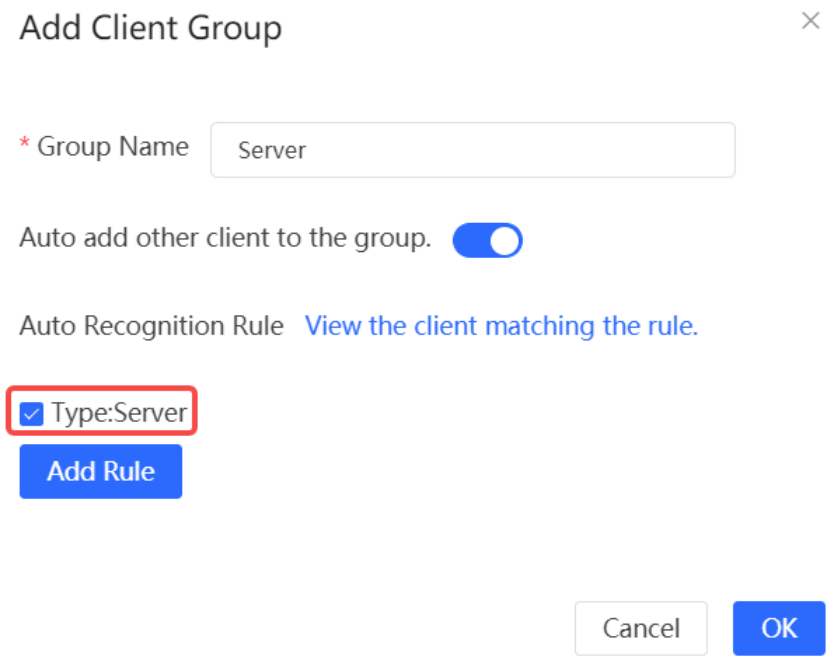

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(5) (Optional) Click **View the client matching the rule** to view the client list where all clients match the same rule based on **oui**, **type**, or **hostname**.

(6) (Optional) Enable **Auto add other client to the group** to add other clients in **Client List** to the group.

(7) Click **OK**.

### 2. Editing Client Group Information

(1) Select the client group to be edited in **Client Group** and click **Edit**.



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System Management

(2) Configure grouping rules. Uncheck a rule or add a new rule.

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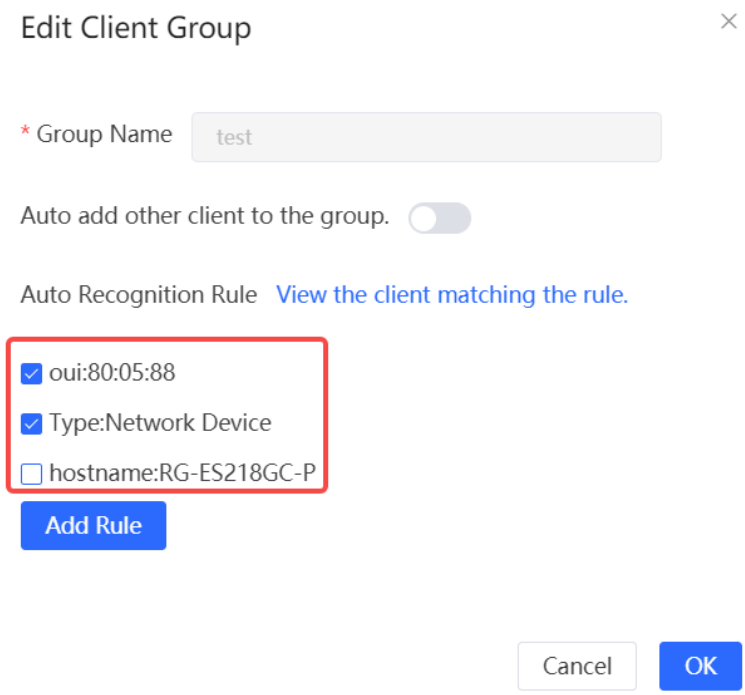
System Management



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(3) Click **OK**.

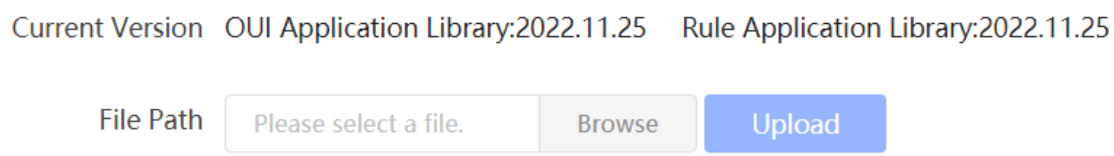
### 9.8.3 Upgrading a Client Application Library

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Clients Management > Client Library Upgrade**.

Upload an application library upgrade file manually to upgrade a client application library.

**Note**

You can upgrade a client application library only when the device flash space and memory space are sufficient.



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System Management

(1) Click **Browse** to select an application library upgrade file.

(2) Click **Upload** to upload the application library upgrade file. Then the system upgrades the application library automatically.

## 9.9 Upgrading the Application Library

### 9.9.1 Overview

The app control function relies on the accuracy of the application library, and the application library is updated with the app version. You can upgrade the application library to the latest version on the **Application Library Update** page.

### 9.9.2 Local Upgrade

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Application Library Update**> **Local Application Library Update**.

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System Management

**Caution**

- Upgrading the application library version takes about one minute to take effect. Do not cut off power during the upgrade. You can view the current application library version on the page.
- Perform subsequent operations based on the memory information displayed on the page. If the memory is insufficient, you are advised to restart the device and then upgrade the application library.
- After the application library is upgraded, the original app control policy may become invalid. Therefore, exercise caution when performing this operation.

(1) Click **Browse**. Select an application library upgrade file.

(2) Click **Upload** to upload the upgrade file.

(3) Click **OK**. Wait for the system to automatically complete the upgrade.

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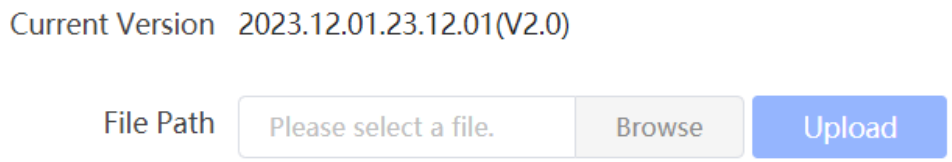


### 9.9.3 Online Upgrade

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Application Library Management** > **Application Library Management**.

Enable **Auto Update Version**. When the system identifies the latest version, the application library is automatically upgraded.

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## 9.10 Network Behavior Settings

### 9.10.1 Internet Alert

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Network Settings** > **Internet Alert**.

Click **Add** to create a network access notification policy and notify users of their online behaviors or application usage.

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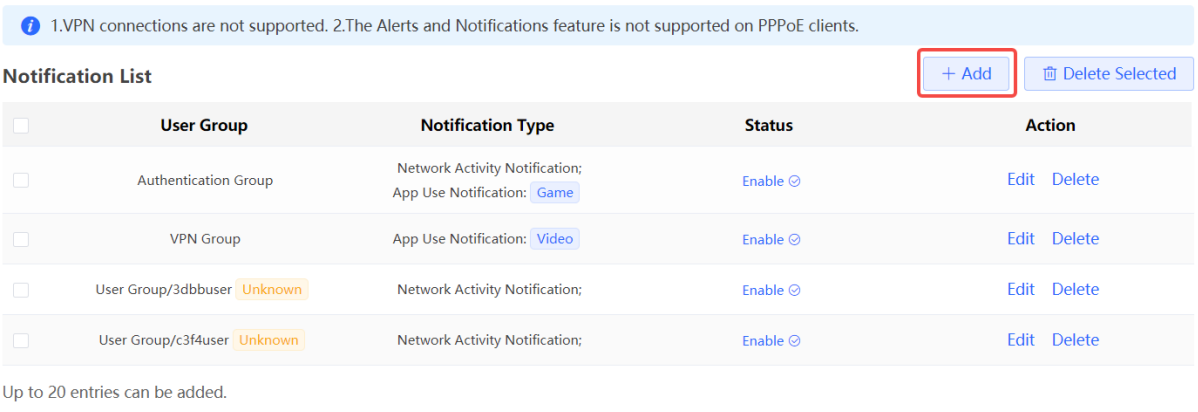

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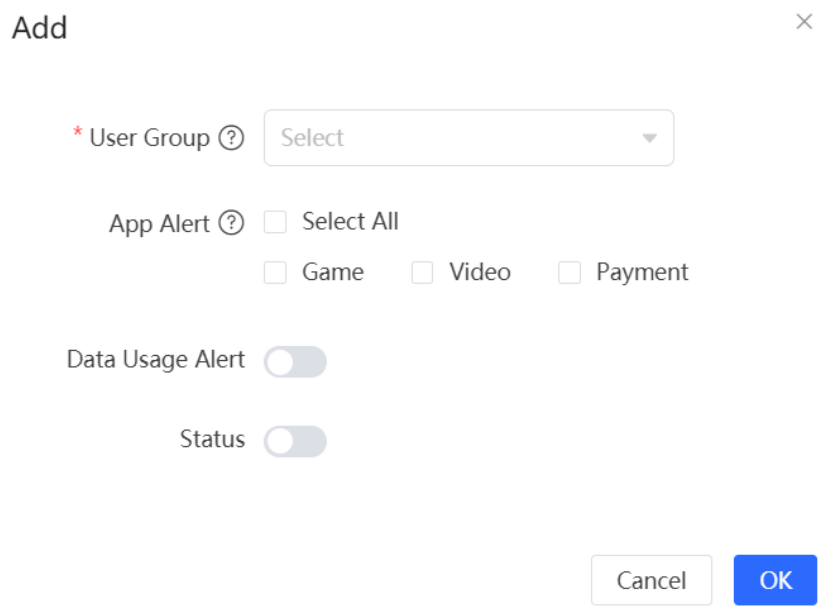

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**Table 9-15 Internet Access Notification Configuration Parameters**

| Parameter | Description |
|---|---|
| User group | Select a user group managed by the policy from the user group list. For details about how to set the user group list, see Section 9.2 User Management.<br>If you select all members of a user group, the policy takes effect on the entire user group (and members added to the user group later). |
| App Alert | To enable the **App Alert** function, enable **Traffic Audit** first. For details, see Section 3.4 Supporting Traffic Monitoring. |
| App category | When **App Alert** is enabled, you need to select the application category for the policy. When a user uses an application in the corresponding application category, a notification will be received. |
| Data Usage Alert | After the **Data Usage Alert** function is enabled, you will receive a notification when a specified user accesses the Internet. |

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
Ruijie Cloud's SD-WAN solution can effectively meet the above requirements and has the following advantages compared with traditional WAN solutions:

(1) **Networking without public IP addresses:** Networking without public IP addresses enables remote connectivity across any broadband connection. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=017d4b240fbc443c9b383d63c35c5aac.

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System Management

| Parameter | Description |
| --- | --- |
| Status | Enable/disable the **Data Usage Alert** function. If it is disabled, the policy does not take effect. |

## 9.10.2 Online Time Control

**Note**

The **Online Time Control** feature can only be configured on the app, and the web interface only displays the synchronization status.

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Network Settings** > **Online Time Control**.

The **Online Time Control** list displays the type, schedule, accounting status, status, and operation information.

# 1 Configuration Guide SD-WAN

**Specification**

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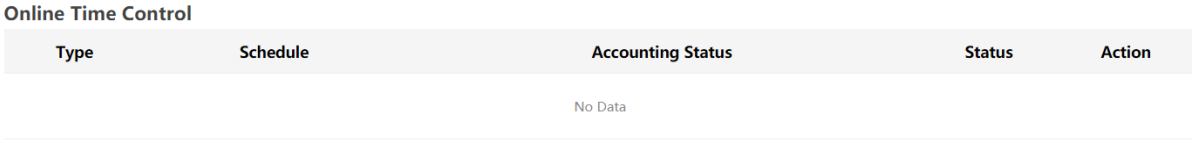


## 9.10.3 Internet Block Policy

**Note**

The Internet block policy can be configured only on the app, and the web interface only displays the synchronization status.

Choose **One-Device** > **Gateway** > **Config** > **Behavior** > **Network Settings** > **Internet Block Policy**.

The **Policy List** displays the user group, start time of network disconnection, end time of network disconnection, start time of temporary access, and end time of temporary access.

# 1 Configuration Guide SD-WAN

**Specification**

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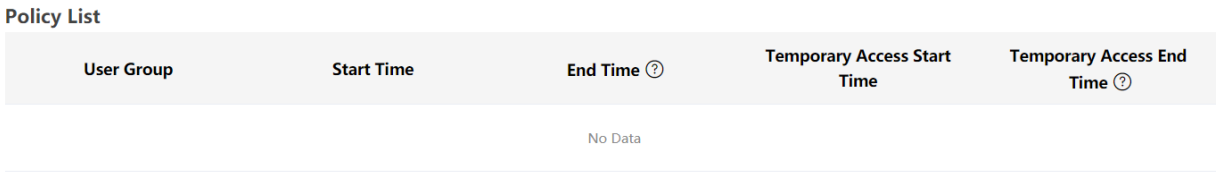
System Management



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# 10 Online Client Management

## 10.1 Overview

Choose **Network-Wide** > **Clients**.

The client list displays wired, wireless, and users not connected on the current network, including the username, connection mode, associated device, IP/MAC address, IP address binding status, rate, and related operations.

# 1 Configuration Guide SD-WAN

**Specification**

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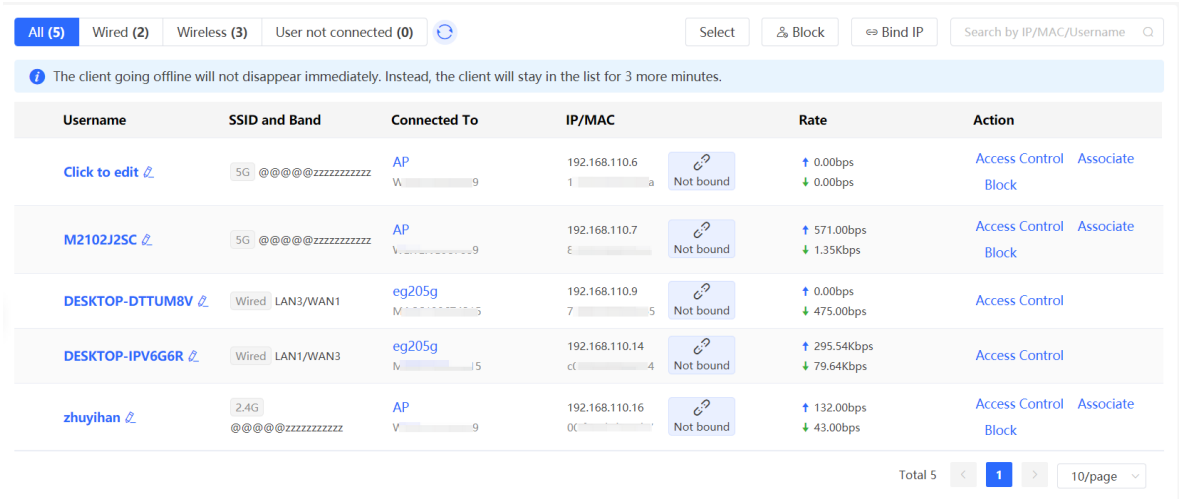
System Management




- Click **Not Bound** in the **IP/MAC** column to bind the client to a static IP address.
- Click a button in the **Action** column to perform the corresponding operation on the online client.
  - Wired: Only access control can be configured.

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

- Wireless: Access control, associate, and block can be configured.

**Table 10-1 Online Client Management Configuration Parameters**

| Parameter | Description |
|---|---|
| Username | Name of the connected client. |
| SSID and Band | Indicates the access mode of the client, which can be wireless or wired. The SSID and frequency band is displayed when a client is connected wirelessly. |
| Connected To | Indicates wired or wireless connection, the associated device and SN. |
| IP/MAC | Indicates the IP address and MAC address of the client. |
| Rate | Indicates the uplink and downlink rates of the client. |
| Action | You can click the corresponding button to perform access control, association, and block operations on online clients. |

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

| Parameter | Description |
|---|---|
| Signal Quality | The Wi-Fi signal strength of the client and the associated channel.<br>Note: This information is displayed only in the wireless online client list. |
| Negotiation Rate | Negotiation rate between the client and the AP.<br>Note: This information is displayed only in the wireless online client list. |
| Online Duration | Online duration of the client.<br>Note: This information is displayed only in the wireless online client list. |
| Limit Speed | Indicates the wireless rate limiting of the current client. For details, see Section 10.6 Configuring Client Rate Limiting.<br>Note: This information is displayed only in the wireless online client list. |

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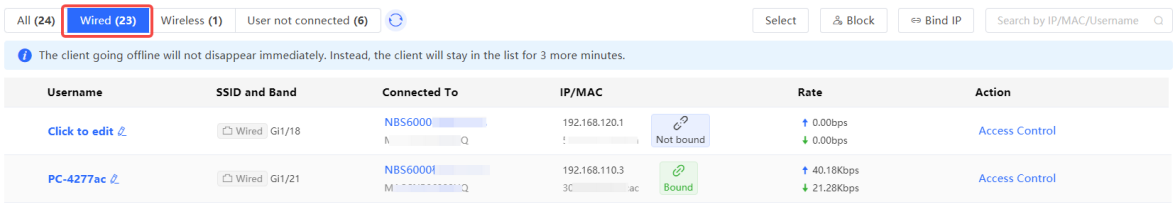
System Management

### 1. Wired Clients

Click the **Wired** tab to see details about wired clients.




### 2. Wireless Clients

Click the **Wireless** tab to see details about wireless clients.

# 1 Configuration Guide SD-WAN

**Specification**

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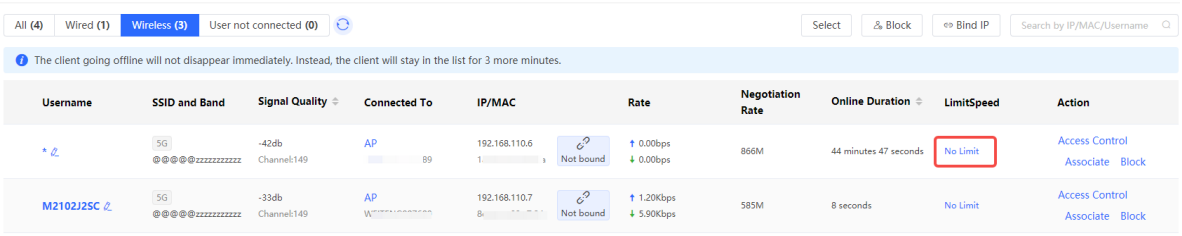
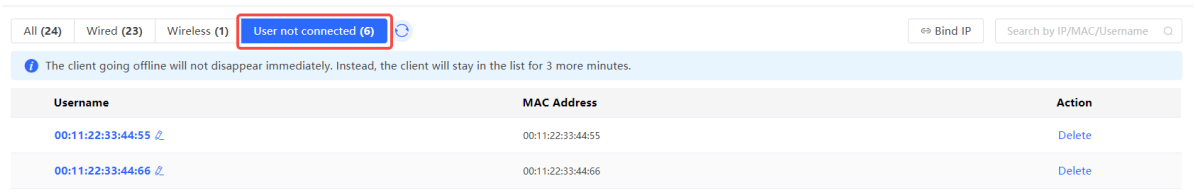



### 3. User not connected

Click the **User not connected tab** to see details about clients waiting to connect. This list includes clients tagged manually or recognized as devices previously connected to the network but not currently listed in device management or online client lists. To remove a client device, click **Delete**.



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## 10.2 Configuring Client IP Binding

Choose **Network-Wide** > **Clients**.

IP address binding is a security and access control policy that associates a specific IP address with a specific device or user to achieve identity authentication, access control, monitoring, and accounting.

- Single client IP address binding

  Select the client to be bound with an IP address in the list, click **Not bound**, and click **OK** in the pop-up box to bind the client to a static IP address.

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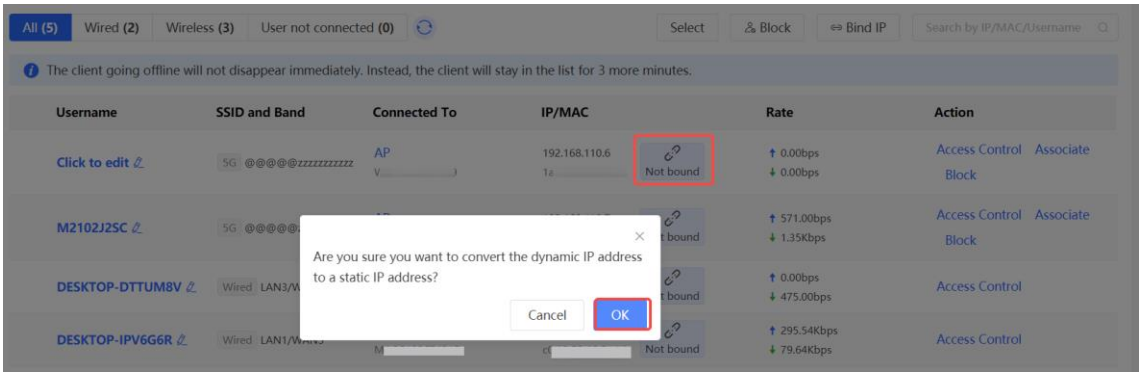
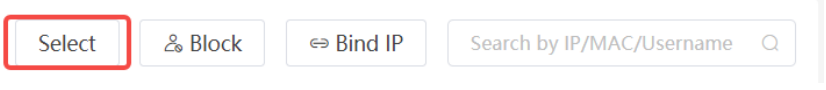
System Management




- Batch IP binding

  Click **Select**.



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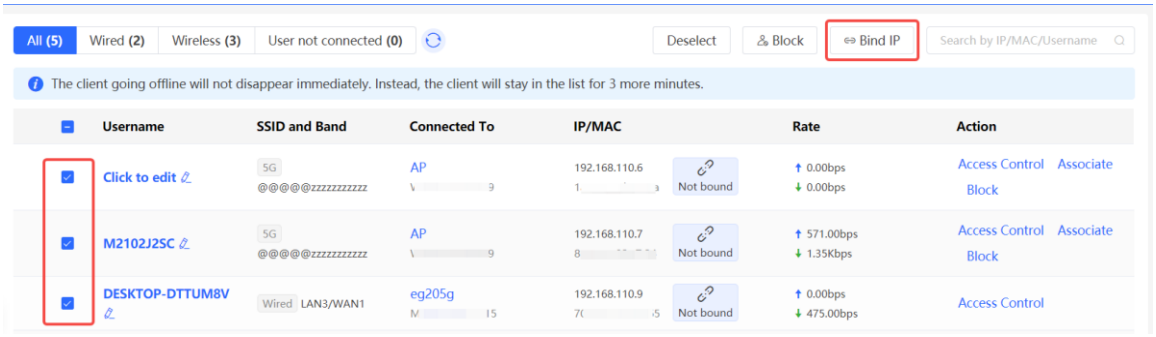
System Management

Select the clients to be bound, click **Bind IP**, and click **OK** in the pop-up box to bind the selected clients to a static IP address.




- Unbind IP address

  Select the client to be unbound from the list, click **Bound**, and click **OK** in the pop-up box.

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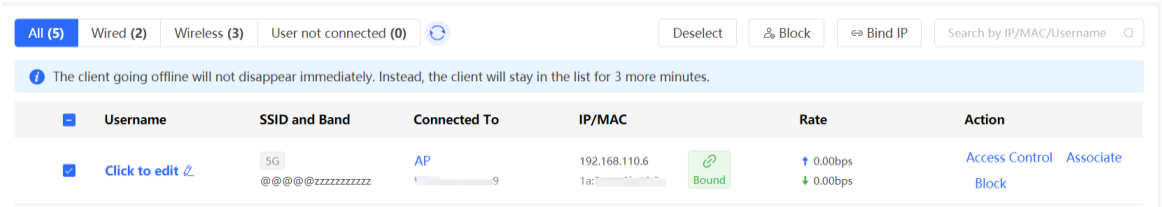


## 10.3 Configuring Client Access Control

Choose **Network-Wide** > **Clients**.

Select a client in the list and click **Access Control** in the **Action** column. You will be redirected to the **Edit Rule** page, where a MAC-based access control rule is automatically generated. The name and MAC address are automatically generated based on the selected client. After selecting the control type and effective time, click **OK** to create an access control rule for the client. For details, see Section Configuring a MAC Address-based ACL Rule.

# 1 Configuration Guide SD-WAN

**Specification**

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Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.

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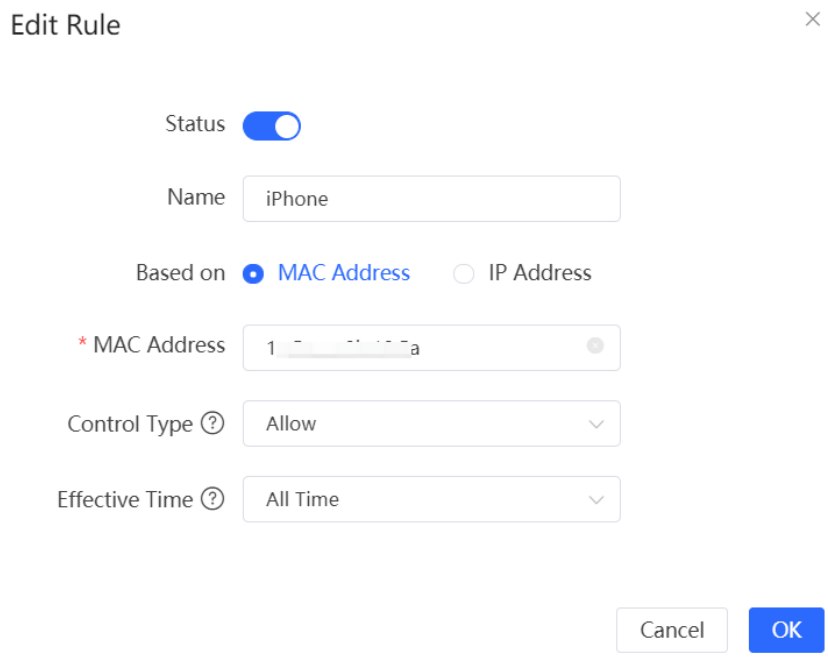
System Management



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## 10.4 Configuring Client Association

Choose **Network-Wide** > **Clients**.

**Note**

The Client Association feature applies only to wireless clients.

Select a client in the list and click **Associate** in the **Action** column. You will be redirected to the **Edit Association** page. The **Client** field is populated with the MAC address of the selected client and cannot be modified. The **Associated Device** field is populated with the associated device of the client by default. Set the SSID and the Forced Association feature as required, and click **OK**. For details, see Section 5.12 Client Association.

# 1 Configuration Guide SD-WAN

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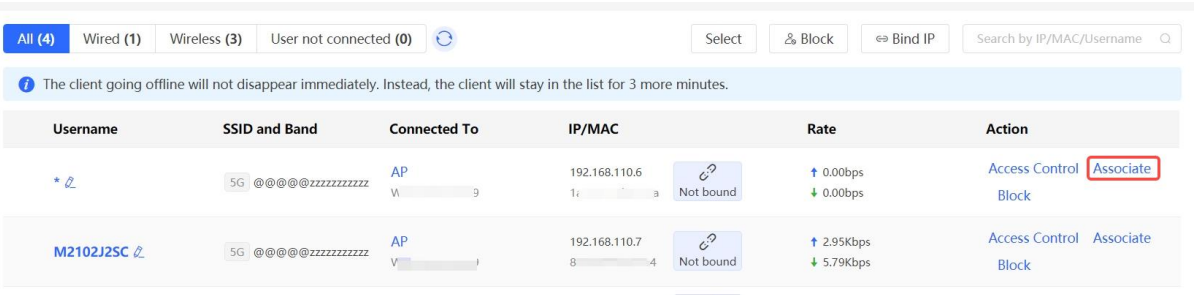

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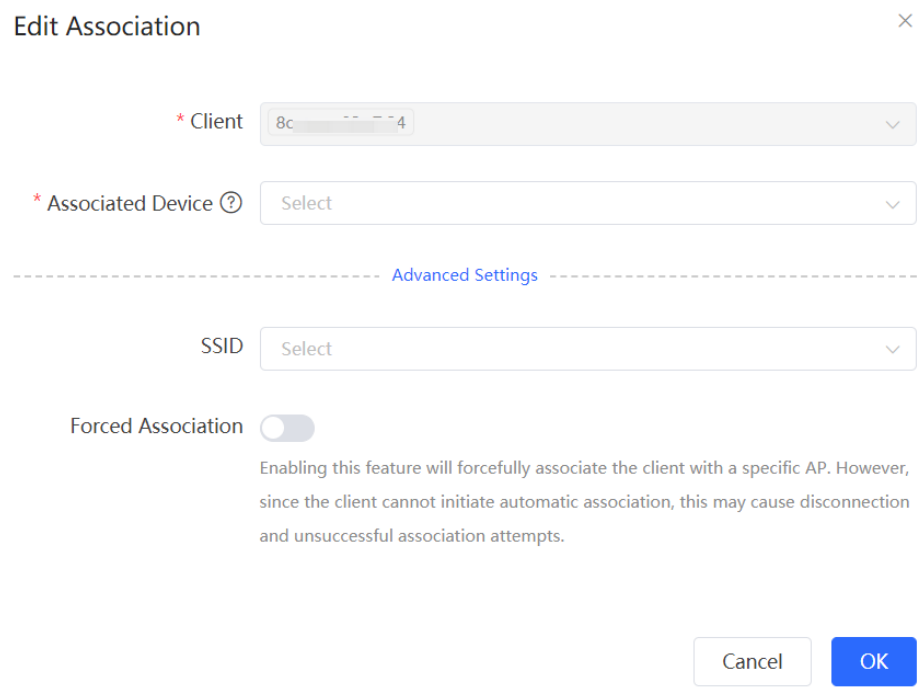

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## 10.5 Blocking Clients

Choose **Network-Wide** > **Clients**.

An unauthorized client may occupy network bandwidth and pose security risks. You can block specified clients to solve the unauthorized access problem.

**Note**

Client Block is available only for wireless clients.

- Block a single client

  Select a client to block in the list, click **Block** in the **Action** column, and click **OK** in the pop-up box to block the selected client.

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**Specification**

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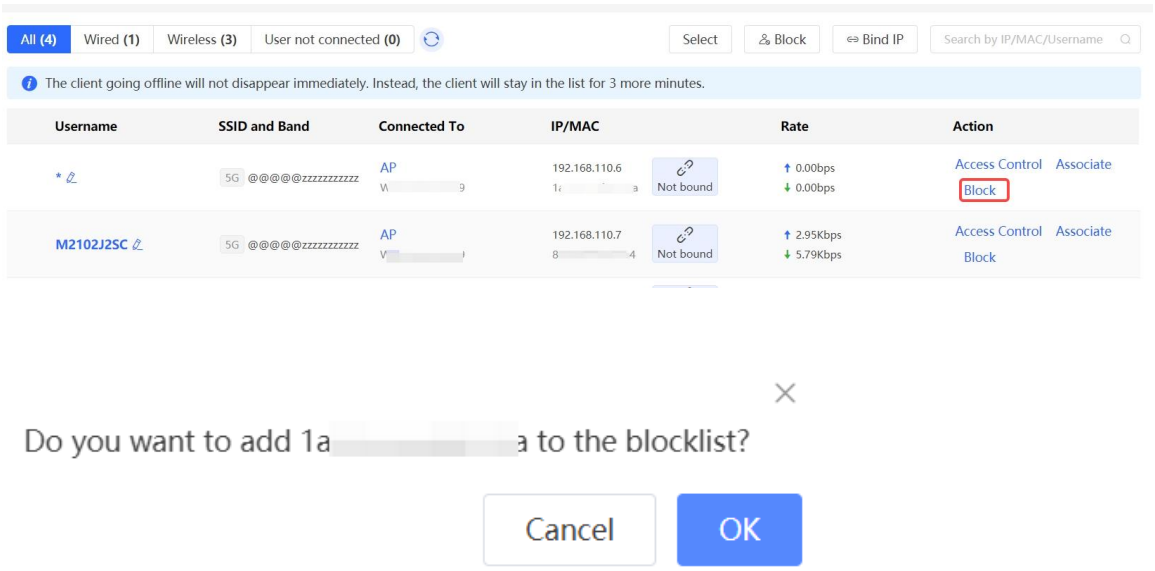





- Batch block clients

  Click **Select**.

# 1 Configuration Guide SD-WAN

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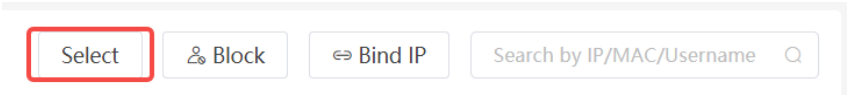
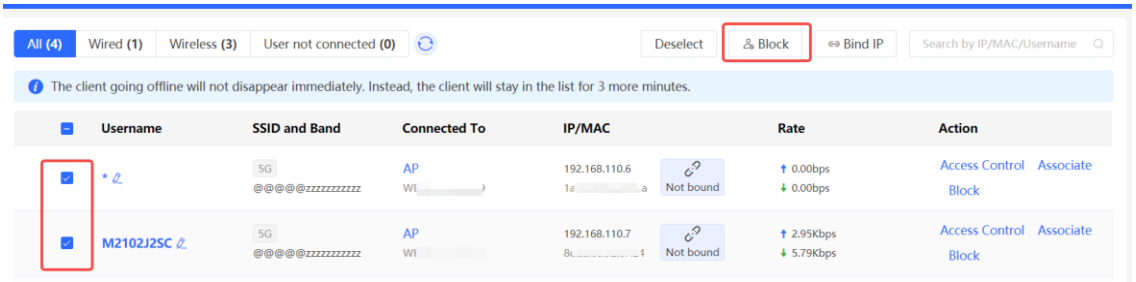



Select the target clients, click **Block**, and click **OK** in the pop-up box to block the selected clients.




- Cancel Block

  Choose **Network-Wide** > **Workspace** > **Wireless** > **Blocklist/Allowlist** > **Global Blocklist/Allowlist.**

  Select the client to be removed from the blocklist in the wireless blocklist and click **Delete**.

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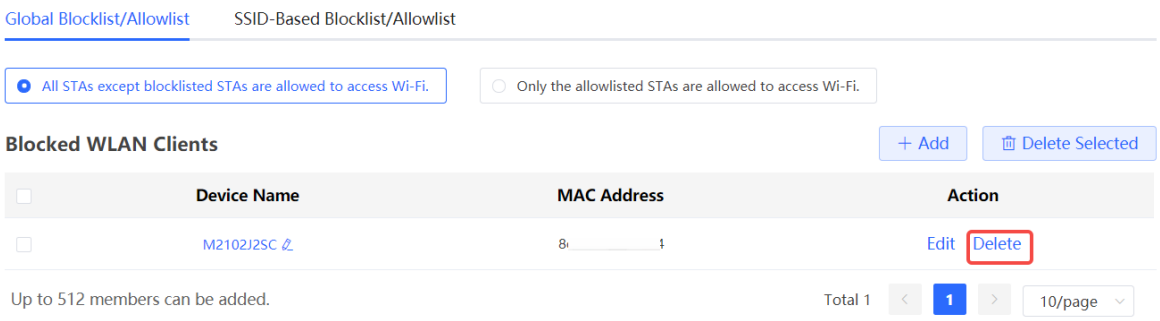


## 10.6 Configuring Client Rate Limiting

Choose **Network-Wide** > **Clients** > **Wireless**.

To ensure fair resource allocation, the network administrator can implement wireless rate limiting to prevent some users or devices from occupying a large amount of bandwidth and affecting the network experience of other users.

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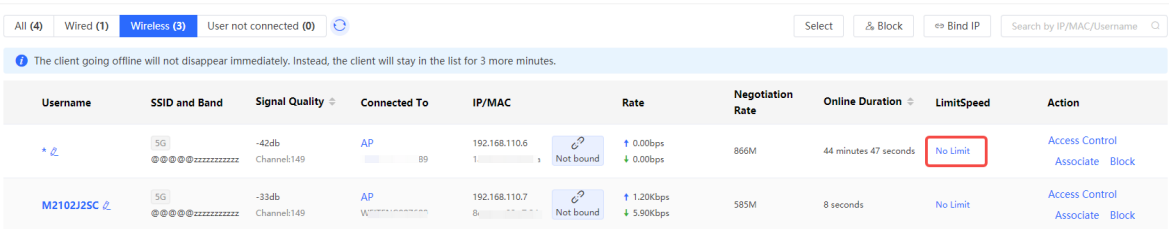
## System Management

**Note**

Rate limiting applies only to wireless clients.

- Configure rate limits for clients

  Click the **Wireless** tab, click the **LimitSpeed** column in the table, set the uplink rate limit and downlink rate limit, and click **OK**.



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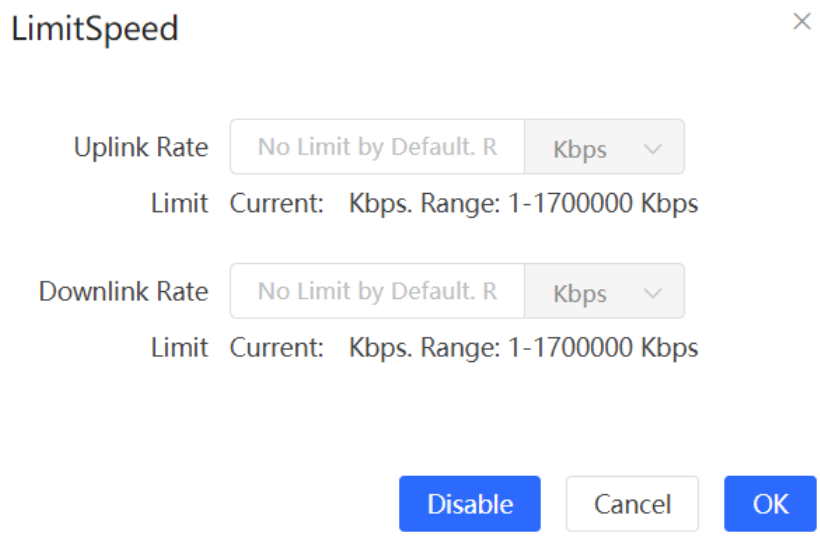


- Cancel rate limits

  Click the **Wireless** tab, click the **LimitSpeed** column in the table, and click **Disable**.

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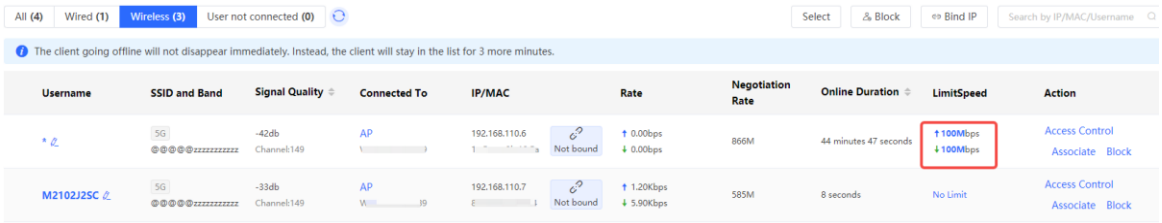

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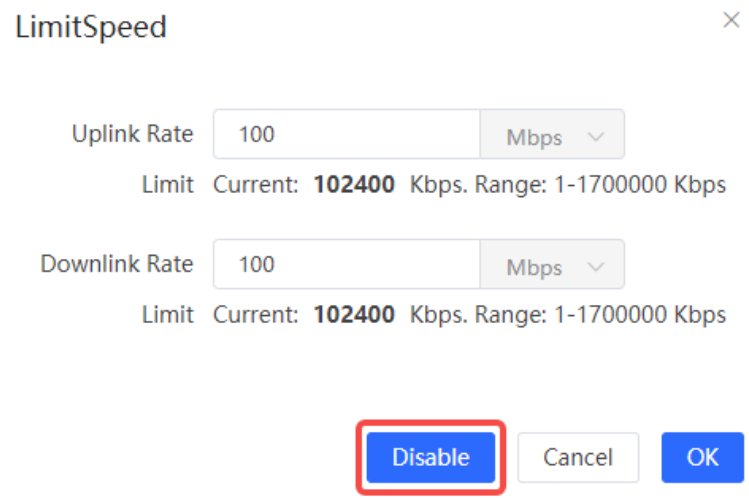

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# 11 VPN

## 11.1 Configuring IPsec VPN

### 11.1.1 Overview

#### 1. IPsec Overview

IP Security (IPsec) is a Layer 3 tunnel encryption protocol defined by the IETF. IPsec is used to provide end-to-end encryption and verification services in the network to provide high quality and interoperability for data transmission over the network and ensure transmission security by using cryptographic algorithms. The communicating parties obtain the following security services at the IP layer through encryption and data source authentication:

- Confidentiality: The IPsec sender encrypts packets before transmitting the packets over the network.
- Data integrity: The IPsec receiver authenticates packets received from the sender to ensure that data is not

# 1 Configuration Guide SD-WAN

**Specification**

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tampered with during the transmission.

- Data authentication: The IPsec receiver authenticates whether the sender of IPsec packets is valid.
- Anti-replay: The IPsec receiver detects and denies expired or repeated packets.

The IPsec protocol is widely used for communication between the HQ and branches of an organization. Currently, the device can be deployed as the IPsec server or client. A secure tunnel is established between the HQ and each branch based on the IPsec protocol to ensure the confidentiality of data transmission and improve network security.

### 2. IKE Overview

IPsec provides secure communication between two endpoints, which are called IPsec peers. Security Association (SA) is the establishment of shared security attributes between the peers to support secure communication. An SA may include attributes such as: security protocol used by the peers, characteristics of data flows to be protected, encapsulation mode of data transmitted between the peers, encryption and authentication algorithms, keys for secure data conversion and transmission, and the SA lifetime. When you configure IPsec, you can use the Internet Key Exchange (IKE) protocol to establish an SA. IKE provides automatically negotiated keys for establishing and maintaining SAs, simplifying IPsec usage and management.

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**3. IPsec Security Policy**

IPsec security policies define security proposals (equivalent to SA) for data flows. You can configure matching security policies on both parties engaged in the communication to establish IPsec tunnels between the IPsec client and the IPsec server, protecting the communication data. An IPsec security policy consists of two parts: basic settings and advanced settings. Advanced settings are optional and include the specific IKE policy and connection policy. You can keep the default settings unless otherwise specified. For details, see the configuration steps below.

## 11.1.2 Configuring the IPsec Server

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **IPsec** > **IPsec Security Policy**.

**1. Basic Settings**

Click **Add**. In the dialog box that appears, set **Policy Type** to **Server**, enter the policy name and local subnet range, set the pre-shared key, and click **OK**.

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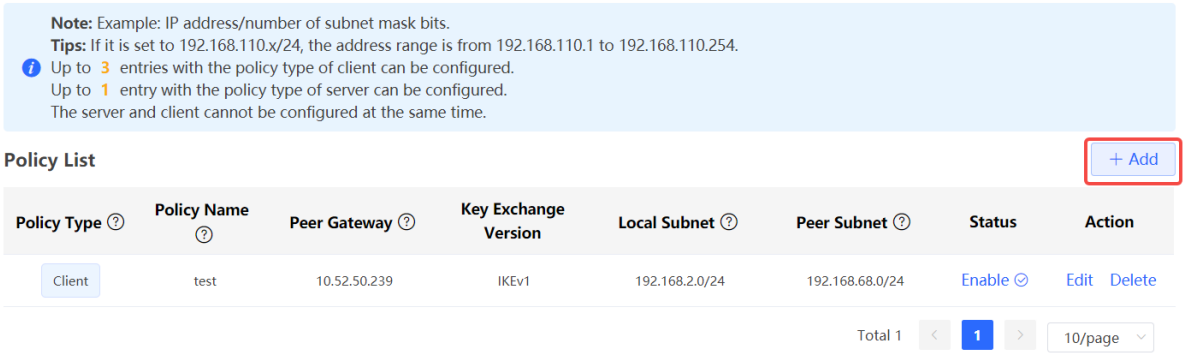
System Management



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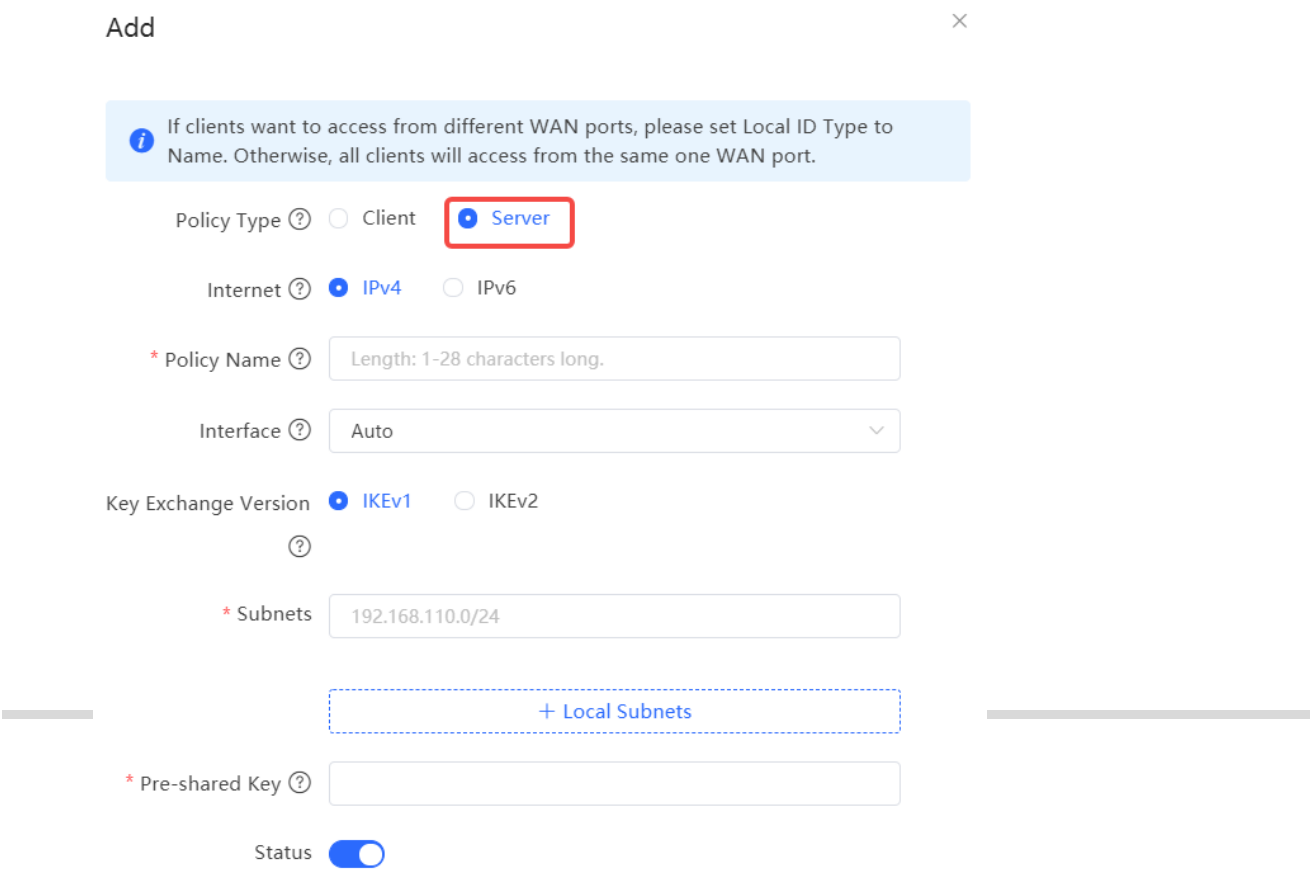

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System Management

**Table 11-1 IPsec server basic settings**

| Parameter | Description |
|---|---|
| Policy Name | Specify the name of the IPsec security policy. The name must be a string of 1 to 28 characters. |
| Internet | Format of the IP address. Both IPv4 and IPv6 address formats are supported. |
| Interface | Select a local WAN interface from the drop-down list box. The **Peer Gateway** parameter set for the communication peer (IPsec client) must use the IP address of the WAN interface specified here.<br>In the multi-line scenario, you are advised to set this parameter to **Auto**. |

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System Management

| | |
|---|---|
| Key Exchange Version | Select the IKE version for SA negotiation. There are two options available:<br>● IKEv1: The negotiation of SA in IKEv1 primarily consists of two phases.<br>○ Phase 1: The purpose is to establish an IKE SA using one of two negotiation modes: Main Mode and Aggressive Mode. Main Mode requires six ISAKMP (Internet Security Association and Key Management Protocol) messages to complete the negotiation, while Aggressive Mode only requires three ISAKMP messages. Aggressive Mode offers faster IKE SA establishment. However, it combines key exchange and identity authentication, which means it does not provide identity protection.<br>○ Phase 2: The purpose is to establish an IPsec SA for data transmission, utilizing a fast exchange mode that requires only three ISAKMP messages to complete the negotiation.<br>● IKEv2: In IKEv2, the negotiation process for SA is simplified. The establishment of one IKE SA and one pair of IPsec SAs can be accomplished using two exchanges with four messages. If there is a need to establish more than one pair of IPsec SAs, only one additional exchange is needed for each pair. This enables the negotiation to be completed with |

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| Parameter | Description |
|---|---|
| | just two messages per pair. |
| Subnets | Specify the local subnet address range for the data flows to be protected, that is, the LAN port network segment of the server. The value is the combination of IP address and subnet mask. |
| Pre-shared Key | Specify the same pre-shared key as the credential for authentication between communicating parties. For higher security, different peers must be configured with different pre-shared keys. That is, a pair of interface bound to the IPsec server and peer gateway of the IPsec client must be configured with the same unique pre-shared key. |
| Status | Specify whether to enable the security policy. |

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**2. Advanced Settings (Phase 1)**

- The key exchange version in the basic setting is IKEv1:

  Click **1. Set IKE Policy** to expand the configuration items. Keep the default settings unless otherwise specified.

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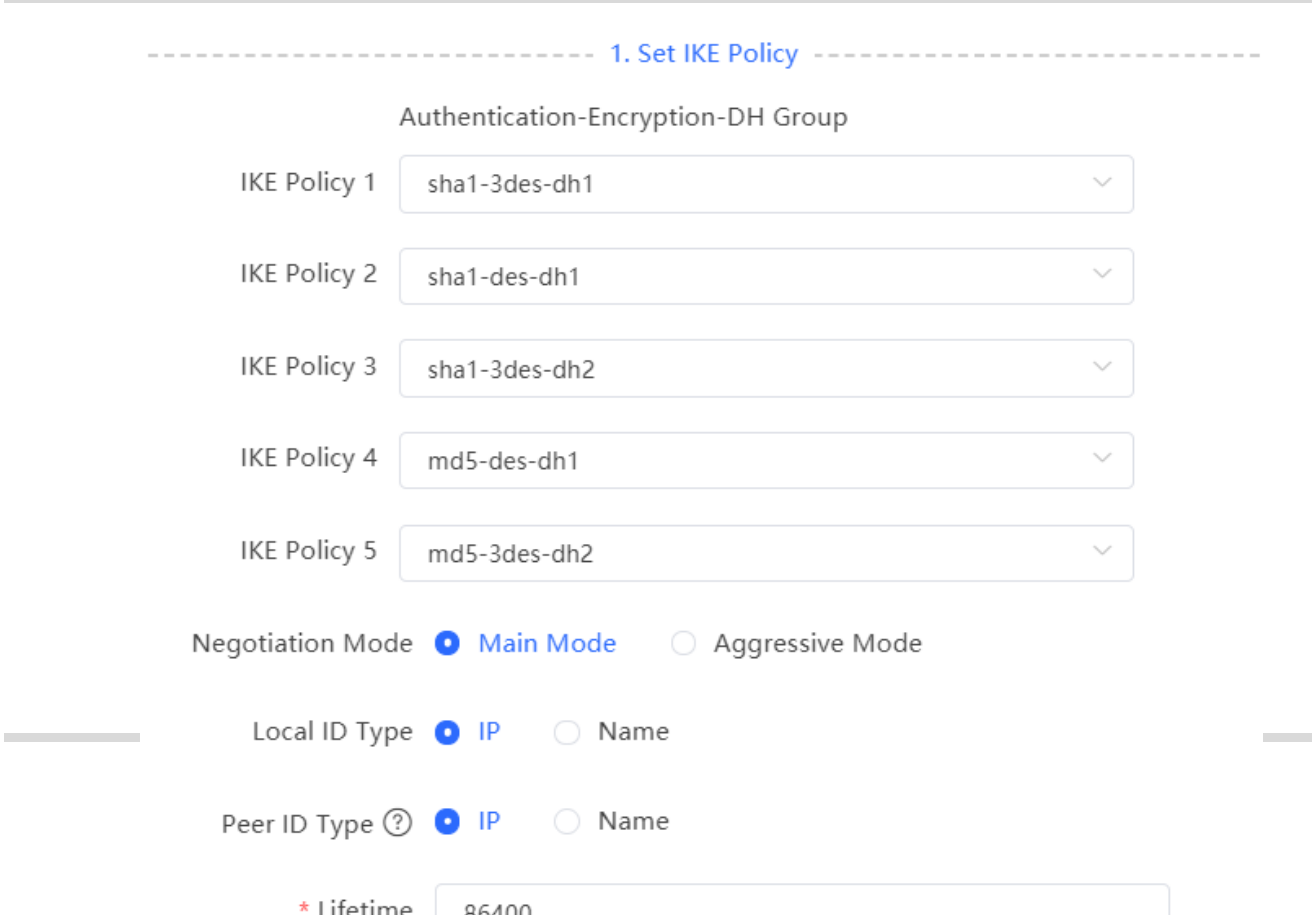
System Management



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- The key exchange version in the basic setting is IKEv2:

  Click **IKE Policy** to expand the configuration items. Keep the default settings unless otherwise specified.

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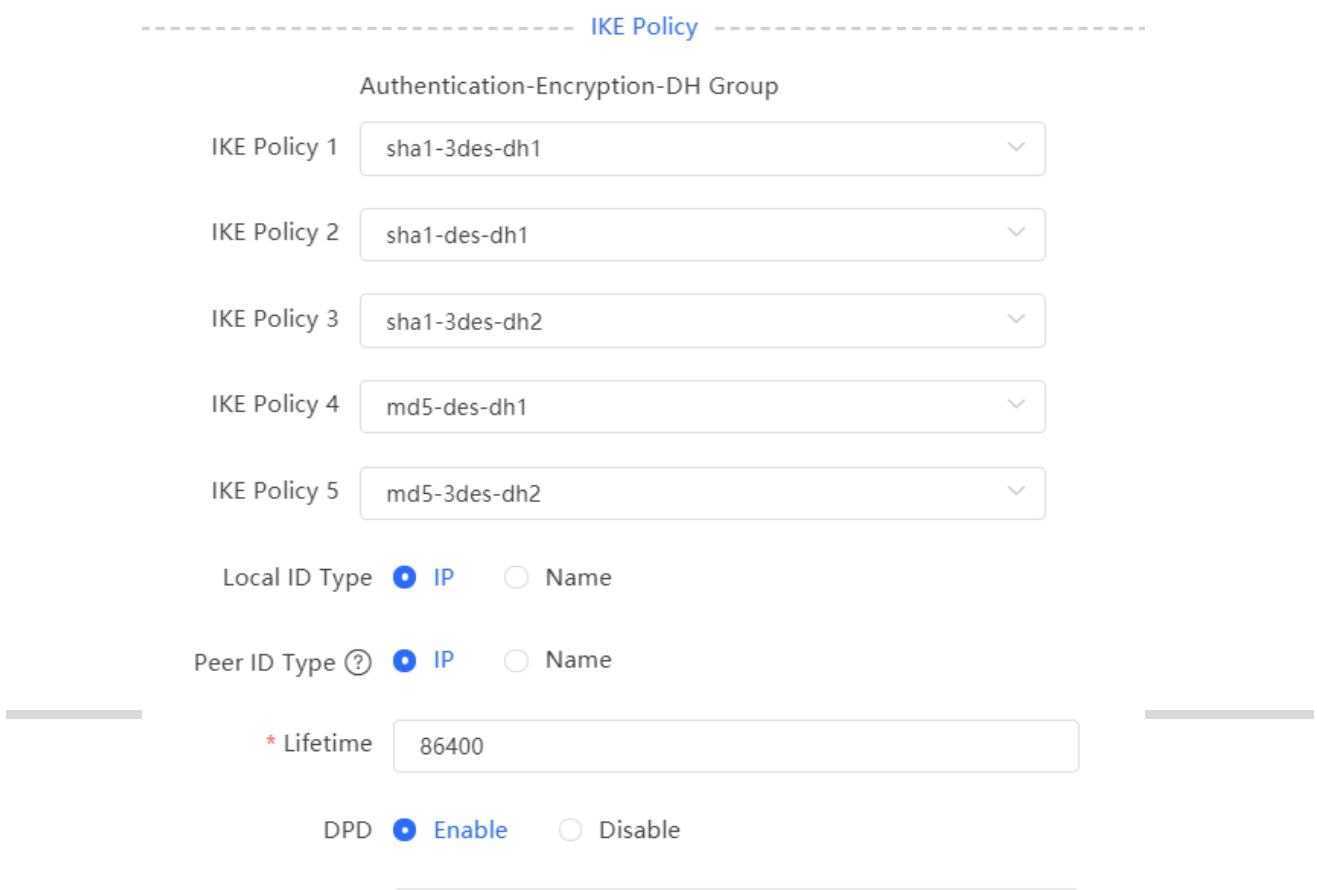

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**Table 11-2 IPsec server IKE policy configuration**

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| Parameter | Description |
| --- | --- |

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System Management

| | |
|---|---|
| IKE Policy | Select the hash algorithm, encryption algorithm, and Diffie-Hellman (DH) group ID used by the IKE protocol. An IKE policy is composed of the three parameters. You can set five sets of IKE policies. To ensure successful IKE negotiation, the two parties engaged in IKE negotiation must have at least one set of consistent IKE policy.<br>● Hash algorithm:<br>○ sha1: SHA-1 algorithm<br>○ md5: MD5 algorithm<br>● Encryption algorithm:<br>○ des: DES algorithm using 56-bit keys<br>○ 3des: 3DES algorithm using 168-bit keys<br>○ aes-128: AES algorithm using 128-bit keys<br>○ aes-192: AES algorithm using 192-bit keys<br>○ aes-256: AES algorithm using 256-bit keys<br>● DH group ID:<br>○ dh1: 768-bit DH group<br>○ dh2: 1024-bit DH group<br>○ dh5: 1536-bit DH group |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| Negotiation Mode | Select **Main Mode** or **Aggressive Mode**. The negotiation mode on the IPsec server and IPsec client must be the same.<br>● **Main Mode**: Generally, this mode is applicable to communication between fixed public network IP addresses and point-to-point communication between devices. In this mode, the peer identity is authenticated to provide high security.<br>● **Aggressive Mode**: The public network IP addresses obtained by ADSL dial-up users are not fixed and an NAT device may exist. Therefore, the aggressive mode is used to implement NAT traversal. In this mode, you need to set the local and peer ID type to **NAME** as the IP address is not fixed. The aggressive mode does not authenticate the peer identity, so it has low security. |

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System Management

| Parameter | Description |
| --- | --- |
| Local/Peer ID Type | Specify the ID type of the local or peer device. The local ID type of the peer device must be the same as the peer ID type of the local device.<br>● **IP**: The IP address is used as the identity ID. The IDs of the local and peer devices are generated automatically.<br>● **NAME**: The host character string is used as the identity ID. The IDs of the local and peer devices are generated automatically. When the IP address is not fixed, you need to set **Local ID Type** to **NAME** and modify the peer device settings accordingly. In this case, you also need to configure the host character string that is used as the identity ID. |
| Local/Peer ID | When the local or peer ID type is set to **NAME**, you also need to host character string that is used as the identity ID. The local ID of the peer device must be the same as peer ID of the local device. |
| Lifetime | Specify the lifetime of the IKE SA. (The negotiated IKE SA lifetime prevails.) You are advised to use the default value. |

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System Management

| Parameter | Description |
| --- | --- |
| DPD | Specify whether to enable Dead Peer Detection (DPD) to detect the IPsec neighbor status. After DPD is enabled, if the receiver does not receive IPsec encrypted packets from the peer within the DPD detection interval, DPD query will be triggered and the receiver actively sends a request packet to detect whether the IKE peer exists.<br>You are advised to configure DPD when links are unstable. |
| DPD Interval | Specify the DPD detection interval. That is, the interval for triggering DPD query. You are advised to keep the default setting. |

### 3. Advanced Settings (Phase 2)

Click **Connection Policy** to expand the configuration items. Keep the default settings unless otherwise specified.

# 1 Configuration Guide SD-WAN

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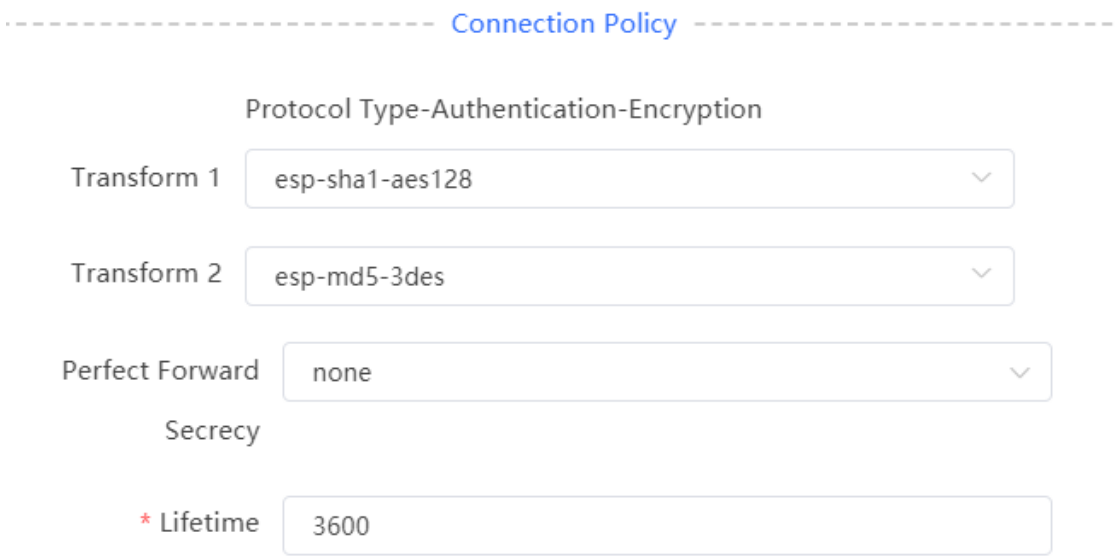

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System Management

**Table 11-3 IPsec server connection policy configuration**

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

| Parameter | Description |
| --- | --- |
| Transform Set | Specify the set of security protocol and algorithms. During IPsec SA negotiation, the two parties use the same transform set to protect specific data flow. The transform set on the IPsec server and IPsec client must be the same.<br>● Security protocol: The Encapsulating Security Payload (ESP) protocol provides data source authentication, data integrity check, and anti-replay functions for IPsec connections and guarantees data confidentiality.<br>● Verification algorithm:<br>o sha1: SHA-1 HMAC<br>o md5: MD5 HMAC<br>● Encryption algorithm:<br>o des: DES algorithm using 56-bit keys<br>o 3des: 3DES algorithm using 168-bit keys<br>o aes-128: AES algorithm using 128-bit keys<br>o aes-192: AES algorithm using 192-bit keys<br>o aes-256: AES algorithm using 256-bit keys |

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System Management

| Parameter | Description |
| --- | --- |
| Perfect Forward Secrecy | Perfect Forward Secrecy (PFS) is a security feature that can guarantee the security of other keys when one key is cracked, because there is no derivative relationship among the keys. After PFS is enabled, temporary private key exchange is performed when an IKE negotiation is initiated using a security policy. If PFS is configured on the local device, it must also be configured on the peer device that initiates negotiation and the DH group specified on the local and peer devices must be the same. Otherwise, negotiation will fail.<br>● none: Disable PFS.<br>● d1: 768-bit DH group<br>● d2: 1024-bit DH group<br>● d5: 1536-bit DH group<br>By default, PFS is disabled. |

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System Management

| Parameter | Description |
| --- | --- |
| Lifetime | Indicates the duration of an IPsec tunnel, which defines the time for data transmission over the IPsec tunnel. |

### 11.1.3 Configuring the IPsec Client

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **IPsec** > **IPsec Security Policy**.

Click **Add**. In the dialog box that appears, set **Policy Type** to **Client**, enter the policy name, peer gateway, local subnet range, and peer subnet range, set the pre-shared key, and click **OK**.

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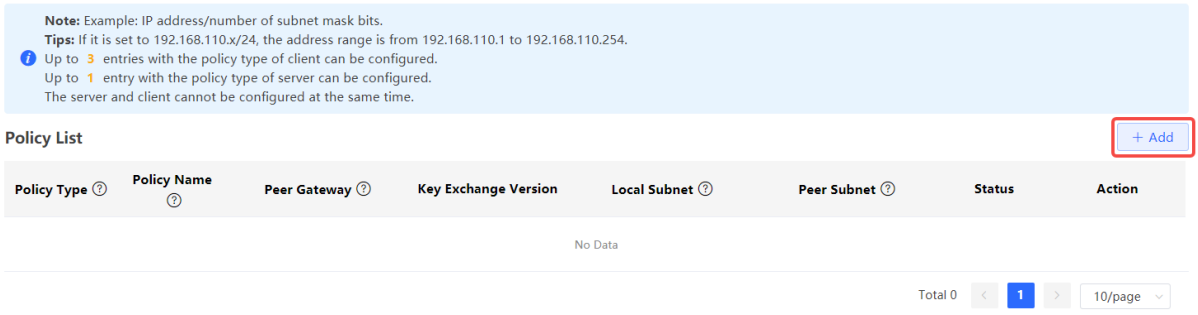
System Management



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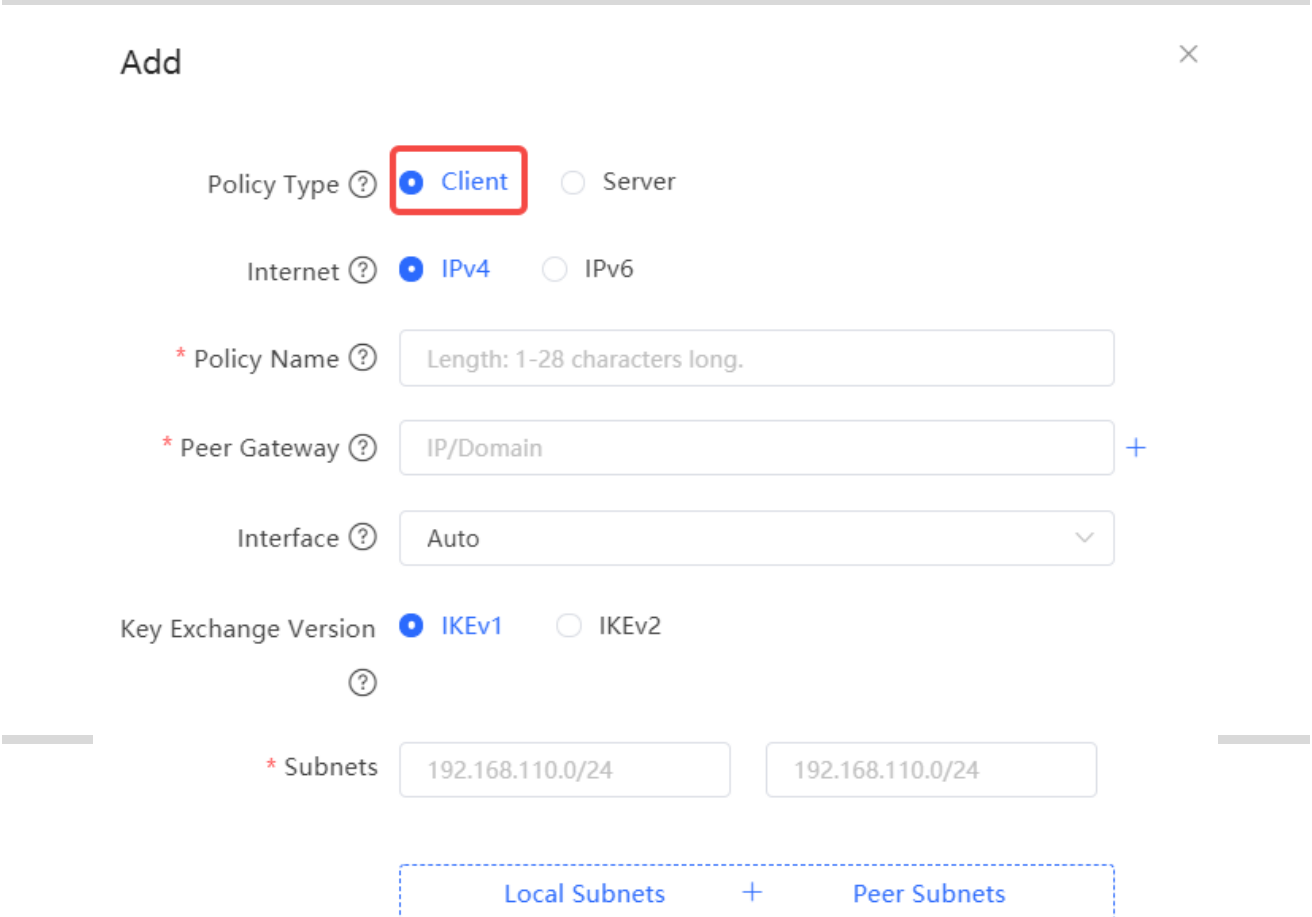
System Management



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System Management

**Table 11-4 IPsec client basic settings**

| Parameter | Description |
|---|---|
| Policy Name | Specify the name of the IPsec security policy. The name must be a string of 1 to 28 characters. |
| Internet | Format of the IP address. Both IPv4 and IPv6 address formats are supported. |
| Peer Gateway | Enter the IP address or domain name of the peer device. |
| Interface | Select a WAN interface used locally from the drop-down list box. In the multi-line scenario, you are advised to set this parameter to **Auto**. |

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System Management

| | |
|---|---|
| Key Exchange Version | Select the IKE version for SA negotiation. There are two options available:<br>● IKEv1: The negotiation of SA in IKEv1 primarily consists of two phases.<br>○ Phase 1: The purpose is to establish an IKE SA using one of two negotiation modes: Main Mode and Aggressive Mode. Main Mode requires six ISAKMP (Internet Security Association and Key Management Protocol) messages to complete the negotiation, while Aggressive Mode only requires three ISAKMP messages. Aggressive Mode offers faster IKE SA establishment. However, it combines key exchange and identity authentication, which means it does not provide identity protection.<br>○ Phase 2: The purpose is to establish an IPsec SA for data transmission, utilizing a fast exchange mode that requires only three ISAKMP messages to complete the negotiation.<br>● IKEv2: In IKEv2, the negotiation process for SA is simplified. The establishment of one IKE SA and one pair of IPsec SAs can be accomplished using two exchanges with four messages. If there is a need |

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| Parameter | Description |
| --- | --- |
| | to establish more than one pair of IPsec SAs, only one additional exchange is needed for each pair. This enables the negotiation to be completed with just two messages per pair. |
| Local Subnets | Specify the local subnet address range for the data flows to be protected, that is, the LAN port network segment of the server. The value is the combination of IP address and subnet mask. |
| Peer Subnets | Specify the peer subnet address range for the data flows to be protected, that is, the LAN port network segment of the client. The value is the combination of IP address and subnet mask. |
| Pre-shared Key | Configure the pre-shared key the same as that on the IPsec server. |

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

| Parameter | Description |
| --- | --- |
| Status | Specify whether to enable the security policy. |

You can configure advanced parameters by referring to the corresponding settings on the IPsec server. For details, see Advanced Settings (Phase 1) and Advanced Settings (Phase 2).

### 11.1.4 Setting WAN Interface Priority

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **IPsec** > **IPsec Security Policy**.

When there are multiple WAN interfaces on the network, configuring WAN interface priorities allows you to define forwarding order for IPsec VPN traffic.

**Note**

By default, priorities are assigned based on the sequence of WAN interfaces, with WAN0 having the highest priority, followed by WAN1, WAN2, and so on.

# 1 Configuration Guide SD-WAN

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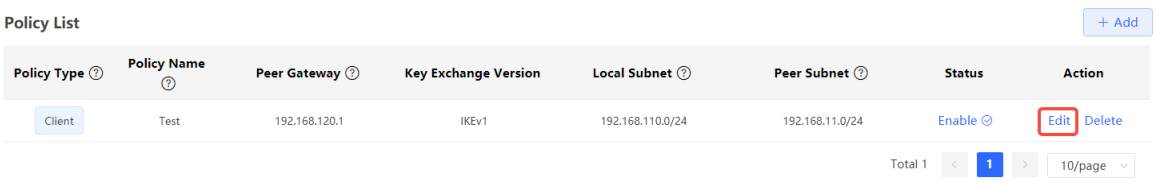
## System Management

(1) Select a policy in the list and click **Edit**.




(2) Click **WAN Port Priority**.

# 1 Configuration Guide SD-WAN

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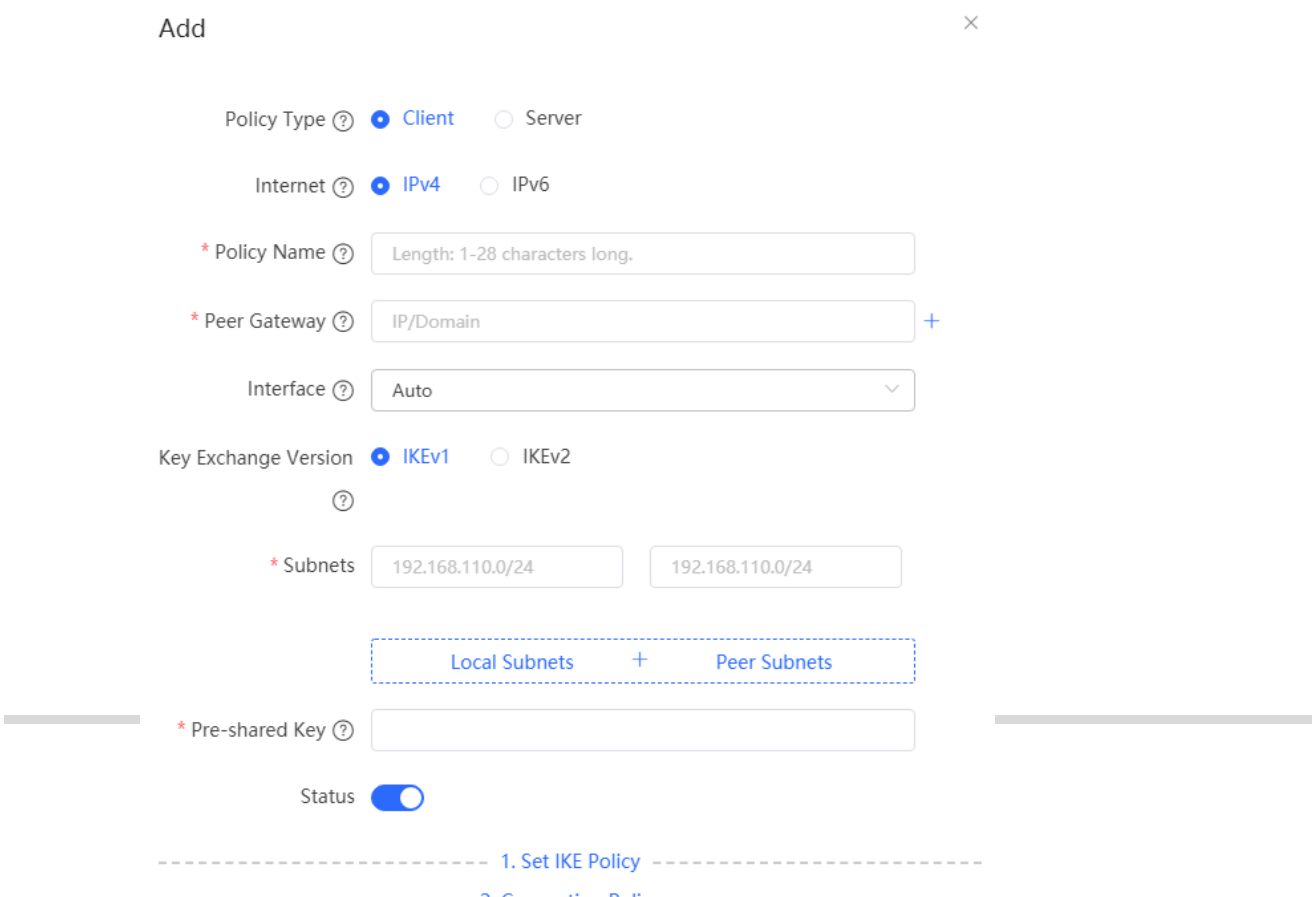
System Management



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(3) Configure the parameters, and click **OK**.

**Table 11-5 Description of WAN Port Priority**

| Parameter | Description |
|---|---|
| Preferred Interface | Select WAN interfaces based on their priorities. A lower value indicates a higher priority. |
| Forced Priority | When enabled, if a higher-priority line becomes available, it will switch over immediately. This could potentially cause interruptions in VPN connectivity. Please proceed with caution. |

## 11.1.5 Viewing the IPsec Connection Status

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **IPsec** > **IPsec Connection Status**.

# 1 Configuration Guide SD-WAN

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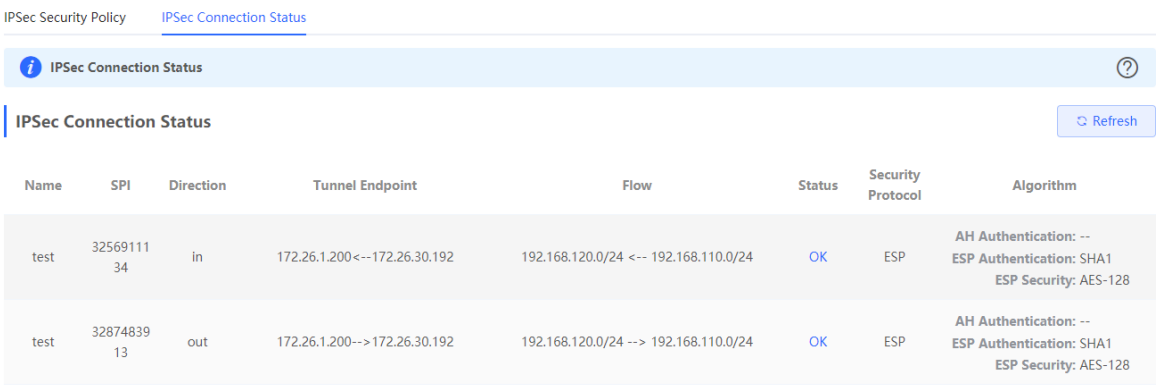
## System Management

You can view the IPsec tunnel connection status on the current page.



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System Management

**Table 11-6 IPsec tunnel connection status information**

| Parameter | Description |
|---|---|
| Name | Indicate the security policy name on the IPsec server or client. |
| SPI | Indicate the Security Parameter Index (SPI) of the IPsec connection, used to associate the received IPsec data packets with the corresponding SA. The SPI of each IPsec connection must be unique. |
| Direction | Indicate the direction of the IPsec connection. The value **in** indicates inbound, and the value **out** indicates outbound. |
| Tunnel Client | Indicate the gateway addresses on two ends of the IPsec connection. The arrow indicates the direction of data flows to be protected by the current tunnel. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
|---|---|
| Flow | Indicate the subnet range on two ends of the IPsec connection. The arrow indicates the direction of data flows to be protected by the current tunnel. |
| Status | Indicate the IPsec tunnel connection status. |
| Security Protocol | Indicate the security protocol used by the IPsec connection. |
| Algorithm | Indicate the encryption algorithm and authentication algorithm used by the IPsec connection. |

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## 11.1.6 Typical Configuration Example

### 1. Networking Requirements

The HQ and branch of an enterprise are connected through the Internet. An IPsec tunnel needs to be established between the HQ gateway and branch gateway to ensure the confidentiality of transmitted data.

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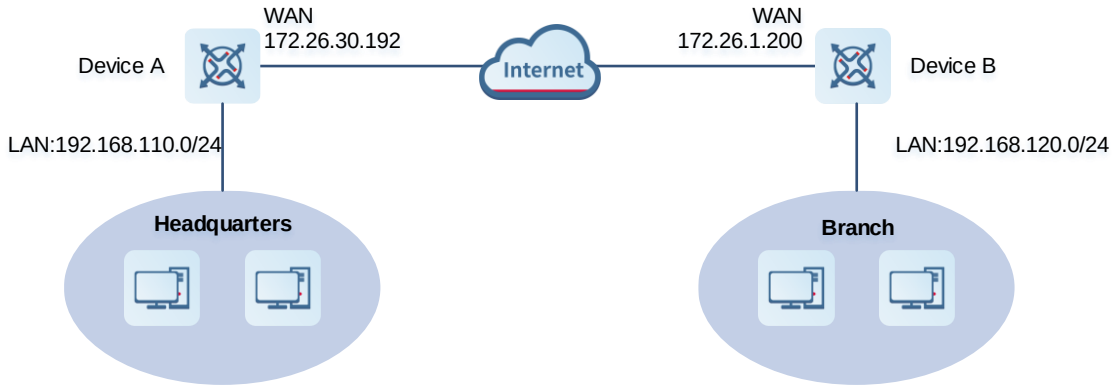
## 2. Networking Diagram




## 3. Configuration Roadmap

- Configure the HQ gateway Device A as the IPsec server.
- Configure the branch gateway Device B as the IPsec client.

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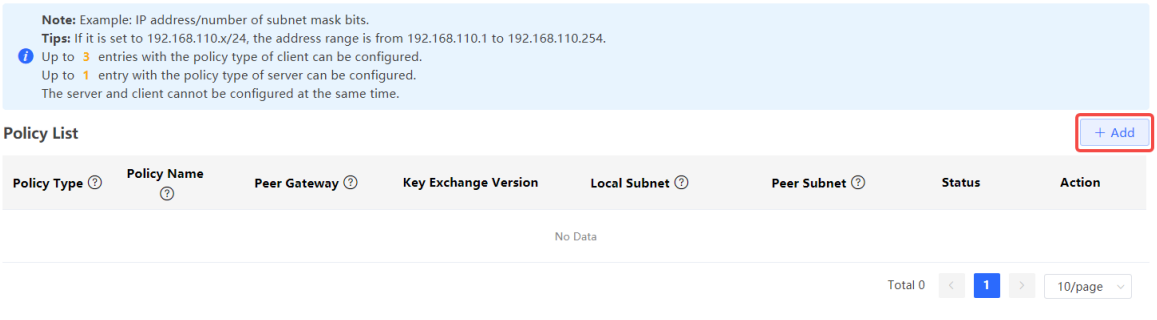
### 4. Configuration Steps

- Configure the HQ gateway.

(1) Log in to the web management system and choose **One-Device** > **Gateway** > **Config** > **VPN** > **IPsec** > **IPsec Security Policy** to access the IPsec Security Policy page.




(2) Click **Add**. In the dialog box that appears, set Policy Type to Server, enter the policy name, select the bound interface, and configure the local subnet to be accessed through IPsec and the pre-shared key.

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## System Management

If the device connects to other EG devices in the Reyee network, you are advised to keep the default settings in IKE phase 1 and phase 2. If the device connects to devices from another vendor, keep the parameter settings consistent on the connected devices.

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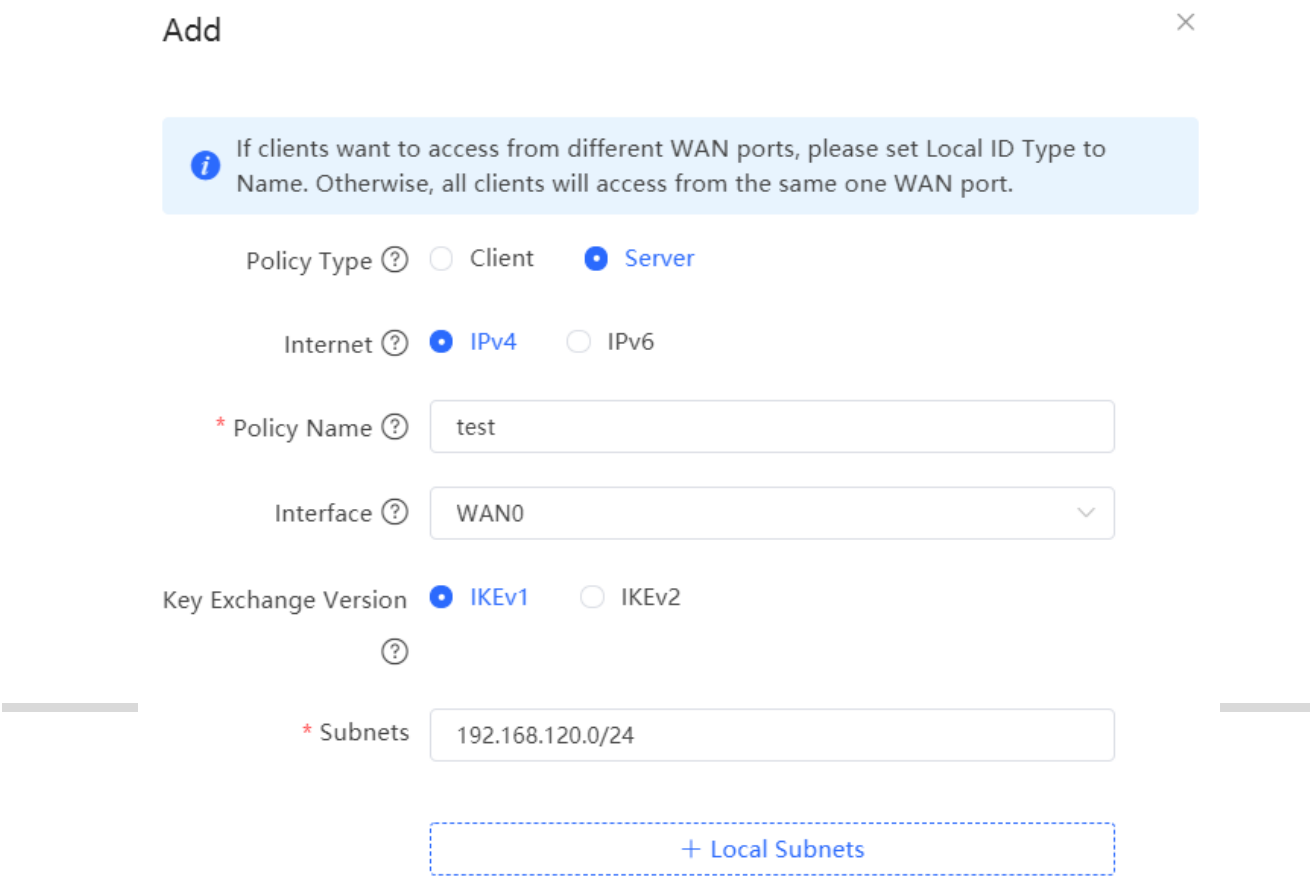

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System Management

- Configure the branch gateway.

(1) Log in to the web management system and access the IPsec Security Policy page.

(2) Click **Add**. In the dialog box that appears, set Policy Type to Client, enter the policy name, select the peer gateway (WAN interface address or domain name of the HQ gateway), and configure the local subnet that needs to access the peer subnet and the pre-shared key the same as that on the HQ gateway. Keep the other phase 1 and phase 2 parameters consistent with those on the IPsec server.

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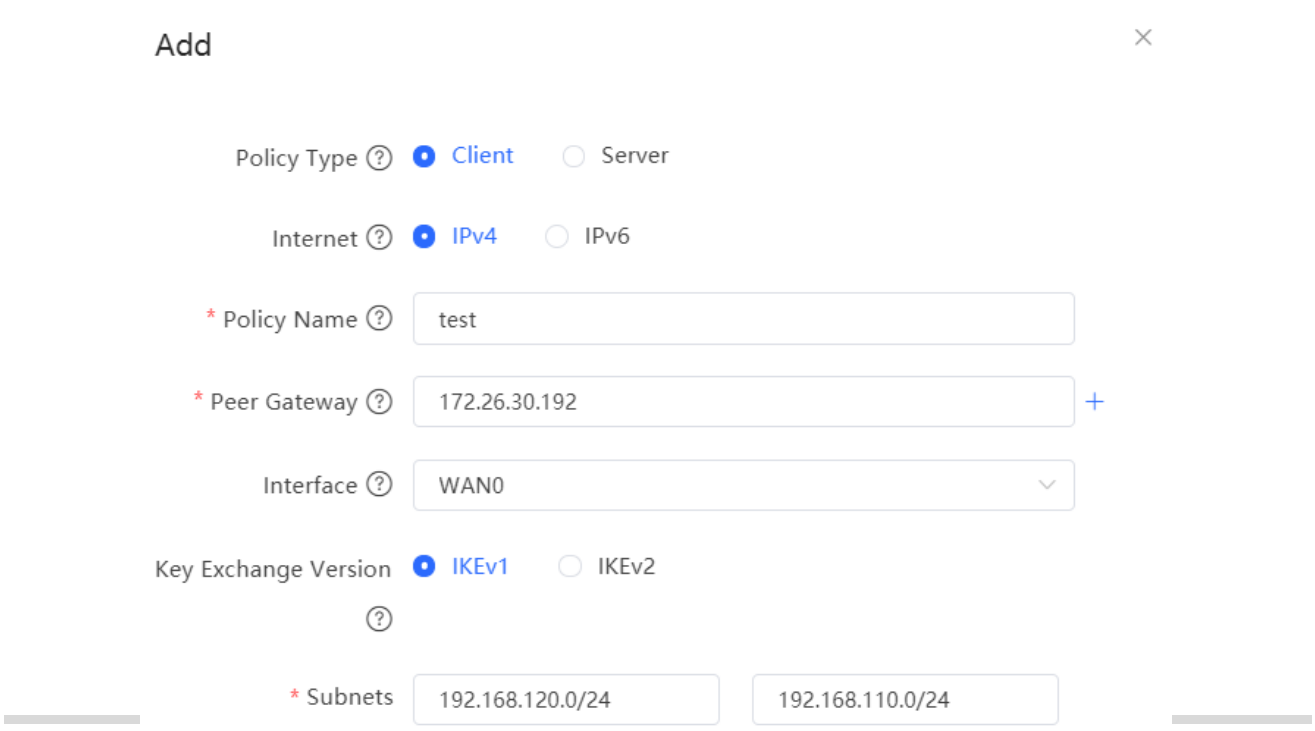
System Management



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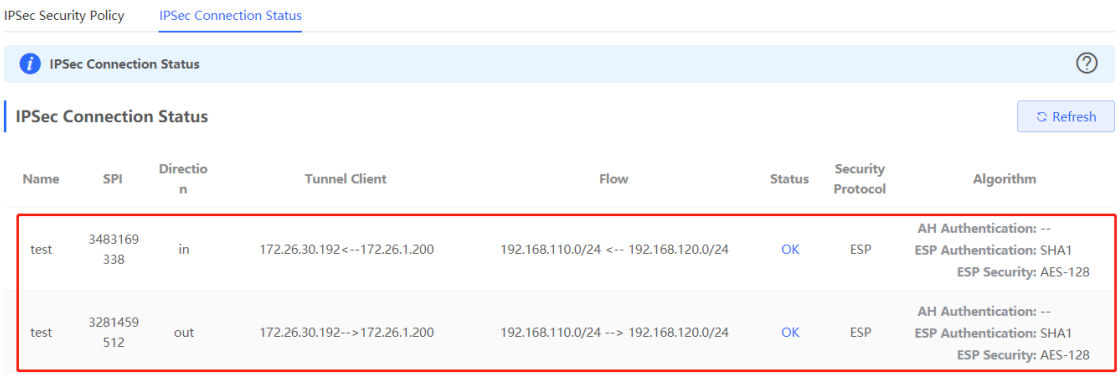
### 5. Verifying Configuration

(1) Log in to the web management system of the HQ or branch gateway and choose **One-Device** > **Gateway** > **Config** > **VPN** > **IPsec** > **IPsec Connection Status**. You can view the IPsec connection status between the HQ and branch.



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(2) Perform ping test between clients on the two ends that need to access each other. The clients can successfully ping and access each other.

### 11.1.7 Solution to IPsec VPN Connection Failure

(1) Run the ping command to test the connectivity between the client and server. For details, see Section 13.12.3 Network Tools. If the ping fails, check the network connection settings. Check whether the branch EG can ping to HQ EG. If the ping fails, check the network connection between the two EGs.

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Network Tools**. Then, you can start the ping operation. For details, see Section 13.12.3 Network Tools.

(2) Confirm that the configurations on the IPsec server and IPsec client are correct.

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **IPsec** > **IPsec Security Policy** and confirm that the security policies configured on the two ends are matching.

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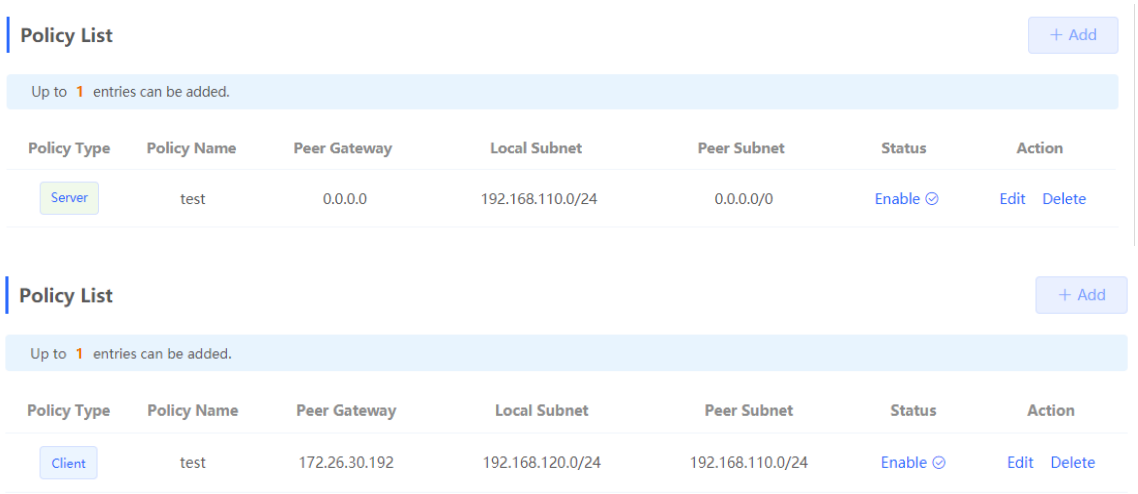


(3) Check whether the WAN IP address of your HQ EG is a public IP address. If not, you need to configure DMZ or port mapping (UDP 500 and 4500 used as IPsec VPN port) on your egress gateway and set **Local ID Type** to **NAME** on HQ and branch gateways.

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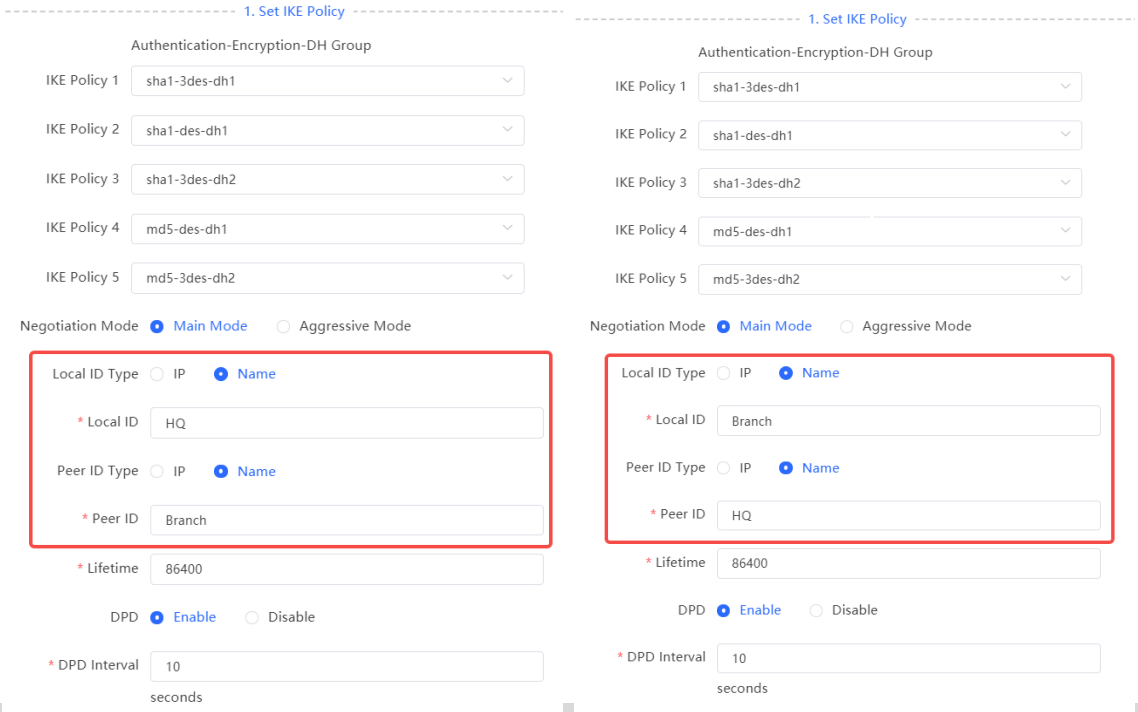

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## 11.2 Configuring L2TP VPN

### 11.2.1 Overview

Layer Two Tunneling Protocol (L2TP) is a virtual tunneling protocol, usually used in virtual private networks.

The L2TP protocol does not provide encryption and reliability verification functions, but it can work with a security protocol to implement encrypted data transmission. L2TP is frequently used with IPsec to encapsulate packets using L2TP before encapsulating packets using IPsec. This combination implements user verification and address allocation through L2TP and ensures communication security through IPsec.

L2TP VPN can be used to establish secure tunnels between the enterprise HQ and branches and allow traveling employees to access the HQ. Currently, the device can be deployed as the L2TP server or client.

# 1 Configuration Guide SD-WAN

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## 11.2.2 Configuring the L2TP Server

### 1. Basic Settings of L2TP Server

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **L2TP** > **L2TP Settings**.

Turn on the L2TP function, set **L2TP Type** to **Server**, set L2TP server parameters, and click **Save**.

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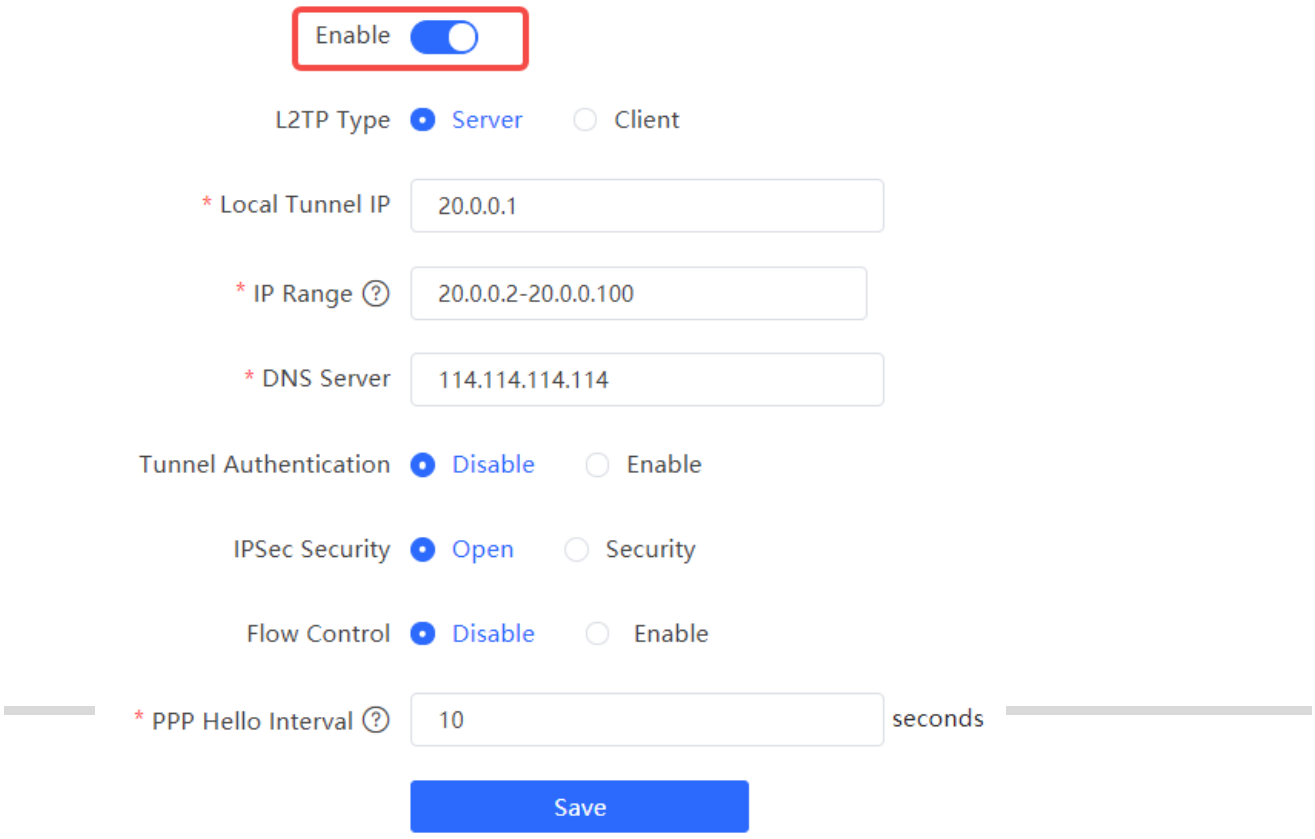
System Management



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System Management

**Table 11-7 L2TP server configuration**

| Parameter | Description |
|---|---|
| Local Tunnel IP | Specify the local virtual IP address of the L2TP server. Clients can dial up to access the L2TP server through this address. |
| IP Range | Specify the address pool used by the L2TP server to allocate IP addresses to clients. |
| DNS Server | Specify the DNS server address pushed by the L2TP server to clients. |

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System Management

| Parameter | Description |
| --- | --- |
| Tunnel Authentication | Specify whether to enable L2TP tunnel authentication. If you enable this function, you need to configure a tunnel authentication key. By default, tunnel authentication is disabled.<br>The tunnel authentication request can be initiated by clients. If tunnel authentication is enabled on one end, a tunnel to the peer can be established only when tunnel authentication is also enabled on the peer and consistent keys are configured on the two ends. Otherwise, the local end will automatically shut down the tunnel connection. If tunnel authentication is disabled on both ends, no authentication key is required for tunnel establishment.<br>When a PC functions as the client to access the L2TP server, you are advised not to enable tunnel authentication on the L2TP server. |

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System Management

| Parameter | Description |
| --- | --- |
| IPsec Security | Specify whether to encrypt the tunnel. If you select **Security**, the device encrypts the L2TP tunnel using IPsec, indicating the L2TP over IPsec mode.<br>If an IPsec security policy is enabled on the current device, you cannot enable IPsec encryption for the L2TP tunnel. If you want to configure L2TP over IPsec, disable the IPsec security policy first.<br>The IPsec encryption configuration on the L2TP server and client must be consistent. For details, see Section Configuring the L2TP over IPsec Server. |
| Flow Control | The VPN server has a lower priority to control the traffic of the client than the custom policy. The VPN server can only limit the maximum uplink and downlink bandwidth per user for the client. For details, see Section 9.6.2 Smart QoS. |

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System Management

| Parameter | Description |
| --- | --- |
| PPP Hello Interval | Specify the interval for sending PPP Hello packets after L2TP VPN is deployed. You are advised to retain the default configuration. |

**Caution**

The local tunnel address and IP address range of the address pool cannot overlap the network segment of the LAN port on the device.

**2. Configuring the L2TP over IPsec Server**

Choose **One-Device > Gateway > VPN** > **L2TP** > **L2TP Settings**.

After you complete Basic Settings of L2TP Server, enable IPsec encryption on the L2TP server to guarantee communication security. For details on the IPsec configuration, see Section 11.1 Configuring IPsec VPN.

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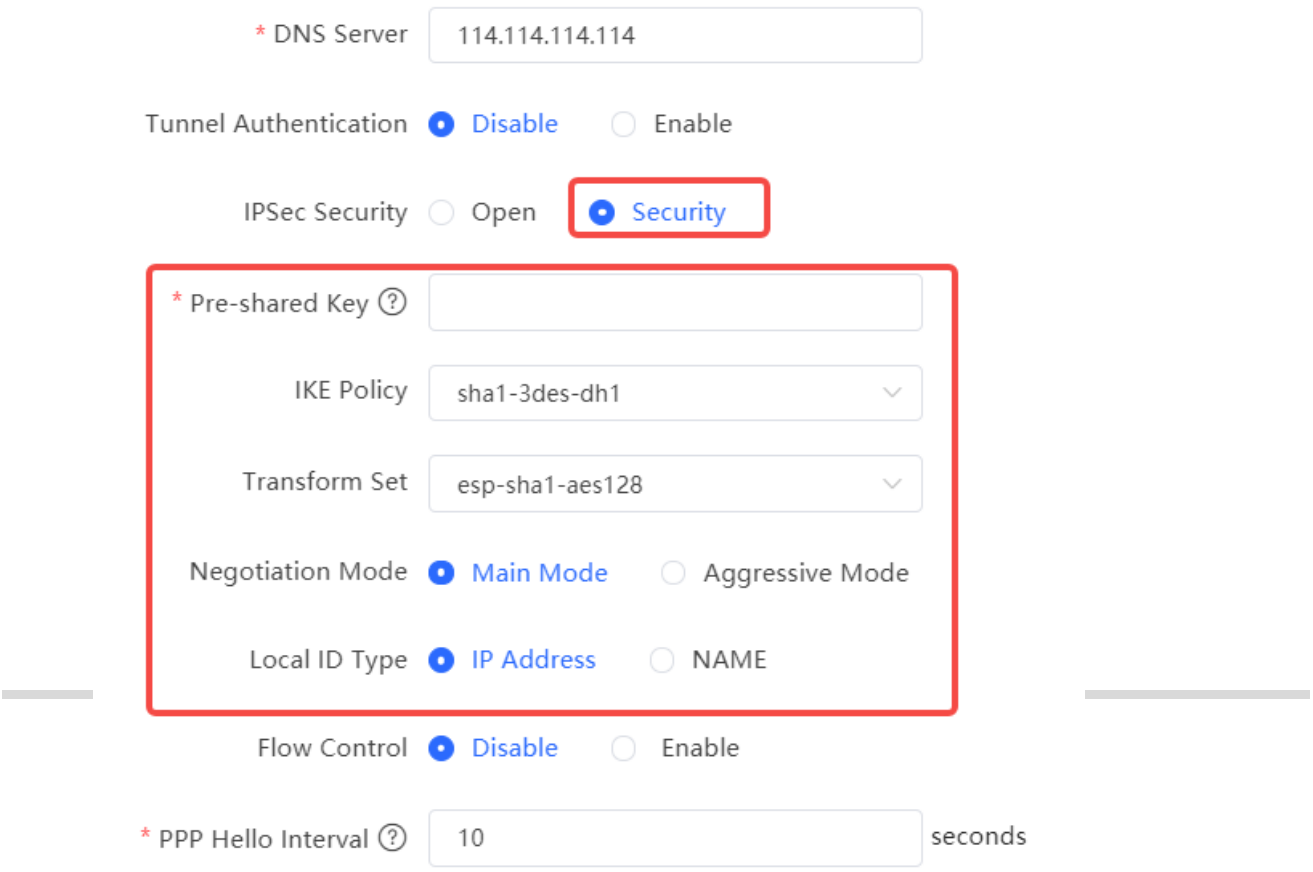

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System Management

**Table 11-8 L2TP over IPsec server configuration**

| Parameter | Description |
| --- | --- |
| Pre-shared Key | Specify the same unique pre-shared key as the credential for mutual authentication between the server and client. |

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System Management

| | |
|---|---|
| IKE Policy | Select the encryption algorithm, hash algorithm, and DH group ID used by the IKE protocol. To ensure successful IKE negotiation, the two parties engaged in IKE negotiation must have at least one set of consistent IKE policy. The IKE policies on the server and client must be consistent.<br>● Hash algorithm:<br>○ sha1: SHA-1 algorithm<br>○ md5: MD5 algorithm<br>● Encryption algorithm:<br>○ des: DES algorithm using 56-bit keys<br>○ 3des: 3DES algorithm using 168-bit keys<br>○ aes-128: AES algorithm using 128-bit keys<br>○ aes-192: AES algorithm using 192-bit keys<br>○ aes-256: AES algorithm using 256-bit keys<br>● DH group ID:<br>○ dh1: 768-bit DH group<br>○ dh2: 1024-bit DH group<br>○ dh5: 1536-bit DH group |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| Transform Set | Specify the set of security protocol and algorithms. During IPsec SA negotiation, the two parties use the same transform set to protect specific data flow. The transform set on the server and client must be the same.<br>● Security protocol: The Encapsulating Security Payload (ESP) protocol provides data source authentication, data integrity check, and anti-replay functions for IPsec connections and guarantees data confidentiality.<br>● Verification algorithm:<br>○ sha1: SHA-1 HMAC<br>○ md5: MD5 HMAC<br>● Encryption algorithm:<br>○ des: DES algorithm using 56-bit keys<br>○ 3des: 3DES algorithm using 168-bit keys<br>○ aes-128: AES algorithm using 128-bit keys<br>○ aes-192: AES algorithm using 192-bit keys<br>○ aes-256: AES algorithm using 256-bit keys |

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System Management

| Parameter | Description |
| --- | --- |
| Negotiation Mode | Select **Main Mode** or **Aggressive Mode**. The negotiation mode on the server and client must be the same.<br>● **Main Mode**: This mode is applicable to communication between fixed public network IP addresses and point-to-point communication between devices. In this mode, the peer identity is authenticated to provide high security.<br>● **Aggressive Mode**: The public network IP addresses obtained by ADSL dial-up users are not fixed and an NAT device may exist. Therefore, the aggressive mode is used to implement NAT traversal. In this mode, you need to set the local and peer ID type to **NAME** as the IP address is not fixed. The aggressive mode does not authenticate the peer identity, so it has low security. |

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System Management

| Parameter | Description |
| --- | --- |
| Local ID Type | Specify the ID type of the local device. The peer ID of the client must be the same as local ID of the server.<br>● **IP**: The IP address is used as the identity ID. The ID of the local device is generated automatically.<br>● **NAME**: The host character string is used as the identity ID. The ID of the local device is generated automatically. In this case, you also need to configure the host character string that is used as the identity ID.<br>When the WAN interface IP address of the server is a private network address, you need to set **Local ID Type** to **NAME** and configure DMZ on the external device.<br>When the IP address is not fixed, you need to set **Local ID Type** to **NAME** and modify the peer device settings accordingly. |
| Local ID | When **Local ID Type** is set to **NAME**, the host character string is used as the identity ID. The peer ID of the client must be the same as local ID of the server. |

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### 3. Configuring L2TP User

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **VPN Account**

Only user accounts added to the VPN client list are allowed to dial up to connect to the L2TP server. Therefore, you need to manually configure user accounts for clients to access the L2TP server.

Click **Add**. In the dialog box that appears, set **Service Type** to **L2TP** or **ALL**. (If you select **ALL**, the created account can be used to establish all types of VPN tunnels.) Enter the username, password, and peer subnet, select a network mode, and click **OK**.

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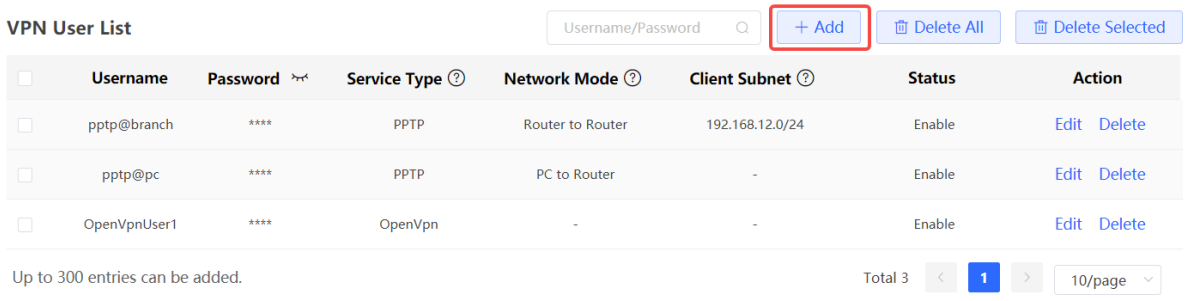
System Management



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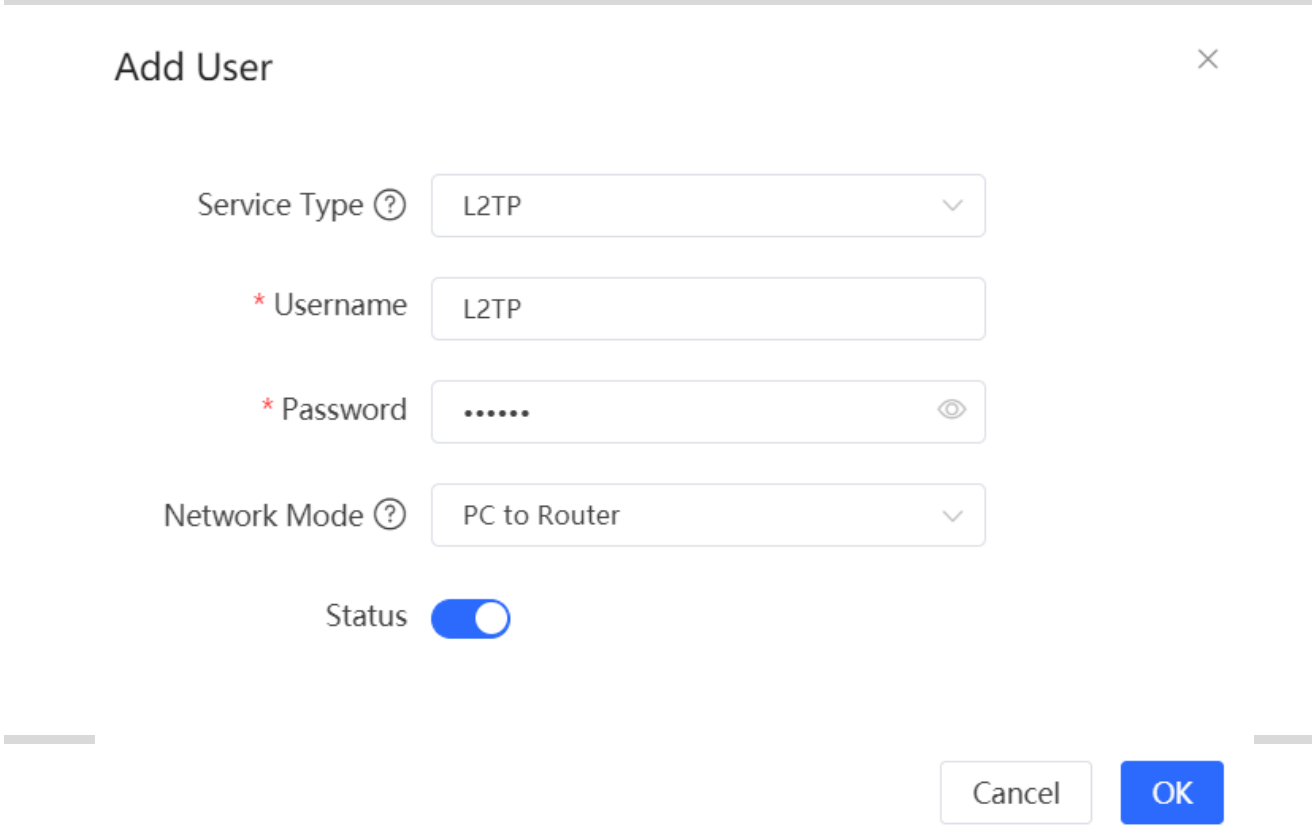
System Management



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System Management

**Table 11-9 L2TP user configuration**

| Parameter | Description |
|---|---|
| Username/Password | Specify the name and password of the L2TP user allowed to dial up to connect to the L2TP server. The username and password are used to establish a connection between the server and client. |
| Network Mode | ● PC to Router: The dial-up client is an individual. Select this mode when a PC wants to dial up to communicate with the remote PC through the LAN.<br>● Router to Router: The dial-up client is a user in a network segment. Select this mode when the LANs on two ends of the tunnel need to communicate through router dial-up. |

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System Management

| Parameter | Description |
| --- | --- |
| Client Subnet | Specify the IP address range used by the LAN on the peer end of the L2TP tunnel. Generally, the Client Subnet is the IP address network segment of the LAN port on the device. (The LAN network segments of the server and client cannot overlap.)<br>For example, when a branch dials up to connect to the HQ, enter the LAN network segment of the router.<br>Note: When the Network Mode is set to Router to Router, you can click + to set multiple pairs of peer subnets for scenarios where multiple clients are connected to the same server. |
| Status | Specify whether to enable the user account. |

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## 11.2.3 Configuring the L2TP Client

### 1. Basic Settings of L2TP Client

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **L2TP** > **L2TP Settings**.

Turn on the L2TP function, set **L2TP Type** to **Client**, set L2TP client parameters, and click **Save**.

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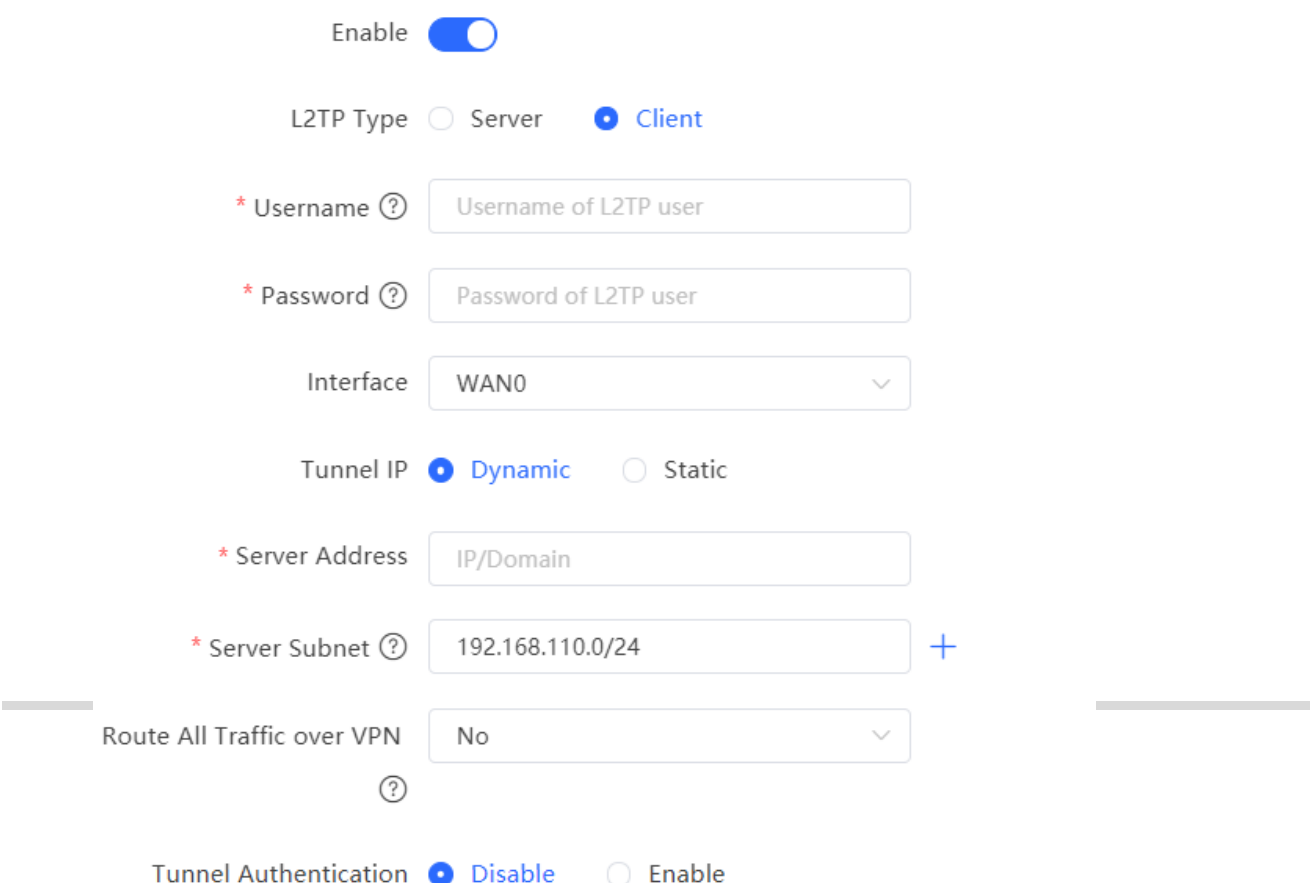
System Management



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System Management

**Table 11-10 L2TP client configuration**

| Parameter | Description |
|---|---|
| Username/Password | Specify the username and password for identity authentication for communication over the L2TP tunnel. The values must be the same as those configured on the L2TP server. |
| Interface | Specify the WAN interface used by the client. |
| Tunnel IP | Specify the virtual IP address of the VPN tunnel client. If you select **Dynamic**, the client obtains an IP address from the server address pool. If you select **Static**, manually configure an idle static address within the range of the server address pool as the local tunnel IP address. |
| Server Address | Enter the WAN interface IP address or domain name of the server. This address must be a public network IP address. |

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System Management

| Parameter | Description |
| --- | --- |
| Server Subnet | Enter the LAN network segment in which clients want to access the server. The value cannot overlap with the LAN network segment of the client. |
| Route ALL Traffic over VPN | Once this feature is enabled, all traffic will be directed through the VPN connection, that is, VPN is configured as the default route. |
| Tunnel Authentication | Specify whether to enable L2TP tunnel authentication. If you enable this function, you need to enter tunnel authentication key the same as that configured on the server. By default, tunnel authentication is disabled. To protect tunnel security, you are advised to enable tunnel authentication. |

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System Management

| Parameter | Description |
|---|---|
| IPsec Security | Specify whether to encrypt the tunnel. If you select **Security**, the device Enable the L2TP tunnel using IPsec, indicating the L2TP over IPsec mode. The IPsec encryption configuration on the server and client must be consistent. For details, see Section Configuring the L2TP over IPsec Client. |
| Working Mode | ● **NAT**: Perform NAT traversal on the data packet passing through the L2TP tunnel. That is, replace the source IP address of the data packet with the local virtual IP address of the L2TP tunnel. In NAT mode, the server cannot access the LAN where the client resides.<br>● **Router**: Only route the data packet passing through the L2TP tunnel. In router mode, the server can access the LAN where the client resides. |
| PPP Hello Interval | Specify the interval for sending PPP Hello packets after L2TP VPN is deployed. You are advised to retain the default configuration. |

# 1 Configuration Guide SD-WAN

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### 2. Configuring the L2TP over IPsec Client

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **L2TP** > **L2TP Settings**.

After you complete Basic Settings of L2TP Client, enable IPsec encryption on the L2TP client to guarantee communication security. The IPsec encryption configuration on the server and client must be consistent. For details, see Configuring the L2TP over IPsec Server.

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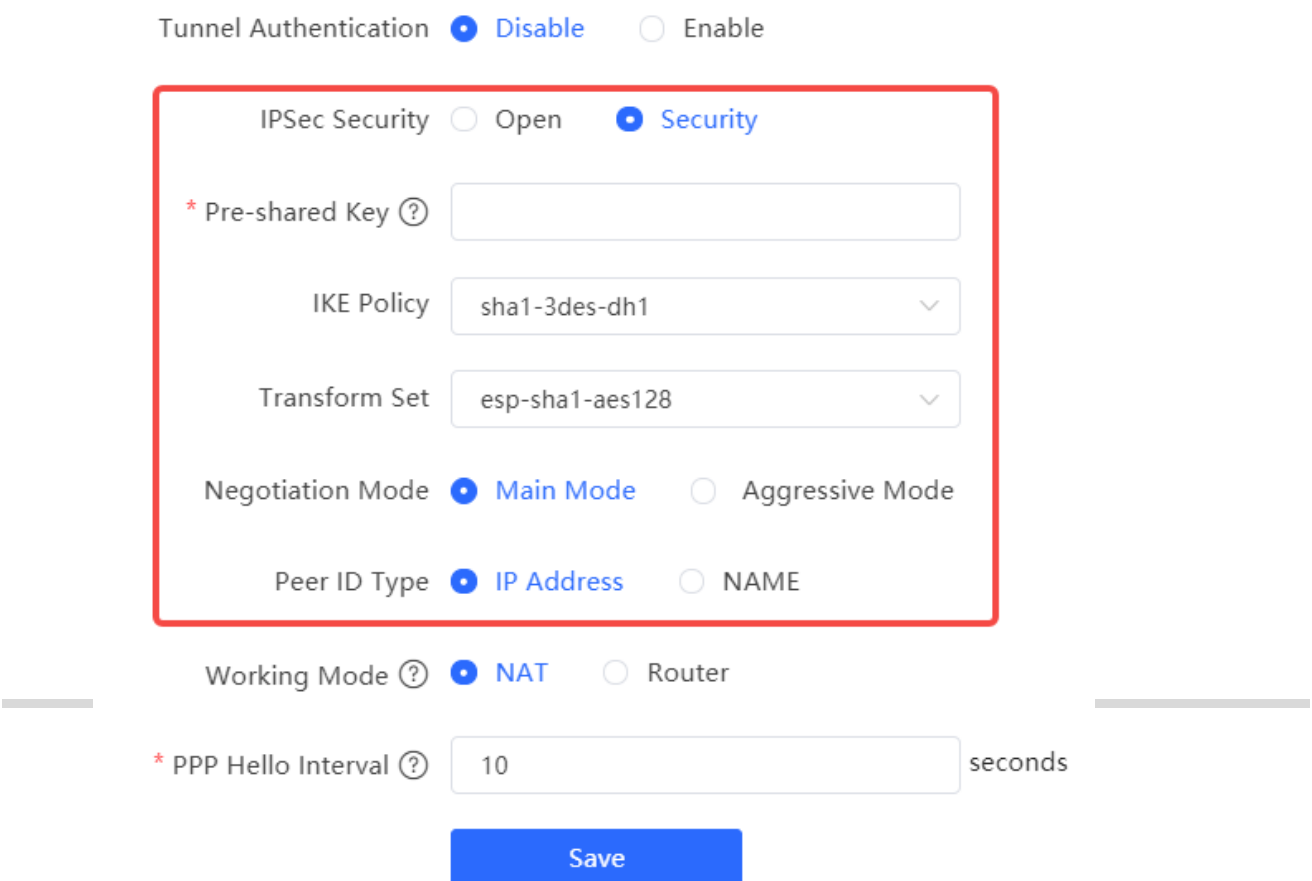
System Management



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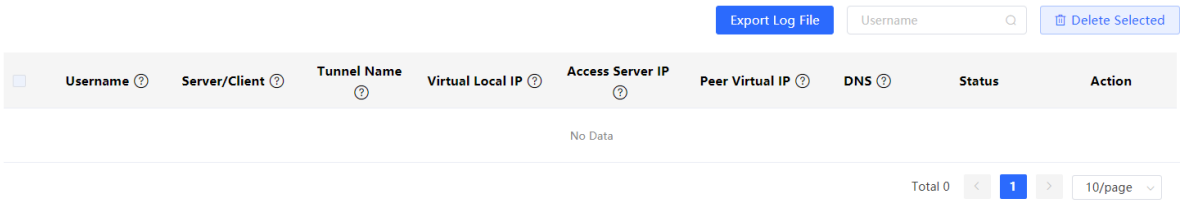
## 11.2.4 Viewing the L2TP Tunnel Information

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **L2TP** > **Tunnel List**.

It takes some time to establish a VPN connection between the server and client. After the configuration of the server and client is completed, wait for 1 to 2 minutes to refresh the page and view the L2TP tunnel establishment status.



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System Management

**Table 11-11 L2TP tunnel information**

| Parameter | Description |
|---|---|
| Username | Indicate the username used by the client for identity authentication. |
| Server/Client | Indicate the role of the current device, which is client or server. |
| Tunnel Name | Indicate the name of the vNIC generated by L2TP. |
| Virtual Local IP | Indicate the local virtual IP address of the tunnel. The virtual IP address of the L2TP client is allocated by the L2TP server. |
| Access Server IP | Indicate the real IP address of the peer connecting to the L2TP tunnel. |
| Peer Virtual IP | Indicate the peer virtual IP address of the tunnel. The virtual IP address of the L2TP client is allocated by the L2TP server. |

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System Management

| Parameter | Description |
| --- | --- |
| DNS | Indicate the DNS server address allocated by the L2TP server. |

## 11.2.5 Typical Configuration Example

### 1. Networking Requirements

An enterprise wants to establish an L2TP tunnel to allow its traveling employees and branch employees to access the servers deployed in the HQ LAN.

- Traveling employees want to access the HQ servers from their PCs through L2TP VPN.
- Branch employees need to frequently access documents on the HQ servers. The enterprise wants to deploy the branch router (Device B) as the L2TP client, so that branch employees can dial up to transparently and directly access documents on the HQ servers, as if they are accessing servers inside the branch.

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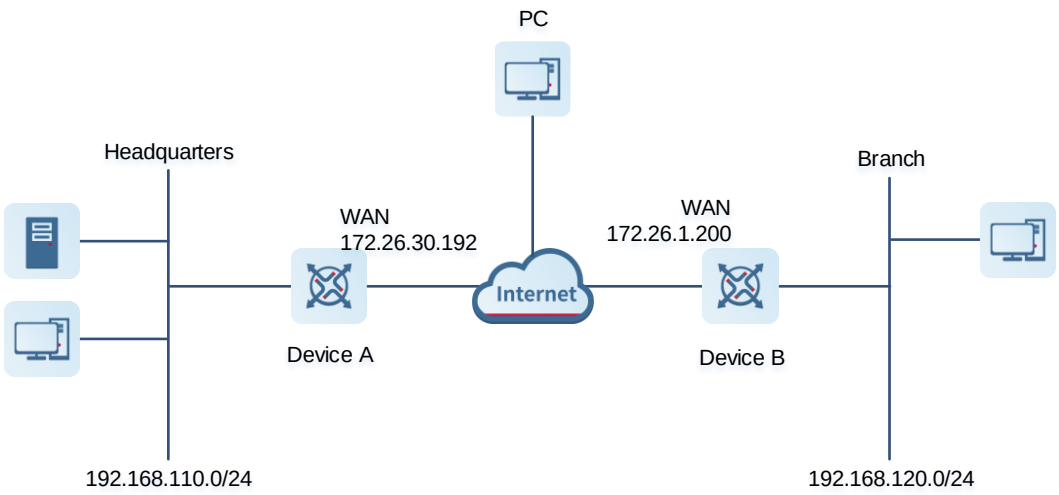
## 2. Networking Diagram



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### 3. Configuration Roadmap

- Configure the HQ gateway Device A as the L2TP server.
- Configure the branch gateway Device B as the L2TP client.
- Configure the PC of the traveling employee as the L2TP client.

### 4. Configuration Steps

- Configure the HQ gateway.

**Note**

The LAN address of the HQ cannot conflict with that of the branch. Otherwise, resource access will fail.

(1) Log in to the web management system and choose **One-Device** > **Gateway** > **Config** > **VPN** > **L2TP** > **L2TP Settings** to access the L2TP Settings page.

(2) Turn on the L2TP function, set L2TP Type to **Server**, enter the local tunnel IP, IP Range, and DNS Server address, specify whether to enable IPsec encryption and tunnel authentication, and click **Save**.

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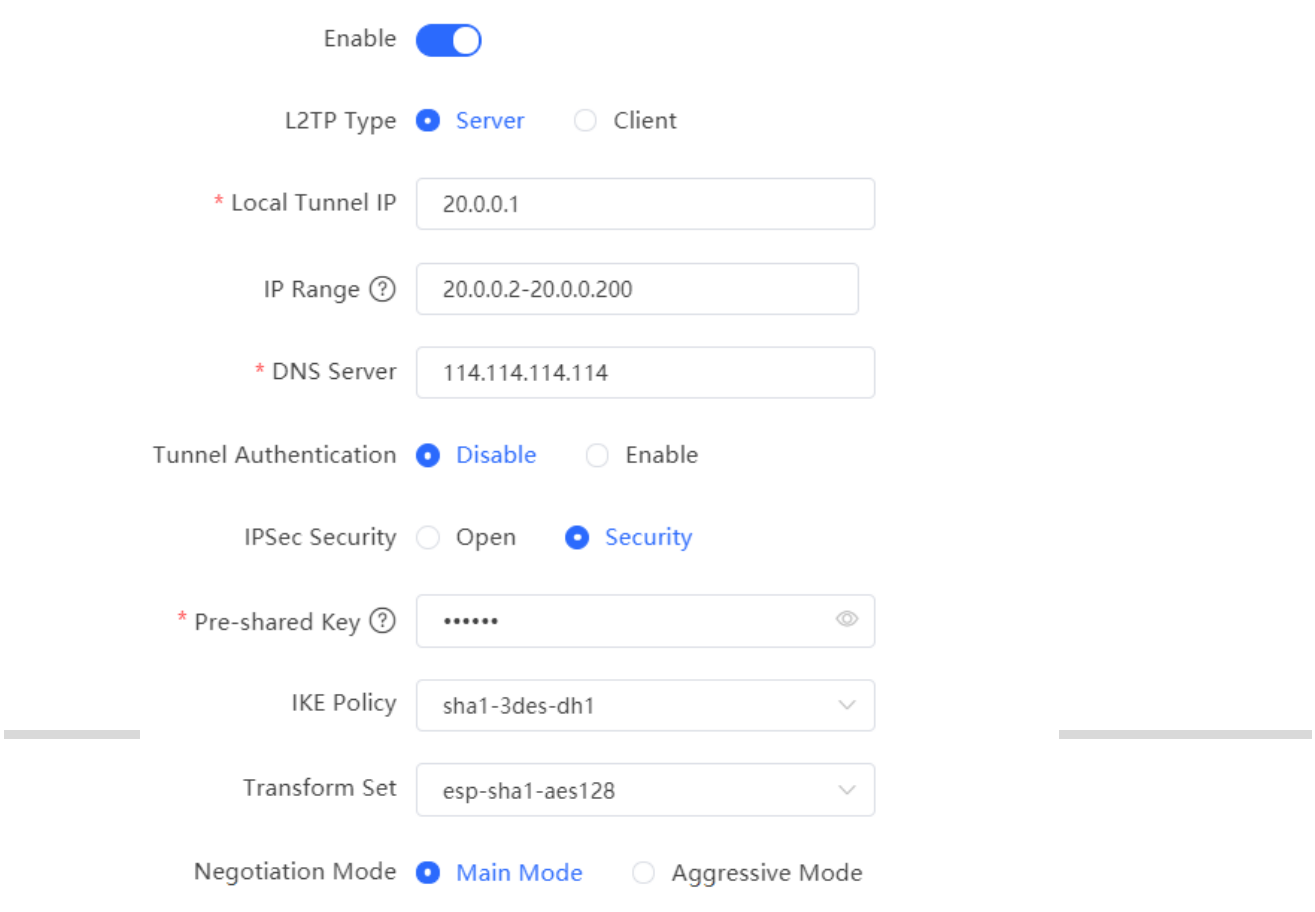
System Management



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System Management

**Table 11-12 L2TP server configuration**

| Parameter | Description |
|---|---|
| Local Tunnel IP | Enter an IP address not in the LAN network segment. The PC can dial up to access the server through this IP address. |
| IP Range | Enter an IP address range not in the LAN network segment, which is used to allocate IP addresses to clients. |
| DNS Server | Enter an available DNS server address. |
| Tunnel Authentication | By default, tunnel authentication is disabled. After this function is enabled, the server and client can be connected only when they use the same tunnel key. You can keep tunnel authentication disabled. |

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System Management

| Parameter | Description |
| --- | --- |
| IPsec Security | Specify whether to encrypt the L2TP tunnel using the IPsec protocol. You are advised to select **Security** to guarantee data security.<br>If an IPsec security policy is enabled on the current device, you cannot enable IPsec encryption for the L2TP tunnel. If you want to configure L2TP over IPsec, disable the IPsec security policy first. |
| Pre-shared Key | Enter the key for IPsec authentication. The client can access the server only when the same pre-shared key is configured on the client. |

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System Management

| Parameter | Description |
| --- | --- |
| IKE Policy<br>Transform Set<br>Negotiation Mode<br>Local ID Type<br>Local ID | Keep the default settings unless otherwise specified. |
| Flow Control | The VPN server has a lower priority to control the traffic of the client than the custom policy. The VPN server can only limit the maximum uplink and downlink bandwidth per user for the client. For details, see Section 9.6.2 Smart QoS. |
| PPP Hello Interval | Keep the default settings unless otherwise specified. |

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System Management

(3) Choose **One-Device** > **Gateway** > **Config** > **VPN** > **VPN Account** and add L2TP user accounts for the traveling employee and branch employee to access the HQ.

For the traveling employee account, set **Network Mode** to **PC to Router**.

For the branch employee account, set **Network Mode** to **Router to Router** and **Peer Subnet** to the LAN network segment of the branch gateway, which is 192.168.120.0/24.

**Caution**

The LAN network segments of the server and client cannot overlap.

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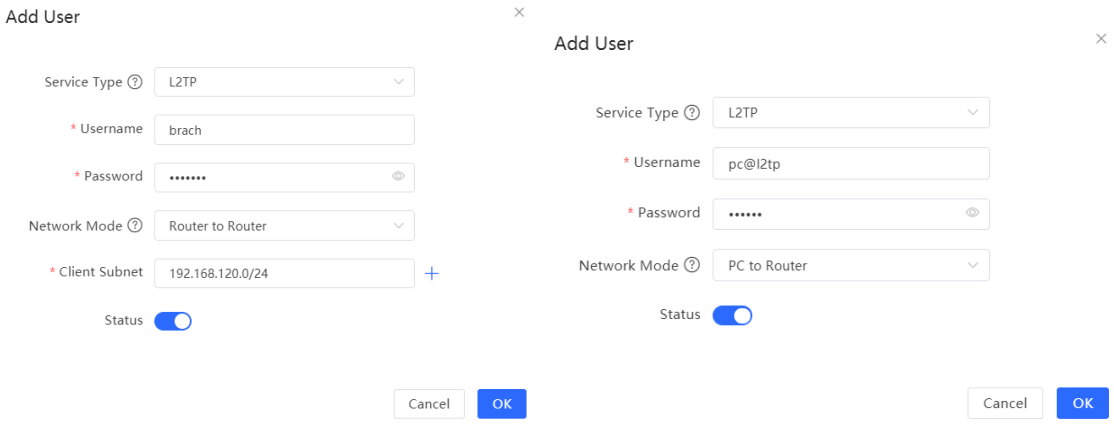

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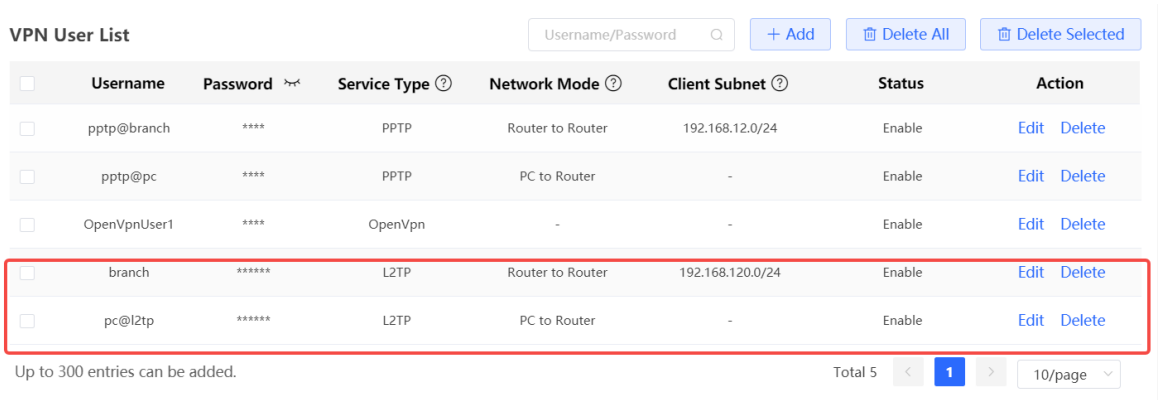
System Management




- Configure the branch gateway.

(1) Log in to the web management system and access the L2TP Settings page.

(2) Turn on the L2TP function, set L2TP Type to Client, enter the username and password configured on the server, server address, and LAN network segment of the peer, configure IPsec encryption parameters the same as those on the server, and click Save.

# 1 Configuration Guide SD-WAN

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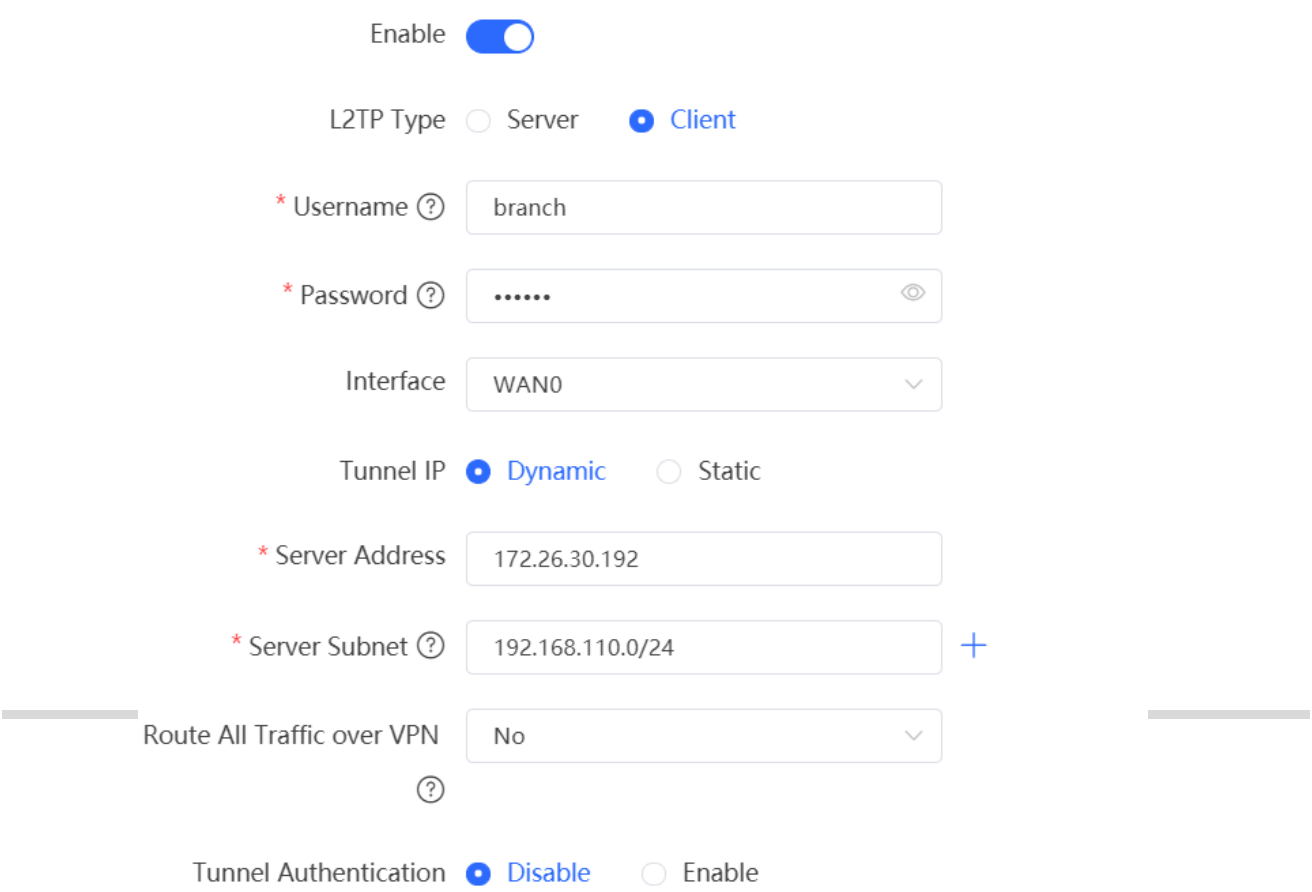

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System Management

**Table 11-13 L2TP client configuration**

| Parameter | Description |
|---|---|
| Username/Password | Enter the username and password configured on the server. |
| Interface | Select the WAN interface on the client to establish a tunnel with the server. |
| Tunnel IP | Select **Dynamic** to automatically obtain the tunnel IP address. You can also select Static and enter an IP address in the address pool of the server. |
| Server Address | Enter the WAN interface address of the server, which is 172.26.30.192. |
| Server Subnet | Enter the LAN network segment (LAN port IP address range) of the server, which is 192.168.110.0/24. |

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System Management

| Parameter | Description |
|---|---|
| Route ALL Traffic over VPN | Once this feature is enabled, all traffic will be directed through the VPN connection, that is, VPN is configured as the default route. |
| Tunnel Authentication | The value must be the same as that on the server. In this example, you need to disable tunnel authentication. |
| IPsec Security | The value must be the same as that on the server. In this example, you need to set this parameter to **Security**. |
| Pre-shared Key | Enter the pre-shared key configured on the server. |

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System Management

| Parameter | Description |
| --- | --- |
| IKE Policy<br>Transform Set<br>Negotiation Mode<br>Peer ID Type<br>Peer ID | The settings must be the same as those on the server. Set **Peer ID Type** to the same value as that of **Local ID Type** on the server. |
| Working Mode | If the HQ wants to access the LAN of the branch, set this parameter to **Router**. |
| PPP Hello Interval | Specify the interval for sending PPP Hello packets after L2TP VPN is deployed. Keep the default settings. |

- Configure the PC of the traveling employee.

# 1 Configuration Guide SD-WAN

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System Management

**Note**

Configure the PC of a traveling employee as the L2TP client. The following uses the PC running Windows 10 operating system as an example.

The Windows XP (shorted as XP) system and Windows 7/Windows 10 (shorted as Win7/10) system differ in their support for L2TP VPN: To enable L2TP VPN in the XP system, you need to modify the service registries. L2TP is supported in the Win7/10 system by default, without the need to modify registries.

Neither the Win7/Win10 system nor the XP system supports L2TP tunnel authentication. Therefore, tunnel authentication must be disabled on the server.

Apple mobile phones support L2TP over IPsec but do not support IPsec encryption for L2TP dial-up.

(1) Choose **Settings** > **Network & Internet** > **VPN** to access the VPN page.

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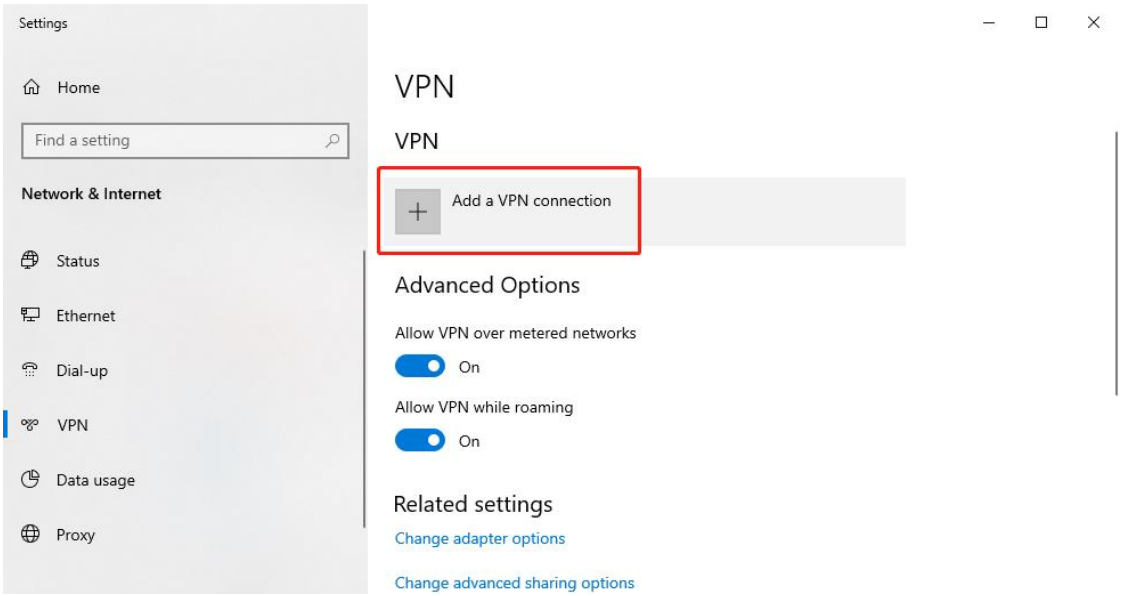


(2) Click **Add a VPN connection**. In the dialog box that appears, set VPN provider to **Windows**, enter the connection name and server address or domain name, and click **Save**.

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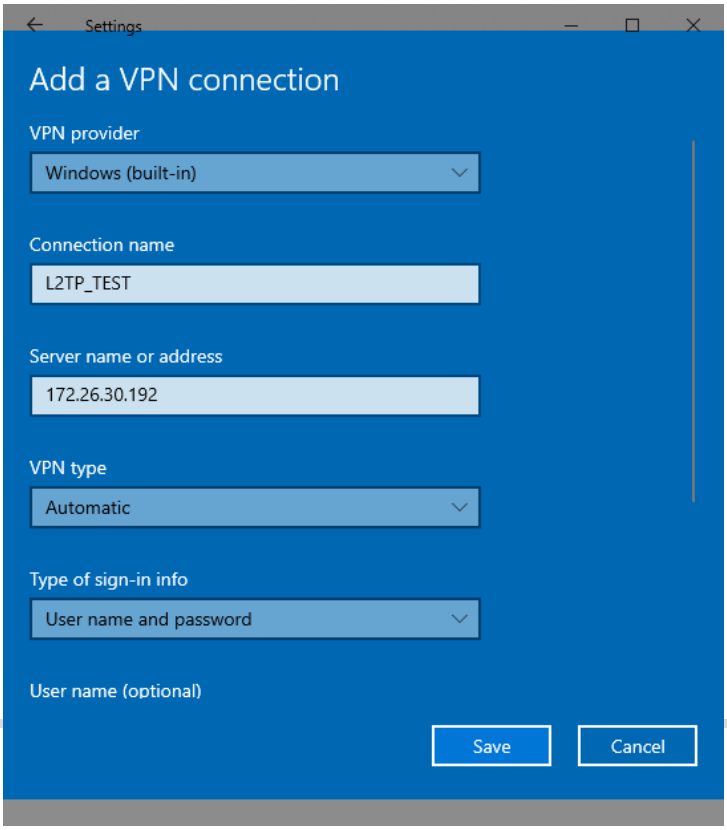

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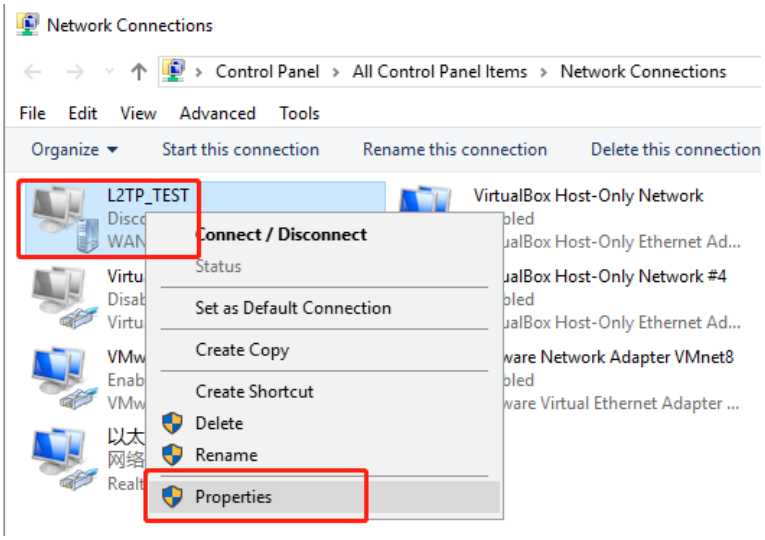
(3) Right-click the created VPN connection named **L2TP_TEST** and select Properties to view the properties of the network connection.



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(4) In the dialog box that appears, click the Security tab, and set Type of VPN to Layer 2 Tunneling Protocol with IPsec (L2TP/IPsec) and Data encryption to Optional encryption (connect even if no encryption).

If IPsec encryption is not enabled on the L2TP server, select **Unencrypted password (PAP)** and click **OK**. Skip Step (5) .

If IPsec encryption is enabled on the L2TP server, perform Step (5) .

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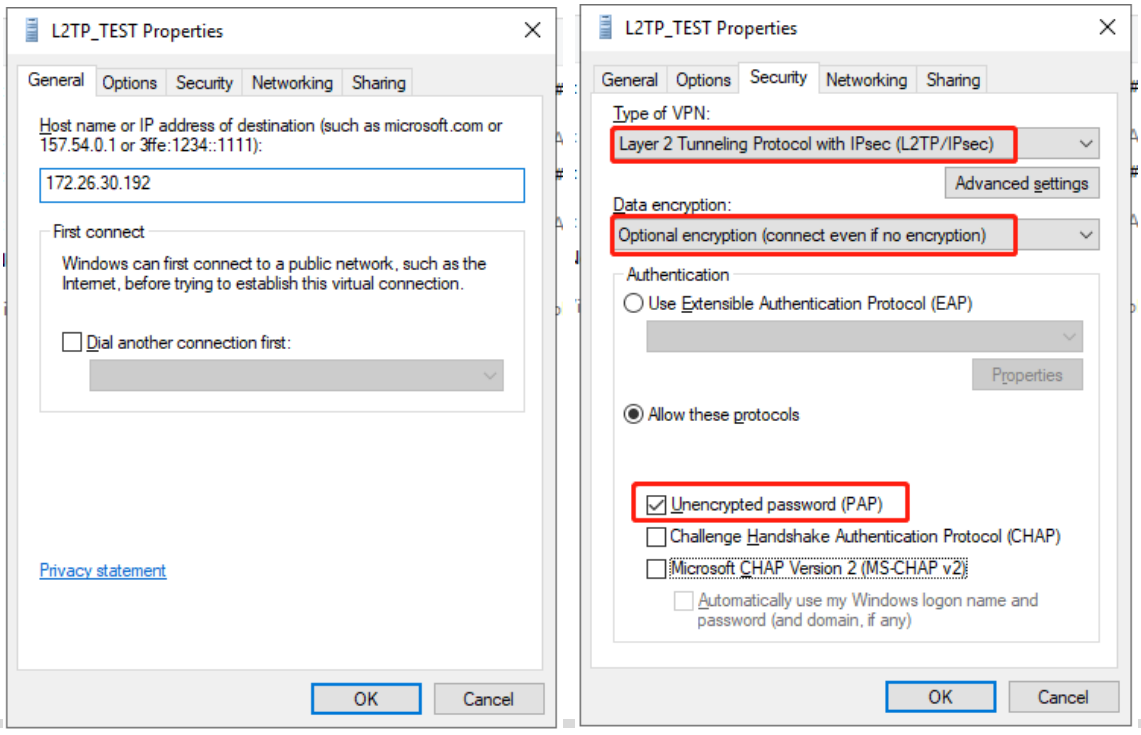

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(5) If IPsec encryption is enabled on the server, select **CHAP** and **MS-CHAP v2** as the identity authentication protocols and click **Advanced settings**. In the dialog box that appears, configure the pre-shared key the same as that on the server. After completing the configuration, click **OK**.

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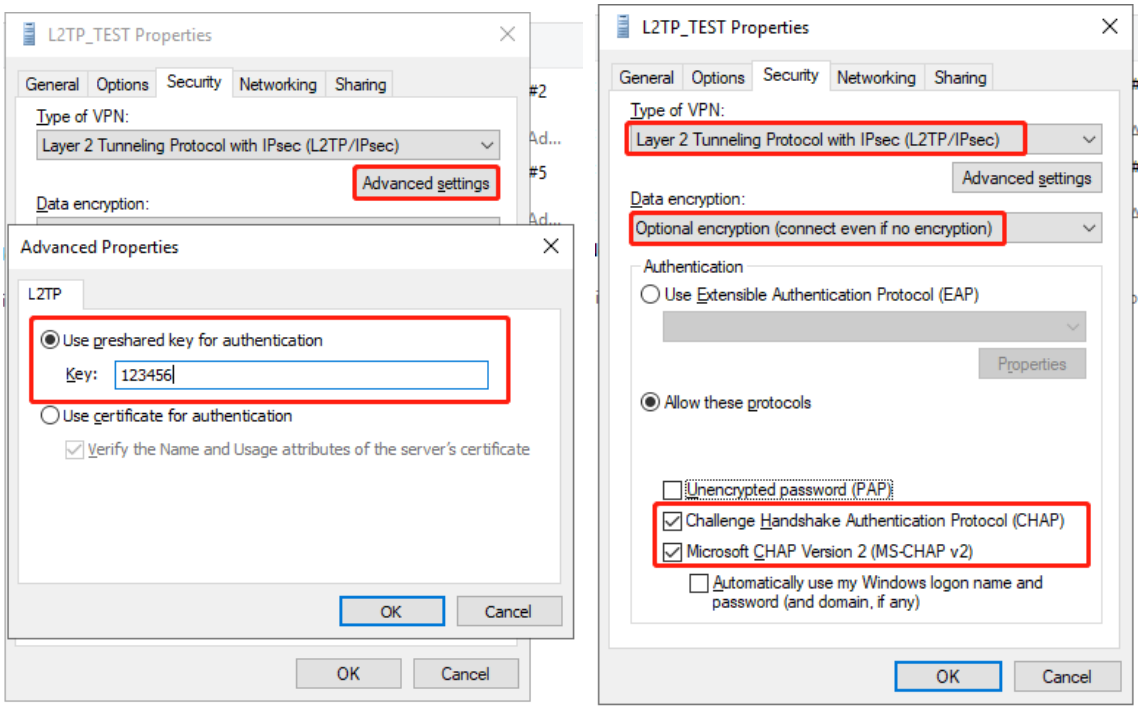

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System Management

**Note**

The device does not support EAP for identity authentication. Therefore, you cannot select EAP-related identity authentication options in the Windows client. Otherwise, the VPN connection fails.

(6) After the L2TP client configuration is completed on the PC, initiate a VPN connection on the PC. Click the network icon  in the task bar, select the created L2TP VPN connection, and click Connect. In the dialog box that appears, enter the username and password configured on the server.

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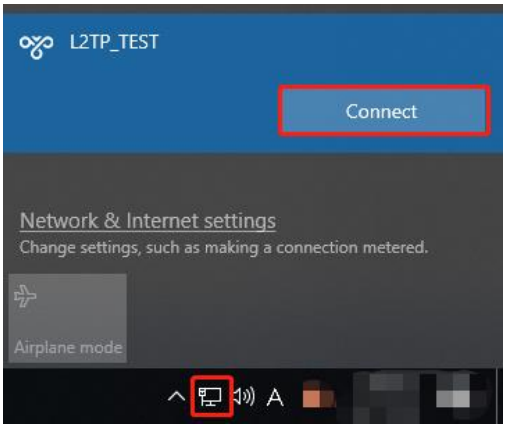
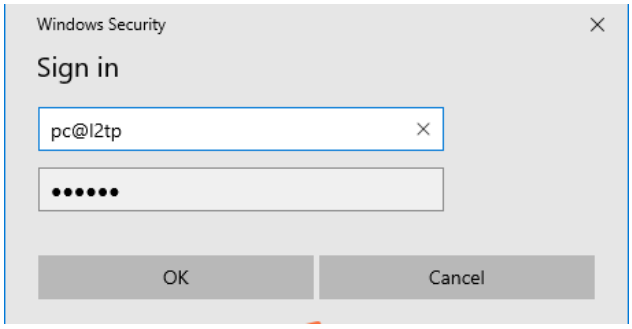
System Management




**5. Verifying Configuration**

(1) After the server and client are configured, wait for about 1 minute. If you can view the L2TP tunnel connection information on the HQ server and branch client, the connection is successful.

HQ:

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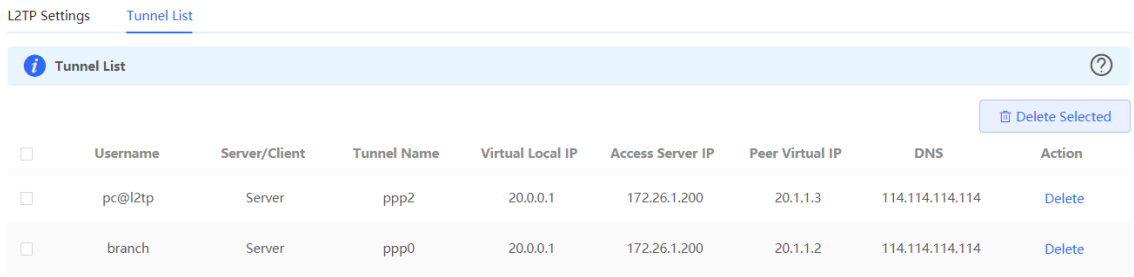
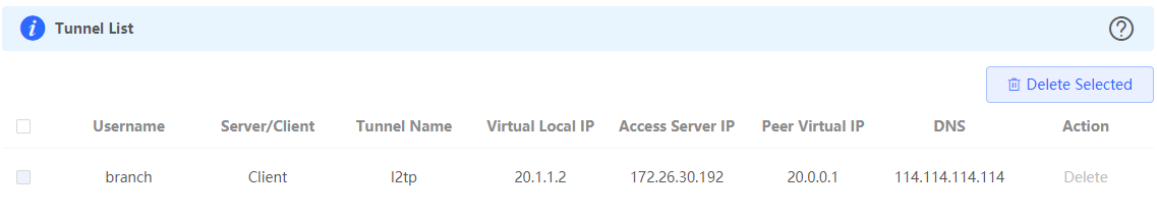



Branch:




(2) Ping the LAN address of the peer from the HQ or branch. The HQ and branch can successfully communicate. The PC of the traveling employee and the PC of the branch employee can access the HQ server.

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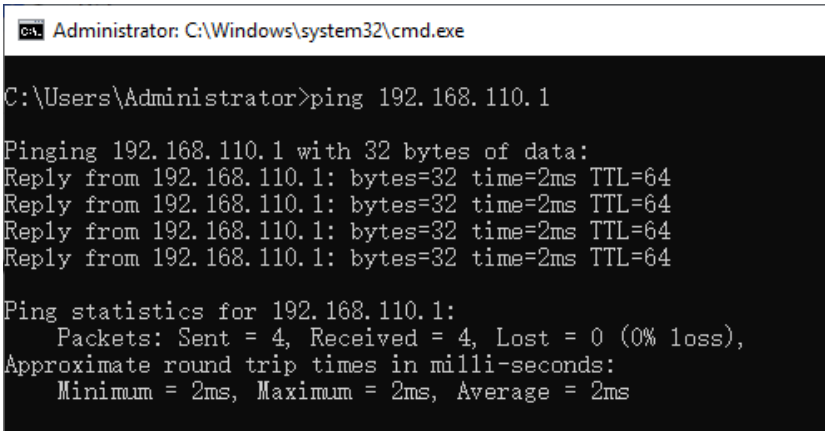


### 11.2.6 Solution to L2TP VPN Connection Failure

(1) Run the ping command to test the connectivity between the client and server. For details, see Section 13.12.3 Network Tools. If the ping fails, check the network connection settings. Check whether the branch EG can ping to HQ EG. If the ping fails, check the network connection between the two EGs.

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Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Network Tools**. Then, you can start the ping operation. For details, see Section 13.12.3 Network Tools.

(2) Check whether the username and password used by the client are the same as those configured on the server.

(3) Check whether the WAN interface IP address of your HQ EG is a public network IP address. If not, you need to configure DMZ on your egress gateway.

## 11.3 Configuring PPTP VPN

### 11.3.1 Overview

Point-to-Point Tunneling Protocol (PPTP) is an enhanced security protocol designed based on the Point-to-Point Protocol (PPP). It allows an enterprise to use private tunnels to expand its enterprise network over the public network. PPTP relies on the PPP protocol to implement security functions such as encryption and identity authentication. Generally, PPTP works with Password Authentication Protocol (PAP), Challenge Handshake Authentication Protocol (CHAP), Microsoft Challenge Handshake Authentication Protocol (MS-CHAPv1/v2), or Extensible Authentication Protocol-Transport Layer Security (EAP-TLS) for identity authentication and Microsoft Point-to-Point Encryption (MPPE) for encryption to improve security.

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System Management

Currently, the device can be deployed as the PPTP server or client. It supports MPPE for encryption MSCHAP-v2 for identity authentication, and does not support EAP authentication.

## 11.3.2 Configuring the PPTP Service

### 1. Configuring the PPTP Server

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **PPTP** > **PPTP Settings**.

Turn on the PPTP function, set **PPTP Type** to **Server**, configure PPTP server parameters, and click **Save**.

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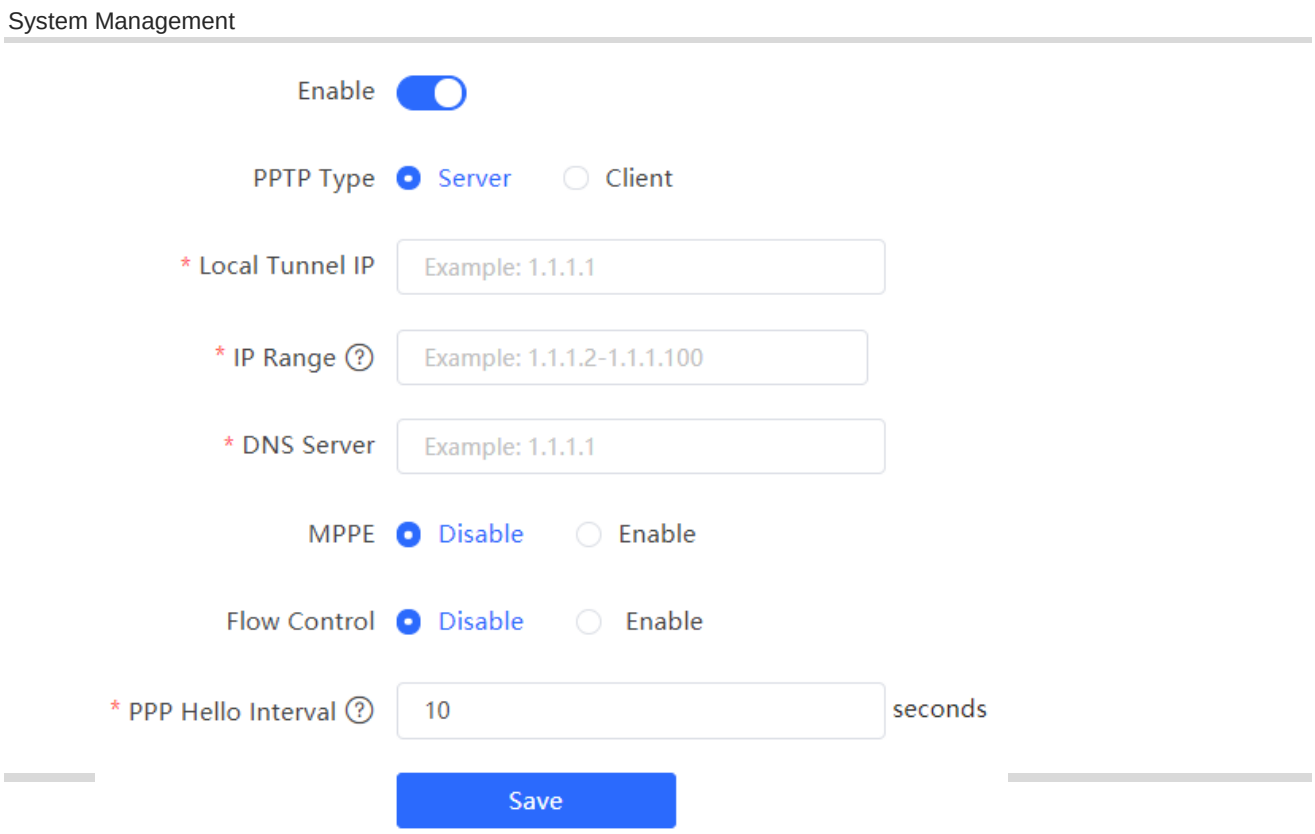

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System Management

**Table 11-14 PPTP server configuration**

| Parameter | Description |
|---|---|
| Local Tunnel IP | Specify the local virtual IP address of the L2TP server. Clients can dial up to access the L2TP server through this address. |
| IP Range | Specify the address pool used by the PPTP server to allocate IP addresses to clients. |
| DNS Server | Specify the DNS server address pushed by the PPTP server to clients. |

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System Management

| Parameter | Description |
| --- | --- |
| MPPE | Specify whether to use MPPE to encrypt the PPTP tunnel.<br>After MPPE is enabled on the server: If **Data encryption** is set to **Optional encryption** on the client, the server and client can be connected but the server does not encrypt packets. If **Data encryption** is set to **Require encryption** on the client, the server and client can be connected and the server encrypts packets. If **Data encryption** is set to **No encryption allowed** on the client, the server and client cannot be connected.<br>If MPPE is disabled on the server but the client requires encryption, the server and client connection fails.<br>By default, MPPE is disabled on the server. After you enable MPPE, the bandwidth performance of the device degrades. You are advised to keep MPPE disabled if there are no special security requirements. |

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System Management

| Parameter | Description |
| --- | --- |
| Flow Control | The VPN server has a lower priority to control the traffic of the client than the custom policy. The VPN server can only limit the maximum uplink and downlink bandwidth per user for the client. For details, see Section 9.6.2 Smart QoS. |
| PPP Hello Interval | Specify the interval for sending PPP Hello packets after PPTP VPN is deployed. |

**Caution**

The local tunnel address and IP address range of the address pool cannot overlap the network segment of the LAN port on the device.

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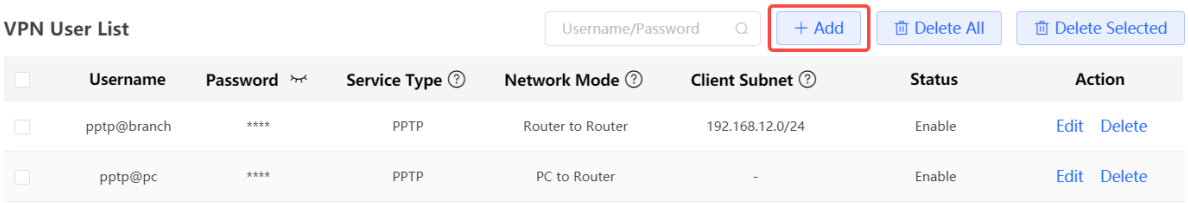
### 2. Configuring PPTP User

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **VPN Account**.

Only user accounts added to the VPN client list are allowed to dial up to connect to the PPTP server. Therefore, you need to manually configure user accounts for clients to access the PPTP server.

Click **Add**. In the dialog box that appears, set **Service Type** to **PPTP** or **ALL**. (If you select **ALL**, the created account can be used to establish all types of VPN tunnels.) Enter the username, password, and peer subnet, select a network mode, and click **OK**.



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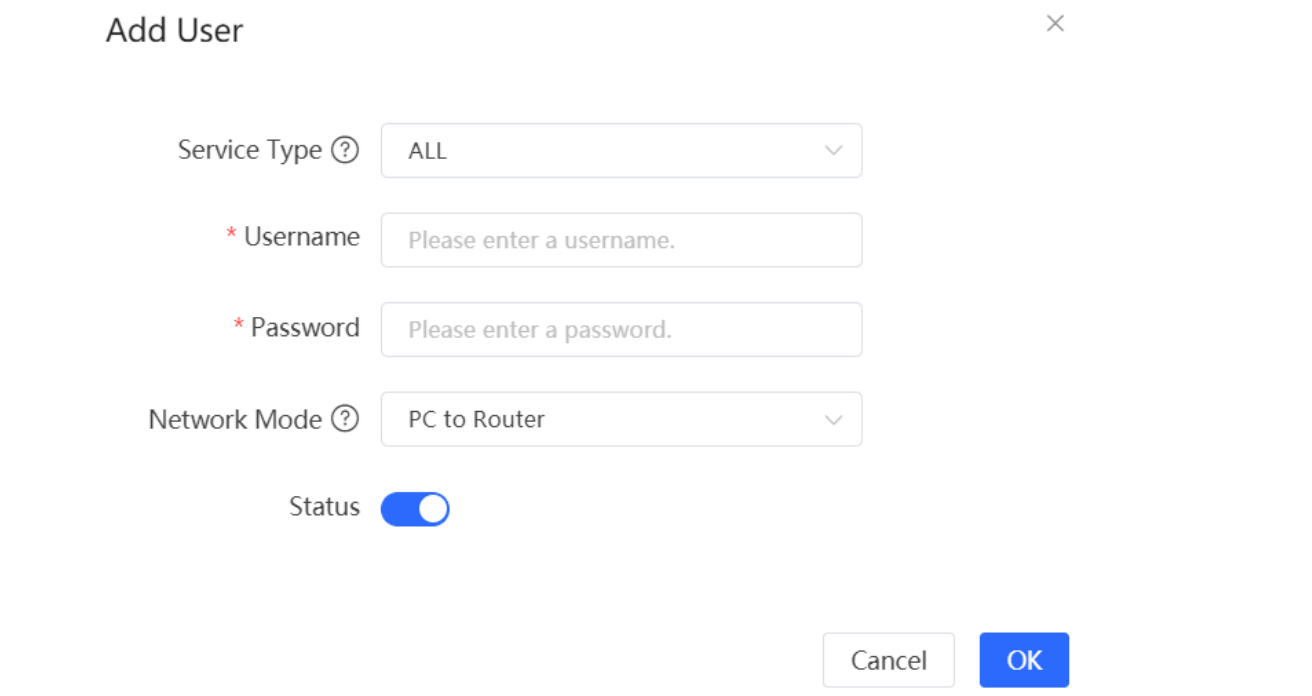

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System Management

**Table 11-15 PPTP user configuration**

| Parameter | Description |
|---|---|
| Username/Password | Specify the name and password of the PPTP user allowed to dial up to connect to the PPTP server. The username and password are used to establish a connection between the server and client. |
| Network Mode | ● PC to Router: The dial-up client is an individual. Select this mode when a PC wants to dial up to communicate with the remote PC through the LAN.<br>● Router to Router: The dial-up client is a user in a network segment. Select this mode when the LANs on two ends of the tunnel need to communicate through router dial-up. |

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| Parameter | Description |
| --- | --- |
| Client Subnet | Specify the IP address range used by the LAN on the peer end of the PPTP tunnel. Generally, the peer subnet is the IP address network segment of the LAN port on the device. (The LAN network segments of the server and client cannot overlap.)<br>For example, when a branch dials up to connect to the HQ, enter the LAN network segment of the router.<br>Note: When the Network Mode is set to Router to Router, you can click + to set multiple pairs of peer subnets for scenarios where multiple clients are connected to the same server. |
| Status | Specify whether to enable the user account. |

# 1 Configuration Guide SD-WAN

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## 11.3.3 Configuring the PPTP Client

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **PPTP** > **PPTP Settings**.

Turn on the PPTP function, set **PPTP Type** to **Client**, configure PPTP client parameters, and click **Save**.

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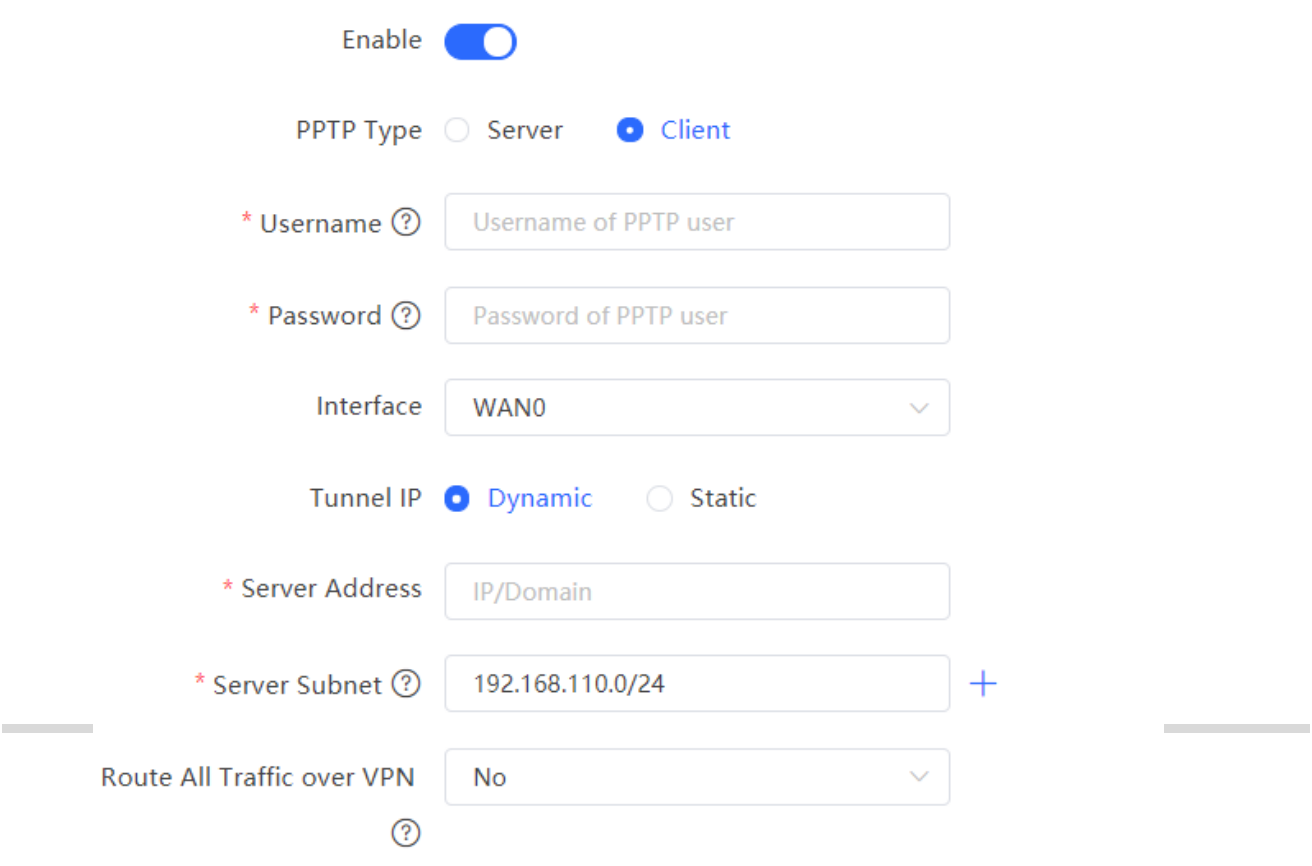
System Management



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System Management

**Table 11-16 PPTP client configuration**

| Parameter | Description |
|---|---|
| Username/Password | Specify the username and password for identity authentication for communication over the PPTP tunnel. The values must be the same as those configured on the PPTP server. |
| Interface | Specify the WAN interface used by the client. |
| Tunnel IP | Specify the virtual IP address of the VPN tunnel client. If you select **Dynamic**, the client obtains an IP address from the server address pool. If you select **Static**, manually configure an idle static address within the range of the server address pool as the local tunnel IP address. |

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System Management

| Parameter | Description |
|---|---|
| Server Address | Enter the WAN interface IP address or domain name of the server. This address must be a public network IP address. |
| Server Subnet | Enter the LAN network segment in which clients want to access the server. The value cannot overlap with the LAN network segment of the client. |
| Route All Traffic over VPN | Once this feature is enabled, all traffic will be directed through the VPN connection, that is, VPN is configured as the default route. |
| MPPE | Specify whether to use MPPE to encrypt the PPTP tunnel. The value must be the same as that on the server. |
| Working Mode | ● **NAT**: The client can access the server network, but the server cannot access the client network.<br>● **Router**: The server can access the client network. |

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System Management

| Parameter | Description |
| --- | --- |
| PPP Hello Interval | Specify the interval for sending PPP Hello packets after a PPTP tunnel is established. You are advised to retain the default configuration. |

### 11.3.4 Viewing the PPTP Tunnel Information

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **PPTP** > **Tunnel List**.

It takes some time to establish a VPN connection between the server and client. After the configuration of the server and client is completed, wait for 1 to 2 minutes to refresh the page and view the PPTP tunnel establishment status.

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System Management

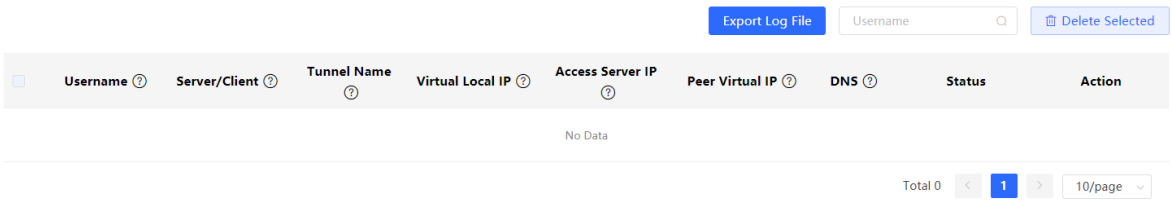


**Table 11-17 PPTP tunnel information**

| Parameter | Description |
|---|---|
| Username | Indicate the username used by the client for identity authentication. |
| Server/Client | Indicate the role of the current device, which is client or server. |
| Tunnel Name | Indicate the name of the vNIC generated by PPTP. |

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System Management

| Parameter | Description |
|---|---|
| Virtual Local IP | Indicate the local virtual IP address of the tunnel. The virtual IP address of the PPTP client is allocated by the PPTP server. |
| Access Server IP | Indicate the real IP address of the peer connecting to the PPTP tunnel. |
| Peer Virtual IP | Indicate the peer virtual IP address of the tunnel. The virtual IP address of the PPTP client is allocated by the PPTP server. |
| DNS | Indicate the DNS server address allocated by the PPTP server. |

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## 11.3.5 Typical Configuration Example

### 1. Networking Requirements

An enterprise wants to establish a PPTP tunnel to allow its traveling employees and branch employees to access the servers deployed in the HQ LAN.

- Traveling employees want to access the HQ servers from their PCs through PPTP dial-up.
- Branch employees need to frequently access documents on the HQ servers. The enterprise wants to deploy the branch router (Device B) as the PPTP client, so that branch employees can dial up to transparently and directly access documents on the HQ servers, as if they are accessing servers inside the branch.

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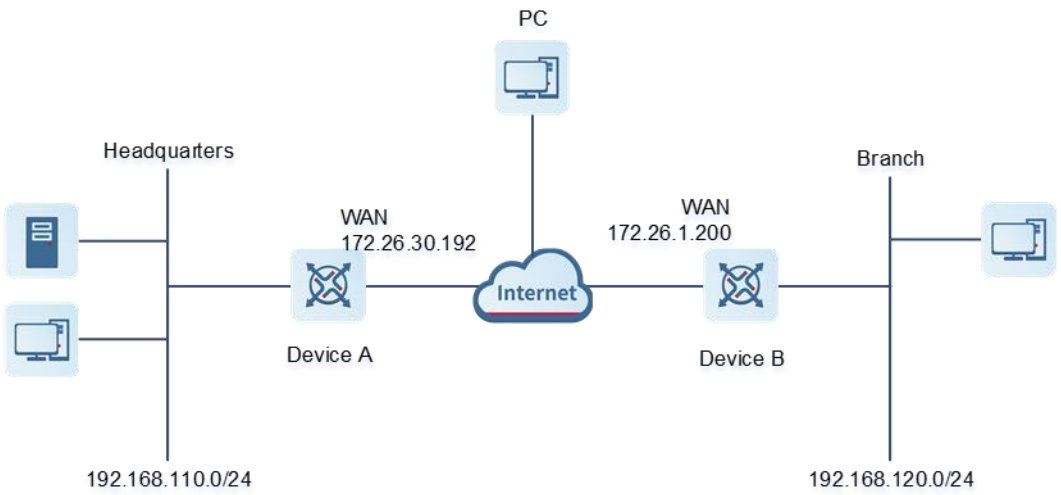
## 2. Networking Diagram



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### 3. Configuration Roadmap

- Configure the HQ gateway Device A as the PPTP server.
- Configure the branch gateway Device B as the PPTP client.
- Configure the PC of the traveling employee as the PPTP client.

### 4. Configuration Steps

- Configure the HQ gateway.

**Note**

The LAN address of the HQ cannot conflict with that of the branch. Otherwise, resource access will fail.

(1) Log in to the web management system and choose **One-Device** > **Gateway** > **Config** > **VPN** > **PPTP** > **PPTP Settings** to access the PPTP Settings page.

(2) Turn on the PPTP function, set PPTP Type to Server, enter the local tunnel IP, IP Range, and DNS server address, specify whether to enable MPPE encryption, and click **Save**.

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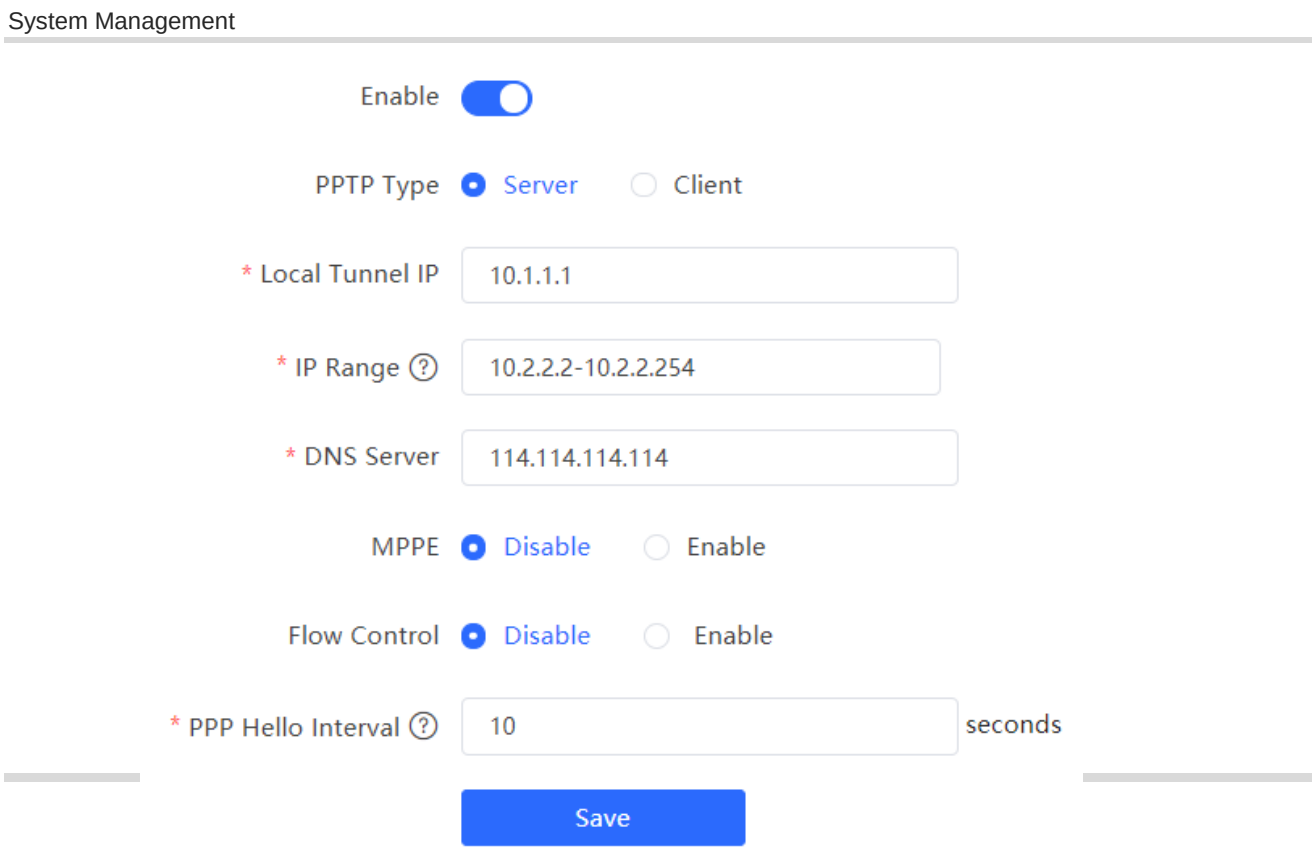

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System Management

**Table 11-18 PPTP server configuration**

| Parameter | Description |
|---|---|
| Local Tunnel IP | Enter an IP address not in the LAN network segment. The PC can dial up to access the server through this IP address. |
| IP Range | Enter an IP address range not in the LAN network segment, which is used to allocate IP addresses to clients. |
| DNS Server | Enter an available DNS server address. |

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System Management

| Parameter | Description |
| --- | --- |
| MPPE | Specify whether to use MPPE to encrypt the PPTP tunnel. The value must be the same as that on the client.<br>After you enable MPPE, the device security is improved but the bandwidth performance of the device degrades. You are advised to keep MPPE disabled if there are no special security requirements. |
| Flow Control | Flow control is disabled by default. |
| PPP Hello Interval | Keep the default settings unless otherwise specified. |

(3) Choose **One-Device** > **Gateway** > **Config** > **VPN** > **VPN Account** and add PPTP user accounts for the traveling employee and branch employee to access the HQ.

For the traveling employee account, set **Network Mode** to **PC to Router**.

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## System Management

For the branch employee account, set **Network Mode** to **Router to Router** and C**lient Subnet** to the LAN network segment of the branch gateway.

**Caution**

The LAN network segments of the server and client cannot overlap.

# 1 Configuration Guide SD-WAN

**Specification**

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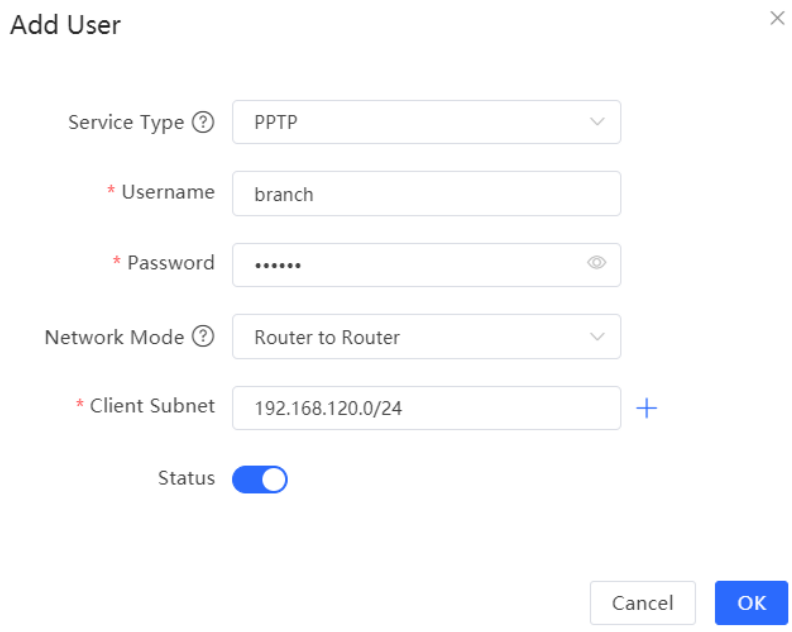
System Management



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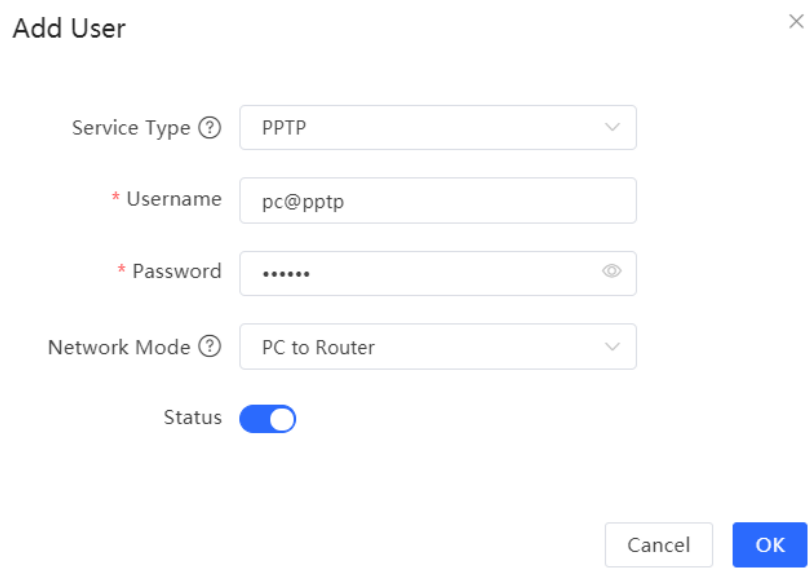

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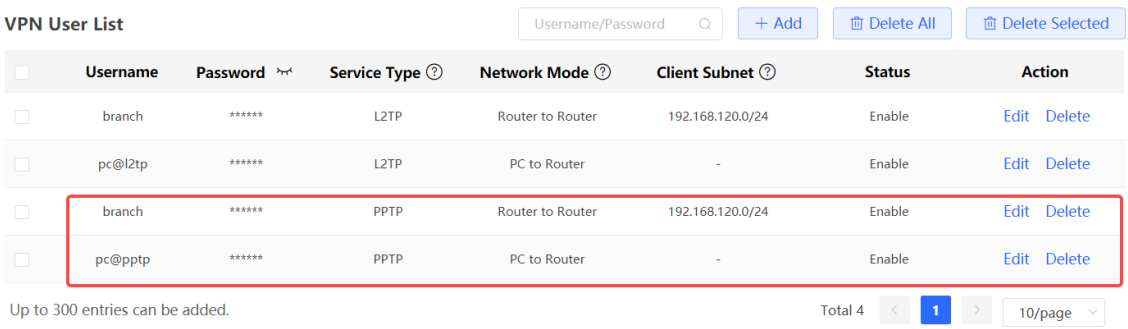


- Configure the branch gateway.

(1) Log in to the web management system and access the PPTP Settings page.

(2) Turn on the PPTP function, set PPTP Type to Client, enter the username and password configured on the server, server address, and LAN network segment of the peer, configure IPsec encryption parameters the same as those on the server, and click Save.

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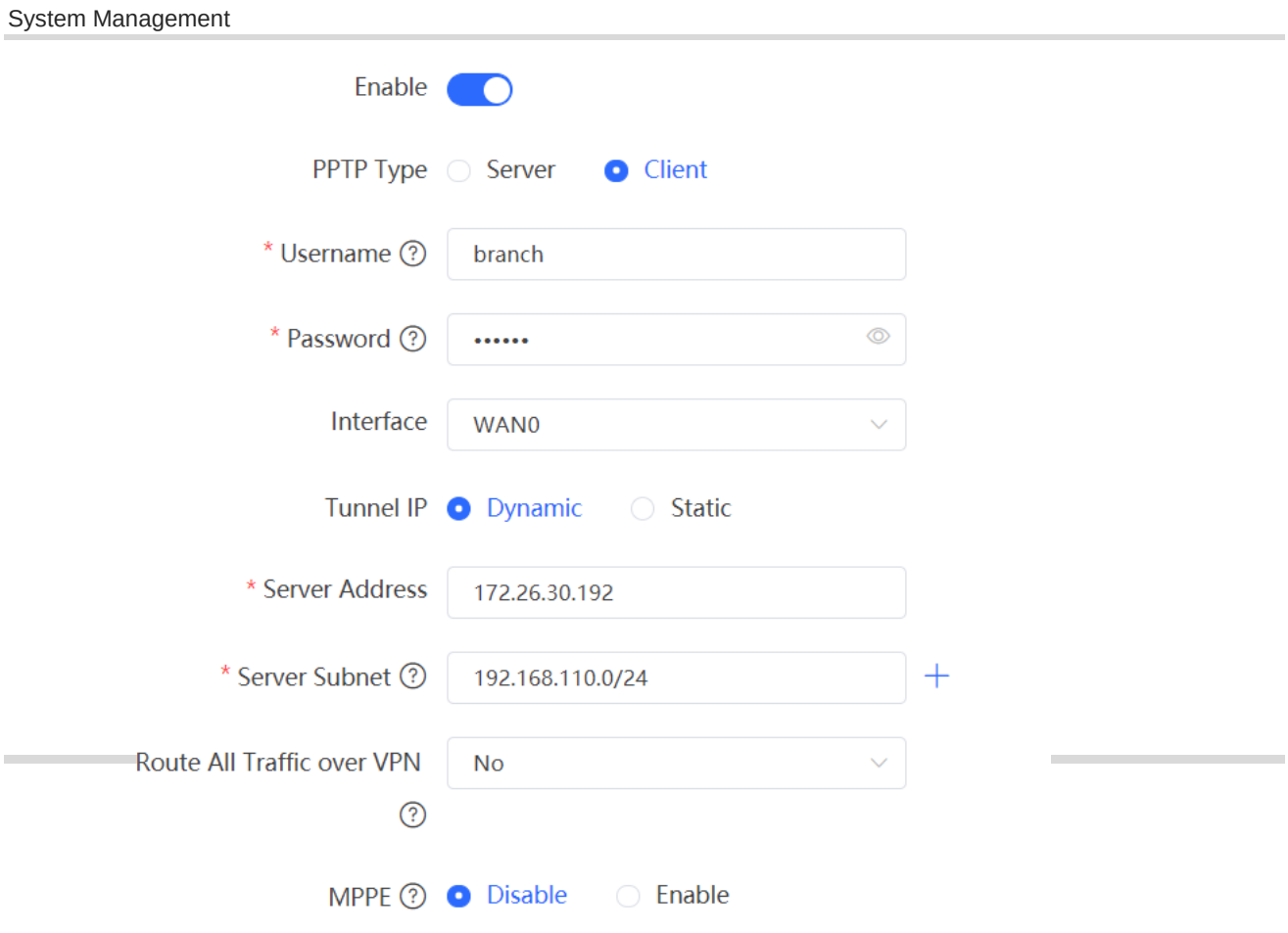

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System Management

**Table 11-19 PPTP client configuration**

| Parameter | Description |
|---|---|
| Username/Password | Enter the username and password configured on the server. |
| Interface | Select the WAN interface on the client to establish a tunnel with the server. |
| Tunnel IP | Select **Dynamic** to automatically obtain the tunnel IP address. You can also select **Static** and enter an IP address in the address pool of the server. |
| Server Address | Enter the WAN interface address of the server. |
| Server Subnet | Enter the LAN network segment (LAN port IP address range) of the server. |

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System Management

| Parameter | Description |
|---|---|
| Route All Traffic over VPN | Once this feature is enabled, all traffic will be directed through the VPN connection, that is, VPN is configured as the default route. |
| MPPE | The value must be the same as that on the server. |
| Working Mode | If the HQ wants to access the LAN of the branch, set this parameter to **Router**. |
| PPP Hello Interval | Specify the interval for sending PPP Hello packets after PPTP VPN is deployed. Keep the default settings. |

- Configure the PC of the traveling employee.

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System Management

**Note**

Configure the PC of a traveling employee as the PPTP client. The following uses the PC running Windows 10 operating system as an example.

Enable ports 1723 (PPTP) and 47 (GRE) on the PC firewall.

(1) Choose **Settings** > **Network & Internet** > **VPN** to access the VPN page.

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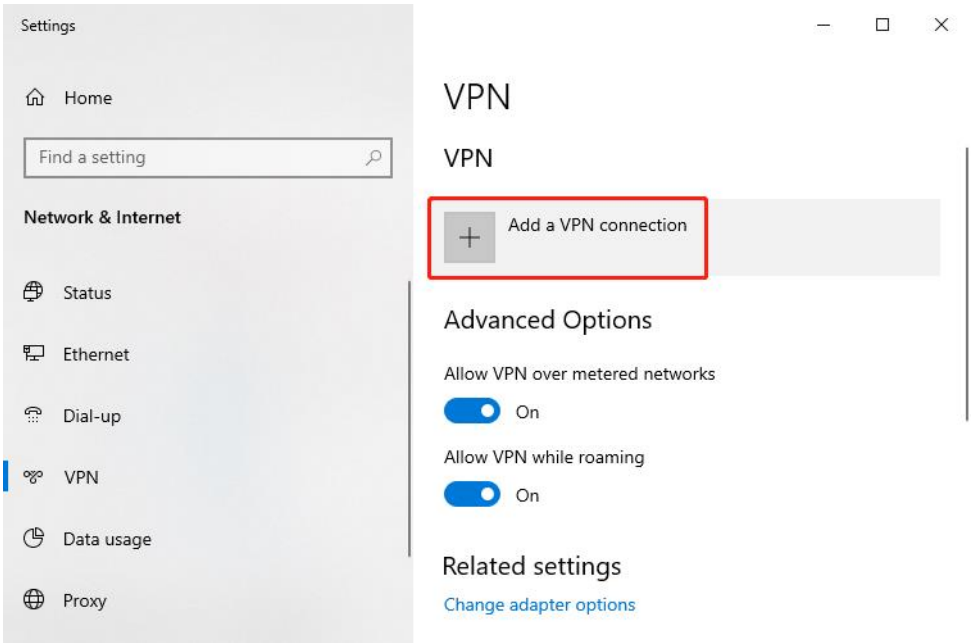

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(2) Click **Add a VPN connection**. In the dialog box that appears, set VPN provider to **Windows** and VPN type to **Point to Point Tunneling Protocol (PPTP)**, enter the connection name and server address or domain name, and click **Save**.

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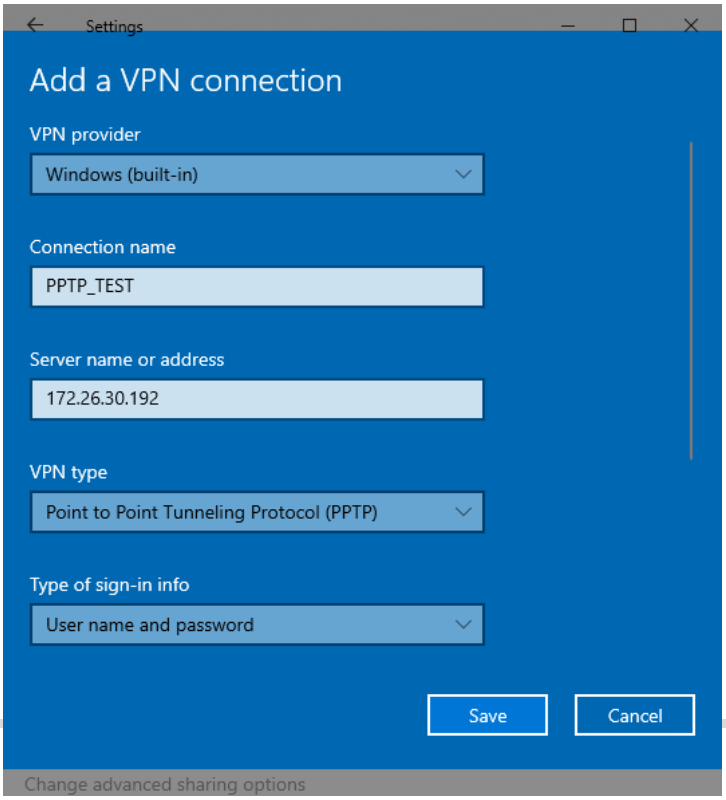

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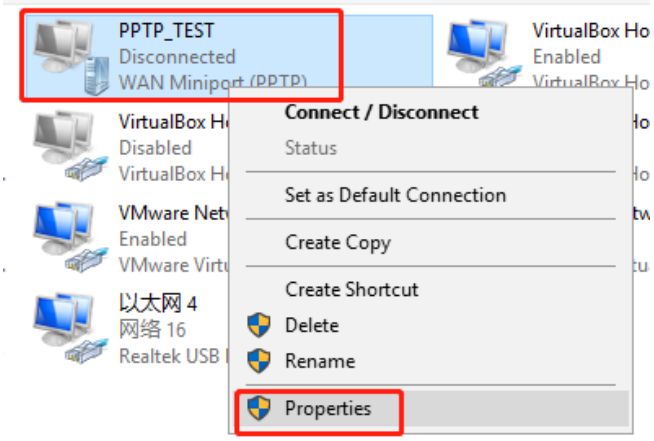
(3) Right-click the created VPN connection named **PPTP_TEST** and select Properties to view the properties of the network connection.




(4) In the dialog box that appears, click the **Security** tab.

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System Management

If MPPE is not enabled on the PPTP server, set **Data encryption** to **Optional encryption** or **No encryption allowed** and use PAP, CHAP, or MS-CHAP v2 for identity authentication, as shown in the following figure on the left.

If MPPE is enabled on the PPTP server, set **Data encryption** to **Require encryption** or **Maximum strength encryption** and use MS-CHAP v2 for identity authentication, as shown in the following figure on the right.

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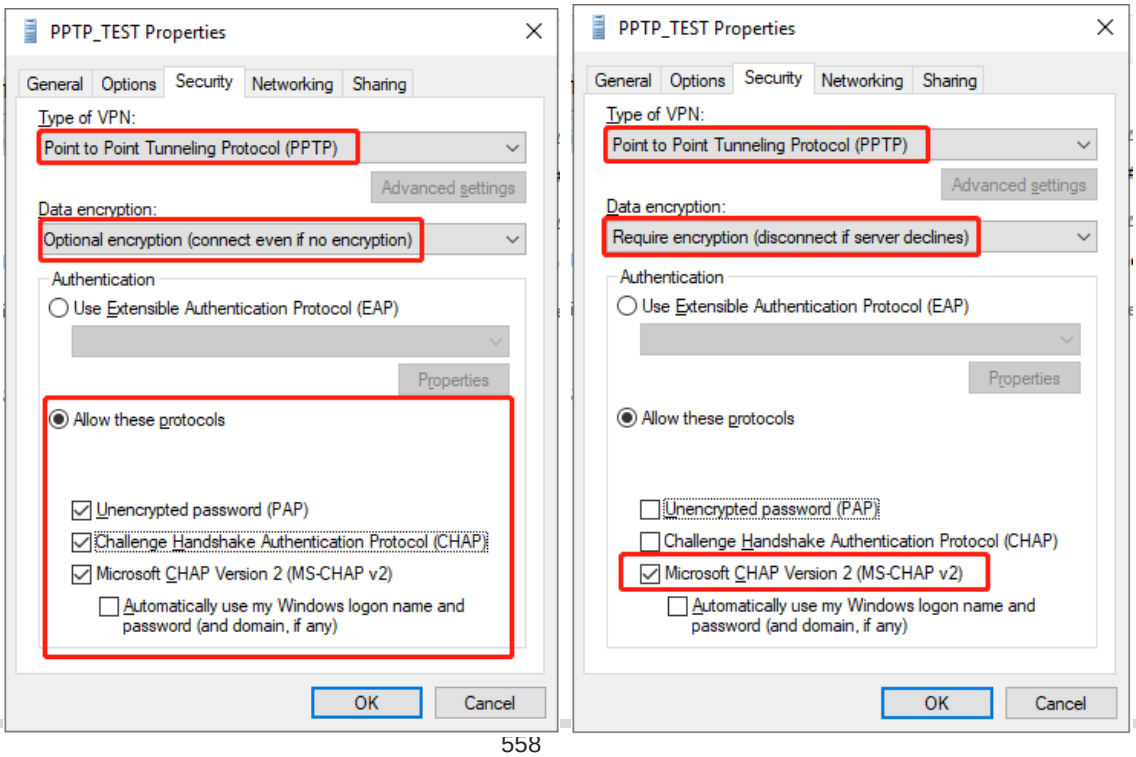

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System Management

**Note**

The device does not support EAP for identity authentication. Therefore, you cannot select EAP-related identity authentication options in the Windows client. Otherwise, the VPN connection fails.

(5) When the PC functions as a dial-up client, configure the PC by using either of the following methods:

- Add a route to the VPN peer network segment on the PC as the administrator.
- In the **Properties** dialog box of the local VPN connection, select **Use default gateway on remote network**. After the VPN connection is successful, all data flows from the PC to the Internet are routed to the VPN tunnel. The following figures show the detailed configuration.

# 1 Configuration Guide SD-WAN

**Specification**

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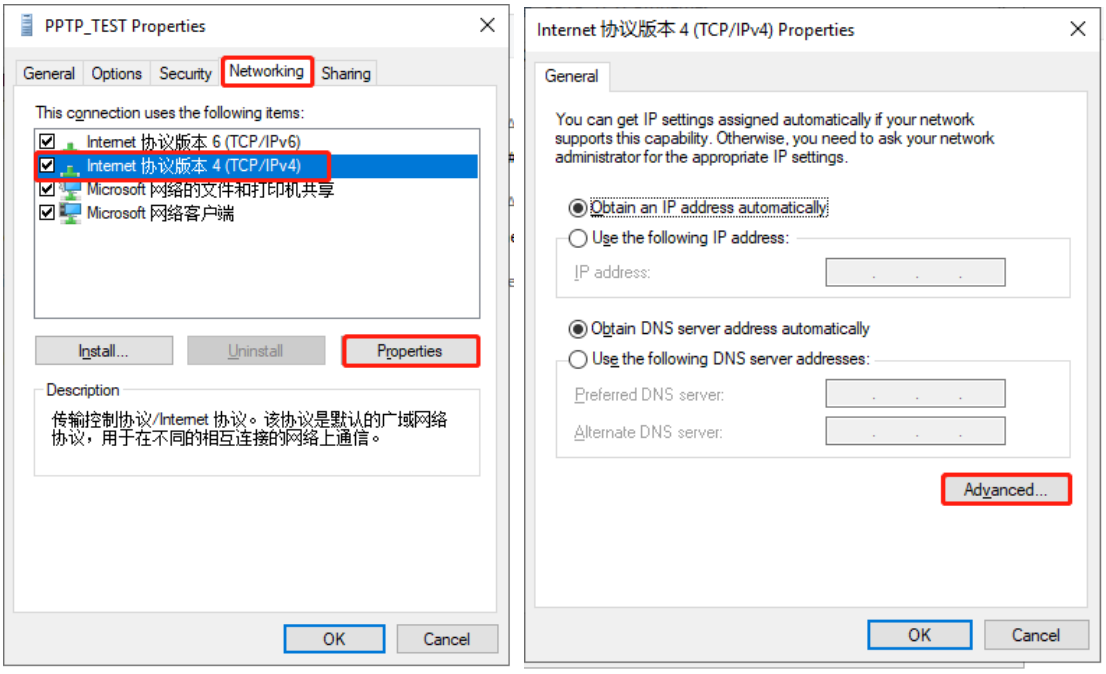
System Management



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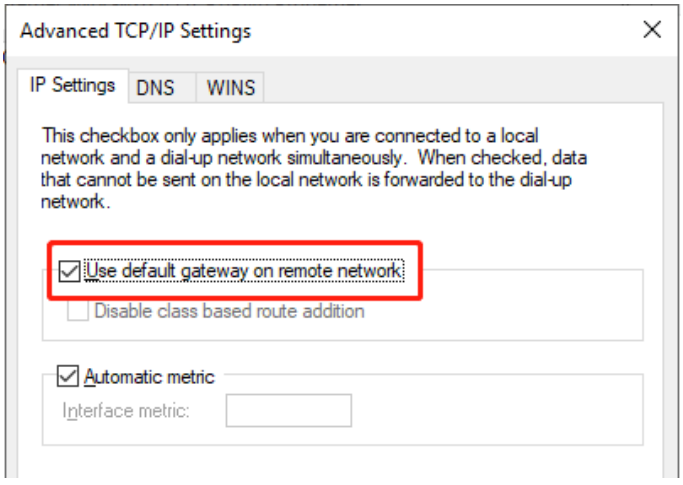


(6) After the PPTP client configuration is completed on the PC, initiate a VPN connection on the PC. Click the network icon  in the task bar, select the PPTP VPN connection, and click **Connect**. In the dialog box that appears, enter the username and password configured on the server.

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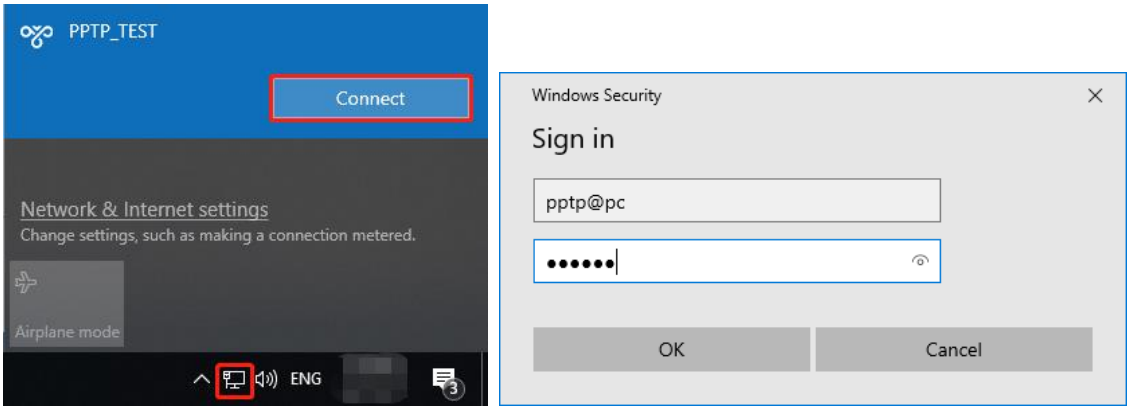


**5. Verifying Configuration**

(1) After the server and client are configured, wait for about 1 minute. If you can view the L2TP tunnel connection information on the HQ server and branch client, the connection is successful.

HQ:

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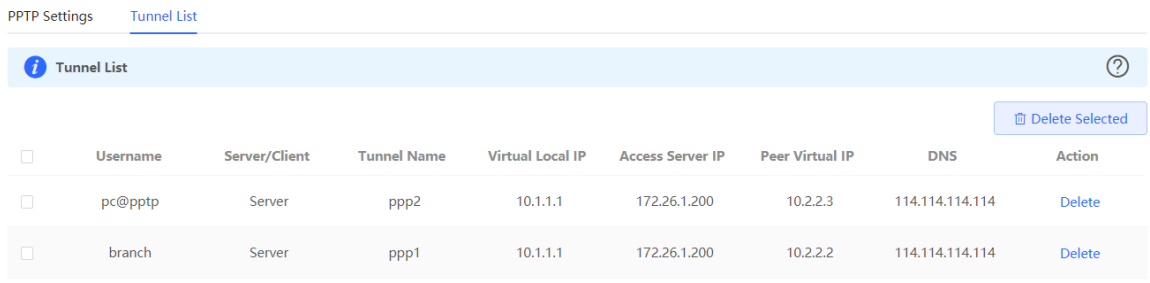
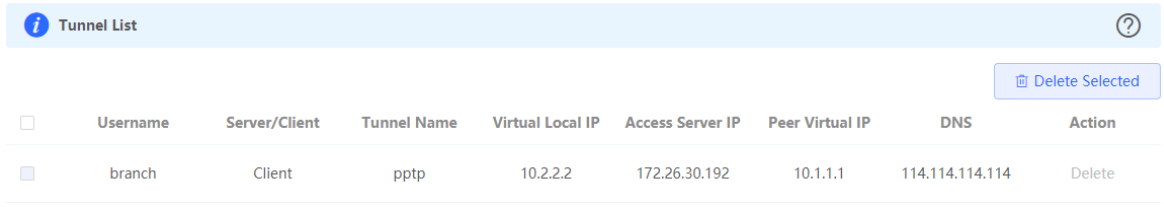



Branch:



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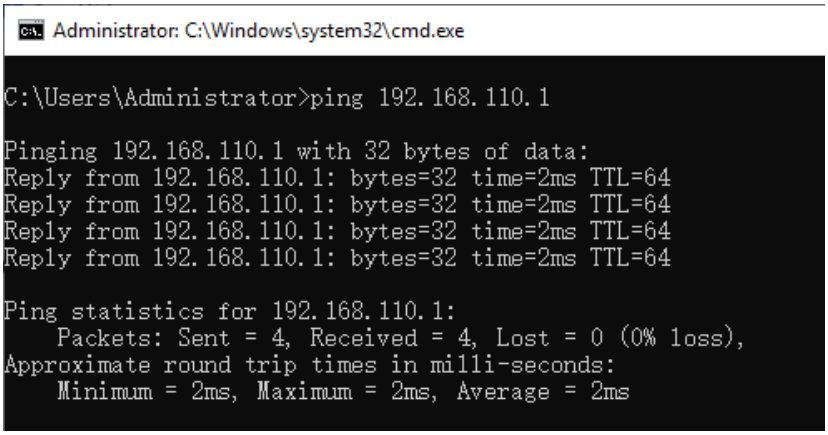
(2) Ping the LAN address of the peer from the HQ or branch. The HQ and branch can successfully communicate. The PC of the traveling employee and the PC of the branch employee can access the HQ server.




### 11.3.6 Solution to PPTP VPN Connection Failure

(1) iPhones and other IOS devices do not support PPTP VPN. Please use L2TP VPN instead

# 1 Configuration Guide SD-WAN

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(2) Run the ping command to test the connectivity between the client and server. For details, see Section 13.12.3 Network Tools. If the ping fails, check the network connection settings. Check whether the branch EG can ping to HQ EG. If the ping fails. Check the network connection between the two EGs.

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Network Tools**. Then, you can start the ping operation. For details, see Section 13.12.3 Network Tools.

(3) Check whether the username and password used by the client are the same as those configured on the server.

(4) Check whether the WAN interface IP address of your HQ EG is a public network IP address. If not, please configure DMZ on your egress gateway.

## 11.4 Configuring OpenVPN

**Caution**

IPTV connection is not supported only in the Chinese environment. To connect to IPTV in the Chinese environment, switch the system language. For details, see Section 13.14 Switching System Language.

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## 11.4.1 Overview

### 1. OpenVPN Overview

Due to security considerations or cross-NAT communication needs, private channels need to be established between enterprises or between individual and enterprise. OpenVPN is used to establish Layer 2 or Layer 3 VPN tunnels by using the vNIC. OpenVPN supports flexible client authorization modes, supports authentication through certificate or username and password, and allows users to connect to VPN virtual interfaces through the firewall. It is easier to use than other types of VPN technologies. OpenVPN can run in the Linux, xBSD, Mac OS X, and Windows 2000/XP systems. The device can establish VPN connections to PCs, Android/Apple mobile phones, routers, and Linux devices, and it is compatible with most OpenVPN products in the market.

OpenVPN connections can traverse most proxy servers and can function well in the NAT environment. The OpenVPN server can push the following network configuration to clients: IP address, routes, and DNS settings.

### 2. Certificate Overview

The major advantage of OpenVPN lies in its high security, but OpenVPN security requires the support of certificates.

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System Management

The OpenVPN client supports certificates **ca.crt**, **ca.key**, **client.crt**, and **client.key** and the OpenVPN server supports certificates **ca.crt**, **ca.key**, **server.crt**, and **server.key**.

## 11.4.2 Configuring the OpenVPN Server

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **OpenVPN**.

### 1. Basic Settings

Turn on **Enable** to enable the OpenVPN function, set **OpenVPN Type** to **Server**, set other parameters, and click **Save**. After the basic settings are completed, you can view the tunnel information of the server in the tunnel list.

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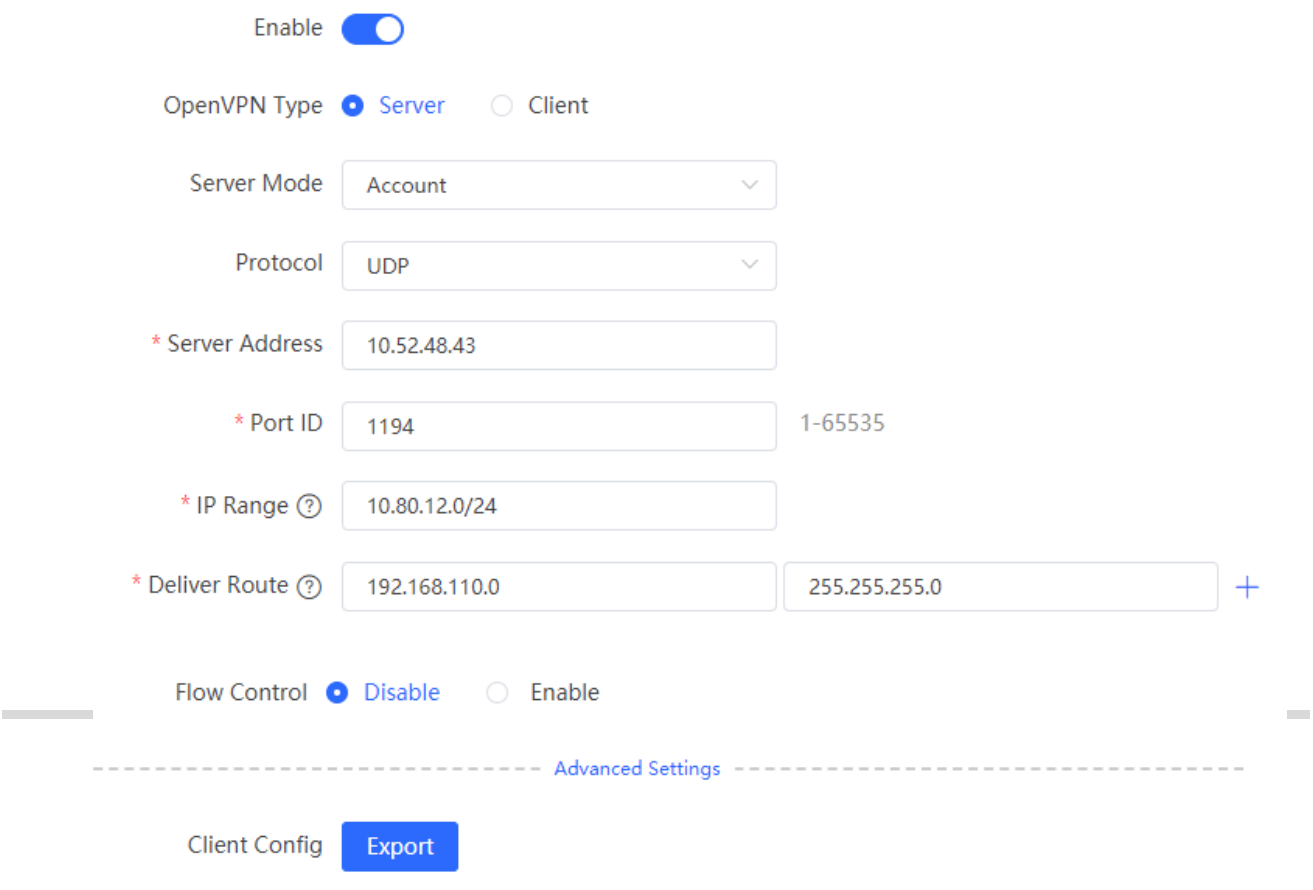
System Management



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System Management

**Table 11-20 OpenVPN server basic settings**

| Parameter | Description |
|---|---|
| Server Mode | Select a server authentication mode. The options are **Account**, **Certificate**, and **Account & Certificate**.<br>● **Account**: Enter the correct username and password and upload the CA certificate on the client to connect to the server. The configuration is simple.<br>● **Certificate**: Upload the CA certificate and client certificate and enter the correct private key on the client to connect to the server.<br>● **Account & Certificate**: Upload the CA certificate and client certificate and enter the correct username, password, and private key. This mode is applicable to scenarios with high security requirements. |

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System Management

| Parameter | Description |
| --- | --- |
| Protocol | Select a protocol for all OpenVPN communications based on a single IP port. The options are **UDP** and **TCP**.<br>The default value is **UDP**, which is recommended. When you select a protocol, pay attention to the network status between two encrypted tunnel ends. If high latency or heavy packet loss occurs, select **TCP** as the underlying protocol. |
| Server Address | Specify the server address for client connection. You can set this parameter to a domain name. |

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System Management

| Parameter | Description |
| --- | --- |
| Port ID | Specify the port used by the OpenVPN service process. Internet Assigned Numbers Authority (IANA) specifies port 1194 as the official port for the OpenVPN service. If the port is in use or disabled in the local network, the server log prompts port binding failure and you are asked to change the port number. |
| IP Range | Specify the network segment of the OpenVPN address pool. The first available in the address pool is allocated to the server, and the other addresses are allocated to clients. For example, if this parameter is set to **10.80.12.0/24**, the VPN virtual address of the server is 10.80.12.1. |
| Deliver Route | Specify the VPN dial-up line for clients to access the LAN network segment of the server. The server informs clients that want to access the server LAN of the route information. You can configure a maximum of three routes. |

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System Management

| Parameter | Description |
| --- | --- |
| Flow Control | The VPN server has a lower priority to control the traffic of the client than the custom policy. The VPN server can only limit the maximum uplink and downlink bandwidth per user for the client. For details, see Section 9.6.2 Smart QoS. |

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System Management

| Parameter | Description |
| --- | --- |
| Client Config | Click **Export** to export the parameter configuration of the client connected to the server in the .tar compressed package. The decompressed information is used for setting the OpenVPN client.<br>In account mode, the compressed package contains the configuration file **client.ovpn**, CA certificate **ca.crt**, and CA private key **ca.key**.<br>If certificate authentication is configured, the compressed package contains the configuration file **client.ovpn**, CA certificate **ca.crt**, CA private key **ca.key**, client certificate **client.cart**, and client private key **client.key**.<br>If TLS authentication is enabled, the compressed package contains the TLS identity authentication key **tls.key** apart from the preceding files. For details on TLS authentication, see Advanced Settings. |

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System Management

| Parameter | Description |
| --- | --- |
| Server Log | Click **Export** to export server log files, including the server start time and client dial-up logs. |

**Caution**

The IP address range of the device cannot overlap the network segment of the LAN port on the device.

### 2. Advanced Settings

Click **Advanced Settings** to configure the advanced parameters. Keep the default settings unless otherwise specified.

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System Management

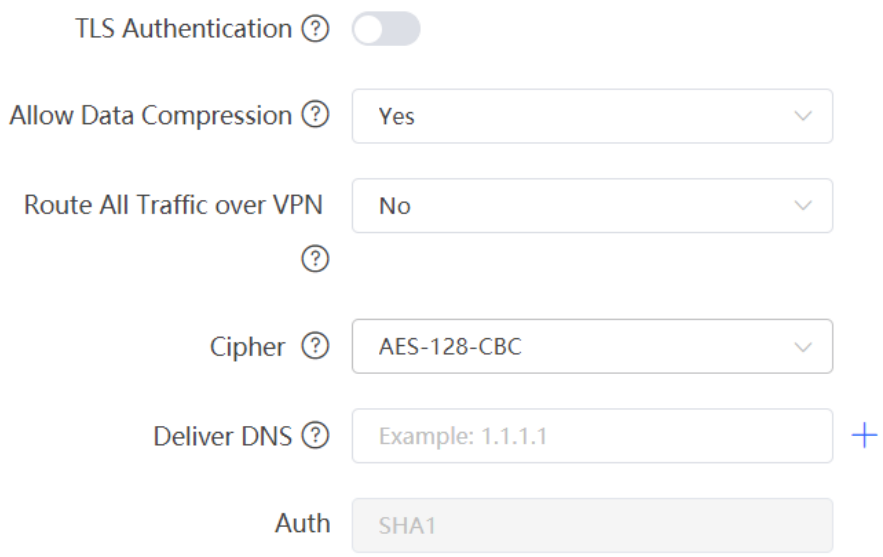

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**Table 11-21 OpenVPN server advanced settings**

| Parameter | Description |
|---|---|
| TLS Authentication | Specify the TLS key for enhanced OpenVPN security by allowing the communicating parties to possess the shared key before TLS handshake. After TLS authentication is enabled, you must import the TLS key on the client. (The version of the peer OpenVPN client must be higher than 2.40.) |
| Allow Data Compression | Specify whether to enable data compression. If this function is enabled, transmitted data is compressed using the LZO algorithm. Data compression saves bandwidth but consumes certain CPU resources. The setting on the client must be the same as that on the server. Otherwise, the connection fails. |
| Route All Traffic over VPN | Specify whether to route all traffic over VPN. After this function is enabled, all the traffic is routed over the VPN tunnel. This means that the VPN tunnel is the default route. |

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System Management

| Parameter | Description |
| --- | --- |
| Cipher | Select the data encryption mode before data transmission to ensure that even data packets are intercepted during transmission, the leaked data cannot be interpreted.<br>If this parameter is set to **Auto** on the server, you can set this parameter to any option on the client.<br>If a specific encryption algorithm is configured on the server, you must select the same encryption algorithm on the client. Otherwise, the connection fails. |
| Deliver DNS | Specify the DNS server address pushed by the server to clients. Currently, the device can push the DNS server address to Windows clients only. |
| Auth | Specify the MD5 algorithm used by the server. The server will inform the clients of this information. The default value is **SHA1**. |

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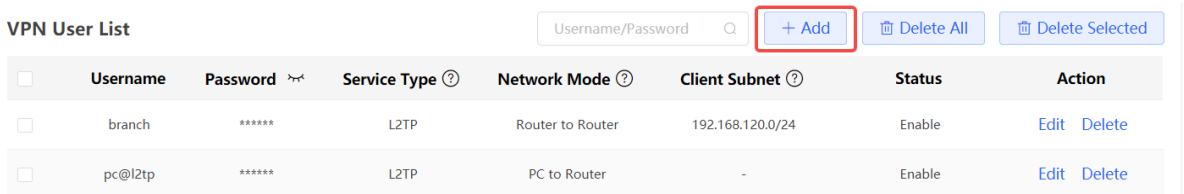
### 3. Configuring OpenVPN User

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **VPN Account**.

Only user accounts added to the VPN client list are allowed to dial up to connect to the OpenVPN server. Therefore, you need to manually configure user accounts for clients to access the OpenVPN server.

Click **Add**. In the dialog box that appears, set **Service Type** to **OpenVpn**, enter the username and password, and click **OK**. The **Status** parameter specifies whether to enable the user account.



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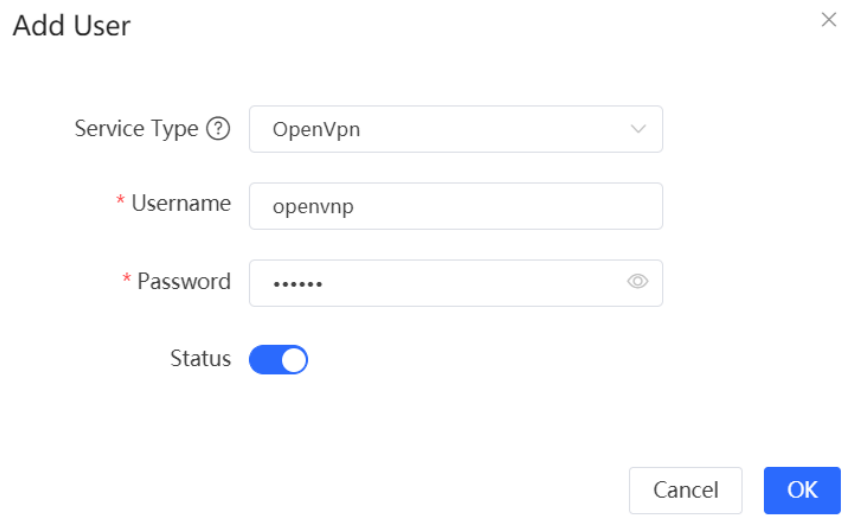
System Management



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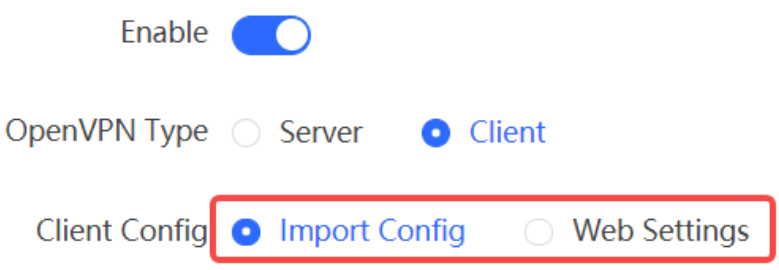
## 11.4.3 Configuring the OpenVPN Client

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **OpenVPN**.

Currently, you can configure the device as the OpenVPN client in either of the following methods:

**Web Settings**: Configure OpenVPN client on the web page. This method is used when the device is connected to a non-EG server.

**Import Config**: Manually import the configuration file. This method is used when the device is connected to a similar device. The client configuration file **client.ovpn** can be directly exported from the connected OpenVPN server.



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System Management

### 1. Import Config

Turn on **Enable** to enable the OpenVPN function, set **OpenVPN Type** to **Client** and **Client Config** to **Import Config**, select a server mode, set relevant parameters, and click **Browse** to import the client configuration file. Then, click **Save** to make the configuration take effect.

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System Management

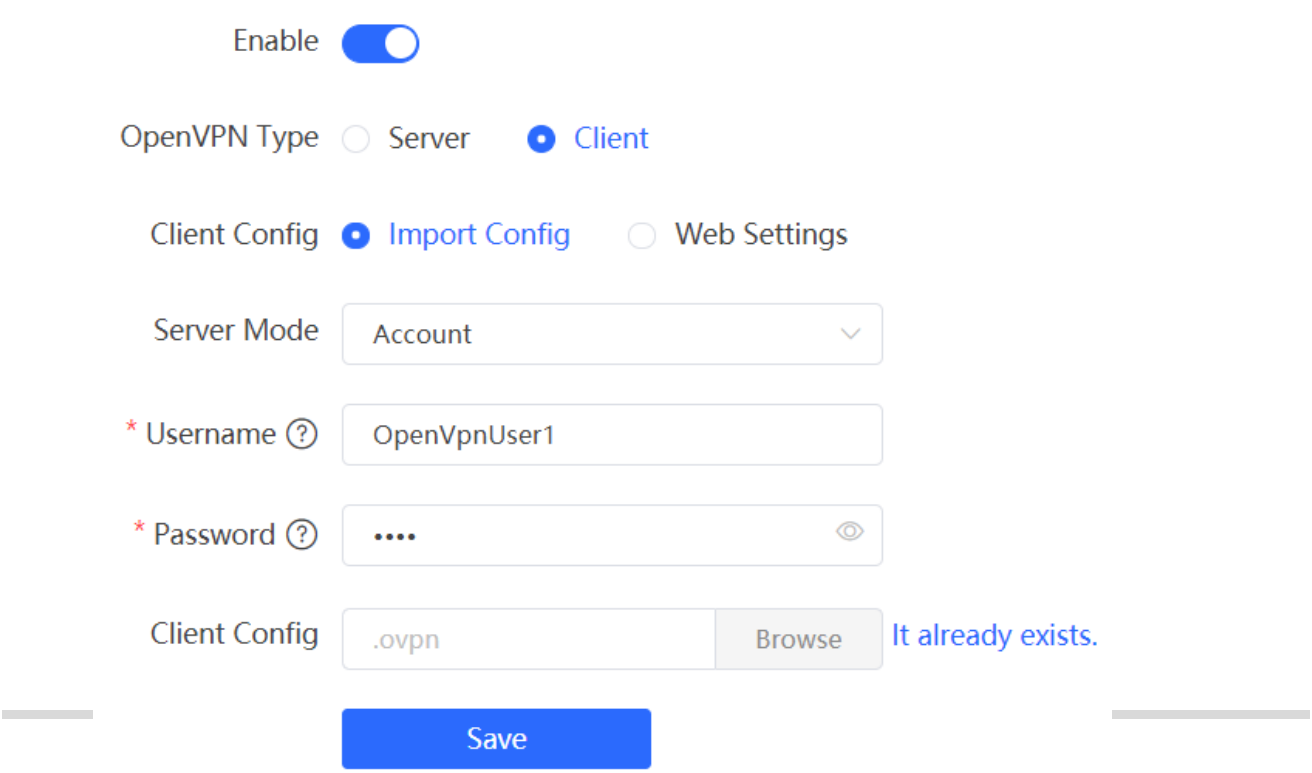

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**Table 11-22 OpenVPN client configuration in Import Config method**

| Parameter | Description |
|---|---|
| Server Mode | Select a server authentication mode. The options are **Account**, **Certificate**, **Account & Certificate** and **Pre-Shared Key**.<br>● **Account**: Enter the correct username and password and upload the CA certificate on the client. The CA certificate information is embedded in the client configuration file.<br>● **Certificate**: Upload the CA certificate and client certificate and enter the correct private key on the client. All the information is embedded in the client configuration file.<br>● **Account & Certificate**: Enter the correct username, password, and private key and upload the CA certificate, and client certificate on the client. The information of the CA certificate, client certificate, and private key is embedded in the client configuration file.<br>● **Static Key**: Upload the pre-shared key file apart from the client configuration file. |

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System Management

| Parameter | Description |
| --- | --- |
| Username/Password | Enter the username and password configured on the server. |
| Client Config | Click **Browse**, select the client configuration file exported from the server, and upload the file. |
| Pre-Shared Key | This parameter is available only when **Server Mode** is set to **Static Key**.<br>Click **Browse**, select the pre-shared key file, and upload the file. |
| Working Mode | This parameter is available only when **Server Mode** is set to **Static Key**.<br>● **NAT**: The client can access the server network, but the server cannot access the client network.<br>● **Router**: The server can access the client network. |

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System Management

### 2. Web Settings

Turn on **Enable** to enable the OpenVPN function, set **OpenVPN Type** to **Client** and **Client Config** to **Web Settings**, configure parameters such as **Device Mode** and **Device Mode**, and click **Save** to make the configuration take effect.

(1) Basic Settings

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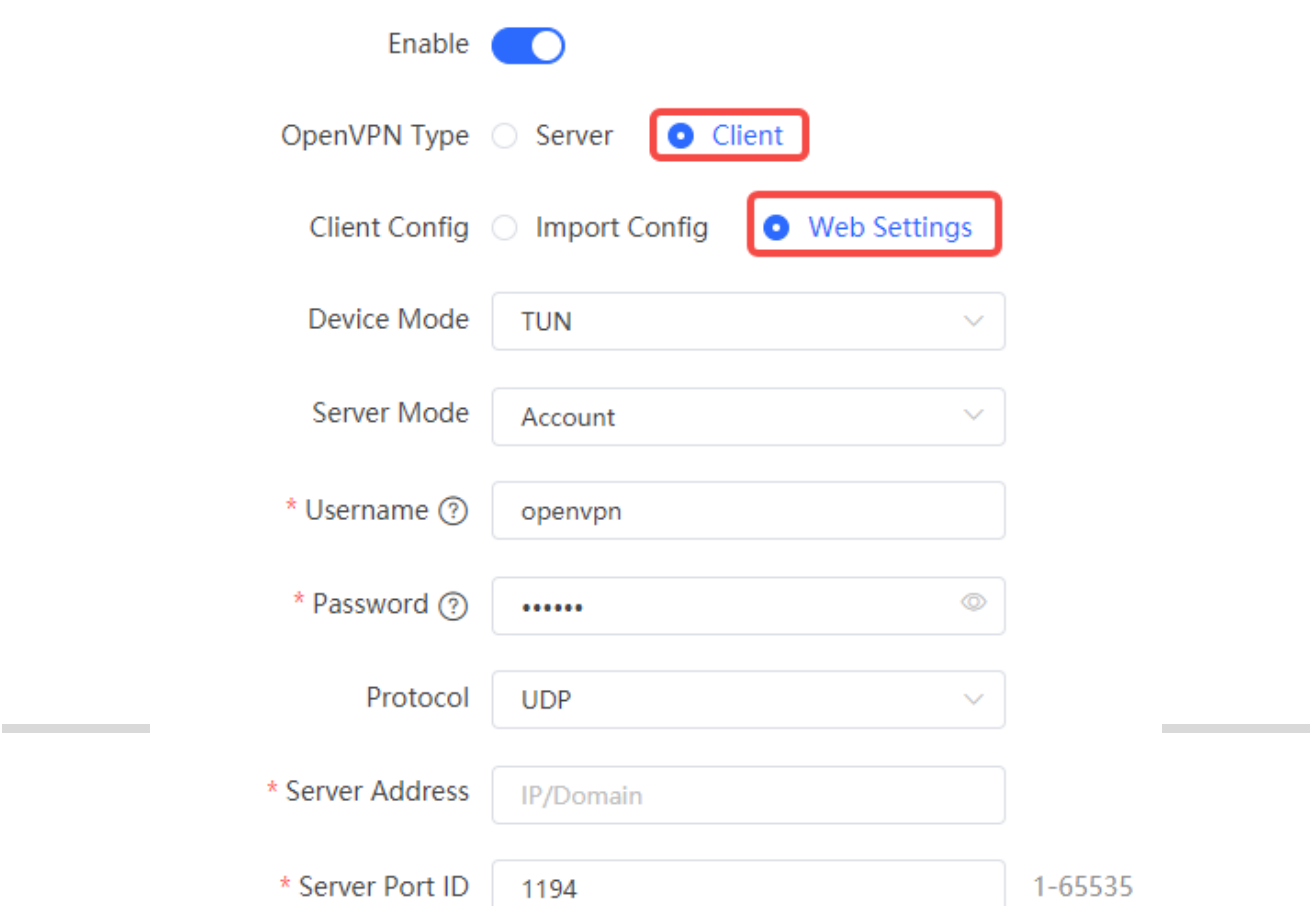
System Management



# 1 Configuration Guide SD-WAN

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**Table 11-23 OpenVPN client configuration in Web Settings method**

| Parameter | Description |
| --- | --- |
| Device Mode | Specify the mode of the EG device that functions as a client. The options are **TUN** and **TAP**. The value must be the same as that configured on the server.<br>When the EG device works as a server, it supports the TUN mode only. |
| Server Mode | Select a client authentication mode. The options are **Account**, **Certificate**, and **Account & Certificate**.<br>● **Account**: Enter the correct username and password and upload the CA certificate on the client.<br>● **Certificate**: Upload the correct CA certificate, client certificate, and private key file on the client.<br>● **Account & Certificate**: Enter the correct username and password, and upload the CA certificate, client certificate, and private key file on the client. |

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System Management

| Parameter | Description |
|---|---|
| Username/Password | Enter the username and password configured on the server. |
| Protocol | Select the protocol running on the device. The options are **UDP** and **TCP**. The value must be the same as that configured on the server. |
| Server Address | Enter the address or domain name of the server to be connected. |
| Server Port ID | Enter the port number of the server to be connected. |
| CA Certificate | Click **Browse**, select the CA certificate file with the file name extension **.ca**, and upload the file. |
| Client Key | Click **Browse**, select the client private file with the file name extension **.key**, and upload the file. |

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System Management

| Parameter | Description |
|---|---|
| Client Certificate | Click **Browse**, select the client certificate file with the file name extension **.crt**, and upload the file. |
| Client Certificate Key | Specify the client certificate key if the client certificate provided by the server (such as the MikroTik server) is encrypted twice. |

(2) Advanced Settings

Click **Advanced Settings** to configure the advanced parameters. Keep the default settings unless otherwise specified.

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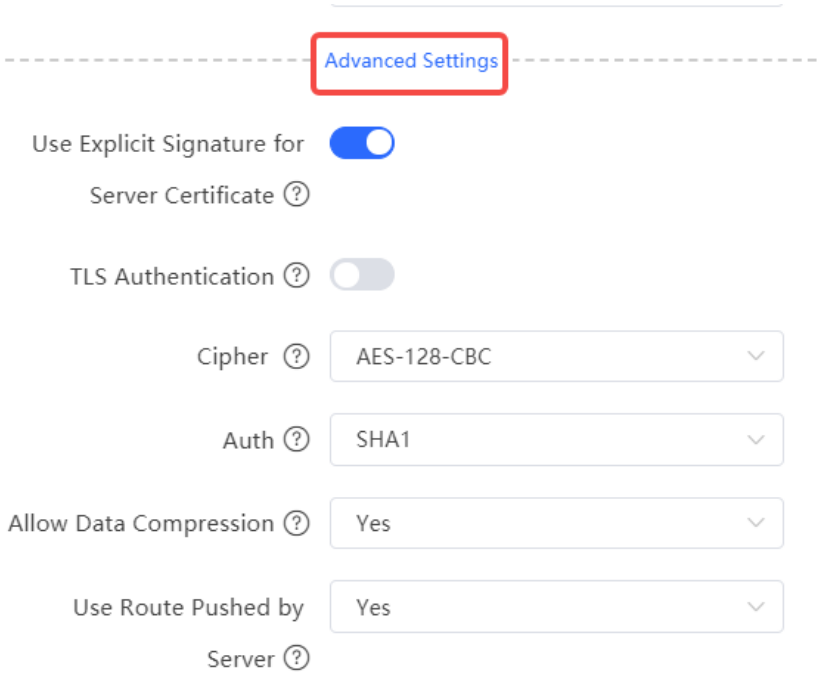

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**Table 11-24 OpenVPN client configuration in Web Settings method**

| Parameter | Description |
| --- | --- |
| Use Explicit Signature for Server Certificate | Specify whether to verify the server certificate using explicit signature. By default, this function is enabled.<br>If the server certificate does not use explicit signature, for example, the MikroTik server, you need to disable this function. Otherwise, the connection fails. |
| TLS Authentication | Specify whether to enable TLS authentication for the server. If this function is enabled, you need to upload the TLS certificate file. |
| Cipher | Select a data compression algorithm. The value must be the same as that configured on the server. Otherwise, the connection fails. |

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System Management

| Parameter | Description |
| --- | --- |
| Auth | Select an MD5 algorithm for data packet verification. The options are **SHA1**, **MD5**, **SHA256**, and **NULL**. The value must be the same as that configured on the server. Otherwise, the connection fails. |
| Allow Data Compression | Specify whether to allow data compression. After this function is enabled, the transmitted data can be compressed by using the LZO algorithm. The value must be the same as that configured on the server. |
| Use Route Pushed by Server | Specify whether to use the routes pushed by the server. If this function is disabled, the device cannot accept the routes pushed by the server. If the server needs to access LAN devices, you must set this parameter to **Yes**. |

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## 11.4.4 Viewing the OpenVPN Tunnel Information

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **OpenVPN** > **Tunnel List**.

After the server and client are configured, you can view the OpenVPN tunnel connection status. If the tunnel is established successfully, the client tunnel information is displayed in the tunnel list of the server.

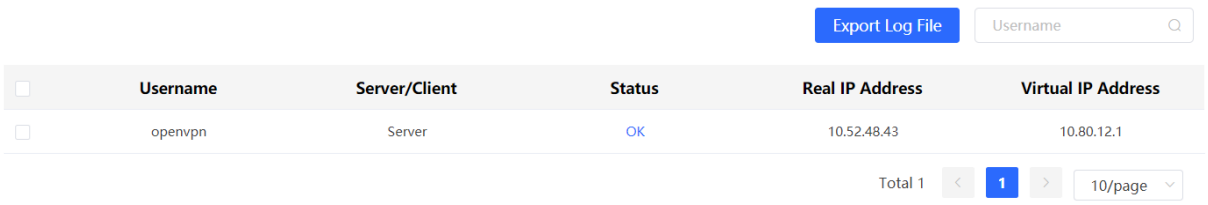

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**Table 11-25 OpenVPN tunnel information**

| Parameter | Description |
|---|---|
| Username | Indicate the username used by the client for identity authentication. By default, the username displayed on the server is **openvpn**. |
| Server/Client | Indicate the role of the local end of the tunnel, which can be client or server. |
| Status | Indicate the tunnel establishment status. |
| Real IP Address | Indicate the real IP address used by the local end to connect to the VPN. |
| Virtual IP Address | Indicate the local virtual IP address of the tunnel. The virtual IP address of the OpenVPN client is allocated by the OpenVPN server. |

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## 11.4.5 Typical Configuration Example

### 1. Networking Requirements

The enterprise wants to allow the client network to dial up to the server through OpenVPN, implementing mutual access between the server and client.

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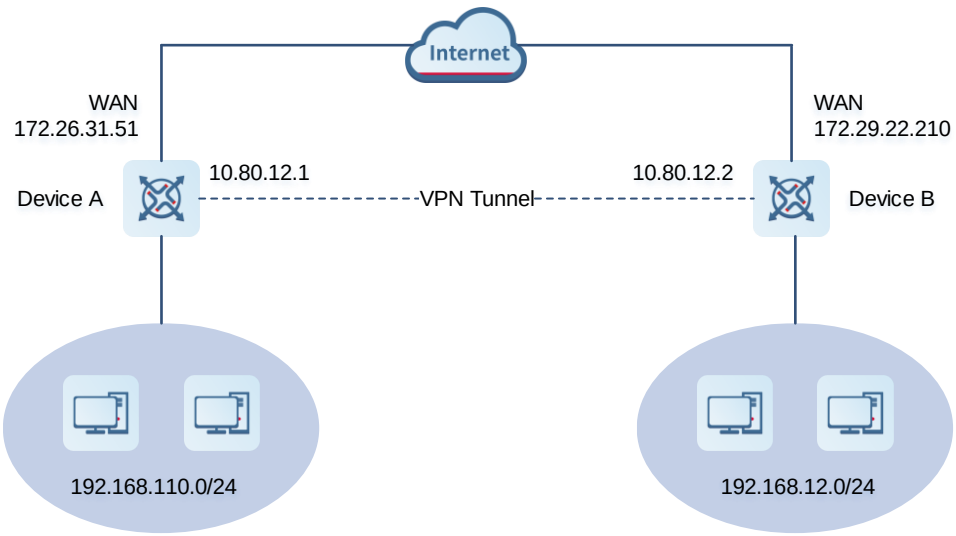
## 2. Networking Diagram



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System Management

### 3. Configuration Roadmap

- Configure Device A as the OpenVPN server.
- Configure Device B as the OpenVPN client.
- The server needs to push the local LAN network segment to the client to allow the client to access the server in the LAN.

### 4. Configuration Steps

- Configure Device A.

(1) Log in to the web management system and choose **One-Device** > **Gateway** > **Config** > **VPN** > **OpenVPN** > **OpenVPN** to access the OpenVPN page.

(2) Turn on Enable to enable the OpenVPN function, set OpenVPN Type to Server, select a server mode and protocol, enter the port number (1194 by default) and server address (external IP address of the local device), and click **Save**.

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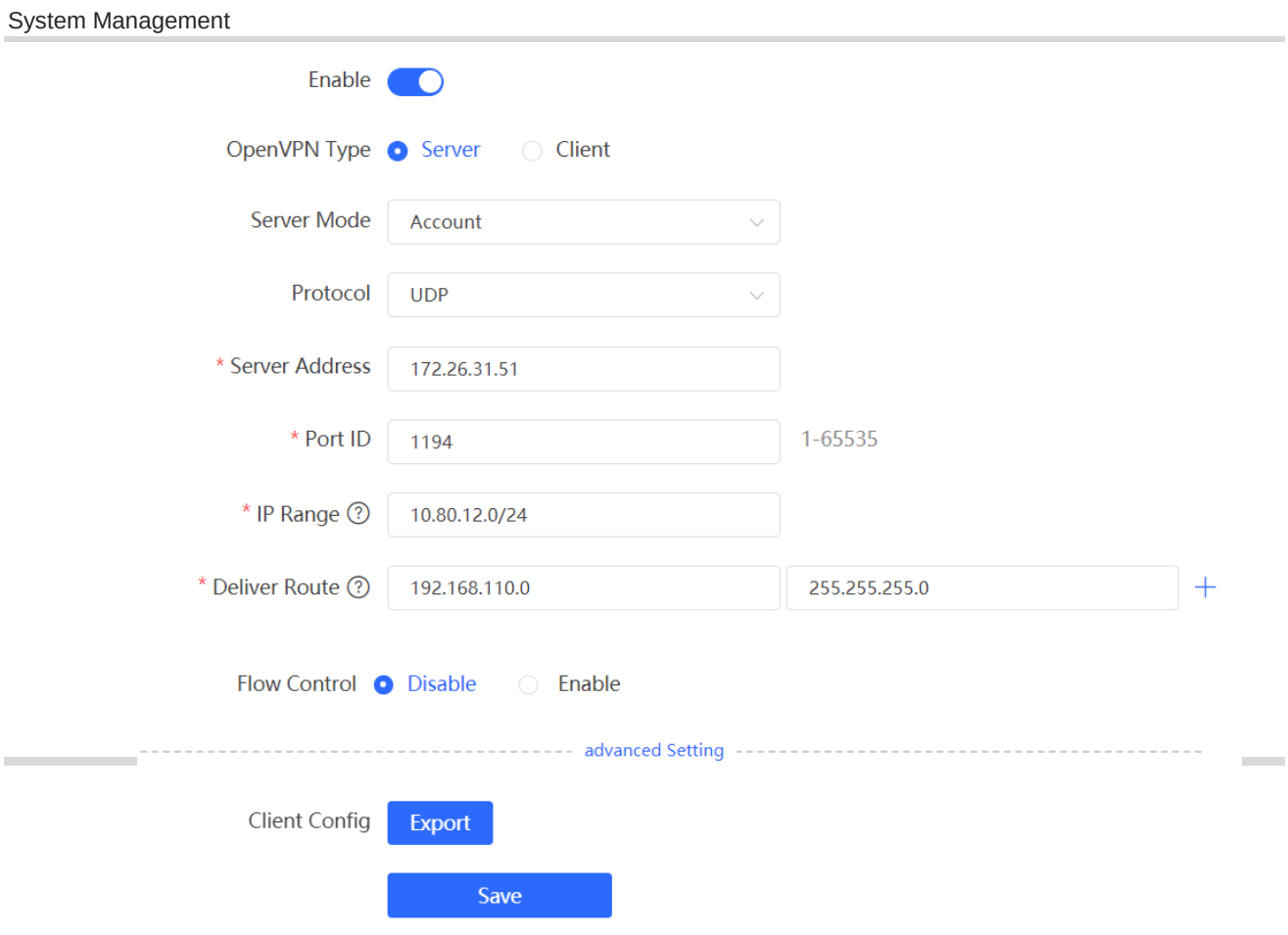

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**Table 11-26 OpenVPN server configuration**

| Parameter | Description |
|---|---|
| Server Mode | Select an authentication mode. In this example, select **Account**.<br>In scenarios with high security requirements, select **Account & Certificate**. |
| Protocol | Select **UDP** unless otherwise specified.<br>When the network status between two encrypted tunnel ends is poor, such as high latency or heavy packet loss, select **TCP**. |
| Server Address | Enter the WAN interface address of the server, which is **172.26.31.51**. |
| Port ID | The default value is **1194**. Keep the default value unless otherwise specified. If the port is in use of disabled in the current network, change to an available port number. |

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System Management

| Parameter | Description |
| --- | --- |
| IP Range | Specify the network segment of the OpenVPN address pool. The first available in the address pool is allocated to the server, and the other addresses are allocated to clients. For example, if this parameter is set to **10.80.12.0/24**, the VPN virtual address of the server is 10.80.12.1. |
| Deliver Route | Add routes to the corresponding network segment if the client wants to the LAN network segment where the server resides. |

(3) Click **Advanced Settings** to configure more advanced parameters. If the device connects to other EG devices in the Reyee network, you are advised to keep the default values for advanced settings. If the device connects to devices from another vendor, keep the parameter settings consistent on the connected devices.

# 1 Configuration Guide SD-WAN

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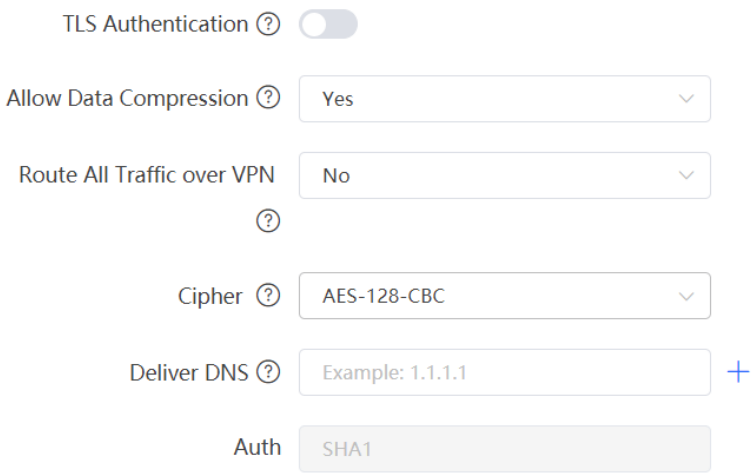


(4) Click **Export** to export the compressed package of the client parameter configuration. Download the compressed package to the local device and decompress it for setting the OpenVPN client in subsequent steps.

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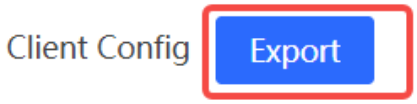


(5) Choose **One-Device** > **Gateway** > **Config** > **VPN** > **VPN Account** and add an OpenVPN user account.

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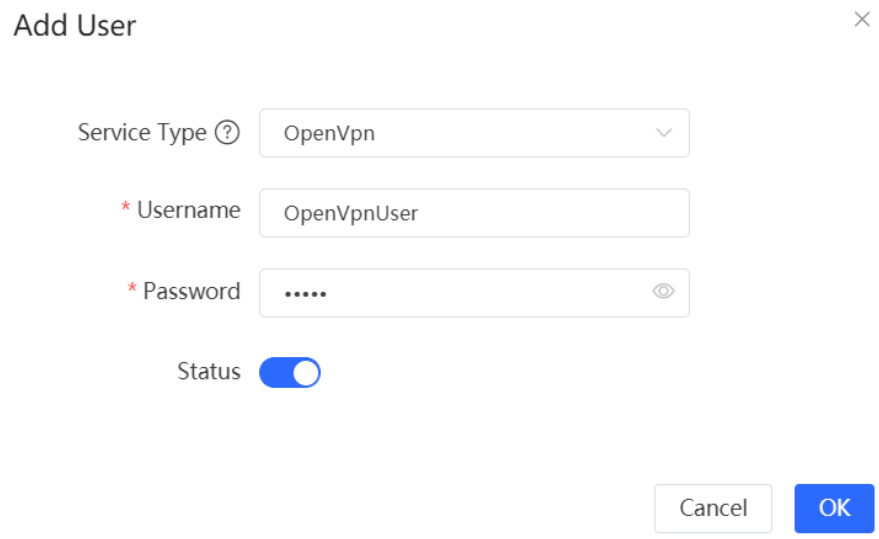


- Configure Device B

(1) Log in to the web management system and access the OpenVPN page.

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System Management

(2) Turn on Enable to enable the OpenVPN function and set OpenVPN Type to Client. Two methods are available for configuring the client. The Import Config method is recommended.

- **Import Config**:

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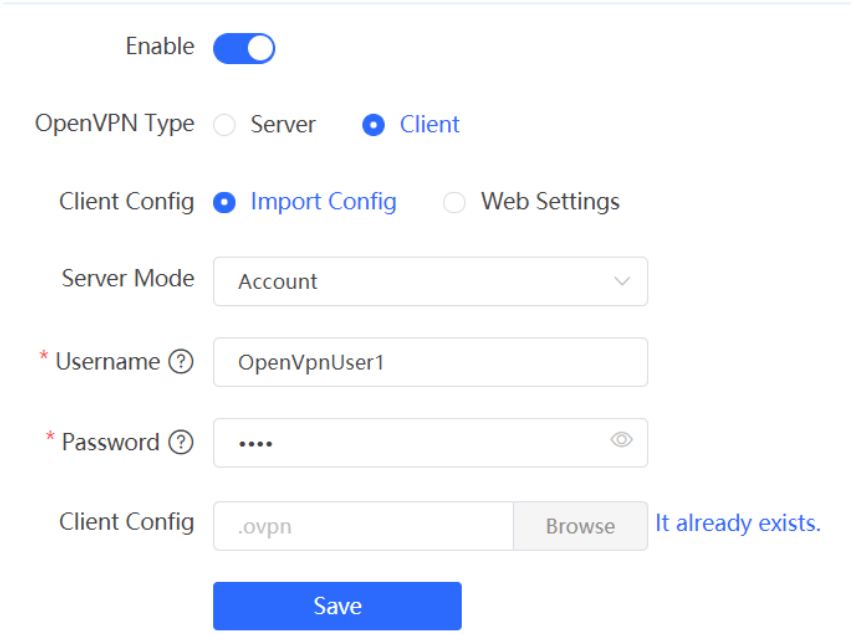

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System Management

**OpenVPN client configuration in Import Config method**

| Parameter | Description |
|---|---|
| Client Config | Select **Import Config**. |
| Server Mode | The value must be the same as that on the server. In this example, select **Account**. |
| Username & Password | Enter the username and password configured on the server. |
| Client Config | Click **Browse**, select the client configuration file exported from the server, and upload the file. |

- **Web Settings**:

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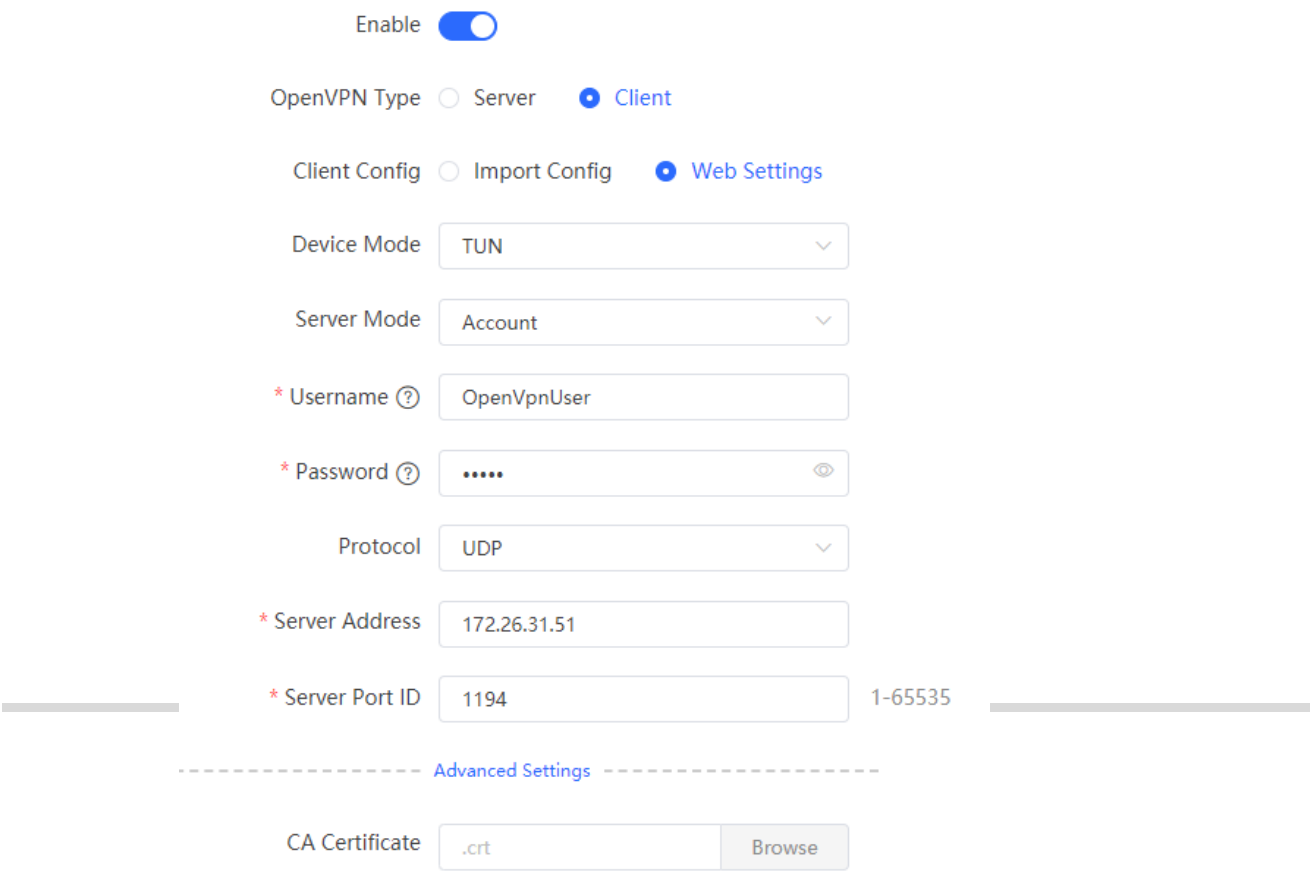

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**OpenVPN client configuration in Web Settings method**

| Parameter | Description |
|---|---|
| Client Config | Select **Web Settings**. |
| Device Mode | The value must be the same as that on the server. In this example, select **TUN**. |
| Server Mode | The value must be the same as that on the server. In this example, select **Account**. |
| Username & Password | Enter the username and password configured on the server. |
| Protocol | The value must be the same as that on the server. In this example, |

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System Management

| Parameter | Description |
| --- | --- |
| | select **UDP**. |
| Server Address | Enter the public network IP address of the server, which is **172.26.31.51**. |
| Server Port ID | Enter the port number used by the server, such as **1194**. |

Import the corresponding files according to the value of **Server Mode**.

If **Server Mode** is set to **Certificate** or **Account & Certificate**, you need to import the CA certificate file, client certificate file, and client private key file. If **Server Mode** is set to **Account**, you only need to import the CA certificate file. If the client certificate is encrypted, you also need to enter the pre-shared key specified by **Client Certificate Key**.

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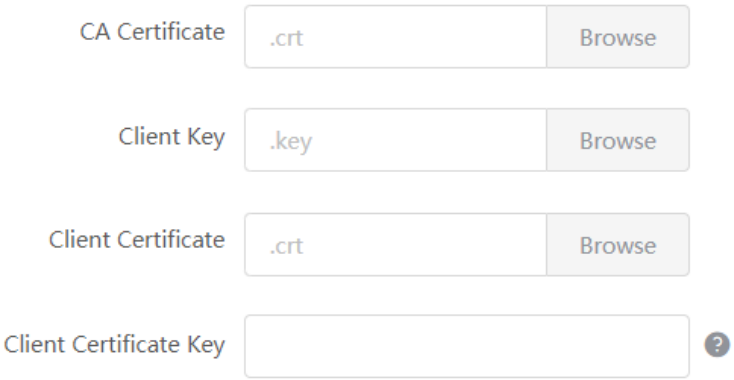


Click **Advanced Settings** to configure more parameters. Configure **Use Route Pushed by Server** to specify whether to accept routes pushed by the server. The value must be the same as that on the server. If the client is connected to a non-EG device, such as MikroTik server outside China, you need to turn off **Use Explicit Signature for Server Certificate**.

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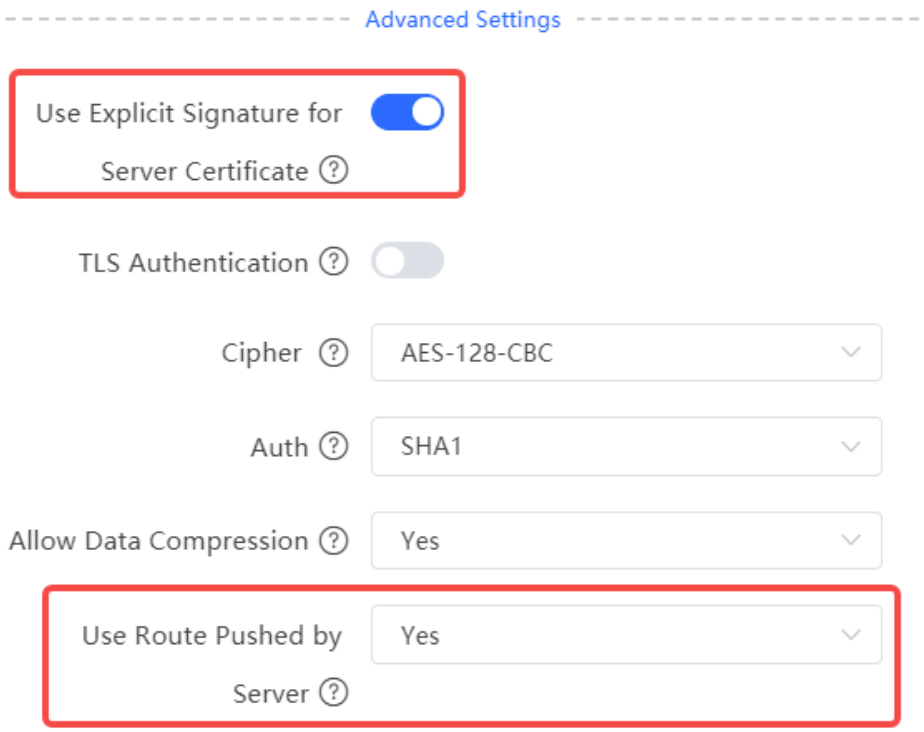

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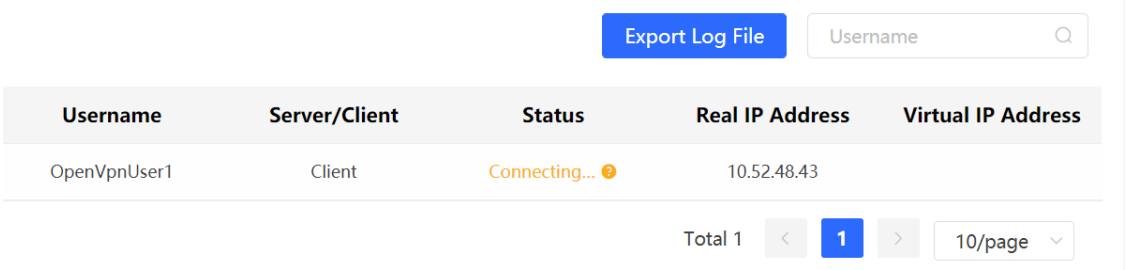
(3) After the configuration is completed, click Save to make the configuration take effect.

### 5. Verifying Configuration

After the server and client are configured, view the two tunnel end information in the tunnel list.

- Client:




- Server:

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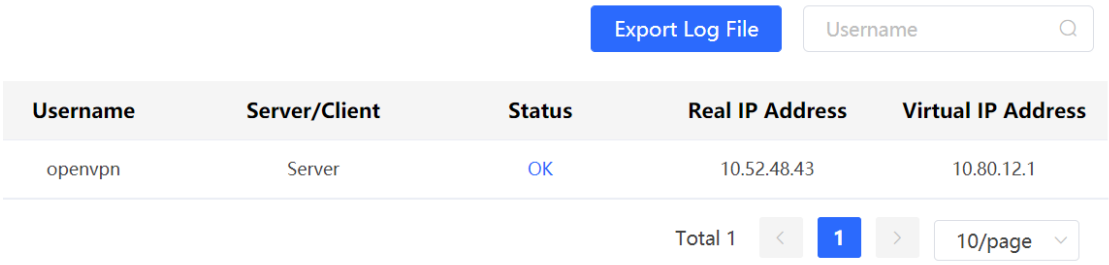


## 11.5 Configuring WireGuard VPN

### 11.5.1 Overview

#### 1. WireGuard VPN Overview

Conventional VPN protocols such as OpenVPN and IPsec have certain limitations, such as slow connection speed due to the complexity of the encryption and encapsulation processes. This is where WireGuard VPN comes in. It is a new OpenVPN protocol and is widely recognized for its high efficiency, security, and ease of use.

# 1 Configuration Guide SD-WAN

**Specification**

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Ruijie Cloud's SD-WAN solution can effectively meet the above requirements and has the following advantages compared with traditional WAN solutions:

(1) **Networking without public IP addresses:** Networking without public IP addresses enables remote connectivity across any broadband connection. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=017d4b240fbc443c9b383d63c35c5aac.

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System Management

WireGuard operates at Layer 3 of the Open System Interconnection (OSI) model and supports IPv4 and IPv6. Simplified design and encryption technologies of WireGuard minimize system overhead, delivering high-speed connections and resulting in lower latency.

WireGuard follows the principles of simplicity and uses modern encryption technologies. Its working principle is as follows:

(1) **Key exchange and handshake:** When a client initiates a connection request to the remote server, key exchange is performed. Public and private key pairs are generated for each of the client and server, which exchange public keys to establish a secure communication channel.

(2) **Tunnel creation:** WireGuard creates a virtual network interface on each of the client and server and establishes an encrypted tunnel to transmit data packets.

(3) **Data packet transmission:** The sender uses the public key of the receiver to encrypt data packets.

(4) **Decryption:** After receiving encrypted data packets, the receiver uses its own private key to decrypt the data packets.

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**2. Applicable Scenarios**

WireGuard VPN on the Ruijie Reyee RG-EG series gateways supports client and server configurations and displays the tunnel link after a successful connection. WireGuard VPN is applicable to the following scenarios:

- End-to-end VPN: connects two or more network nodes to enable communication, data sharing, and resource access between networks. In this scenario, an RG-EG gateway can function as the server or client of WireGuard VPN and interconnect with another RG-EG gateway or a third-party device.
- Mobile access VPN: allows mobile users to securely access specified network resources from anywhere. In this scenario, the RG-EG gateway can serve as the WireGuard VPN server, and mobile devices connect to the VPN through the configuration of the WireGuard VPN client.

## 11.5.2 Configuring the WireGuard VPN Server

**Caution**

- A WireGuard VPN server must have a public IP address. Otherwise, a VPN tunnel cannot be established.
- Intranet access supports only IPv4.

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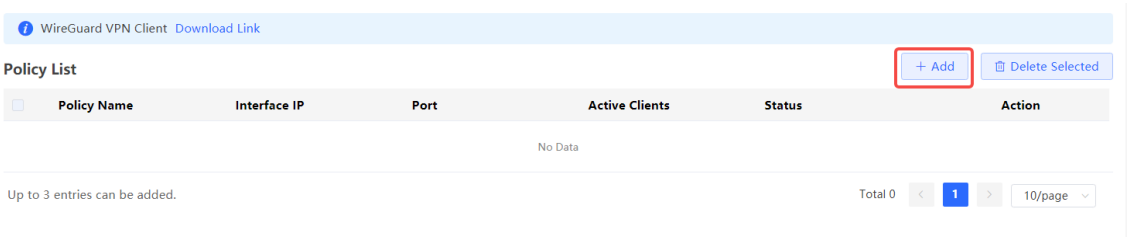
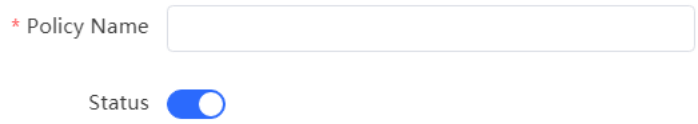
## System Management

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **WireGuard VPN** > **WireGuard VPN Server**.

(1) Click **Add** on the right of **Policy List**.




(2) Set **Policy Name** and toggle on **Status**.




(3) Set related parameters of the server.

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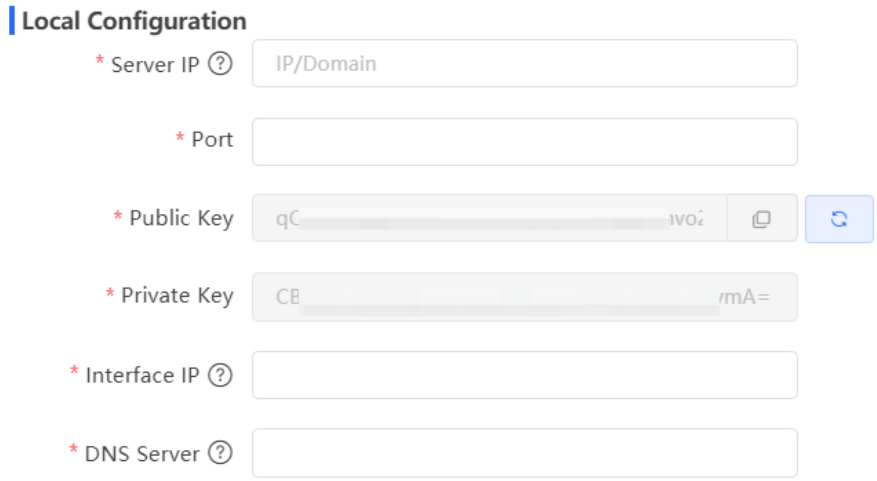
System Management



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System Management

**Table 11-27 Local Configuration Parameters of a WireGuard VPN Server**

| Parameter | Description |
|---|---|
| Server IP | Specify a public IP address or a domain name of a VPN server to establish a connection with a VPN client. |
| Port | Specify the port number on which a VPN server listens. The port number is used to receive connection requests from a VPN client. WireGuard uses UDP by default and the default port number is 51820. |

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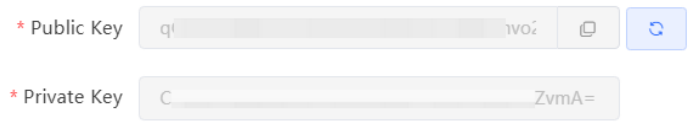
System Management

| Parameter | Description |
| --- | --- |
| Public Key | Specify the public key of a server. The public key is used to encrypt data packets transmitted in a VPN tunnel. During the exchange of WireGuard keys, the public key of a server will be sent to a client so that the client can securely send information to the server. The public and private keys are automatically generated by the system. You can click the copy icon to copy the public key of the server, and click the refresh icon to generate a new public and private key pair.<br> |
| Private Key | Specify the private key of a server. The private key is used to decrypt encrypted information received from a client and encrypt information to be sent to the client. |

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System Management

| Parameter | Description |
|---|---|
| Interface IP | Specify the IP address of a tunnel interface on a server, which is used to identify the server connected to a VPN tunnel. A client will communicate with the server with this IP address. |
| DNS Server | Specify the DNS server for resolving a domain name when **Server IP** is set to the domain name. |

(4) In the **Client** area, click **Add** to add a client.

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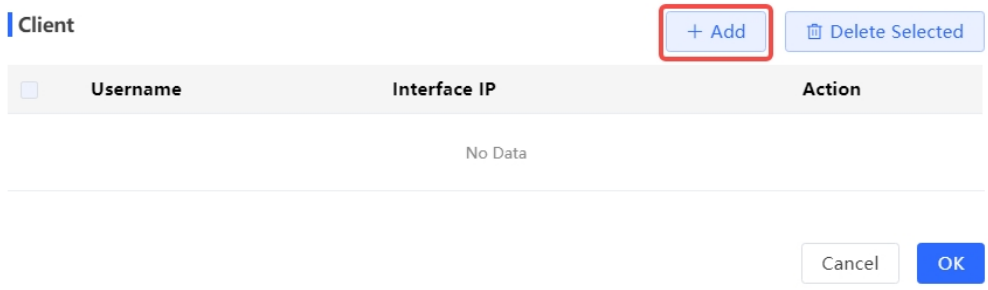

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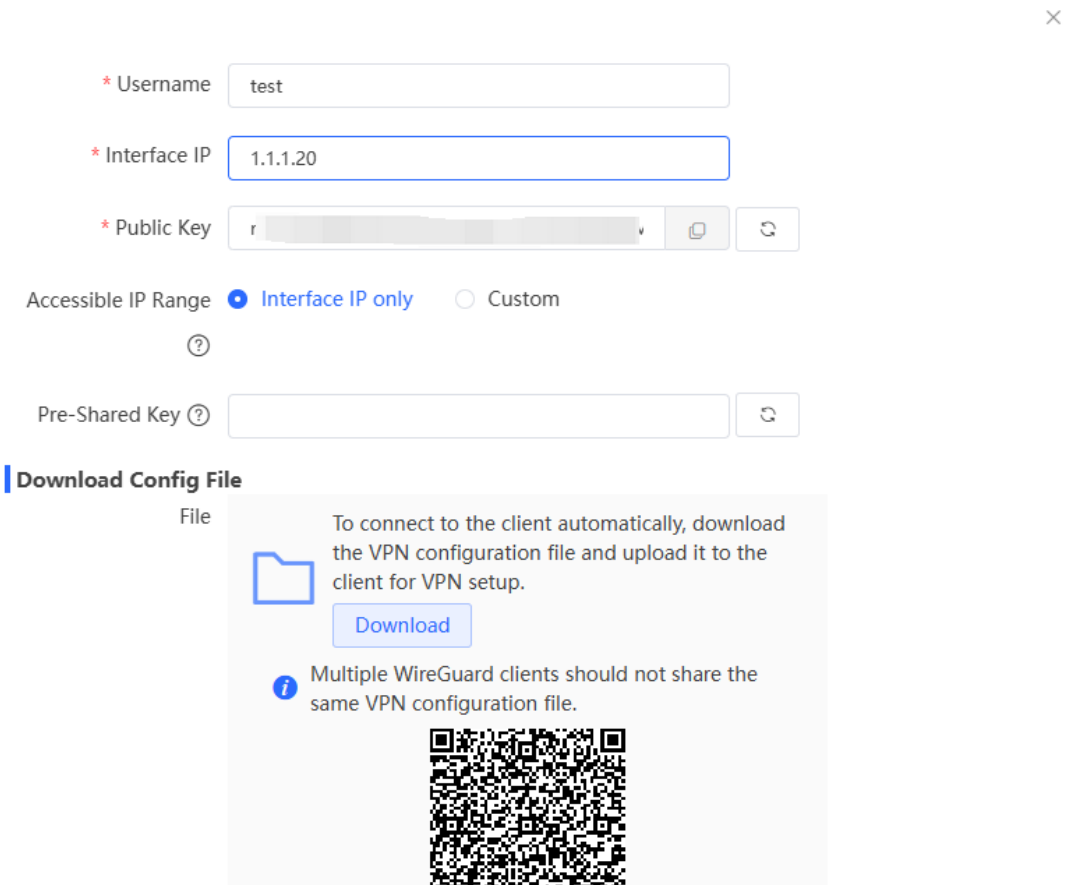

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System Management

Click **OK** to save the configuration. A prompt is displayed. After a client is added, the **Download Config File** function is unavailable.

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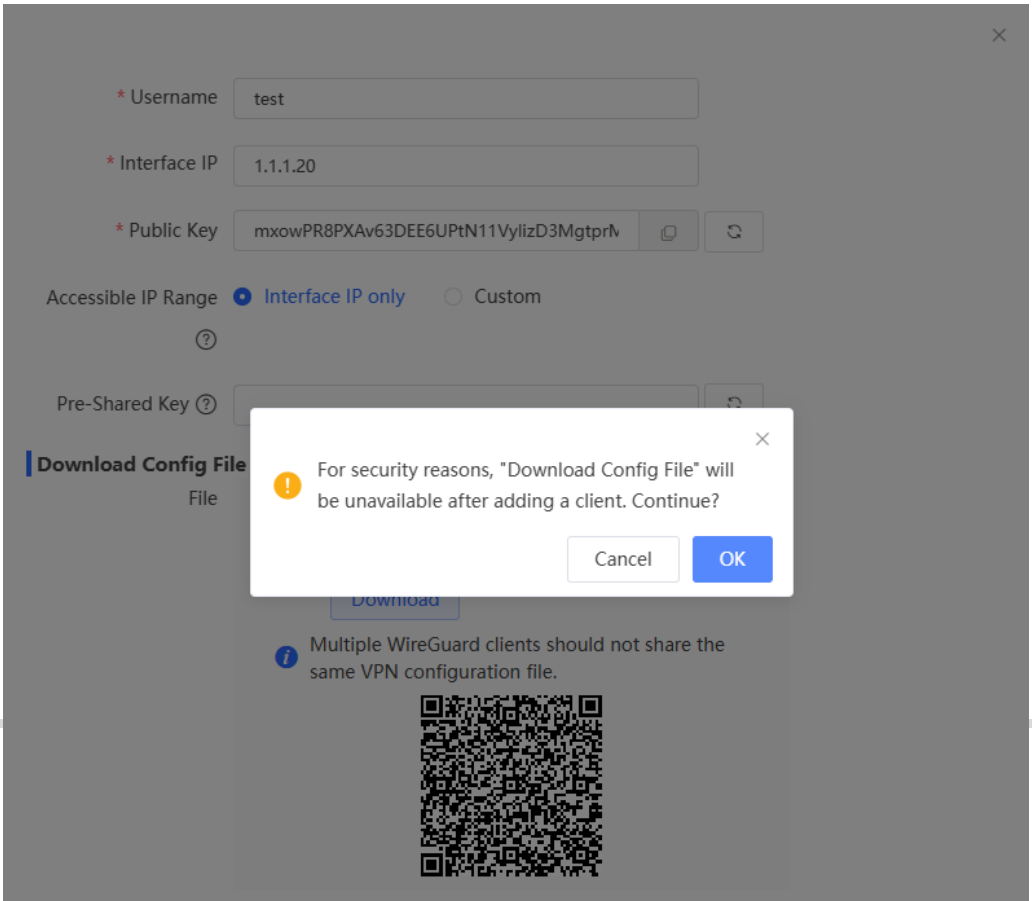

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**Table 11-28 Parameters of Adding a Client on a WireGuard VPN Server**

| Parameter | Description |
|---|---|
| Username | Specify the client identifier, which is used to identify a client during the authentication. A username is typically unique to identify a client. |
| Interface IP | Specify the IP address of a tunnel interface on a client. The IP address is used to identify the client connected to a VPN tunnel. |
| Public Key | Specify the public key of a client, which is used to encrypt data packets transmitted in a VPN tunnel. |
| Accessible IP Range | Specify the client IP address range that is allowed to access a server.<br>● Interface IP only: Access is allowed only through the interface IP address, that is, only the client with the interface IP address can access the server.<br>● Custom: You can add the intranet addresses of the clients so that they can also access the server. |

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System Management

| Parameter | Description |
| --- | --- |
| Pre-Shared Key | Specify a pre-shared key, which improves link security. The keys on the client and server must be consistent. |
| Download Config File | Click **Download** to download the configuration file. After the configuration file is uploaded to the clients, the configuration is automatically complete.<br>After the configuration is complete on the clients, the QR code is displayed. The content of the QR code is the same as that of the exported configuration file, which facilitates the configuration of mobile clients by scanning the QR code.<br>Multiple WireGuard clients should not share the same VPN configuration file. |

### 11.5.3 Configuring a WireGuard VPN Client

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **WireGuard VPN** > **WireGuard VPN Client**.

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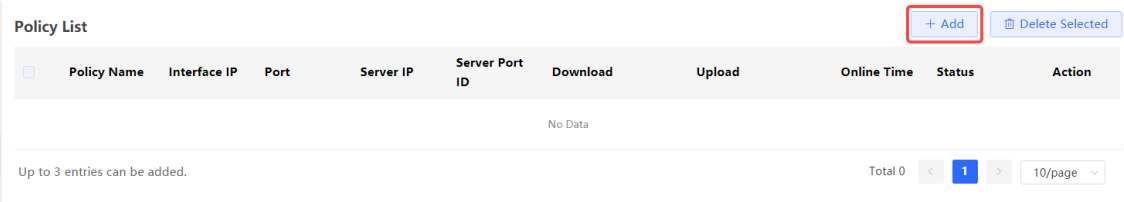
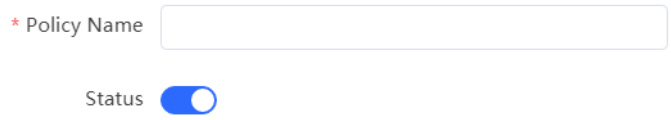
## System Management

(1) Click **Add** on the right of **Policy List**.




(2) Set **Policy Name** and toggle on **Status**.




(3) Set **Configuration Mode**.

- Manual: Manually enter the configuration parameters related to the client and server.



# 1 Configuration Guide SD-WAN

**Specification**

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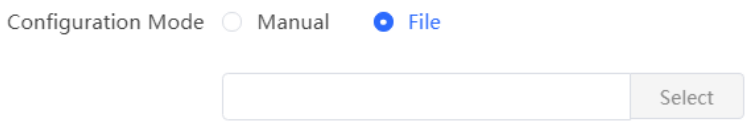
System Management

- File: Click **Select**, select the configuration file downloaded from the server, and complete the configuration automatically.




(4) Configure the client parameters.

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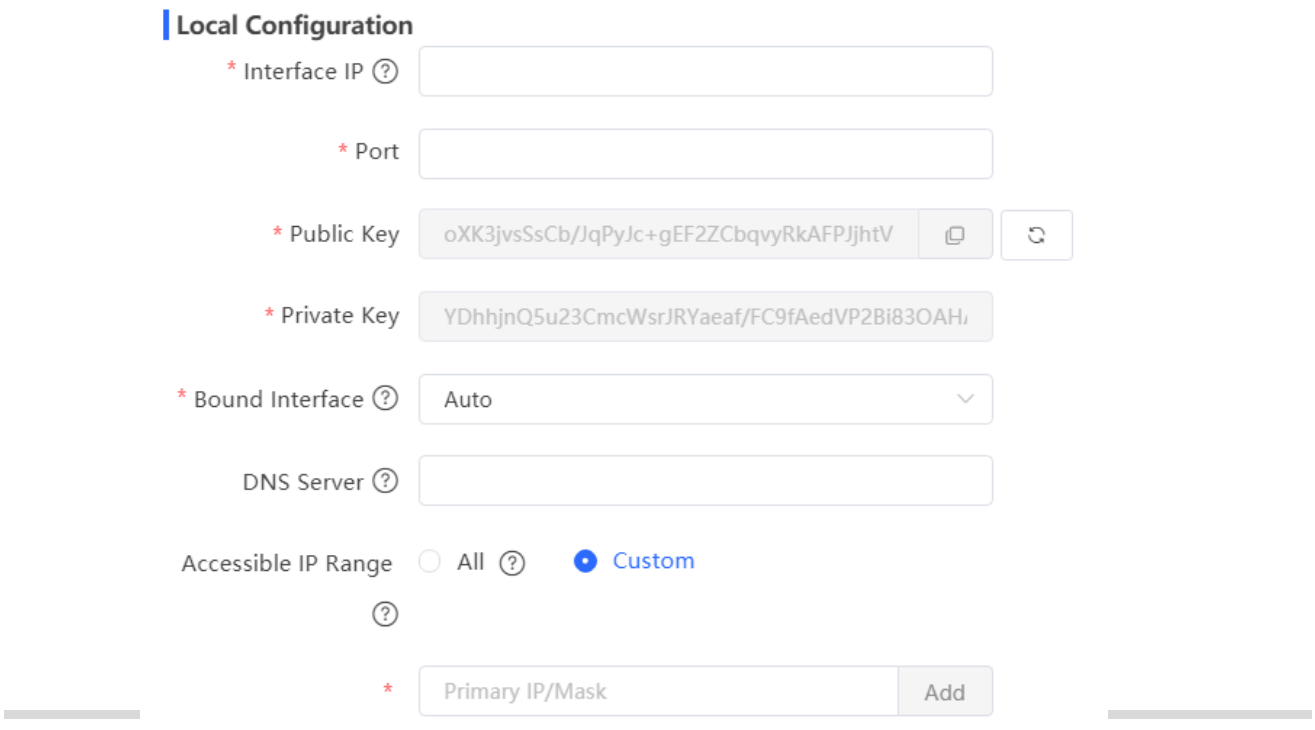

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System Management

**Table 11-29 Local Configuration Parameters of a WireGuard VPN Client**

| Parameter | Description |
|---|---|
| Interface IP | Specify the IP address of a tunnel interface on a client. The IP address is used to identify the client connected to a VPN tunnel. |
| Port | Specify the UDP port number used by the client to communicate with the VPN server. The value must be the same as that configured on the server. |

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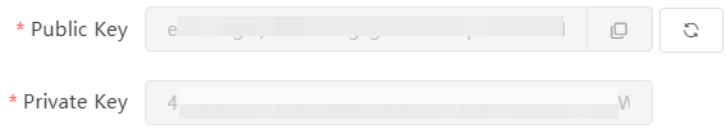
System Management

| Parameter | Description |
| --- | --- |
| Public Key | Specify the public key of a client, which is used to encrypt data packets transmitted in a VPN tunnel. During the WireGuard key exchange, the public key of a client will be sent to a server so that the server can securely send information to the client. The public and private keys are automatically generated by the system. You can click the copy icon to copy the public key of the client, and click the refresh icon to generate a new public and private key pair.<br> |

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System Management

| Parameter | Description |
| --- | --- |
| Private Key | Specify the private key of the client. The private key is used to decrypt encrypted information received from the server and encrypt information to be sent to the server. |
| Bound Interface | In the scenario of multiple WAN ports, you can configure this parameter to specify the outbound interface of VPN traffic. You are advised to set this parameter to **Auto**. |
| DNS Server | Specify the DNS server for resolving a domain name when **Server IP** is set to the domain name. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| Accessible IP Range | Specify the IP address range of a server to be accessed by a client.<br>● All: Force the client-generated IPv4 traffic to be routed through the VPN tunnel.<br>● Custom: You can add the intranet address of the server so that data is transmitted through a VPN tunnel only when the client accesses the corresponding network segment. |

(5) Set related parameters of the server.

# 1 Configuration Guide SD-WAN

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System Management

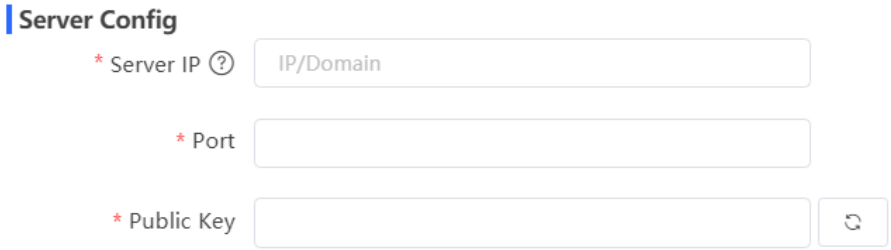


**Table 11-30 Server Config Parameters on a WireGuard VPN Client**

| Parameter | Description |
|---|---|
| Server IP | Specify a public IP address or a domain name of a VPN server to establish a connection with a VPN client. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
|---|---|
| Port | Specify the port number on which a VPN server listens. The port number is used to receive connection requests from a VPN client. The value must be the same as that on the server. |
| Public Key | Specify the public key of a server. The public key is used to encrypt data packets transmitted in a VPN tunnel. The value must be the same as that on the server. |

(6) (Optional) Click **Advanced Settings** to set advanced parameters.

# 1 Configuration Guide SD-WAN

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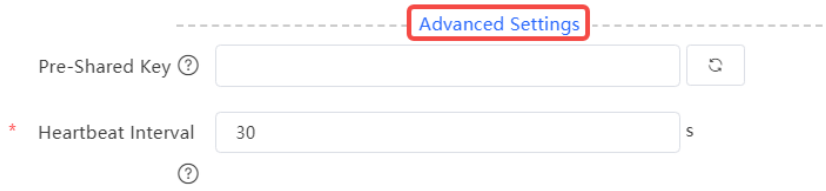


**Table 11-31 Advanced Settings Parameters on a WireGuard VPN Client**

| Parameter | Description |
|---|---|
| Pre-Shared Key | Specify the key shared by both communication parties for authentication and encrypted communication in advance. The key is used to enhance the security of the handshake process. The value must be the same as that configured on the server. |

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System Management

| Parameter | Description |
| --- | --- |
| Heartbeat Interval | Specify the interval at which a client sends heartbeat packets to a server, which is used to detect the connection liveliness. If the server does not receive any heartbeat signal from the client within the specified interval, the connection is considered to be disconnected and is closed. |

(7) Click **OK**.

## 11.5.4 Checking the Status of a WireGuard VPN Connection

### 1. Checking the Server Connection Status

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **WireGuard VPN** > **WireGuard VPN Server**.

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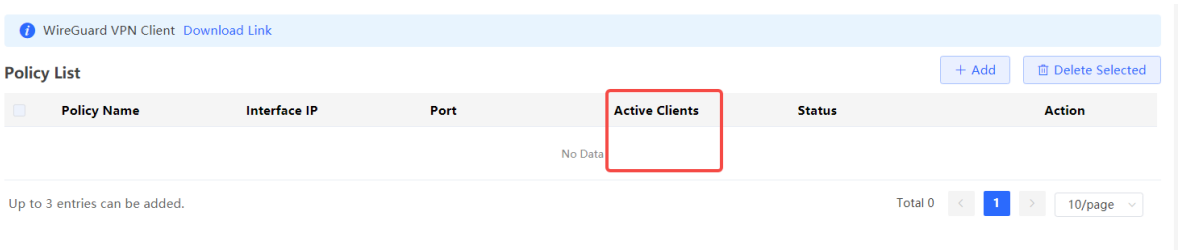


**Active Clients** indicates the number of clients that have successfully connected to the server. Click the number in the **Active Clients** column to display the real-time upload and download rates of a client. **Online Time** indicates the last time of a successful handshake between the server and client.

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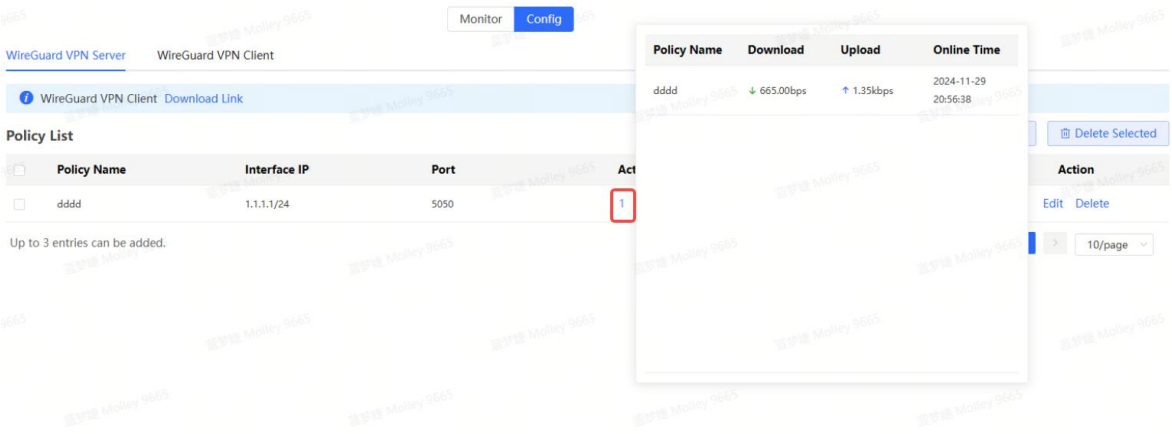


## 2. Checking the Client Connection Status

Choose **One-Device** > **Gateway** > **Config** > **VPN** > **WireGuard VPN** > **WireGuard VPN Client**.

If a client successfully connects to a server, upload and download rates as well as the onboarding time are displayed in the policy list.

# 1 Configuration Guide SD-WAN

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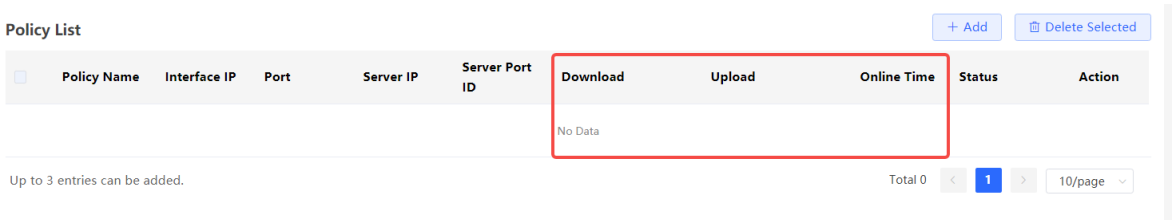
System Management



# 1 Configuration Guide SD-WAN

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# 13 System Management

## 13.1 System Logs

For medium to large-scale network projects, network administrators often use third-party software to interface with all devices, monitoring system metrics and identifying any abnormal behavior to ensure system health and security. Devices usually support network management protocols such as SNMP and Syslog for seamless integration.

### 13.1.1 Viewing System Logs

**Go to the configuration page.**

- In SON mode:
  - Choose **Network-Wide** > **System** > **Syslog**.
  - Choose **One-Device** > **Config > System** > **Syslog**.
- In standalone mode: Choose **System** > **Syslog**.

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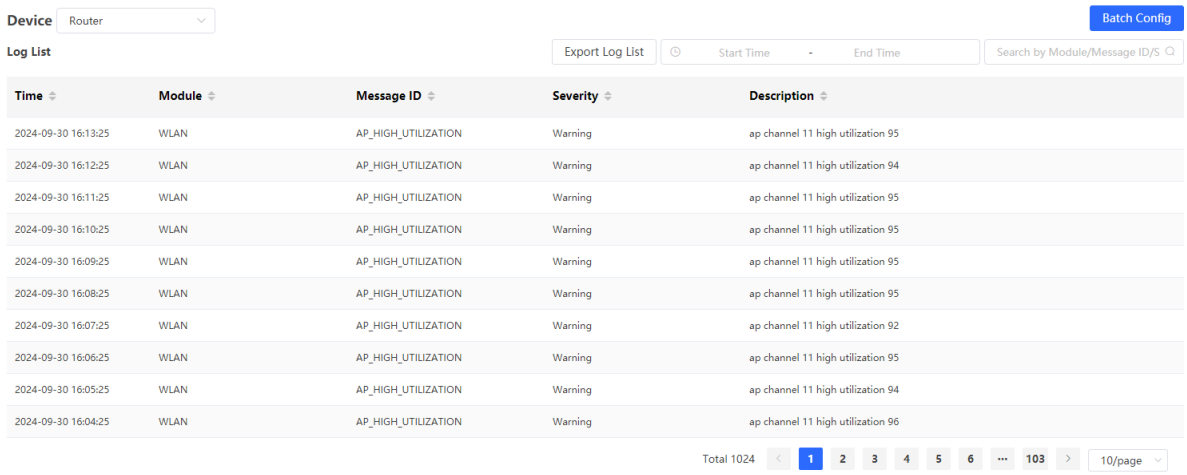
## System Management

The **Log List** displays the operation logs of the local device. You can filter the logs by specific dates or modules on the **View Log** page. You can also export the log list and log files to your local system for storage, viewing, or backup.



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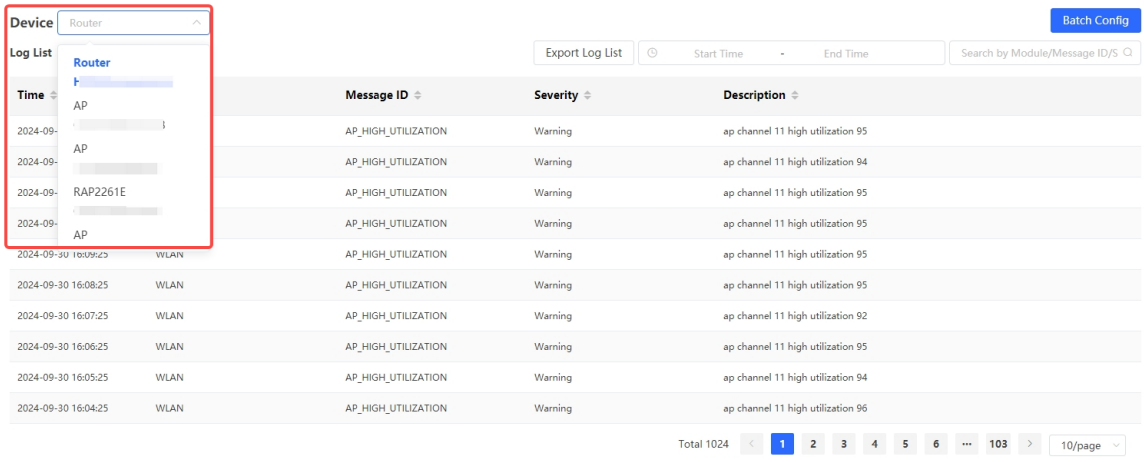
## System Management

- On the **Syslog** page in Network-Wide mode, you can view the logs of specific devices.




- To view logs for a specific date, click **Start Time**, select the start and end time, and then click **OK** to filter the logs accordingly.

# 1 Configuration Guide SD-WAN

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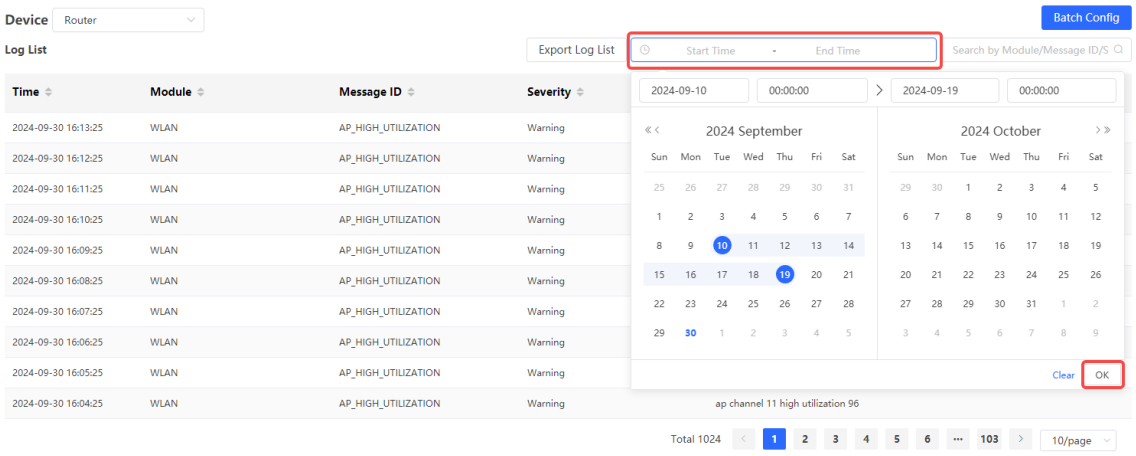


- To view the logs of a specific module, enter the module name in the search box to access its operation logs.

# 1 Configuration Guide SD-WAN

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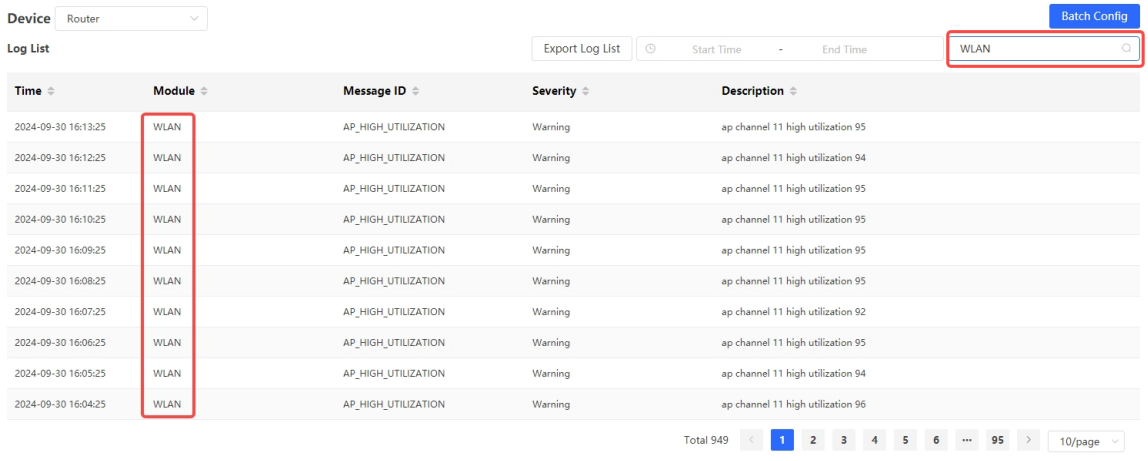


- To download the log files, click **Download Local Log File** to save the compressed log file to your local device for storage and backup. To export the log list, click **Export Log List** to download the log list in .csv format for viewing on your computer.

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System Management

- Syslog page in Network-Wide mode.

Specification

Only **Export Log list** is supported on the syslog page in Network-Wide mode, but **Download Local Log File** is not supported. To download the log file, click **One-Device** > **Config > System** > **Syslog** to access the device configuration page.

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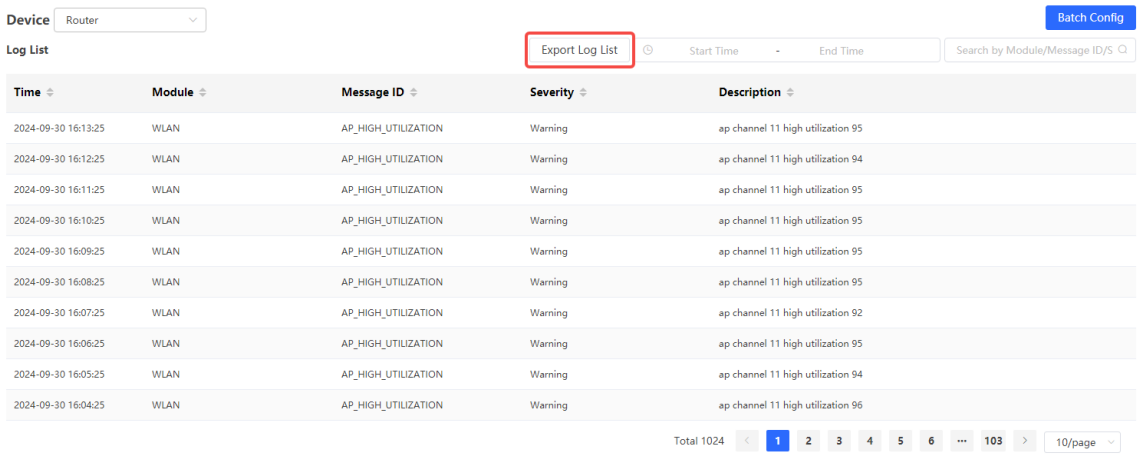


- Syslog page in Standalone mode.

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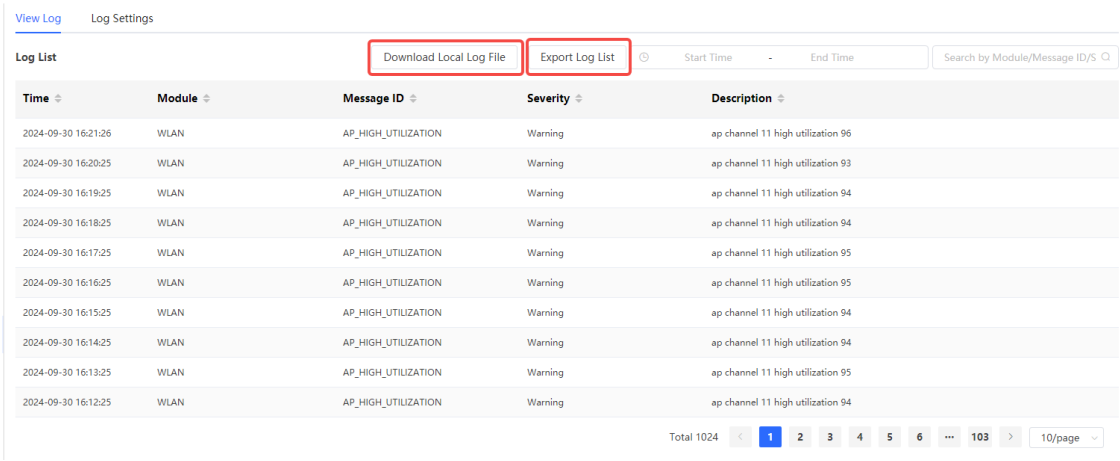


## 13.1.2 Configuring System Logs

**Go to the configuration page.**

- In SON mode:
  - Choose **Network-Wide** > **System** > **Syslog**. Click **Batch Config.**

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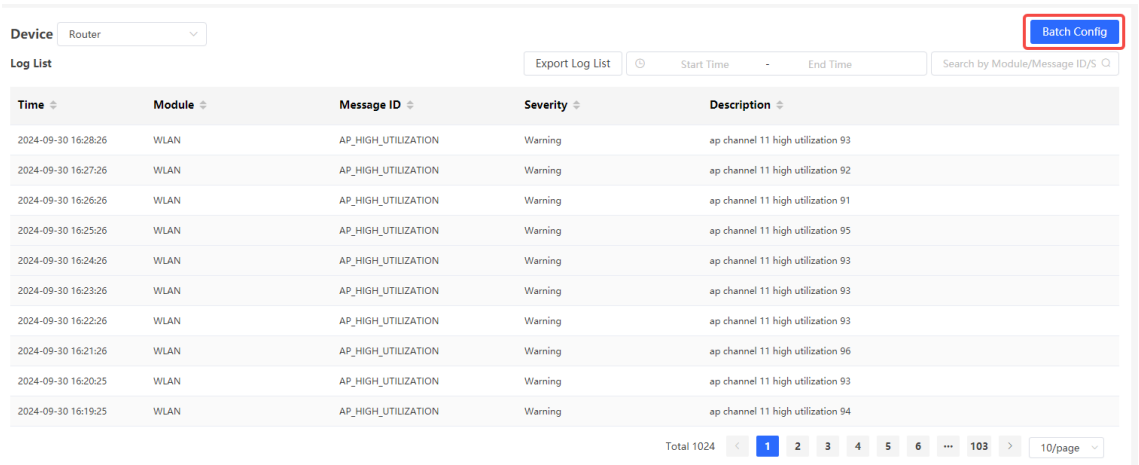


- Choose **One-Device** > **Config > System** > **Syslog**. Click **Log Settings**.

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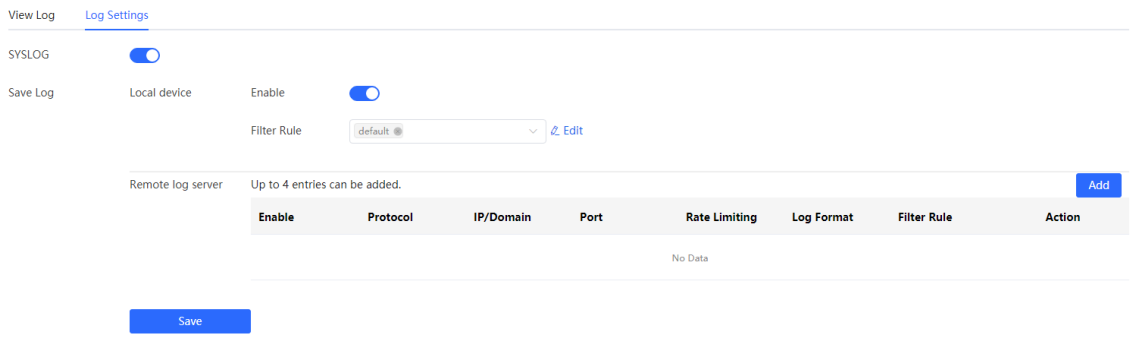


- In standalone mode, choose **System** > **Syslog.** Click **Log Settings**.

### 1. Enabling Syslog

Toggle on **SYSLOG** to enable the SYSLOG protocol. When enabled, the device can connect with a remote log server to send log information over the network.

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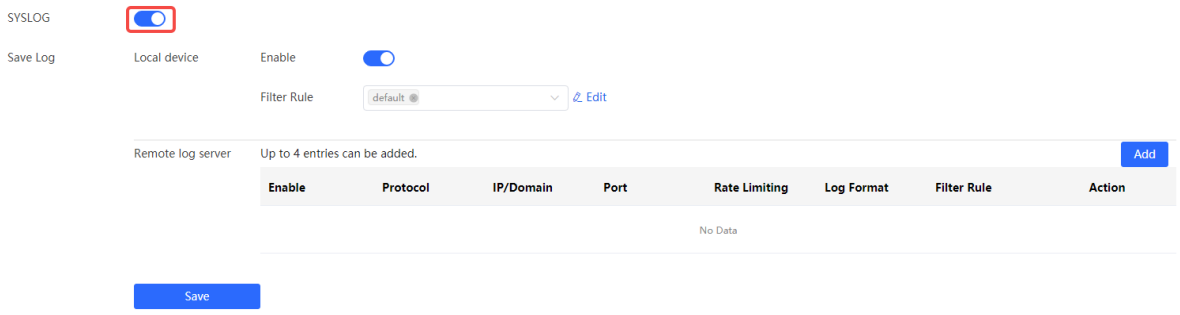
System Management




## 2. Configuring Local Logs

Local log saving is enabled by default. Click **Edit**, and then **Add** to create filtering rules for device operation logs, allowing you to exclude certain operation logs (like debug messages from all modules) from being displayed in the log list.

# 1 Configuration Guide SD-WAN

**Specification**

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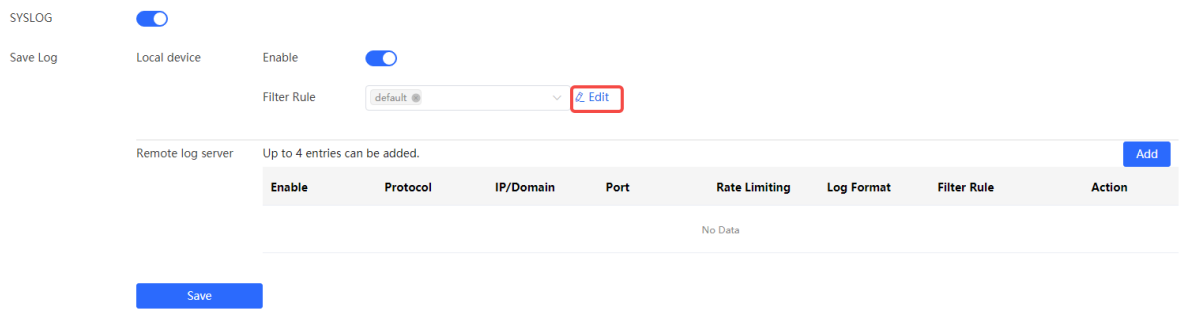
System Management

**Caution**

When local log saving is disabled, all actions performed on the device will no longer be displayed in the log list. Please exercise caution.



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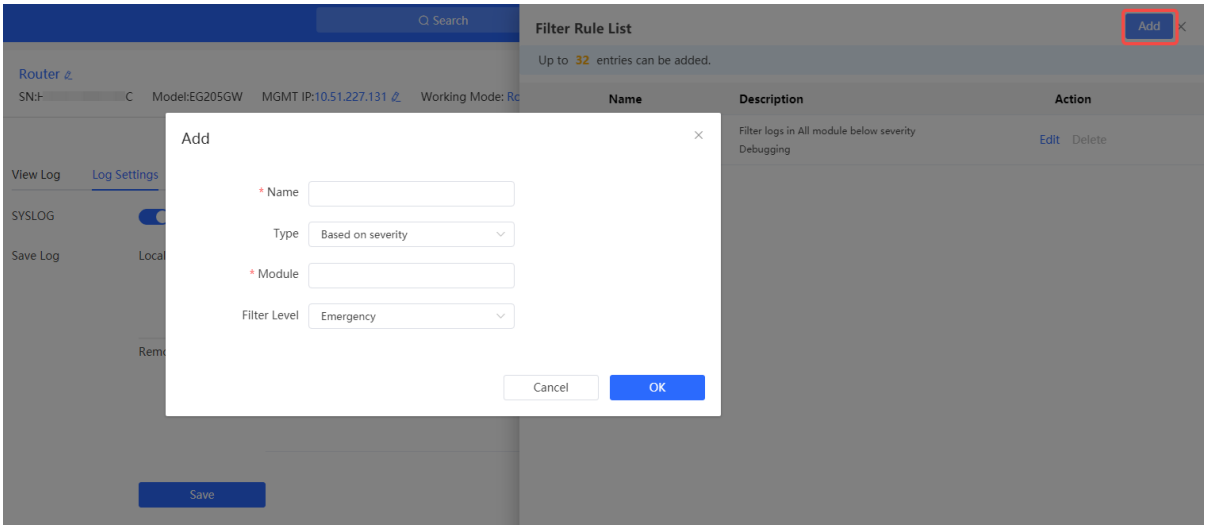


### 3. Configuring Remote Log Server

Click **Add** next to the **Remote log server** to add basic information of the remote log server.

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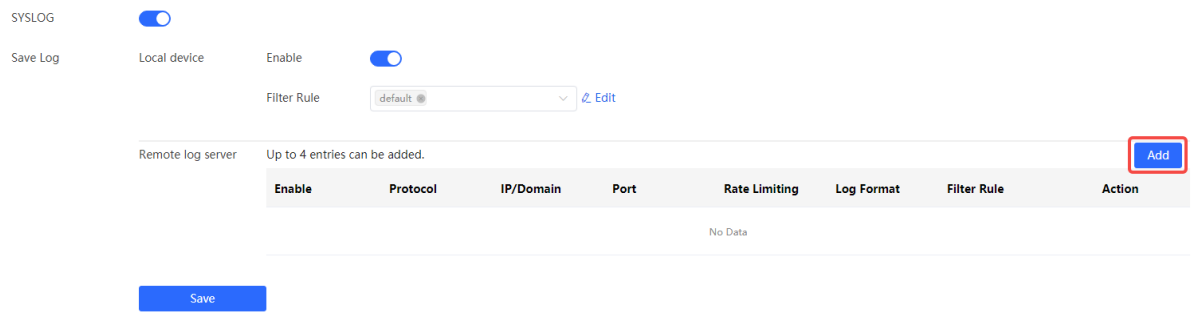

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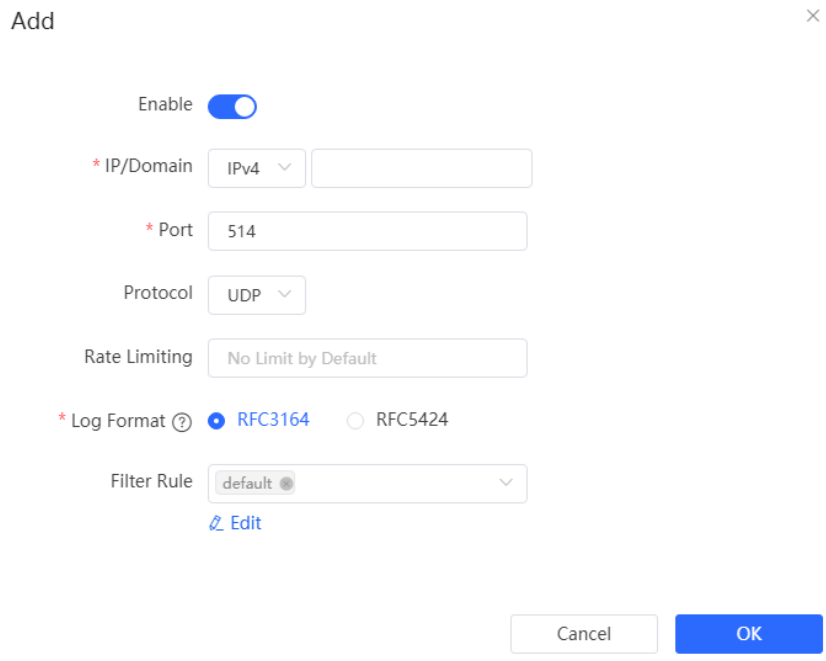

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System Management

**Table 13-1 Remote Log Server Configuration Parameters**

| Parameter | Description | Default Value |
|---|---|---|
| Enable | Enable or disable the remote log server. When enabled, the device will send its operation logs to the remote log server. | Enabled |
| IP/Domain | IP address or domain name of the remote log server. The IP address can be an IPv4 or IPv6 address. | N/A |
| Port | Port number of the remote log server. | 514 |
| Protocol | Protocol for communication between the device and the remote log server. Currently only UDP is supported. | UDP |
| Rate Limiting | The highest rate at which the device can send log data to the remote log server. | No limit |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description | Default Value |
|---|---|---|
| Log Format | The format of logs sent to the remote log server.<br>RFC3164: <Priority> second-level local time Hostname Module Name % Message Identifier: Log Message.<br>RFC5424: <Priority> microsecond-level UTC time Hostname Module % Process ID Message Identifier - Log Message. | RFC3164 |
| Filter Rule | Rules for filtering device operation logs. Any logs that are filtered out will not be sent to the remote log server. | default is selected. |

### 4. Batch Configuration

Go to the configuration page.

Choose **Network-Wide** > **System** > **Syslog**. Click **Batch Config.**

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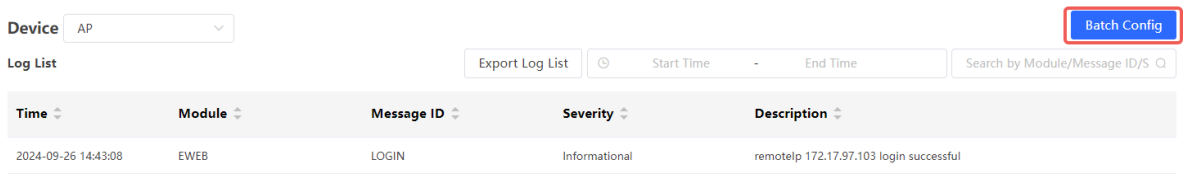


On the **Log Settings** page in Network-Wide mode, select the targeted devices and configure the log settings. Then, click **Save** to apply the settings to the selected devices.

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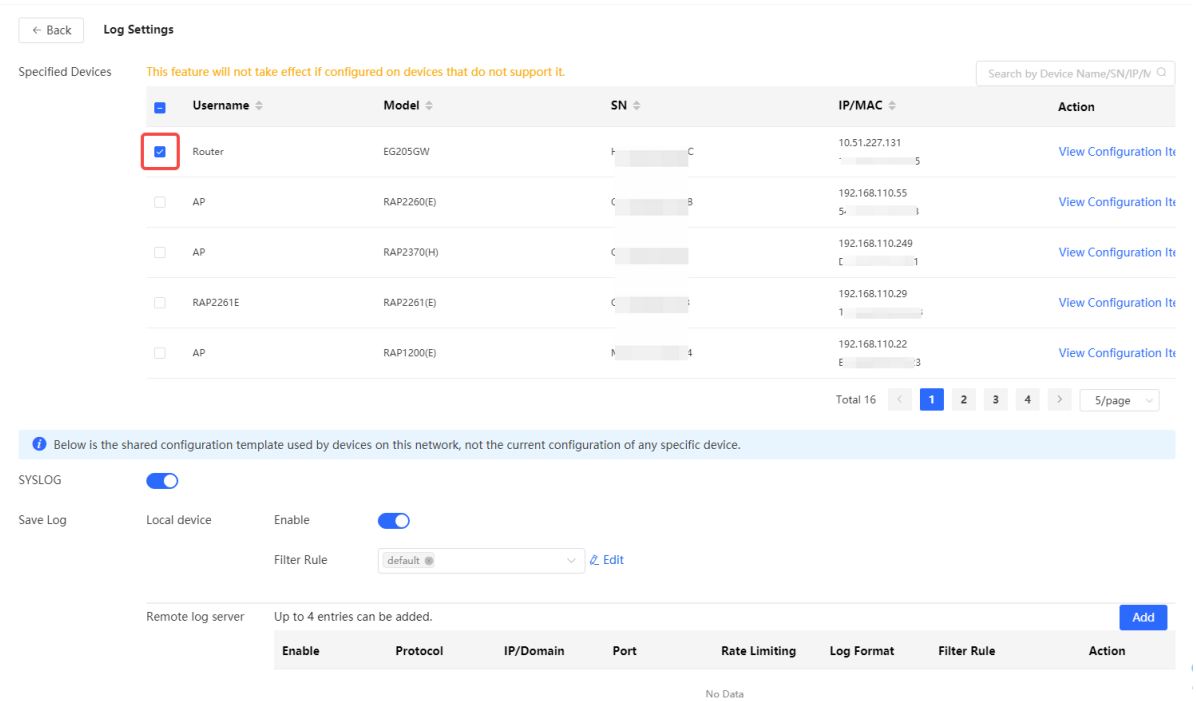

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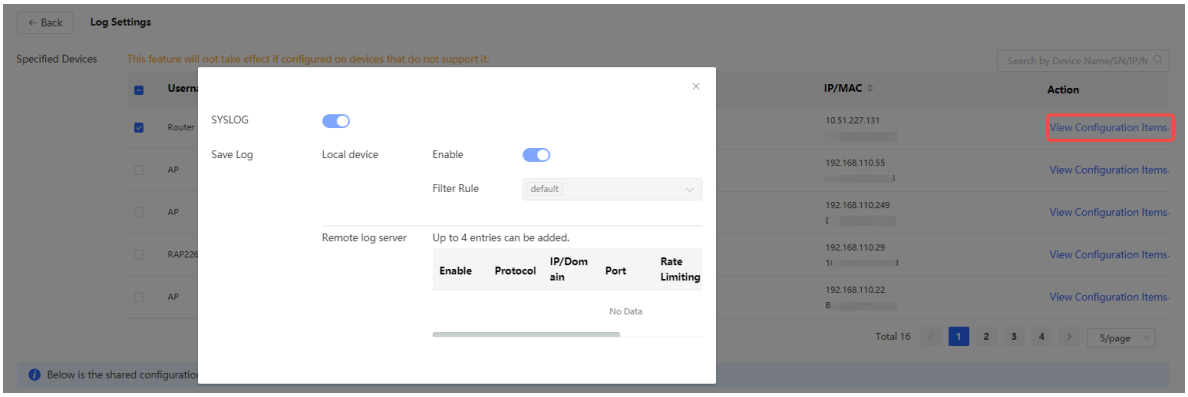
System Management

After the log settings are successfully applied, click **View Configuration** to view the log settings of individual devices.



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## 13.2 Setting the Login Password

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **Password**.

Enter the old password and new password. After saving the configuration, log in again using the new password.

**Caution**

In the self-organizing network mode, the login password of all devices in the network will be changed synchronously.

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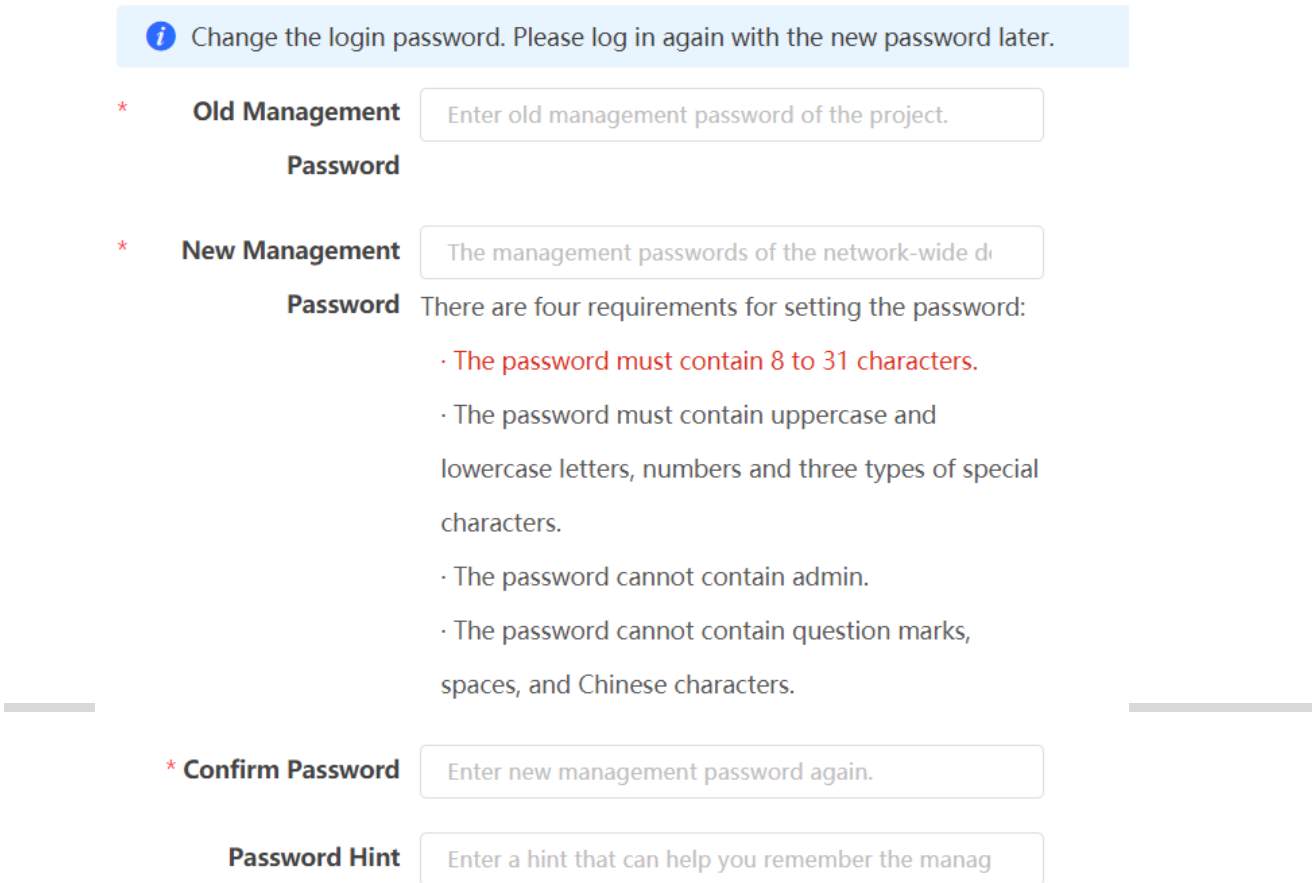

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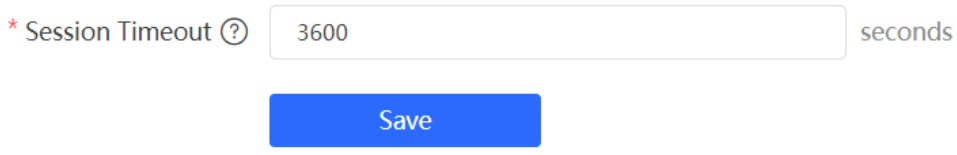
## 13.3 Setting the Session Timeout Duration

Choose **One-Device** > **Gateway** > **Config** > **System** > **Login** > **Session Timeout**.

If no operation is performed on the Web page within a period of time, the session is automatically disconnected. When you need to perform operations again, enter the password to log in again. The default timeout duration is 3600 seconds, that is, 1 hour.




## 13.4 Restoring Factory Settings

### 13.4.1 Restoring the Current Device to Factory Settings

Choose **One-Device** > **Gateway** > **Config** > **System** > **Backup > Reset**.

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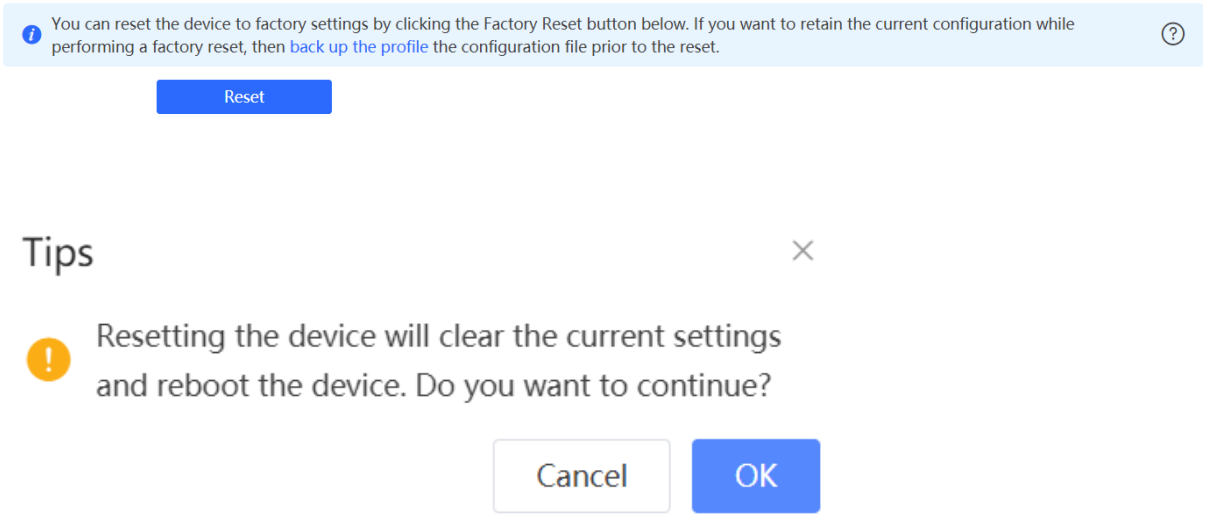
System Management

Click **Reset** to restore the current device to the factory settings.



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**Caution**

The operation will clear all configuration of the current device. If you want to retain the current configuration, back up the configuration first. (For details, see Section 13.10 Configuring Backup and Import.) Therefore, exercise caution when performing this operation.

### 13.4.2 Restoring All Devices to Factory Settings

Choose **Network-Wide** > **System** > **Reset**.

Click **All Devices**, select whether to enable **Keep Account and Password,** and click **Reset All Devices**. All devices in the network will be restored to factory settings.

# 1 Configuration Guide SD-WAN

**Specification**

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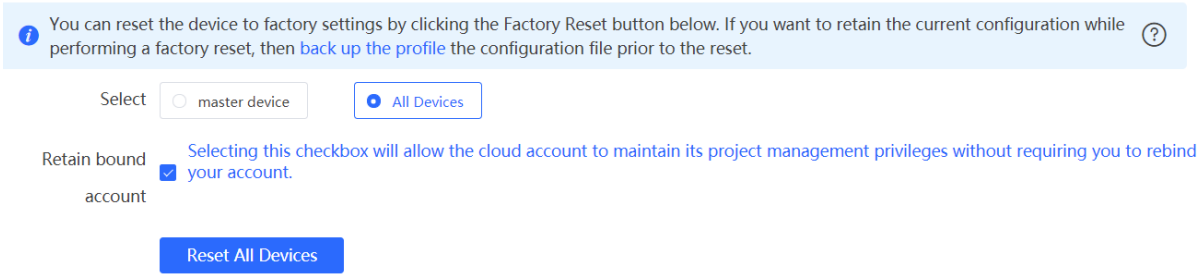
System Management




**Caution**

The operation will clear all configuration of all devices in the network. Therefore, exercise caution when performing this operation.

# 1 Configuration Guide SD-WAN

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## 13.5 Configuring SNMP

### 13.5.1 Overview

The Simple Network Management Protocol (SNMP) is a protocol for managing network devices. Based on the client/server model, it can achieve remote monitoring and control of network devices.

SNMP uses a manager and agent architecture. The manager communicates with agents through the SNMP protocol to retrieve information such as device status, configuration details, and performance data. It can also be used to configure and manage devices.

SNMP can be used to manage various network devices, including routers, switches, servers, firewalls, etc. You can achieve user management through the SNMP configuration interface and monitor and control devices through the third-party software.

# 1 Configuration Guide SD-WAN

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## 13.5.2 Global Configuration

### 1. Overview

The purpose of global configuration is to enable the SNMP service and make the SNMP protocol version (v1/v2c/v3) take effect, so as to achieve basic configuration of local port, device location, and contact information.

SNMP v1: As the earliest version of SNMP, SNMP v1 has poor security, and only supports simple community string authentication. SNMP v1 has certain flaws, such as plaintext transmission of community strings and vulnerability to attacks. Therefore, SNMP v1 is not recommended for modern networks.

SNMP v2c: As an improved version of SNMP v1, SNMP v2c supports richer functions and more complex data types, with enhanced security. SNMP v2c performs better than SNMP v1 in terms of security and functionality, and is more flexible. It can be configured according to different needs.

SNMP v3: As the newest version, SNMP v3 supports security mechanisms such as message authentication and encryption compared to SNMP v1 and SNMP v2c. SNMP v3 has achieved significant improvements in security and access control.

# 1 Configuration Guide SD-WAN

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System Management

### 2. Configuration Steps

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **Global Config**

(1) Enable the SNMP service.

# 1 Configuration Guide SD-WAN

**Specification**

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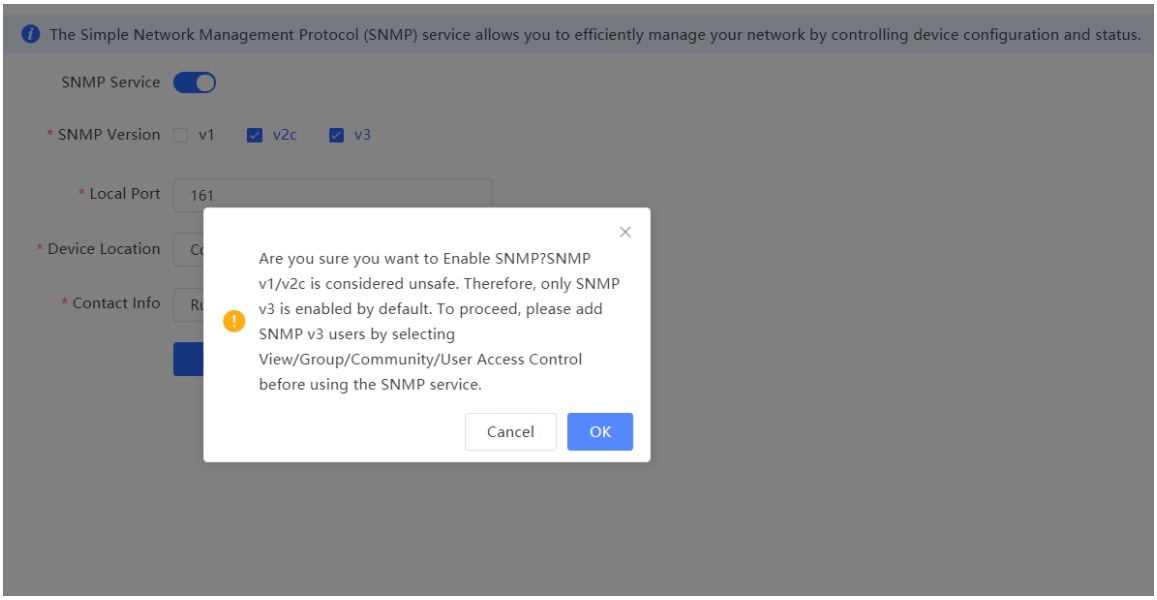
System Management




When it is enabled for the first time, SNMP v3 is enabled by default. Click **OK**.

# 1 Configuration Guide SD-WAN

**Specification**

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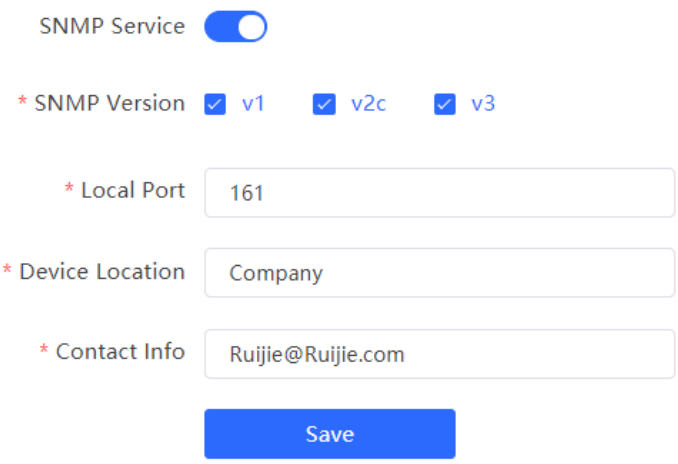
System Management

(2) Set SNMP service global configuration parameters.



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System Management

**Table 13-2 Global Configuration Parameters**

| Parameter | Description |
|---|---|
| SNMP Server | Indicates whether SNMP service is enabled. |
| SNMP Version | Indicates the SNMP protocol version, including v1, v2c, and v3 versions. |
| Local Port | The port range is 1 to 65535. |
| Device Location | 1-64 characters. Chinese characters, full-width characters, question marks, and spaces are not allowed. |
| Contact Info | 1-64 characters. Chinese characters, full-width characters, question marks, and spaces are not allowed. |

(3) After the SNMP service is enabled, click **Save** to make basic configurations such as the SNMP protocol version number take effect.

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## 13.5.3 View/Group/Community/User Access Control

### 1. Configuring Views

- Overview

Management Information Base (MIB) can be regarded as a database storing the status information and performance data of network devices. It contains a large number of object identifiers (OIDs) to identify the status information and performance data of these network devices.

Views in SNMP can limit the range of MIB nodes that the management system can access, thereby improving the security and reliability of network management. Views are an indispensable part of SNMP and need to be configured or customized according to specific management requirements.

A view can have multiple subtrees. The management system can only access MIB nodes in these subtrees, and cannot access other unauthorized MIB nodes. This can prevent unauthorized system administrators from accessing sensitive MIB nodes, thereby protecting the security of network devices. Moreover, views can also improve the efficiency of network management and speed up the response from the management system.

- Configuration Steps

# 1 Configuration Guide SD-WAN

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## System Management

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **View/Group/Community/Client Access Control**

(1) Click **Add** under the **View List** to add a view.




(2) Configure basic information of a view.

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System Management

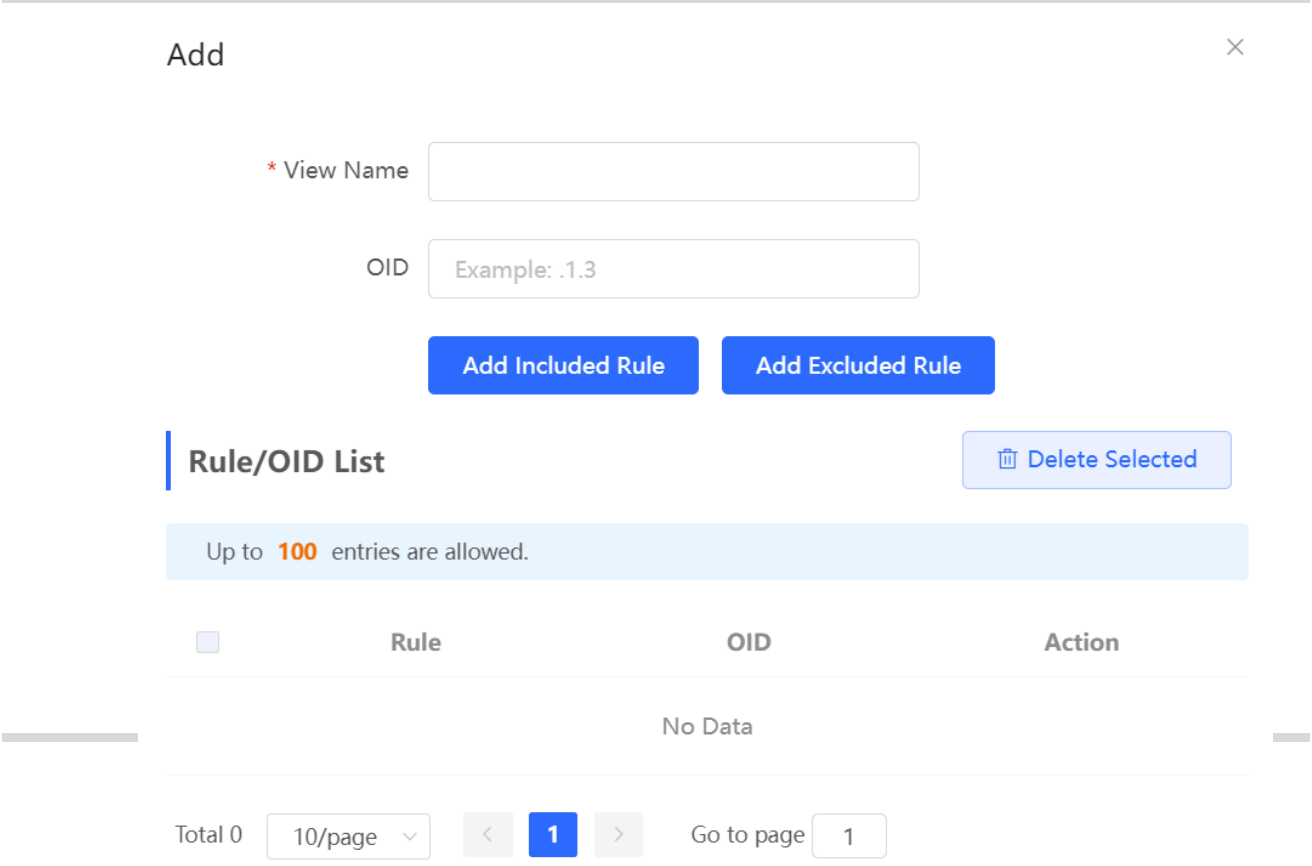

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**Table 13-3 View Configuration Parameters**

| Parameter | Description |
|---|---|
| View Name | Indicates the name of the view.<br>1-32 characters. Chinese or full width characters are not allowed. |
| OID | Indicates the range of OIDs included in the view, which can be a single OID or a subtree of OIDs. |
| Type | There are two types of rules: included and excluded rules.<br>● The included rule only allows access to OIDs within the OID range. Click **Add Included Rule** to set this type of view.<br>● Excluded rules allow access to all OIDs except those in the OID range. Click **Add Excluded Rule** to configure this type of view. |

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**Note**

A least one OID rule must be configured for a view. Otherwise, an alarm message will appear.

(3) Click **OK**.

### 2. Configuring v1/v2c Users

- Overview

  When the SNMP version is set to v1/v2c, user configuration is required.

# 1 Configuration Guide SD-WAN

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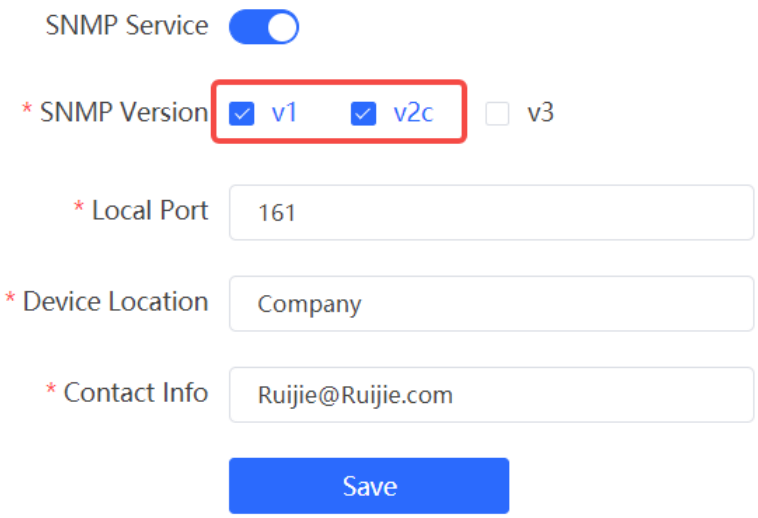
System Management



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(2) **Visualized monitoring:** Map-based network monitoring provides a clear, intuitive overview of the entire network, projects, and links, with one-click alarm analysis. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=d48a89fb844a4795bf0f3967245597fd.

(3) **Batch configuration:** A template can be applied across multiple projects, eliminating the need for repetitive operations. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=586ede226ec04f0f9fe32ce1fdb34f56.

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## System Management

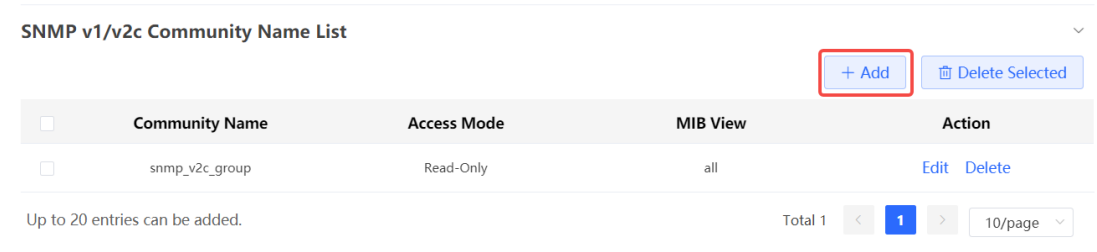
**Note**

Select the SNMP protocol version, and click **Save**. The corresponding configuration options will appear on the **View/Group/Community/User Access Control** page.

- Configuration Steps

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **View/Group/Community/Client Access Control**

(1) Click **Add** in the **SNMP v1/v2c Community Name List** pane.



# 1 Configuration Guide SD-WAN

**Specification**

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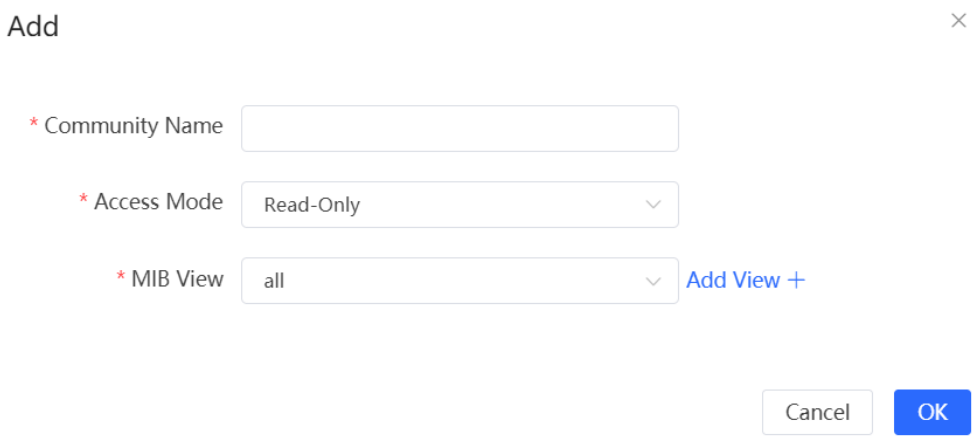
(2) Add a v1/v2c user.



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System Management

**Table 13-4 v1/v2c User Configuration Parameters**

| Parameter | Description |
|---|---|
| Community Name | ● At least 8 characters.<br>● It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>● Admin, public or private community names are not allowed.<br>● Question marks, spaces, and Chinese characters are not allowed. |
| Access Mode | Indicates the access permission (read-only or read & write) for the community name. |
| MIB View | The options under the drop-down box are configured views (default: all, none). |

**Note**

- Community names cannot be the same among v1/v2c users.
- Click **Add View** to add a view.

# 1 Configuration Guide SD-WAN

**Specification**

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### 3. Configuring v3 Groups

- Overview

SNMP v3 introduces the concept of grouping to achieve better security and access control. A group is a group of SNMP users with the same security policies and access control settings. With SNMP v3, multiple groups can be configured, each with its own security policies and access control settings. Each group can have one or more users.

- Prerequisites

When the SNMP version is set to v3, the v3 group configuration is required.

# 1 Configuration Guide SD-WAN

**Specification**

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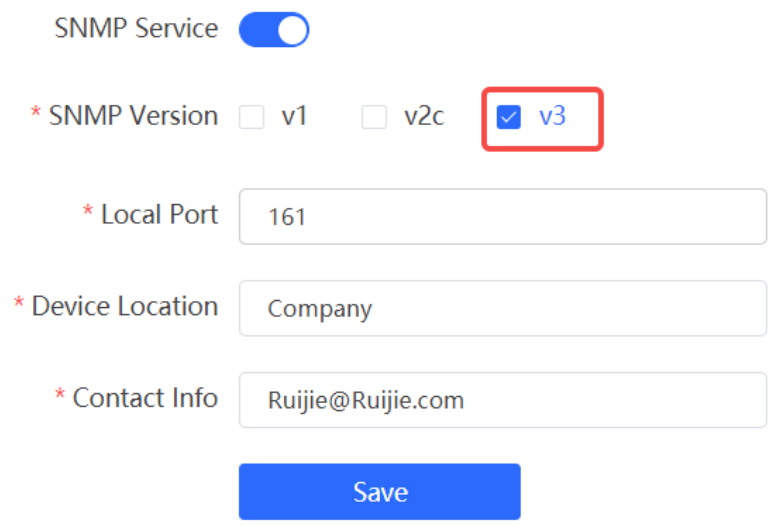
System Management



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## System Management

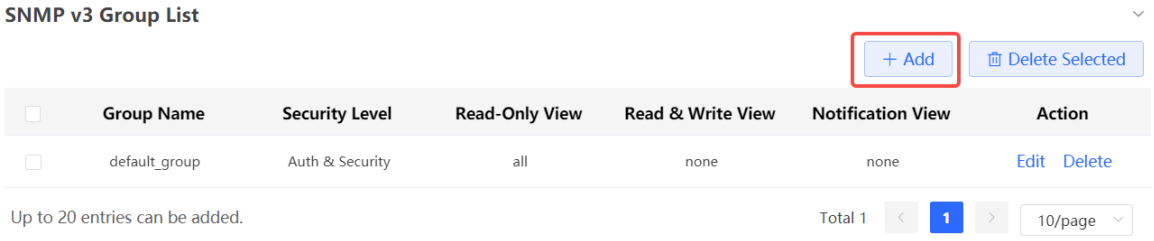
**Note**

Select the SNMP protocol version, and click **Save**. The corresponding configuration options will appear on the **View/Group/Community/User Access Control** page.

- Configuration Steps

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **View/Group/Community/Client Access Control**

(1) Click **Add** in the **SNMP v3 Group List** pane to create a group.



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System Management

(2) Configure v3 group parameters.

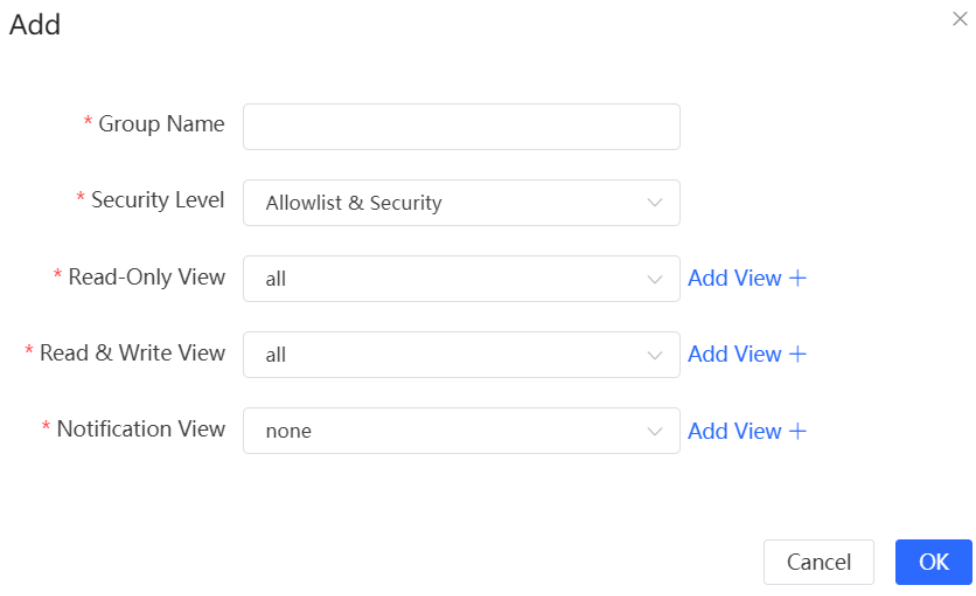

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**Table 13-5 v3 Group Configuration Parameters**

| Parameter | Description |
|---|---|
| Group Name | Indicates the name of the group.<br>● 1-32 characters.<br>● Chinese characters, full-width characters, question marks, and spaces are not allowed. |
| Security Level | Indicates the minimum security level (authentication and encryption, authentication but no encryption, no authentication and encryption) of the group. |
| Read-Only View | The options under the drop-down box are configured views (default: all, none). |
| Read & Write View | The options under the drop-down box are configured views (default: all, none). |
| Notify View | The options under the drop-down box are configured views (default: all, none). |

# 1 Configuration Guide SD-WAN

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System Management

**Note**

- A group defines the minimum security level, read and write permissions, and scope for users within the group.
- The group name must be unique. To add a view, click **Add View**.

(3) Click **OK**.

### 4. Configuring v3 Users

- Prerequisites

When the SNMP version is set to v3, the v3 group configuration is required.

# 1 Configuration Guide SD-WAN

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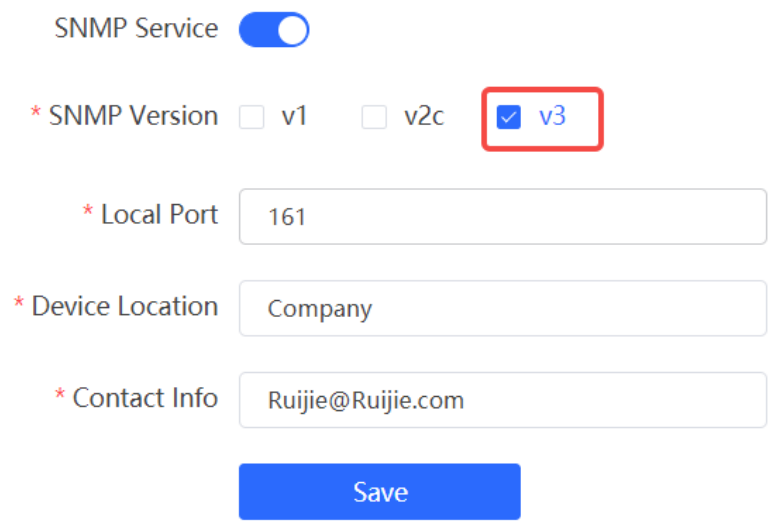
System Management



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## System Management

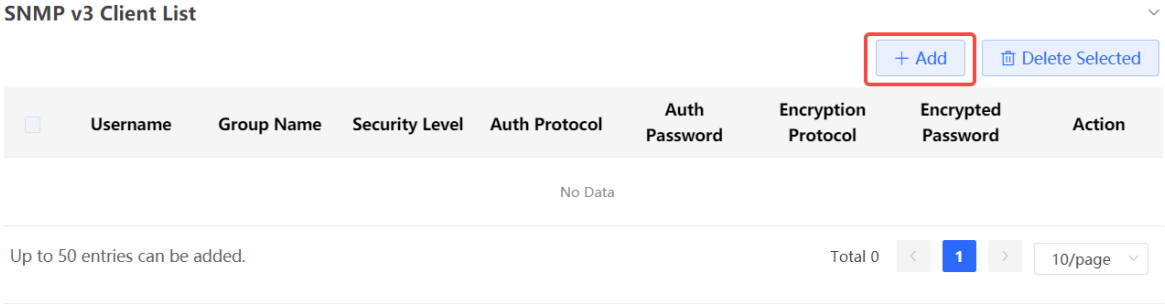
**Note**

Select the SNMP protocol version, and click **Save**. The corresponding configuration options will appear on the **View/Group/Community/User Access Control** page.

- Configuration Steps

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **View/Group/Community/Client Access Control**.

(1) Click **Add** in the **SNMP v3 Client List** pane to add a v3 user.



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System Management

(2) Configure v3 user parameters.

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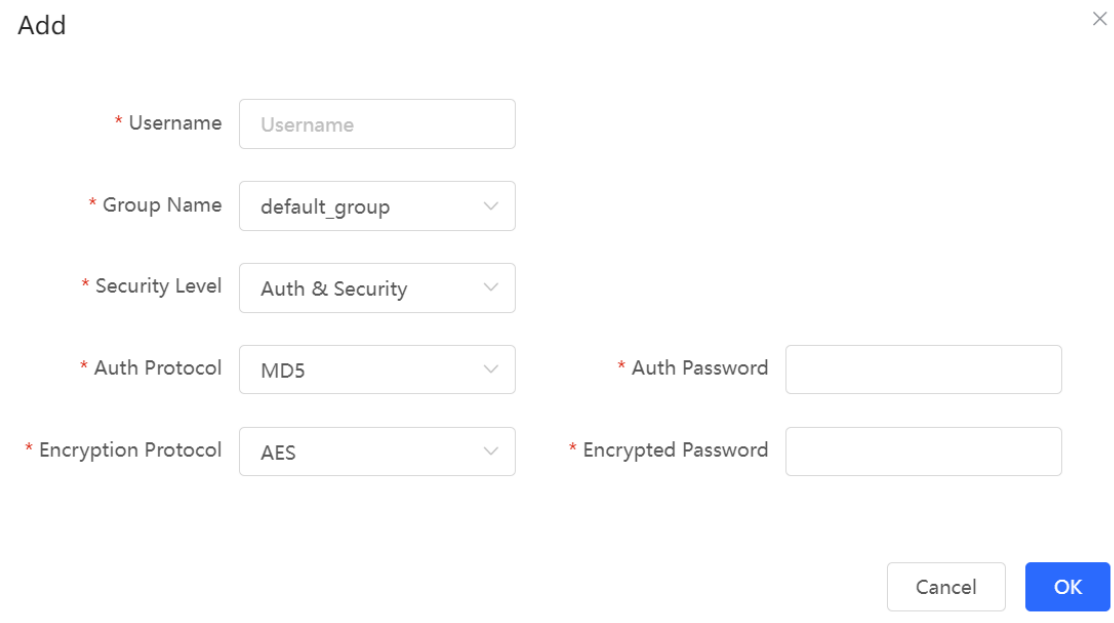
System Management



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System Management

**Table 13-6 v3 User Configuration Parameters**

| Parameter | Description |
|---|---|
| Username | ● At least 8 characters.<br>● It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>● Admin, public or private community names are not allowed.<br>● Question marks, spaces, and Chinese characters are not allowed. |
| Group Name | Indicates the group to which the user belongs. |
| Security Level | Indicates the security level (authentication and encryption, authentication but no encryption, and no authentication and encryption) of the user. |

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
Ruijie Cloud's SD-WAN solution can effectively meet the above requirements and has the following advantages compared with traditional WAN solutions:

(1) **Networking without public IP addresses:** Networking without public IP addresses enables remote connectivity across any broadband connection. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=017d4b240fbc443c9b383d63c35c5aac.

(2) **Visualized monitoring:** Map-based network monitoring provides a clear, intuitive overview of the entire network, projects, and links, with one-click alarm analysis. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=d48a89fb844a4795bf0f3967245597fd.

(3) **Batch configuration:** A template can be applied across multiple projects, eliminating the need for repetitive operations. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=586ede226ec04f0f9fe32ce1fdb34f56.

(4) **Pre-configuration deployment:** Templates can be created beforehand, which are automatically delivered to devices upon network connection, facilitating zero-touch provisioning onsite. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=6436c96a5cf94b9c97b92f863ff8bf06.

System Management

| Parameter | Description |
| --- | --- |
| Auth Protocol, Auth Password | Authentication protocols supported: MD5/SHA/SHA224/SHA256/SHA384/SHA512.<br>Authentication password: 8-31 characters. Chinese characters, full-width characters, question marks, and spaces are not allowed. It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>Note: This parameter is mandatory when the security level is authentication and encryption, or authentication but no encryption. |

# 1 Configuration Guide SD-WAN

**Specification**

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Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
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System Management

| Parameter | Description |
| --- | --- |
| Encryption Protocol, Encryption Password | Encryption protocols supported: DES/AES/AES192/AES256.<br>Encryption password: 8-31 characters. Chinese characters, full-width characters, question marks, and spaces are not allowed.<br>It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>Note: This parameter is mandatory when the security level is authentication and encryption. |

**Note**

- The security level of v3 users must be greater than or equal to that of the group.
- There are three security levels, among which authentication and encryption requires the configuration of authentication protocol, authentication password, encryption protocol, and encryption password. Authentication but no encryption only requires the configuration of authentication protocol and encryption protocol, while no authentication and encryption does not require any configuration.

# 1 Configuration Guide SD-WAN

**Specification**

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Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
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## 13.5.4 SNMP Service Typical Configuration Examples

### 1. Configuring SNMP v2c

- Application Scenario

You only need to monitor the device information, but do not need to set and deliver it. A third-party software can be used to monitor the data of nodes like 1.3.6.1.2.1.1 if v2c version is configured.

- Configuration Specification

According to the user's application scenario, the requirements are shown in the following table:

**Table 13-7 User Requirement Specification**

| Item | Description |
| --- | --- |
| View range | Included rule: the OID is .1.3.6.1.2.1.1, and the custom view name is "system". |

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
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System Management

| Item | Description |
| --- | --- |
| Version | For SNMP v2c, the custom community name is "snmp_v2c_group", and the default port number is 161. |
| Read & write permission | Read-only permission. |

- Configuration Steps

(1) In the global configuration interface, select v2c and set other settings as default. Then, click **Save**.

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.

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(2) **Visualized monitoring:** Map-based network monitoring provides a clear, intuitive overview of the entire network, projects, and links, with one-click alarm analysis. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=d48a89fb844a4795bf0f3967245597fd.

(3) **Batch configuration:** A template can be applied across multiple projects, eliminating the need for repetitive operations. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=586ede226ec04f0f9fe32ce1fdb34f56.

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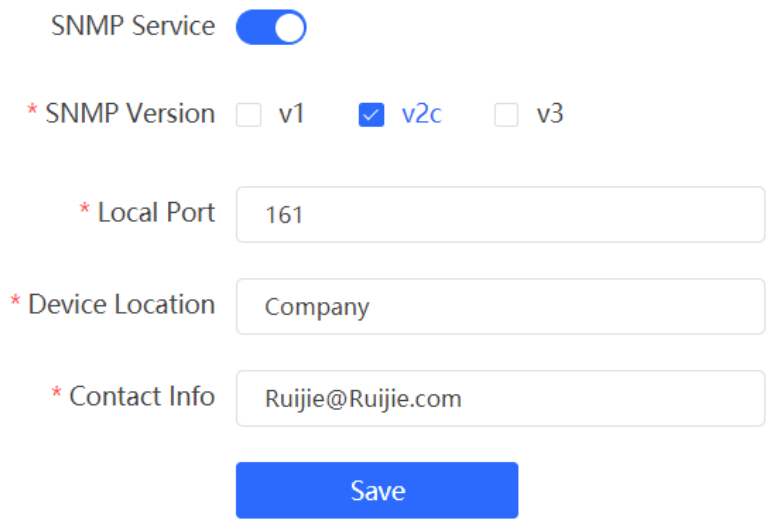
System Management




(2) Add a view on the **View/Group/Community/Client Access Control** interface.

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.
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System Management

a Click **Add** in the **View List** pane to add a view.

b Enter the view name and OID in the pop-up window, and click **Add Included Rule**.

# 1 Configuration Guide SD-WAN

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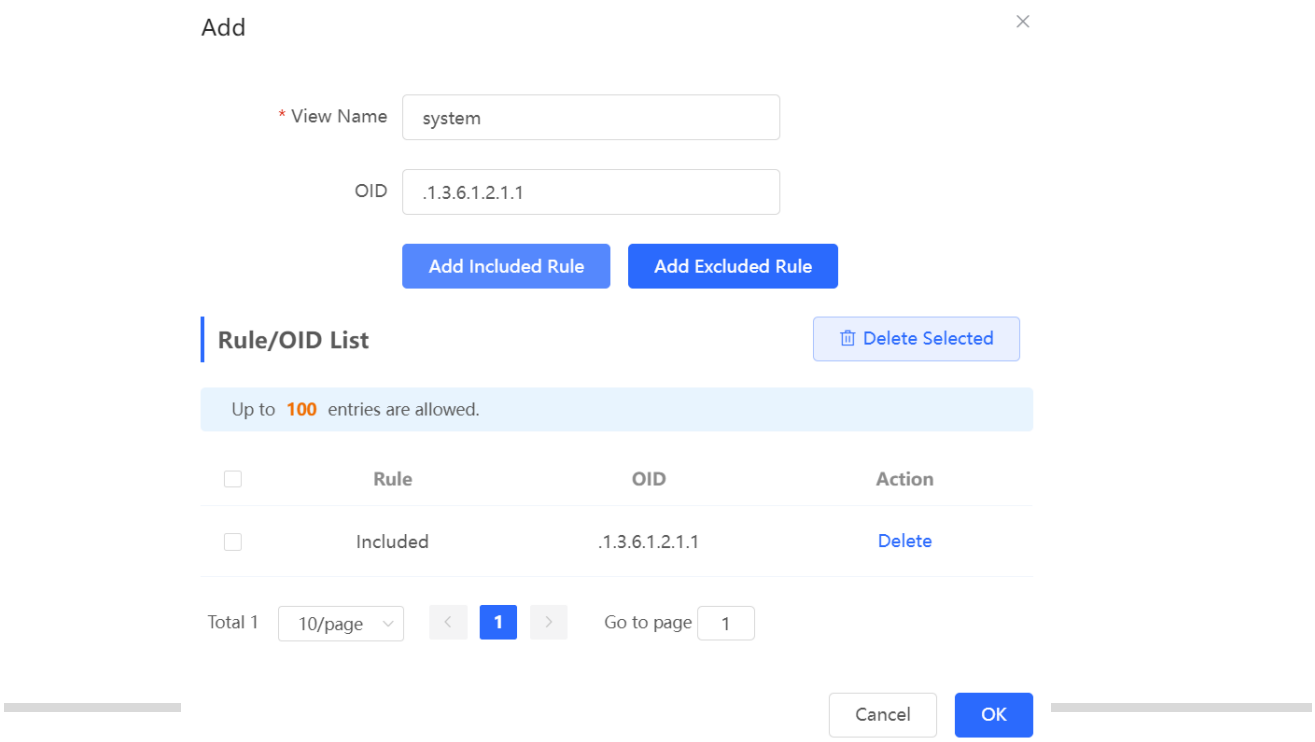
System Management



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c Click **OK**.

(3) On the View/Group/Community/Client Access Control interface, enter the SNMP v1/v2c community name.

a Click **Add** in the **SNMP v1/v2c Community Name List** pane.

b Enter the group name, access mode, and view in the pop-up window.

# 1 Configuration Guide SD-WAN

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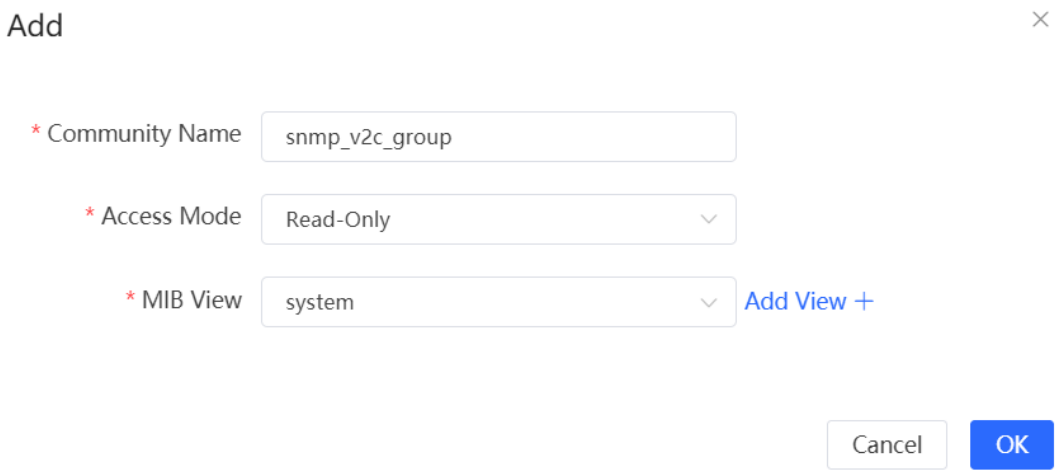


c Click **OK**.

# 1 Configuration Guide SD-WAN

**Specification**

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### 2. Configuring SNMP v3

- Application Scenario

You need to monitor and control devices, and use the third-party software to monitor and deliver device information to public nodes (1.3.6.1.2.1). The security level of v3 is authentication and encryption.

- Configuration Specification

According to the user's application scenario, the requirements are shown in the following table:

**Table 13-8 User Requirement Specification**

| Item | Description |
| --- | --- |
| View range | Included rule: the OID is .1.3.6.1.2.1, and the custom view name is "public_view". |

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

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System Management

| Item | Description |
| --- | --- |
| Group configuration | Group name: default_group<br>Security level: authentication and encryption<br>Select **public_view** for a read-only view.<br>Select **public_view** for a read & write view.<br>Select **none** for a notify view. |
| Configuring v3 Users | User name: snmp _v3_user<br>Group name: default_group<br>Security level: authentication and encryption<br>Authentication protocol/password: MD5/Ruijie123<br>Encryption protocol/password: AES/Ruijie123 |
| Version | For SNMP v3, the default port number is 161. |

# 1 Configuration Guide SD-WAN

**Specification**

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## System Management

- Configuration Steps

(1) On the global configuration interface, select v3, and change the port number to 161. Set other settings to defaults. Then, click **Save**.

# 1 Configuration Guide SD-WAN

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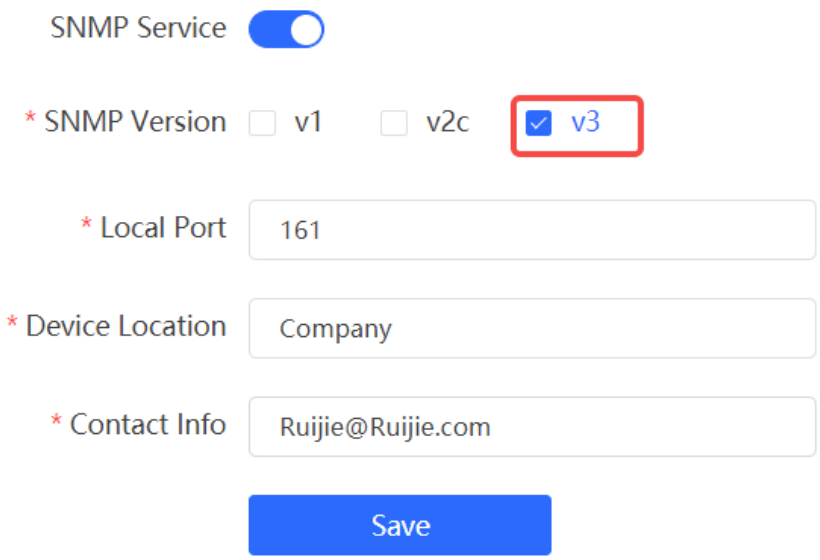
System Management




(2) Add a view on the **View/Group/Community/Client Access Control** interface.

# 1 Configuration Guide SD-WAN

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System Management

a Click **Add** in the **View List** pane.

b Enter the view name and OID in the pop-up window, and click **Add Included Rule**.

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.

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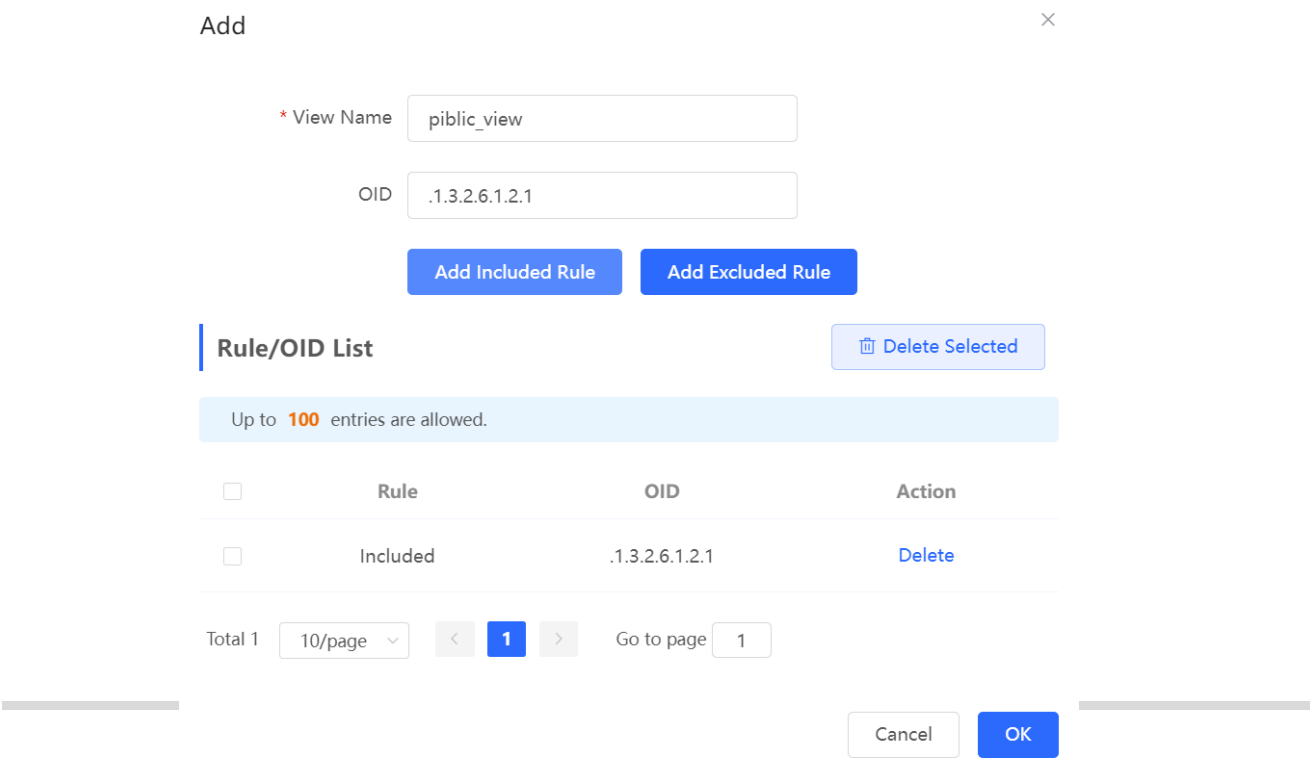
System Management



# 1 Configuration Guide SD-WAN

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c Click **OK**.

(3) On the View/Group/Community/Client Access Control interface, add an SNMP v3 group.

a Click **Add** in the **SNMP v3 Group List** pane.

b Enter the group name and security level on the pop-up window. As this user has read and write permissions, select public_view for read-only and read & write views, and select none for notify views.

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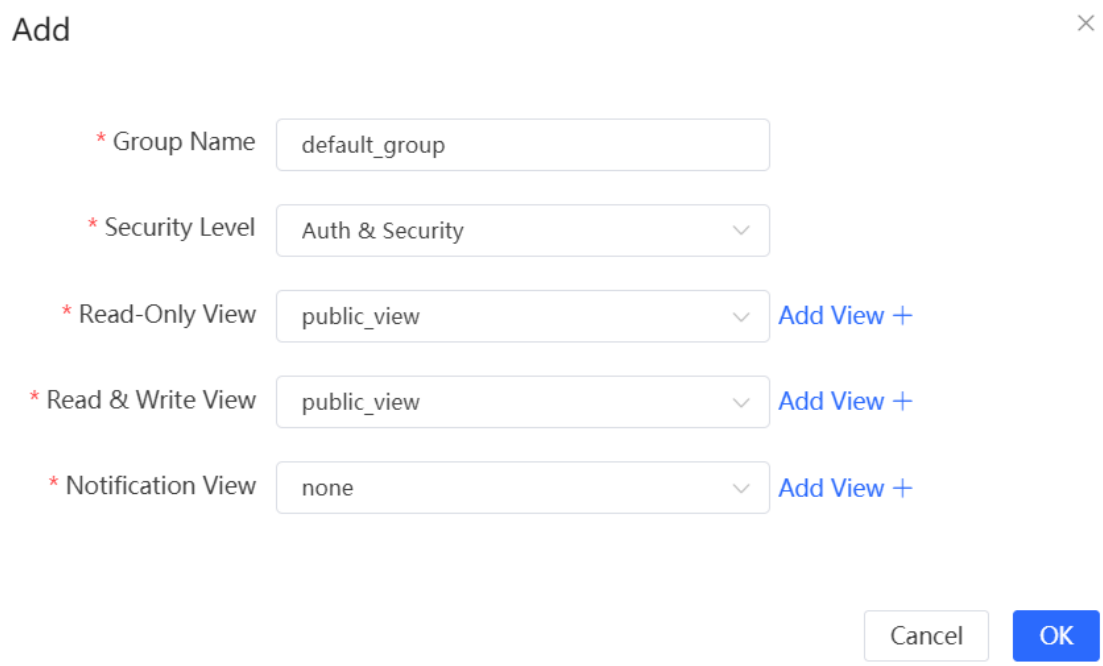

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c Click **OK**.

(4) On the View/Group/Community/Client Access Control interface, add an SNMP v3 user.

a Click Add in the SNMP v3 Client List pane.

b Enter the user name and group name in the pop-up window. As the user's security level is authentication and encryption, enter the authentication protocol, authentication password, encryption protocol, and encryption password.

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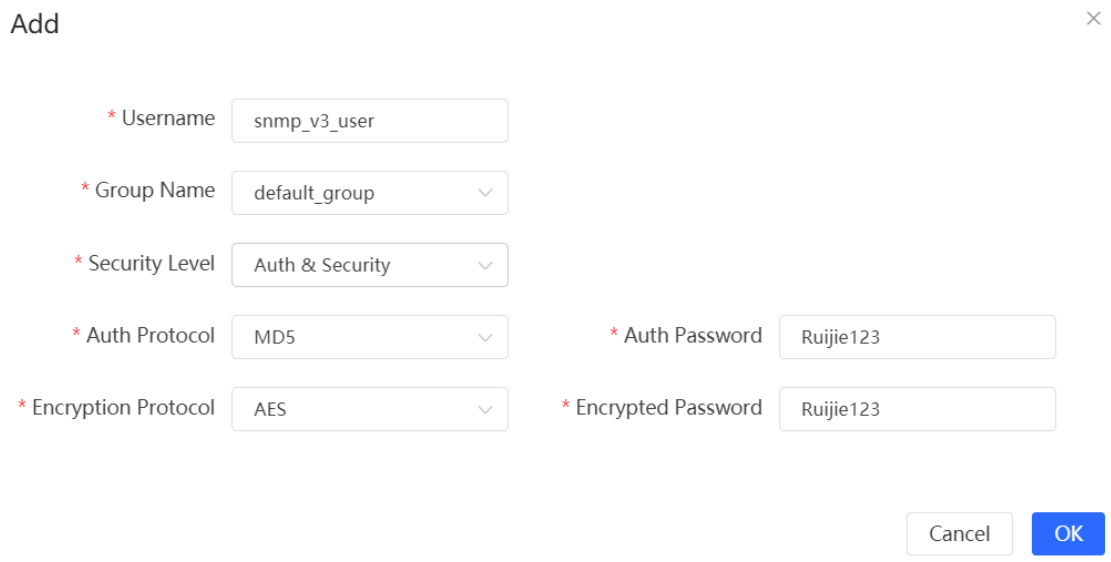


c Click **OK**.

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## 13.5.5 Configuring Trap Service

Trap is a notification mechanism of the Simple Network Management Protocol (SNMP) protocol. It is used to report the status and events of network devices to administrators, including device status, faults, performance, configuration, and security management. Trap provides real-time network monitoring and fault diagnosis services, helping administrators discover and solve network problems in a timely manner.

### 1. Enabling Trap Service

Enable the trap service and select the effective trap version, including v1, v2c, and v3 versions.

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **Trap Setting**

(1) Enable the trap service. When the trap service is enabled for the first time, the system will pop up a prompt message. Click **OK**.

# 1 Configuration Guide SD-WAN

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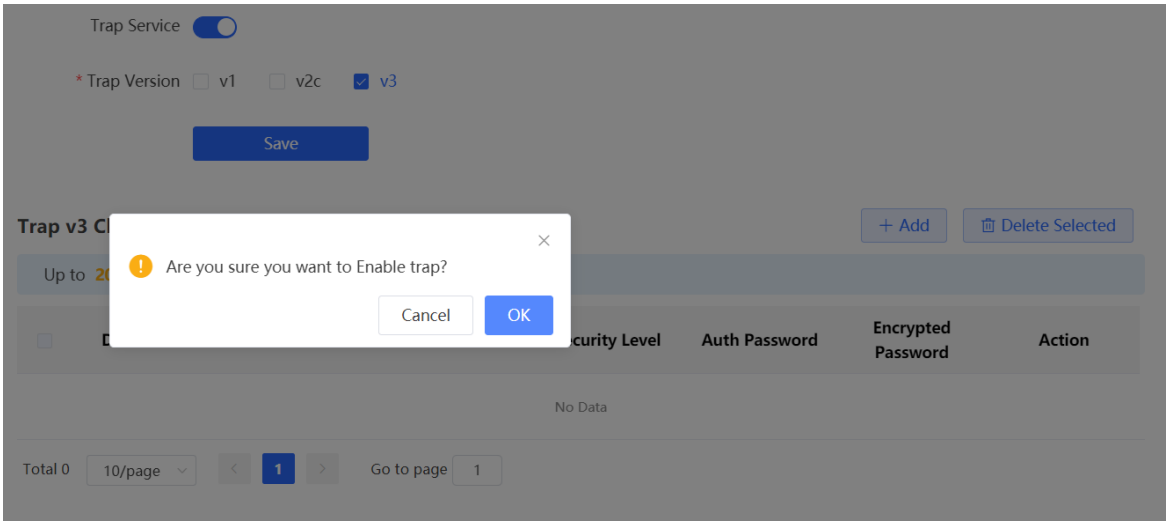
System Management




(2) Set the trap version. The trap versions include v1, v2c, and v3.

# 1 Configuration Guide SD-WAN

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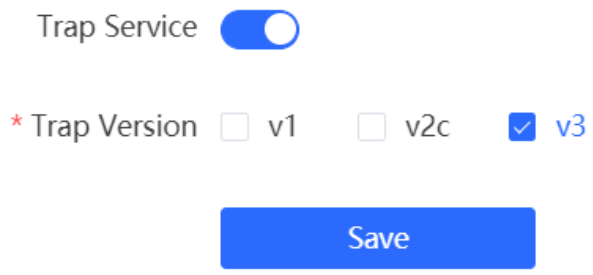


(3) After the trap service is enabled, click **Save** for the configuration to take effect.

### 2. Configuring Trap v1/v2c Users

- Overview

Trap is a notification mechanism that is used to send alerts to administrators when important events or failures occur on devices or services. Trap v1/v2c are two versions in the SNMP protocol for network management and monitoring.

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## System Management

Trap v1 is the first version that supports basic alert notification functionality. Trap v2c is the second version, which supports more alert notification options and advanced security features.

By using trap v1/v2c, administrators can promptly understand problems on the network and take corresponding measures.

- Prerequisites

Once trap v1 and v2c versions are selected, it is necessary to add trap v1v2c users.

- Procedure

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **Trap Setting**

(1) Click **Add** in the **Trap v1/v2c Client List** pane to add a trap v1/v2c user.

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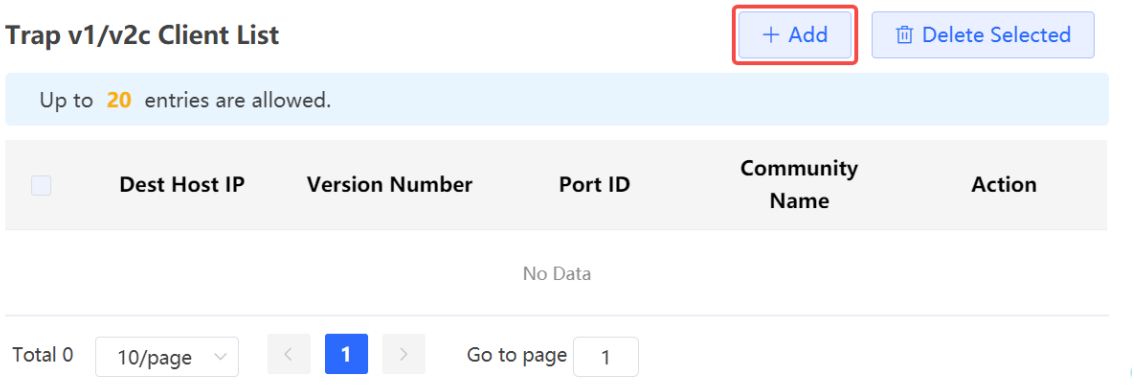


(2) Configure trap v1/v2c user parameters.

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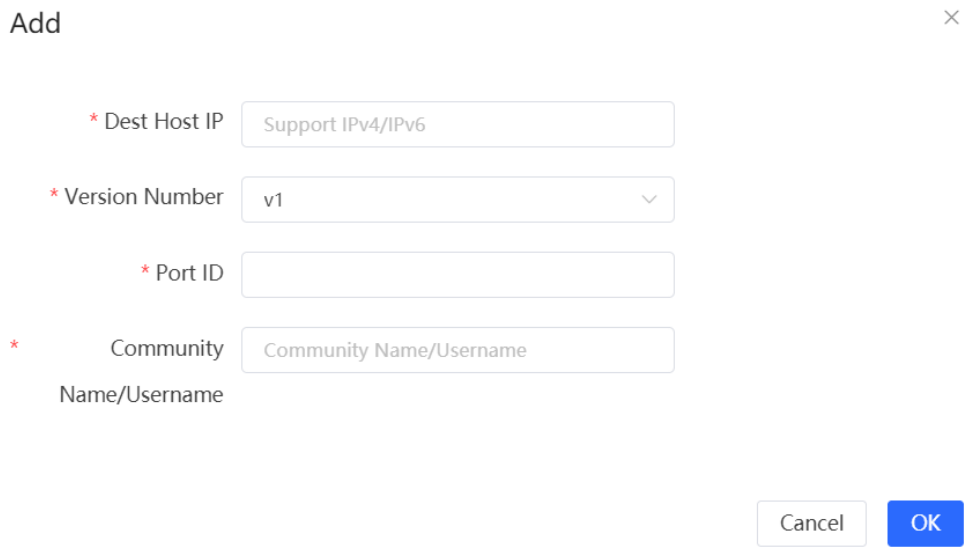

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System Management

**Table 13-9 Trap v1/v2c User Configuration Parameters**

| Parameter | Description |
|---|---|
| Dest Host IP | IP address of the trap peer device. An IPv4 or IPv6 address is supported. |
| Version Number | Trap version, including v1 and v2c. |
| Port ID | The port range of the trap peer device is 1 to 65535. |
| Community Name/User Name | Community name of the trap user.<br>● At least 8 characters.<br>● It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>● Admin, public or private community names are not allowed.<br>● Question marks, spaces, and Chinese characters are not allowed. |

**Note**

- The destination host IP address of trap v1/ v1/v2c users cannot be the same.

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- Community names of trap v1/ v1/v2c users cannot be the same.

(3) Click **OK**.

### 3. Configuring Trap v3 Users

- Overview

Trap v3 is a network management mechanism based on the SNMP protocol. It is used to send alert notifications to administrators. Unlike previous versions, trap v3 provides more secure and flexible configuration options, including authentication and encryption features.

Trap v3 offers custom conditions and methods for sending alerts, as well as the recipients and notification methods for receiving alerts. This enables administrators to have a more accurate understanding of the status of network devices and to take timely measures to ensure the security and reliability of the network.

- Prerequisites

When the v3 version is selected for the trap service, it is necessary to add a trap v3 user.

- Configuration Steps

# 1 Configuration Guide SD-WAN

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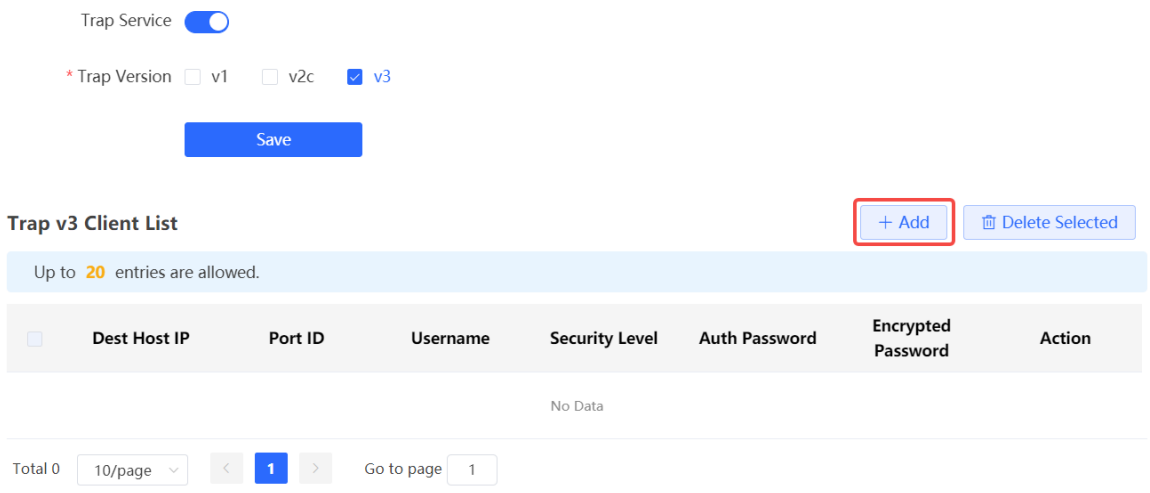
## System Management

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **SNMP** > **Trap Setting**

(1) Click **Add** in the **Trap v3 User** pane to add a trap v3 user.




(2) Configure trap v3 user parameters.

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.

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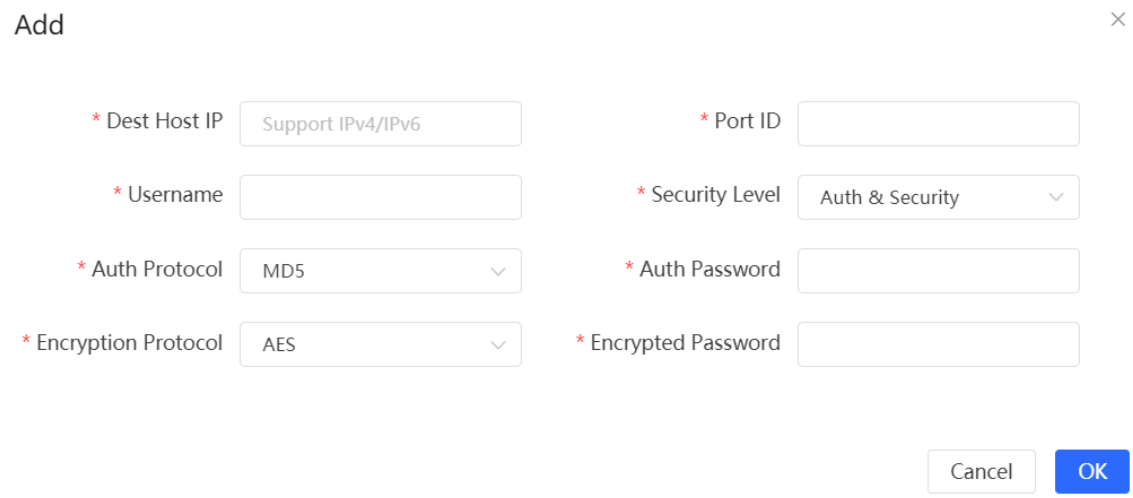
System Management



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System Management

**Table 13-10 Trap v3 User Configuration Parameters**

| Parameter | Description |
|---|---|
| Dest Host IP | IP address of the trap peer device. An IPv4 or IPv6 address is supported. |
| Port ID | The port range of the trap peer device is 1 to 65535. |
| Username | Name of the trap v3 user.<br>● At least 8 characters.<br>● It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>● Admin, public or private community names are not allowed.<br>● Question marks, spaces, and Chinese characters are not allowed. |
| Security Level | Indicates the security level of the trap v3 user. The security levels include authentication and encryption, authentication but no encryption, and no authentication and encryption. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| Auth Protocol, Auth Password | Authentication protocols supported: MD5/SHA/SHA224/SHA256/SHA384/SHA512.<br>Authentication password: 8-31 characters. Chinese characters, full-width characters, question marks, and spaces are not allowed. It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>Note: This parameter is mandatory when the security level is authentication and encryption, or authentication but no encryption. |

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System Management

| Parameter | Description |
| --- | --- |
| Encryption Protocol, Encryption Password | Encryption protocols supported: DES/AES/AES192/AES256.<br>Encryption password: 8-31 characters. Chinese characters, full-width characters, question marks, and spaces are not allowed.<br>It must contain at least three character categories, including uppercase and lowercase letters, digits, and special characters.<br>Note: This parameter is mandatory when the security level is authentication and encryption. |

**Note**

The destination host IP address of trap v1/ v1/v2c users cannot be the same.

# 1 Configuration Guide SD-WAN

**Specification**

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## 13.5.6 Trap Service Typical Configuration Examples

### 1. Configuring Trap v2c

- Application Scenarios

During device monitoring, if the device is suddenly disconnected or encounters an abnormality, and the third-party monitoring software cannot detect and handle the abnormal situation in a timely manner, you can configure the device with a destination IP address of 192.168.110.85 and a port number of 166 to enable the device to send a v2c trap in case of an abnormality.

- Configuration Specification

According to the user's application scenario, the requirements are shown in the following table:

**Table 13-11 User Requirement Specification**

| Item | Description |
| --- | --- |
| IP address and port number | The destination host IP is 192.168.110.85, and the port number is 166. |

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

| Item | Description |
|---|---|
| Version | Select the v2 version. |
| Community name/User name | Trap_user |

- Configuration Steps

(1) Select the v2c version in the **Trap Setting** interface and click **Save**.

# 1 Configuration Guide SD-WAN

**Specification**

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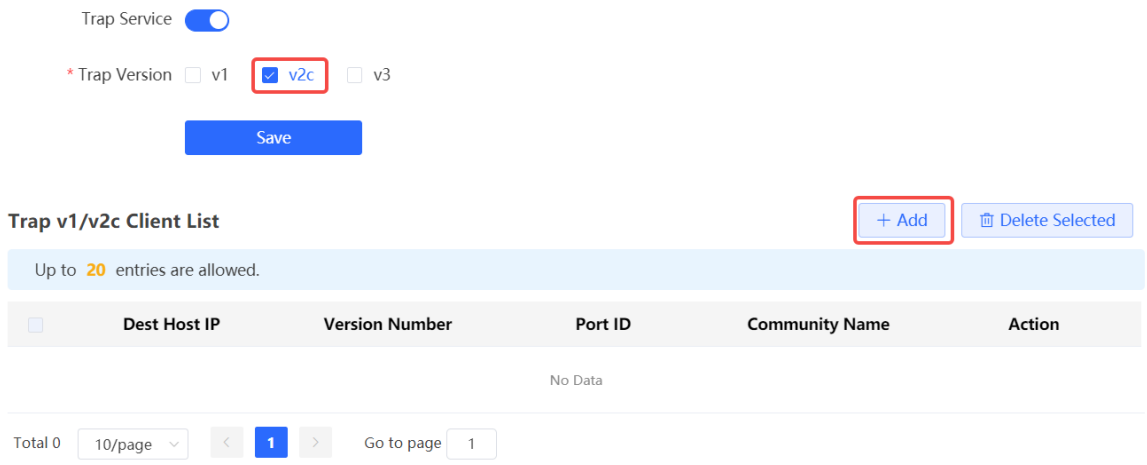
System Management




(2) Click **Add** in the Trap v1/v2c Client List to add a trap v2c user.

(3) Enter the destination host IP address, version, port number, user name, and other information. Then, click **OK**.

# 1 Configuration Guide SD-WAN

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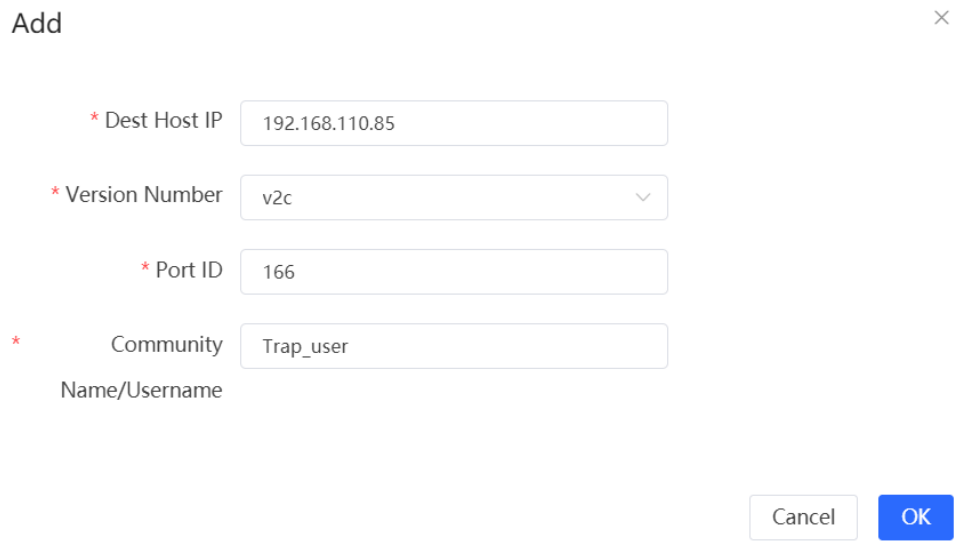


**2. Configuring Trap v3**

- Application Scenarios

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

During device monitoring, if the device is suddenly disconnected or encounters an abnormality, and the third-party monitoring software cannot detect and handle the abnormal situation in a timely manner, you can configure the device with a destination IP address of 192.168.110.87 and a port number of 167 to enable the device to send a v3 trap, which is a safer trap compared with v1/v2c traps.

- Configuration Specification

According to the user's application scenario, the requirements are shown in the following table:

**Table 13-12 User Requirement Specification**

| Item | Description |
| --- | --- |
| IP address and port number | The destination host IP is 192.168.110.87, and the port number is 167. |
| Version and user name | Select the v3 version and trapv3_user for the user name. |
| Authentication protocol/authentication password<br>Encryption protocol/encryption password | Authentication protocol/password: MD5/Ruijie123<br>Encryption protocol/password: AES/Ruijie123 |

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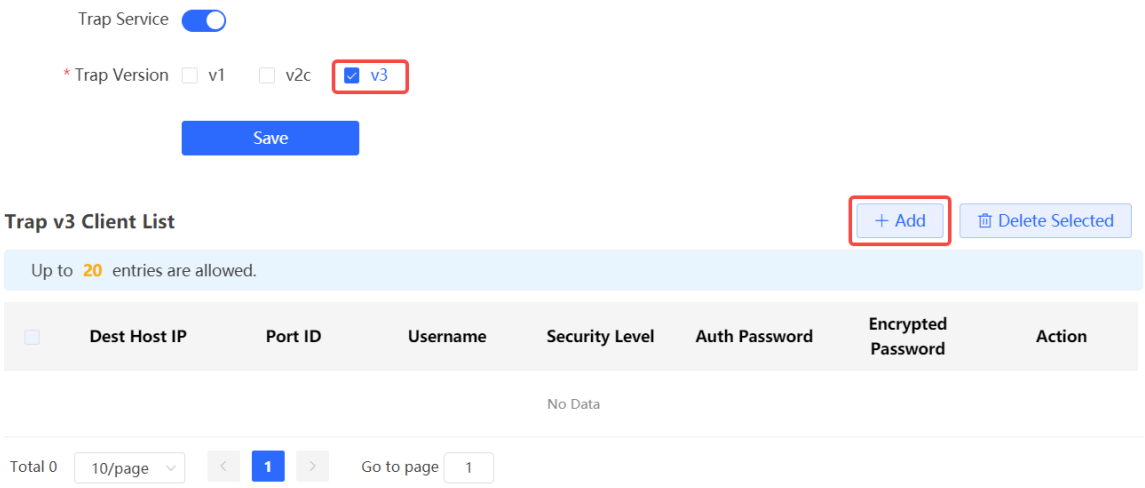
## System Management

- Configuration Steps

(1) Select the v3 version in the **Trap Setting** interface and click **Save**.



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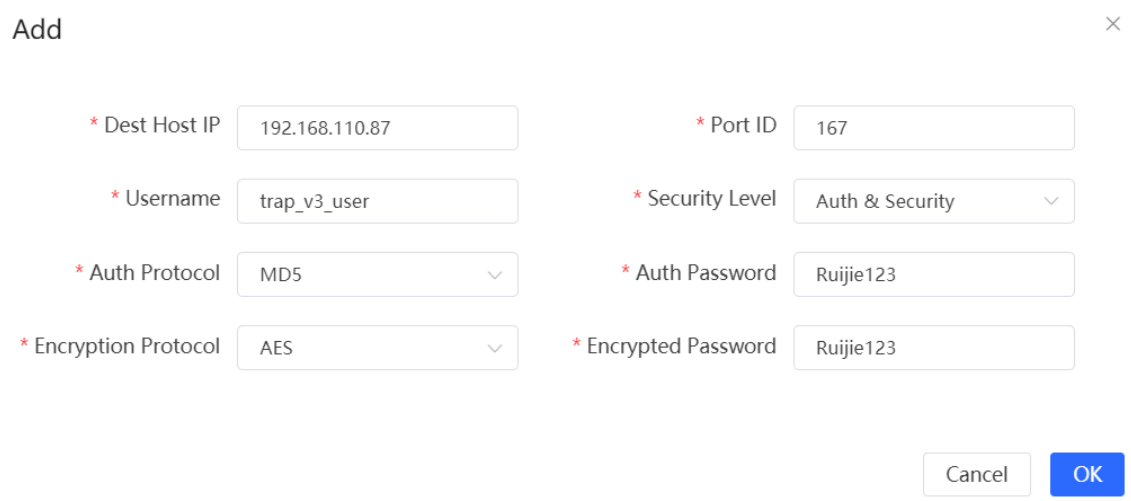
(2) Click **Add** in the Trap v3 Client List to add a trap v3 user.

(3) Enter the destination host IP address, port number, user name, and other information. Then, click **OK**.



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## 13.6 Configure IEEE 802.1X authentication

### 13.6.1 Overview

IEEE 802.1X is a port-based network access control standard that provides secure access services for LANs.

On an IEEE 802 LAN, a user can directly access network resources without authentication and authorization as long as it can connect to a network device. This uncontrolled behavior can bring security risks to the network. The IEEE 802.1X protocol was proposed to address the security issues on an IEEE 802 LAN.

The IEEE 802.1X protocol supports three security applications: Authentication, Authorization, and Accounting, abbreviated as AAA.

- Authentication: Determines whether a user can obtain access, and restricts unauthorized users.
- Authorization: Authorizes services available for authorized users, and controls the permissions of unauthorized users.
- Accounting: Records the usage of network resources by users, and provides a basis for traffic billing.

The 802.1X feature can be deployed on networks to control user authentication, authorization, and more.

# 1 Configuration Guide SD-WAN

**Specification**

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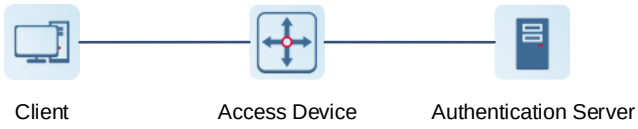
System Management

An 802.1X network uses a typical client/server architecture, consisting of three entities: client, access device, and authentication server. A typical architecture is shown here.

**Figure 13-1 Typical Architecture of 802.1X Network**




- The client is usually an endpoint device which can initiate 802.1X authentication through the client software. The client must support the Extensible Authentication Protocol over LANs (EAPoL) on the local area network.
- The access device is usually a network device (AP or switching device) that supports the IEEE 802.1X protocol. It provides an interface for clients to access the local area network, which can be a physical or a logical interface.

# 1 Configuration Guide SD-WAN

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**Note**

- The RG-EG gateway device itself does not support the IEEE 802.1X authentication, and can only serve as the primary device to support 802.1X global configuration and deliver the configuration to APs and switching devices on the entire network.
- To achieve IEEE 802.1X authentication, ensure that the network includes an AP or switching device.

- The authentication server can realize user authentication, authorization, and accounting. Usually a RADIUS server is used as the authentication server.

### 13.6.2 Configuring 802.1X Globally

The gateway device supports the 802.1X global configuration, and can synchronously deliver the configuration to APs and switching devices on the network.

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **802.1x Authentication** > **802.1x Authentication.**

(1) Click the **802.1x Authentication** tab to configure global configuration for 802.1x wireless authentication.

(2) Select the authentication device group, and enable the global 802.1x authentication.

# 1 Configuration Guide SD-WAN

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System Management

You will be prompted to enable this feature or not. Click **OK**.

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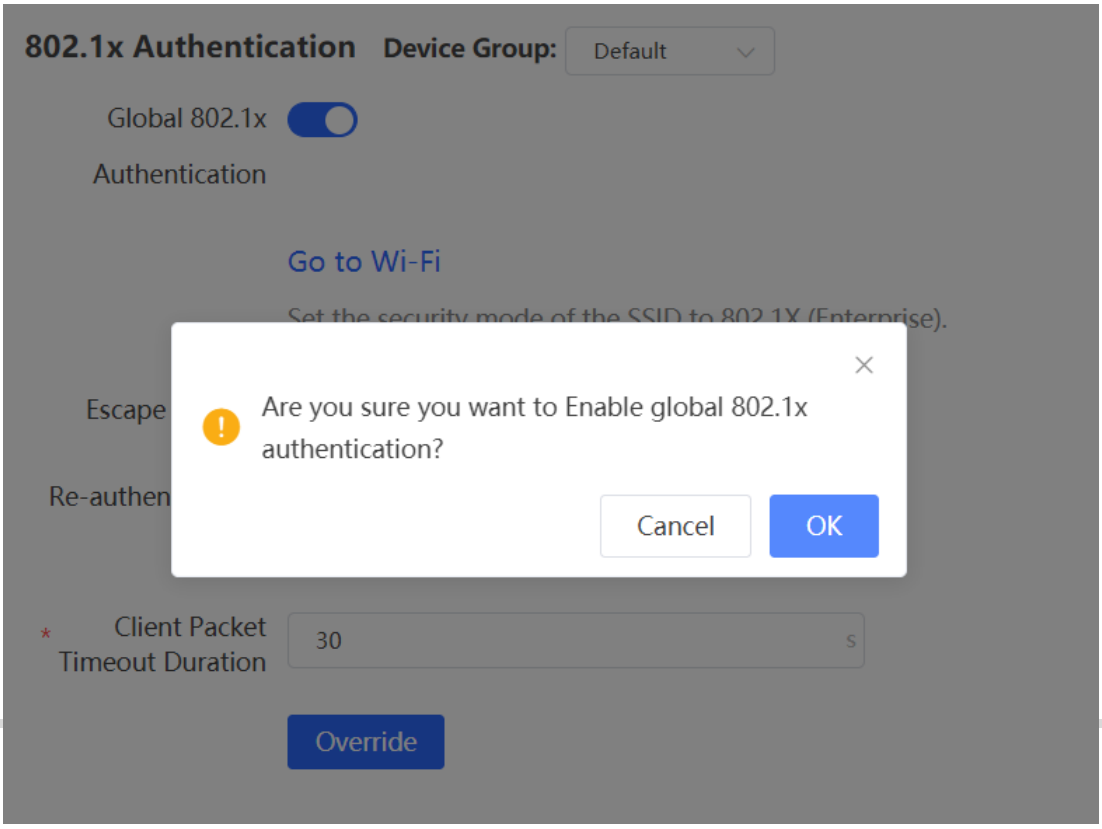

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System Management

(3) Click **Go to Wi-Fi,** and set the encryption method of SSID to **802.1x (Enterprise)**.

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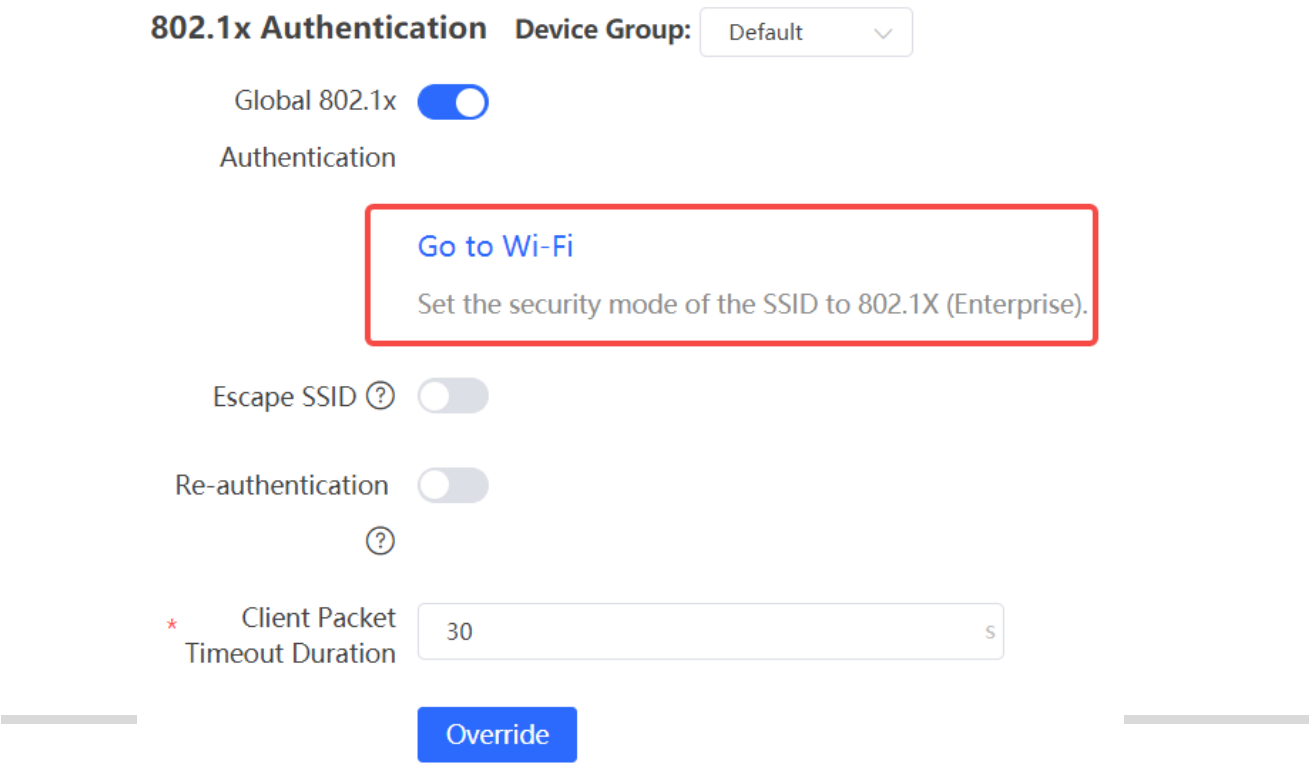

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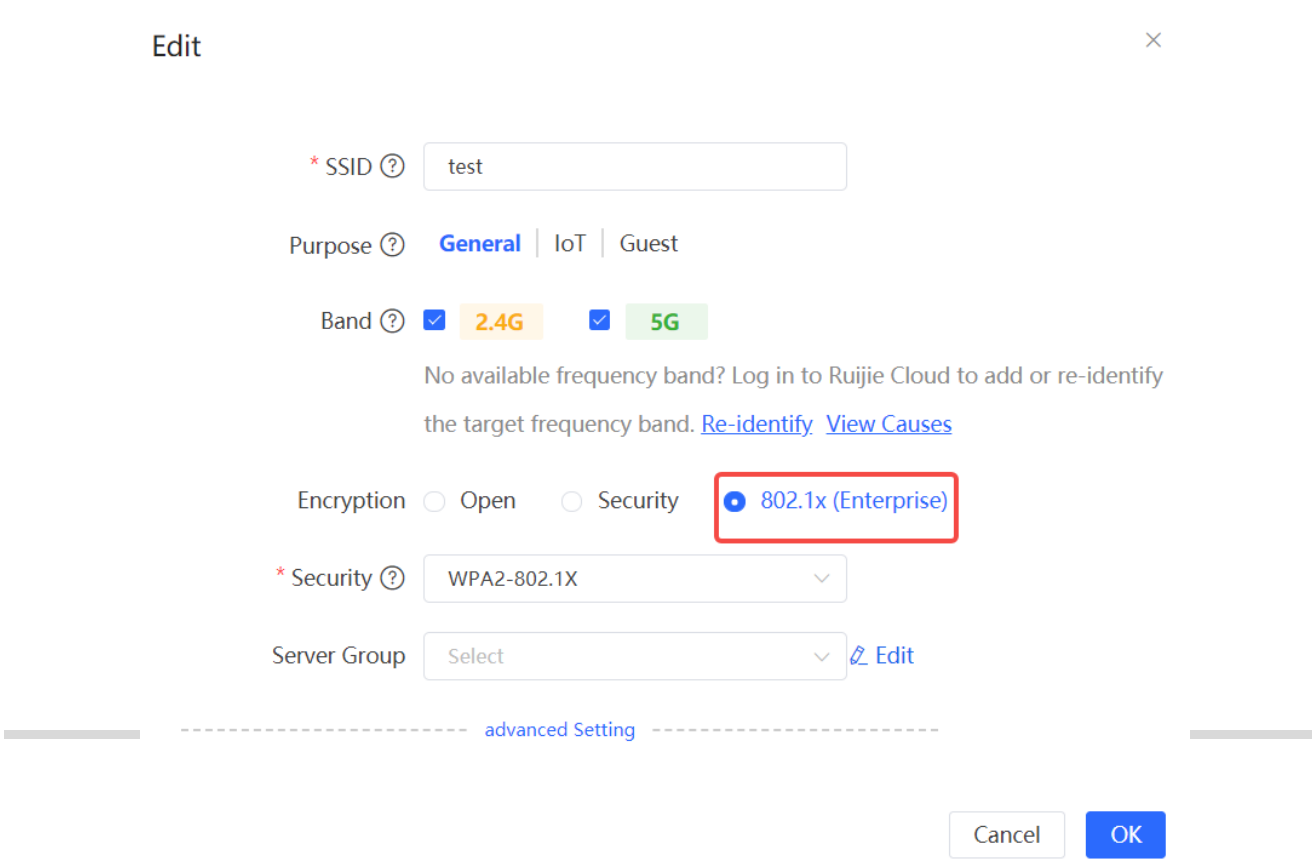

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System Management

(4) Configure global parameters.

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System Management

**Table 13-13 Description of Global 802.1x Authentication Configuration**

| Parameter | Description |
| --- | --- |
| Escape SSID | Once this feature is enabled, when the authentication server is unavailable, the system will create a temporary Wi-Fi network for users.<br>If this function is enabled, it is necessary to set the Escape SSID, encryption type, and Wi-Fi password. |
| Re-authentication | Once this feature is enabled, the system regularly re-authenticates users. Users who do not match the information on the server will be automatically disconnected.<br>If this function is enabled, it is necessary to set the re-authentication cycle, which is 21600 seconds by default. |

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System Management

| Parameter | Description |
| --- | --- |
| Client Packet Timeout Duration | The timeout period during which the client waits for a response from the authentication server. If this timer expires, authentication is considered failed. The value range is 10 seconds to 60 seconds. The default value is 30 seconds. |

(5) Click **Override**.

### 13.6.3 Configuring the RADIUS Server

#### 1. Prerequisites

Before configuration, ensure that the RADIUS server is ready, and that the IP address and shared key of the RADIUS server are configured.

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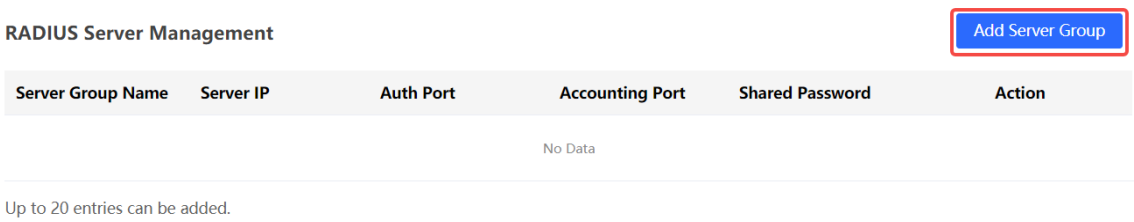
## 2. Configuration Steps

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **802.1x Authentication** > **RADIUS Server Management.**

(1) Click the **RADIUS Server Management** tab.

(2) Click **Add Server Group** to configure related server parameters.



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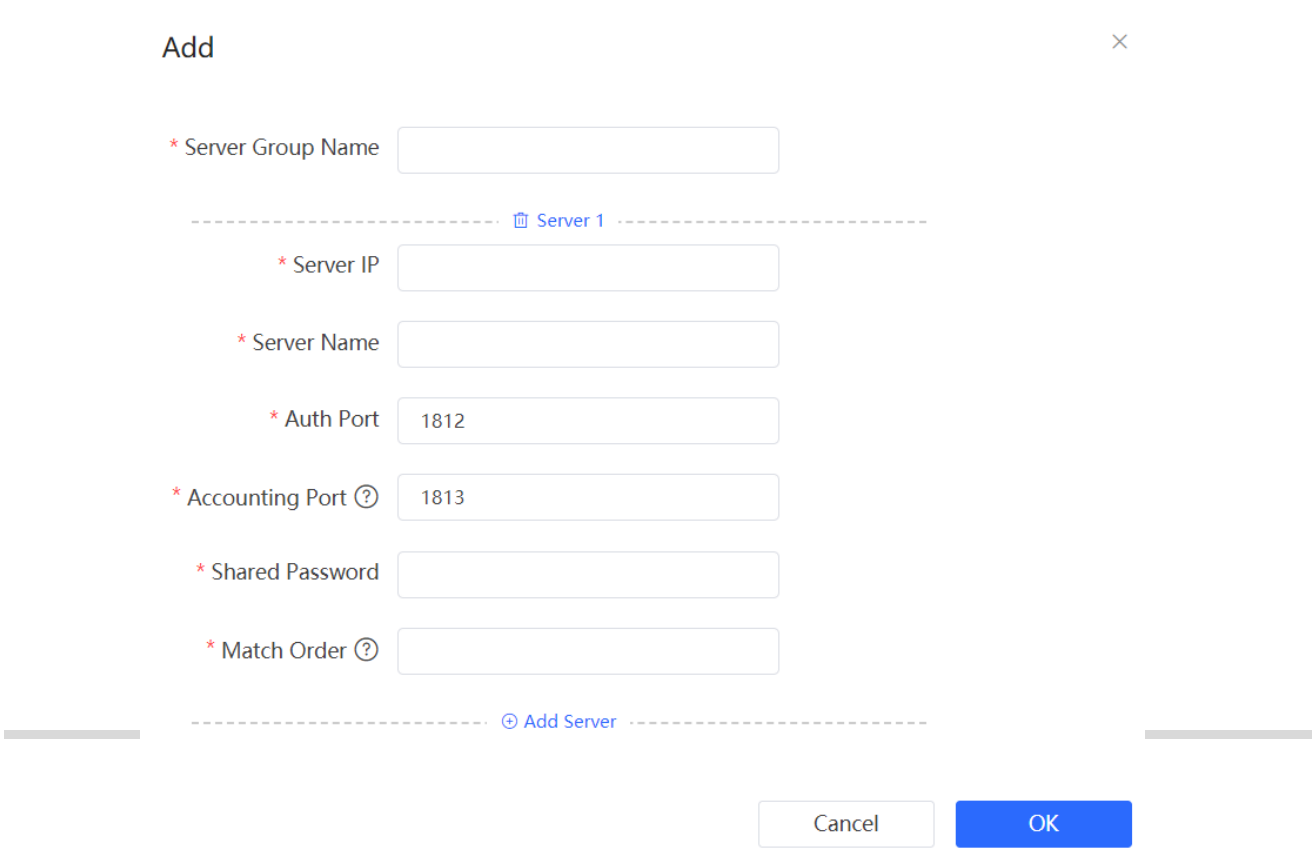

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System Management

**Table 13-14 Description of RADIUS Server Management Configuration**

| Parameter | Description |
|---|---|
| Server IP | IP address of the RADIUS server. |
| Auth Port | The port number for the RADIUS server to perform user authentication. |
| Accounting Port | The port number for the RADIUS server to perform user accounting. |
| Shared Password | Shared key of the RADIUS server. |
| Match Order | The system supports up to five RADIUS servers. A larger value indicates a higher priority. |

(3) Enter the server global configuration parameters, and click **Save**.

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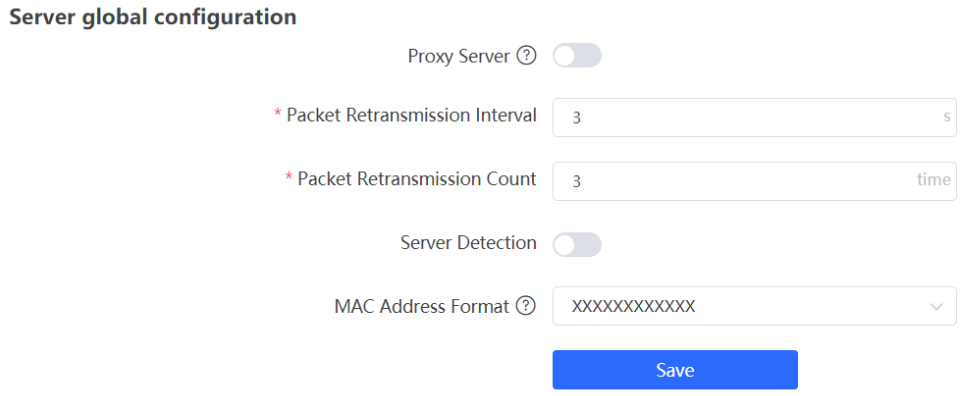


**Table 13-15 Description of Server Global Configuration**

| Parameter | Description |
|---|---|
| Proxy Server | After this function is enabled, local device will act as a proxy for the RADIUS server to send RADIUS messages. |

# 1 Configuration Guide SD-WAN

**Specification**

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System Management

| Parameter | Description |
| --- | --- |
| Packet Retransmission Interval | Configure the interval during which the device sends a request to a RADIUS server before confirming that the RADIUS server is unreachable. |
| Packet Retransmission Count | Configure the number of times that the device sends requests to a RADIUS server before confirming that the RADIUS server is unreachable. |
| Server Detection | If this function is enabled, it is necessary to set the server detection cycle, server detection times, and server detection username. Determines the server status and whether to enable functions such as the escape function. |

# 1 Configuration Guide SD-WAN

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System Management

| Parameter | Description |
| --- | --- |
| MAC Address Format | Configure the format of the MAC address used in attribute 31 (**Calling-Station-ID**) of a RADIUS message.<br>The following formats are supported:<br>● Dotted hexadecimal format. For example, 00d0.f8aa.bbcc.<br>● IETF format. For example: 00-D0-F8-AA-BB-CC.<br>● Unformatted (default). For example: 00d0f8aabbcc |

## 13.6.4 Checking Authentication User List

When the 802.1x feature is configured on the entire network, and a terminal is authenticated and connected to the network, you can view the list of authenticated users.

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **802.1x Authentication** > **Wireless User List/ Wired User List.**

Click **Wireless User List** or **Wired User List** to view specific user information.

# 1 Configuration Guide SD-WAN

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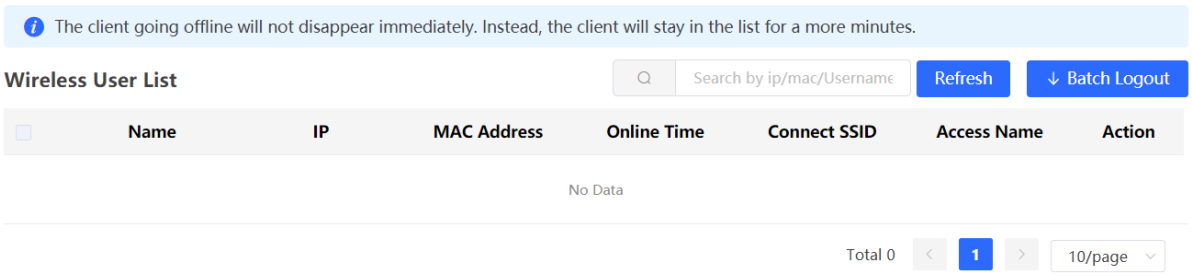
System Management




Click **Refresh** to view the latest user list.

If you want to disconnect a user from the network, select the user and click **Logout** under the **Action** column. You can also select multiple users and click **Batch Logout** to disconnect selected users.

# 1 Configuration Guide SD-WAN

**Specification**

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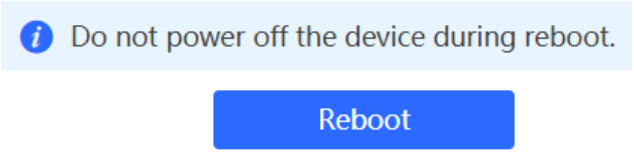
## 13.7 Configuring Reboot

### 13.7.1 Rebooting the Current Device

Choose **One-Device** > **Gateway** > **Config** > **System** > **Reboot** > **Reboot**.

Click **Reboot**, and the device will be restarted. Please do not refresh or close the page during the reboot process. After the device is rebooted, the browser will be redirected to the login page.




### 13.7.2 Rebooting All Devices in the Network

Choose **Network-wide** > **System** > **Reboot** > **Reboot**.

Select **All Devices**, and click **Reboot All Device** to reboot all devices in the current network.

# 1 Configuration Guide SD-WAN

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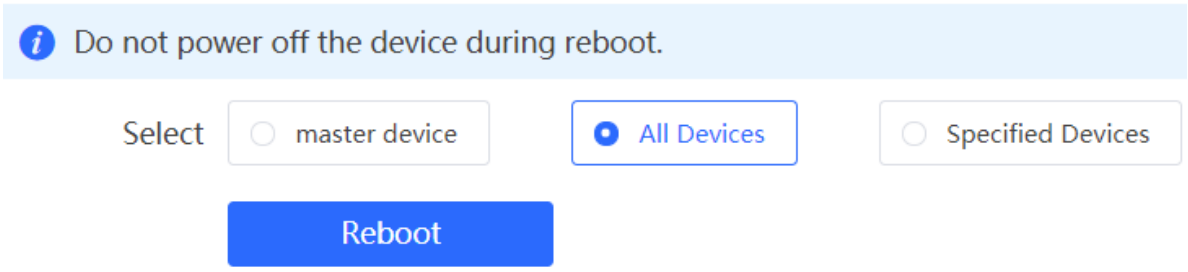
System Management




**Caution**

The operation takes some time and affects the whole network. Therefore, exercise caution when performing this operation.

### 13.7.3 Rebooting the Specified Device

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **Reboot** > **Reboot**.

# 1 Configuration Guide SD-WAN

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System Management

Select the required devices from the list and click **Reboot**.

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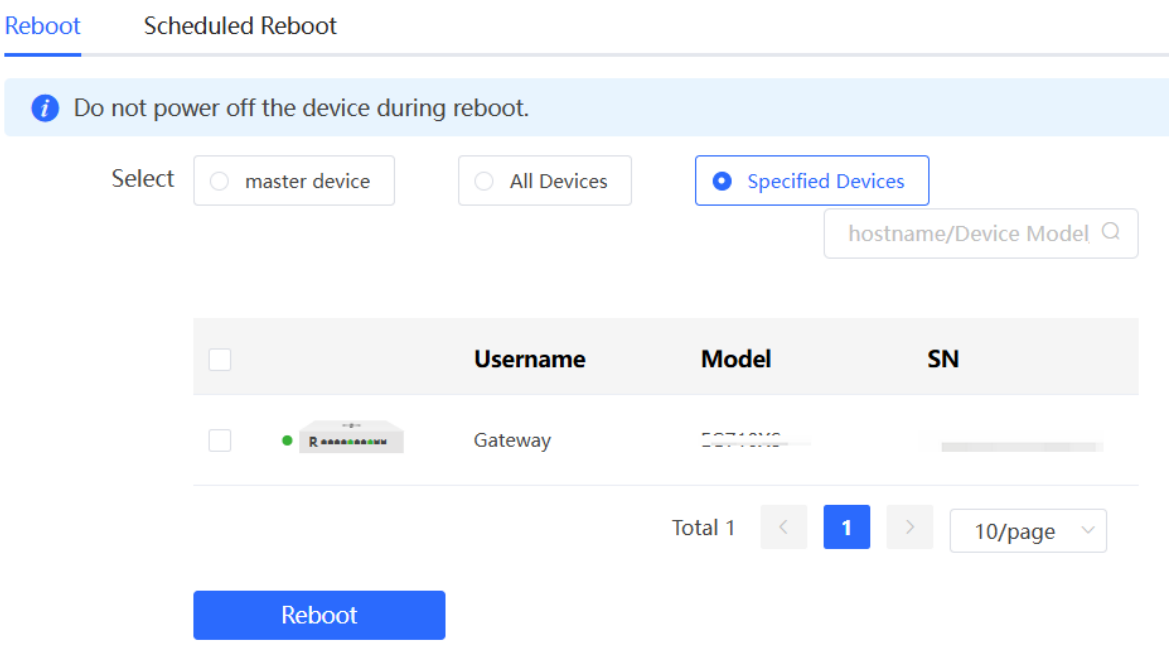
System Management



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## 13.8 Configuring Scheduled Reboot

Confirm that the system time is accurate to avoid network interruption caused by device reboot at wrong time. For details about how to configure the system time, see Section 13.9 Setting and Displaying System Time.

Choose **Network-Wide** > **Workspace** > **Network-Wide** > **Reboot** > **Scheduled Reboot**.

Turn on **Enable**, and select the date and time of scheduled reboot every week. Click **Save**. When the system time matches the scheduled reboot time, the device will restart. You are advised to set scheduled reboot time to off-peak hours.

**Caution**

The operation affects the whole network. Therefore, exercise caution when performing this operation.

# 1 Configuration Guide SD-WAN

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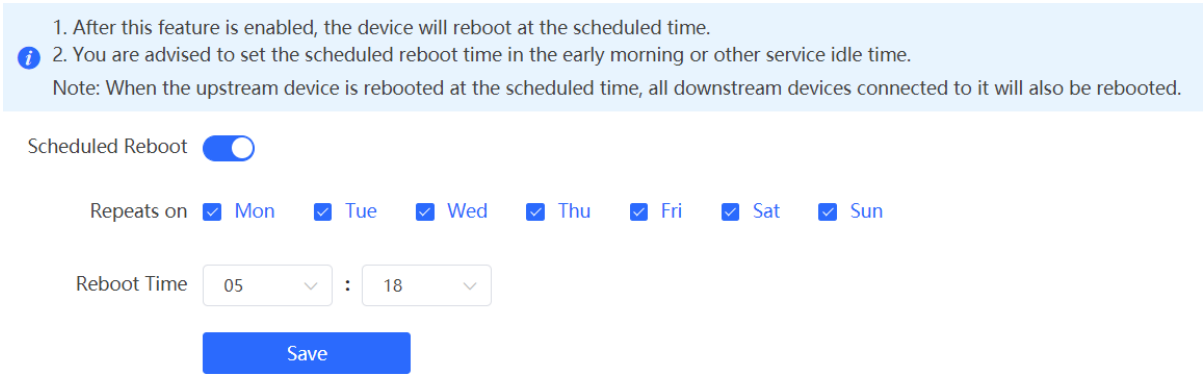
System Management




## 13.9 Setting and Displaying System Time

Choose **Network-Wide** > **System** > **System Time**.

You can view the current system time. If the time is incorrect, check and select the local time zone. If the time zone is correct but time is still incorrect, click **Edit** to manually set the time. In addition, the device supports

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## System Management

Network Time Protocol (NTP) servers. By default, multiple servers serve as the backup of each other. You can add or delete the local server as required.

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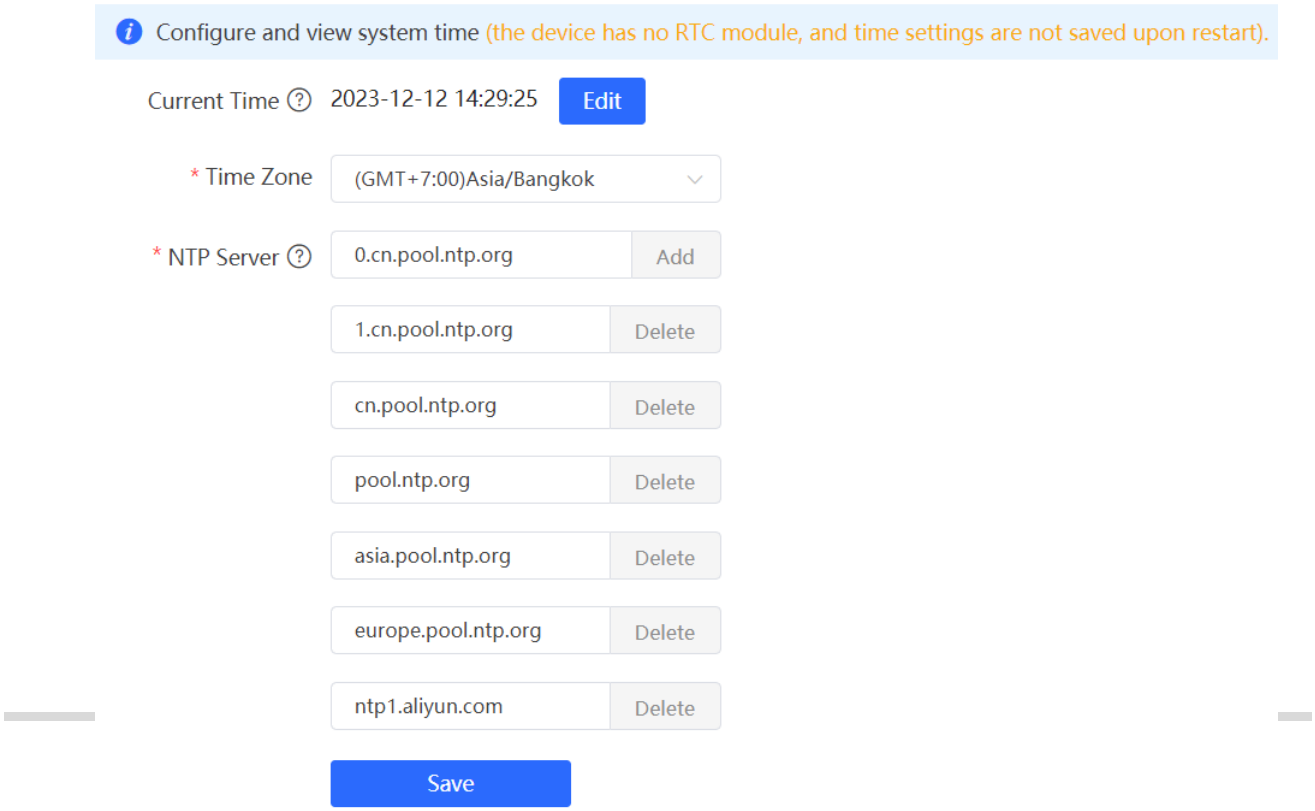

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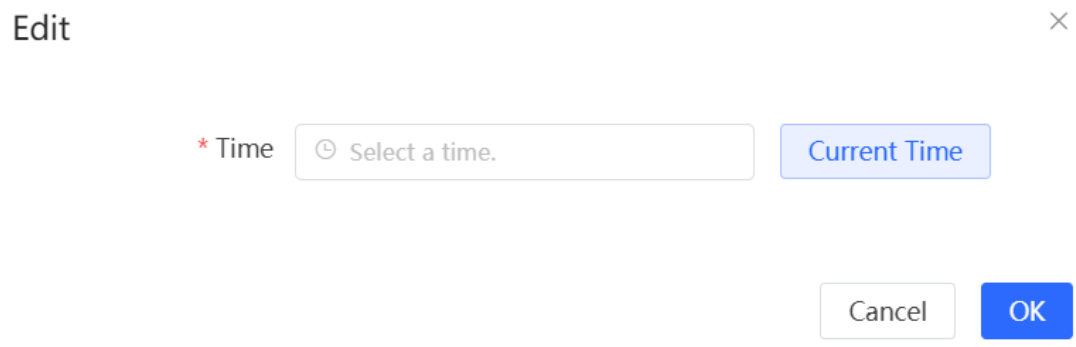
System Management

Click **Current Time**, and the current system time will be filled in automatically.




## 13.10 Configuring Backup and Import

Choose **Network-Wide** > **System** > **Backup & Import**.

Configuration backup: Click **Backup** to download a configuration file locally.

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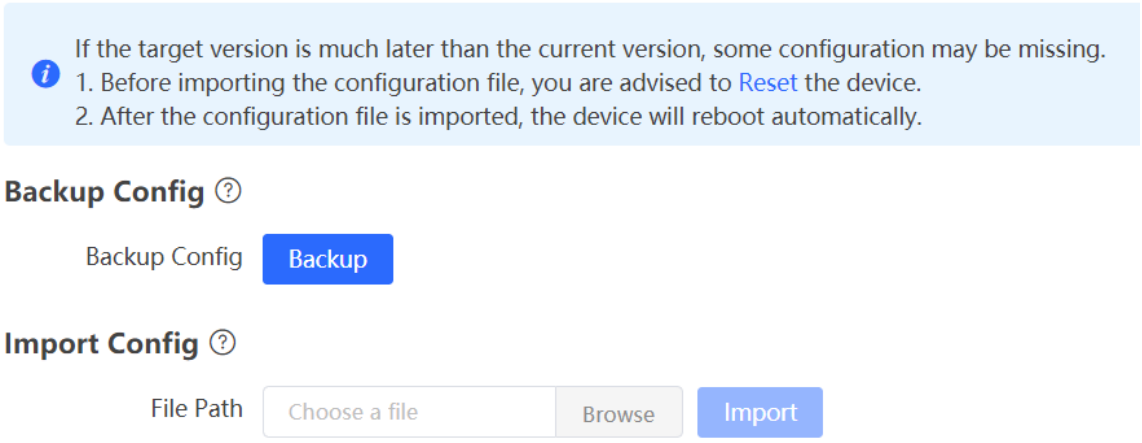
System Management

Configuration import: Click **Browse**, select a backup file on the local PC, and click **Import** to import the configuration file. The device will restart.




## 13.11 Configuring LEDs

Choose **Network-Wide** > **Workspace** > **Wireless > LED**.

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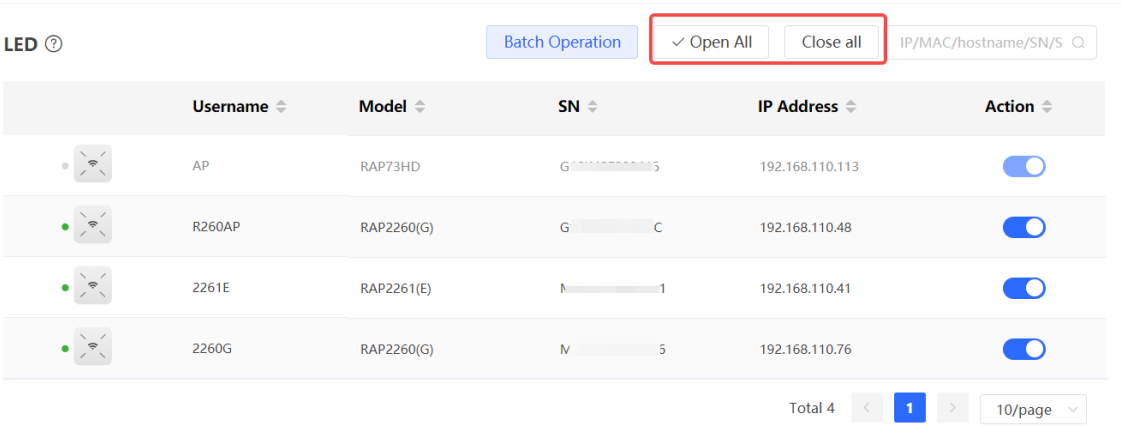
## System Management

- Configuring the LED status of network-wide APs

  Click **Open All** or **Close All** to enable or disable the LEDs of all APs on the network.




- Configuring the LED status of selected APs

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

Small and medium-sized chain businesses usually require service interconnectivity between their headquarters and branch offices for purposes such as supervision, information tracking, and video conferencing. These services demand high real-time performance and reliability. Moreover, pre-configuration and batch configuration features are often necessary during project deployment, in order to improve network deployment efficiency.

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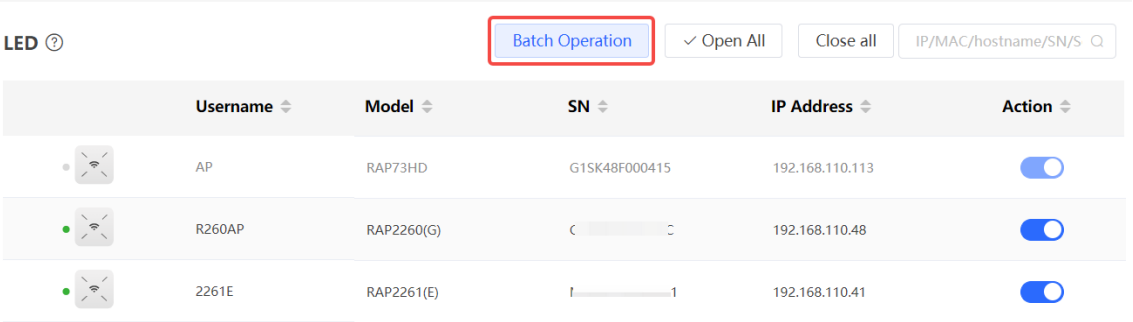
System Management

Click **Batch Operation**, select the desired APs, and click **Open Selected** or **Close Selected** to enable or disable the LED status of the selected APs.



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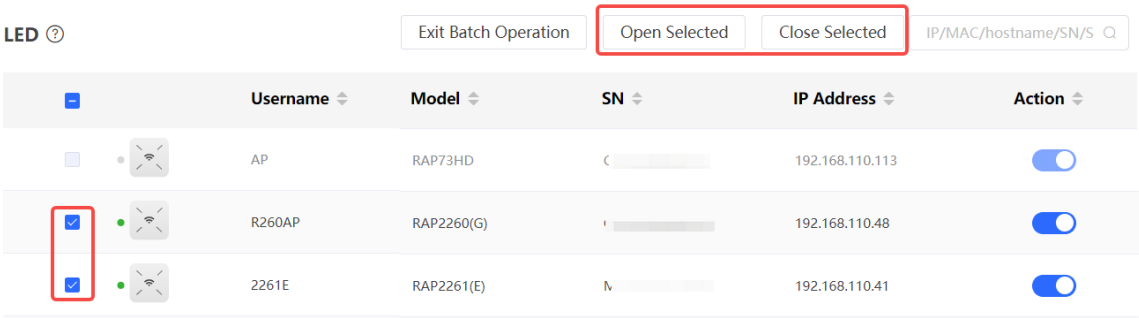
System Management




- Configuring the LED status of a single AP

  Toggle on or off the switch in the **Action** column to enable or disable the LED status of the corresponding AP.

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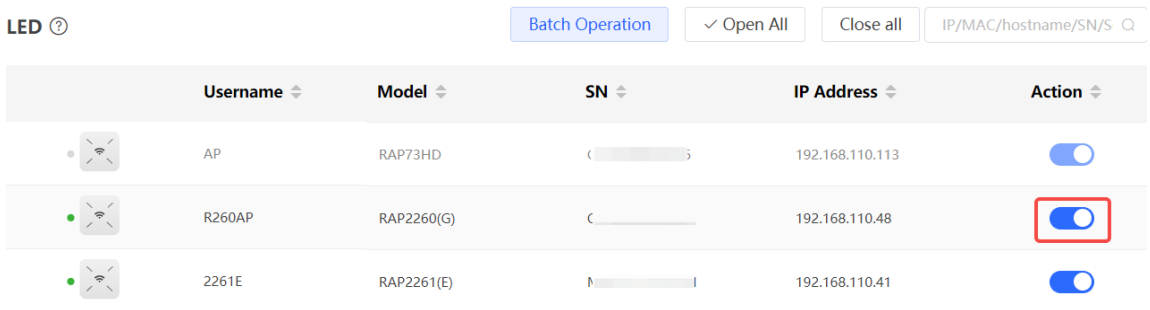


## 13.12 Configuring Diagnostics

### 13.12.1 Network Check

When a network error occurs, perform **Network Check** to identify the fault and take the suggested action.

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Network Check**.

Click **Start** to perform the network check and show the result.

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System Management

Start

# 1 Configuration Guide SD-WAN

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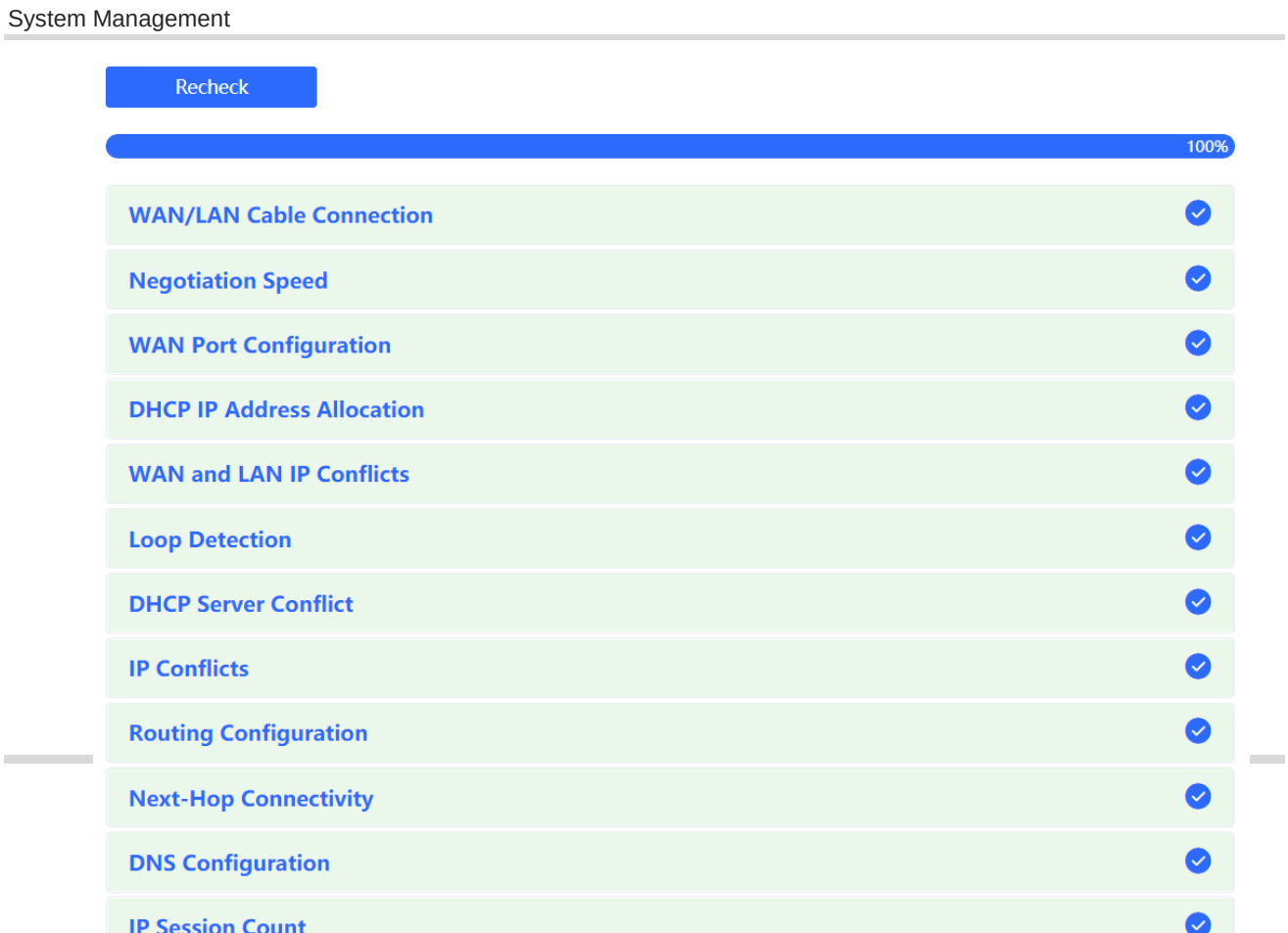

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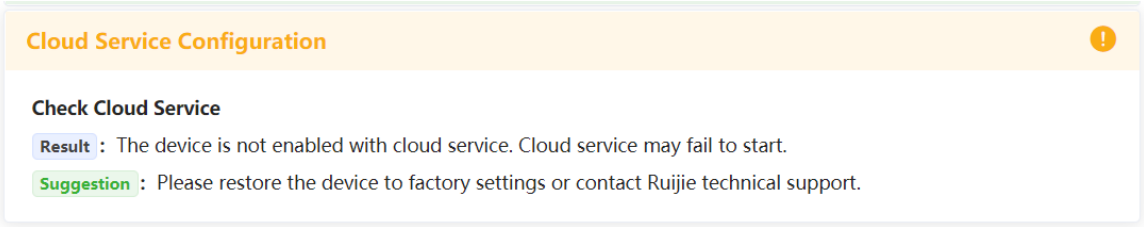
System Management

If a network error occurs, its symptom and suggested action will be displayed.




## 13.12.2 Alerts

Click **Alert Center** in the navigation bar.

The **Alert List** page displays possible problems on the network environment and device. All types of alerts are followed by default. You can click **Unfollow** in the **Action** column to unfollow this type of alert.

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System Management

**Caution**

After unfollowing a specified alert type, you will not discover and process all alerts of this type promptly. Therefore, exercise caution when performing this operation.




Click **View Unfollowed Alert** to view the unfollowed alert. You can follow the alert again in the pop-up window.

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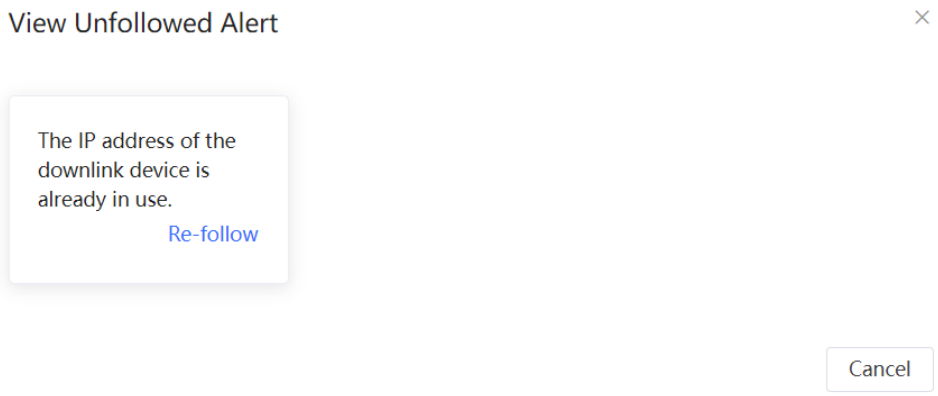


## 13.12.3 Network Tools

### 1. Ping

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Network Tools**.

# 1 Configuration Guide SD-WAN

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## System Management

The **Ping** command is used to detect the network connectivity.

Select **Ping** as the diagnosis mode, select the IP type, enter the destination IP address or website address, configure the ping count and packet size, and click **Start** to test the network connectivity between the device and the IP address or website. If "Ping failed" is displayed, the device is not reachable to the IP address or website.

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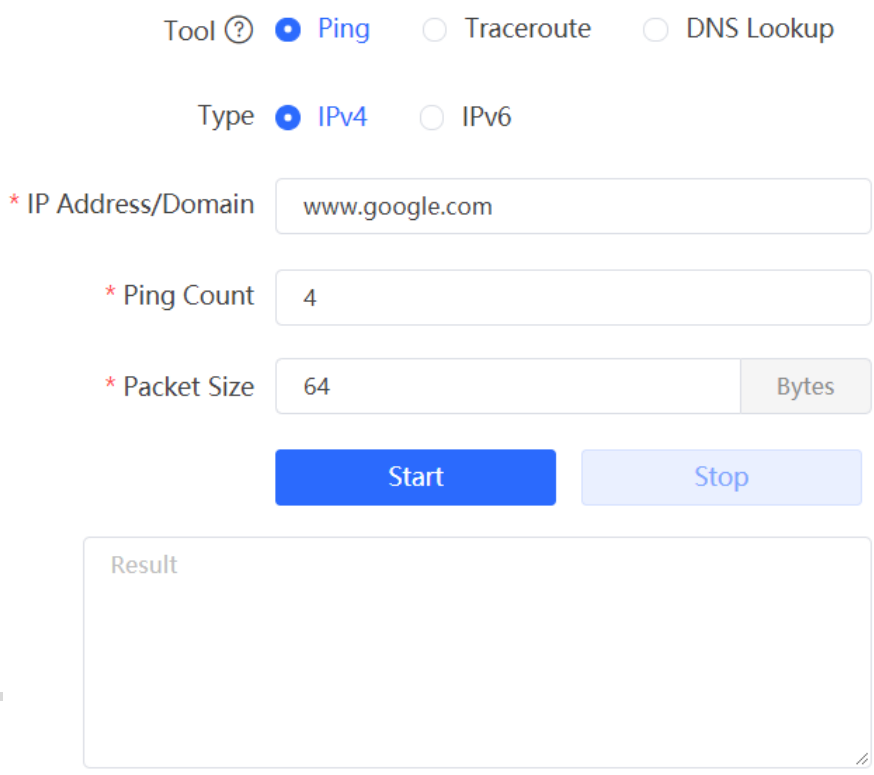

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### 2. Traceroute

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Network Tools**.

The **Traceroute** function is used to identify the network path from one device to another. On a simple network, the network path may pass through only one routing node or none at all. On a complex network, packets may pass through dozens of routing nodes before reaching their destination. The traceroute function can be used to judge the transmission path of data packets during communication.

Select **Traceroute** as the diagnosis mode, select the IP type, and enter a destination IP address or the maximum TTL value used by the URL and traceroute, and click **Start**.

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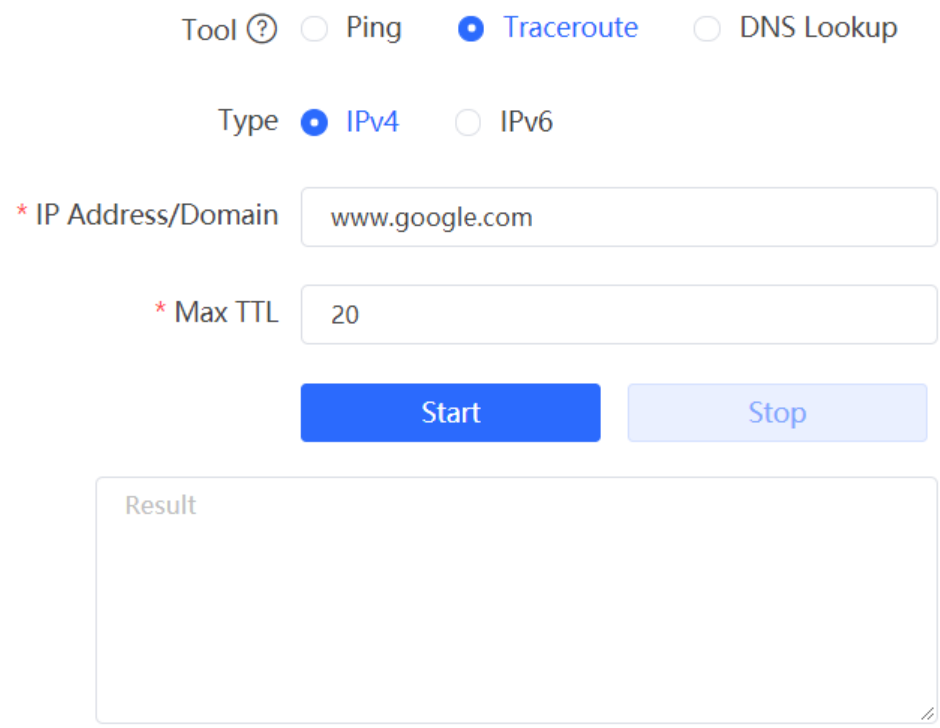

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### 3. DNS Lookup

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Network Tools**.

DNS Lookup is used to query the information of network domain name or diagnose DNS server problems. If the device can ping through the IP address of the Internet from your web page but the browser cannot open the web page, you can use the DNS lookup function to check whether domain name resolution is normal.

Select **DNS Lookup** as the diagnosis mode, enter a destination IP address or URL, and click **Start**.

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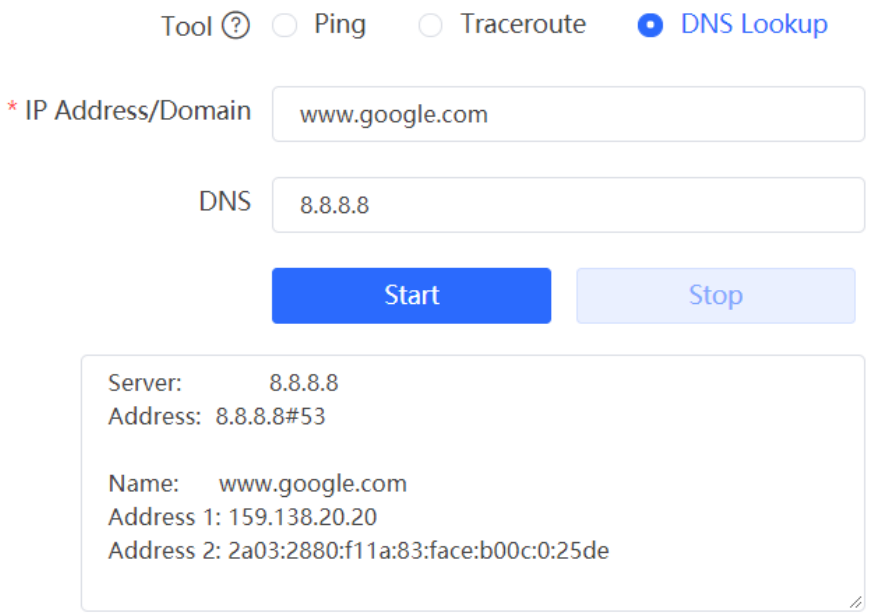

# 1 Configuration Guide SD-WAN

**Specification**

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### 13.12.4 Packet Capture

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Packet Capture**.

If the device fails and troubleshooting is required, the packet capture result can be analyzed to locate and rectify the fault.

Select an interface and a protocol and specify the host IP address to capture the content in data packets. Select the file size limit and packet count limit to determine the conditions for automatically stopping packet capture. (If the file size or number of packets reaches the specified threshold, packet capture stops and a diagnostic package download link is generated.) Click **Start** to execute the packet capture command.

**Caution**

The packet capture operation may occupy many system resources, causing network freezing. Therefore, exercise caution when performing this operation.

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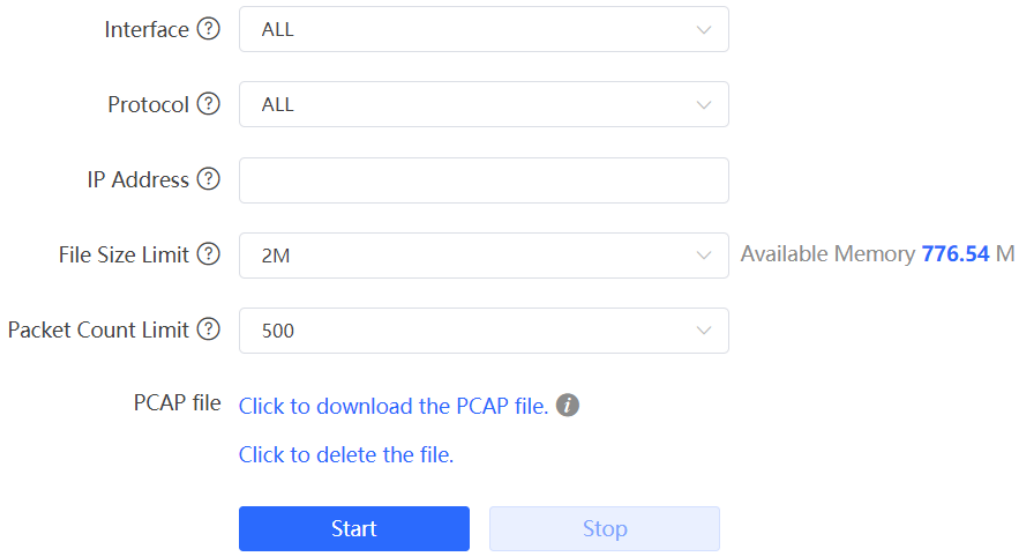
System Management



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## System Management

Packet capture can be stopped at any time. After that, a download link is generated. Click this link to save the packet capture result in the PCAP format locally. Use analysis software such as Wireshark to view and analyze the result.

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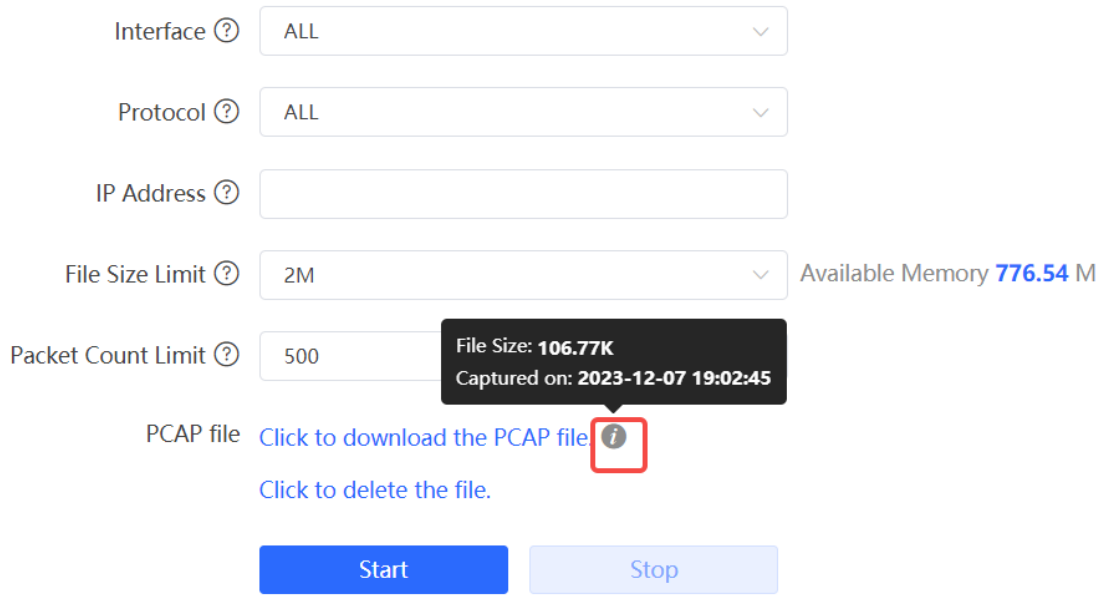
System Management



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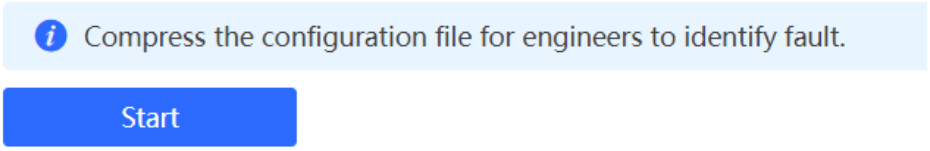
## 13.12.5 Fault Collection

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Fault Collection**.

When the device fails, you need to collect the fault information. Click **Start**. The configuration files of the device will be packed into a compressed file. Download the compressed file locally and provide it to R&D personnel for fault locating.




## 13.12.6 Viewing Flow Statistics

Choose **One-Device** > **Gateway** > **Config** > **Diagnostics** > **Flow Statistic**.

On the **Flow Table Packet Counters Page**, you can view the details of packets received by the device, including protocol, aging time, state, source IP address, destination IP address, source port, destination port, and so on.

# 1 Configuration Guide SD-WAN

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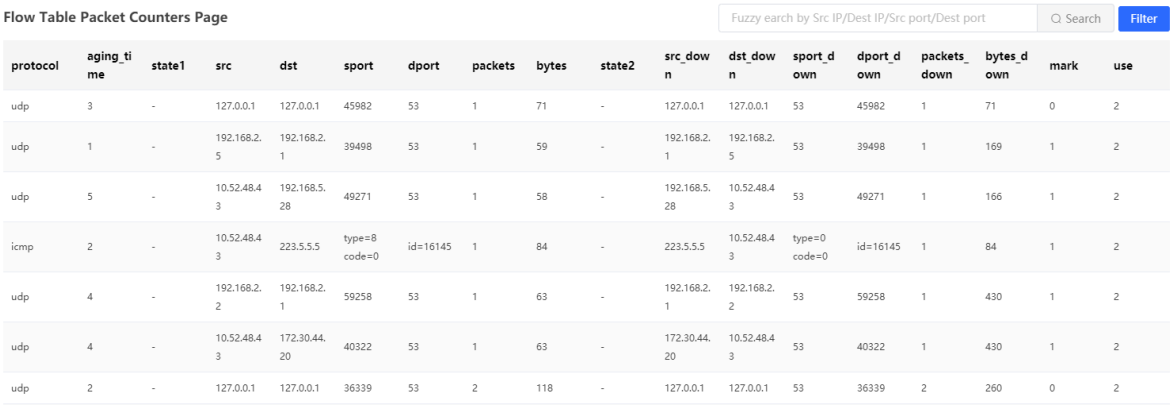
System Management




| protocol | aging_time | state1 | src | dst | sport | dport | packets | bytes | state2 | src_down | dst_down | sport_down | dport_down | packets_down | bytes_down | mark | use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| udp | 3 | - | 127.0.0.1 | 127.0.0.1 | 45982 | 53 | 1 | 71 | - | 127.0.0.1 | 127.0.0.1 | 53 | 45982 | 1 | 71 | 0 | 2 |
| udp | 1 | - | 192.168.2.5 | 192.168.2.1 | 39498 | 53 | 1 | 59 | - | 192.168.2.1 | 192.168.2.5 | 53 | 39498 | 1 | 169 | 1 | 2 |
| udp | 5 | - | 10.52.48.43 | 192.168.5.28 | 49271 | 53 | 1 | 58 | - | 192.168.5.28 | 10.52.48.43 | 53 | 49271 | 1 | 166 | 1 | 2 |
| icmp | 2 | - | 10.52.48.43 | 223.5.5.5 | type=8 code=0 | id=16145 | 1 | 84 | - | 223.5.5.5 | 10.52.48.43 | type=0 code=0 | id=16145 | 1 | 84 | 1 | 2 |
| udp | 4 | - | 192.168.2.2 | 192.168.2.1 | 59258 | 53 | 1 | 63 | - | 192.168.2.1 | 192.168.2.2 | 53 | 59258 | 1 | 430 | 1 | 2 |
| udp | 4 | - | 10.52.48.43 | 172.30.44.20 | 40322 | 53 | 1 | 63 | - | 172.30.44.20 | 10.52.48.43 | 53 | 40322 | 1 | 430 | 1 | 2 |
| udp | 2 | - | 127.0.0.1 | 127.0.0.1 | 36339 | 53 | 2 | 118 | - | 127.0.0.1 | 127.0.0.1 | 53 | 36339 | 2 | 260 | 0 | 2 |

**Note**

If the preceding troubleshooting steps fail to resolve the issue, and remote assistance from technical support is needed, you can contact them to assist in enabling the developer mode. The technical support team can then perform diagnostics to identify and address the issue effectively.

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## 13.13 Performing Upgrade and Checking System Version

**Caution**

You are advised to back up the configuration before upgrading the router.

Version upgrade will restart the device. Do not refresh or close the browser during the upgrade process.

### 13.13.1 Online Upgrade

Choose **One-Device** > **Gateway** > **Config** > **System** > **Upgrade** > **Online Upgrade**.

The current page displays the current system version and allows you to detect whether a later version is available. If a new version is available, click **Upgrade Now** to perform online upgrade. If the network environment does not support online upgrade, click **Download File** to download the upgrade installation package locally and then perform local upgrade.

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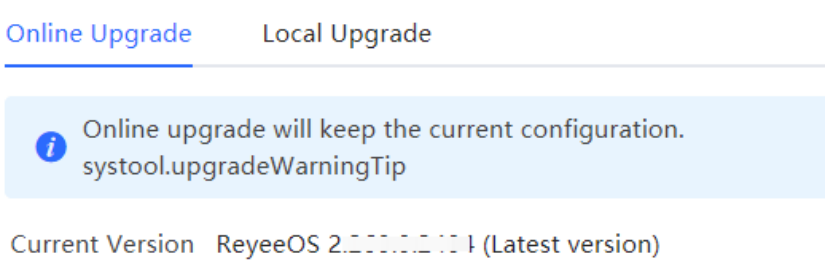
System Management

**Note**

Online upgrade will retain the current configuration.

Do not refresh the page or close the browser during the upgrade process. After successful upgrade, you will be redirected to the login page automatically.




## 13.13.2 Local Upgrade

Choose **One-Device** > **Gateway** > **Config** > **System** > **Upgrade** > **Local Upgrade**.

# 1 Configuration Guide SD-WAN

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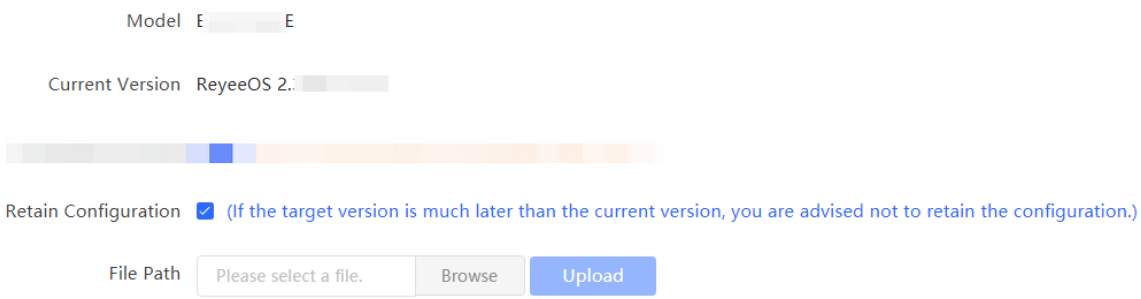
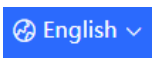
System Management

You can view the current software version and device model. If you want to upgrade the device with the configuration retained, select **Keep Config**. Click **Browse**, select an upgrade package on the local PC, and click **Upload** to upload the file. The device will be upgraded.




## 13.14 Switching System Language

Click  in the upper-right corner of the Web page.


Click a required language to switch the system language.

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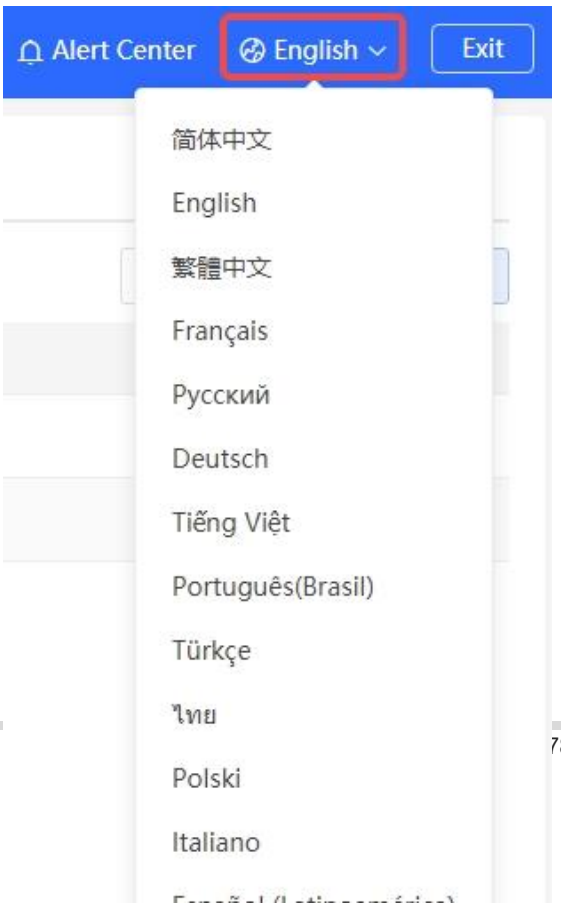

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## 13.15 Configuring Cloud Service

### 13.15.1 Overview

The Cloud Service feature provides powerful remote network management and operation capabilities, making it convenient and efficient to manage geographically dispersed networks with diverse device types. This feature supports wireless devices, switches, and gateways, enabling unified network management and visualized monitoring and operation. Additionally, it also offers various components such as real-name authentication, dedicated Wi-Fi, and passenger flow analysis, allowing for flexible expansion of network services.

By configuring Cloud Service, you can conveniently mange networks through Ruijie Cloud or the Ruijie Reyee app.

### 13.15.2 Configuration Steps

Choose **One-Device** > **Gateway** > **Config** > **System** > **Cloud Service**.

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## System Management

If the device is not currently associated with a cloud account, simply follow the on-screen instructions to add it to the network. Open up the Ruijie Reyee app, click the scan icon at the upper left corner on the **Project** page, and enter the device's management password.

# 1 Configuration Guide SD-WAN

**Specification**

This feature can only be configured in Ruijie Cloud.

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Ruijie Cloud's SD-WAN solution can effectively meet the above requirements and has the following advantages compared with traditional WAN solutions:

(1) **Networking without public IP addresses:** Networking without public IP addresses enables remote connectivity across any broadband connection. For details, see https://cloud.ruijienetworks.com/help/#/ArticleList?id=017d4b240fbc443c9b383d63c35c5aac.

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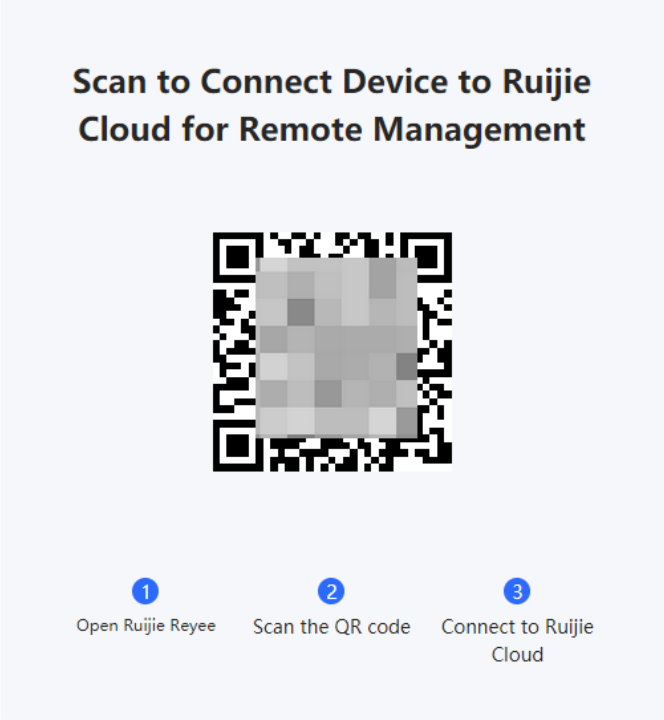
System Management




If the device cannot connect to Ruijie Cloud through QR code scanning, you can click the Configure Cloud Service button to connect the device to Ruijie Cloud.

Configure Cloud Service

# 1 Configuration Guide SD-WAN

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## System Management

Once the device is associated with a cloud account, it will automatically be bound to a cloud server based on its geographic location.

**Caution**

Exercise caution when modifying cloud service configurations as improper modifications may lead to connectivity issues between the device and the cloud service.

# 1 Configuration Guide SD-WAN

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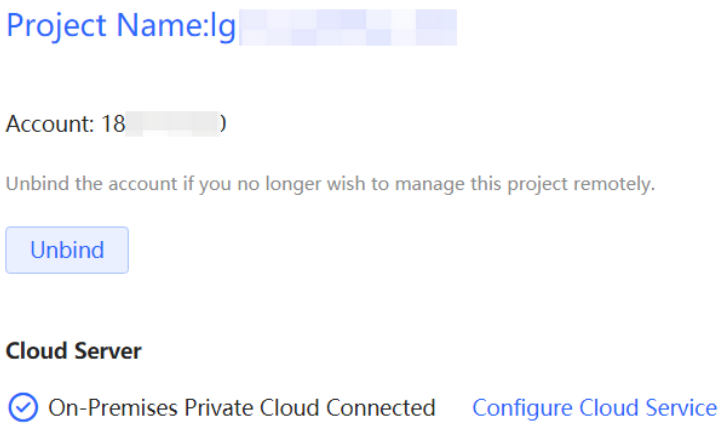


To change the Cloud Service configurations, select the cloud server from the **Cloud Server** drop-down list, enter the domain name and IP address, and click **Save**.

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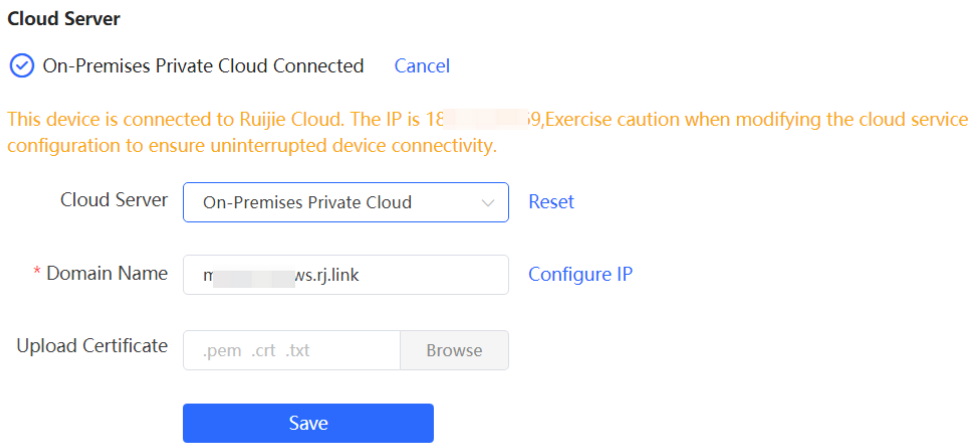

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System Management

**Note**

If the server selected is not **Other Cloud**, the system automatically fills in the domain name and IP address of the cloud server. When **Other Cloud** is selected, you need to manually configure the domain name and IP address and upload the cloud server certificate. .

## 13.15.3 Unbinding Cloud Service

Choose **One-Device** > **Gateway** > **Config** > **System** > **Cloud Service**.

You can click **Unbind** to unbind the account if you no longer wish to manage this project remotely.

# 1 Configuration Guide SD-WAN

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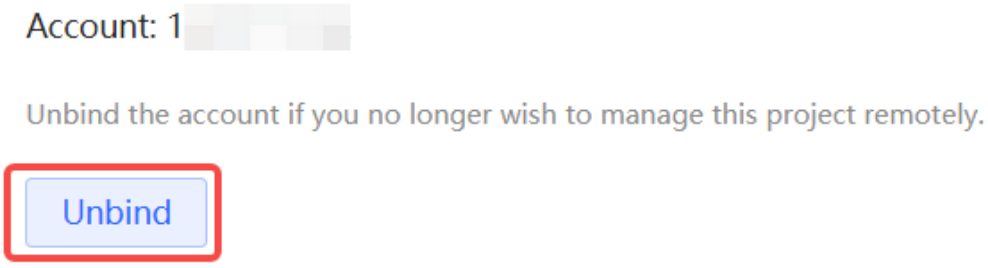

# 14 FAQs

## 14.1 Login Failure

- What can I do if I fail to log in to the Web management system?

(1) Confirm that the network cable is correctly connected to the LAN port of the device, and the corresponding indicator is flashing or solid on.

(2) Before you access the Web management system page, you are advised to configure the PC to automatically obtain an IP address, so the DHCP-enabled device automatically allocates an IP address to the PC. If you want to specify a static IP address to the PC, ensure that the IP address of the PC and the IP address of the device's LAN port are in the same network segment. For example, if the LAN port IP address is 192.168.110.1 and subnet mask is 255.255.255.0, set the PC IP address to 192.168.110.X (X representing any integer in the range of 2 to 254) and the subnet mask to 255.255.255.0.

(3) Run the ping command to test the connectivity between the PC and device. If ping fails, check the network settings.

(4) If you still cannot log in to the **Device Management** page after the preceding steps, restore the device to factory settings.

## 14.2 Password Loss/Factory Setting Restoration

- What can I do if I forget the login password? How can I restore the device to factory settings?

When the device is powered, press and hold the **Reset** button on the panel for 5 seconds. The device will restore factory settings after restart. Then, you can log in to the Web page of the device using the default IP address 192.168.110.1.

## 14.3 Internet Access Failure

- What can I do if the Internet access through PPPoE Dial-Up fails?

(1) Check whether the PPPoE account and password are correct. Please see Section 2.5.3 Forgetting the PPPoE Account for details.

(2) Check whether the IP address allocated by the ISP conflicts with the IP address existing on the router.

(3) Check whether the MTU setting of the device meets the requirements of the ISP.

The default MTU is 1500. Please see Section 4.3.3 Modifying the MTU for details.

(4) Check whether VLAN tagging should be configured for PPPoE.

VLAN tagging is disabled by default. Please see Section 4.3.5 Configuring the VLAN Tag for details.