User Guide

Omada 4G+Cat6 AX3000 Outdoor/Indoor Gateway

CONTENTS

About This Guide

This User Guide provides information for managing Omada VPN Router. Please read this guide carefully before operation.

Intended Readers

This Guide is intended for network managers familiar with IT concepts and network terminologies.

Conventions

When using this guide, notice that features available in SafeStream series products may vary by model and software version. Availability of SafeStream series products may also vary by region or ISP. All images, steps, and descriptions in this guide are only examples and may not reflect your actual experience.

Some models featured in this guide may be unavailable in your country or region. For local sales information, visit https://www.tp-link.com.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute the warranty of any kind, express or implied. Users must take full responsibility for their application of any products.

In this Guide, the following conventions are used:

- The symbol ☛ stands for Note. Notes contain suggestions or references that helps you make better use of your device.
- **Menu Name > Submenu Name > Tab** page indicates the menu structure. **Status > Traffic Statistics > Interface Statistics** means the Interface Statistics page under the Traffic Statistics menu option that is located under the Status menu.
- **Bold** font indicates a button, toolbar icon, menu or menu item.

More Information

- The latest software and documentations can be found at Download Center at https://www.tp-link.com/support.
- The Installation Guide (IG) can be found where you find this guide or inside the package of the router.
- Specifications can be found on the product page at https://www.tp-link.com.
- To ask questions, find answers, and communicate with TP-Link users or engineers, please visit https://community.tp-link.com to join TP-Link Community.
- Our Technical Support contact information can be found at the Contact Technical Support page at https://www.tp-link.com/support.

Part 1

Accessing the Gateway

CHAPTERS

1 Determine the Management Method

Before building your network, choose a proper method to manage your gateway based on your actual network situation. The gateway supports two configuration options: Standalone Mode or Controller Mode.

- Controller Mode

If you want to configure and manage a large-scale network centrally, which consists of mass devices such as access points, switches, and gateways, Controller Mode is recommended. In Controller Mode, the gateway can be centrally configured and monitored via Omada SDN Controller.

To prepare the gateway for Omada SDN Controller Management, refer to Controller Settings. For detailed instructions about the network topology in such situations and how to use Omada SDN Controller, refer to the User Guide of Omada SDN Controller. The guide can be found on the download center of our official website: https://www.tp-link.com/support/download/.

- Standalone Mode

If you have a relatively small-sized network and only one or just a small number of devices need to be managed, Standalone Mode is recommended. In Standalone Mode, you can access and manage the gateway using the GUI (Graphical User Interface, also called web interface in this text). The gateway uses two built-in web servers, HTTP server and HTTPS server, for user authentication.

This User Guide introduces how to configure and monitor the gateway in Standalone Mode.

Note:

The GUI is inaccessible while the gateway is managed by a controller. To turn the gateway back to Standalone Mode and access its GUI, you can forget the gateway on the controller or reset the gateway.

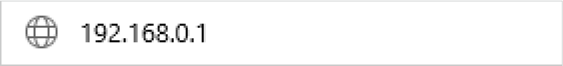
2 Web Interface Access

The following example shows how to log in via the web browser.

1) Connect to the gateway using the default SSID printed on the label at the bottom of the gateway or connect a PC to a LAN port of the gateway with an RJ45 port properly. If your computer is configured with a fixed IP address, change it to “Obtain an IP address automatically“.

2) Open a web browser and type http://tplinker.net or http://192.168.0.1 in the address field of the browser, then press the Enter key.

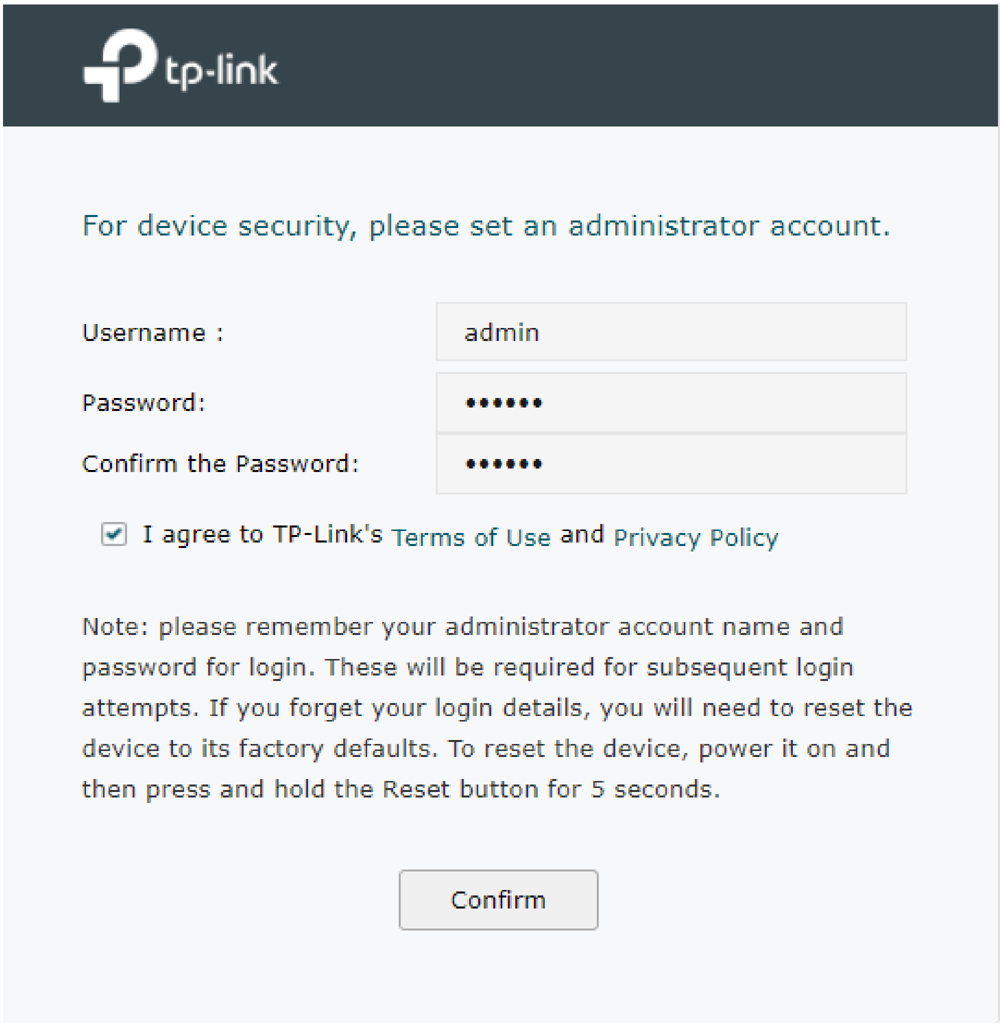
Figure 2-1 Enter the gateway's IP Address In the Browser



192.168.0.1

3) Create a username and a password for subsequent login attempts.

Figure 2-2 Create a Username and a Password



For device security, please set an administrator account.

Username : admin

Password: ••••••

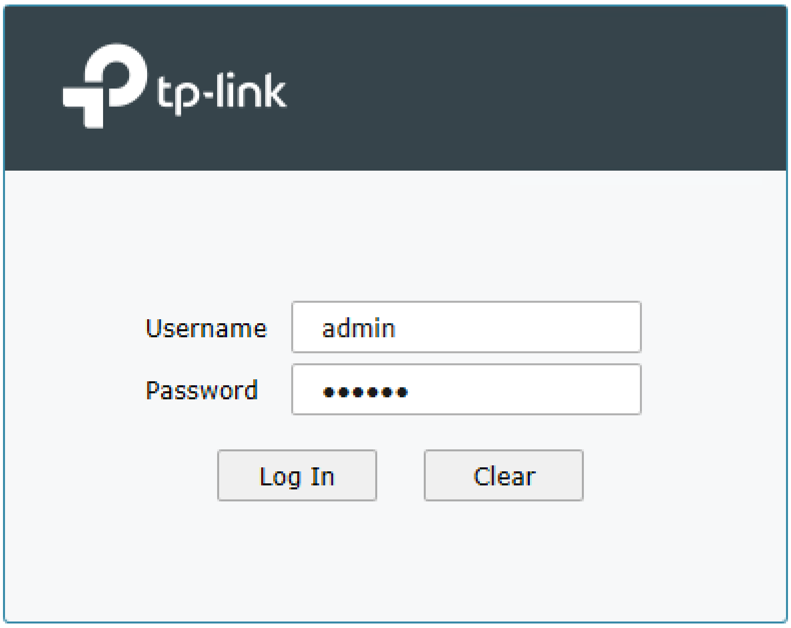
Confirm the Password: ••••••

☑ I agree to TP-Link's Terms of Use and Privacy Policy

Note: please remember your administrator account name and password for login. These will be required for subsequent login attempts. If you forget your login details, you will need to reset the device to its factory defaults. To reset the device, power it on and then press and hold the Reset button for 5 seconds.

4) Use the username and password set above to log in to the webpage.

Figure 2-3 Login Authentication



Username admin

Password ●●●●●●

5) After a successful login, the main page will appear, and you can configure the function by clicking the setup menu on the left side of the screen.

Part 2

Viewing Status Information

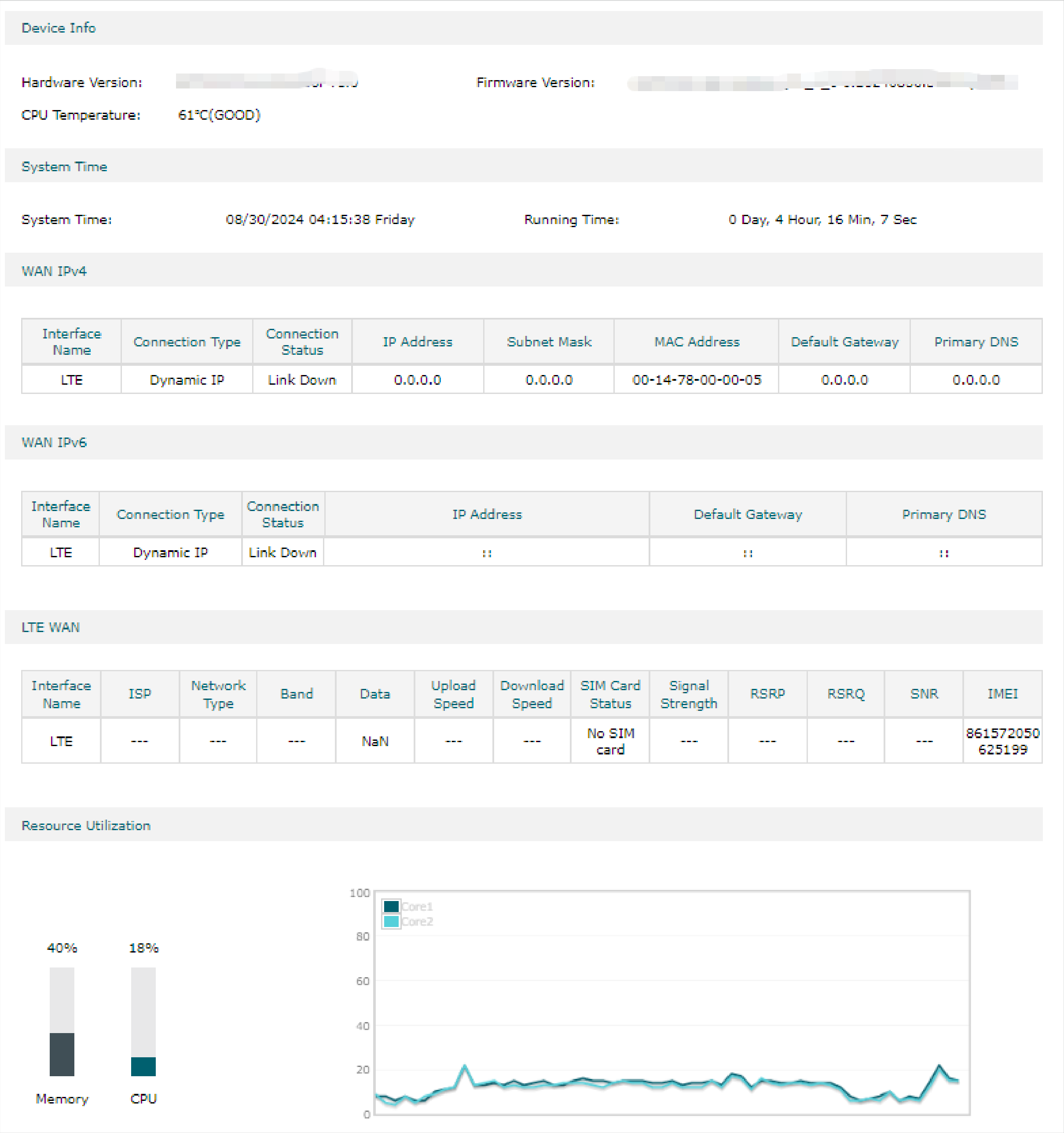
CHAPTERS

1 System Status

The System Status page displays the basic system information (like the hardware version, firmware version and system time) and the running information (like the WAN interface status, memory utilization and CPU utilization).

Choose the menu **Status > System Status > System Status** to load the following page.

Figure 1-1 System Status



Device Info

Hardware Version: [redacted] Firmware Version: [redacted]

CPU Temperature: 61℃(GOOD)

System Time

System Time: 08/30/2024 04:15:38 Friday Running Time: 0 Day, 4 Hour, 16 Min, 7 Sec

WAN IPv4

Interface Name	Connection Type	Connection Status	IP Address	Subnet Mask	MAC Address	Default Gateway	Primary DNS
LTE	Dynamic IP	Link Down	0.0.0.0	0.0.0.0	00-14-78-00-00-05	0.0.0.0	0.0.0.0

WAN IPv6

Interface Name	Connection Type	Connection Status	IP Address	Default Gateway	Primary DNS
LTE	Dynamic IP	Link Down	::	::	::

LTE WAN

Interface Name	ISP	Network Type	Band	Data	Upload Speed	Download Speed	SIM Card Status	Signal Strength	RSRP	RSRQ	SNR	IMEI
LTE	---	---	---	NaN	---	---	No SIM card	---	---	---	---	861572050 625199

Resource Utilization

2 Traffic Statistics

Traffic Statistics displays detailed information relating to the data traffic of interfaces and IP addresses. You can monitor the traffic and locate faults according to this information.

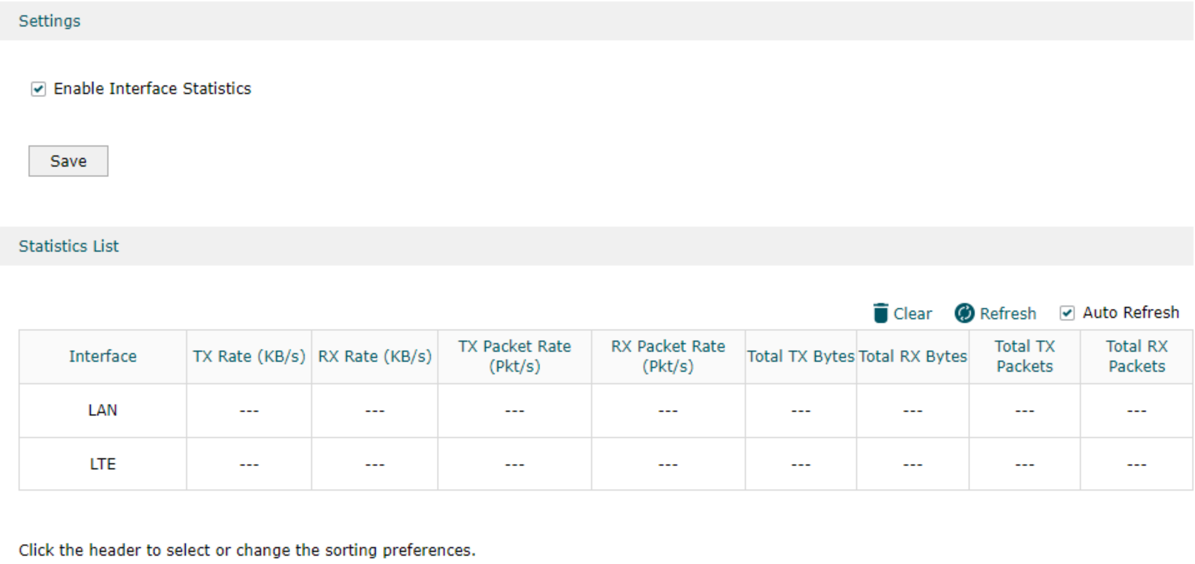
With the Traffic Statistics function, you can:

- View the traffic statistics on each interface.
- Specify an IP address range, and view the traffic statistics of the IP addresses in this range.

2.1 Viewing the Interface Statistics

Choose the menu **Status > Traffic Statistics > Interface Statistics** to load the following page.

Figure 2-1 Interface Statistics



Settings

☑ Enable Interface Statistics

Save

Statistics List

Clear Refresh ☑ Auto Refresh

Interface	TX Rate (KB/s)	RX Rate (KB/s)	TX Packet Rate (Pkt/s)	RX Packet Rate (Pkt/s)	Total TX Bytes	Total RX Bytes	Total TX Packets	Total RX Packets
LAN	---	---	---	---	---	---	---	---
LTE	---	---	---	---	---	---	---	---

Click the header to select or change the sorting preferences.

Enable **Interface Statistics**, then you can view the detailed traffic information of each interface in the statistics list.

TX Rate (KB/s)	Displays the rate for transmitting data in kilobytes per second.
RX Rate (KB/s)	Displays the rate for receiving data in kilobytes per second.
TX Packet Rate (Pkt/s)	Displays the rate for transmitting data in packets per second.
RX Packet Rate (Pkt/s)	Displays the rate for receiving data in packets per second.
Total TX Bytes	Displays the bytes of packets transmitted on the interface.

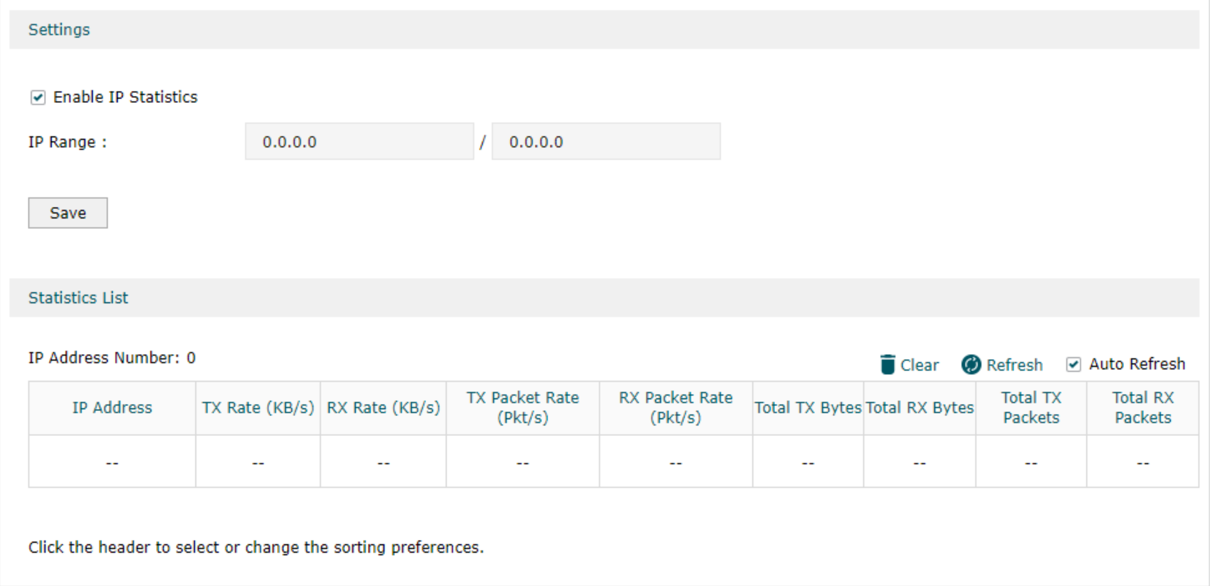
Total RX Bytes	Displays the bytes of packets received on the interface.
Total TX Packets	Displays the number of packets transmitted on the interface.
Total RX Packets	Displays the number of packets received on the interface.

You can enable **Auto Refresh** or click **Refresh** to get the latest statistics information, or click **Clear** to clear the current statistics information.

2.2 Viewing the IP Statistics

Choose the menu **Status > Traffic Statistics > IP Statistics** to load the following page.

Figure 2-2 IP Statistics



Settings

☑ Enable IP Statistics

IP Range : 0.0.0.0 / 0.0.0.0

Save

Statistics List

IP Address Number: 0

Clear Refresh ☑ Auto Refresh

IP Address	TX Rate (KB/s)	RX Rate (KB/s)	TX Packet Rate (Pkt/s)	RX Packet Rate (Pkt/s)	Total TX Bytes	Total RX Bytes	Total TX Packets	Total RX Packets
--	--	--	--	--	--	--	--	--

Click the header to select or change the sorting preferences.

Follow these steps to view the traffic statistics of the specific IP addresses:

1) In the **Settings** section, enable IP Statistics and specify an IP range to monitor.

Enable IP Statistics	Check the box to enable IP Statistics.
IP Range	Specify an IP range. The gateway will monitor the packets whose source IP addresses or destination IP addresses are in this range, and display the statistics information in Statistics List.

2) In the **Statistics List** section, view the detailed traffic information of the IP addresses.

IP Address Number	Displays the number of active users whose IP address is in the specified IP range.
TX Rate (KB/s)	Displays the rate for transmitting data in kilobytes per second.
RX Rate (KB/s)	Displays the rate for receiving data in kilobytes per second.

TX Packet Rate (Pkt/s)	Displays the rate for transmitting data in packets per second.
RX Packet Rate (Pkt/s)	Displays the rate for receiving data in packets per second.
Total TX Bytes	Displays the bytes of packets transmitted by the user who owns the IP address.
Total RX Bytes	Displays the bytes of packets received by the user who owns the IP address.

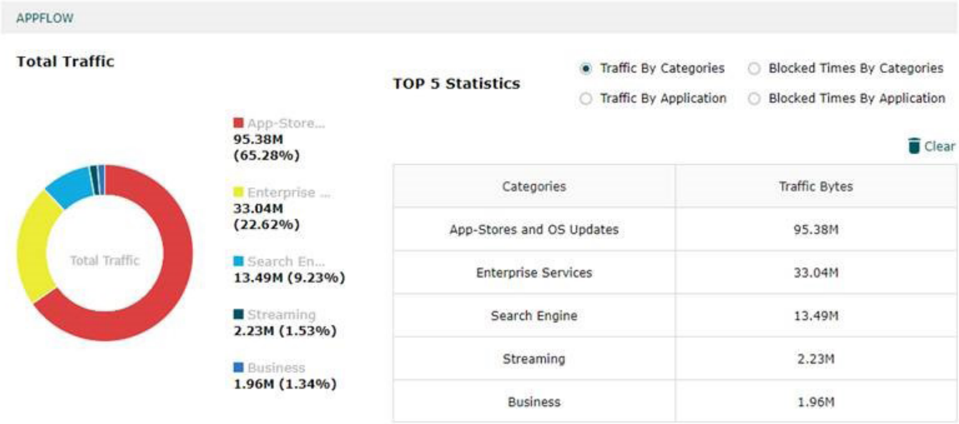
You can enable **Auto Refresh** or click **Refresh** to get the latest statistics information, or click **Clear** to clear the current statistics information.

2.3 Viewing the DPI Statistics

If you have enabled the DPI feature on **Firewall > Application Control**, you can view the DPI statistics here.

Choose the menu **Status > Traffic Statistics > DPI Statistics** to load the following page. You can view the traffic by categories and application.

Figure 2-3 DPI Statistics


APPFLOW
Total Traffic
Total Traffic
🟥 App-Store... 95.38M (65.28%)
🟨 Enterprise ... 33.04M (22.62%)
🟦 Search En... 13.49M (9.23%)
■ Streaming 2.23M (1.53%)
■ Business 1.96M (1.34%)
TOP 5 Statistics
Clear

● Traffic By Categories ○ Blocked Times By Categories
○ Traffic By Application ○ Blocked Times By Application

Categories	Traffic Bytes
App-Stores and OS Updates	95.38M
Enterprise Services	33.04M
Search Engine	13.49M
Streaming	2.23M
Business	1.96M

Part 3

Configuring Wireless Settings

CHAPTERS

1. Overview
2. Wireless Status
3. Wireless Settings
4. Mesh Management

1 Overview

The Wireless module provides basic wireless functions, including checking wireless connection details, configuring wireless parameters, setting up mesh network and more.

1.1 Supported Features

Status

You can check the parameters of the gateway’s wireless network (SSID lists, radio settings, and radio traffic) and the details about the connected clients.

Wireless Settings

Wireless networks enable wireless clients to access the internet. Once a wireless network is set up, the gateway typically broadcast the network name (SSID) in the air, and wireless clients can connect to the network and access the internet. In this module, you can configure wireless settings, set up wireless VLAN, configure MAC filtering, set wireless schedule and enable Band Steering.

Mesh

Enable the Mesh feature and synchronize the mesh network settings to the Omada app.

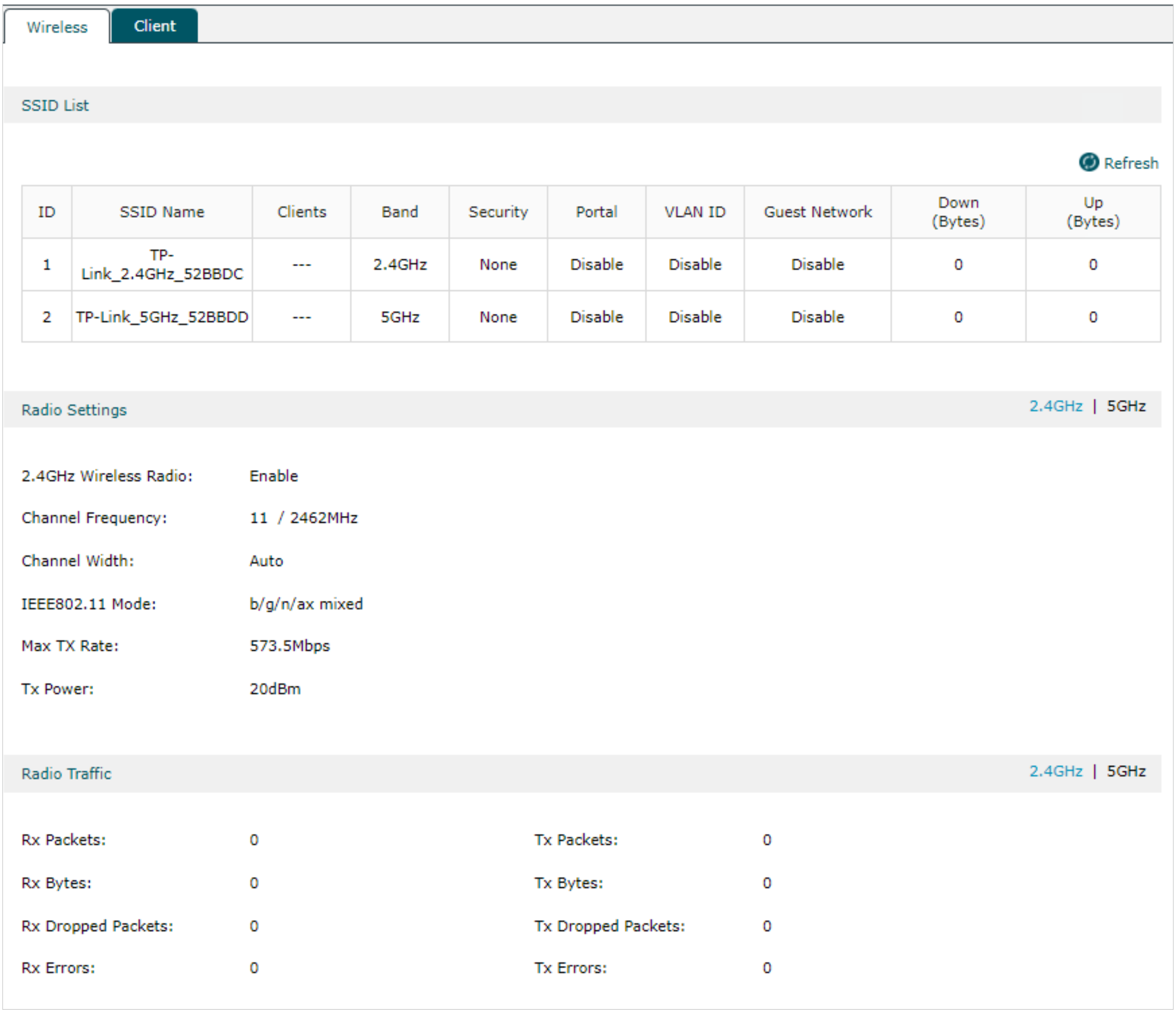
2 Wireless Status

You can check the parameters of the gateway's wireless network (SSID lists, radio settings, and radio traffic) and the details about the connected clients.

2.1 View Gateway's Wireless Settings

Choose the menu **Wireless** > **Status** > **Wireless** to load the following page.

Figure 2-1 Viewing the Wirelesss Settings



SSID List

ID	SSID Name	Clients	Band	Security	Portal	VLAN ID	Guest Network	Down (Bytes)	Up (Bytes)
1	TP-Link_2.4GHz_52BBDC	---	2.4GHz	None	Disable	Disable	Disable	0	0
2	TP-Link_5GHz_52BBDD	---	5GHz	None	Disable	Disable	Disable	0	0

Radio Settings 2.4GHz | 5GHz

2.4GHz Wireless Radio:	Enable
Channel Frequency:	11 / 2462MHz
Channel Width:	Auto
IEEE802.11 Mode:	b/g/n/ax mixed
Max TX Rate:	573.5Mbps
Tx Power:	20dBm

Radio Traffic 2.4GHz | 5GHz

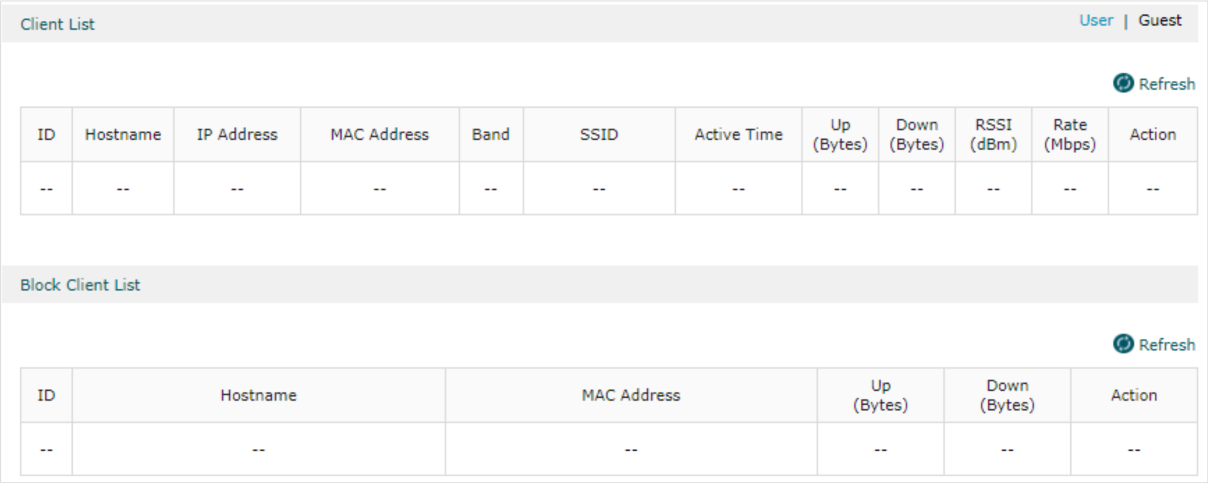
Rx Packets:	0	Tx Packets:	0
Rx Bytes:	0	Tx Bytes:	0
Rx Dropped Packets:	0	Tx Dropped Packets:	0
Rx Errors:	0	Tx Errors:	0

SSID List	Displays the 2.4GHz/5GHz SSIDs you have created and their details. Click Refresh to get the latest status of the SSID List.
Radio Settings	The gateway works on the 2.4GHz and 5GHz bands. Click 2.4GHz | 5GHz to select a band first, and view the following parameters.
Radio Traffic	The gateway works on the 2.4GHz and 5GHz bands. Click 2.4GHz | 5GHz to select a band first, and view the following parameters.

2.2 View Client Details

Choose the menu **Wireless** > **Status** > **Client** to load the following page.

Figure 2-2 Viewing Client Details



Client List User | Guest

Refresh

ID	Hostname	IP Address	MAC Address	Band	SSID	Active Time	Up (Bytes)	Down (Bytes)	RSSI (dBm)	Rate (Mbps)	Action
--	--	--	--	--	--	--	--	--	--	--	--

Block Client List

Refresh

ID	Hostname	MAC Address	Up (Bytes)	Down (Bytes)	Action
--	--	--	--	--	--

Client List

Click User | Guest to select the client type (User or Guest), and view the following parameters. Click Refresh to get the latest status of the Client List.

Block Client List

Allows you to view the information of the clients that have been blocked, and resume the client’s access. Click Refresh to get the latest status of the Block Client List.

3 Wireless Settings

Wireless networks enable wireless clients to access the internet. Once a wireless network is set up, the gateway typically broadcast the network name (SSID) in the air, and wireless clients can connect to the network and access the internet. In this module, you can configure wireless settings, set up wireless VLAN, configure MAC filtering, set wireless schedule and enable Band Steering.

3.1 Wireless Settings Access

Wireless Settings Access allows you to create wireless networks on the 2.4GHz or 5GHz band, view and edit the information of the wireless networks that have been created, and configure the wireless networks' advanced settings including Radio Settings, Load Balance, Airtime Fairness, etc.

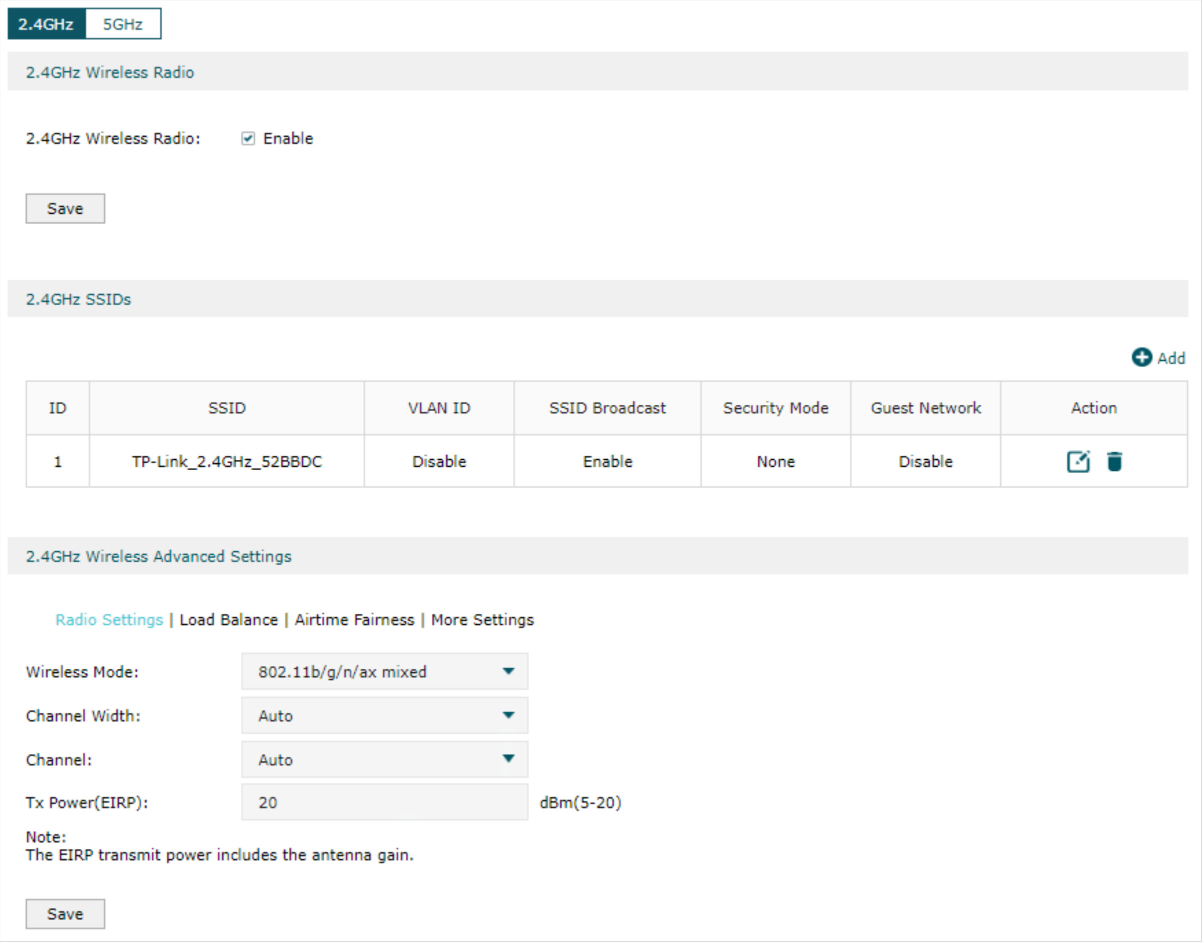
To complete wireless settings access, follow these steps:

1) Click 2.4GHz | 5GHz to select a frequency band.

2) Configure the information and features of the wireless network.

Choose the menu **Wireless** > **Wireless Settings** > **Wireless Settings Access** to load the following page.

Figure 3-1 Configuring the Wireless Settings Access


2.4GHz
5GHz
Save
Add
Radio Settings | Load Balance | Airtime Fairness | More Settings
Save

2.4GHz Wireless Radio

2.4GHz Wireless Radio: ☑ Enable

2.4GHz SSIDs

ID	SSID	VLAN ID	SSID Broadcast	Security Mode	Guest Network	Action
1	TP-Link_2.4GHz_52BBDC	Disable	Enable	None	Disable	✎ 🗑

2.4GHz Wireless Advanced Settings

Wireless Mode: 802.11b/g/n/ax mixed

Channel Width: Auto

Channel: Auto

Tx Power(EIRP): 20 dBm(5-20)

Note:
The EIRP transmit power includes the antenna gain.

2.4GHz/5GHz Wireless Radio	Check the box to enable the wireless radio of the chosen band before configuring the wireless parameters. Only when this option is enabled will the wireless radio on 2.4GHz or 5GHz band works.
2.4GHz/5GHz SSIDs	Click **Add** to create a new SSID on the chosen band, configure the parameters, and click OK.

2.4GHz/5GHz Wireless Advanced Settings	**Radio Settings** Radio settings directly control the behavior of the radio in the gateway and its interaction with the physical medium; that is, how and what type of signal the gateway emits. **Load Balance** Load Balance allows you to limit the maximum number of clients who can access the gateway's wireless network. In this way, you can achieve a rational use of network resources. **Airtime Fairness** With Airtime Fairness enabled, each client connected to the gateway's wireless network can get the same amount of time to transmit data, avoiding low-data-rate clients occupying too much network bandwidth. **More Settings** To improve the network's stability, reliability, and communication efficiency, configure the following parameters based on your needs.

Configuring Advanced Settings

■ Radio Settings

Configure the following parameters of the chosen band, and click **Save**.

Wireless Mode	Select the IEEE 802.11 mode the radio uses. **For 2.4GHz:** 802.11n only - Only 802.11n clients can connect to the gateway. 802.11b/g mixed - Both 802.11b and 802.11g clients can connect to the gateway. 802.11b/g/n mixed - All of 802.11b, 802.11g, and 802.11n clients operating in the 2.4GHz frequency can connect to the gateway. 802.11b/g/n/ax mixed - All of 802.11b, 802.11g, 802.11n, and 802.11ax clients operating in the 2.4GHz frequency can connect to the gateway. Note that 802.11ax is only available for certain devices. **For 5GHz:** 802.11n/ac mixed - Both 802.11n clients and 802.11ac clients operating in the 5GHz frequency can connect to the gateway. 802.11a/n/ac mixed - All of 802.11a, 802.11n, and 802.11ac clients operating in the 5GHz frequency can connect to the gateway. 802.11a/n/ac/ax mixed - All of 802.11a, 802.11n, 802.11ac, and 802.11ax clients operating in the 5GHz frequency can connect to the gateway. Note that 802.11ax is only available for certain devices.

Channel Width	Select the channel width of the gateway. For the 2.4GHz band, available options include Auto, 20MHz, and 40MHz. For the 5GHz band, available options include Auto, 20MHz, 40MHz, 80MHz, and 160MHz.
Channel	Select the channel used by the gateway. For example, 1/2412MHz means that the channel is 1 and the frequency is 2412MHz. By default, the channel is selected as Auto, and we recommend that you keep the default setting.
Tx Power (EIRP)	Specify the transmit power value. If this value is set to be larger than the maximum transmit power that is allowed by the local regulation, the regulated maximum transmit power will be applied in the actual situation.

Note:

- Note that in most cases, it is unnecessary to use the maximum transmit power. Specifying a larger transmit power than needed may cause interference to the neighborhood. Also, it consumes more power and reduces the longevity of the device.

■ Load Balance

Configure the following parameters of the chosen band, and click **Save**.

Load Balance	Check the box to enable Load Balance.
Maximum Associated Clients	Specify the maximum number of clients who can connect to a radio band (either 2.4GHz or 5GHz) of the gateway at the same time. While the number of connected clients has reached the limit and there are more clients requesting to access the network, the gateway will disconnect those with weaker signals. The value of Maximum Associated Clients is from 1-127, and the default is 50.

■ Airtime Fairness

We recommend you check the box to enable Airtime Fairness under multi-rate wireless networks. In this way, the faster clients can get more time for the data transmission and the network's overall throughput can be improved.

■ More Settings

Configure the following parameters of the chosen band, and click **Save**.

Beacon Interval	Beacons are transmitted periodically by the gateway to announce the presence of a wireless network for the clients. Beacon Interval determines the time interval of the beacons sent by the gateway. You can specify a value between 40 and 100ms. The default is 100ms.

DTIM Period	The DTIM (Delivery Traffic Indication Message) is contained in some Beacon frames. It indicates whether the gateway has buffered data for client devices. The DTIM Period indicates how often the clients served by this gateway should check for buffered data still on the gateway awaiting pickup. You can specify the value between 1-255 Beacon Intervals. The default value is 1, indicating that clients check for buffered data at every beacon. An excessive DTIM interval may reduce the performance of multicast applications, so we recommend you keep the default value.
RTS Threshold	RTS/CTS (Request to Send/Clear to Send) is used to improve the data transmission efficiency of the network with hidden nodes, especially when there are lots of large packets to be transmitted. When the size of a data packet is larger than the RTS Threshold, the RTS/CTS mechanism will be activated. As a result, before sending a data packet, the client will send an RTS packet to the gateway to request data transmitting. And then the gateway will send a CTS packet to inform other clients to delay their data transmitting. In this way, packet collisions can be avoided. For a busy network with hidden nodes, a low threshold value will help reduce interference and packet collisions. But for a not-so-busy network, a too low threshold value will cause bandwidth wasting and reduce the data throughput. The recommended and default value is 2347 bytes.
Fragmentation Threshold	The fragmentation function can limit the size of packets transmitted over the network. If the size of a packet exceeds the Fragmentation Threshold, the fragmentation function is activated and the packet will be fragmented into several packets. Fragmentation helps improve network performance if properly configured. However, a too low fragmentation threshold may result in poor wireless performance caused by the extra work of dividing up and reassembling of frames and increased message traffic. The recommended and default value is 2346 bytes.
OFDMA	OFDMA enables multiple users to transmit data simultaneously, and thus greatly improves speed and efficiency. Only when your clients also support OFDMA, can you fully enjoy the benefits.

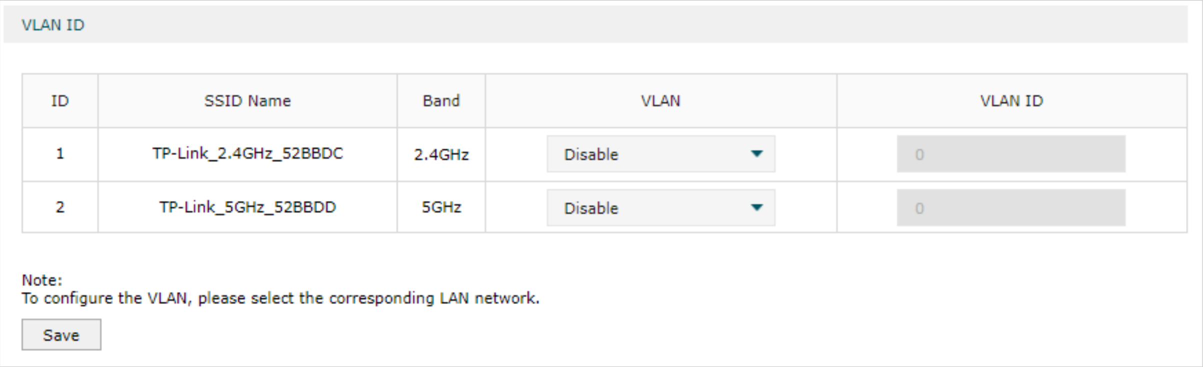
3.2 Wireless VLAN

Wireless VLAN is used to set VLANs for wireless networks. With this feature, the gateway can work together with the switches supporting 802.1Q VLAN. Traffic from the clients in different wireless networks is added with different VLAN tags according to the VLAN settings of the wireless networks. Then the wireless clients in different VLANs cannot directly communicate with each other. Note that the traffic from the wired clients will not be added with VLAN tags.

To complete wireless VLAN, select the specific SSID in the VLAN ID list to configure the VLAN parameters and click **Save**.

Choose the menu **Wireless** > **Wireless Settings** > **VLAN** to load the following page.

Figure 3-2 Configuring the Wireless VLAN



VLAN ID

ID	SSID Name	Band	VLAN	VLAN ID
1	TP-Link_2.4GHz_52BBDC	2.4GHz	Disable	0
2	TP-Link_5GHz_52BBDD	5GHz	Disable	0

Note:
To configure the VLAN, please select the corresponding LAN network.

VLAN	Select Enable to enable the VLAN function on the SSID.
VLAN ID	Specify the VLAN ID for the wireless network. Every VLAN ID represents a different VLAN. 0 is used to disable VLAN tagging.

Note:

- You can manage the VLAN IDs in Network > VLAN.

3.3 MAC Filtering

MAC Filtering is used to allow or block clients with specific MAC addresses to access the network. With this feature, you can effectively control clients' access to the wireless network according to your needs.

To complete MAC filtering settings, follow these steps:

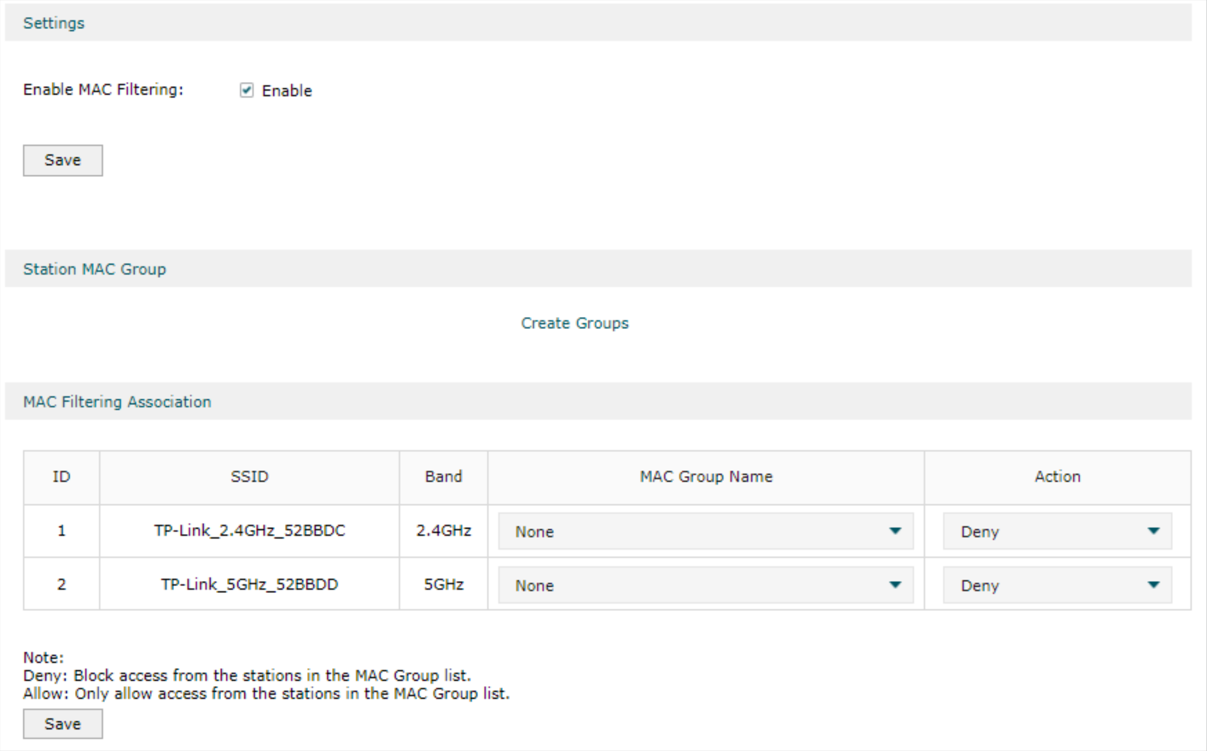
1) In **Settings**, check the box of **Enable MAC Filtering**.

2) In **Station MAC Group**, click **Create Groups**, create a new MAC group, and add the MAC address of the hosts to be filtered to the MAC group.

3) In **MAC Filtering Association**, configure the filtering rule

Choose the menu **Wireless** > **Wireless Settings** > **MAC Filtering** to load the following page.

Figure 3-3 Configuring MAC Filtering



Settings

Enable MAC Filtering: ☑ Enable

Save

Station MAC Group

Create Groups

MAC Filtering Association

ID	SSID	Band	MAC Group Name	Action
1	TP-Link_2.4GHz_52BBDC	2.4GHz	None	Deny
2	TP-Link_5GHz_52BBDD	5GHz	None	Deny

Note:
Deny: Block access from the stations in the MAC Group list.
Allow: Only allow access from the stations in the MAC Group list.

Save

In **Settings** section, Check the box to enable **MAC Filtering,** and click **Save.**

In **Station MAC Group** section, click **Create Groups**, and two pop-up windows will appear, which allow you to create a MAC group first, and add the MAC addresses to the MAC group.

Add (above the Operation column)	Click **Add** , and a pop-up window will appear, on which you can create a new MAC group.
MAC Group	Specify a name for the MAC Group, and click **OK**.
MAC Group Name	Displays all the MAC groups you have created.
Add (above the Modify column)	Select a MAC group in the group list, and click Add . On the pop-up window, add the MAC address to be filtered.
MAC Address	Enter the MAC address to be filtered in the format XX-XX-XX-XX-XX-XX, and OK. In the same way, you can add more MAC addresses to the selected MAC group. And you can also view all the added MAC addresses here.
Modify	Edit or delete the selected MAC address.

In **MAC Filtering Association** section, specify the filtering rule, then click **Save**.

SSID	Displays the SSIDs that you can set the filtering rule.

Band	Displays the SSIDs that you can set the filtering rule.
MAC Group Name	Select a MAC group to be filtered from the drop-down list.
Action	Specify the filtering rule (Allow/Deny) for the selected MAC group from the drop-down list, and click **Save.**

3.4 Wireless Schedule

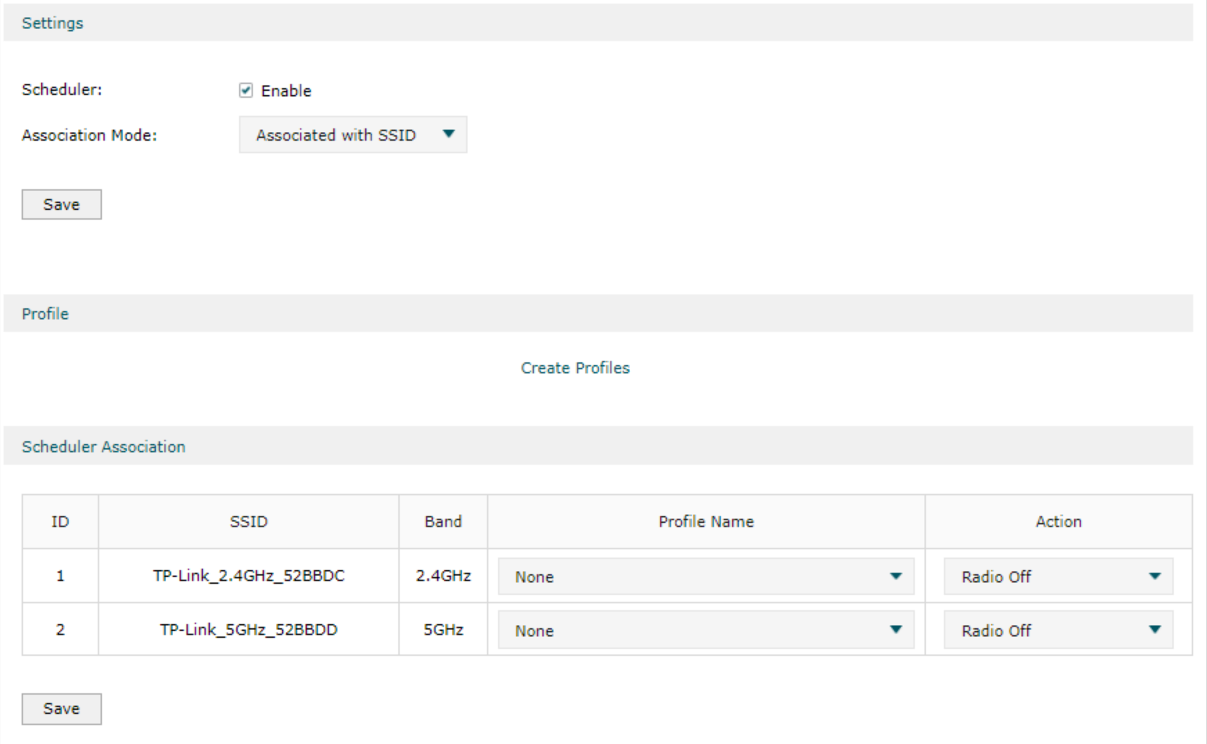
The Scheduler feature allows the gateway's wireless network to automatically turns on or off at the time you set. As a time-based function, Scheduler takes effect according to the gateway's system time. You can set or view the system time in **System Tools** > **Time Settings**.

To complete wireless schedule settings, follow these steps:

1) In **Settings**, check the box to enable **Scheduler**, and select the **Association Mode**.
2) In **Profile**, click **Create Profiles**, create a new scheduler profile, and add time range items to the profile. Note that if there are several time range items in one profile, the time range of this profile is the sum of all of these time ranges.
3) In **Scheduler Association**, configure the scheduler rule.

Choose the menu **Wireless** > **Wireless Settings** > **Scheduler** to load the following page.

Figure 3-4 Configuring Schduler



Settings

Scheduler: ☑ Enable

Association Mode: Associated with SSID

Profile

Scheduler Association

ID	SSID	Band	Profile Name	Action
1	TP-Link_2.4GHz_52BBDC	2.4GHz	None	Radio Off
2	TP-Link_5GHz_52BBDD	5GHz	None	Radio Off

In **Settings** section, Check the box to enable **Scheduler**, and select the **Association Mode.**

Associated with SSID	The scheduler profile will be applied to the specific SSID.
Associated with Gateway	The profile will be applied to all SSIDs on the gateway.

In **Profile**, click **Create Profiles**, and two pop-up windows will appear, which allow you to create a scheduler profile first, and add time range items to the profile.

Add (of the scheduler profile window)	Click **Add** , and a pop-up window will appear, on which you can create a new scheduler profile.
Profile	Specify a name for the scheduler profile, and click **OK**.
Profile Name	Displays all the scheduler profiles you have created.
Operation	Edit or delete the selected scheduler profile's information..
Add (of the time range items window)	Select a profile in the profile list (the color of the selected one will turn green), and click **Add** on the time range items window. On the pop-up window, configure the parameters, and click **OK**.
Day	Select on which day(s) (Weekday/Weekend/Everyday/Custom) the scheduler will take effect.
Time	If you check the box of 24 hours, the scheduler rule will take effect for 24 hours on each selected day.
Start Time	Specify when the scheduler rule will take effect.
End Time	Specify when the scheduler rule will end.

In **Scheduler Association** section, specify the rule, then click **Save**.

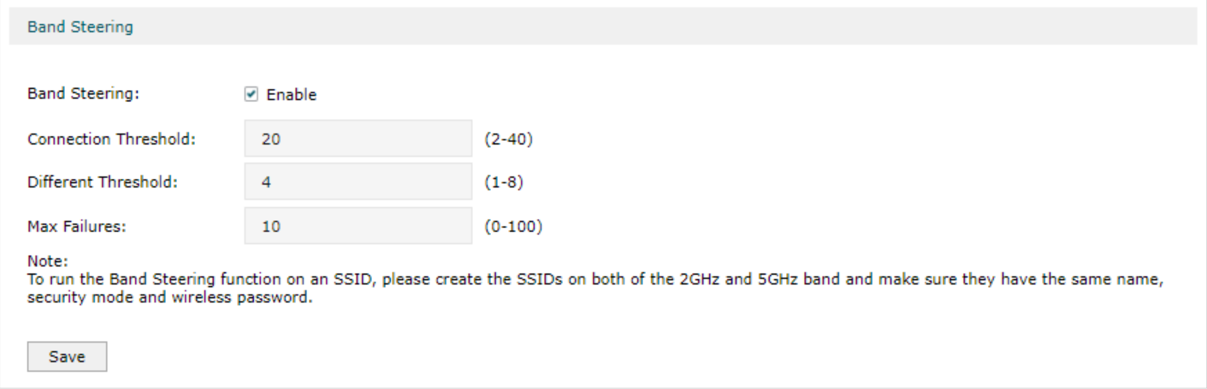
SSID	Displays the SSIDs that you can set the scheduler rule.
Band	Displays which frequency band the SSID belongs to.
Profile Name	Select a scheduler profile for the SSID.
Action	Select the scheduler rule (Radio On/Radio Off), and click **Save**.

3.5 Band Steering

With Band Steering enabled, dual-band clients will be steered to the 5GHz band according to the configured parameters. Band Steering adjusts the number of clients on 2.4GHz and 5GHz bands. As the 5GHz band supports a larger number of non-overlapping channels and is less noisy, the network performance can be improved.

To run the Band Steering function on an SSID, you need to create the SSIDs on both the 2.4GHz and 5GHz bands and make sure they have the same name, security mode, and wireless password.

To complete the Band Steering settings, check the box to enable **Band Steering**, and configure the parameters to balance the clients on both frequency bands, then click **Save**.



Band Steering

Band Steering: ☑ Enable

Connection Threshold: 20 (2-40)

Different Threshold: 4 (1-8)

Max Failures: 10 (0-100)

Note:
To run the Band Steering function on an SSID, please create the SSIDs on both of the 2GHz and 5GHz band and make sure they have the same name, security mode and wireless password.

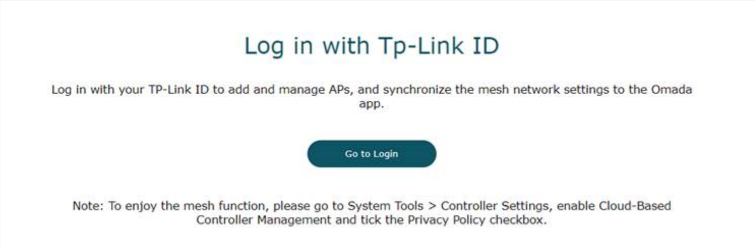
Connection Threshold	Defines the maximum number of clients connected to the 5GHz band. The value of Connection Threshold is from 2 to 40, and the default is 20.
Different Threshold	Defines the maximum difference between the number of clients on the 5GHz band and 2.4GHz band. The value of Different Threshold is from 1 to 8, and the default is 4. When the following two conditions are both met, the gateway prefers to refuse the connection request on 5GHz band and no longer steer other clients to the 5GHz band: 1. The number of clients on the 5GHz band reaches the Connection Threshold value. 2. The difference between the number of clients on the 2.4GHz band and 5GHz band reaches the Different Threshold value.
Max Failures	When the gateway's 5GHz band is overloaded, if a client repeatedly attempts to associate with the gateway on the 5GHz band and the number of rejections reaches the value of Max Failures, the gateway will accept the request. The value is from 0 to 100, and the default is 10.

4 Mesh Management

Log in with your TP-Link ID to add and manage APs, and synchronize the mesh network settings to the Omada app.

Choose the menu **Wireless** > **Mesh** to load the following page.To complete Mesh Management, follow these steps:

1) Click **Go to Login** to configure mesh network and log in with TP-Link ID

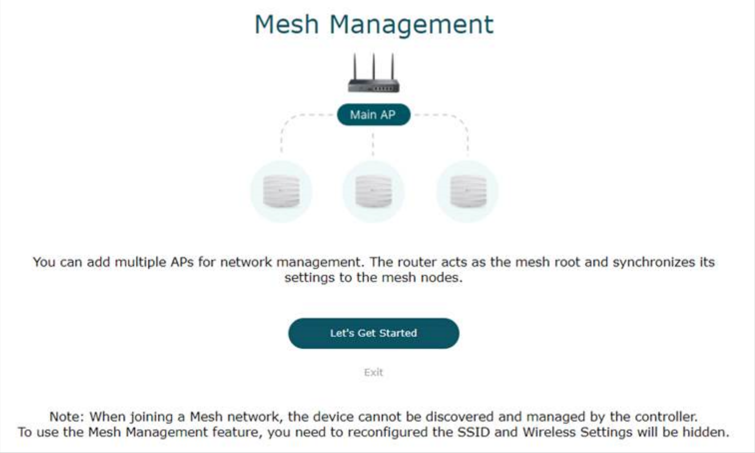


Log in with Tp-Link ID

Log in with your TP-Link ID to add and manage APs, and synchronize the mesh network settings to the Omada app.

Note: To enjoy the mesh function, please go to System Tools > Controller Settings, enable Cloud-Based Controller Management and tick the Privacy Policy checkbox.

2) Click **Let's Get Started** to start setting up the mesh network.

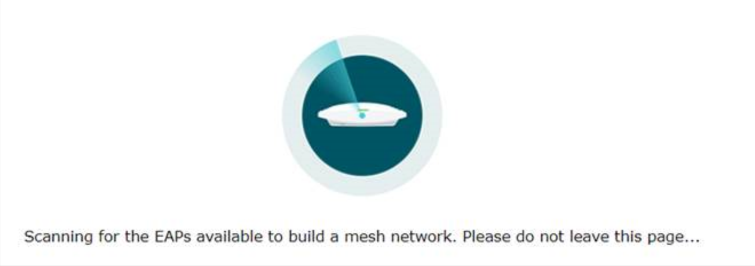


Mesh Management

You can add multiple APs for network management. The router acts as the mesh root and synchronizes its settings to the mesh nodes.

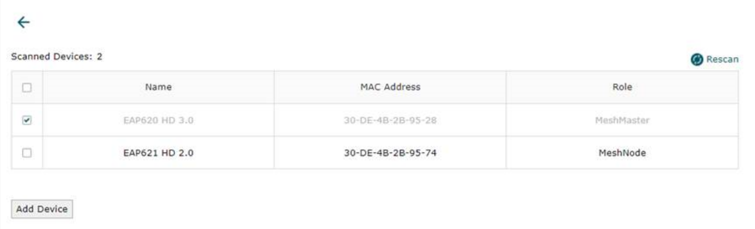
Note: When joining a Mesh network, the device cannot be discovered and managed by the controller.
To use the Mesh Management feature, you need to reconfigured the SSID and Wireless Settings will be hidden.

3) The system will scan for the EAPs available to build a mesh network.



Scanning for the EAPs available to build a mesh network. Please do not leave this page...

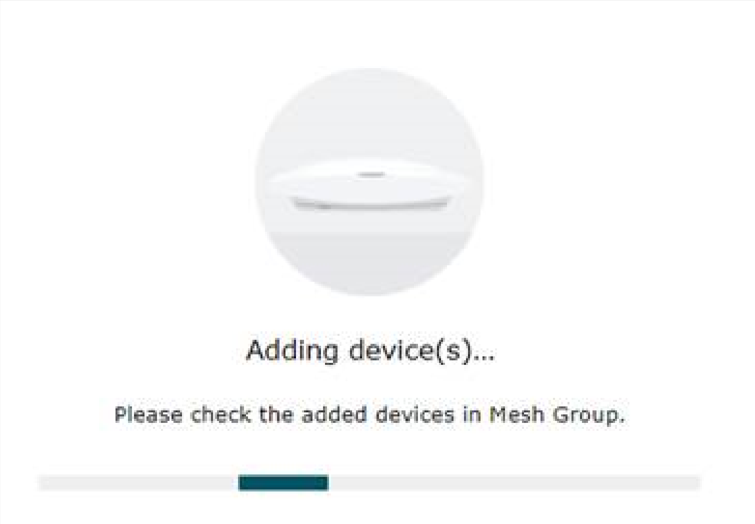
4) Click **Add Device** to add the selected device to the mesh network. The gateway will be the mesh root.



Scanned Devices: 2

□	Name	MAC Address	Role
☑	EAP620 HD 3.0	30-DE-4B-2B-95-28	MeshMaster
□	EAP621 HD 2.0	30-DE-4B-2B-95-74	MeshNode

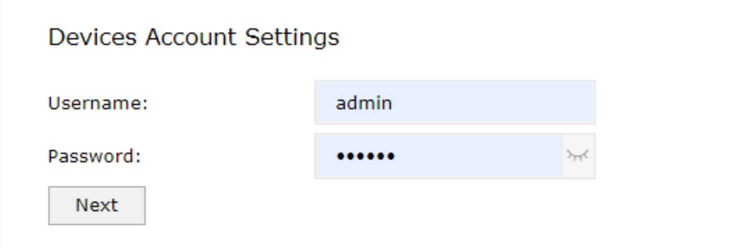
5) Adding device to the mesh network.



Adding device(s)...

Please check the added devices in Mesh Group.

6) Configure the Device Account Settings.

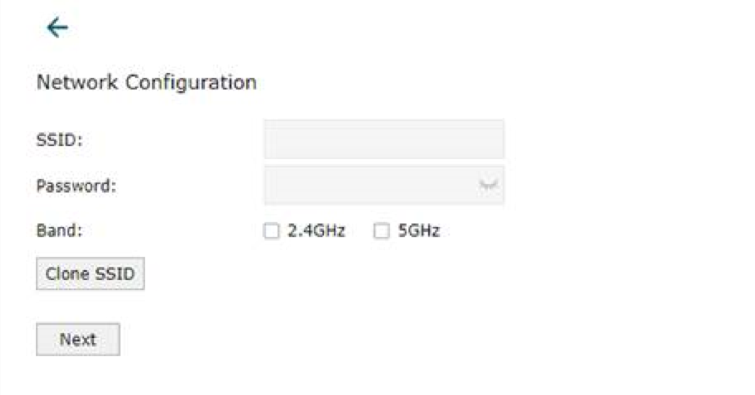


Devices Account Settings

Username: admin

Password: ••••••

7) Configure the network settings.



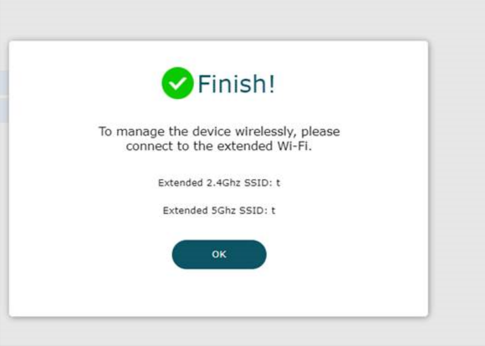
Network Configuration

SSID:

Password:

Band: □ 2.4GHz □ 5GHz

8) Done. The mesh network is set up. To manage the device wirelessly, connect to the extended network.



Finish!

To manage the device wirelessly, please connect to the extended Wi-Fi.

Extended 2.4Ghz SSID: t

Extended 5Ghz SSID: t

Part 4

Configuring Network

CHAPTERS

1 Overview

The Network module provides basic router functions, including WAN connection, DHCP service, VLAN and more.

1.1 Supported Features

WAN

WAN ports connect to the internet. You can configure multiple WAN ports for your network. Each WAN port has its own connection type and parameters, which you should configure according to the requirements of your ISP.

LAN

When the LAN ports of the router connect to your local network devices, the router functions as the gateway, which allows those devices to connect to the internet.

IPTV

Configure IPTV settings to enable Internet/IPTV/Phone service provided by your ISP (internet service provider).

MAC

You can change the default MAC address of the WAN port according to your needs.

Switch

The router supports some basic switch port management functions, like Port Mirror, Rate Control, Flow Control and Port Negotiation, to help you monitor the traffic and manage the network effectively.

VLAN

VLAN enables you to divide the LAN into multiple logical networks and control the traffic among them in a convenient and flexible way. The LAN can be logically segmented by departments, application, or types of users, without regard to geographic locations.

IPv6

IPv6 is the next-generation network protocol following IPv4. You can configure IPv6 network for the router if your ISP supports IPv6. IPv6 network won’t cause conflict with your current IPv4 network.

2 WAN Configuration

WAN ports connect to the internet. You can configure multiple WAN ports for your network. Each WAN port has its own connection type and parameters, which you should configure according to the requirements of your ISP.

To complete WAN configuration, follow these steps:

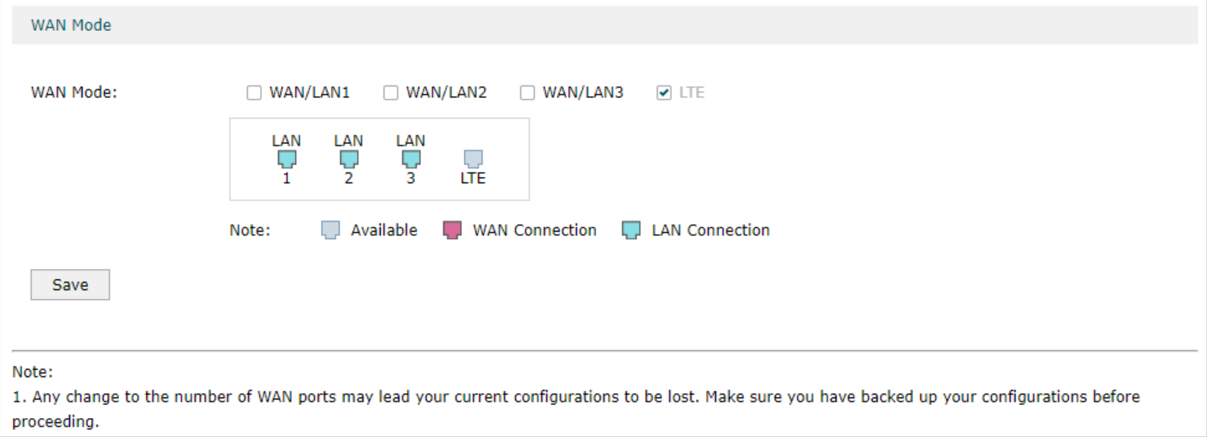
1) In WAN Mode, determine the number of WAN ports according to your needs.

2) Configure WAN connection for the WAN port(s).

2.1 Configuring the Number of WAN Ports

Choose the menu **Network** > **WAN** > **WAN Mode** to load the following page.

Figure 2-1 Configuring the WAN Mode



WAN Mode

WAN Mode: □ WAN/LAN1 □ WAN/LAN2 □ WAN/LAN3 ☑ LTE

Note: Available WAN Connection LAN Connection

Save

Note:
1. Any change to the number of WAN ports may lead your current configurations to be lost. Make sure you have backed up your configurations before proceeding.

WAN Mode	Determine the number of WAN ports according to your needs. To enable a port as WAN port, check the box of the desired port. To configure multiple WAN ports, enable the ports. Only WAN, WAN/LAN can function as WAN port.

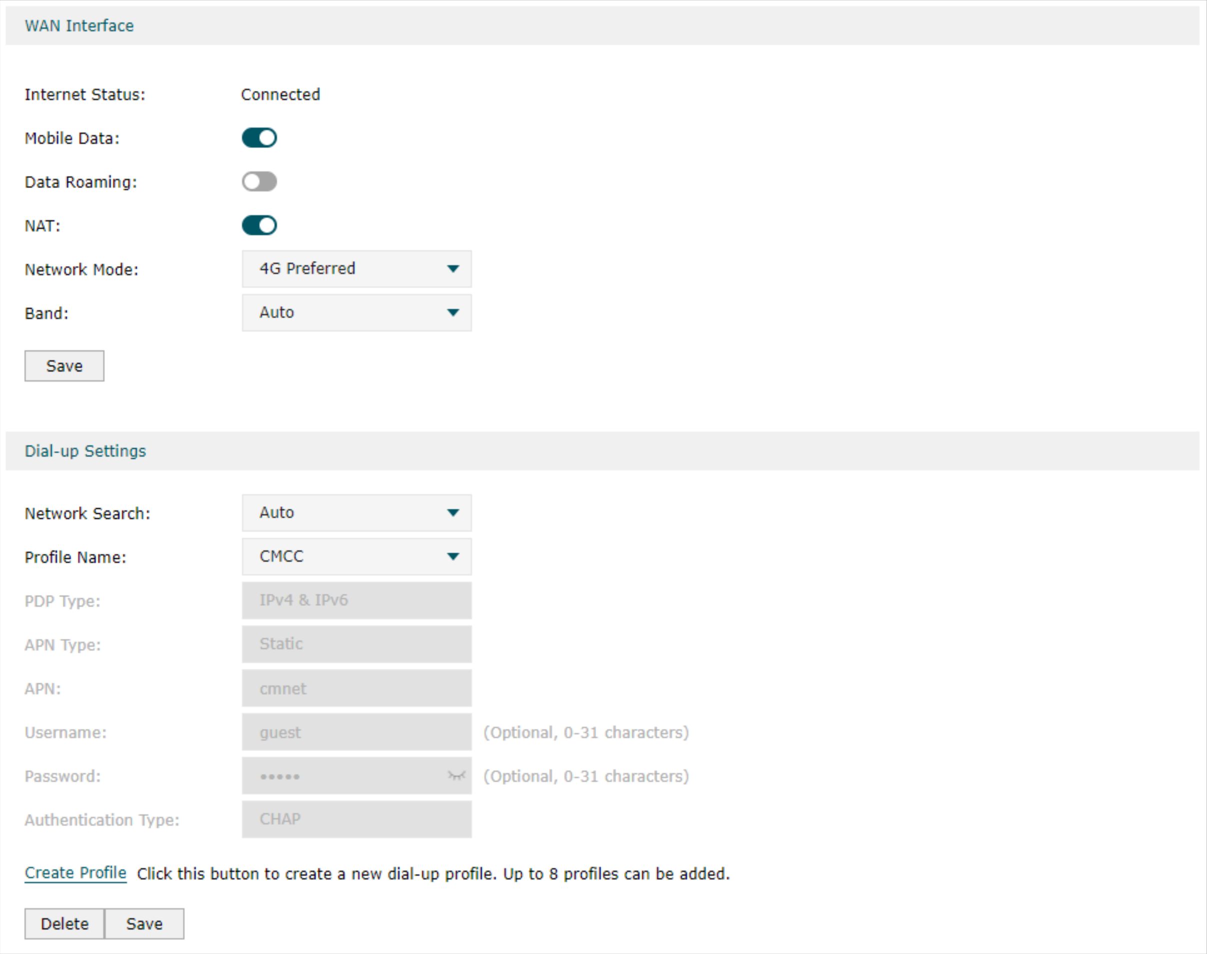
Note:

Any change to the number of WAN ports may lead your current configurations to be lost. Make sure you have backed up your configurations before proceeding.

2.2 Configuring LTE WAN

Choose the menu **Network** > **WAN** > **LTE WAN** to load the following page.

Figure 2-1 Configuring the LTE WAN



WAN Interface

Internet Status: Connected

Mobile Data: ●

Data Roaming: ○

NAT: ●

Network Mode: 4G Preferred

Band: Auto

Save

Dial-up Settings

Network Search: Auto

Profile Name: CMCC

PDP Type: IPv4 & IPv6

APN Type: Static

APN: cmnet

Username: guest (Optional, 0-31 characters)

Password: ••••• (Optional, 0-31 characters)

Authentication Type: CHAP

Create Profile Click this button to create a new dial-up profile. Up to 8 profiles can be added.

Delete Save

In the **WAN Interface** section, enable the desired features and enter the corresponding parameters and click **Save**.

Mobile Data	It is enabled by default. You can disable it to block internet access.
Data Roaming	It is disabled by default. If disabled, data service usage is not allowed while roaming. If enabled, data service is allowed while roaming, but significant roaming charges may apply.
NAT	This feature is enabled by default. It is recommended to keep the default setting. If you disable it, you may not be able to access the internet.
Network Mode	You can choose a network mode according to your mobile network standard and current network conditions.
Band	The device supports two methods of band selection - Auto and Manual. Auto - The device will automatically choose available LTE frequency bands nearby based on advanced band selection algorithms. Manual - The device will automatically search for available LTE frequency bands. Then you can select specific bands as needed.

Note:

If you are not familiar with this, keep the default option or contact your carrier for more details.

In the **Dial-up Settings** section, enter the corresponding parameters and click **Save**.

Network Search	The device provides two types of network connection - Auto and Manual. Please select the connection mode as you need. Auto - The device will automatically establish connection once it's started. Manual - When you select Manual and click Search, the device will search for mobile networks automatically and you can choose a network with better performance to access, which is related or have corporation with the network provider of your SIM.
Create Profile	Click to create a new dial-up profile. Up to 8 profiles can be added.
Profile Name	The name of the profile you've selected.
PDP Type	Select the type of your PDP (Packet Data Protocol).
APN	Access Point Name, provided by your ISP. You need to set APN only after selecting the static APN type. You are recommended to keep the default value.
Username/ Password	Enter the username and password provided by your ISP. These fields are case-sensitive. You are recommended to keep the default value.
Authentication Type	Some ISPs need a specific authentication type, please confirm it with your ISP or keep the default value. None - No authentication is required. PAP - Password Authentication Protocol. The protocol allows a device to establish authentication with a peer using a two-way handshake. Select this option if your ISP requires this authentication type. CHAP - Challenge Handshake Authentication Protocol. The protocol allows a device to establish authentication with a peer using a three-way handshake and periodically checking the peer's identity. Select this option if your ISP requires this authentication type.

2.3 Configuring the WAN Connection

The gateway supports five connection types: **Static IP, Dynamic IP, PPPoE, L2TP, PPTP,** you can choose one according to the requirements of your ISP.

Static IP: Select this type if your ISP has offered you a fixed IP address.

Dynamic IP: Select this type if your ISP automatically assigns the IP address.

PPPoE: Select this type if your ISP provides you with a PPPoE account.

L2TP: Select this type if your ISP provides you with an L2TP account.

PPTP: Select this type if your ISP provides you with a PPTP account.

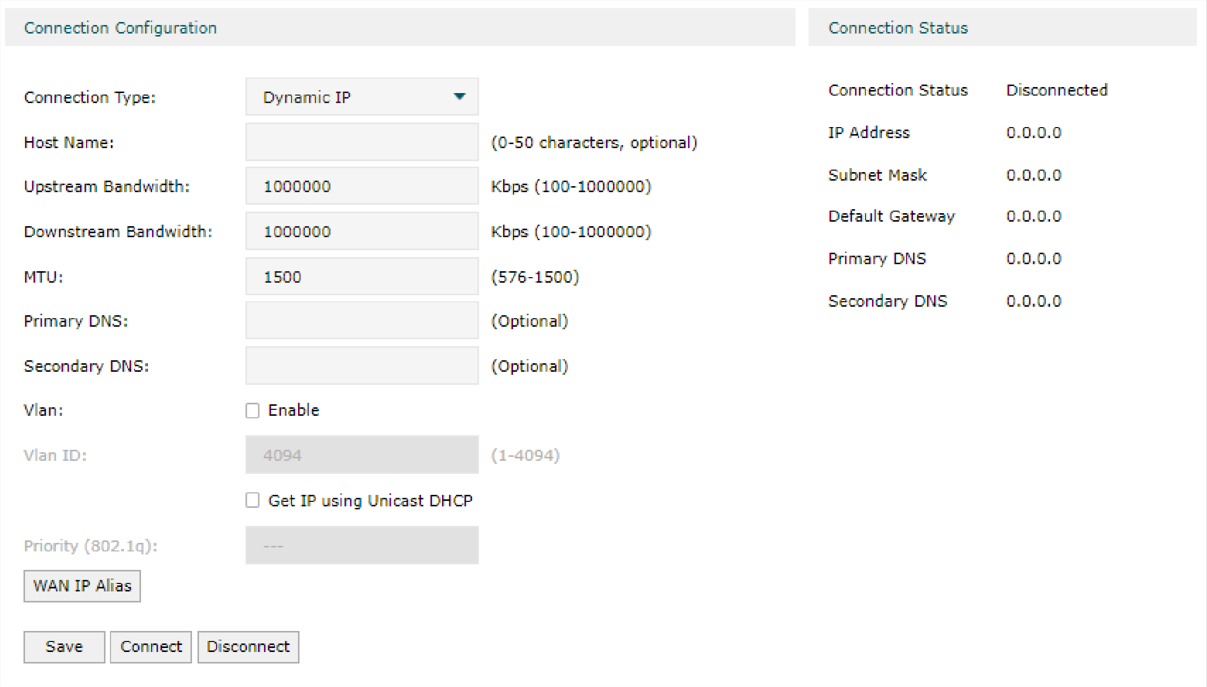
Note:

The number of configurable WAN ports is decided by WAN Mode. To configure WAN Mode, refer to Configuring the Number of WAN Ports.

Configuring the Dynamic IP

Choose the menu **Network** > **WAN** > **WAN/LAN1** to load the following page.

Figure 2-2 Configuring the Dynamic IP



Connection Configuration

Connection Type:	Dynamic IP	
Host Name:		(0-50 characters, optional)
Upstream Bandwidth:	1000000	Kbps (100-1000000)
Downstream Bandwidth:	1000000	Kbps (100-1000000)
MTU:	1500	(576-1500)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	□ Enable	
Vlan ID:	4094	(1-4094)
	□ Get IP using Unicast DHCP	
Priority (802.1q):	---	

Connection Status

Connection Status	Disconnected
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0

In the **Connection Configuration** section, select the connection type as Dynamic IP. Enter the corresponding parameters and click **Save**.

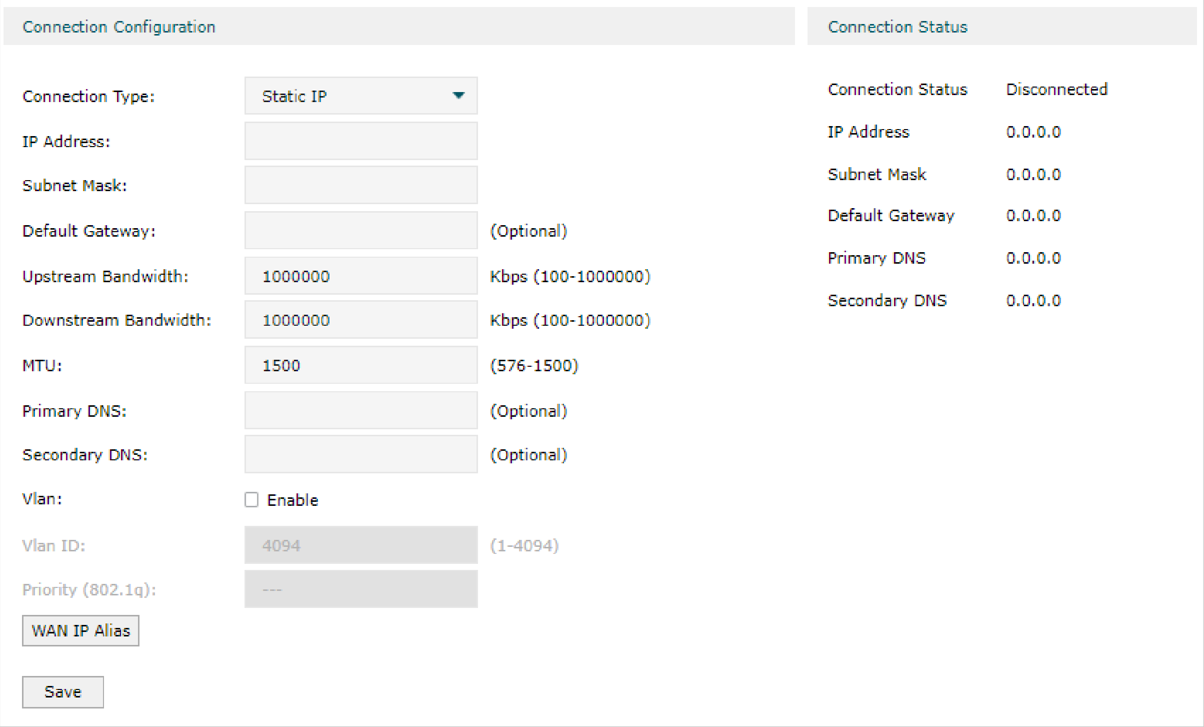
Connection Type	Choose the connection type as Dynamic IP if your ISP has offered you a fixed IP address..
Host Name	(Optional) Enter a name for the gateway. It is null by default.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. This value is the upper limit of the Maximum Upstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. This value is the upper limit of the Maximum Downstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.

MTU	Specify the MTU (Maximum Transmission Unit) of the WAN port. MTU is the maximum data unit transmitted in the physical network. When Dynamic IP is selected, MTU can be set in the range of 576-1500 bytes. The default value is 1500.
Primary/ Secondary DNS	(Optional) Enter the IP address of the DNS server provided by your ISP.
VLAN	Add the WAN port to a VLAN. Generally, you don’t need to manually configure it unless required by your ISP.
VLAN ID	If VLAN for the WAN port is enabled, you need to enter a VLAN ID. Then the WAN port is automatically assigned to the VLAN. By default, the egress rule of the VLAN is UNTAG, so the packets are transmitted by the WAN port without VLAN tags. If you want the WAN port to transmit packets with VLAN tag, you need to configure its egress rule as TAG. To configure VLANs, go to **Network > VLAN > VLAN**.
Get IP using Unicast DHCP	The broadcasting requirement may not be supported by a few ISPs. Select this option if you can not get the IP address from your ISP in the normal DHCP process. This option is not required generally.
Priority	Priority is only available when Internet VLAN is enabled. The Internet VLAN Priority function helps to prioritize the internet traffic based on your needs. You can determine the priority level for the traffic by specifying the tag. The tag ranges from 0 to 7. None means the packet will be forwarded without any operation.
WAN IP Alias	WAN IP Alias supports configuring multiple IP addresses on one WAN port, and these IP addresses can be used to configure virtual server and other functions. Note: The WAN IP Alias configuration will take effect only when you click Save to apply the connection settings.
Connect/ Disconnect	Click the button to active/terminate the connection.

Configuring the Static IP

Choose the menu **Network** > **WAN** > **WAN/LAN1** to load the following page.

Figure 2-3 Configuring the Static IP



Connection Configuration

Connection Type:	Static IP	
IP Address:		
Subnet Mask:		
Default Gateway:		(Optional)
Upstream Bandwidth:	1000000	Kbps (100-1000000)
Downstream Bandwidth:	1000000	Kbps (100-1000000)
MTU:	1500	(576-1500)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	□ Enable	
Vlan ID:	4094	(1-4094)
Priority (802.1q):	---	

Connection Status

Connection Status	Disconnected
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0

In **Connection Configuration** section, select the connection type as Static IP. Enter the corresponding parameters and click **Save**.

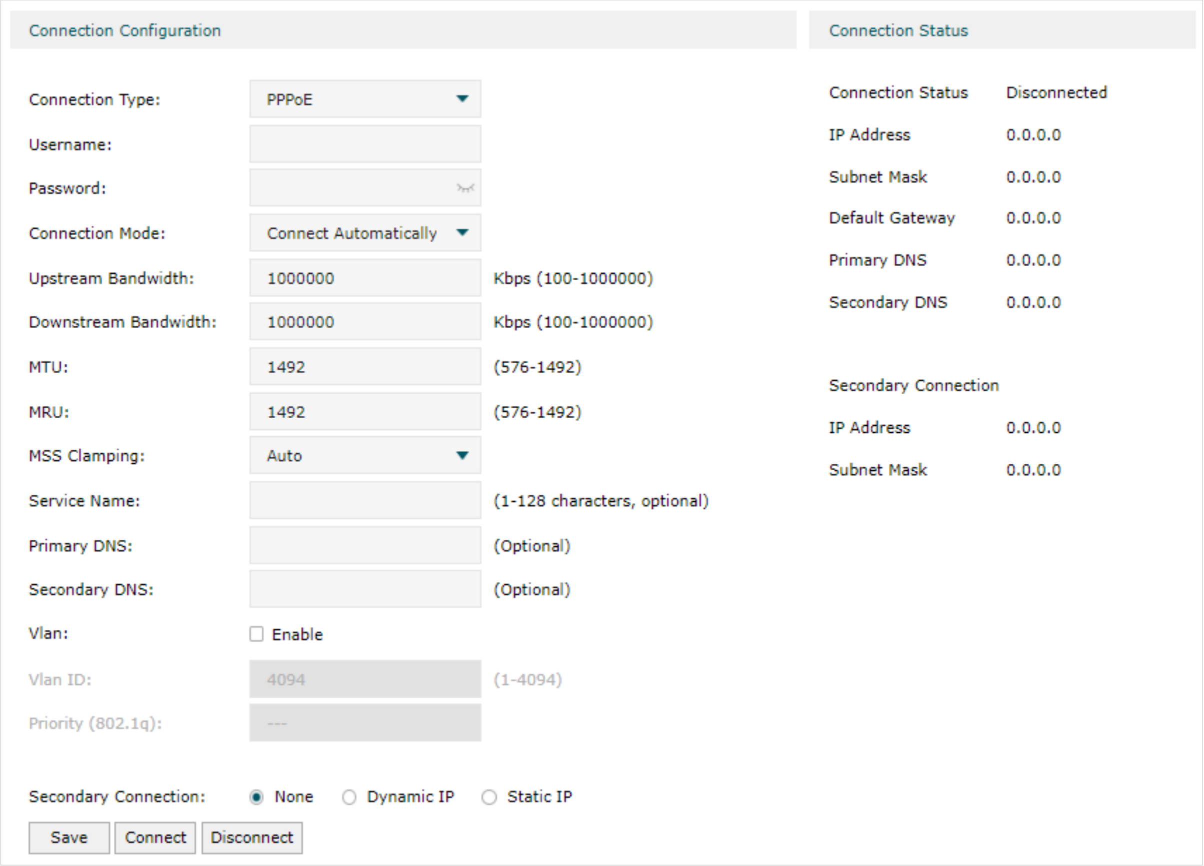
Connection Type	Choose the connection type as Static IP if your ISP has offered you a fixed IP address.
IP Address	Enter the IP address provided by your ISP.
Subnet Mask	Enter the subnet mask provided by your ISP.
Default Gateway	Enter the default gateway provided by your ISP.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. This value is the upper limit of the Maximum Upstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. This value is the upper limit of the Maximum Downstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.

MTU	Specify the MTU (Maximum Transmission Unit) of the WAN port. MTU is the maximum data unit transmitted in the physical network. When Static IP is selected, MTU can be set in the range of 576-1500 bytes. The default value is 1500.
Primary/ Secondary DNS	(Optional) Enter the IP address of the DNS server provided by your ISP.
VLAN	Add the WAN port to a VLAN. Generally, Generally, you don't need to enable VLAN for the WAN port unless required by your ISP.
VLAN ID	If VLAN for the WAN port is enabled, you need to enter a VLAN ID. Then the WAN port is automatically assigned to the VLAN. By default, the egress rule of the VLAN is UNTAG, so the packets are transmitted by the WAN port without VLAN tags. If you want the WAN port to transmit packets with VLAN tag, you need to configure its egress rule as TAG. To configure VLANs, go to **Network > VLAN > VLAN**.
Priority	Priority is only available when Internet VLAN is enabled. The Internet VLAN Priority function helps to prioritize the internet traffic based on your needs. You can determine the priority level for the traffic by specifying the tag. The tag ranges from 0 to 7. None means the packet will be forwarded without any operation.
WAN IP Alias	WAN IP Alias supports configuring multiple IP addresses on one WAN port, and these IP addresses can be used to configure virtual server and other functions. Note: The WAN IP Alias configuration will take effect only when you click Save to apply the connection settings.

Configuring the PPPoE

Choose the menu **Network** > **WAN** > **WAN/LAN1** to load the following page.

Figure 2-4 Configuring the PPPoE



Connection Configuration

Connection Type:	PPPoE ▼	
Username:		
Password:		
Connection Mode:	Connect Automatically ▼	
Upstream Bandwidth:	1000000	Kbps (100-1000000)
Downstream Bandwidth:	1000000	Kbps (100-1000000)
MTU:	1492	(576-1492)
MRU:	1492	(576-1492)
MSS Clamping:	Auto ▼	
Service Name:		(1-128 characters, optional)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	□ Enable	
Vlan ID:	4094	(1-4094)
Priority (802.1q):	---	

Secondary Connection: ● None ○ Dynamic IP ○ Static IP

Connection Status

Connection Status	Disconnected
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0

Secondary Connection

IP Address	0.0.0.0
Subnet Mask	0.0.0.0

In the **Connection Configuration** section, select the connection type as PPPoE. Enter the corresponding parameters and click **Save**.

Connection Type	Choose the connection type as PPPoE if your ISP provides you with a PPPoE account.
Username	Enter the PPPoE username provided by your ISP.
Password	Enter the PPPoE password provided by your ISP.
Connection Mode	Choose the connection mode, including **Connect Automatically**, **Connect Manually** and **Time-Based.** **Connect Automatically:** The gateway will activate the connection automatically when the gateway reboots or the connection is down. **Connect Manually:** You can manually activate or terminate the connection. **Time-Based:** During the specified period, the gateway will automatically activate the connection.
Time	Choose the time range for automatic connection. To create the time range, go to **Preferences** > **Time Range > Time Range**.

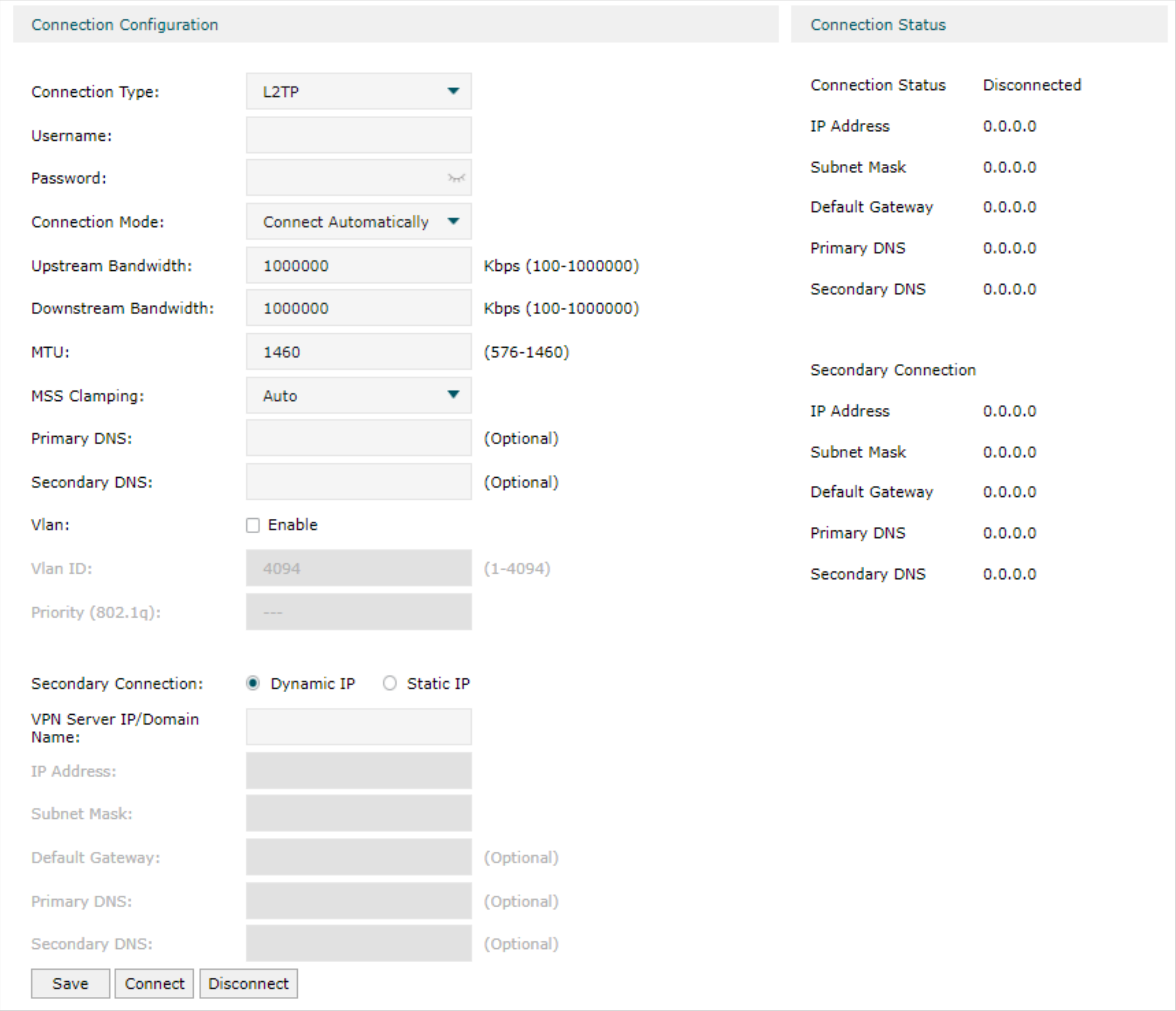
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. This value is the upper limit of the Maximum Upstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. This value is the upper limit of the Maximum Downstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
MTU	Specify the MTU (Maximum Transmission Unit) of the WAN port. MTU is the maximum data unit transmitted in the physical network. When PPPoE is selected, MTU can be set in the range of 576-1492 bytes. The default value is 1492.
MRU	Specify the MRU (Maximum Receive Unit) of the WAN port. MRU is the largest packet size the gateway will allow a computer on the network to receive. When PPPoE is selected, MRU can be set in the range of 576-1492 bytes. The default value is 1492.
Service Name	(Optional) Enter the service name. This parameter is not required unless provided by your ISP. It is null by default.
Primary/ Secondary DNS	(Optional) Enter the IP address of the DNS server provided by your ISP.
VLAN	Add the WAN port to a VLAN. Generally, Generally, you don’t need to enable VLAN for the WAN port unless required by your ISP.
VLAN ID	If VLAN for the WAN port is enabled, you need to enter a VLAN ID. Then the WAN port is automatically assigned to the VLAN. By default, the egress rule of the VLAN is UNTAG, so the packets are transmitted by the WAN port without VLAN tags. If you want the WAN port to transmit packets with VLAN tag, you need to configure its egress rule as TAG. To configure VLANs, go to **Network > VLAN > VLAN**.
Priority	Priority is only available when Internet VLAN is enabled. The Internet VLAN Priority function helps to prioritize the internet traffic based on your needs. You can determine the priority level for the traffic by specifying the tag. The tag ranges from 0 to 7. None means the packet will be forwarded without any operation.
WAN IP Alias	WAN IP Alias supports configuring multiple IP addresses on one WAN port, and these IP addresses can be used to configure virtual server and other functions. Note: The WAN IP Alias configuration will take effect only when you click Save to apply the connection settings.

Secondary Connection	Secondary connection is required by some ISPs. Select the connection type required by your ISP. **None:** Select this if the secondary connection is not required by your ISP. **Dynamic IP:** Select this if your ISP automatically assigns the IP address and subnet mask for the secondary connection. **Static IP:** Select this if your ISP provides you with a fixed IP address and subnet mask for the secondary connection.
Connect/ Disconnect	Click the button to active/terminate the connection.

Configuring the L2TP

Choose the menu **Network** > **WAN** > **WAN/LAN1** to load the following page.

Figure 2-5 Configuring the L2TP



Connection Configuration

Connection Type:	L2TP	
Username:		
Password:		
Connection Mode:	Connect Automatically	
Upstream Bandwidth:	1000000	Kbps (100-1000000)
Downstream Bandwidth:	1000000	Kbps (100-1000000)
MTU:	1460	(576-1460)
MSS Clamping:	Auto	
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	□ Enable	
Vlan ID:	4094	(1-4094)
Priority (802.1q):	---	
Secondary Connection:	● Dynamic IP ○ Static IP	
VPN Server IP/Domain Name:		
IP Address:		
Subnet Mask:		
Default Gateway:		(Optional)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)

Connection Status

Connection Status	Disconnected
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0
Secondary Connection	
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0

In the **Connection Configuration** section, select the connection type as L2TP. Enter the corresponding parameters and click **Save**.

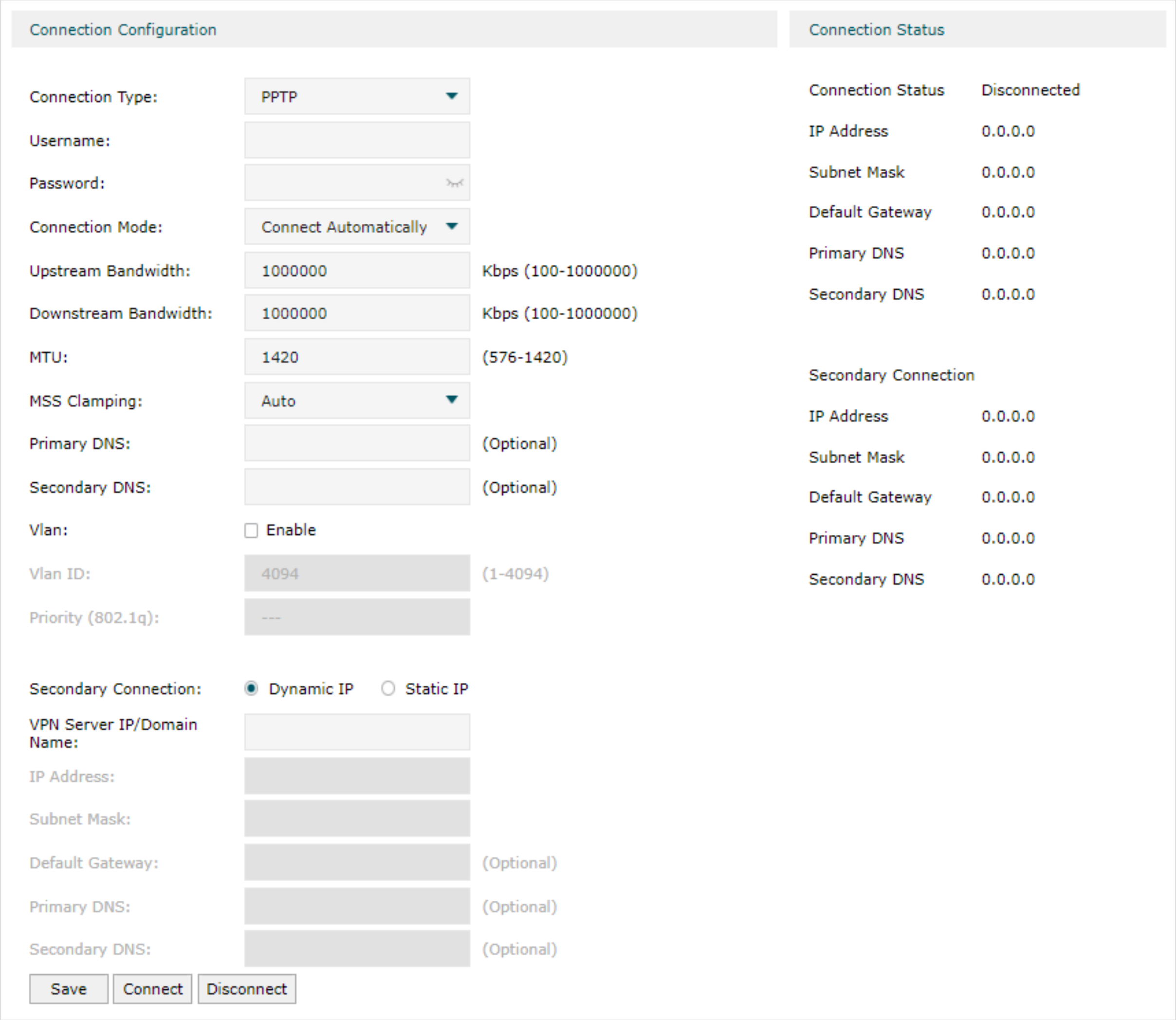
Connection Type	Choose the connection type as L2TP if your ISP provides you with an L2TP account.
Username	Enter the L2TP username provided by your ISP.
Password	Enter the L2TP password provided by your ISP.
Connection Mode	Choose the connection mode, including **Connect Automatically**, **Connect Manually** and **Time-Based.** **Connect Automatically:** The gateway will activate the connection automatically when the gateway reboots or the connection is down. **Connect Manually:** You can manually activate or terminate the connection. **Time-Based:** During the specified period, the gateway will automatically activate the connection.
Time	Choose the time range for automatic connection. To create the time range, go to **Preferences > Time Range > Time Range**.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. This value is the upper limit of the Maximum Upstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. This value is the upper limit of the Maximum Downstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
MTU	Specify the MTU (Maximum Transmission Unit) of the WAN port. MTU is the maximum data unit transmitted in the physical network. When L2TP is selected, MTU can be set in the range of 576-1460 bytes. The default value is 1460.
Primary/ Secondary DNS	(Optional) Enter the IP address of the DNS server provided by your ISP.
VLAN	Add the WAN port to a VLAN. Generally, Generally, you don't need to enable VLAN for the WAN port unless required by your ISP.
VLAN ID	If VLAN for the WAN port is enabled, you need to enter a VLAN ID. Then the WAN port is automatically assigned to the VLAN. By default, the egress rule of the VLAN is UNTAG, so the packets are transmitted by the WAN port without VLAN tags. If you want the WAN port to transmit packets with VLAN tag, you need to configure its egress rule as TAG. To configure VLANs, go to **Network > VLAN > VLAN**.
Priority	Priority is only available when Internet VLAN is enabled. The Internet VLAN Priority function helps to prioritize the internet traffic based on your needs. You can determine the priority level for the traffic by specifying the tag. The tag ranges from 0 to 7. None means the packet will be forwarded without any operation.

WAN IP Alias	WAN IP Alias supports configuring multiple IP addresses on one WAN port, and these IP addresses can be used to configure virtual server and other functions. Note: The WAN IP Alias configuration will take effect only when you click Save to apply the connection settings.
Secondary Connection	Select the secondary connection type according to the requirements of your ISP. The secondary connection is required for L2TP connection. The gateway will get some necessary information after the secondary connection succeeded. The information will be used in the L2TP connection process. **Dynamic IP:** If you select the secondary connection type as Dynamic IP, the gateway set up the secondary connection dynamically. **Static IP:** If you select the secondary connection type as Static IP, you need to configure IP Address, Subnet Mask, Default Gateway, Primary/Second DNS for the secondary connection.
VPN Server/ Domain Name	Enter the VPN Server/Domain Name provided by your ISP.
IP Address	Enter the IP address provided by your ISP for the secondary connection.
Subnet Mask	Enter the subnet mask provided by your ISP for the secondary connection.
Default Gateway	Enter the default gateway provided by your ISP for the secondary connection.
Primary/ Secondary DNS	Enter the primary/secondary DNS provided by your ISP for the secondary connection.
Connect/ Disconnect	Click the button to active/terminate the connection.

Configuring the PPTP

Choose the menu **Network** > **WAN** > **WAN/LAN1** to load the following page.

Figure 2-6 Configuring the PPTP



Connection Configuration

Connection Type:	PPTP	
Username:		
Password:		
Connection Mode:	Connect Automatically	
Upstream Bandwidth:	1000000	Kbps (100-1000000)
Downstream Bandwidth:	1000000	Kbps (100-1000000)
MTU:	1420	(576-1420)
MSS Clamping:	Auto	
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	□ Enable	
Vlan ID:	4094	(1-4094)
Priority (802.1q):	---	
Secondary Connection:	● Dynamic IP ○ Static IP	
VPN Server IP/Domain Name:		
IP Address:		
Subnet Mask:		
Default Gateway:		(Optional)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)

Connection Status

Connection Status	Disconnected
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0
Secondary Connection	
IP Address	0.0.0.0
Subnet Mask	0.0.0.0
Default Gateway	0.0.0.0
Primary DNS	0.0.0.0
Secondary DNS	0.0.0.0

In **Connection Configuration** section, select the connection type as PPTP. Enter the corresponding parameters and click **Save**.

Connection Type	Choose the connection type as PPTP if your ISP provides you with a PPTP account.
Username	Enter the PPTP username provided by your ISP.
Password	Enter the PPTP password provided by your ISP.

Connection Mode	Choose the connection mode, including **Connect Automatically**, **Connect Manually** and **Time-Based.** **Connect Automatically:** The gateway will activate the connection automatically when the gateway reboots or the connection is down. **Connect Manually:** You can manually activate or terminate the connection. **Time-Based:** During the specified period, the gateway will automatically activate the connection.
Time	Choose the time range for automatic connection. To create the time range, go to **Preferences** > **Time Range > Time Range**.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. This value is the upper limit of the Maximum Upstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. This value is the upper limit of the Maximum Downstream Bandwidth on **Transmission > Bandwidth Control** page. Also, this value determines the bandwidth ratio of each WAN port after Bandwidth Based Balance Routing is enabled on **Transmission > Load Balancing > Basic Settings** page.
MTU	Specify the MTU (Maximum Transmission Unit) of the WAN port. MTU is the maximum data unit transmitted in the physical network. When PPTP is selected, MTU can be set in the range of 576-1420 bytes. The default value is 1420.
Primary/ Secondary DNS	(Optional) Enter the IP address of the DNS server provided by your ISP.
VLAN	Add the WAN port to a VLAN. Generally, you don't need to enable VLAN for the WAN port unless required by your ISP.
VLAN ID	If VLAN for the WAN port is enabled, you need to enter a VLAN ID. Then the WAN port is automatically assigned to the VLAN. By default, the egress rule of the VLAN is UNTAG, so the packets are transmitted by the WAN port without VLAN tags. If you want the WAN port to transmit packets with VLAN tag, you need to configure its egress rule as TAG. To configure VLANs, go to **Network > VLAN > VLAN**.
VLAN ID	If VLAN for the WAN port is enabled, you need to enter a VLAN ID. Then the WAN port is automatically assigned to the VLAN. By default, the egress rule of the VLAN is UNTAG, so the packets are transmitted by the WAN port without VLAN tags. If you want the WAN port to transmit packets with VLAN tag, you need to configure its egress rule as TAG. To configure VLANs, go to **Network > VLAN > VLAN**.
Priority	Priority is only available when Internet VLAN is enabled. The Internet VLAN Priority function helps to prioritize the internet traffic based on your needs. You can determine the priority level for the traffic by specifying the tag. The tag ranges from 0 to 7. None means the packet will be forwarded without any operation.

Secondary Connection	Select the secondary connection type according to the requirements of your ISP. The secondary connection is required for PPTP connection. The gateway will get some necessary information after the secondary connection succeeded. The information will be used in the PPTP connection process. **Dynamic IP:** If you select the secondary connection type as Dynamic IP, the gateway set up the secondary connection dynamically. **Static IP:** If you select the secondary connection type as Static IP, you need to configure IP Address, Subnet Mask, Default Gateway, Primary/Second DNS for the secondary connection.
VPN Server/ Domain Name	Enter the VPN Server/Domain Name provided by your ISP.
IP Address	Enter the IP address provided by your ISP for the secondary connection.
Subnet Mask	Enter the subnet mask provided by your ISP for the secondary connection.
Default Gateway	Enter the default gateway provided by your ISP for the secondary connection.
Primary/ Secondary DNS	Enter the primary/secondary DNS provided by your ISP for the secondary connection.
Connect/ Disconnect	Click the button to active/terminate the connection.

3 LTE Configuration

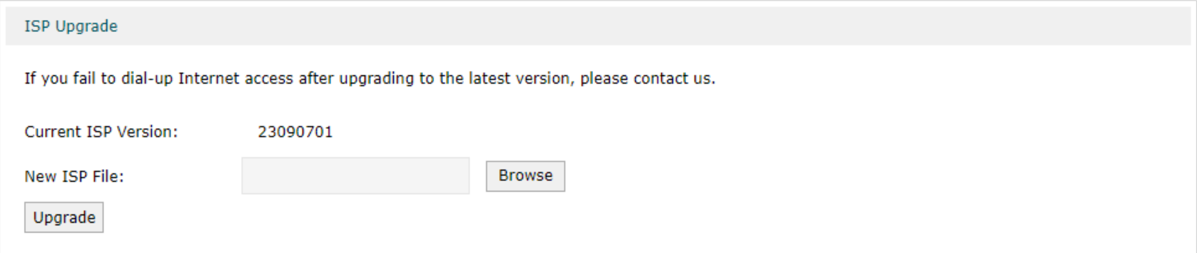
Configure the LTE related parameters for your LTE network.

- Configure the ISP Upgrade.
- Configure the PIN Management.
- Configure the Data Settings

3.1 Configuring the ISP Upgrade

Choose the menu **Network** > **LTE** > **ISP Upgrade** to load the following page.

Figure 3-1 Configuring the ISP Upgrade



ISP Upgrade

If you fail to dial-up Internet access after upgrading to the latest version, please contact us.

Current ISP Version: 23090701

New ISP File:

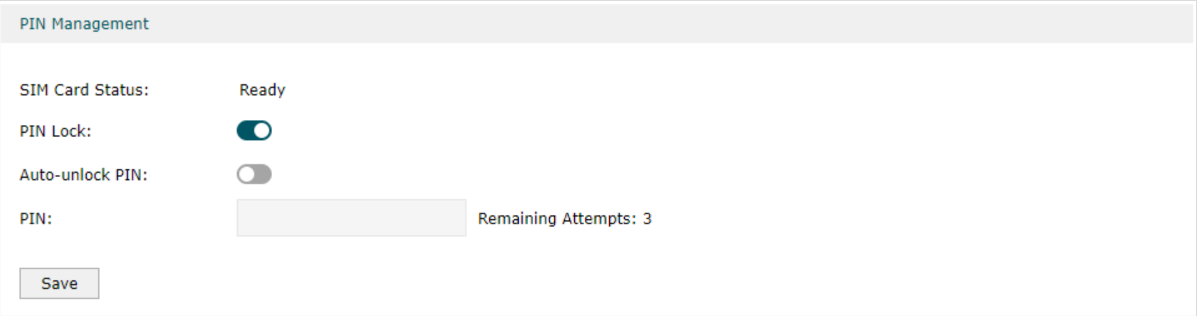
- To upgrade ISP information

1) Download the latest ISP upgrade file from the Support page at www.tp-link.com to your computer.
2) Click **Browse** to locate and select the latest file.
3) Click **Upgrade**.

3.2 Configuring the PIN Management

Choose the menu **Network** > **LTE** > **PIN Management** to load the following page.

Figure 3-2 Configuring the PIN Management



PIN Management

SIM Card Status: Ready

PIN Lock: ●

Auto-unlock PIN: ○

PIN:

Remaining Attempts: 3

SIM Card Status	Displays the status of your SIM card.
PIN Lock	You can select whether to enable this function or not. Once the PIN Lock function is enabled, every time you start the device with this SIM card inserted, you need to enter the PIN code. But you can go to enable the Auto-unlock PIN function, which could save you this trouble.
Auto-unlock PIN	When the PIN code is required upon device restarting, it will be validated automatically once. If validation failed, you need to enter the PIN code on the PIN Management page.
PIN	Personal Identification Number of the SIM card. It consists of 4-8 digits.
PUK	PIN Unlocked Key. It consists of 8 digits.
Remaining Attempts	Displays how many attempts are left for you to try entering the PIN or PUK code. You have 3 attempts at most for entering the PIN code and 10 attempts at most for entering the PUK code.

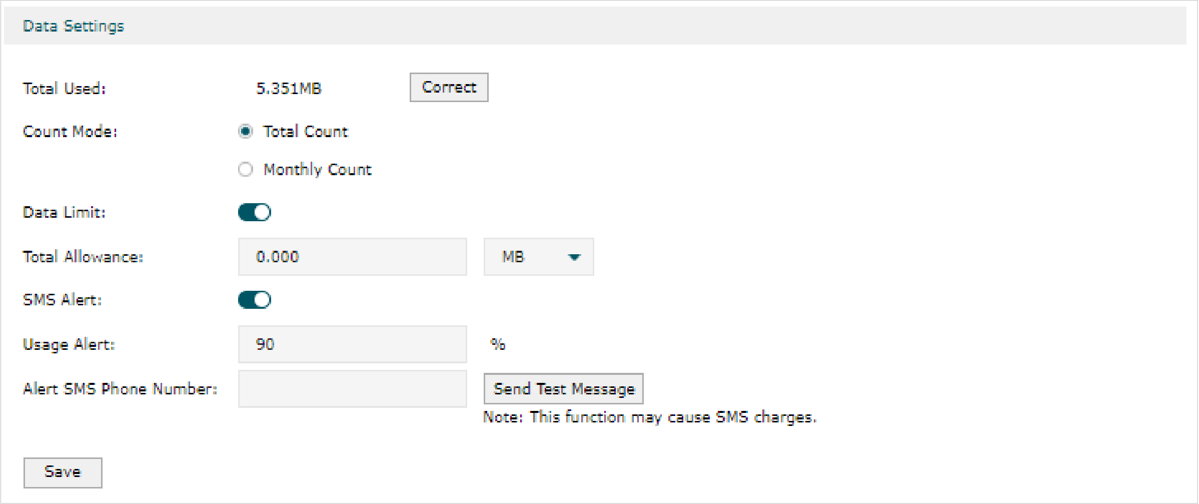
3.3 Configuring the Data Settings

You can view the data statistics and set a data limit to better control your data usage so that you will not exceed the data package provided by your carrier.

The data usage is for reference only, and the specific data shall be subject to the operator.

Choose the menu **Network** > **LTE** > **Data Settings** to load the following page.

Figure 3-3 Configuring the Data Settings



Data Settings

Total Used: 5.351MB

Count Mode: ● Total Count ○ Monthly Count

Data Limit: On

Total Allowance: 0.000 MB

SMS Alert: On

Usage Alert: 90 %

Alert SMS Phone Number:

Note: This function may cause SMS charges.

Follow the steps below to set the data limit:

1) Toggle on **Data Limit**.

2) Enter the total allowance provided by your carrier. When your data usage reaches the allowance, the device will automatically disconnect from the internet.

3) Enter the usage alert percentage. When your data usage reaches this proportion of the total allowance, you will receive a message.

4) Enter the phone number via which you will receive the alert message. You will also receive a message if the device automatically disconnects from the internet when your data usage reaches the allowance.

5) Toggle on **Monthly Count** and enter the start date if you want to view the monthly data used and set a monthly data limit.

6) Click **Save**.

Parameters

Monthly Used/ Total Used	Displays the total traffic/monthly traffic used according to the set traffic billing method.
Correct	Correct the traffic used (according to the billing method, total traffic/monthly traffic).
Count Mode	Select the count mode, total count or monthly count. Monthly count needs to select start date for each monthly count cycle.
Start Date	The start date of the monthly count cycle. For example: 2nd, indicating that the monthly count cycle is from the 2nd of this month to the 1st of the next month.
Total Allowance/ Monthly Allowance	How much traffic is allowed to use for a month or in total.
SMS Alert	The SMS alert switch of the data limit, if the data limit function is turned on and the SMS altert is turned on, when the usage alert of the set data allowance is reached or the set data allowance is reached, the SMS alert will be sent.
Usage Alert	Usage alert. For example, when 80% of the data allowance is reached, an SMS alert will be sent.
Alert SMS Phone Number	The number for receiving alert SMS.
Send Text Message	Send a test SMS to confirm that the number can be used to receive alert SMS.

4 LAN Configuration

The LAN port is used to connect to the LAN clients, and works as the default gateway for these clients. You can configure the DHCP server for the LAN clients, and clients will automatically be assigned to IP addresses if the method of obtaining IP addresses is set as "Obtain IP address automatically".

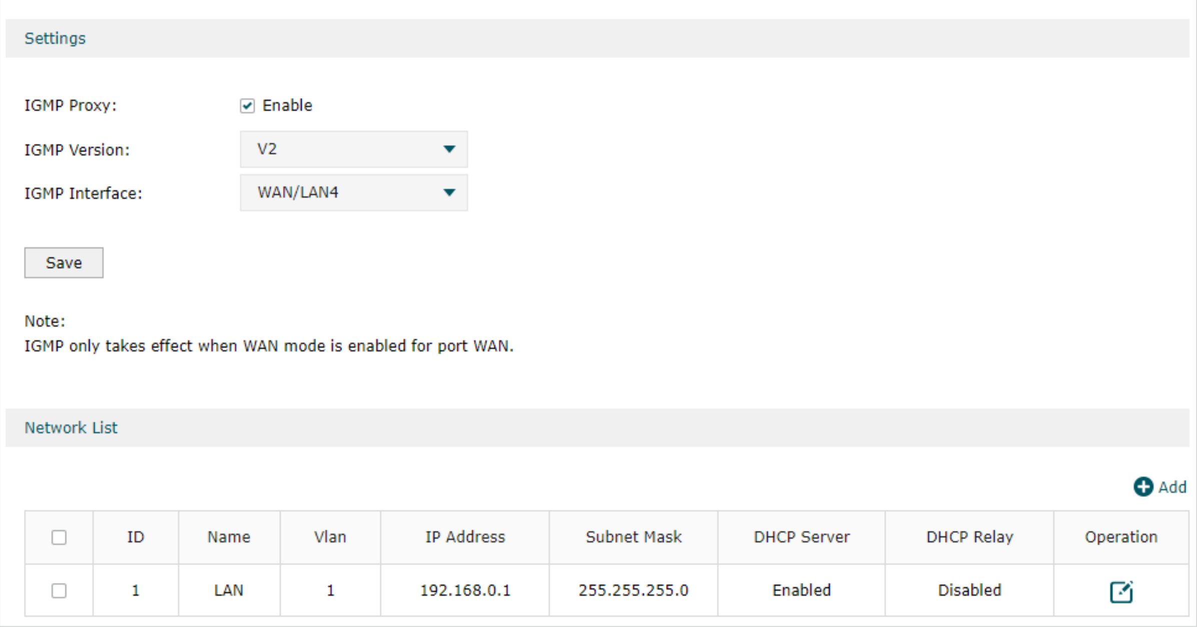
For LAN configuration, you can:

- Configure the IP address of the LAN port.
- Configure the DHCP server.
- Reserve IP addresses for certain LAN clients

4.1 Configuring the IGMP Proxy

Choose the menu **Network** > **LAN** > **LAN** to load the following page.

Figure 4-1 Configuring the LAN IP Address



Settings

IGMP Proxy: ☑ Enable

IGMP Version: V2

IGMP Interface: WAN/LAN4

Note:
IGMP only takes effect when WAN mode is enabled for port WAN.

Network List

□	ID	Name	Vlan	IP Address	Subnet Mask	DHCP Server	DHCP Relay	Operation
□	1	LAN	1	192.168.0.1	255.255.255.0	Enabled	Disabled	✎

In the **Settings** section, enable IGMP Proxy, select the corresponding parameters and click **Save**.

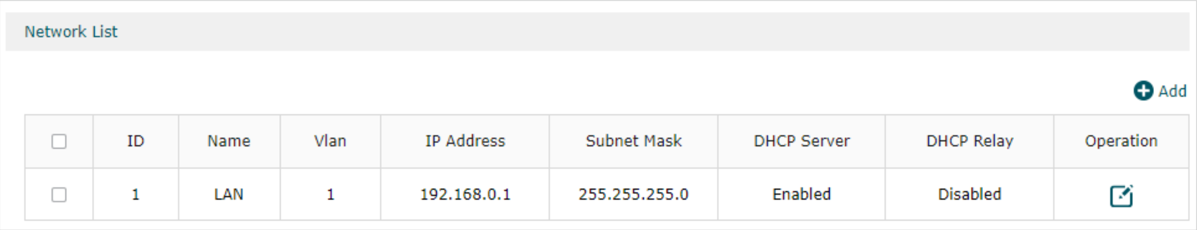
IGMP Proxy	If you want the local network devices to receive multicast data from the Internet, check the box to enable IGMP Proxy. This feature is used to detect whether there is any multicast member connected to the LAN ports.
IGMP Version	Configure the IGMP version as V2 or V3 according to your ISP.

IGMP Interface	Select the interface on which the IGMP Proxy takes effect.

Note:

- IGMP only takes effect when WAN mode is enabled for port WAN.

Figure 4-2 Configuring the LAN network



Network List

□	ID	Name	Vlan	IP Address	Subnet Mask	DHCP Server	DHCP Relay	Operation
□	1	LAN	1	192.168.0.1	255.255.255.0	Enabled	Disabled	

In the **Network List** section, set up the LAN network or click **Add** to add new networks, and configure the related parameters.

Name	set up the LAN network or click Add to add new networks, and configure the related parameters.
IP Address	Enter the IP address of the LAN port. To make your local network devices connect to the internet, you need to set the IP address of the LAN port as the default gateway of those devices.
Subnet Mask	Enter the subnet mask of the LAN port (255.255.255.0 by default). The IP addresses of all devices which connect to the LAN ports should be in the same subnet as the IP address of the LAN port.
VLAN	Specify the VLAN of the LAN port, only the devices in the specified VLAN can access and manage the gateway.

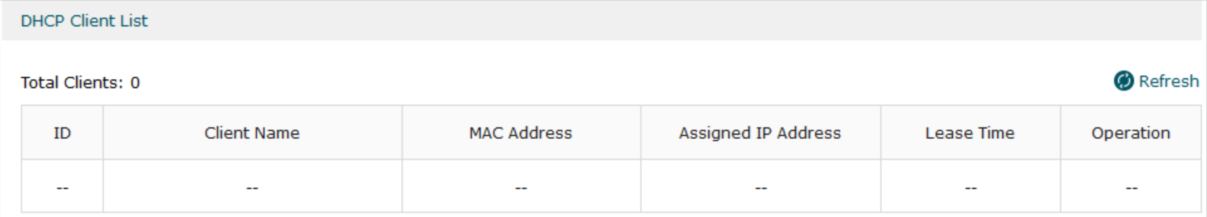
DHCP Mode -- DHCP Server	If you select DPCP Server as DHCP Mode, the DHCP server of the gateway will assign IP addresses to the LAN clients. Configure the following parameters. **Status:** Check the box to enable DHCP Server. **Starting IP Address / Ending IP Address:** Enter the starting IP address and ending IP address of the DHCP server's IP pool. The IP pool defines the range of IP addresses that can be assigned to the LAN clients. Note that the starting IP address and ending IP address should be in the same subnet as the IP address of the LAN port. **Lease Time:** Specify the lease time for DHCP clients. Lease time defines how long the clients can use the IP address assigned by the DHCP server. Generally, the client will automatically request the DHCP server for extending the lease time before the lease expired. If the request fails, the client will have to stop using that IP address when the lease finally expired, and try to get a new IP address from another DHCP server. **Default Gateway:** (Optional) Enter the default gateway which is assigned by the DHCP server. It is recommended to enter the IP address of the LAN port. **Default Domain:** (Optional) Enter the domain name of your network. **Primary DNS / Secondary DNS:** (Optional) Enter the DNS server address provided by your ISP. If you are not clear, please consult your ISP. **Option60:** (Optional) Enter the value for DHCP Option 60. DHCP clients use this field to optionally identify the vendor type and configuration of a DHCP client. Mostly, it is used in the scenario where the APs apply for different IP addresses from different servers according to the needs. For detailed information, please consult the vendor. For TP-Link, this entry should be TP-Link. **Option66:** (Optional) Enter the value for DHCP Option 66. It specifies the TFTP server information and supports a single TFTP server IP address. **Option67:** (Optional) Enter the value for DHCP Option 67. It specifies the boot file name. **Option138:** (Optional) Enter the value for DHCP Option 138. It is used in discovering the devices by the Omada controller. **Option150:** (Optional) Enter the value for DHCP Option 150. It specifies the TFTP server information and supports multiple TFTP server IP addresses. **Option159:** (Optional) Enter the value for DHCP Option 159. This option is used to configure a set of ports bound to a shared IPv4 address. **Option160:** (Optional) Enter the value for DHCP Option 160. This option is used to configure DHCP captive portal. **Option176:** (Optional) Enter the value for DHCP Option 176. This option is used to configure parameters for IP phones. **Option242:** (Optional) Enter the value for DHCP Option 242. This option is used to provide the TMS address automatically.

DHCP Mode -- DHCP Relay	If you select DHCP Relay as DHCP Mode, the gateway will relay DHCP requests from LAN clients to the DHCP server in another network. Then the DHCP server will assign IP addresses to the LAN clients. Configure the following parameters. **Status:** Check the box to enable DHCP Relay. **Server Address:** Enter the IP address of the DHCP server.

4.2 Viewing the DHCP Client List

Choose the menu **Network** > **LAN** > **DHCP Client List** to load the following page.

Figure 4-3 Viewing the DHCP Client List



DHCP Client List

Total Clients: 0

ID	Client Name	MAC Address	Assigned IP Address	Lease Time	Operation
--	--	--	--	--	--

Here you can view the DHCP client list.

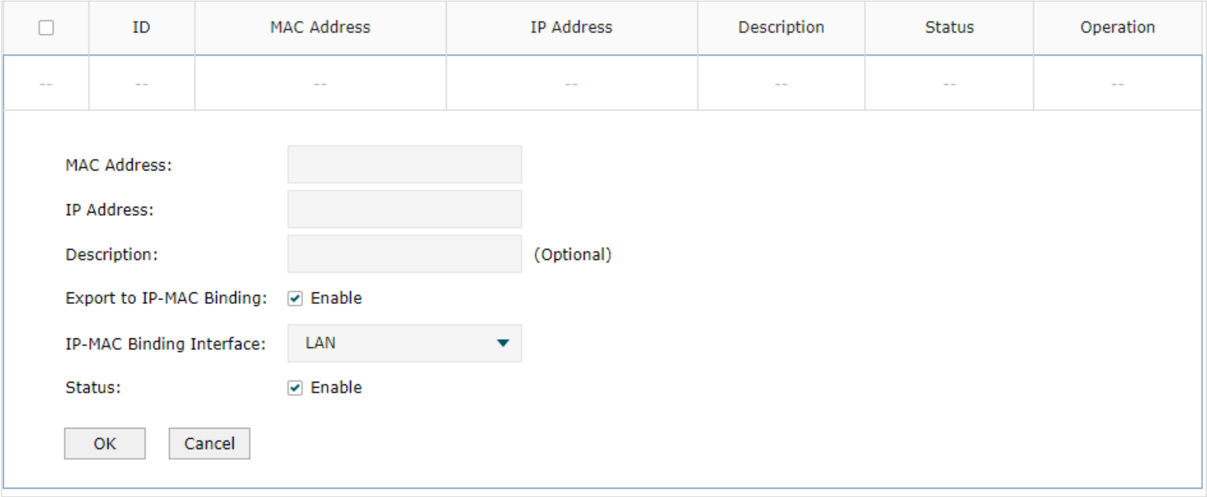
Client Name	Displays the host name of the DHCP client. It should be composed of digits, English letters, dashes and underscores only.
MAC Address	Displays the MAC address of the client.
Assigned IP Address	Displays the IP address assigned to the client.
Lease Time	Displays the remaining lease time of the assigned IP address. After the lease expires, the IP address will be re-assigned.

4.3 Configuring the Address Reservation

- Configuring the Address Reservation

Choose the menu **Network** > **LAN** > **Address Reservation** and click **Add** to load the following page.

Figure 4-4 Configuring the Address Reservation



□	ID	MAC Address	IP Address	Description	Status	Operation
--	--	--	--	--	--	--

MAC Address:

IP Address:

Description: (Optional)

Export to IP-MAC Binding: ☑ Enable

IP-MAC Binding Interface: LAN

Status: ☑ Enable

Configure the parameters for the address reservation entry, including MAC address, IP Address, and so on, then click **OK**.

MAC Address	Enter the MAC address of the client.
IP Address	Enter the IP address to be reserved.
Description	(Optional) Enter a brief description for the entry. Up to 32 characters can be entered.
Export to IP-MAC Binding	(Optional) Check the box to export this binding entry to IP-MAC Binding List on **Firewall > Anti ARP Spoofing > IP-MAC Binding** page.
Status	Check the box to enable this entry.

5 IPTV Configuration

Configure IPTV settings to enable Internet/IPTV/Phone service provided by your ISP (internet service provider).

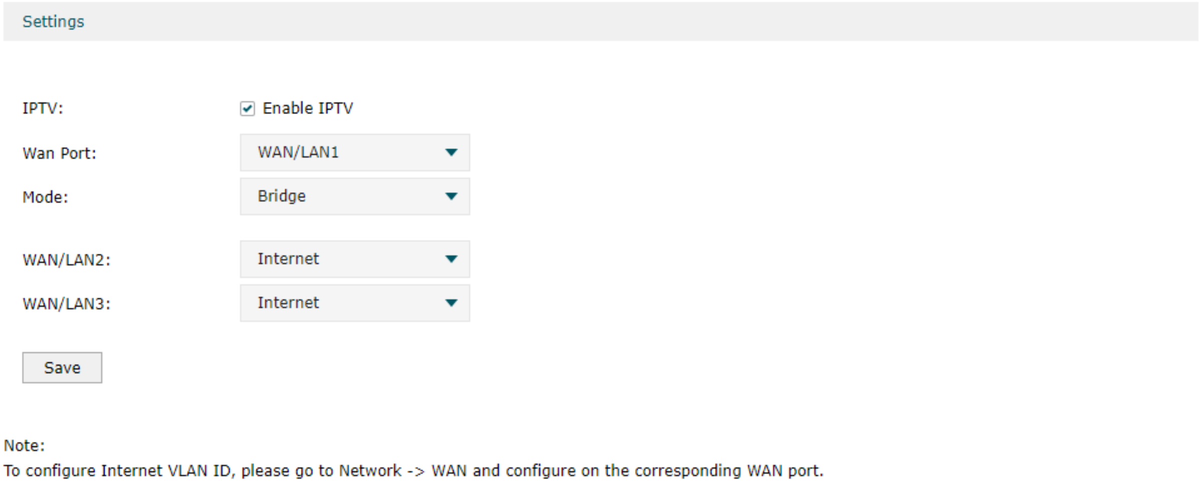
To complete IPTV configuration, follow these steps:

1) Enable IPTV globally.
2) Chose the Wan Port according to your ISP.
3) Select the appropriate Mode according to your ISP.
4) Select the Port Mode to determine which port is used to support IPTV service, IP-Phone service, or internet service.
5) Click **Save**.

5.1 Configuring the IPTV

Choose the menu **Network** > **IPTV** > **IPTV** to load the following page.

Figure 5-1 Configuring the IPTV



Settings

IPTV: ☑ Enable IPTV

Wan Port: WAN/LAN1

Mode: Bridge

WAN/LAN2: Internet

WAN/LAN3: Internet

Note:
To configure Internet VLAN ID, please go to Network -> WAN and configure on the corresponding WAN port.

In the **Settings** section, enable IPTV and configure corresponding parameters, then click **Save**.

IPTV	Enable IPTV globally.
Wan Port	Select the Wan Port according to your ISP.

Mode	Select the appropriate Mode according to your ISP. **Bridge**: Select this mode if your ISP requires no other parameters. **Custom**: Select this mode if your ISP provides necessary parameters, and configure the parameters according to the requirements of your ISP.
Port Mode	Select the appropriate Port Mode of the LAN ports to determine which port is used to support Internet service, IPTV service, or IP-Phone service.

Note:

To configure Internet VLAN ID, please go to WAN Configuration and configure on the corresponding WAN port.

6 MAC Configuration

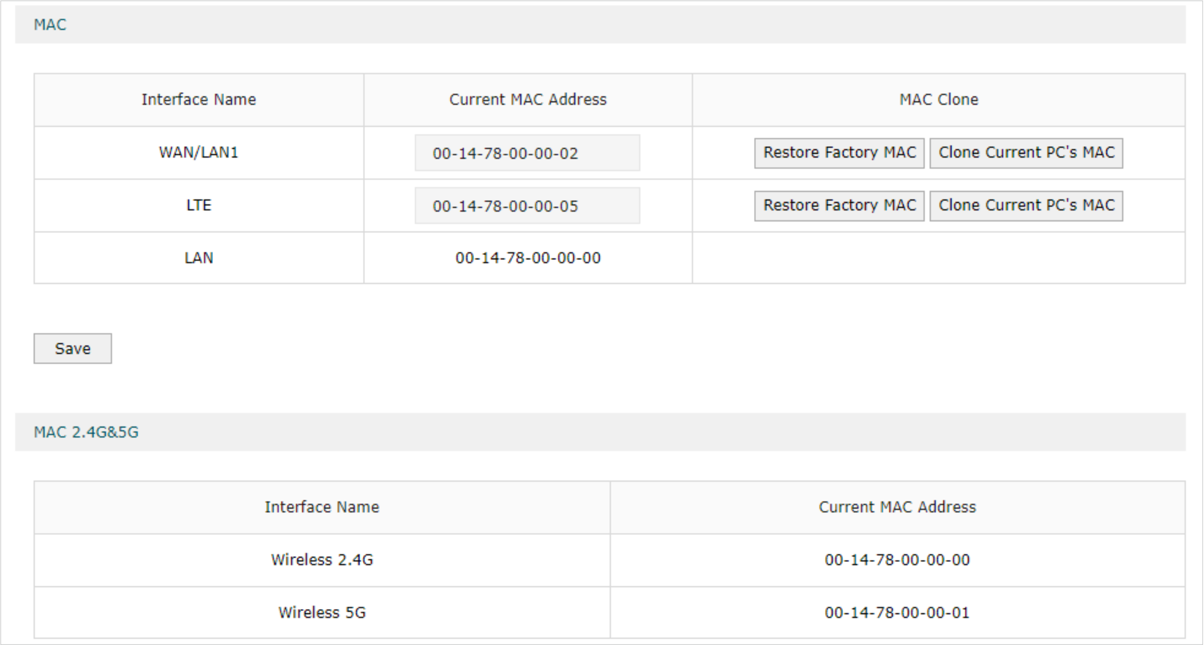
Generally, the MAC address does not need to be changed. However, in the following situations, you may need to change the MAC address of the WAN port.

In the condition that your ISP has bound your account to the MAC address of the dial- up device, if you want to replace the dial-up device with this router, you can just set the MAC address of this router’s WAN port the same as that of the previous dial-up device for a normal internet connection.

6.1 Configuring MAC Address

Choose the menu **Network** > **MAC** > **MAC** to load the following page.

Figure 6-1 Configuring MAC Address



MAC

Interface Name	Current MAC Address	MAC Clone
WAN/LAN1	00-14-78-00-00-02	Restore Factory MAC Clone Current PC's MAC
LTE	00-14-78-00-00-05	Restore Factory MAC Clone Current PC's MAC
LAN	00-14-78-00-00-00	

Save

MAC 2.4G&5G

Interface Name	Current MAC Address
Wireless 2.4G	00-14-78-00-00-00
Wireless 5G	00-14-78-00-00-01

Configure the MAC address of the WAN port according to your need, then click **Save**.

Interface Name	Displays the WAN port and LAN port.
Current MAC Address	Configure the MAC address of the WAN port.
MAC Clone	MAC Clone provides a shortcut to changing the MAC Address. **Restore Factory MAC**: Click this button to restore the MAC address to the factory default value. **Clone Current PC’s MAC**: Click this button to clone the MAC address of the PC you are currently using to configure the router. It’s only available for the WAN ports.

Note:

When cloning curent management host's MAC on the WAN port, the management PC should be connected to the LAN port.

If the connection type on the WAN port is PPPoE, L2TP or PPTP, changing the MAC address of the WAN port may cause the connection to be terminated or re-established.

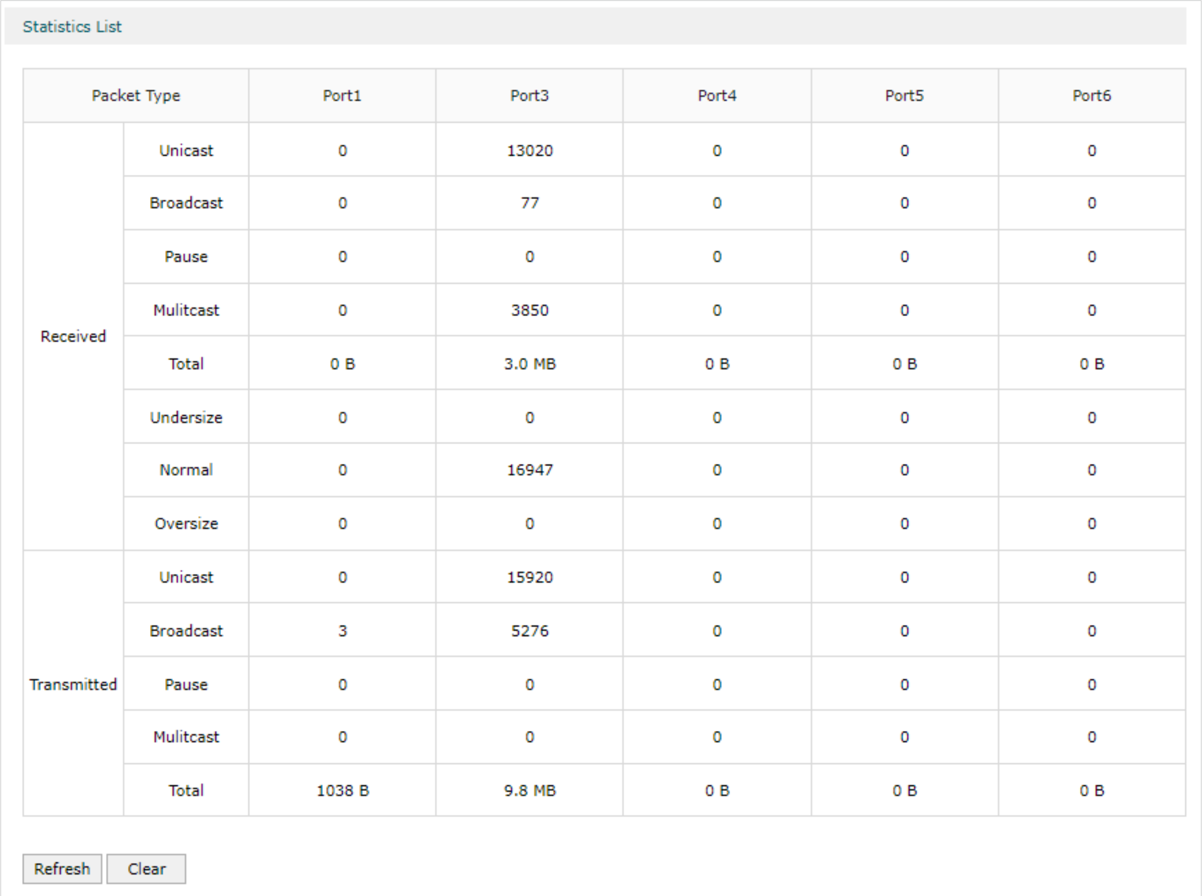
7 Switch Configuration

The router provides some basic switch port management function, including **Statistics**, **Port Mirror**, **Rate Control**, **Port Config**, **Port Status** and **DDM Status**.

7.1 Viewing the Statistics

Choose the menu **Network** > **Switch** > **Statistics** to load the following page.

Figure 7-1 Viewing the Statistics



Statistics List

Packet Type		Port1	Port3	Port4	Port5	Port6
Received	Unicast	0	13020	0	0	0
	Broadcast	0	77	0	0	0
	Pause	0	0	0	0	0
	Mulitcast	0	3850	0	0	0
	Total	0 B	3.0 MB	0 B	0 B	0 B
	Undersize	0	0	0	0	0
	Normal	0	16947	0	0	0
	Oversize	0	0	0	0	0
Transmitted	Unicast	0	15920	0	0	0
	Broadcast	3	5276	0	0	0
	Pause	0	0	0	0	0
	Mulitcast	0	0	0	0	0
	Total	1038 B	9.8 MB	0 B	0 B	0 B

You can view the detailed traffic information of each port, which facilitates you to monitor the traffic and manage the network effectively.

Unicast	Displays the number of normal unicast packets received or transmitted on the port.
Broadcast	Displays the number of normal broadcast packets received or transmitted on the port.
Pause	Displays the number of flow control frames received or transmitted on the port.
Multicast	Displays the number of normal multicast packets received or transmitted on the port.
Total	Displays the total bytes of the received or transmitted packets (including error frames).

Undersize	Displays the number of received packets which have a length less than 64 bytes (including error frames).
Normal	Displays the number of received packets which have length between 64 bytes and the maximum frame length (including error frames).
Oversize	Displays the number of received packets that have a length greater than the maximum frame length (including error frames).
Refresh	Click Refresh to view the latest traffic statistics of each port.
Clear	Click Clear to clear all the traffic statistcs.

Note:

Error Frame: The frames that have a false checksum.

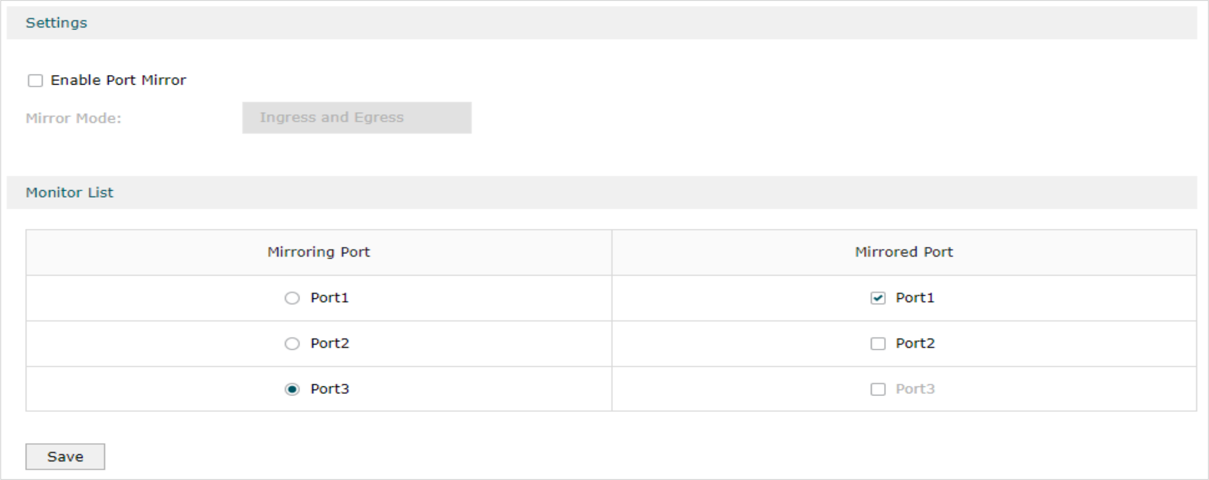
Maximum frame length: The maximum frame length supported by the router. For untagged frames, it's 1518 bytes long; for tagged packets, it's 1522 bytes long.

7.2 Configuring Port Mirror

Port Mirror function allows the router to forward packet copies of the monitored ports to a specific monitoring port. Then you can analyze the copied packets to monitor network traffic and troubleshoot network problems.

Choose the menu **Network** > **Switch** > **Mirror** to load the following page.

Figure 7-2 Configuring Port Mirror



Settings

□ Enable Port Mirror

Mirror Mode: Ingress and Egress

Monitor List

Mirroring Port	Mirrored Port
○ Port1	☑ Port1
○ Port2	□ Port2
● Port3	□ Port3

Follow these steps to configure Port Mirror:

1) In **Settings** section, enable Port Mirror function, and choose the mirror mode.

Enable Port Mirror	Check the box to enable Port Mirror function.

Mirror Mode	Choose the mirror mode which includes **Ingress**, **Egress** and **Ingress and Egress**. **Ingress:** The packets received by the mirrored port will be copied to the mirroring port. **Egress:** The packets sent by the mirrored port will be copied to the mirroring port. **Ingress and Egress:** Both the incoming and outgoing packets through the mirrored port will be copied to the mirroring port.

2) In the **Monitor List** section, set the mirroring port and the mirrored port(s), then click **Save**.

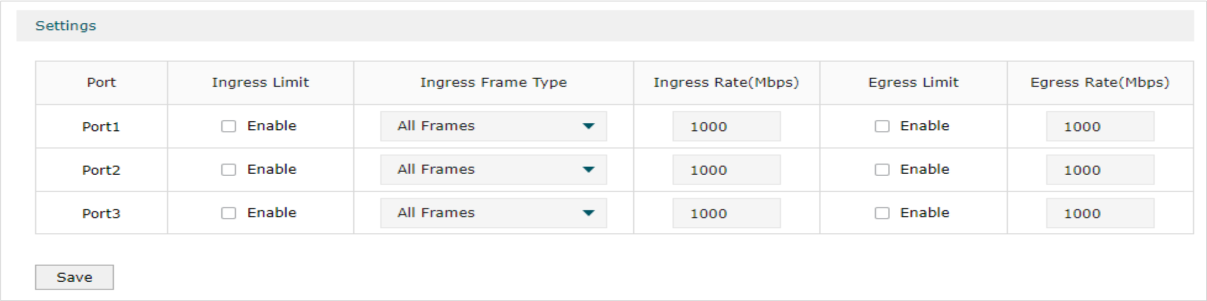
Mirroring Port	The packets through the mirrored port will be copied to this port. Usually, the mirroring port is connected to a data diagnose device, which is used to analyze the mirrored packets for monitoring and troubleshooting the network.
Mirrored Port	The packets through this port will be copied to the mirroring port. Usually, the mirrored ports are the ports to be monitored.

7.3 Configuring Rate Control

Rate Control enables you to set limit to the traffic rate for the specific packets on each port to manage the traffic flow of your network.

Choose the menu **Network** > **Switch** > **Rate Control** to load the following page.

Figure 7-3 Configuring Rate Control



Settings

Port	Ingress Limit	Ingress Frame Type	Ingress Rate(Mbps)	Egress Limit	Egress Rate(Mbps)
Port1	☐ Enable	All Frames ▼	1000	☐ Enable	1000
Port2	☐ Enable	All Frames ▼	1000	☐ Enable	1000
Port3	☐ Enable	All Frames ▼	1000	☐ Enable	1000

Choose the port and configure the ingress frames or egress frames limitation, then click **Save**.

Ingress Limit	Check the box to enable the Ingress Limit feature.
Ingress Frame Type	Specify the ingress frame type to be limited. It is All Frames by default. **All Frames**: The ingress rate of all frames is limited. **Broadcast**: The ingress rate of broadcast frames is limited. **Broadcast and Multicast**: The ingress rate of broadcast and multicast frames is limited.
Ingress Rate (Mbps)	Specify the limit rate for the ingress packets.

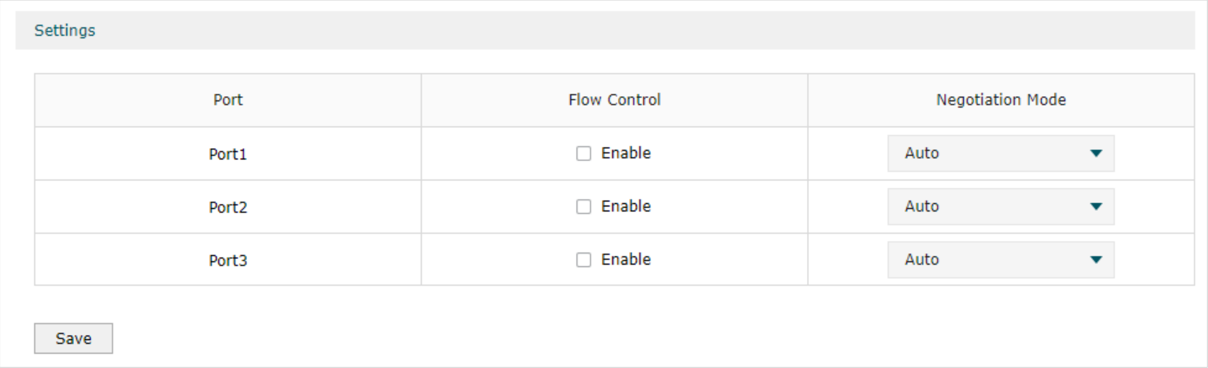
Egress Limit	Check the box to enable Egress Limit feature.
Egress Rate (Mbps)	Specify the limit rate for the egress packets.

7.4 Configuring Port Config

You can configure the flow control and negotiation mode for the port.

Choose the menu **Network** > **Switch** > **Port Config** to load the following page.

Figure 7-4 Configuring Flow Control and Negotiation



Settings

Port	Flow Control	Negotiation Mode
Port1	□ Enable	Auto
Port2	□ Enable	Auto
Port3	□ Enable	Auto

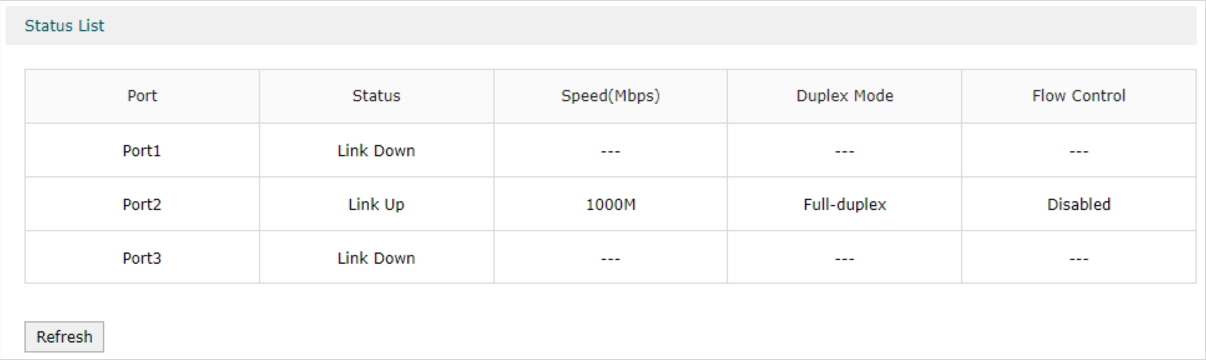
Configure the flow control and negotiation mode for a port.

Flow Control	Check the box to enable the flow control function. Flow Control is the process of managing the data transmission of the sender to avoid the receiver getting overloaded.
Negotiation Mode	Select the Negotiation Mode for the port. You can select Auto (Auto-negoation), or manually select the speed and duplex mode.

7.5 Viewing Port Status

Choose the menu **Network** > **Switch** > **Port Status** to load the following page.

Figure 7-5 Viewing Port Status



Status List

Port	Status	Speed(Mbps)	Duplex Mode	Flow Control
Port1	Link Down	---	---	---
Port2	Link Up	1000M	Full-duplex	Disabled
Port3	Link Down	---	---	---

Status	Displays the port status. **Link Down**: The port is not connected. **Link Up**: The port is working normally.
Speed (Mbps)	Displays the port speed.
Duplex Mode	Displays the duplex mode of the port.
Flow Control	Displays if the Flow Control is enabled.

8 VLAN Configuration

VLAN enables you to divide the LAN into multiple logical networks and control the traffic among them in a convenient and flexible way. The LAN can be logically segmented by departments, application, or types of users, without regard to geographic locations.

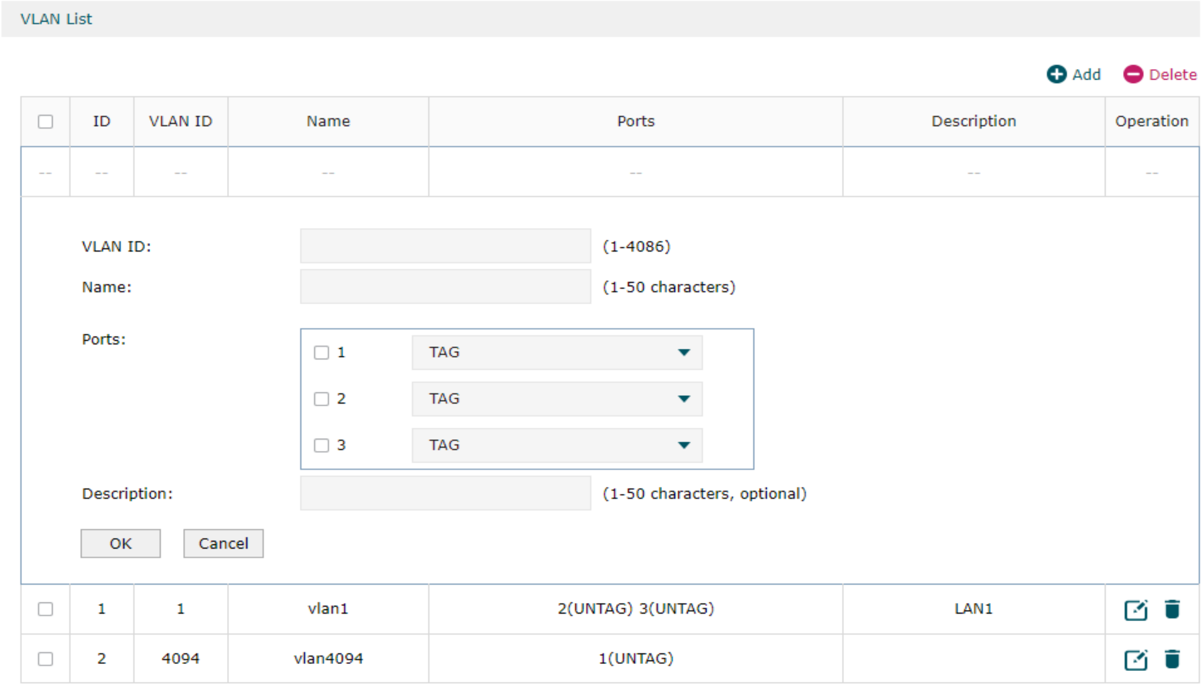
For VLAN configuration, you can:

- Create VLANs and add the desired ports to the VLANs.
- Configure the PVID of the ports.

8.1 Creating a VLAN

Choose the menu **Network** > **VLAN** > **VLAN** and click **Add** to load the following page.

Figure 8-1 Creating a VLAN



VLAN List

Add Delete

□	ID	VLAN ID	Name	Ports	Description	Operation
--	--	--	--	--	--	--

VLAN ID: (1-4086)

Name: (1-50 characters)

Ports:
□ 1 TAG
□ 2 TAG
□ 3 TAG

Description: (1-50 characters, optional)

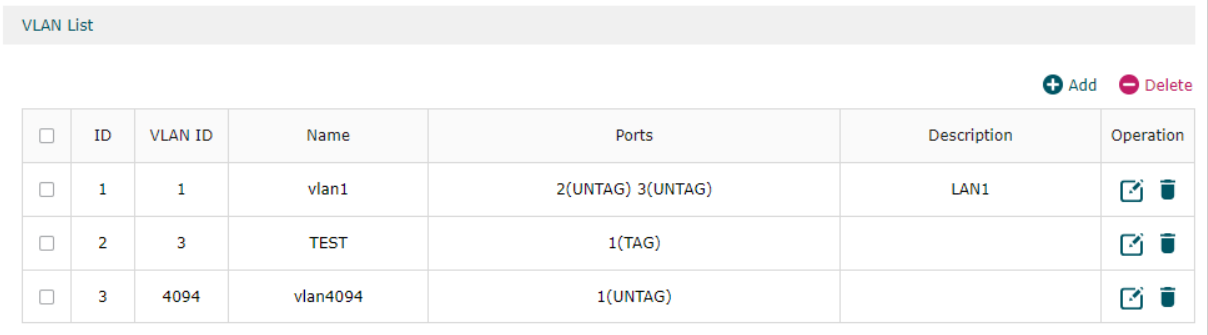
OK Cancel

□	ID	VLAN ID	Name	Ports	Description	Operation
□	1	1	vlan1	2(UNTAG) 3(UNTAG)	LAN1	
□	2	4094	vlan4094	1(UNTAG)		

Create a VLAN and add the port(s) to the VLAN, then click **OK**.

VLAN ID	Enter a VLAN ID. The value ranges from 1 to 4094.
Name	Specify the name of the VLAN for easy identification.

Ports	Check the box to add the desired port to the VLAN and specify the port type in the specified VLAN. The port can be divided into two types: TAG or UNTAG. **TAG**: The egress rule of the packets transmitted by the port is tagged. **UNTAG**: The egress rule of the packets transmitted by the port is untagged. If the device connected to the port is an end device, like a PC or a server, the port type should be UNTAG, because end devices don't recognize tagged packets.
Description	(Optional) Enter a brief description for easy management and searching.


VLAN List

□	ID	VLAN ID	Name	Ports	Description	Operation
□	1	1	vlan1	2(UNTAG) 3(UNTAG)	LAN1	
□	2	3	TEST	1(TAG)		
□	3	4094	vlan4094	1(UNTAG)		

In the VLAN list you can view all the VLANs existing in the router.

VLAN ID	Displays the VLAN ID.
Name	Displays the VLAN name.
Ports	Displays the ports which belongs to the corresponding VLAN.
Description	Displays the description of the VLAN.

Note:

The VLAN list contains all the VLANs existing in the router. Some of them are manually created by the user, and can be edited or deleted. Some are automatically created and referenced by the router for some special scenarios like management VLAN, and you cannot edit or delete these VLANs.

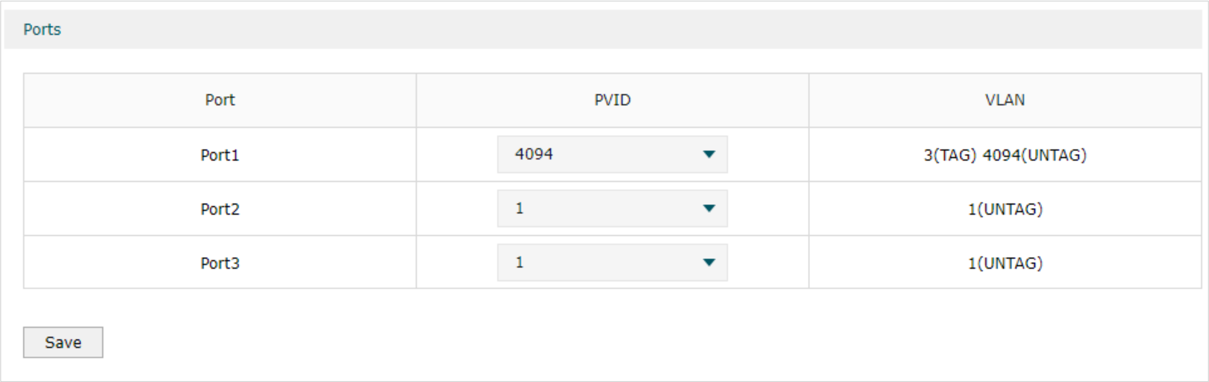
8.2 Configuring the PVID of a Port

PVID indicates the default VLAN for the corresponding port. Untagged packets which are received by the port are tagged with the PVID and then transmitted within the corresponding VLAN.

For example, if Port 2 is in both VLAN 10 and VLAN 20, and the PVID of the port is 10, when Port 2 receives an untagged packet from a PC, the packet is transmitted within VLAN 10, but cannot reach VLAN 20 directly.

To Configure the PVID of the port, choose the menu **Network** > **VLAN** > **Ports** to load the following page.

Figure 8-2 Configuring the PVID



Ports

Port	PVID	VLAN
Port1	4094	3(TAG) 4094(UNTAG)
Port2	1	1(UNTAG)
Port3	1	1(UNTAG)

Configure the PVID of the port, then click **Save**.

Port	Displays the port.
PVID	Specify the PVID for the port. PVID indicates the default VLAN for the corresponding port.
VLAN	Displays the VLAN(s) the port belongs to.

9 IPv6 Configuration

IPv6 is the next-generation network protocol following IPv4. You can configure IPv6 network for the router if your ISP supports IPv6. IPv6 network won't cause conflict with your current IPv4 network.

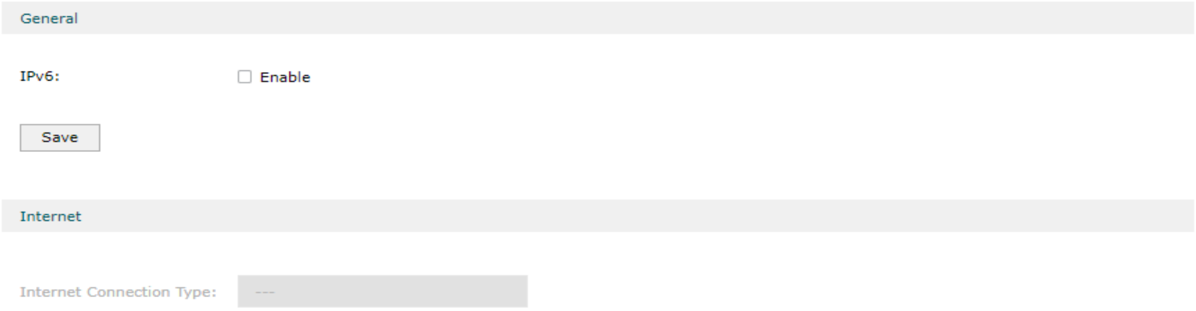
To configure the IPv6 network, follow the guidelines:

- Configure IPv6 for the LANs.
- Configure IPv6 for the WAN port(s). You can configure IPv6 for multiple WANs, and each WAN port has its own Internet Connection Type and parameters.

9.1 Configure IPv6 for WAN port(s)

Choose the menu **Network** > **IPv6** > **WAN/LAN1** to load the following page.

Figure 9-1 Enable IPv6



General

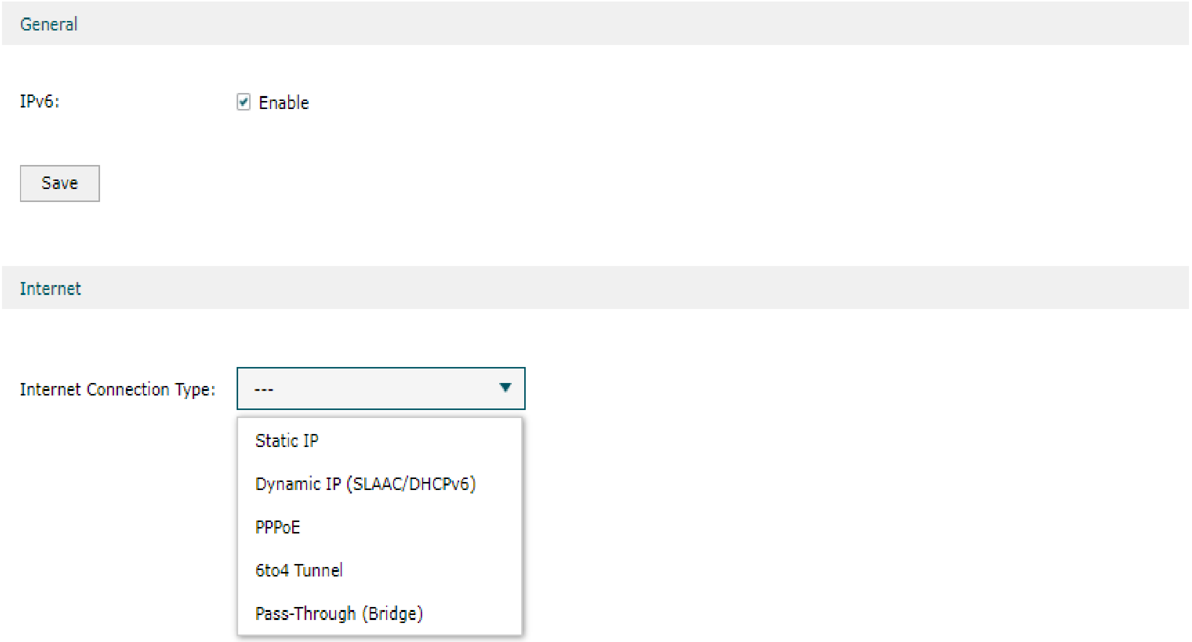
IPv6: □ Enable

Internet

Internet Connection Type: ---

In the **General** section, enable IPv6 and click **Save**.

Figure 9-2 Select Internet Connection Type



General

IPv6: ☑ Enable

Save

Internet

Internet Connection Type: ---

In the **Internet** section, select the proper Internet Connection Type and configure the parameters according to the requirements of your ISP. Then click **Save**.

Internet Connection Type	Choose the proper Internet Connection Type according to the requirements of your ISP.

9.2 Configuring the WAN Connection

The router supports five connection types: **Static IP, Dynamic IP (SLAAC/DHCPv6), PPPoE, 6to4 Tunnel, PPTP,** you can choose one according to the service provided by your ISP.

Static IP: If your ISP provides you with a fixed IP address and the corresponding parameters, choose Static IP.

Dynamic IP (SLAAC/DHCPv6): If your ISP automatically assigns the IP address and the corresponding parameters, choose Dynamic IP.

PPPoE: If your ISP provides you with a PPPoE account, choose PPPoE.

6to4 Tunnel: Select this type if your ISP uses 6to4 deployment for assigning address.

Pass-Through (Bridge): Select this type if your ISP uses Pass-Through (Bridge) network deployment.

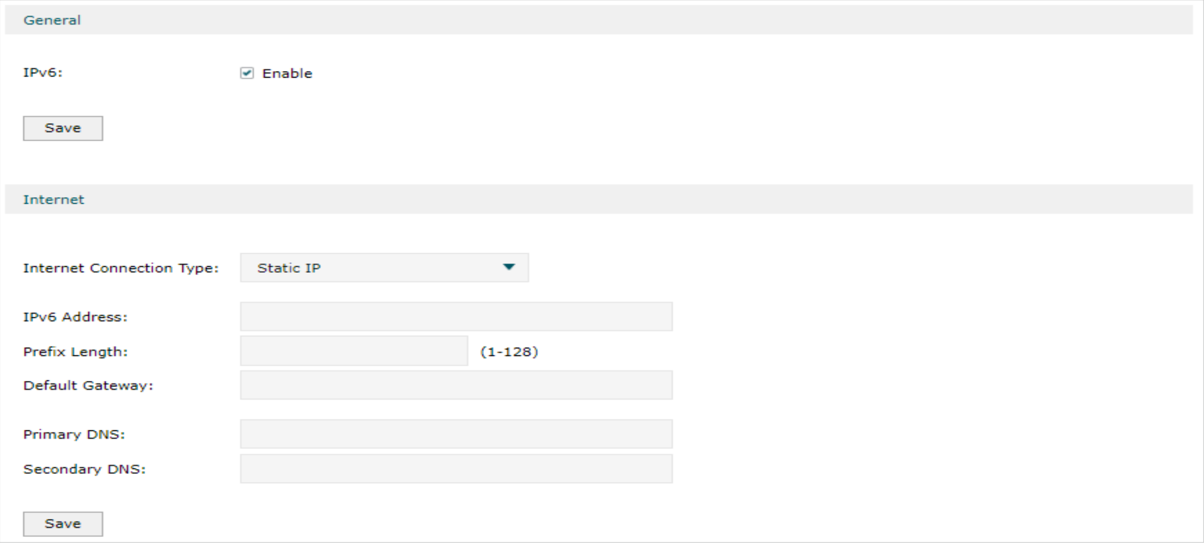
Note:

If Internet Connection Type of WAN is selected as Pass-Through (Bridge), the IPv6 parameters of the LAN port and the other WAN ports cannot be configured.

■ Configuring the Static IP

Choose the menu **Network** > **IPv6** > **WAN/LAN1** to load the following page.

Figure 9-3 Configuring the Static IP



General

IPv6: ☑ Enable

Save

Internet

Internet Connection Type: Static IP

IPv6 Address:

Prefix Length: (1-128)

Default Gateway:

Primary DNS:

Secondary DNS:

Save

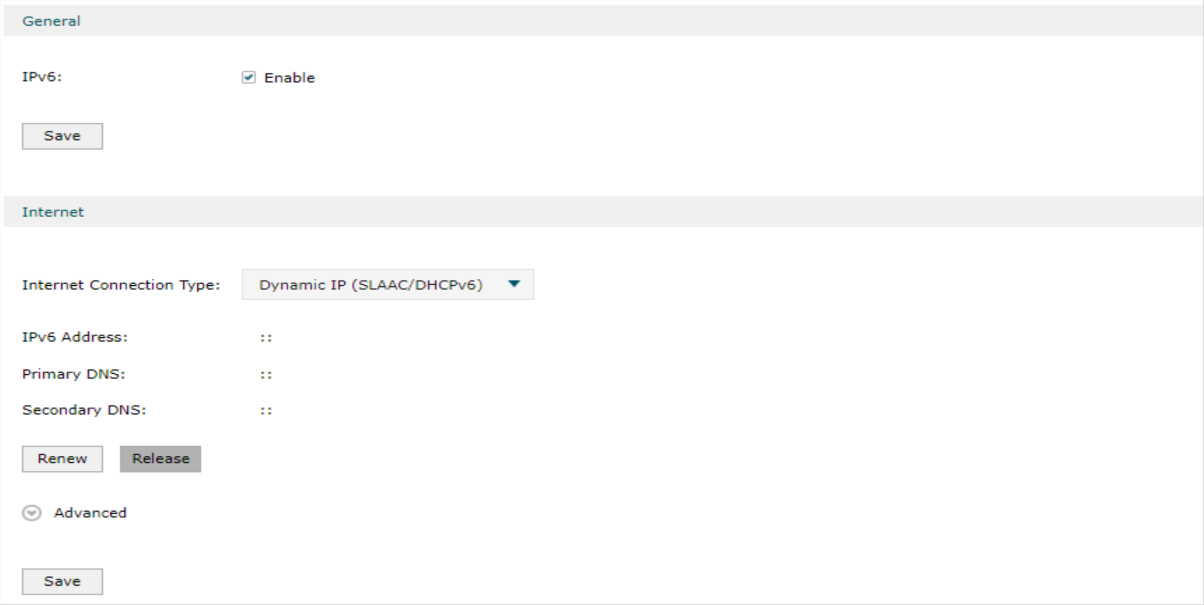
In **Internet** section, select the connection type as Static IP. Enter the corresponding parameters and click **Save**.

IPv6 Address/ Prefix Length/ Default Gateway/ Primary DNS/ Secondary DNS	Enter these parameters as provided by the ISP.

■ Configuring the Dynamic IP (SLAAC/DHCPv6)

Choose the menu **Network** > **IPv6** > **WAN/LAN1** to load the following page.

Figure 9-4 Configuring the Dymanic IP (SLAAC/DHCPv6)



General

IPv6: ☑ Enable

Save

Internet

Internet Connection Type: Dynamic IP (SLAAC/DHCPv6)

IPv6 Address: ::

Primary DNS: ::

Secondary DNS: ::

Renew Release

Advanced

Save

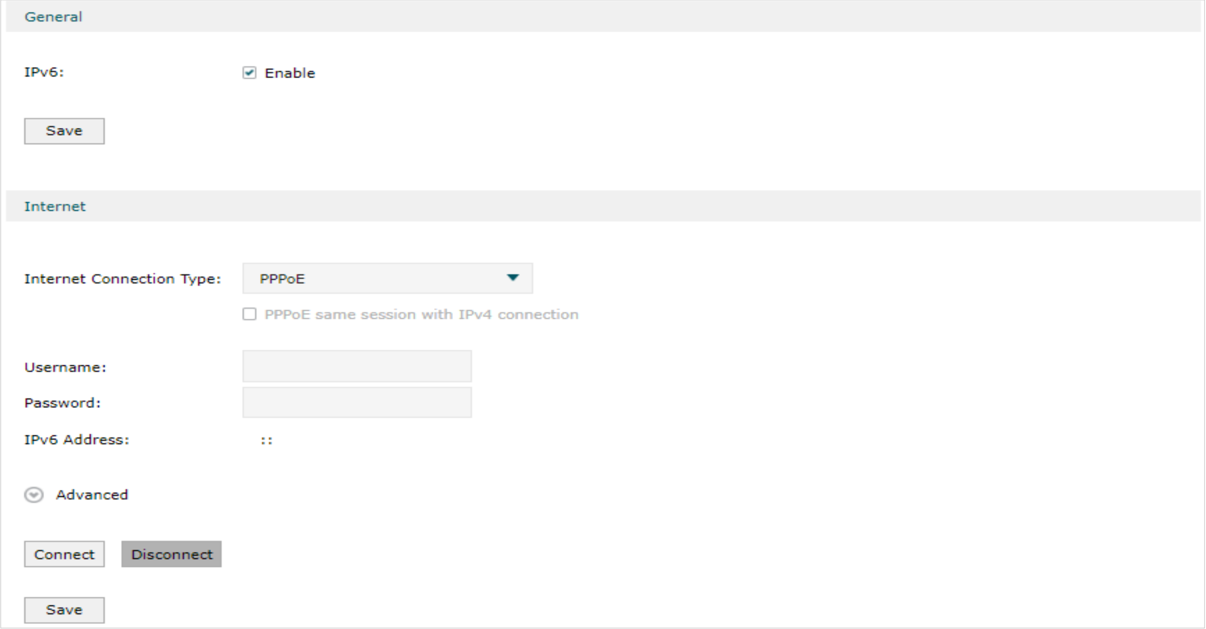
In **Internet** section, select the connection type as Dynamic IP (SLAAC/DHCPv6). Enter the corresponding parameters and click **Save**.

IPv6 Address/ Primary DNS/ Secondary DNS	These parameters are automatically assigned by your ISP.
Renew	Click this button to get new IPv6 parameters assigned by your ISP.
Release	Click this button to release all IPv6 addresses assigned by your ISP.
Get IPv6 Address	Select the proper method whereby your ISP assigns IPv6 address to your gateway.
Auto	Select Auto to get an IPv6 address automatically.
DHCPv6	Your ISP assigns an IPv6 address and other parameters including the DNS server address to your gateway using DHCPv6.
SLAAC+Stateless DHCP	Your ISP assigns the IPv6 address prefix to your gateway and your gateway automatically generates its own IPv6 address. Also, your ISP assigns other parameters including the DNS server address to your gateway using DHCPv6.
Prefix Delegation	Select Enable to get an address prefix for your LAN port from your ISP, or Disable to designate an address prefix for your LAN port manually. Clients in LAN will get an IPv6 address with this prefix.
Prefix Delegation Size	With Prefix Delegation enabled, enter the Prefix Delegation Size to determine the length of the address prefix. You can get this value from your ISP.
DNS Address	Select whether to get the DNS address dynamically from your ISP or designate the DNS address manually.
Get dynamically from ISP	Your ISP assigns an DNS address to your gateway dynamically.
Use the following DNS Addresses	You should manually enter the DNS address provided by your ISP.
Primary DNS/ Secondary DNS	Enter the DNS address manually or display the DNS address which is assigned by your ISP.

Configuring the PPPoE

Choose the menu **Network** > **IPv6** > **WAN/LAN1** to load the following page.

Figure 9-5 Configuring the PPPoE



General

IPv6: ☑ Enable

Save

Internet

Internet Connection Type: PPPoE

□ PPPoE same session with IPv4 connection

Username:

Password:

IPv6 Address: ::

Advanced

Connect Disconnect

Save

In **Internet** section, select the connection type as PPPoE. Enter the corresponding parameters and click **Save**.

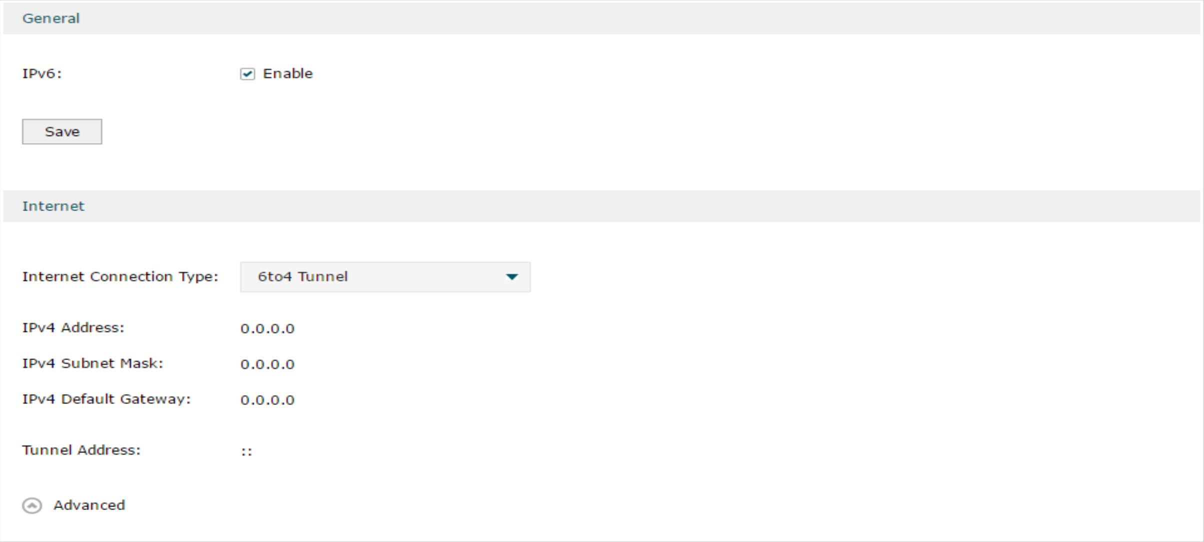
PPPoE same session with IPv4 connection	If this option is enabled, IPv6 uses the same PPPoE session as IPv4.
Username/ Password:	Enter these parameters as provided by your ISP.
IPv6 Address	This address will be automatically assigned by your ISP after you enter the username and password and click **Connect**.
Connect	Click this button to connect to the internet.
Disconnect	Click this button to disconnect from the internet.
Get IPv6 Address	Select the proper method whereby your ISP assigns IPv6 address to your gateway.
Auto	Select Auto to get an IPv6 address automatically.
DHCPv6	Your ISP assigns an IPv6 address and other parameters including the DNS server address to your gateway using DHCPv6.
SLAAC+Stateless DHCP	Your ISP assigns the IPv6 address prefix to your gateway and your gateway automatically generates its own IPv6 address. Also, your ISP assigns other parameters including the DNS server address to your gateway using DHCPv6.
Specified by ISP	You should manually enter the IPv6 address provided by your ISP.

Prefix Delegation	Select Enable to get an address prefix for your LAN port from your ISP, or Disable to designate an address prefix for your LAN port manually. Clients in LAN will get an IPv6 address with this prefix.
Prefix Delegation Size	With Prefix Delegation enabled, enter the Prefix Delegation Size to determine the length of the address prefix. You can get this value from your ISP.
DNS Address	Select whether to get the DNS address dynamically from your ISP or designate the DNS address manually.
Get dynamically from ISP	Your ISP assigns an DNS address and to your gateway dynamically.
Use the following DNS Addresses	You should manually enter the DNS address provided by your ISP.
Primary DNS/ Secondary DNS	Enter the DNS address manually or display the DNS address which is assigned by your ISP.
Connect	Click this button to connect to the internet.
Disconnect	Click this button to disconnect from the internet.

Configuring the 6to4 Tunnel

Choose the menu **Network** > **IPv6** > **WAN/LAN1** to load the following page.

Figure 9-6 Configuring the 6to4 Tunnel



General

IPv6: ☑ Enable

Internet

Internet Connection Type: 6to4 Tunnel

IPv4 Address: 0.0.0.0

IPv4 Subnet Mask: 0.0.0.0

IPv4 Default Gateway: 0.0.0.0

Tunnel Address: ::

In **Internet** section, select the connection type as 6to4 Tunnel. Enter the corresponding parameters and click **Save**.

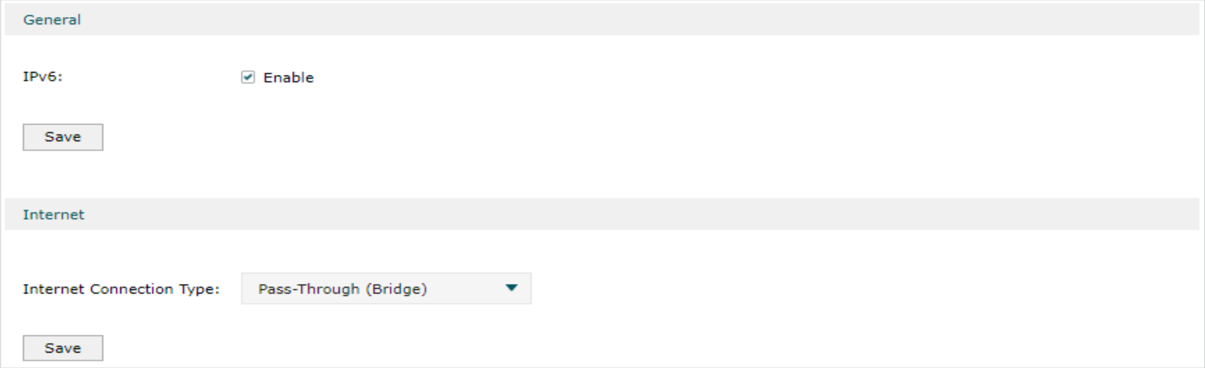
IPv4 Address/ IPv4 Subnet Mask/IPv4 Default Gateway/ Tunnel Address	IPv4 Address/IPv4 Subnet Mask/IPv4 Default Gateway/Tunnel Address: These parameters will be dynamically generated by the IPv4 information of WAN port after you click Connect.

Use the following DNS Server	Click the box to manually enter the primary DNS and/or secondary DNS as provided by your ISP.
Connect	Click this button to connect to the internet.
Disconnect	Click this button to disconnect from the internet.

Configuring the Pass-Through (Bridge)

Choose the menu **Network** > **IPv6** > **WAN/LAN1** to load the following page.

Figure 9-7 Configuring the Pass-Through (Bridge)



General

IPv6: ☑ Enable

Save

Internet

Internet Connection Type: Pass-Through (Bridge)

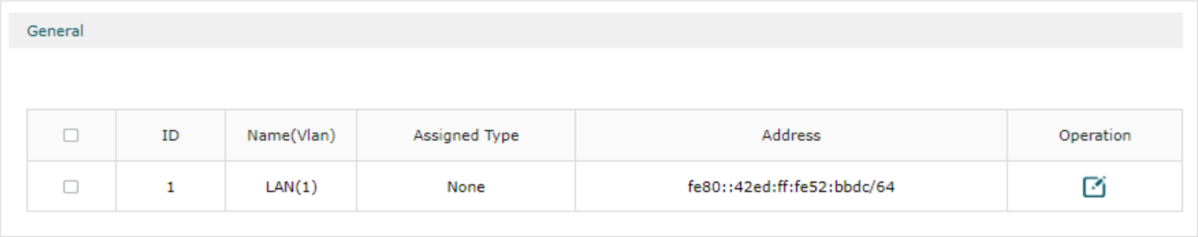
Save

In **Internet** section, select the connection type as Pass-Through (Bridge). No configuration is required for this type of connection.

9.3 Configuring IPv6 for the LAN Port

Choose the menu **Network** > **IPv6** > **LAN** > **Operation** to load the following page.

Figure 9-8 Select Assigned Type



General

□	ID	Name(Vlan)	Assigned Type	Address	Operation
□	1	LAN(1)	None	fe80::42ed:ff:fe52:bbdc/64	✎

In the **General** section, select the proper Assigned Type, which is determined by the compatibility of clients in your local network, and configure the parameters according to the requirements of your ISP. Then click **OK**.

Assigned Type	Determines the method whereby the gateway assigns IPv6 addresses to the clients in your local network. Some clients may support only a few of these assigned types, so you should choose it according to the compatibility of clients in your local network.

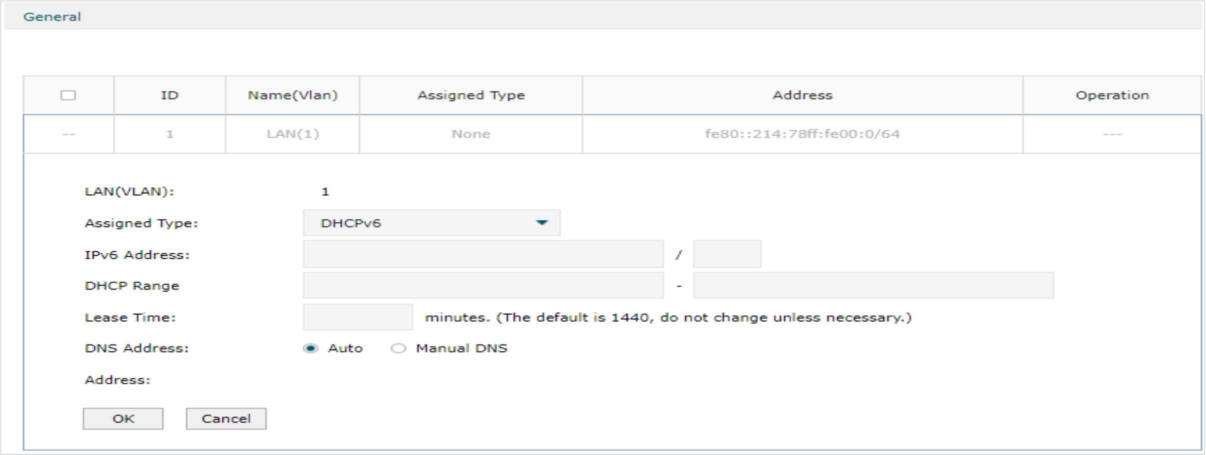
Note:

- If Internet Connection Type of WAN is selected as Pass-Through (Bridge), the IPv6 parameters of the LAN port and the other WAN ports cannot be configured.
- If Prefix Delegation of WAN is enabled, the Address Prefix of LAN is automatically assigned by your ISP and you cannot designate an address prefix manually.

■ Configuring the DHCPv6

Choose the menu **Network** > **IPv6** > **LAN** to load the following page.

Figure 9-9 Configuring the DHCPv6



General

☐	ID	Name(Vlan)	Assigned Type	Address	Operation
--	1	LAN(1)	None	fe80::214:78ff:fe00:0/64	---

LAN(VLAN): 1

Assigned Type: DHCPv6

IPv6 Address: /

DHCP Range -

Lease Time: minutes. (The default is 1440, do not change unless necessary.)

DNS Address: ● Auto ○ Manual DNS

Address:

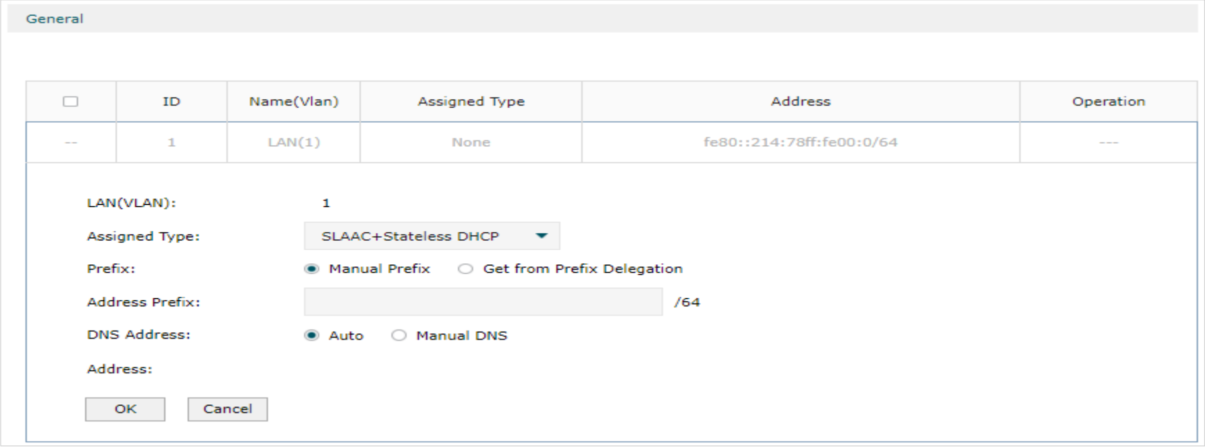
In **Assigned Type** section, select the connection type as DHCPv6. Enter the corresponding parameters and click **OK**.

IPv6 Address	Enter the IPv6 address and prefix length (subnet mask).
File Suffix	Enter file suffixes to specify the file types. Use Enter key, Space key, "," or ";" to divide different file suffixes. The hosts of the selected IP group cannot download these types of files from the internet.
DHCP Range	Enter the starting and ending IPv6 address to define a range for the DHCPv6 server to assign dynamic IPv6 addresses.
Lease Time	The duration time in minutes when the assigned IPv6 address remains valid. Either keep the defualt 1440 minutes or change it if required.
DNS Address	Select a method to configure the DNS server for the LAN, with Auto selected, the DNS server addresses are automatically obtained. With Manual DNS selected, manually enter the primary and secondary DNS server addresses provided by your ISP.
Address	Displays the IPv6 address of the LAN port.

■ Configuring the SLAAC+Stateless DHCP

Choose the menu **Network** > **IPv6** > **LAN** to load the following page.

Figure 9-10 Configuring the SLAAC+Stateless DHCP



General

□	ID	Name(Vlan)	Assigned Type	Address	Operation
--	1	LAN(1)	None	fe80::214:78ff:fe00:0/64	---

LAN(VLAN): 1

Assigned Type: SLAAC+Stateless DHCP

Prefix: ● Manual Prefix ○ Get from Prefix Delegation

Address Prefix: /64

DNS Address: ● Auto ○ Manual DNS

Address:

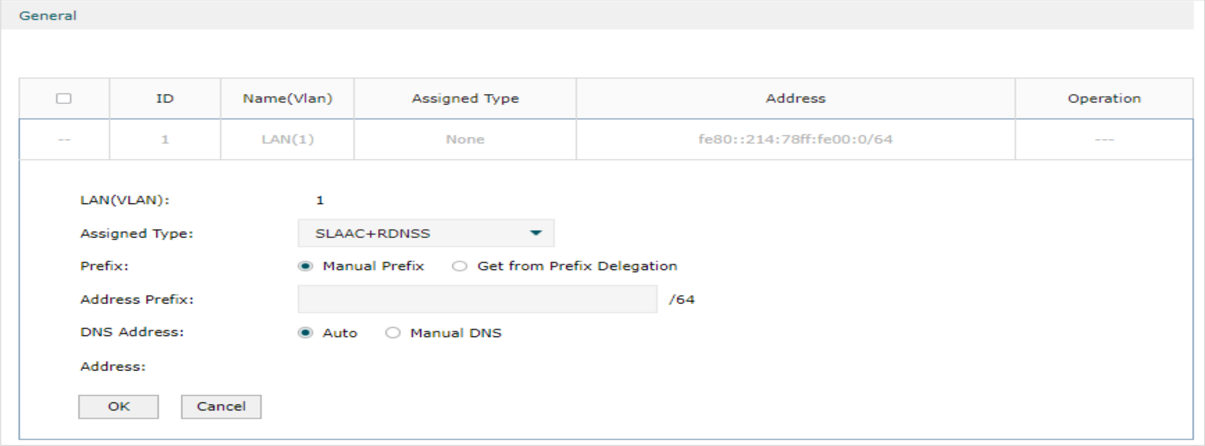
In **Assigned Type** section, select the connection type as SLAAC+Stateless DHCP. Enter the corresponding parameters and click **OK**.

Prefix	Configure the IPv6 address prefix for each client in the local network. WIth Manual Prifix selected, enter the prefix in the Address Prefix field. With Get from Prefix Delegation selected, select hte IPv6 Prefix Delegation WAN port, and enter the IPv6 Prefix ID to get a prefix delegation from the ISP.
IPv6 Prefix Delegation WAN	Enter the IPv6 Prefix Delegation WAN port and the IPv6 Prefix ID to get a prefix delegation from the ISP.
IPv6 Prefix ID	With Get from Prefix Delegation selected, enter the Prefix ID, which will be addred to the prefix to obtain a /64 subnet. The range of IPv6 Prefix ID is determined by Prefix Delegation Size and Prefix Length.
DNS Address	Select a method to configure the DNS server for the LAN. With Auto selected, the DNS server addresses are automatically obtained. With Manual DNS selected, manually enter the primary and secondary DNS server addresses provided by your ISP.
Address	Displays the IPv6 address automatically generated by Prefix.

■ Configuring the SLAAC+RDNSS

Choose the menu **Network** > **IPv6** > **LAN** to load the following page.

Figure 9-11 Configuring the SLAAC+RDNSS



General

□	ID	Name(Vlan)	Assigned Type	Address	Operation
--	1	LAN(1)	None	fe80::214:78ff:fe00:0/64	---

LAN(VLAN): 1

Assigned Type: SLAAC+RDNSS

Prefix: ● Manual Prefix ○ Get from Prefix Delegation

Address Prefix: /64

DNS Address: ● Auto ○ Manual DNS

Address:

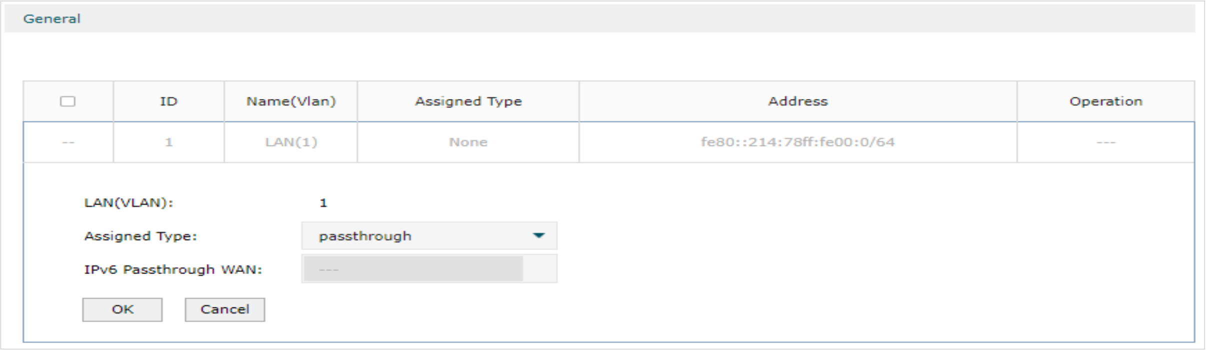
In **Assigned Type** section, select the connection type as SLAAC+RDNSS. Enter the corresponding parameters and click **OK**.

Prefix	Configure the IPv6 address prefix for each client in the local network. WIth Manual Prifix selected, enter the prefix in the Address Prefix field. With Get from Prefix Delegation selected, select hte IPv6 Prefix Delegation WAN port, and enter the IPv6 Prefix ID to get a prefix delegation from the ISP.
IPv6 Prefix Delegation WAN	Enter the IPv6 Prefix Delegation WAN port and the IPv6 Prefix ID to get a prefix delegation from the ISP.
IPv6 Prefix ID	With Get from Prefix Delegation selected, enter the Prefix ID, which will be addred to the prefix to obtain a /64 subnet. The range of IPv6 Prefix ID is determined by Prefix Delegation Size and Prefix Length.
DNS Address	Select a method to configure the DNS server for the LAN. With Auto selected, the DNS server addresses are automatically obtained. With Manual DNS selected, manually enter the primary and secondary DNS server addresses provided by your ISP.
Address	Displays the IPv6 address automatically generated by Prefix.

■ Configuring the pass-through

Choose the menu **Network** > **IPv6** > **LAN** to load the following page.

Figure 9-12 Configuring the pass-through



General

□	ID	Name(Vlan)	Assigned Type	Address	Operation
--	1	LAN(1)	None	fe80::214:78ff:fe00:0/64	---

LAN(VLAN): 1

Assigned Type: passthrough

IPv6 Passthrough WAN: ---

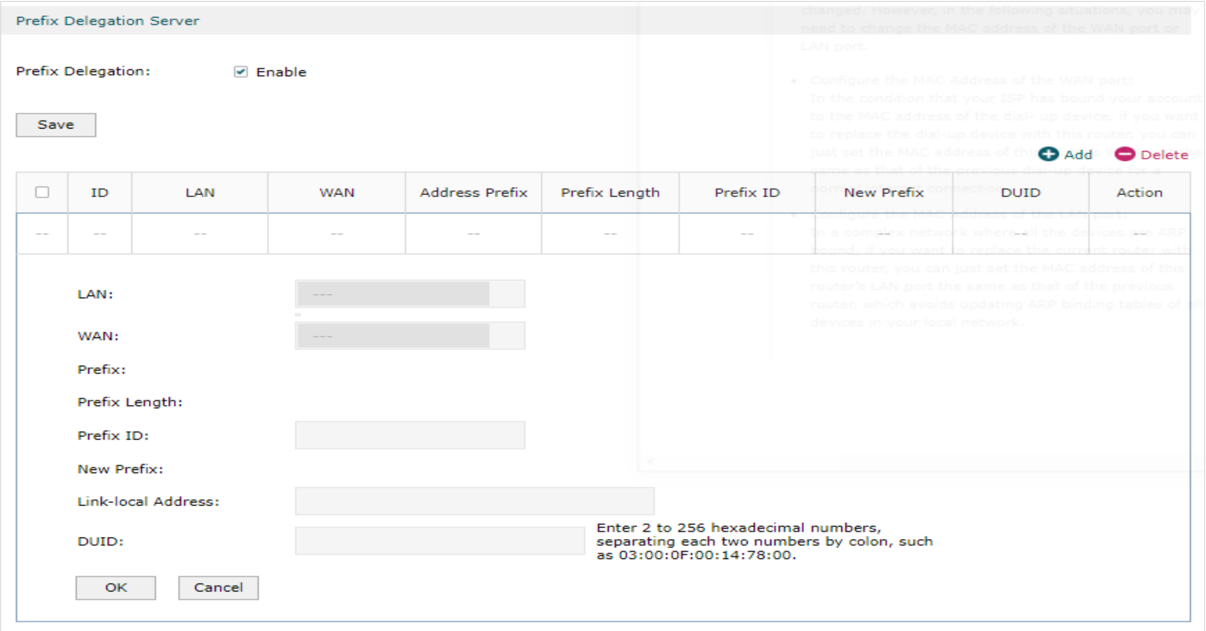
In **Assigned Type** section, select the connection type as pass-through. Enter the corresponding parameters and click **OK**.

IPv6 Passthrough WAN	Select the WAN port using Pass-Through (Bridge) for the IPv6 connection.

Note:

- If Internet Connection Type of WAN is selected as Pass-Through (Bridge), the IPv6 parameters of the LAN port and the other WAN ports cannot be configured.
- If Prefix Delegation of WAN is enabled, the Address Prefix of LAN is automatically assigned by your ISP and you cannot designate an address prefix manually.

3) In the **Prefix Delegation Server** section, check the box to enable **Prefix Delegation**, click **Add** to add a Prefix Delegation Server. Then click **OK**.



Prefix Delegation Server

Prefix Delegation: ☑ Enable

□	ID	LAN	WAN	Address Prefix	Prefix Length	Prefix ID	New Prefix	DUID	Action
--	--	--	--	--	--	--	--	--	--

LAN: ---

WAN: ---

Prefix:

Prefix Length:

Prefix ID:

New Prefix:

Link-local Address:

DUID: Enter 2 to 256 hexadecimal numbers, separating each two numbers by colon, such as 03:00:0F:00:14:78:00.

LAN	Specify the LAN port to which the requesting router will connect.

WAN	Select the WAN port to obtain the delegated prefix.
Prefix	Displays the prefix delegated by the selected WAN port. (Note: You need to enable Prefix Delegation for the corresponding WAN port. Follow the steps: Go to Network > IPV6 > WAN, set Internet Connection Type to Dynamic IP, and enable Prefix Delegation in Advanced.)
Prefix Length	Displays the length of the prefix to be applied. (Note: To set the prefix length, go to Network > IPV6 > WAN, set Internet Connection Type to Dynamic IP, and set the Prefix Delegation Size in Advanced.)
Prefix ID	Specify the value of the remaining bits if the configured Prefix Length is greater than the Prefix Length allocated by the original WAN port.
New Prefix	Displays the prefix to be applied.
Link-local Address	Specify the link-local IPv6 address of the device to apply the prefix.
DUID	The ID of the device to be apply the prefix.

Part 5

Configuring PoE

CHAPTERS

1 Overview

Power over Ethernet (PoE) is a remote power supply function. With this function, the gateway can supply power in addition to data to connected devices over twisted-pair cables.

1.1 Supported Features

PoE Config

Configure PoE settings to supply power to other devices.

PoE Profile

Set a profile with the desired parameters and bind the profile to the corresponding ports to quickly configure the PoE parameters for the ports.

PoE Auto Recovery

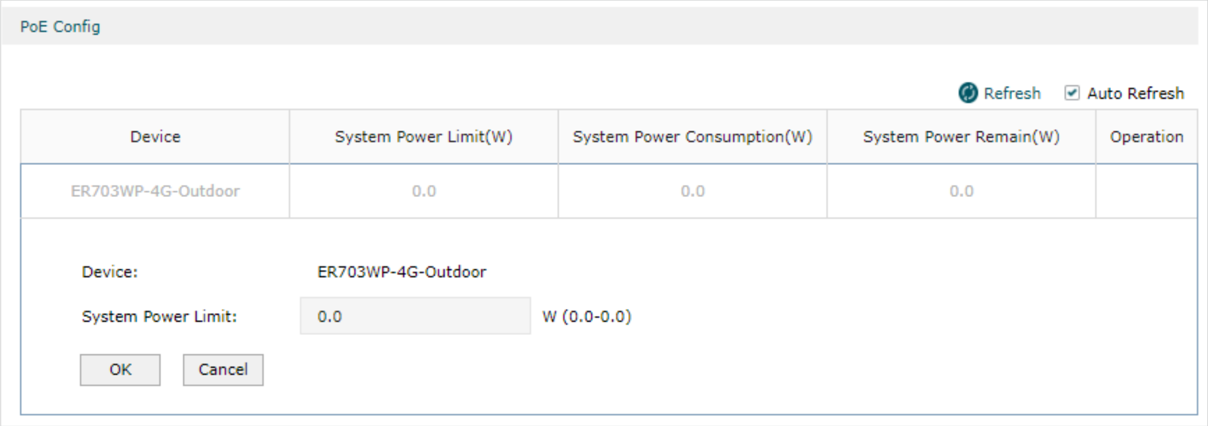
PoE Auto Recovery uses ping packets to detect the link status between PoE ports and connected PoE powered devices (PDs). The gateway pings the IP addresses of PDs constantly. If a PD loses connection, the gateway will reboot it automatically.

2 PoE Config

You can configure the global PoE parameters and PoE parameters of each PoE port.

2.1 Configuring Global PoE parameters

1) Choose the menu **PoE** > **PoE Config**, and locate the **PoE Config** section.



PoE Config

Refresh ☑ Auto Refresh

Device	System Power Limit(W)	System Power Consumption(W)	System Power Remain(W)	Operation
ER703WP-4G-Outdoor	0.0	0.0	0.0	

Device: ER703WP-4G-Outdoor

System Power Limit: 0.0 W (0.0-0.0)

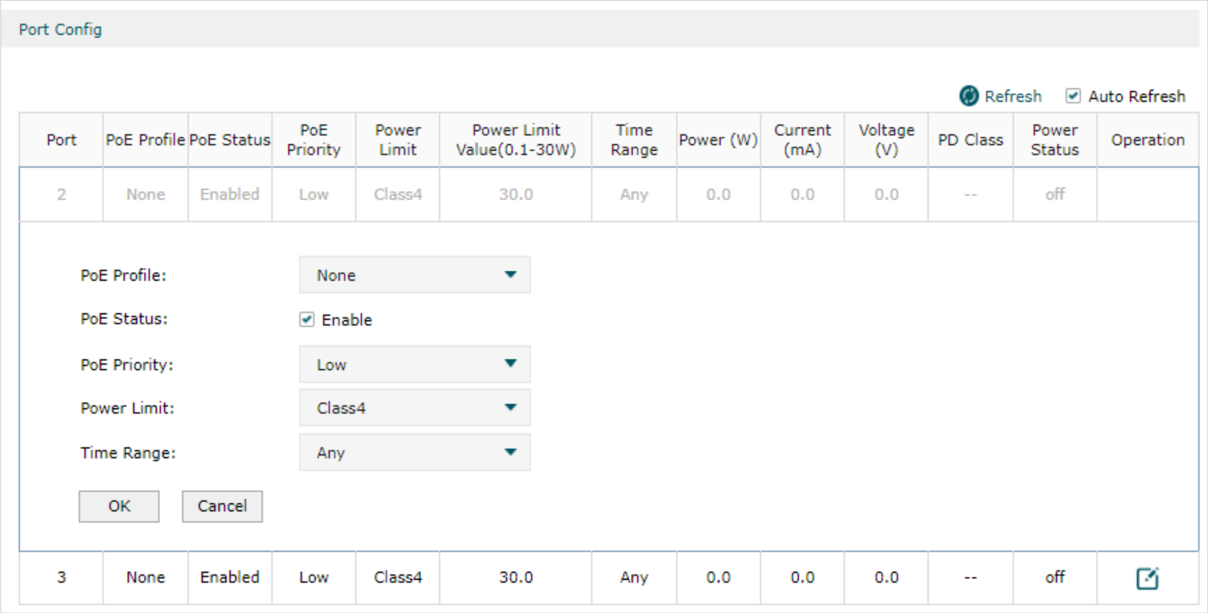
2) Click Edit in the Operation column and specify the maximum power the PoE gateway can supply.

3) You can check the real-time power consumption of the PoE gateway and the real-time power remained for the connected devices.

Note: The POE management system takes into account safety margins to ensure stable operation of the system and devices. Actually, the System Power Consumption may be slightly greater than the System Power Limit.

2.2 Configuring PoE parameters for Port

1) Choose the menu **PoE** > **PoE Config**, and locate the **Port Config** section.



Port Config

Refresh ☑ Auto Refresh

Port	PoE Profile	PoE Status	PoE Priority	Power Limit	Power Limit Value(0.1-30W)	Time Range	Power (W)	Current (mA)	Voltage (V)	PD Class	Power Status	Operation
2	None	Enabled	Low	Class4	30.0	Any	0.0	0.0	0.0	--	off	
3	None	Enabled	Low	Class4	30.0	Any	0.0	0.0	0.0	--	off	

PoE Profile: None

PoE Status: ☑ Enable

PoE Priority: Low

Power Limit: Class4

Time Range: Any

2) Select one port to configure.

PoE Profile: A quick configuration method for the corresponding ports. Select a profile to use its preset configurations. You will be unable to modify the PoE status, PoE priority or power limit manually.

PoE Status: Enable or disable the PoE function for the corresponding port. The port can supply power to the PD when its status is enable.

PoE Priority: Select the priority level for the corresponding port. When the power required exceeds the system power limit, the gateway will power off PDs on low-priority ports to ensure stable running of other PDs.If the port priorities are the same, the gateway will shut down the PD connected to the port with the larger port number.

Power Limit: Specify the maximum power the port can supply. The following options are provided:

Auto: The gateway will allocate a value as the maximum power that the port can supply automatically.

Class1 - The maximum power that the port can supply is 4W.

Class2 - The maximum power that the port can supply is 7W.

Class3 - The maximum power that the port can supply is 15.4W.

Class4 - The maximum power that the port can supply is 30W.

Manual - Enter a value manually.

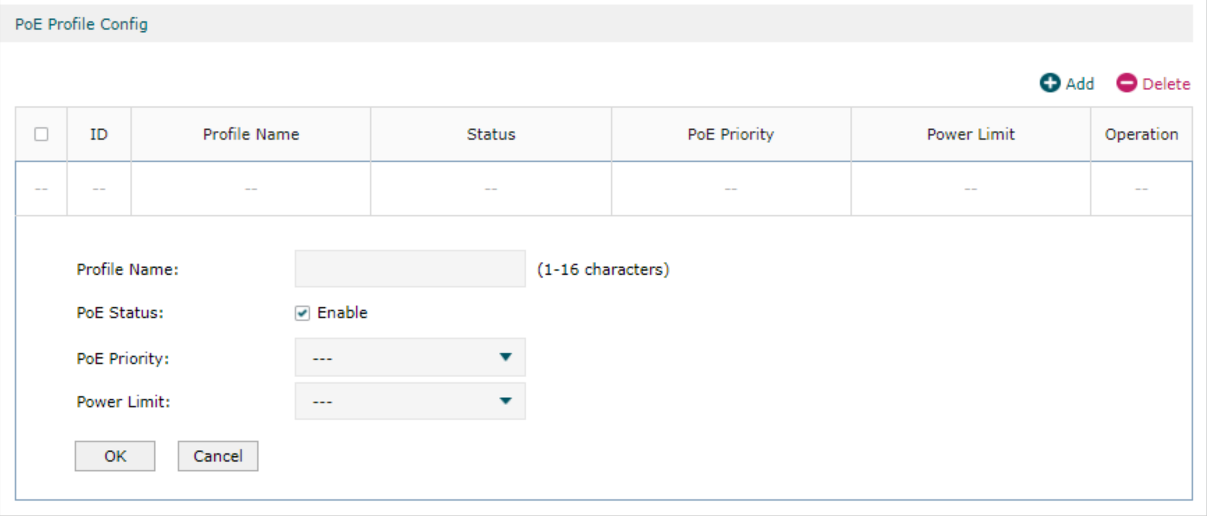
Time Range: Select a time range. The port will supply power only during the time range. The time range referenced here can be created on the Preferences > Time Range page.

3) Click **OK** to apply the settings.

3 Configuring PoE Profile

You can set a profile with the desired parameters and bind the profile to the corresponding ports to quickly configure the PoE parameters for the ports.

Choose the menu **PoE** >**PoE Profile**, and click **Add** to load the following page.



PoE Profile Config

□	ID	Profile Name	Status	PoE Priority	Power Limit	Operation
--	--	--	--	--	--	--

Profile Name: (1-16 characters)

PoE Status: ☑ Enable

PoE Priority: ---

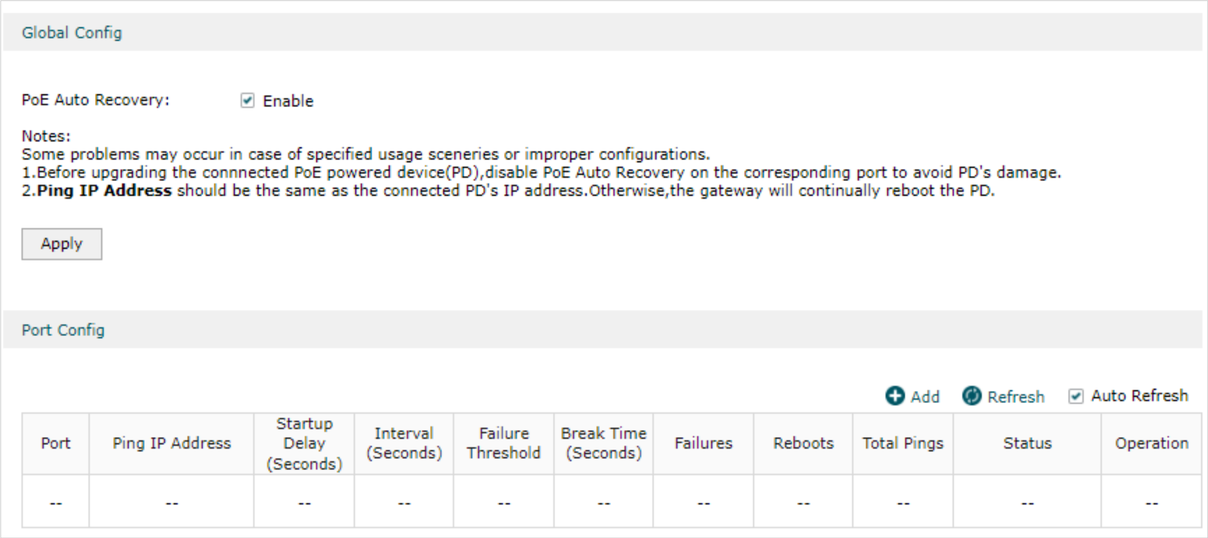
Power Limit: ---

Profile Name	Specify a name for the PoE profile.
PoE Status	Specify the PoE status for the PoE profile.
PoE Priority	Specify the priority level for the PoE profile. The following options are provided: High, Middle and Low. When the supply power exceeds the system power limit, the gateway will power off PDs on low-priority ports to ensure stable running of other PDs.
Power Limit	Specify the maximum power the port can supply. The following options are provided: Auto - The gateway will allocate a value as the maximum power that the port can supply automatically. Class1 - The maximum power that the port can supply is 4W. Class2 - The maximum power that the port can supply is 7W. Class3 - The maximum power that the port can supply is 15.4W. Class4 - The maximum power that the port can supply is 30W. Manual - Enter a value manually.

4 PoE Auto Recovery

PoE Auto Recovery uses ping packets to detect the link status between PoE ports and connected PoE powered devices (PDs). The gateway pings the IP addresses of PDs constantly. If a PD loses connection, the gateway will reboot it automatically.

1) Choose the menu **PoE** > **PoE Auto Recovery** to load the following page.



Global Config

PoE Auto Recovery: ☑ Enable

Notes:
Some problems may occur in case of specified usage sceneries or improper configurations.
1.Before upgrading the connnected PoE powered device(PD),disable PoE Auto Recovery on the corresponding port to avoid PD's damage.
2.**Ping IP Address** should be the same as the connected PD's IP address.Otherwise,the gateway will continually reboot the PD.

Port Config

Port	Ping IP Address	Startup Delay (Seconds)	Interval (Seconds)	Failure Threshold	Break Time (Seconds)	Failures	Reboots	Total Pings	Status	Operation
--	--	--	--	--	--	--	--	--	--	--

2) Enable PoE Auto Recovery globally.

3) Click **Add**, and select a port and specify the parameters

Port	Specify the PoE status for the PoE profile.
Ping IP Address	Set the IP address of the PD connected to the port.,Make sure the IP address configured here is the same as that of the PD connected to the corresponding port. Otherwise, the gateway will continually reboot the PD.
Startup Delay (Seconds)	Set the time that the gateway will wait before starting to ping the IP address, which is to reserve time for the connected PD's rebooting. It ranges from 30 to 600 seconds.
Interval (Seconds)	Set the interval between two consecutive ping packets. It ranges from 10 to 120 seconds.
Failure Threshold	Set the threshold that the gateway consecutively fails to receive the responses from the PD on the port. Once the failures reach the threshold, the gateway will reboot the device. It ranges from 1 to 10.
Break Time (Seconds)	Display the time that the gateway powers off the PD after the connection failures it detected have reached Failure Threshold. It ranges from 3 to 120 seconds.

5) Click **OK** to apply the settings.

Part 6

Configuring SMS

CHAPTERS

1 Overview

The SMS module lets you manage SMS usage, check inbox messages, send messages and configure gateway commands.

1.1 Supported Features

SMS Quota

Set SMS quota to better manage SMS usage so that it does not exceed your set quota.

SMS Inbox/Outbox Message

Check inbox and outbox messages, and send messages.

Router Command

Send specific commands via SMS to interact with the device, and only specific users are allowed to perform these interactions.

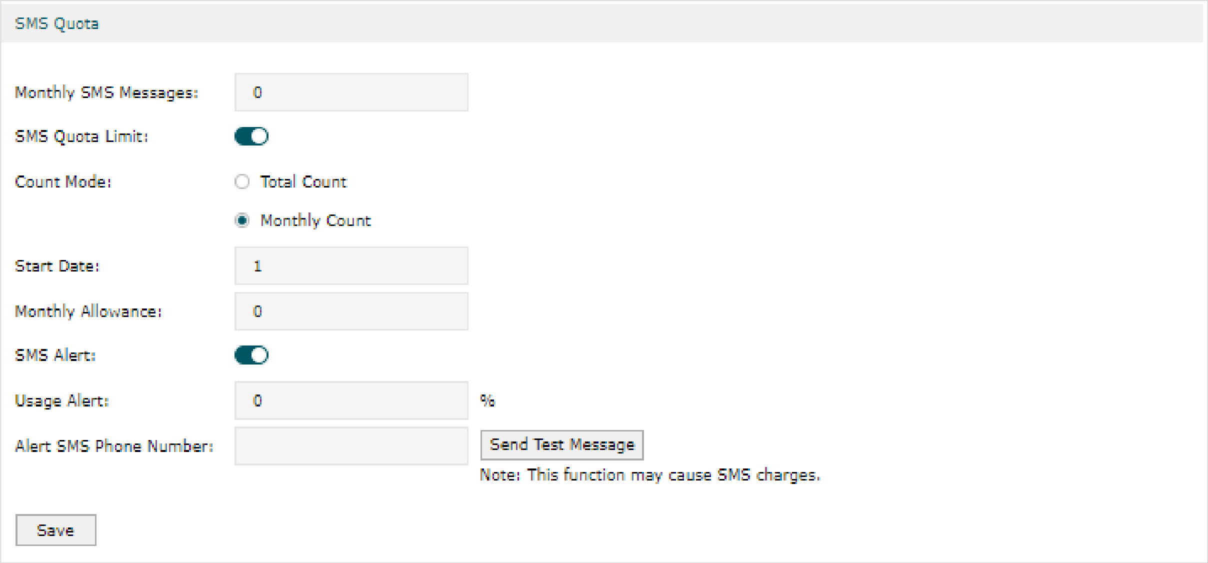
2 SMS Configuration

You can set SMS quota to better manage SMS usage. You can also set policies related to sending and receiving inboxes.

2.1 Configuring SMS Quota

Choose the menu **SMS** > **SMS Settings** > **SMS Quota**, enable **SMS Quota Limit**.

Figure 2-1 Configuring the SMS Quota



SMS Quota

Monthly SMS Messages: 0

SMS Quota Limit: enabled

Count Mode: ○ Total Count ● Monthly Count

Start Date: 1

Monthly Allowance: 0

SMS Alert: enabled

Usage Alert: 0 %

Alert SMS Phone Number:

Note: This function may cause SMS charges.

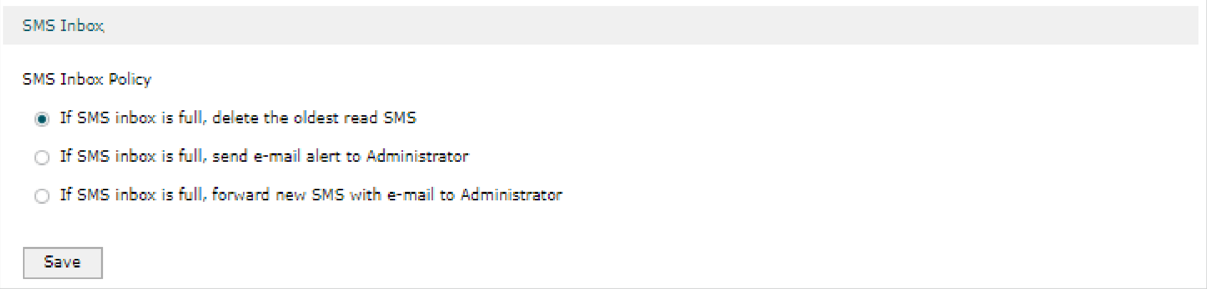
Total SMS Messages	When Total SMS Messages is selected, the total number of SMS sent will be displayed here, and it can be modified.
Monthly SMS Messages	When Monthly SMS Messages is selected, the number of SMS sent every month will be displayed here, and it can be modified.
SMS Quota Limit	Whether to enable the SMS quota function, if enabled, you will not be able to send SMS when the SMS quota is reached.
Count Mode	Select count mode: Total Count - The total number of text messages allowed to be sent. Monthly Count - The number of text messages allowed to be sent within a one-month cycle, monthly count needs to select the start date of each monthly count cycle.
Total Allowance	SMS allowance, that is, how many SMS messages are allowed to be sent.
Start Date	The start date of the monthly count cycle. For example: 2nd, indicating the monthly count cycle is from the 2nd of this month to the 1st of the next month.
Monthly Allowance	Monthly SMS allowance, that is, how many SMS messages are allowed to be sent before the next cycle.

SMS Alert	The SMS alert switch of the SMS quota, if the SMS quota function is turned on and the SMS alert is turned on, the SMS allowance alet message will be sent when the alert ratio reaches the set SMS allowance.
Usage Alert	Usage alert. For example, when 80% of the SMS allowance is reached, an SMS allowance alert message will be sent.
Alert SMS Phone Number	The number for receiving alert SMS receiving.
Send Text Message	Send a test message to confirm that the number can be used to receive SMS limit alert messages.

2.2 Configuring SMS Inbox Policy

Choose the menu **SMS** > **SMS Settings** > **SMS Inbox** to load the following page. Select the desired policy and click **Save** to save the settings.

Figure 2-1 Configuring the SMS Inbox Policy



SMS Inbox

SMS Inbox Policy

● If SMS inbox is full, delete the oldest read SMS

○ If SMS inbox is full, send e-mail alert to Administrator

○ If SMS inbox is full, forward new SMS with e-mail to Administrator

If SMS inbox is full, delete the oldest read SMS	When the inbox is full, delete the oldest read SMS.
If SMS inbox is full, send e-mail alert to Administrator	When the inbox is full, an e-mail will be sent to the administrator, and the new SMS will be lost, and an alert email will be sent to administrator. You need to enable **Mail Notification Setup** in **System Tools > Mail Notification**, configure related parameters and check **SMS Alert** in **Enable Mail Notification**.
If SMS inbox is full, forward new SMS with e-mail to Administrator	When the inbox is full, forward new SMS with e-mail to Administrator. You need to enable **Mail Notification Setup** in **System Tools > Mail Notification**, configure related parameters and check **SMS Alert** in **Enable Mail Notification**.

3 SMS Inbox/Outbox Management

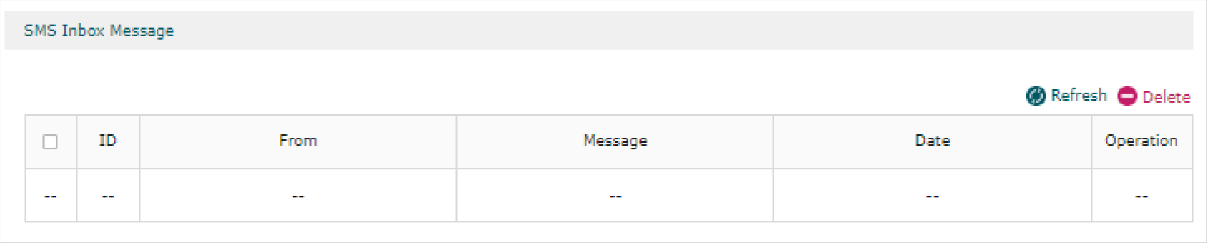
You can set SMS quota to better manage SMS usage. You can also set policies related to sending and receiving inboxes.

3.1 SMS Inbox Message

This box displays the messages you have received.

Choose the menu **SMS** >**SMS Inbox Message** to load the following page.

Figure 3-1 Configuring the SMS Inbox Message



SMS Inbox Message

□	ID	From	Message	Date	Operation
--	--	--	--	--	--

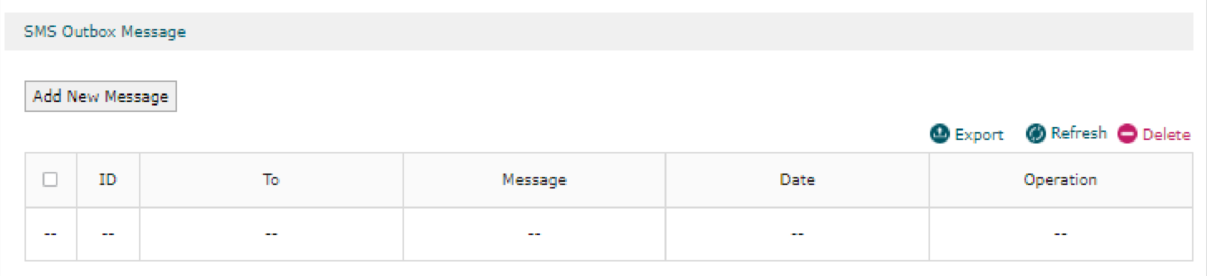
Refresh	Click to refresh the inbox.
Delete	Click to delete the messages you select.

3.2 SMS Outbox Message

This box displays the messages you have successfully sent.

Choose the menu **SMS** >**SMS Outbox Message** to load the following page.

Figure 3-1 Configuring the SMS Outbox Message



SMS Outbox Message

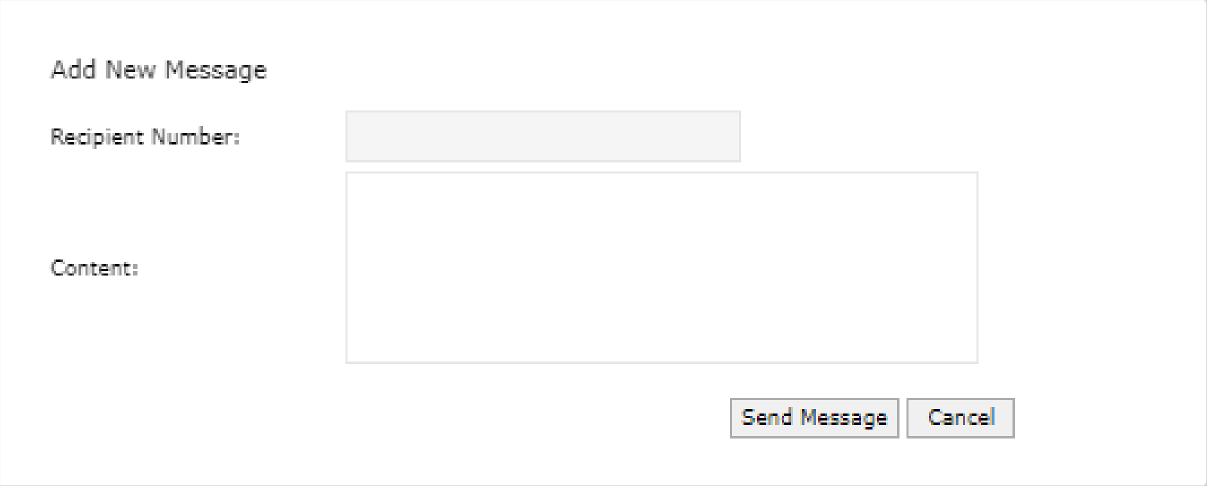
□	ID	To	Message	Date	Operation
--	--	--	--	--	--

Export	Click to export the required SMS to the local.
Refresh	Click to refresh the outbox.
Delete	Click to delete the messages you select.

- **To send a message**

Click **Add New Message** to send a message. Enter the receiver's phone number in the Phone Number field and enter your message in the Content field. Click Send to send out your message.

Figure 3-2 Sending a Message



Add New Message

Recipient Number:

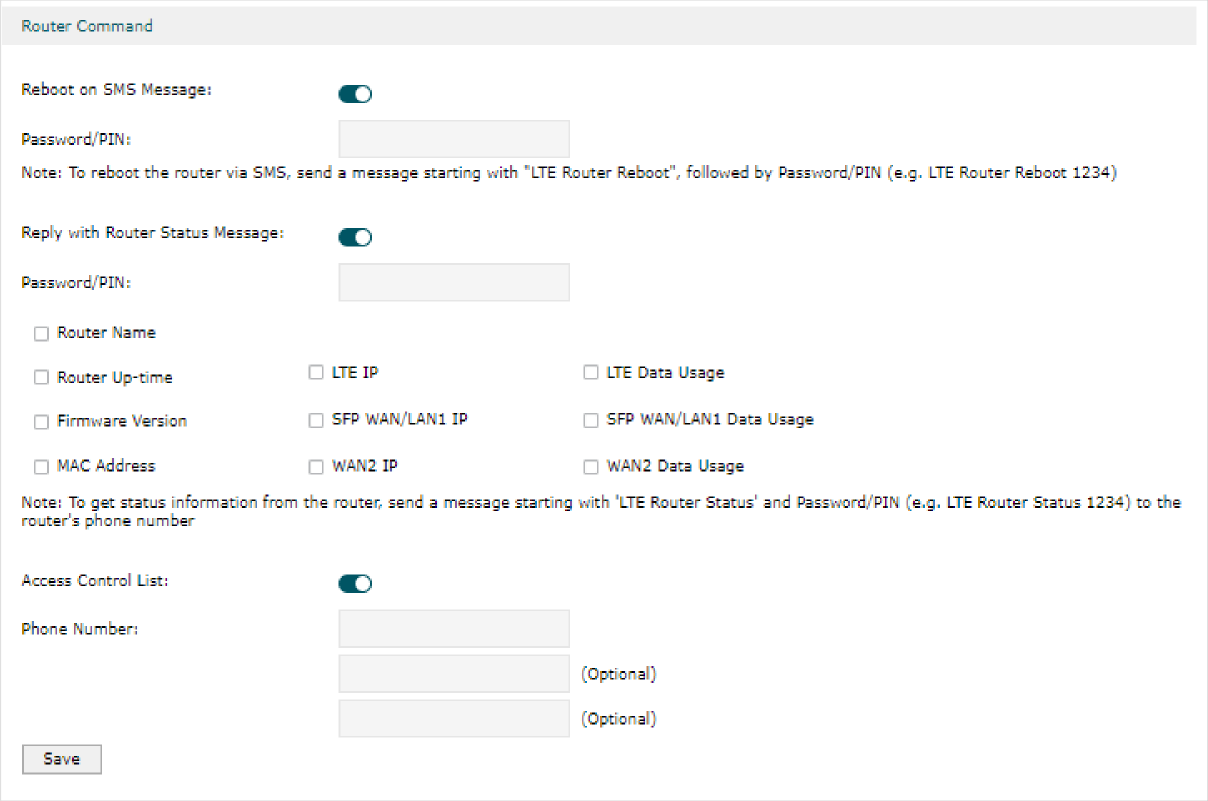
Content:

4 Router Command Configuration

You can send specific commands via SMS to interact with the device, and only specific users are allowed to perform these interactions.

Choose the menu **SMS** > **Router Command** to load the following page.

Figure 4-1 Configuring the Gateway Command



Router Command

Reboot on SMS Message: ●

Password/PIN:

Note: To reboot the router via SMS, send a message starting with "LTE Router Reboot", followed by Password/PIN (e.g. LTE Router Reboot 1234)

Reply with Router Status Message: ●

Password/PIN:

□ Router Name

□ Router Up-time	□ LTE IP	□ LTE Data Usage
□ Firmware Version	□ SFP WAN/LAN1 IP	□ SFP WAN/LAN1 Data Usage
□ MAC Address	□ WAN2 IP	□ WAN2 Data Usage

Note: To get status information from the router, send a message starting with 'LTE Router Status' and Password/PIN (e.g. LTE Router Status 1234) to the router's phone number

Access Control List: ●

Phone Number:

(Optional)

(Optional)

■ **Reboot on SMS Message**

1) Enable **Reboot on SMS Message**, enter the password for the control of device restart via SMS.

2) To reboot the gateway via SMS, send a message starting with “LTE Gateway Reboot”, followed by Password/PIN (e.g. LTE Gateway Reboot 1234)

■ **Reply with Gateway Status Message**

1) Enable **Reply with Gateway Status Message**, enter the password for viewing device-related information and WAN port-related information via SMS.

2) Check the types of information you want to review.

3) To get status information from the gateway, send a message starting with ‘LTE Gateway Status’ and Password/PIN (e.g. LTE Gateway Status 1234) to the gateway’s phone number.

■ **Access Control List**

1) Enable **Access Control List** to enable the allow list of the above functions, and only allow users in the list to interact with the device.

2) Enter the allowed phone numbers. Note that the international telephone area code needs to be added before the number.

Part 7

Configuring Preferences

CHAPTERS

1 Overview

You can preset certain preferences, such as IP groups, time ranges, IP Pools and service types. These preferences will appear as options for you to choose when you are configuring the corresponding parameters for some functions. For example, the IP groups configured here will appear as options when you are configuring the effective IP addresses for functions like Bandwidth Control, Session Limit , Policy Routing and so on.

Once you configure a preference here, it can be applied to multiple functions, saving time during the configuration. For example, after configuring a time range in the **Preferences > Time Range > Time Range** page, you can use this time range as the effective time of Bandwidth Control rules, Link Backup rules, Policy Routing rules, and so on.

2 IP Group Configuration

In IP Group, you can preset IP groups that will appear as options for you to choose when configuring related parameters for some features, such as Bandwidth Control, Session Limit, and Policy Routing. After creating the entries, you can apply them to multiple configurations, which saves you from repeatedly setting up the same information.

To complete IP Group configuration, follow these steps:

1) Click Add to add a new IP group.

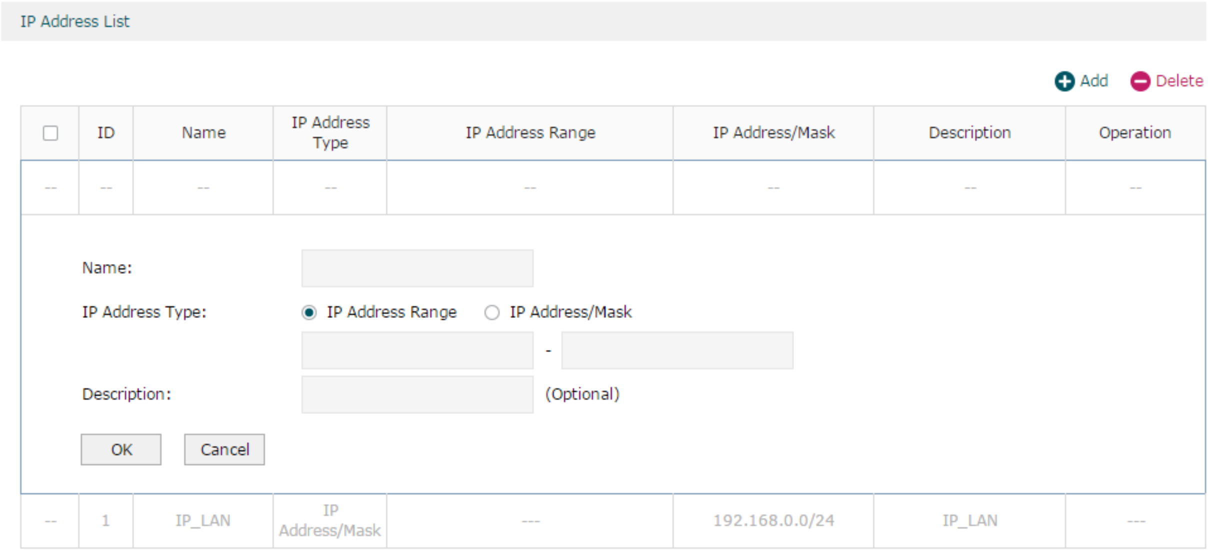
2) Enter a name, select the preset IP address entries, and then configure the corresponding parameters for the new entry.

3) Select the created IP group entry in related configurations, such as Bandwidth Control, Session Limit, and Policy Routing.

2.1 Adding IP Address Entries

Choose the menu **Preferences > IP Group > IP Address** and click **Add** to load the following page.

Figure 2-1 Add an IP Address Entry



IP Address List

□	ID	Name	IP Address Type	IP Address Range	IP Address/Mask	Description	Operation
--	--	--	--	--	--	--	--
--	1	IP_LAN	IP Address/Mask	---	192.168.0.0/24	IP_LAN	---

Name:

IP Address Type: ● IP Address Range ○ IP Address/Mask

-

Description: (Optional)

Follow these steps to add an IP address entry:

1) Enter a name and specify the IP address range.

Name	Enter a name for the IP address entry. Only letters, digits or underscores are allowed.

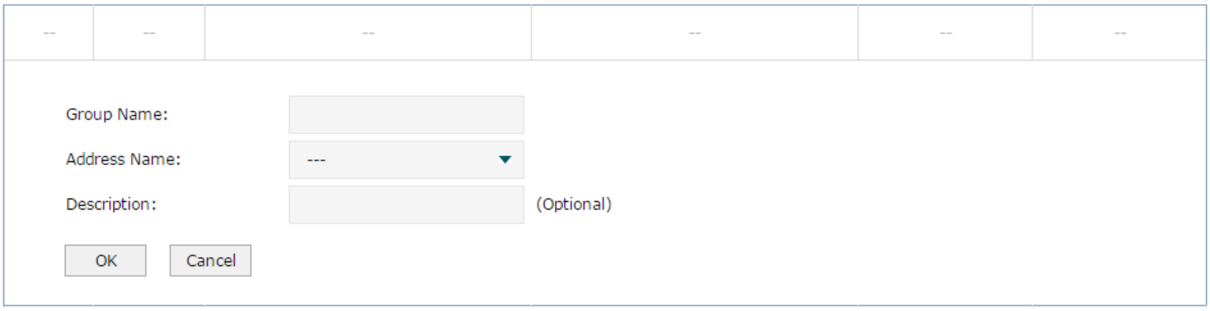
IP Address Type	Specify the type of the IP address entry. Two types are provided: **IP Address Range**: Specify a starting IP address and an ending IP address. A rule that references the IP address entry will be applied to the IP addresses within the range in the entry. **IP Address/Mask**: Specify a network address and a subnet mask. A rule that references the IP address entry will be applied to the IP addresses within the range in the entry.
Description	Enter a brief description for the IP address entry to facilitate your management. It can be 50 characters at most.

2) Click **OK**.

2.2 Grouping IP Address Entries

Choose the menu **Preferences > IP Group > IP Group** and click **Add** to load the following page.

Figure 2-2 Create an IP Group



Follow these steps to create an IP group and add IP address entries to the group:

1) Specify a name and configure the range to add an IP address range.

Group Name	Enter a name for the IP group. Only letters, digits or underscores are allowed.
Address Name	Select the IP address entry, and you can select more than one entry for one IP group. A rule that references the IP group will be applied to all the IP addresses in the group.
Description	Enter a brief description for the address group to facilitate your management. It can be 50 characters at most.

2) Click **OK**.

Note:

The IP group that has been referenced by a rule cannot be deleted unless the rule no longer references the IP group.

The IP group can be null, which means the IP group contains no IP address. A rule that references the address group will not take effect on any IP address.

3 IPv6 Group Configuration

In IPv6 Group, you can preset IPv6 groups that will appear as options for you to choose when configuring related parameters for some features, such as Bandwidth Control, Session Limit, and Policy Routing. After creating the entries, you can apply them to multiple configurations, which saves you from repeatedly setting up the same information.

To complete IPv6 Group configuration, follow these steps:

3) Click Add to add a new IPv6 group.

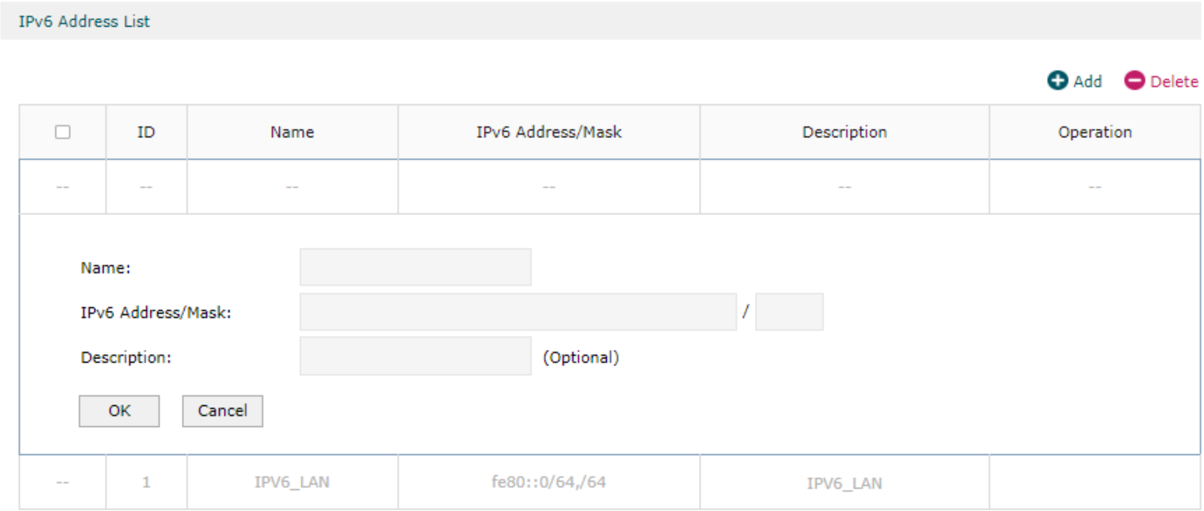
4) Enter a name, select the preset IPv6 address entries, and then configure the corresponding parameters for the new entry.

5) Select the created IPv6 group entry in related configurations, such as Bandwidth Control, Session Limit, and Policy Routing.

3.1 Adding IP Address Entries

Choose the menu **Preferences > IPv6 Group > IPv6 Address** and click **Add** to load the following page.

Figure 3-1 Add an IPv6 Address Entry



IPv6 Address List

□	ID	Name	IPv6 Address/Mask	Description	Operation
--	--	--	--	--	--
--	1	IPV6_LAN	fe80::0/64,/64	IPV6_LAN	

Name:

IPv6 Address/Mask: /

Description: (Optional)

Follow these steps to add an IPv6 address entry:

1) Enter a name and specify the IPv6 address range.

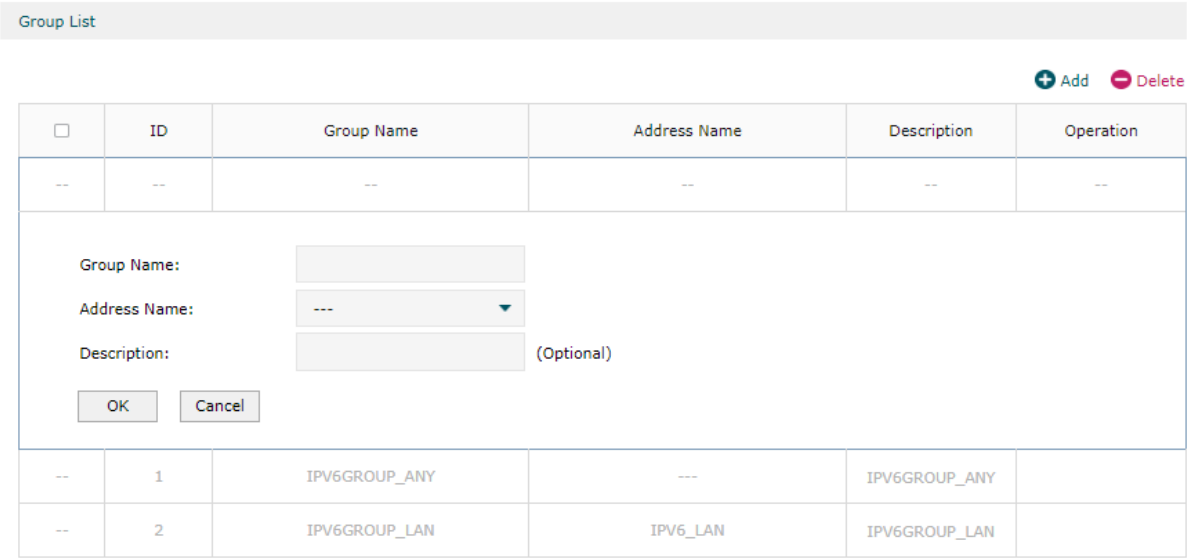
Name	Enter a name for the IPv6 address entry. Only letters, digits or underscores are allowed.
IPv6 Address/ Mask:	Specify a network address and a subnet mask. A rule that references the IP v6address entry will be applied to the IPv6 addresses within the range in the entry.
Description	Enter a brief description for the IP address entry to facilitate your management. It can be 50 characters at most.

2) Click **OK**.

3.2 Grouping IP Address Entries

Choose the menu **Preferences > IPv6 Group > IPv6 Group** and click **Add** to load the following page.

Figure 3-2 Create an IPv6 Group



Group List

□	ID	Group Name	Address Name	Description	Operation
--	--	--	--	--	--
--	1	IPV6GROUP_ANY	---	IPV6GROUP_ANY	
--	2	IPV6GROUP_LAN	IPV6_LAN	IPV6GROUP_LAN	

Group Name:

Address Name: ---

Description: (Optional)

Follow these steps to create an IPv6 group and add IPv6 address entries to the group:

1) Specify a name and configure the range to add an IPv6 address range.

Group Name	Enter a name for the IPv6 group. Only letters, digits or underscores are allowed.
Address Name	Select the IPv6 address entry, and you can select more than one entry for one IPv6 group. A rule that references the IPv6 group will be applied to all the IPv6 addresses in the group.
Description	Enter a brief description for the address group to facilitate your management. It can be 50 characters at most.

2) Click **OK**.

Note:

The IPv6 group that has been referenced by a rule cannot be deleted unless the rule no longer references the IPv6 group.

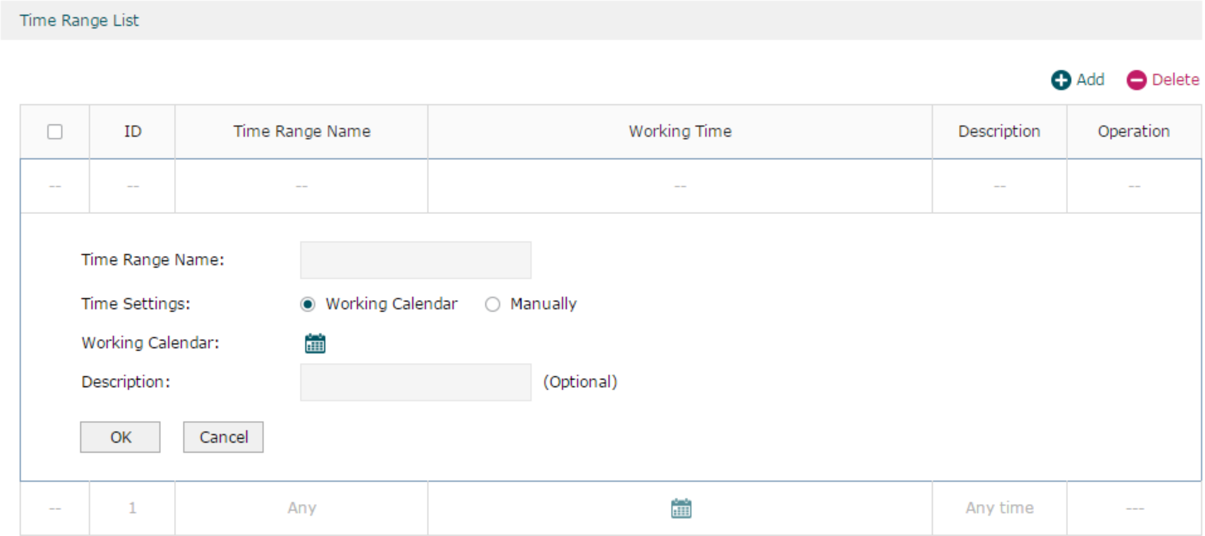
The IPv6 group can be null, which means the IPv6 group contains no IPv6 address. A rule that references the address group will not take effect on any IPv6 address.

4 Time Range Configuration

Time range configuration allows you to define time ranges by specifying the period in a day and days in a week. The time range configured here can be used as the effective time for multiple functions like Bandwidth Control, Link Backup, Policy Routing and so on.

Choose the menu **Preferences > Time Range > Time Range** and click **Add** to load the following page.

Figure 4-1 Add a Time Range Entry



□	ID	Time Range Name	Working Time	Description	Operation
--	--	--	--	--	--

Time Range Name:

Time Settings: ● Working Calendar ○ Manually

Working Calendar: 📅

Description: (Optional)

--	1	Any	📅	Any time	---

Follow these steps to add a time range entry:

1) Enter a name for the time range entry.

Time Range Name	Enter a name for the time range entry. Only letters, digits or underscores are allowed.

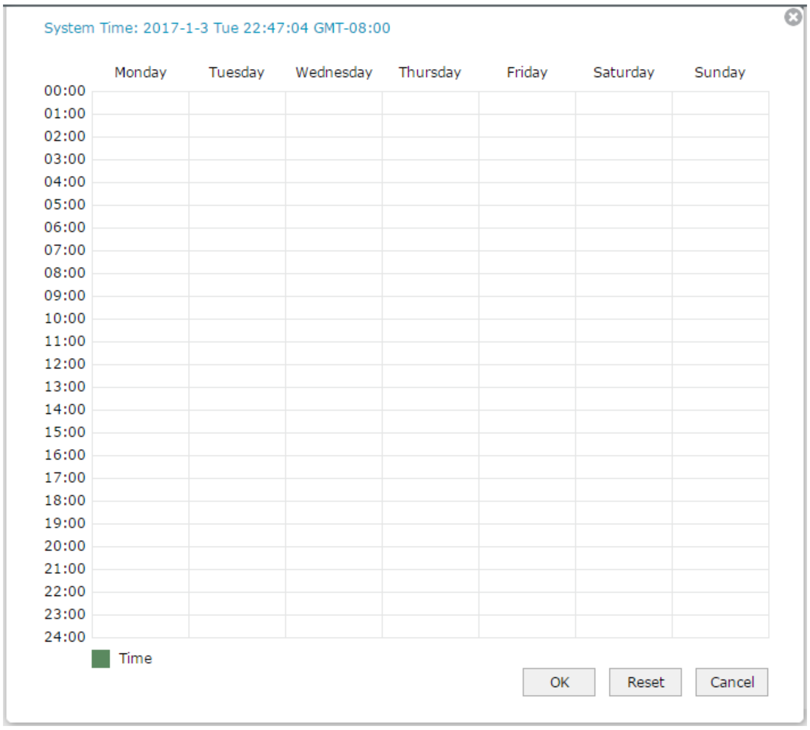
2) Choose a mode to set the time range. Two modes are provided: Working Calendar and Manually.

- Working Calendar

Working Calendar mode allows you to set the time range on a calendar. In this mode, the effective time can be accurate to the hour.

Choose Working Calendar mode and click 📅 to load the following page.

Figure 4-2 Working Calendar Mode



System Time: 2017-1-3 Tue 22:47:04 GMT-08:00

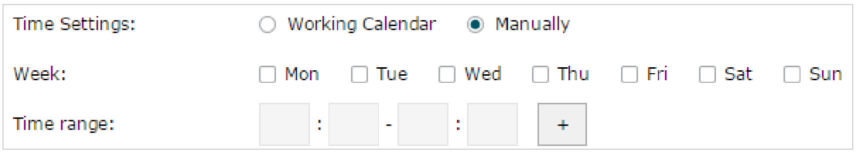
Select the time slices and click **OK** to set the time range. You can click the time slices, or alternatively drag the areas to select or deselect the time slices.

- Manually

Manually mode allows you to enter the time range and select the effective days in a week manually. In this mode, effective time can be accurate to the minute.

Choose Manually mode to load the following page.

Figure 4-3 Manually Mode



Time Settings: ○ Working Calendar ● Manually

Week: □ Mon □ Tue □ Wed □ Thu □ Fri □ Sat □ Sun

Time range: : - : +

Week	Select the effective days in a week.
Time Range	Enter a start and end time. If the effective time is discontinuous, click + to add another time range.

3) (Optional) Enter an brief description of this time range to make identifying it easier.

4) Click **OK**.

Note:

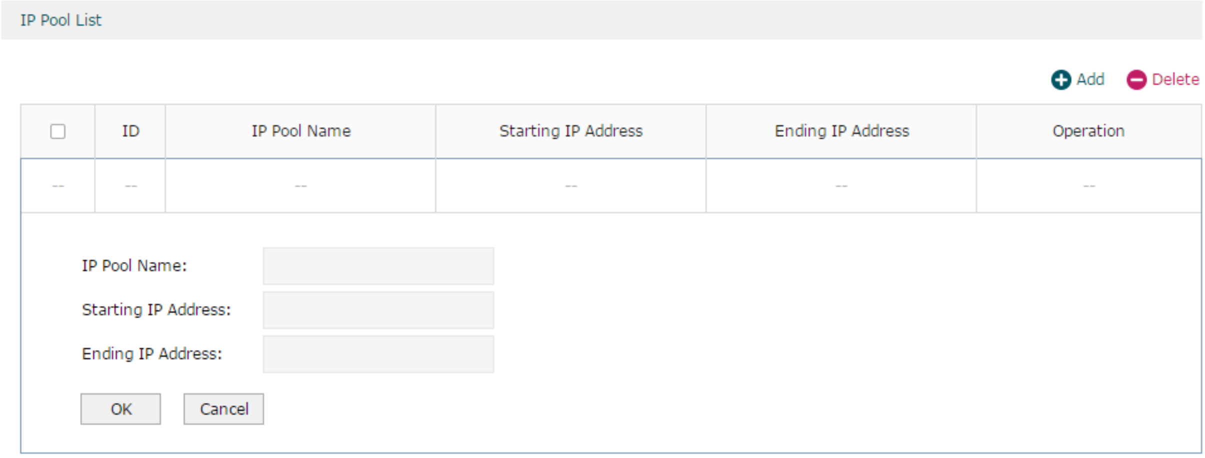
A time range entry that is being referenced by a rule cannot be deleted.

5 VPN IP Pool Configuration

In VPN IP Pool, you can preset VPN IP pools that will appear as options for you to choose when configuring L2TP VPN and PPTP VPN. After creating the entries, you can apply them to different rules, which saves you from repeatedly setting up the same information.

Choose the menu **Preferences > VPN IP Pool > VPN IP Pool** and click **Add** to load the following page.

Figure 5-1 Add an IP Pool Entry



IP Pool List

□	ID	IP Pool Name	Starting IP Address	Ending IP Address	Operation
--	--	--	--	--	--

IP Pool Name:

Starting IP Address:

Ending IP Address:

Follow these steps to add an IP Pool:

1) Enter a name and specify the starting and ending IP address of the IP Pool.

IP Pool Name	Enter a name for the IP Pool. Only letters, digits or underscores are allowed.
Starting IP Address/ Ending IP Address	Specify the starting and ending IP address. The range of the IP pool cannot overlap with the existing IP pools.

2) Click **OK**.

Note:

The range of the newly created IP pool cannot overlap with the IP range of the DHCP pool and other existing VPN IP pools.

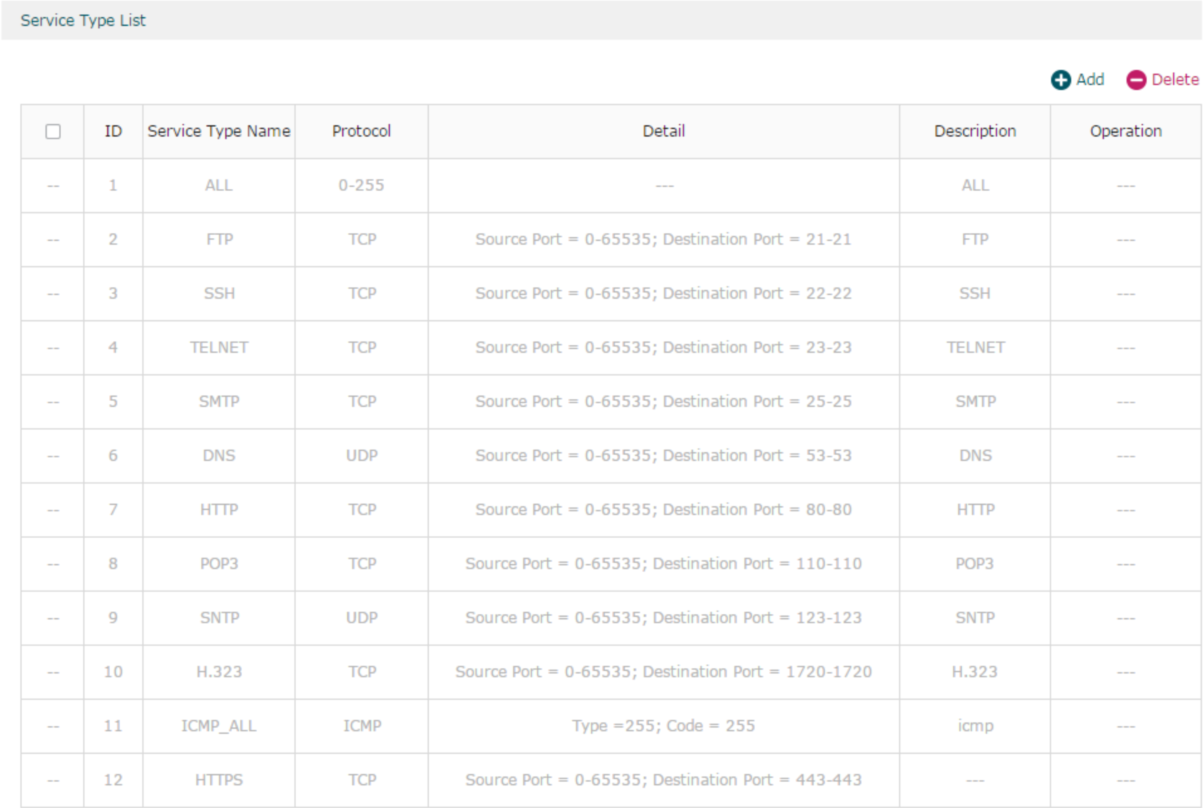
The VPN IP pool entry that has been referenced by a rule cannot be deleted unless the rule no longer references the entry.

6 Service Type Configuration

In Service Type, you can define service type entries that will appear as matching conditions for you to choose when configuring the rules of Access Control in Firewall. The entries in gray are system predefined service types, and they cannot be edited or deleted. You can add other entries if your service type is not in the list.

Choose the menu **Preferences > Service Type > Service Type** to load the following page.

Figure 6-1 Service Type List



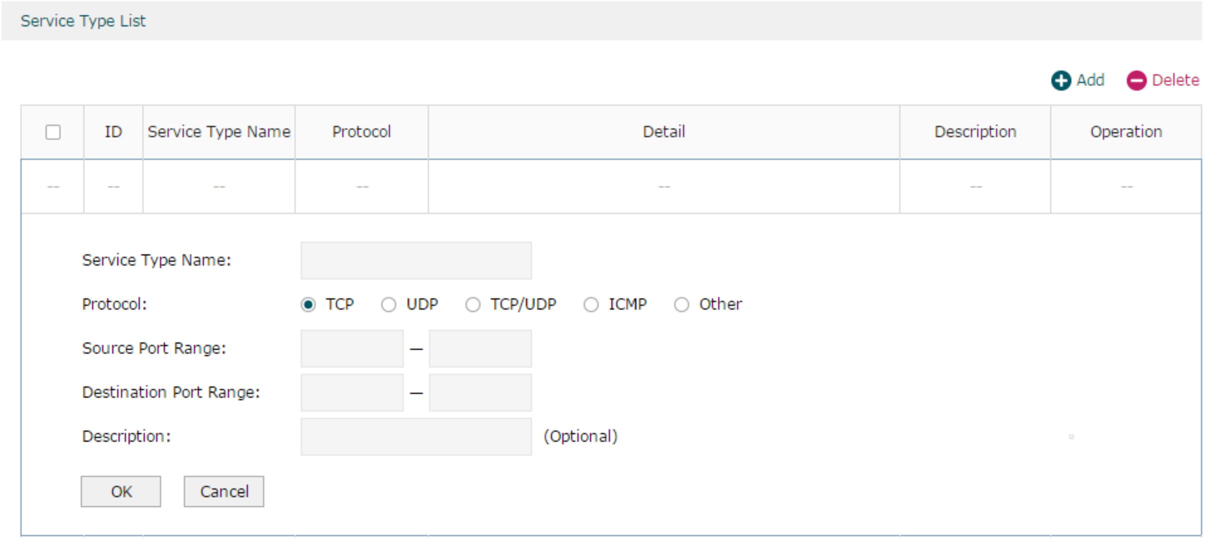
Service Type List

□	ID	Service Type Name	Protocol	Detail	Description	Operation
--	1	ALL	0-255	---	ALL	---
--	2	FTP	TCP	Source Port = 0-65535; Destination Port = 21-21	FTP	---
--	3	SSH	TCP	Source Port = 0-65535; Destination Port = 22-22	SSH	---
--	4	TELNET	TCP	Source Port = 0-65535; Destination Port = 23-23	TELNET	---
--	5	SMTP	TCP	Source Port = 0-65535; Destination Port = 25-25	SMTP	---
--	6	DNS	UDP	Source Port = 0-65535; Destination Port = 53-53	DNS	---
--	7	HTTP	TCP	Source Port = 0-65535; Destination Port = 80-80	HTTP	---
--	8	POP3	TCP	Source Port = 0-65535; Destination Port = 110-110	POP3	---
--	9	SNTP	UDP	Source Port = 0-65535; Destination Port = 123-123	SNTP	---
--	10	H.323	TCP	Source Port = 0-65535; Destination Port = 1720-1720	H.323	---
--	11	ICMP_ALL	ICMP	Type =255; Code = 255	icmp	---
--	12	HTTPS	TCP	Source Port = 0-65535; Destination Port = 443-443	---	---

The entries in gray are system predefined service types. You can add other entries if your service type is not in the list.

Click **Add** to load the following page.

Figure 6-2 Add a Service Type Entry



Service Type List

□	ID	Service Type Name	Protocol	Detail	Description	Operation
--	--	--	--	--	--	--

Service Type Name:

Protocol: ● TCP ○ UDP ○ TCP/UDP ○ ICMP ○ Other

Source Port Range: —

Destination Port Range: —

Description: (Optional)

Follow these steps to add a service type entry:

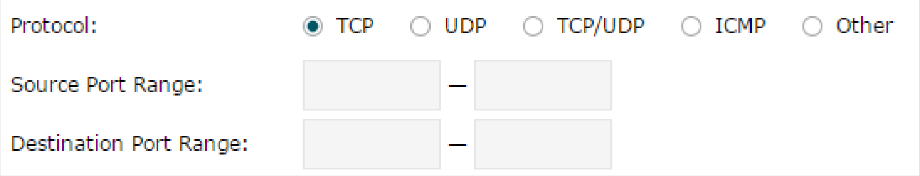
1) Enter a name for the service type.

Service Type Name	Enter a name for the service type. Only letters, digits or underscores are allowed.

2) Select the protocol for the service type. The predefined protocols include **TCP**, **UDP**, **TCP/UDP** and **ICMP**. For other protocols, select the option **Other**.

When **TCP**, **UDP**, or **TCP/UDP** is selected, the following page will appear.

Figure 6-3 TCP/UDP Protocol



Protocol: ● TCP ○ UDP ○ TCP/UDP ○ ICMP ○ Other

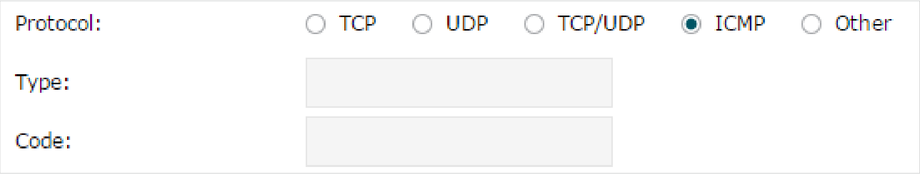
Source Port Range: —

Destination Port Range: —

Source Port Range/ Destination Port Range	Specify range of the source port and destination port of the TCP or UDP packets. Packets whose source port and destination port are both in the range are considered as the target packets.

When **ICMP** is selected, the following page will appear.

Figure 6-4 ICMP Protocol



Protocol: ○ TCP ○ UDP ○ TCP/UDP ● ICMP ○ Other

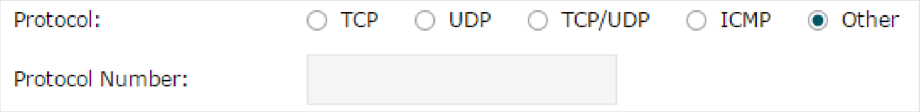
Type:

Code:

Type/Code	Specify the type and code of the ICMP packets. ICMP packets with both the type and code fields matched are considered as the target packets.

When **Other** is selected, the following page will appear.

Figure 6-5 Other Protocols



Protocol: ○ TCP ○ UDP ○ TCP/UDP ○ ICMP ● Other

Protocol Number:

Protocol Number	Specify the protocol number of the packets. Packets with the protocol number field matched are considered as the target packets.

3) (Optional) Enter a brief description of this service type to make identifying it easier.

4) Click **OK**.

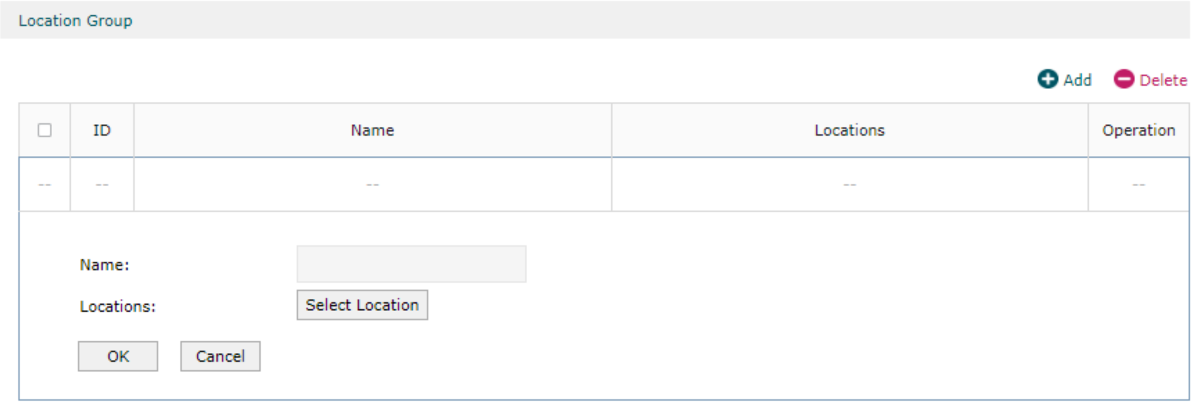
Note:

A service type entry that is being referenced by a rule cannot be deleted unless the rule no longer references the entry.

7 Location Group Configuration

In Location Group, you can preset location groups, which will be used as options for you to choose when configuring functions such as Access Control. Once related entries are created, you can apply them to multiple configurations to avoid repeated settings.

5) Choose the menu **Preferences > Location Group, and click Add** to load the following page.



Location Group

□	ID	Name	Locations	Operation
--	--	--	--	--

Name:

Locations: Select Location

6) Enter the group name.

7) Click **Select Location** to choose a the location for the group.

8) Click **OK** to apply the settings.

Part 8

Configuring Transmission

CHAPTERS

1 Transmission

1.1 Overview

Transmission function provides multiple traffic control measures for the network. You can configure the transmission function according to your actual needs.

1.2 Supported Features

The transmission module includes NAT, Bandwidth Control, Session Limit, Load Balancing and Routing.

NAT

NAT (Network Address Translation) is the translation between private IP and public IP. NAT provides a way to allow multiple private hosts to access the public network using one public IP at the same time, which alleviates the shortage of IP addresses. Furthermore, NAT strengthens the LAN (Local Area Network) security since the address of LAN host never appears on the internet. The gateway supports following NAT features:

- One-to-One NAT

One-to-One NAT creates a relationship between a private IP address and a public IP address. A device with a private IP address can be accessed through the corresponding valid public IP address.

- Virtual Servers

When you build up a server in the local network and want to share it on the internet, Virtual Servers can realize the service and provide it to the internet users. At the same time Virtual Servers can keep the local network safe as other services are still invisible from the internet.

- Port Triggering

Port Triggering is a feature used to dynamically forward traffic on a certain port to a specific server on the local network. When a host in the local network initiates a connection to the triggering port, all the external ports will be opened for subsequent connections. The gateway can record the IP address of the host, when the data from the internet returns to the external ports, the gateway can forward them to the corresponding host. Port Triggering is mainly applied to online games, VoIPs, video players and so on.

- NAT-DMZ

When a PC is set to be a DMZ (Demilitarized Zone) host in the local network, it is totally exposed to the internet, which can realize the unlimited bidirectional communication between internal hosts and external hosts. The DMZ host becomes a virtual server with all ports opened. When you are not clear about which ports to open in some special applications, such as IP camera and database software, you can set the PC to be a DMZ host.

- ALG

Some special protocols such as FTP, H.323, SIP, IPSec and PPTP will work properly only when ALG (Application Layer Gateway) service is enabled.

Bandwidth Control

Bandwidth Control function allows you to configure rules to limit various data flows. In this way, you can optimize the network performance by reasonably utilizing the bandwidth.

Quality of Services

Quality of Services allows you to configure rules to limit various data flows.

Session Limit

Session limit feature limits the number of sessions that specific sources can use. This feature can prevent the network resources and bandwidth from being exhausted by some hosts which use too many sessions at one time, and therefore optimizes network performance.

Load Balancing

You can configure the traffic sharing mode of the WAN ports to optimize the resource utilization and processing capability of servers. The gateway will switch all the new sessions from dropped lines automatically to the others to keep an always on-line network.

Routing

You can configure policy routing rules and static routing.

Policy routing provides a more accurate way to control the routing based on the policy defined by the network administrator.

Static routing is a form of routing that is configured manually by adding non-aging entries into a routing table. The manually-configured routing information guides the gateway in forwarding data packets to the specific destination.

2 NAT Configurations

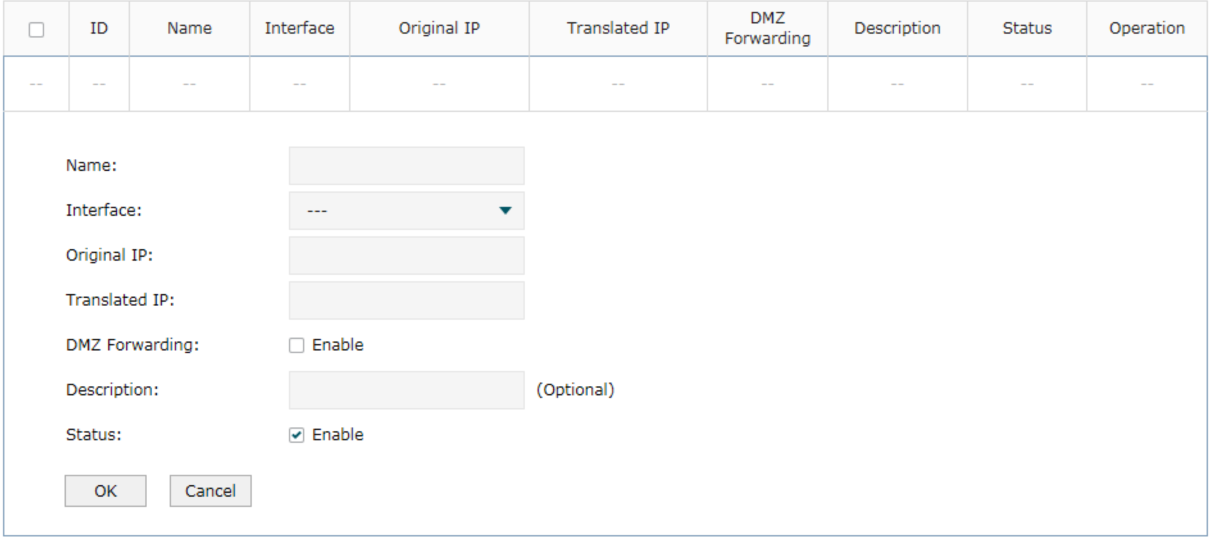
With NAT configurations, you can:

- Configure the One-to-One NAT.
- Configure the Virtual Servers.
- Configure the Port Triggering.
- Configure the NAT-DMZ.
- Configure the ALG.

2.1 Configuring the One-to-One NAT

Choose the menu **Transmission > NAT > One-to-One NAT** and click **Add** to load the following page.

Figure 2-1 Configuring the One-to-One NAT



□	ID	Name	Interface	Original IP	Translated IP	DMZ Forwarding	Description	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name:

Interface: ---

Original IP:

Translated IP:

DMZ Forwarding: □ Enable

Description: (Optional)

Status: ☑ Enable

Follow these steps to configure the One-to-One NAT:

1) Specify the name of the One-to-One NAT rule and configure other related parameters.

Interface	Specify the effective interface for the rule only when the connection type is Static IP. If you choose multiple ports, the entry will be applied to all selected ports simultaneously.
Original IP	Specify the private IP address for the rule. The original IP address cannot be the broadcast address and the IP address of the LAN interface.

Translated IP	Specify the public IP address for the rule. The translated IP address cannot be the broadcast address and the IP address of the WAN interface.
DMZ Forwarding	Check the box to enable DMZ Forwarding. The packets transmitted to the translated IP address will be forwarded to the host of original IP address if DMZ Forwarding is enabled.
Description	(Optional) Enter a brief description for the rule to facilitate your management.
Status	Check the box to enable the rule.

2) Click **OK**.

Note:

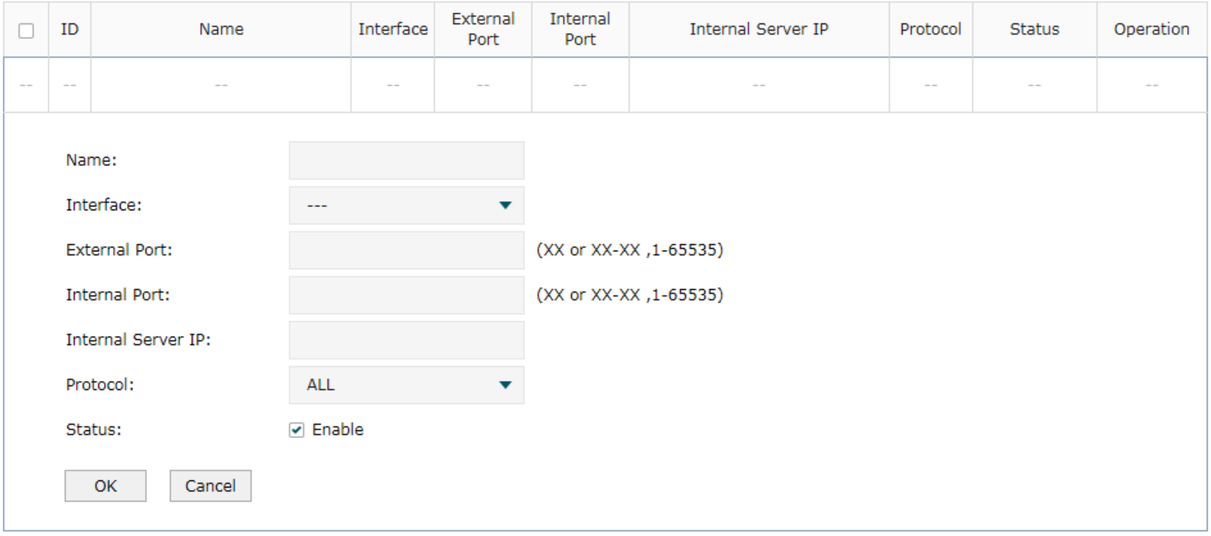
One-to-One NAT takes effect only when the connection type of WAN is Static IP.

When setting open ports for NAT, do not select the reserved ports (1723/1701 is reserved for PPTP/ L2TP, 1194 is reserved for OpenVPN, and the specific ports you reserved).

2.2 Configuring the Virtual Servers

Choose the menu **Transmission > NAT > Virtual Servers** and click **Add** to load the following page.

Figure 2-2 Configuring the Virtual Servers



□	ID	Name	Interface	External Port	Internal Port	Internal Server IP	Protocol	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name:	
Interface:	---
External Port:	(XX or XX-XX ,1-65535)
Internal Port:	(XX or XX-XX ,1-65535)
Internal Server IP:	
Protocol:	ALL
Status:	☑ Enable

Follow these steps to configure the Virtual Servers:

1) Specify the name of the Virtual Server rule and configure other related parameters.

Interface	Specify the effective interface for the rule. If you choose multiple ports, the entry will be applied to all selected ports simultaneously.
External Port	Enter the service port or port range of the gateway for external network access. The ports or port ranges cannot overlap with those of other virtual server rules.

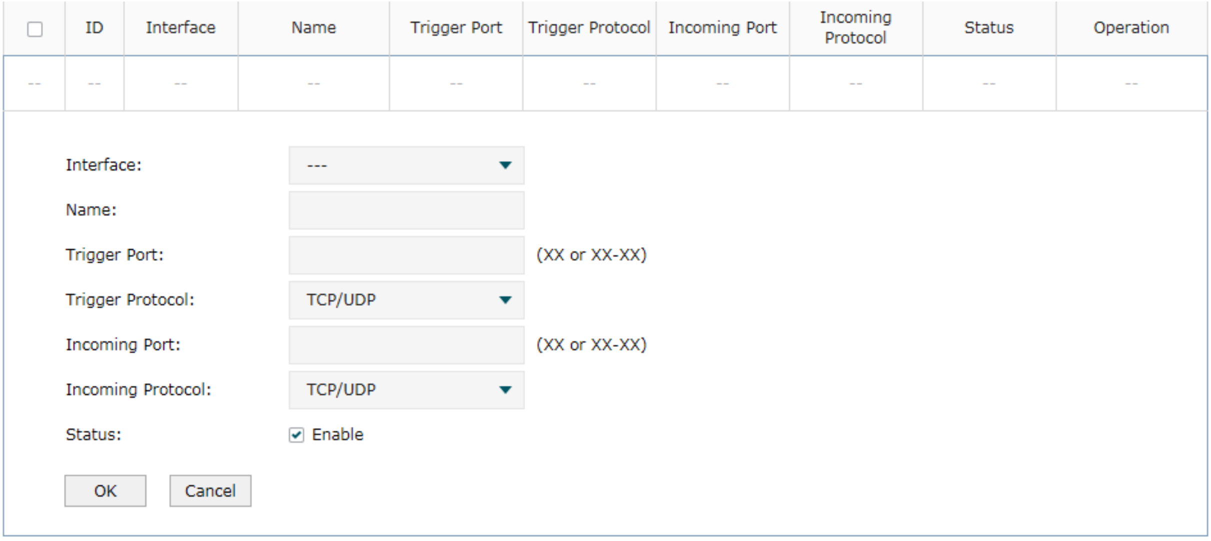
Internal Port	Enter the service port or port range of the gateway for external network access. The ports or port ranges cannot overlap with those of other virtual server rules.
Internal Server IP	Enter the IP address of the specified internal server for the entry. All the requests from the internet to the specified LAN port will be redirected to this host.
Protocol	Specify the protocol used for the rule. **ALL:** Data packets are transmitted based on TCP or UDP protocols. **TCP:** Data packets are transmitted based on TCP protocol. **UDP:** Data packets are transmitted based on UDP protocol.
Status	Check the box to enable the rule.

2) Click **OK**.

2.3 Configuring the Port Triggering

Choose the menu **Transmission > NAT > Port Triggering** and click **Add** to load the following page.

Figure 2-3 Configuring the Port Triggering



□	ID	Interface	Name	Trigger Port	Trigger Protocol	Incoming Port	Incoming Protocol	Status	Operation
--	--	--	--	--	--	--	--	--	--

Interface:	---
Name:	
Trigger Port:	(XX or XX-XX)
Trigger Protocol:	TCP/UDP
Incoming Port:	(XX or XX-XX)
Incoming Protocol:	TCP/UDP
Status:	☑ Enable

Follow these steps to configure the Port Triggering:

1) Specify the name of the Port Triggering rule and configure other related parameters.

Interface	Specify the effective interface for the rule. If you choose multiple ports, the entry will be applied to all selected ports simultaneously.
Trigger Port	Enter the trigger port or port range from which the data flows out. Each entry supports at most 5 groups of trigger ports. For example, you can enter 1 or 1-2. Note that the ports or port ranges cannot overlap with those of other port triggering rules.

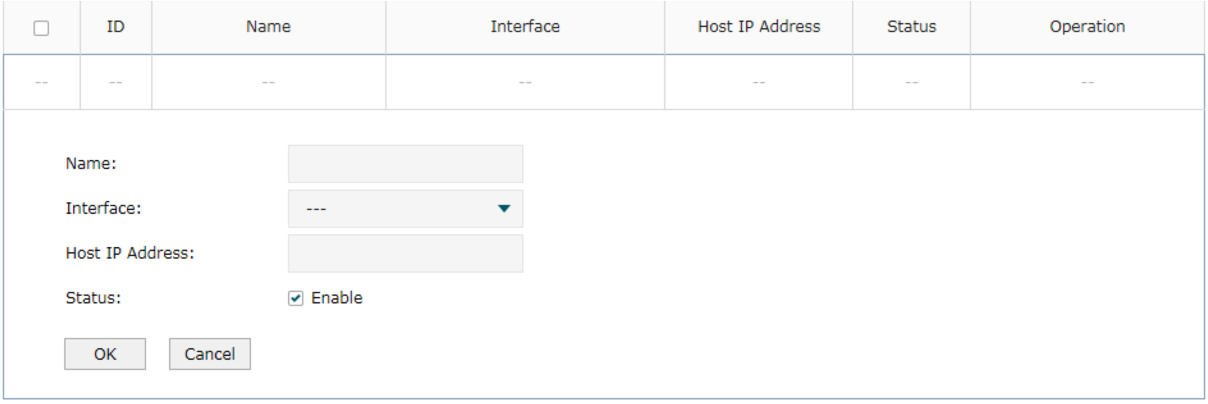
Trigger Protocol	Specify the protocol for the trigger port. **ALL:** Data packets are transmitted based on TCP or UDP protocols. **TCP:** Data packets are transmitted based on TCP protocol. **UDP:** Data packets are transmitted based on UDP protocol.
Incoming Port	Enter the incoming port or port range from which the data is received. Each entry supports at most 5 groups of incoming ports. For example, you can enter 1-2 or 11-12. Note that the ports or port ranges cannot overlap with those of other port triggering rules.
Incoming Protocol	Specify the protocol for the incoming port. **ALL:** Data packets are transmitted based on TCP or UDP protocols. **TCP:** Data packets are transmitted based on TCP protocol. **UDP:** Data packets are transmitted based on UDP protocol.
Status	Check the box to enable the rule.

2) Click **OK**.

2.4 Configuring the NAT-DMZ

Choose the menu **Transmission > NAT > NAT-DMZ** and click **Add** to load the following page.

Figure 2-4 Configuring the NAT-DMZ



□	ID	Name	Interface	Host IP Address	Status	Operation
--	--	--	--	--	--	--

Name:

Interface: ---

Host IP Address:

Status: ☑ Enable

Follow these steps to configure the NAT-DMZ:

1) Specify the name of the NAT-DMZ rule and configure other related parameters.

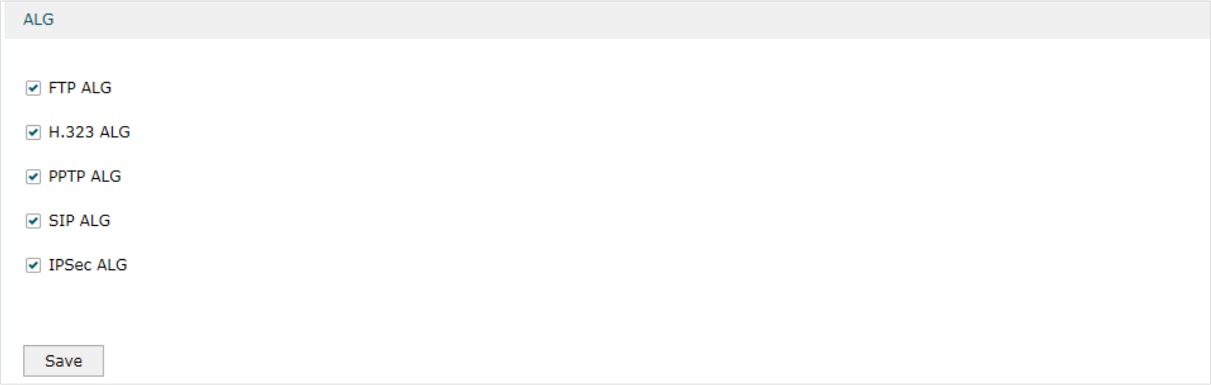
Interface	Specify the effective interface for the rule.
Host IP Address	Specify the host IP address for NAT-DMZ.
Status	Check the box to enable the rule.

2) Click **OK**.

2.5 Configuring the ALG

Choose the menu **Transmission > NAT > ALG** to load the following page.

Figure 2-5 Configuring the ALG



ALG

☑ FTP ALG

☑ H.323 ALG

☑ PPTP ALG

☑ SIP ALG

☑ IPSec ALG

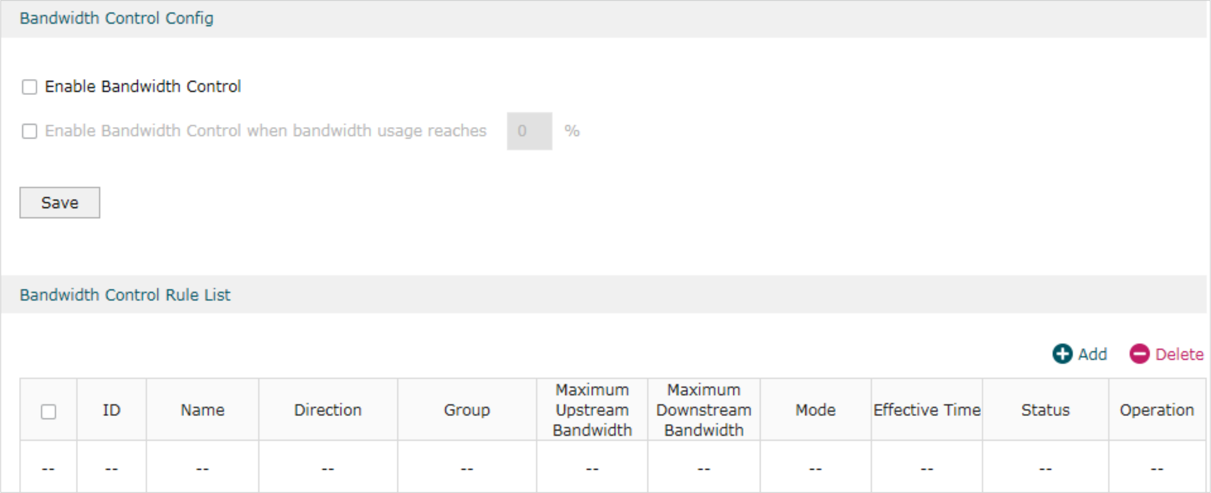
Enable related ALG according to your needs and click **Save**.

3 Bandwidth Control Configuration

Bandwidth Control functions to control the bandwidth by configuring rules for limiting various data flows. In this way, the network bandwidth can be reasonably distributed and utilized.

Choose the menu **Transmission> Bandwidth Control** to load the following page.

Figure 3-1 Configuring the Bandwidth Control



Bandwidth Control Config

□ Enable Bandwidth Control

□ Enable Bandwidth Control when bandwidth usage reaches 0 %

Save

Bandwidth Control Rule List

Add Delete

□	ID	Name	Direction	Group	Maximum Upstream Bandwidth	Maximum Downstream Bandwidth	Mode	Effective Time	Status	Operation
--	--	--	--	--	--	--	--	--	--	--

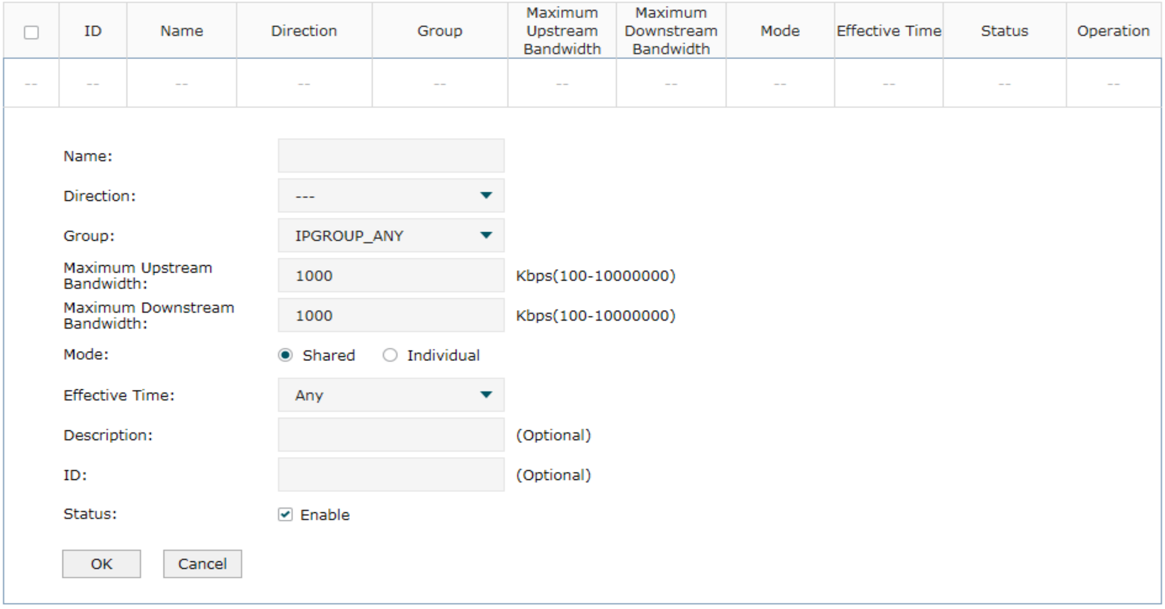
Follow these steps to configure the Bandwidth Control rule:

1) In the **Bandwidth Control Config** Section, enable Bandwidth Control function globally.

Enable Bandwidth Control	Check the box to enable Bandwidth Control globally.
Bandwidth Control Threshold	With "Enable Bandwidth Control" selected, you can specify a percentage, and the Bandwidth Control will take effect only when the bandwidth usage reaches the percentage you specified.

2) In the **Bandwidth Control Rule List** section, click **Add** to load the following page.

Figure 3-2 Add Bandwidth Control rules



□	ID	Name	Direction	Group	Maximum Upstream Bandwidth	Maximum Downstream Bandwidth	Mode	Effective Time	Status	Operation
--	--	--	--	--	--	--	--	--	--	--

Name:		
Direction:	---	
Group:	IPGROUP_ANY	
Maximum Upstream Bandwidth:	1000	Kbps(100-10000000)
Maximum Downstream Bandwidth:	1000	Kbps(100-10000000)
Mode:	● Shared ○ Individual	
Effective Time:	Any	
Description:		(Optional)
ID:		(Optional)
Status:	☑ Enable	

Specify the name of the Bandwidth Control rule and configure other related parameters. Then click **OK**.

Direction	Specify the data stream direction for the rule.
Group	Select the IP groups you have created from the drop-down list. With IPGROUP_ ANY selected, the rule will apply to all clients. If no desired IP groups have been created, go to **Preferences > IP Group** page to create one.
Maximum Upstream Bandwidth	Specify the limit of upstream bandwidth for the specific user to transmit traffic to the internet through the gateway.
Maximum Downstream Bandwidth	Specify the limit of downstream bandwidth for the specific user to receive traffic from the internet through the gateway.
Mode	Select the bandwidth control mode for the controller users. **Shared:** The total bandwidth for all users is equal to the specified values in upstream and downstream bandwidth. **Individual:** The bandwidth for each user is equal to the specified value in upstream and downstream bandwidth.
Effective Time	Specify the time for the rule to take effect. Any means it always takes effect. If no desired time ranges have been configured, go to **Preferences > Time Range** page to create one.
Description	Enter a brief description for the rule.
ID	Assign a number to the rule to reorder the list.
Status	Check the box to enable the rule.

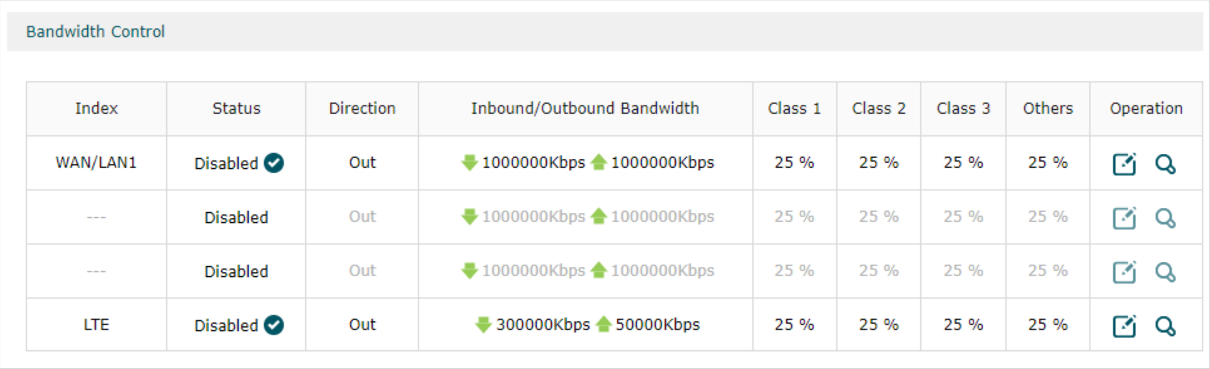
4 Quality of Services Configurations

4.1 Configuring Bandwidth Control

Bandwidth Control allows you to configure rules to limit various data flows. In this way, you can optimize the network performance by reasonably utilizing the bandwidth.

Choose the menu **Transmission > Quality of Services > Bandwidth Control** to load the following page.

Figure 4-1 Configuring the Bandwidth Control



Bandwidth Control

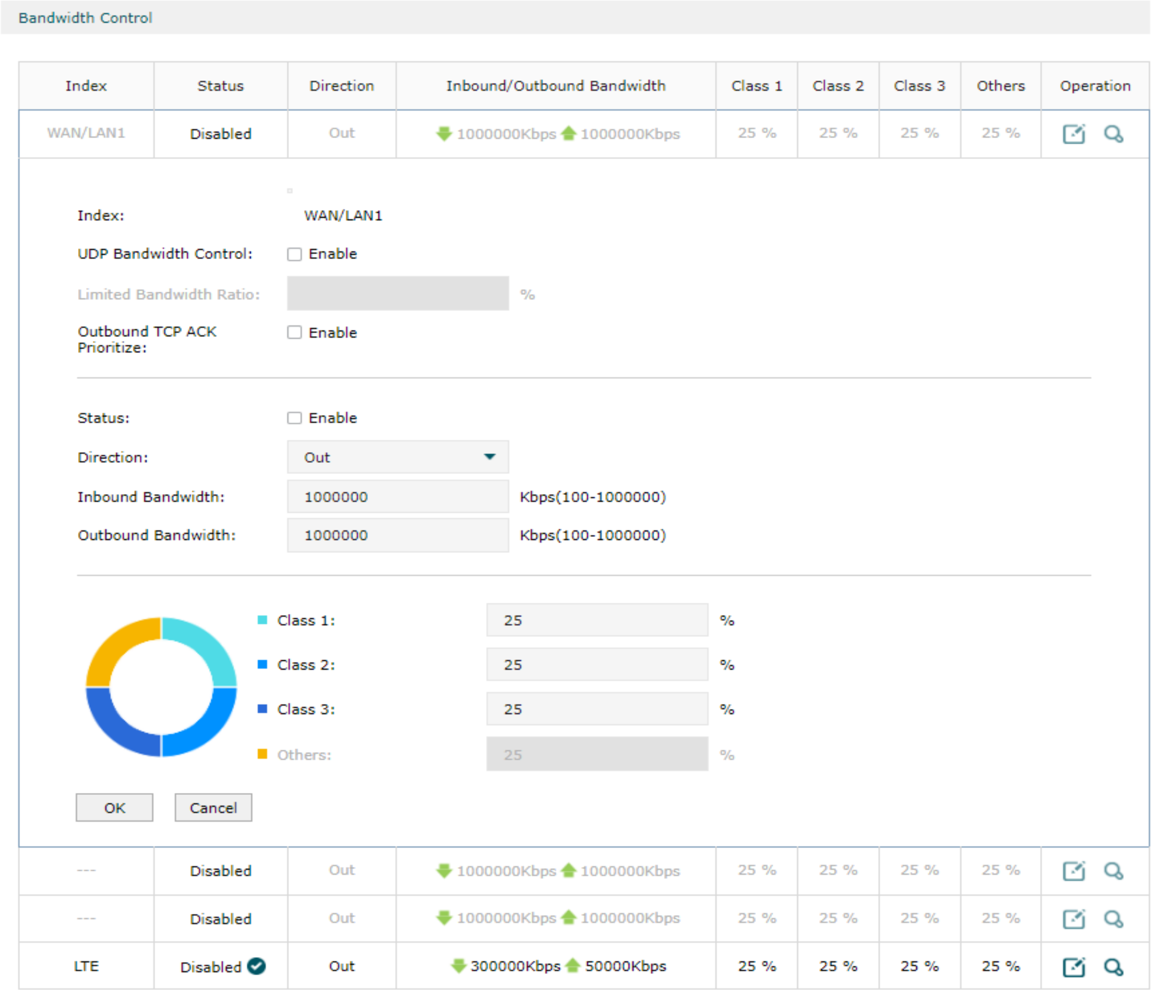
Index	Status	Direction	Inbound/Outbound Bandwidth	Class 1	Class 2	Class 3	Others	Operation
WAN/LAN1	Disabled ✓	Out	↓1000000Kbps ↑1000000Kbps	25 %	25 %	25 %	25 %	
---	Disabled	Out	↓1000000Kbps ↑1000000Kbps	25 %	25 %	25 %	25 %	
---	Disabled	Out	↓1000000Kbps ↑1000000Kbps	25 %	25 %	25 %	25 %	
LTE	Disabled ✓	Out	↓300000Kbps ↑50000Kbps	25 %	25 %	25 %	25 %	

Follow these steps to configure the Bandwidth Control rule:

1) Select a WAN interface, enable **Bandwidth Control** function.

2) In the **Operation** column, click **Edit** to load the following page.

Figure 4-2 Edit Bandwidth Control rules



Bandwidth Control

Index	Status	Direction	Inbound/Outbound Bandwidth	Class 1	Class 2	Class 3	Others	Operation
WAN/LAN1	Disabled	Out	⬇ 1000000Kbps ⬆ 1000000Kbps	25 %	25 %	25 %	25 %	

Index: WAN/LAN1

UDP Bandwidth Control: □ Enable

Limited Bandwidth Ratio: %

Outbound TCP ACK Prioritize: □ Enable

Status: □ Enable

Direction: Out

Inbound Bandwidth: 1000000 Kbps(100-1000000)

Outbound Bandwidth: 1000000 Kbps(100-1000000)

Class 1: 25 %

Class 2: 25 %

Class 3: 25 %

Others: 25 %

OK Cancel

Index	Status	Direction	Inbound/Outbound Bandwidth	Class 1	Class 2	Class 3	Others	Operation
---	Disabled	Out	⬇ 1000000Kbps ⬆ 1000000Kbps	25 %	25 %	25 %	25 %	
---	Disabled	Out	⬇ 1000000Kbps ⬆ 1000000Kbps	25 %	25 %	25 %	25 %	
LTE	Disabled ✓	Out	⬇ 300000Kbps ⬆ 50000Kbps	25 %	25 %	25 %	25 %	

Configure the related parameters. Then click **OK**.

Index	Displays the WAN port. You can configure the QoS rule for a WAN port only when the port is enabled.
UDP Bandwidth Control	Check the box to enable UDP bandwidth control.
Limited Bandwidth Ratio	When UDP Bandwidth Control is enabled, specify the maximum bandwidth ratio allowed for UDP traffic in each class.
Outbound TCP ACK Prioritize	Check the box to prioritize outbound TCP ACK packets.
Status	Enable or disable QoS for the current entry.
Direction	Specify the direction of the controlled traffic. "Out" means control sending packets. "In" means receiving packets. "Both" means both are controlled.
Inbound/ Outbound Bandwidth	Enter the maximum threshold of the inbound/outbound bandwidth.

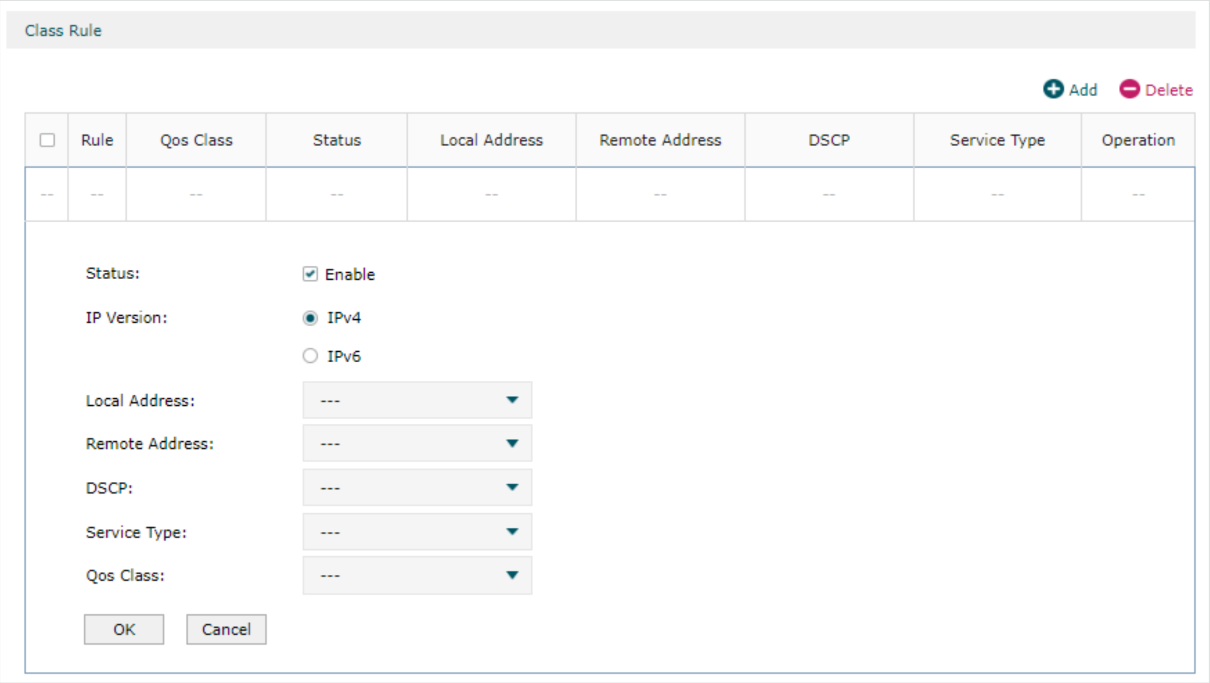
Class1/Class2/ Class3/Others	Specify the percentage of WAN bandwidth assigned to class1, class2, class3 and other traffic flowing through the WAN port.

4.2 Configuring Class Rule

Class Rule allows you to add or delete class rules. Rules will be matched from top to bottom according to the rule sequence number. When the traffic matches a rule, it will be assigned to the corresponding class and will not continue to match down.

Choose the menu **Transmission > Quality of Services > Class Rule**, click **Add** to load the following page.

Figure 4-3 Configuring the Class Rule



Class Rule

Add Delete

□	Rule	Qos Class	Status	Local Address	Remote Address	DSCP	Service Type	Operation
--	--	--	--	--	--	--	--	--

Status:	☑ Enable
IP Version:	● IPv4 ○ IPv6
Local Address:	---
Remote Address:	---
DSCP:	---
Service Type:	---
Qos Class:	---

OK Cancel

Configure the related parameters. Then click **OK**.

Status	Check the box to enable the rule.
IP Version	Specify the protocol version: IPv4 or IPv6.
Local Address	Match the source IP address of the traffic. For IPv4 protocol, you can use the IP Group object configured in the Preferences > IP Group module. For the IPv6 protocol, you can use the IPv6 Group object configured in the Preferences > IPv6 Group module. QoS does not take effect on the traffic of LAN > LAN. When configuring the class rule, Local Address and Remote Address cannot select IPGROUP on the LAN side at the same time.

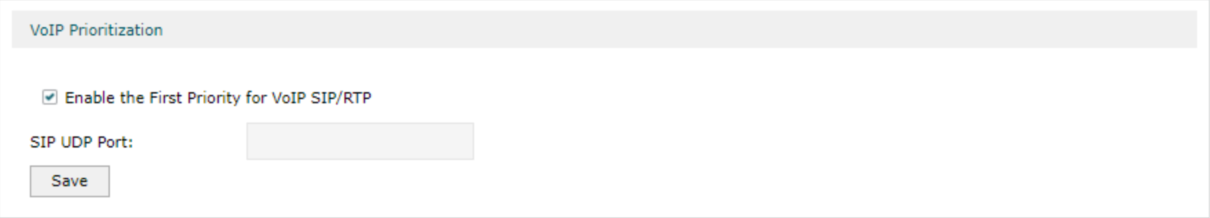
Remote Address	Match the destination IP address of the traffic. For IPv4 protocol, you can use the IP Group object configured in the Preferences > IP Group module. For the IPv6 protocol, you can use the IPv6 Group object configured in the Preferences > IPv6 Group module. QoS does not take effect on the traffic of LAN > LAN. When configuring the class rule, Local Address and Remote Address cannot select IPGROUP on the LAN side at the same time.
DSCP	Match the DSCP value of the traffic.
Service Type	Match the port number of the traffic. Select the service type object defined in the Preference > Service Type module.
QoS Class	Select the category of traffic that meets the rule.

4.3 Configuring VoIP Prioritization

You can enable the first priority for VoIP SIP/RTP traffic.

Choose the menu **Transmission > Quality of Services > VoIP Prioritization** to load the following page.

Figure 4-4 Configuring the VoIP Prioritization



VoIP Prioritization

☑ Enable the First Priority for VoIP SIP/RTP

SIP UDP Port:

Configure the related parameters. Then click **Save**.

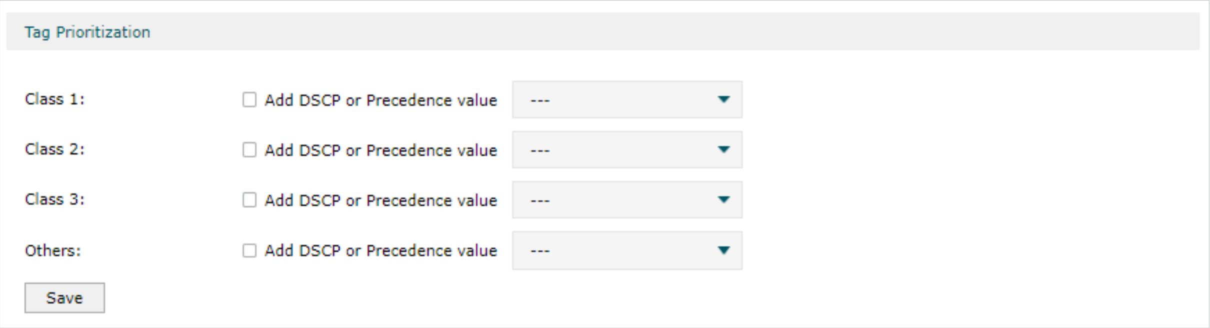
Enable the First Priority for VoIP SIP/RTP	Check the box to enable prioritize VoIP traffic.
SIP UDP Port	Enter the UDP port ID of the VoIP traffic.

4.4 Configuring Tag Prioritization

You can add a DSCP or Precedence value for traffic in different classes.

Choose the menu **Transmission > Quality of Services > Tag Outbound Traffic** to load the following page.

Figure 4-5 Configuring the Tag Prioritization



Tag Prioritization

Class 1: □ Add DSCP or Precedence value ---

Class 2: □ Add DSCP or Precedence value ---

Class 3: □ Add DSCP or Precedence value ---

Others: □ Add DSCP or Precedence value ---

Check the box for your desired class and select the DSCP or Precedence value. Then click **Save**.

5 Session Limit Configurations

To complete Session Limit configuration, follow these steps:

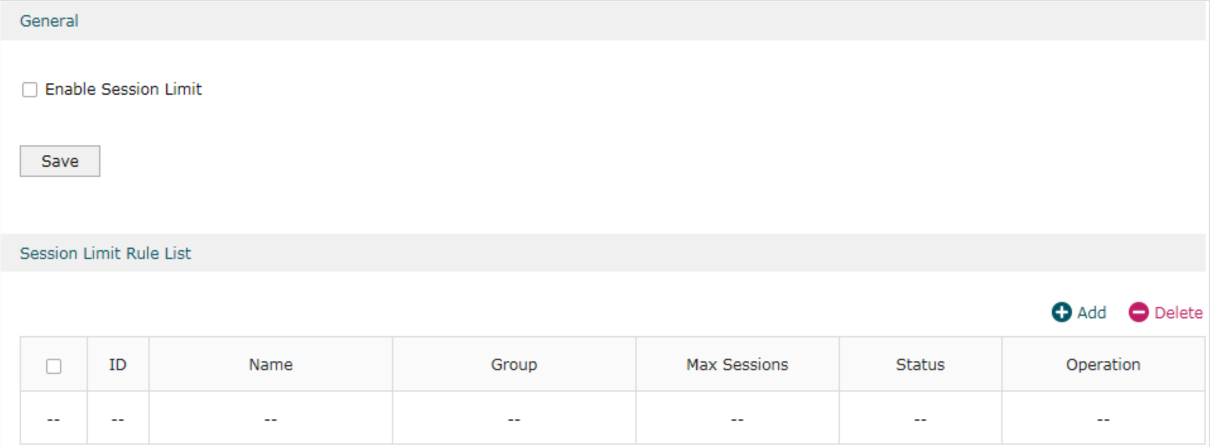
1) Configure session limit.

2) View the session limit information.

5.1 Configuring Session Limit

Choose the menu **Transmission> Session Limit > Session Limit** to load the following page.

Figure 5-1 Configuring the Session Limit



General

□ Enable Session Limit

Session Limit Rule List

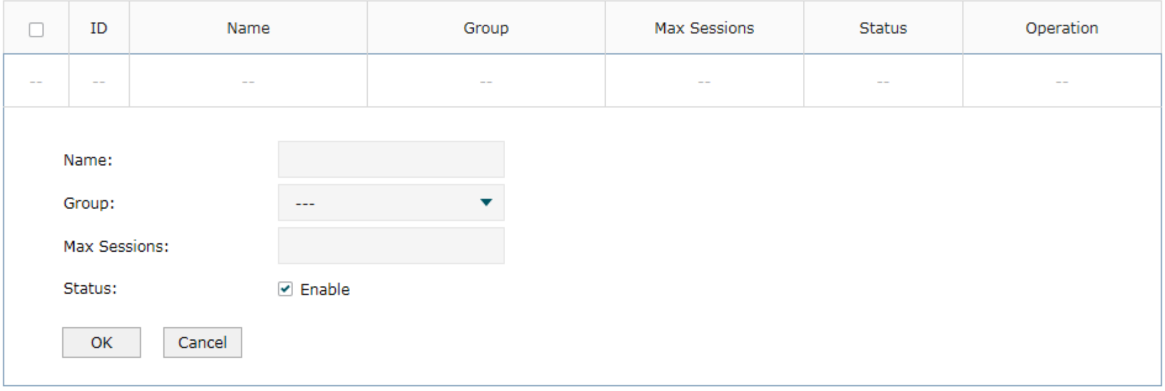
□	ID	Name	Group	Max Sessions	Status	Operation
--	--	--	--	--	--	--

Follow these steps to configure the Session Limit rule:

1) In the **General** Section, enable Session Limit function globally.

2) In the **Session Limit Rule List** section, click **Add** to load the following page.

Figure 5-2 Add Session Limit rules



□	ID	Name	Group	Max Sessions	Status	Operation
--	--	--	--	--	--	--

Name:	
Group:	---
Max Sessions:	
Status:	☑ Enable

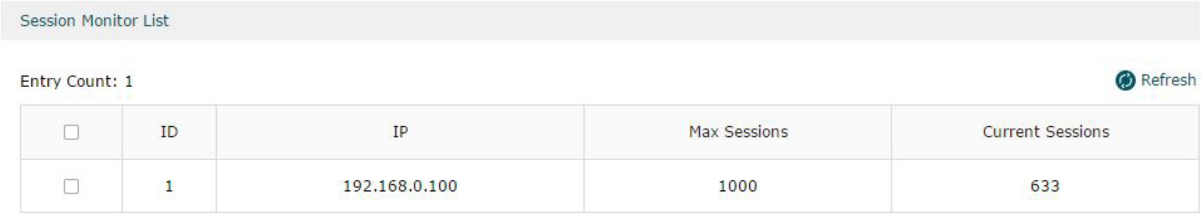
Specify the name of the Session Limit rule and configure other related parameters. Then click **OK**.

Group	Specify the address group to which the rule will be applied. The IP Group referenced here can be created on the **Preferences > IP Group** page.
Max Sessions	Enter the maximum number of sessions that a LAN host can use. The gateway will limit the sessions of the source when its number exceeds the maximum value.
Status	Check the box to enable the rule.

5.2 Viewing the Session Limit Information

Choose the menu **Transmission> Session Limit > Session Monitor** to load the following page.

Figure 5-3 Viewing the Session Limit Information



Session Monitor List

Entry Count: 1

□	ID	IP	Max Sessions	Current Sessions
□	1	192.168.0.100	1000	633

View the Session Limit information of hosts configured with Session Limit. Click the **Refresh** button to get the latest information.

6 Load Balancing Configurations

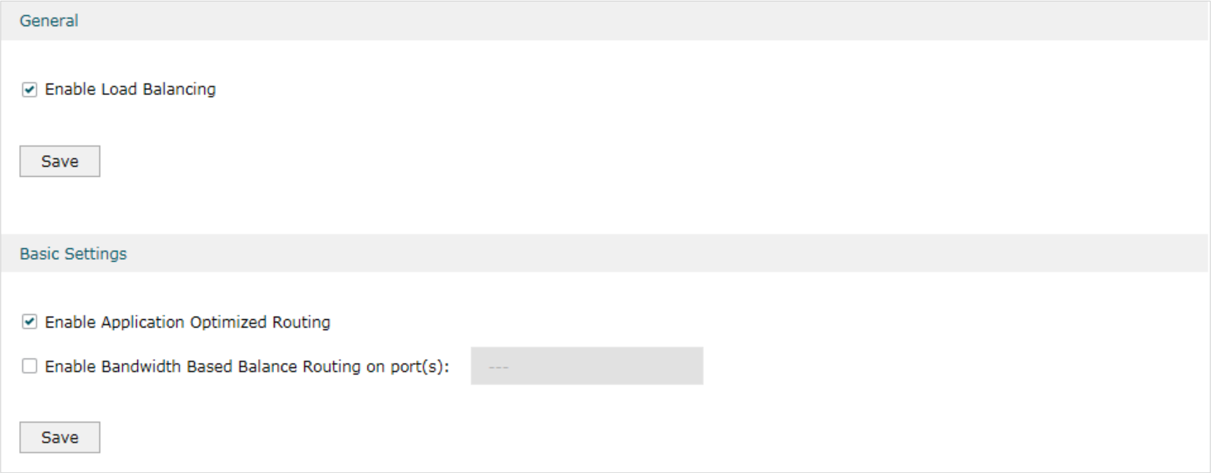
With load balancing configurations, you can:

- Configure the load balancing
- Configure the link backup
- Configure the online detection

6.1 Configuring the Load Balancing

Choose the menu **Transmission > Load Balancing > Basic Settings** to load the following page.

Figure 6-1 Configuring the Load Balancing



General

☑ Enable Load Balancing

Save

Basic Settings

☑ Enable Application Optimized Routing

□ Enable Bandwidth Based Balance Routing on port(s): ---

Save

Follow these steps to configure the load balancing:

1) In the **General** Section, enable load balancing function globally and click **Save**.

2) In the **Basic Settings** section, select the appropriate method for load balancing and click **Save**.

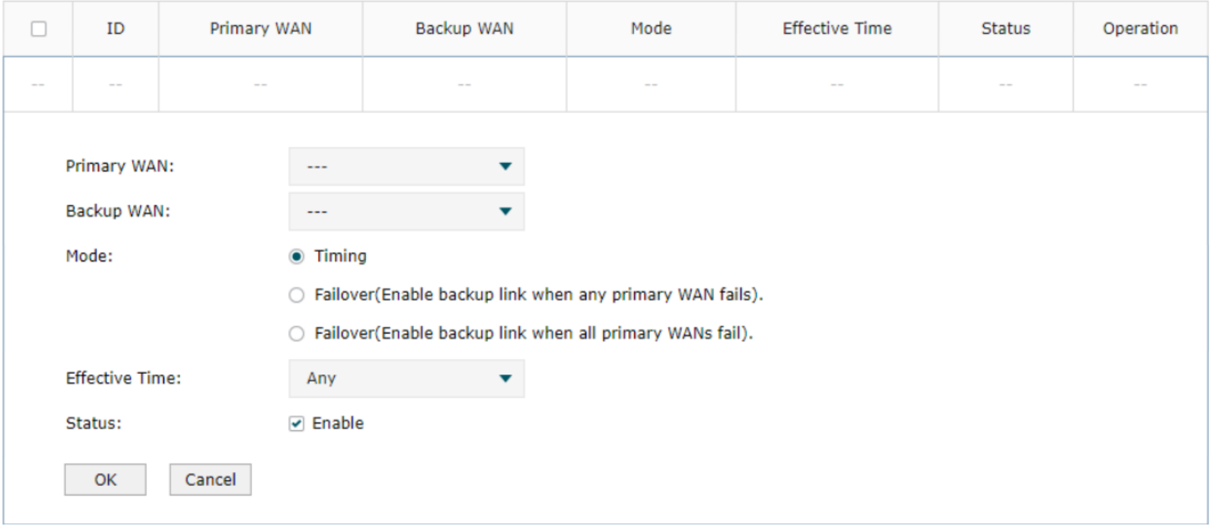
Enable Application Optimized Routing	With Application Optimized Routing enabled, the gateway will consider the source IP address and destination IP address (or destination port) of the packets as a whole and record the WAN port they pass through. Then packets with the same source IP address and destination IP address (or destination port) will be forwarded to the recorded WAN port. This feature ensures that multi-connected applications work properly.
Enable Bandwidth Based Balance Routing on port(s)	Select the WAN port from the drop-down list on which bandwidth-based balance routing is enabled.

6.2 Configuring the Link Backup

With Link Backup function, the gateway will switch all the new sessions from dropped lines automatically to another to keep an always on-line network.

Choose the menu **Transmission > Load Balancing > Link Backup** and click **Add** to load the following page.

Figure 6-2 Configuring the Link Backup Rule



□	ID	Primary WAN	Backup WAN	Mode	Effective Time	Status	Operation
--	--	--	--	--	--	--	--

Primary WAN: ---

Backup WAN: ---

Mode:
● Timing
○ Failover(Enable backup link when any primary WAN fails).
○ Failover(Enable backup link when all primary WANs fail).

Effective Time: Any

Status: ☑ Enable

Configure the following parameters on this page and click **OK**.

Primary WAN	Specify the primary WAN port. You can choose one primary WAN port, or choose multiple primary WAN ports to perform load balance.
Backup WAN	Specify the backup WAN port to back up the traffic for the primary WAN port under the specified condition.
Mode	Specify the mode as Timing or Failover. **Timing**: Link Backup will be enabled if the specified effective time is reached. All the traffic on the primary WAN will switch to the backup WAN at the beginning of the effective time; the traffic on the backup WAN will switch to the primary WAN at the ending of the effective time. **Failover(Enable backup link when any primary WANs fails)**: Link Backup will be enabled when any primary WANs fails. Load balancing will be enabled on the backup WAN. The traffic on the backup WAN will switch to the primary WAN when the failed primary WANs works properly. **Failover(Enable backup link when all primary WANs fail)**: Link Backup will be enabled only when all primary WANs fail. All the traffic on the primary WAN will switch to the backup WAN. The traffic on the backup WAN will switch to the primary WAN when all the primary WANs works properly.
Effective Time	Specify the time for the rule to take effect. Any means it takes effect at any time. If no desired time ranges have been configured, go to **Preferences > Time Range** page to create one.

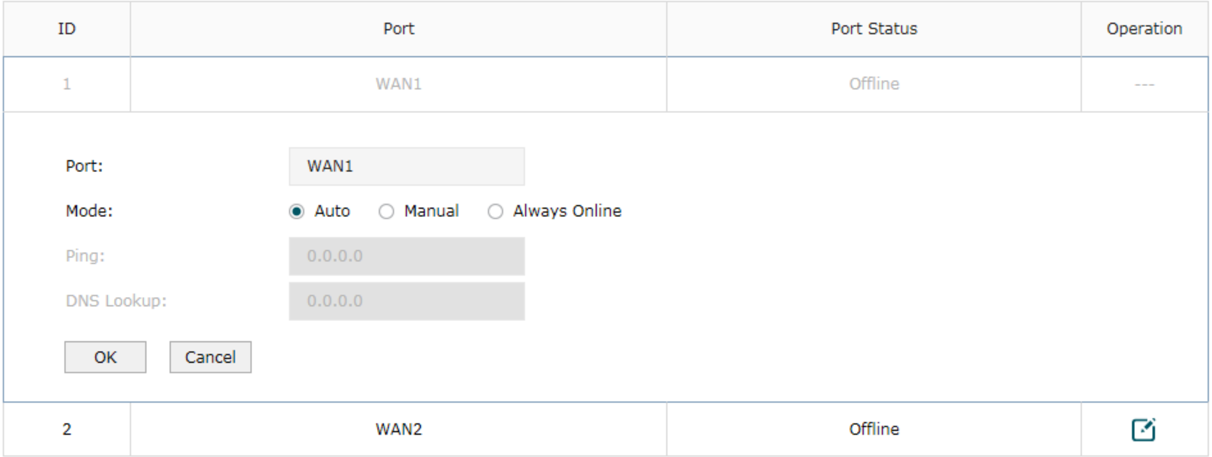
Status	Check the box to enable the rule.

6.3 Configuring the Online Detection

With Online Detection function, you can detect the online status of the WAN port.

Choose the menu **Transmission > Load Balancing > Online Detection** and click ✎ to load the following page.

Figure 6-3 Configuring the Online Detection



ID	Port	Port Status	Operation
1	WAN1	Offline	---
2	WAN2	Offline	✎

Port: WAN1

Mode: ● Auto ○ Manual ○ Always Online

Ping: 0.0.0.0

DNS Lookup: 0.0.0.0

Configure the following parameters on this page and click **OK**.

Port	Displays the name of WAN Port.
Mode	Select the online detection mode. **Auto:** In Auto Mode, the DNS server of the WAN port will be selected as the destination for DNS Lookup to detect whether the WAN is online. **Manual:** In Manual Mode, you can configure the destination IP address for PING and DNS Lookup manually to detect whether the WAN is online. **Always Online:** In Always Online Mode, the status of the port will always be online.
Ping	With “Manual Mode” selected, specify the destination IP for Ping. The corresponding port will ping the IP address to detect whether the WAN port is online. 0.0.0.0 means Ping detection is disabled.
DNS Lookup	With Manual Mode selected, specify the IP address of DNS server. The corresponding port will perform the DNS lookup using default domain name to detect whether the WAN port is online. 0.0.0.0 means DNS Lookup is disabled.

7 Routing Configurations

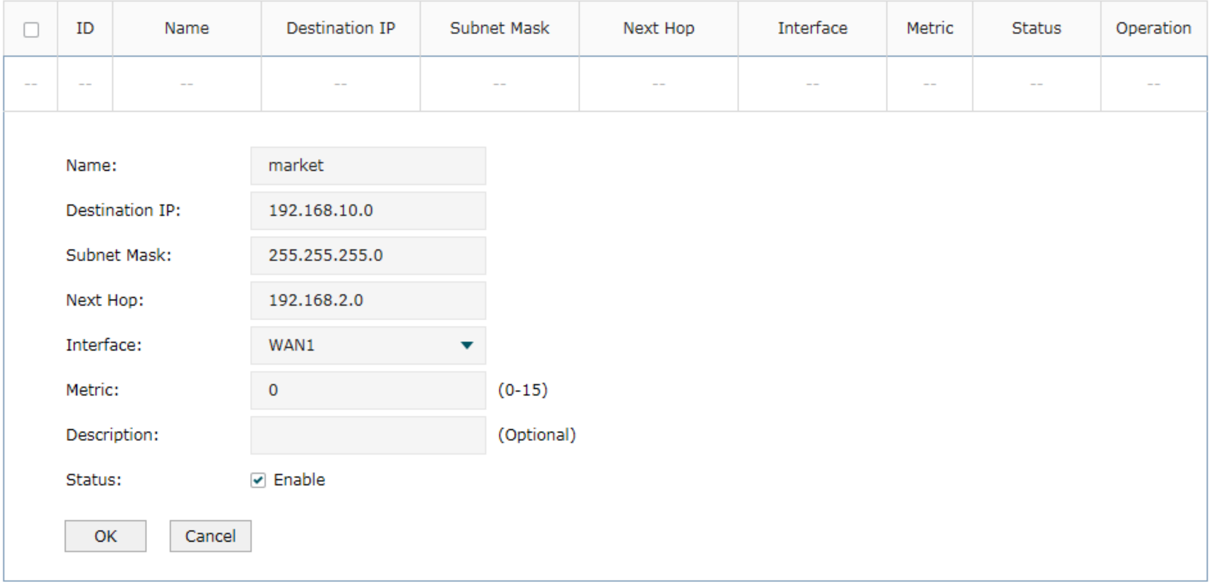
With routing configurations, you can:

- Configure the static routing
- Configure the policy routing rule
- View the routing table
- Configure RIP
- Configure OSPF

7.1 Configuring the Static Routing

Choose the menu **Transmission> Routing > Static Route** and click **Add** to load the following page.

Figure 7-1 Configuring the Static Routing



□	ID	Name	Destination IP	Subnet Mask	Next Hop	Interface	Metric	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name:	market	
Destination IP:	192.168.10.0	
Subnet Mask:	255.255.255.0	
Next Hop:	192.168.2.0	
Interface:	WAN1	
Metric:	0	(0-15)
Description:		(Optional)
Status:	☑ Enable	

Specify the name of the static route entry and configure other related parameters. Then click **OK**.

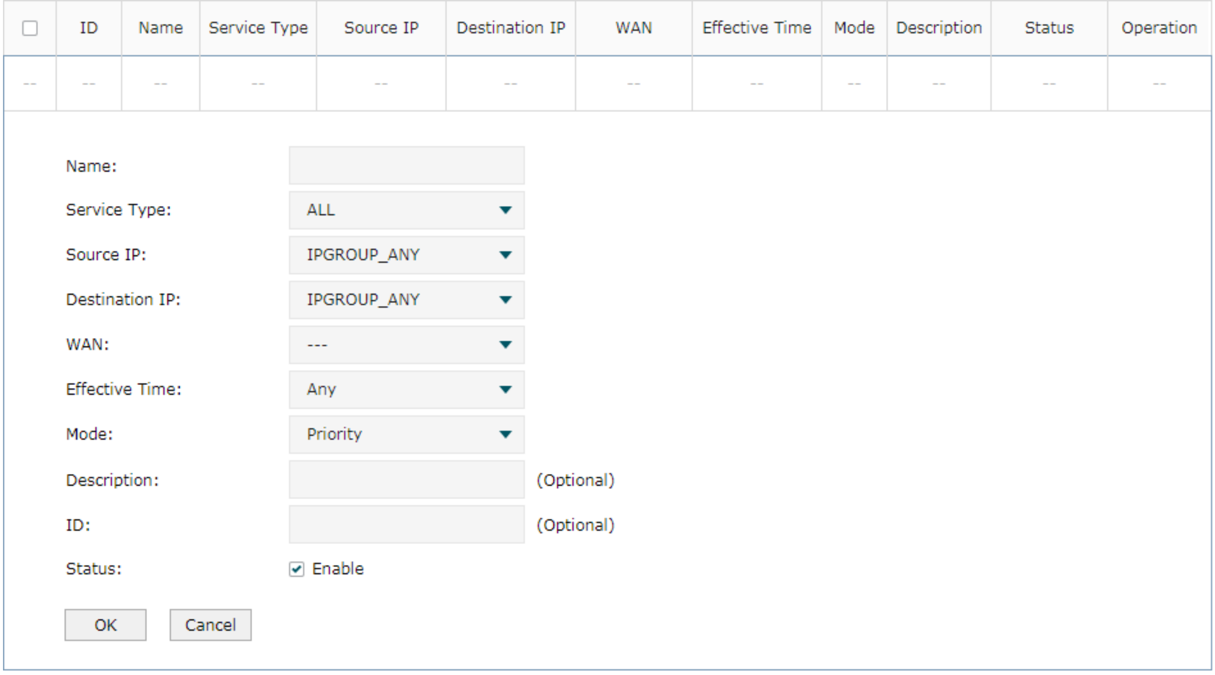
Destination IP	Specify the destination IP address the route leads to.
Subnet Mask	Specify the subnet mask of the destination network.
Next Hop	Specify the IP address to which the packet should be sent next.

Interface	Specify the physical network interface through which this route is accessible.
Metric	Define the priority of the route. A smaller value means a higher priority. The default value is 0. It is recommended to keep the default value.
Description	Enter a brief description for the rule.
Status	Check the box to enable the rule.

7.2 Configuring the Policy Routing

Choose the menu **Transmission > Routing > Policy Routing** and click **Add** to load the following page.

Figure 7-2 Configuring the Policy Routing



□	ID	Name	Service Type	Source IP	Destination IP	WAN	Effective Time	Mode	Description	Status	Operation
--	--	--	--	--	--	--	--	--	--	--	--

Name:		
Service Type:	ALL	
Source IP:	IPGROUP_ANY	
Destination IP:	IPGROUP_ANY	
WAN:	---	
Effective Time:	Any	
Mode:	Priority	
Description:		(Optional)
ID:		(Optional)
Status:	☑ Enable	

Specify the name of the policy routing entry and configure other related parameters. Then click **OK**.

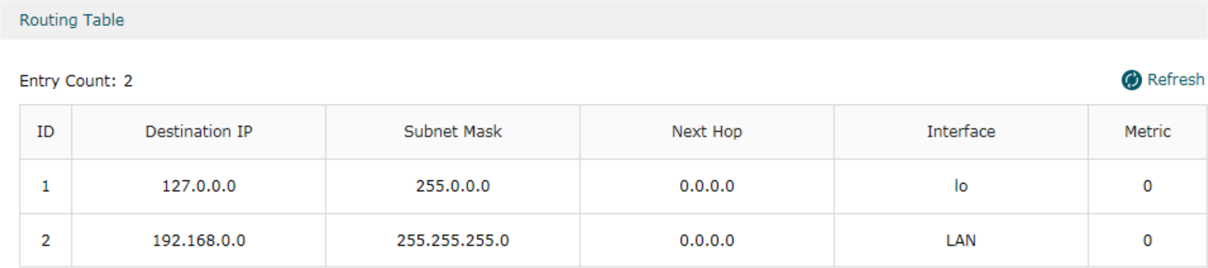
Service Type	Specify the service type for the rule.
Source IP	Enter the source IP range for the rule. 0.0.0.0 - 0.0.0.0 means any IP is acceptable.
Destination IP	Enter the destination IP range for the rule. 0.0.0.0 - 0.0.0.0 means any IP is acceptable.
WAN	Specify the outcoming port for the rule. If you choose multiple ports, the entry will be applied to all selected ports simultaneously.
Effective Time	Specify the effective time for the rule.

Mode	Specify the policy routing mode for the rule. Priority: In Priority Mode, the rule depends on the online detection result. If any WAN port that you specify is online, the rule will take effect. If all the WAN ports that you specify are offline, the rule will not take effect. Only: In Only Mode, the rule always takes effect regardless of the WAN port status or online detection result.
Description	Enter a brief description for the rule.
Status	Check the box to enable the rule.

7.3 Viewing the Routing Table

Choose the menu **Transmission> Routing > Routing Table** to load the following page.

Figure 7-3 Routing Table



Routing Table

Entry Count: 2

ID	Destination IP	Subnet Mask	Next Hop	Interface	Metric
1	127.0.0.0	255.0.0.0	0.0.0.0	lo	0
2	192.168.0.0	255.255.255.0	0.0.0.0	LAN	0

The **Routing Table** shows the information of the current route entries.

Destination IP	Displays the destination IP address the route leads to.
Subnet Mask	Displays the subnet mask of the destination network.
Next Hop	Displays the gateway IP address to which the packet should be sent next.
Interface	Displays the physical network interface through which this route is accessible.
Metric	Displays the metric to reach the destination IP address.

7.4 Configuring RIP

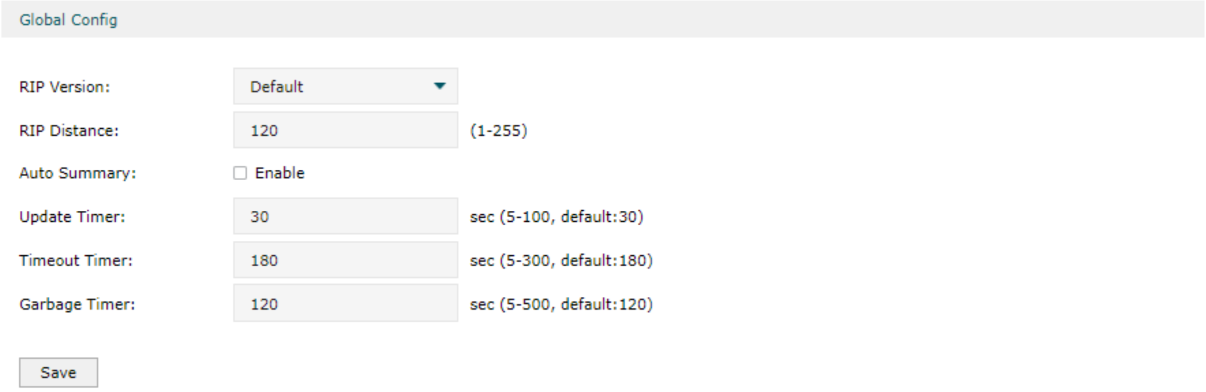
RIP(Routing Information Protocol) is a dynamic gateway protocol with Distance Vector Algorithms. You could config the protocol below to active as you like.

Choose the menu **Transmission> Routing > RIP.**

1) Check the box to enable the **RIP** function.

2) In the **Global Config** section to configure the following parameters, then click **Save**.

Figure 7-4 Configuring the Global Settings



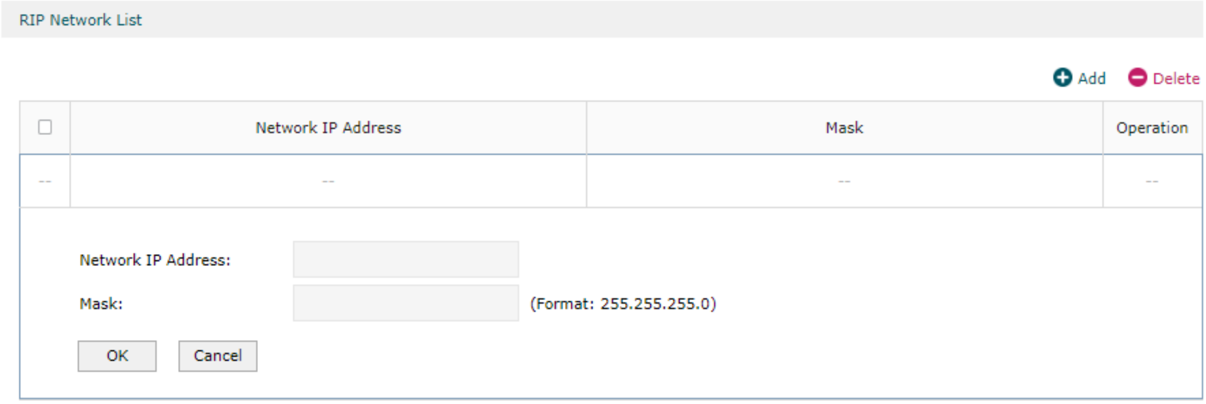
Global Config

RIP Version:	Default
RIP Distance:	120 (1-255)
Auto Summary:	□ Enable
Update Timer:	30 sec (5-100, default:30)
Timeout Timer:	180 sec (5-300, default:180)
Garbage Timer:	120 sec (5-500, default:120)

RIP Version	Choose the global RIP version. Default: send with RIP version 2 and receive with both RIP version 1 and 2. RIPv1: send and receive RIP version 1 formatted packets via broadcast. RIPv2: send and receive RIP version 2 packets using multicast.
RIP Distance	Specify RIP route distance. When more than two protocols have routes to the same destination, only the route which have smallest distance will be inserted to IP routing table. The valid value ranges from 1 to 255 and the default is 120.
Auto Summary	Summarize entries to their main class boundary.
Update Timer	The timer interval to generate a complete response to every neighboring gateway..
Timeout Timer	Upon expiration of the timeout, the route is no longer valid and set to unreachable.
Garbage Timer	Upon expiration of the garbage-collection timer, the route is finally removed from the tables.

3) In the **RIP Network List** section, click **Add** to add the network to enable RIP protocol, so the interface in the network would enable RIP protocol.

Figure 7-5 Configuring the RIP Network List



RIP Network List

□	Network IP Address	Mask	Operation
--	--	--	--

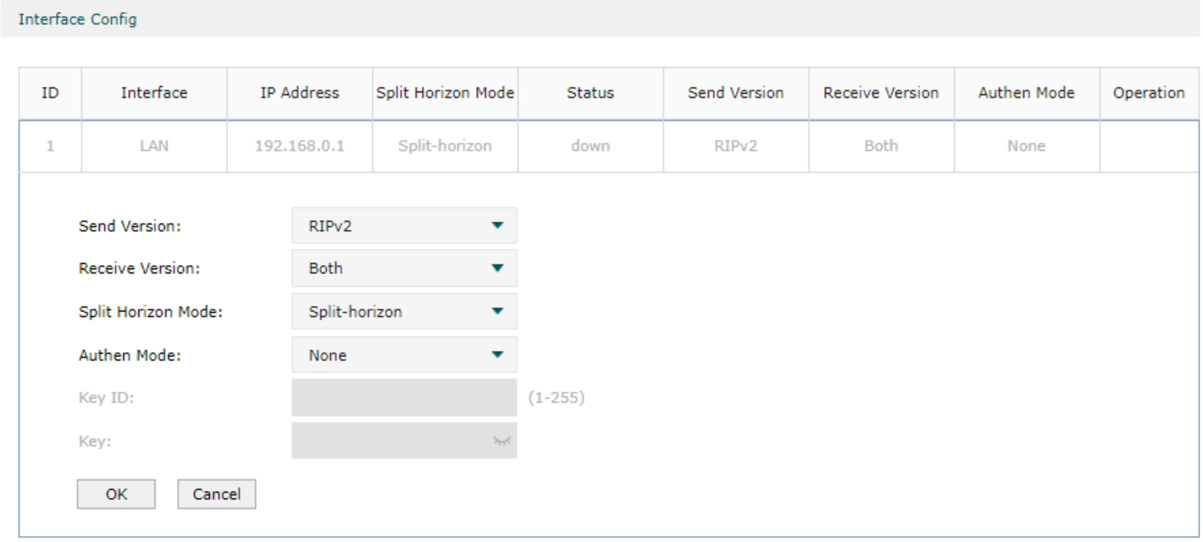
Network IP Address:	
Mask:	(Format: 255.255.255.0)

Network IP Address	Enter the IP address of the network.

Mask	Enter the subnet mask of the network.

4) In the **Interface Config** section, click the edit button to configure the RIP parameters of the interface.

Figure 7-6 Configuring the Interface



Interface Config

ID	Interface	IP Address	Split Horizon Mode	Status	Send Version	Receive Version	Authen Mode	Operation
1	LAN	192.168.0.1	Split-horizon	down	RIPv2	Both	None	

Send Version: RIPv2

Receive Version: Both

Split Horizon Mode: Split-horizon

Authen Mode: None

Key ID: (1-255)

Key:

IP Address	The interface IP address. You can't change it here.
Status	The interface RIP status(up or down) is decided by the network status. You can't change it here.
Send Version	Select the version of RIP control packets the interface should send from the pulldown menu. RIPv1: Send RIP version 1 formatted packets via broadcast. RIPv2: Send RIP version 2 packets using multicast.
Receive Version	Select what RIP control packets the interface will accept from the pulldown menu. RIPv1: Accept only RIP version 1 formatted packets. RIPv2: Accept only RIP version 2 formatted packets. Both: Accept both RIP version 1 and RIP version 2 formatted packets.
Split Horizon Mode	Choose the Split Horizon Mode. None: No special processing for this case. Split-horizon: A route will not be included in updates sent to the gateway from which it was learned. Poison Reverse: A route will be included in updates sent to the gateway from which it was learned, but the metric will be set to infinity.

Authen Mode	Select an authentication type. None: This is the initial interface state. If you select this option from the pulldown menu no authentication protocols will be run. Simple: If you select 'Simple' you will be prompted to enter an authentication key. This key will be included, in the clear, in the RIP header of all packets sent on the network. All gateways on the network must be configured with the same key. MD5: If you select 'MD5' you will be prompted to enter both an authentication key and an authentication ID. All gateways on the network must be configured with the same key and ID.
Key ID	Enter the RIP Authentication Key ID for the specified interface. If you choose not to use authentication or to use 'simple' you will not be prompted to enter the key ID.
Key	Enter the RIP Authentication Key for the specified interface. If you do not choose to use authentication you will not be prompted to enter a key. If you choose 'simple' or 'MD5' the key may be up to 16 octets long.

7.5 Configuring OSPF

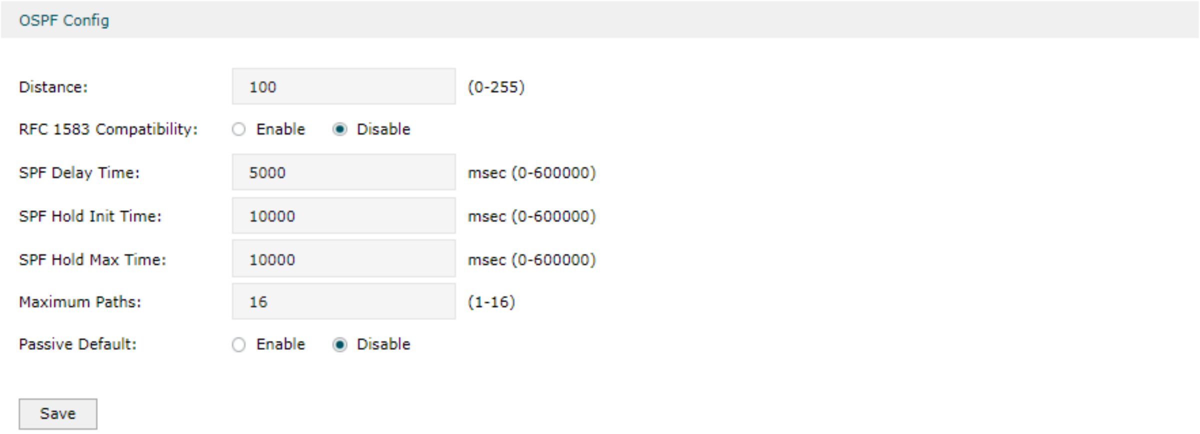
OSPF (Open Shortest Path First) is an Interior Gateway Protocol (IGP) used to make routing decisions in a single autonomous system (AS).

Choose the menu **Transmission> Routing > OSPF**.

1) Check the box to enable the **OSPF** function, and set the **Gateway ID**.

2) In the **OSPF Config** section to configure the following parameters, then click **Save**.

Figure 7-7 Configuring the OSPF



OSPF Config

Distance: 100 (0-255)

RFC 1583 Compatibility: ○ Enable ● Disable

SPF Delay Time: 5000 msec (0-600000)

SPF Hold Init Time: 10000 msec (0-600000)

SPF Hold Max Time: 10000 msec (0-600000)

Maximum Paths: 16 (1-16)

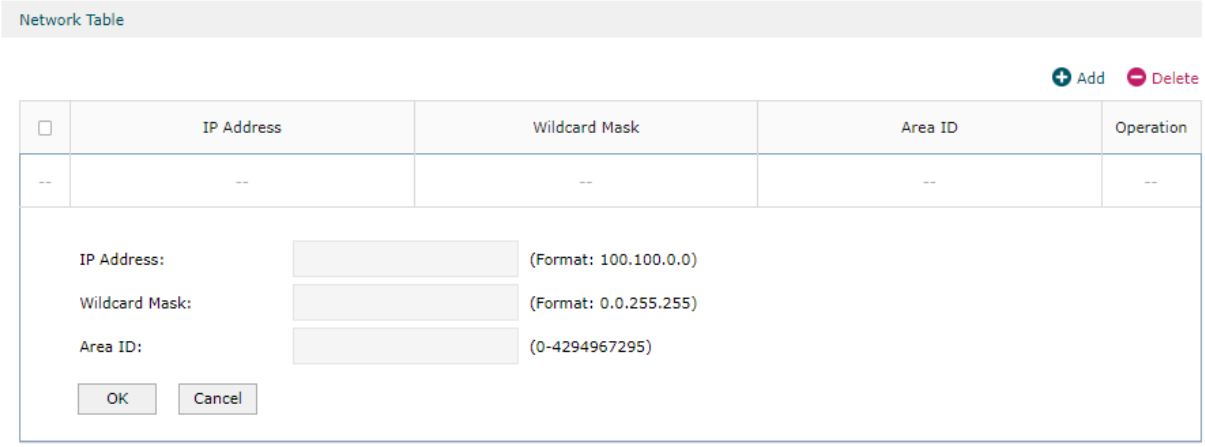
Passive Default: ○ Enable ● Disable

Distance	Specify OSPF route distance. When more than two protocols have routes to the same destination, only the route which have smallest distance will be inserted to IP routing table. The valid value ranges from 0 to 255 and the default is 100.

RFC 1583 Compatibility	Select the preference rules that will be used when choosing among multiple AS-external LSAs advertising the same destination. If you select Enable, the preference rules will be those defined by RFC 1583. Else the preference rules will be those defined in RFC 2328, which will prevent routing loops when AS-external LSAs for the same destination have been originated from different areas. All gateways in the OSPF domain must be configured the same. The default value is 'Disable'.
SPF Delay Time	The number of seconds from when OSPF receives a topology change to the start of the next SPF calculation. The valid value ranges from 0 to 600 000 msec and the default is 5000.
SPF Hold Init Time	Initial hold time (msec) between consecutive SPF calculations. The valid value ranges from 0 to 600000 msec and the default is 10000.
SPF Hold max Time	Maximum hold time (msec). The valid value ranges from 0 to 600000 msec and the default is 10000.
Maximum Paths	Set the number of paths that OSPF can report for a given destination. The valid value ranges from 1 to 16 and the default is 16.
Passive Default	Configure the default passive mode setting for the OSPF interfaces which do not specify the interface passive mode setting. OSPF does not form adjacencies on passive interfaces, due to that the routing updates on passive interfaces would be suppressed. The default value is 'Disable'.

3) In the **Network Table** section, click **Add** to add the network to enable OSPF protocol, so the interface in the network would enable OSPF protocol.

Figure 7-8 Configuring the Network Table



Network Table

□	IP Address	Wildcard Mask	Area ID	Operation
--	--	--	--	--

IP Address: (Format: 100.100.0.0)

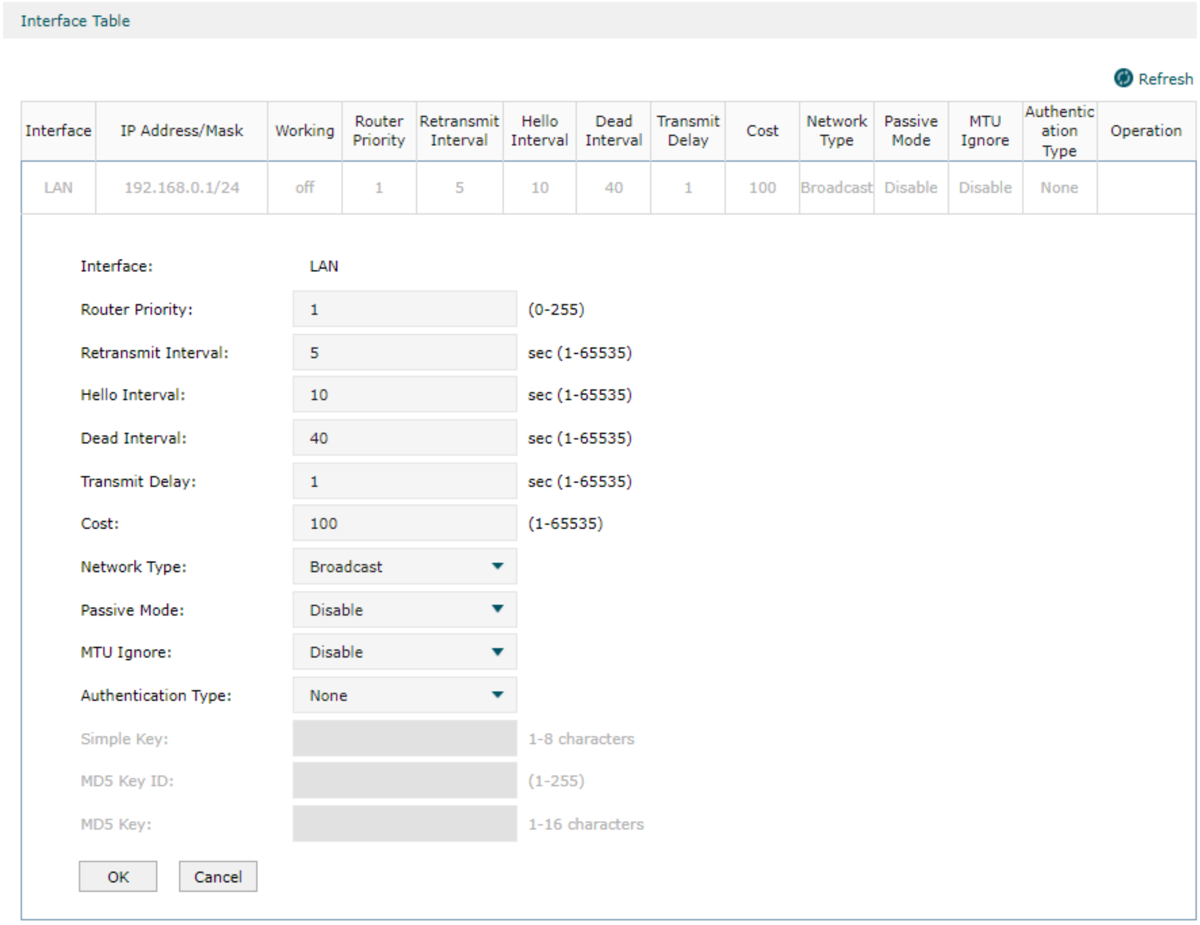
Wildcard Mask: (Format: 0.0.255.255)

Area ID: (0-4294967295)

IP Address	Enter the IP address of the network.
Wildcard Mask	Enter the wildcard mask of the network. Normal subnet mask is also supported.
Area ID	The 32 bit unsigned integer that uniquely identifies the area to which a gateway interface connects. If you assign an Area ID which does not exist, the area will be created with default values. It can be in decimal format or dotted decimal format.

4) In the **Interface Config** section, click the edit button to configure the OSPF parameters of the interface.

Figure 7-9 Configuring the Interface



Interface Table

Interface	IP Address/Mask	Working	Router Priority	Retransmit Interval	Hello Interval	Dead Interval	Transmit Delay	Cost	Network Type	Passive Mode	MTU Ignore	Authentication Type	Operation
LAN	192.168.0.1/24	off	1	5	10	40	1	100	Broadcast	Disable	Disable	None	

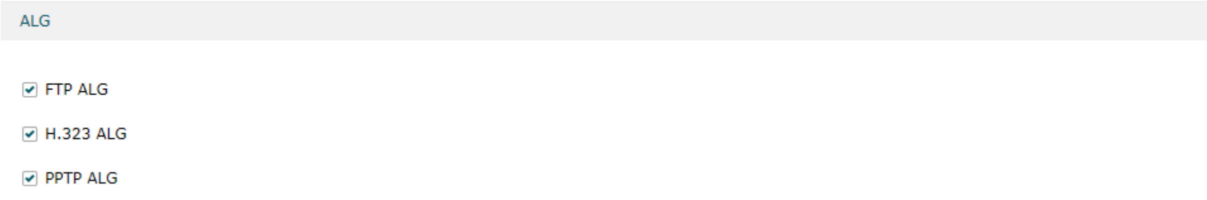
Interface:	LAN	
Router Priority:	1	(0-255)
Retransmit Interval:	5	sec (1-65535)
Hello Interval:	10	sec (1-65535)
Dead Interval:	40	sec (1-65535)
Transmit Delay:	1	sec (1-65535)
Cost:	100	(1-65535)
Network Type:	Broadcast	
Passive Mode:	Disable	
MTU Ignore:	Disable	
Authentication Type:	None	
Simple Key:		1-8 characters
MD5 Key ID:		(1-255)
MD5 Key:		1-16 characters

Interface	The interface for which data is to be displayed or configured.
IP Address/ Mask	The IP address and subnet mask of the interface.
Gateway Priority	The gateway priority for the selected interface. The priority of an interface is specified as an integer from 0 to 255. A value of '0' indicates that the gateway is not eligible to become the designated gateway on this network. The default is 1.
Hello Interval	The hello interval for the specified interface in seconds. This parameter must be the same for all gateways attached to a network. The valid value ranges from 1 to 65535 seconds and the default is 10 seconds.
Dead Interval	The dead interval for the specified interface in seconds. This specifies how long a gateway will wait to see a neighbor gateway's Hello packets before declaring that the gateway is down. This parameter must be the same for all gateways attached to a network. The valid value ranges from 1 to 65535 seconds and the default is 40.
Transmit Delay	The Transit Delay for the specified interface. This specifies the estimated number of seconds it takes to transmit a link state update packet over the selected interface. The valid value ranges from 1 to 65535 seconds and the default is 1 second.
Cost	The link cost. OSPF uses this value in computing shortest paths. The valid value ranges from 1 to 65535.

Network Type	The OSPF network type on the interface. The default network type for Ethernet interfaces is broadcast.
Passive Mode	Make an interface passive to prevent OSPF from forming an adjacency on an interface. The routing updates on passive interface would be suppressed. Interfaces are not passive by default.
MTU Ignore	Disables OSPF MTU mismatch detection on received database description packets. Default value is Disable(MTU mismatch detection is enabled).
Authentication Type	Displays the authentication type of the interface. One of the following: none: No authentication. simple: Use simple password. md5: Use md5 message-digest algorithm.
Simple Key	Displays the key used for simple authentication.
MD5 Key ID	Displays the key ID used for md5 authentication.

5) View the **Neighbor Table.**

Figure 7-10 Viewing the Neighbor Table



ALG

☑ FTP ALG

☑ H.323 ALG

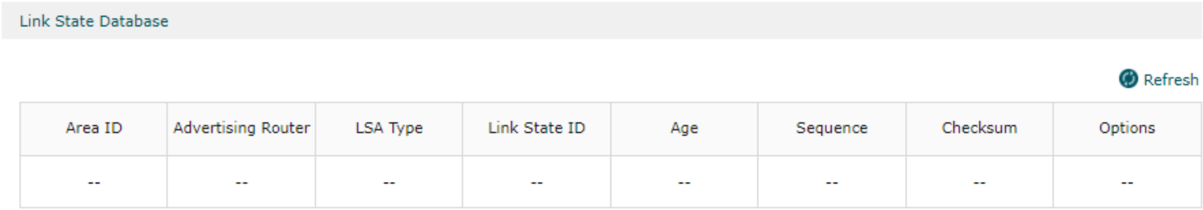
☑ PPTP ALG

Interface	Displays the interface for which neighbor list is to be displayed.
Neighbor IP Address	The IP address of the neighboring gateway's interface to the attached network.
Gateway ID	A 32 bit integer in dotted decimal format representing the neighbor.
Area ID	The area ID of the OSPF area associated with the interface.
Gateway Priority	The gateway priority of the neighbor.
Options	An integer value that indicates the optional OSPF capabilities supported by the neighbor. The neighbor's optional OSPF capabilities are also listed in its Hello packets.

State	he state of the neighbor. Down: This is the initial state of a neighbor conversation. It indicates that there has been no recent information received from the neighbor. On NBMA networks, Hello packets may still be sent to 'Down' neighbors, although at a reduced frequency. Attempt: This state is only valid for neighbors attached to NBMA networks. It indicates that no recent information has been received from the neighbor, but that a more concerted effort should be made to contact the neighbor. This is done by sending the neighbor Hello packets at intervals of Hello Interval. Init: In this state, a Hello packet has recently been seen from the neighbor. However, bidirectional communication has not yet been established with the neighbor (i.e., the gateway itself did not appear in the neighbor's Hello packet). All neighbors in this state (or greater) are listed in the Hello packets sent from the associated interface. 2-Way: In this state, communication between the two gateways is bidirectional. This has been assured by the operation of the Hello Protocol. This is the most advanced state short of beginning adjacency establishment. The (Backup) Designated Gateway is selected from the set of neighbors in state 2-Way or greater. ExStart: This is the first step in creating an adjacency between the two neighboring gateways. The goal of this step is to decide which gateway is the master, and to decide upon the initial DD sequence number. Neighbor conversations in this state or greater are called adjacencies. Exchange: In this state the gateway is describing its entire link state database by sending Database Description packets to the neighbor. In this state, Link State Request Packets may also be sent asking for the neighbor's more recent LSAs. All adjacencies in Exchange state or greater are used by the flooding procedure. These adjacencies are fully capable of transmitting and receiving all types of OSPF routing protocol packets. Loading: In this state, Link State Request packets are sent to the neighbor asking for the more recent LSAs that have been discovered (but not yet received) in the Exchange state. Full: In this state, the neighboring gateways are fully adjacent. These adjacencies will now appear in Gateway LSAs and Network LSAs.
Events	The number of times this neighbor relationship has changed state, or an error has occurred.
Retransmission Queue length	An integer representing the current length of the retransmission queue of the specified neighbor gateway ID of the specified interface.
Dead Time	The amount of time, in seconds, to wait before the gateway assumes the neighbor is unreachable.

6) View the **Link State Database**

Figure 7-11 Viewing the Link State Database



Link State Database

Area ID	Advertising Router	LSA Type	Link State ID	Age	Sequence	Checksum	Options
--	--	--	--	--	--	--	--

Area ID	Displays the ID of the area to which the LSA belongs.
Advertising Gateway	Displays the ID of the gateway that advertising the LSA.
LSA Type	The format and function of the link state advertisement. One of the following: Gateway, Network, Network-Summary, ASBR-Summary, External (Type 5), NSSA-External (Type 7).
Link State ID	The Link State ID identifies the piece of the routing domain that is being described by the advertisement. The value of the LS ID depends on the advertisement's LS type.
Age	The time since the link state advertisement was first originated, in seconds.
Sequence	The sequence number field is a signed 32-bit integer. It is used to detect old and duplicate link state advertisements. The larger the sequence number, the more recent the advertisement.
Checksum	The checksum is used to detect data corruption of an advertisement. This corruption can occur while an advertisement is being flooded, or while it is being held in a gateway's memory. This field is the checksum of the complete contents of the advertisement, except the LS age field.
Options	The Options field in the link state advertisement header indicates which optional capabilities are associated with the advertisement.

8 Configuration Examples

8.1 Example for Configuring NAT

8.1.1 Network Requirements

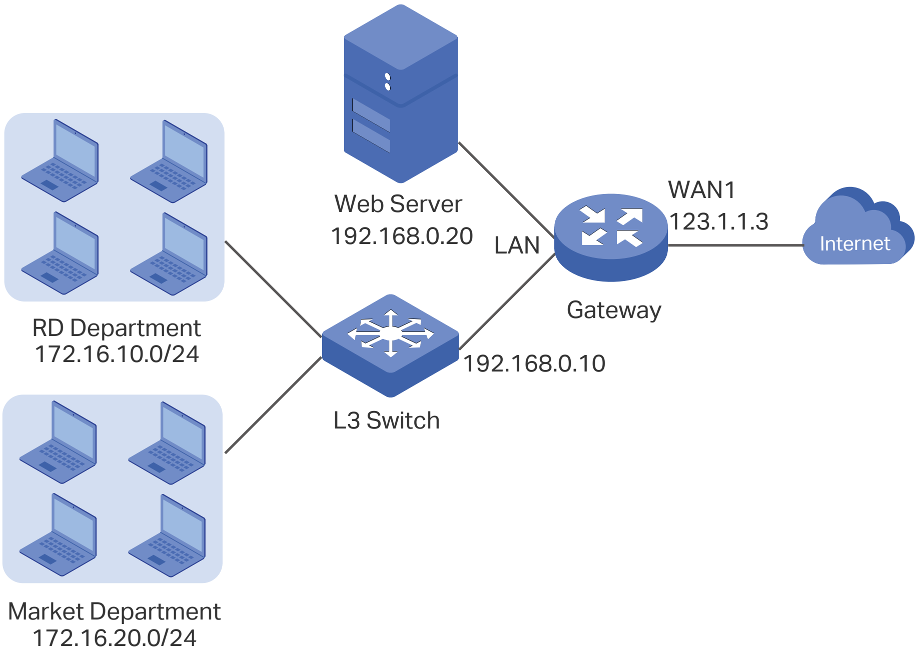
A company has two departments: Market Department and RD department. Each department is assigned to an individual subnet. The company has the following requirements:

1) The two departments need to access the internet via the same gateway.

2) The company has a web server which needs to be accessed by the users on the internet.

8.1.2 Network Topology

Figure 8-1 Network Topology



8.1.3 Configuration Scheme

To meet the first requirement, configure static routing on the gateway to make sure the gateway know where to deliver the packets to IP addresses in different subnets (172.16.10.0/24, 172.16.20.0/24).

To meet the second requirement, add One-to-One NAT entry for the Web Server on the gateway, thus the web server with a private IP address can be accessed at a corresponding valid public IP address. Note that One-to-One NAT take effects only when the connection type of WAN port is Static IP.

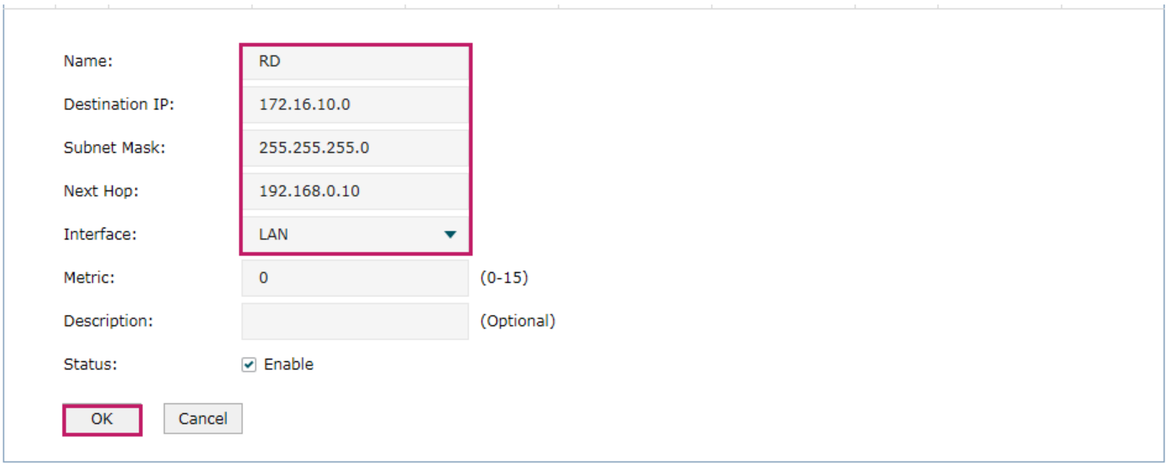
8.1.4 Configuration Procedure

Follow the steps below to configure NAT on the gateway:

- Configuring the static routing

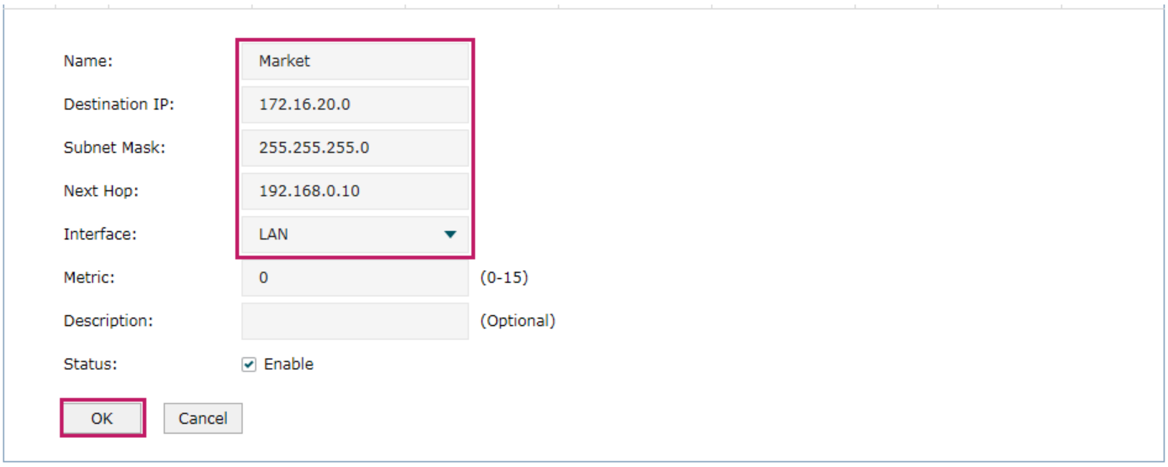
1) Choose the menu **Transmission > Routing > Static Route** to load the configuration page, and click **Add**.
2) Add static routes for the two departments respectively: Specify the entry name as RD/Market, enter 172.16.10.0/172.16.20.0 as the destination IP, and specify the VLAN 1 interface IP of L3 switch as next hop, then choose the interface as WAN1. Keep Status of this entry as **Enable**. Click **OK**.

Figure 8-2 Configuring the Static Routing for RD Department



Name:	RD	
Destination IP:	172.16.10.0	
Subnet Mask:	255.255.255.0	
Next Hop:	192.168.0.10	
Interface:	LAN	
Metric:	0	(0-15)
Description:		(Optional)
Status:	☑ Enable	

Figure 8-3 Configuring the Static Routing for Market Department



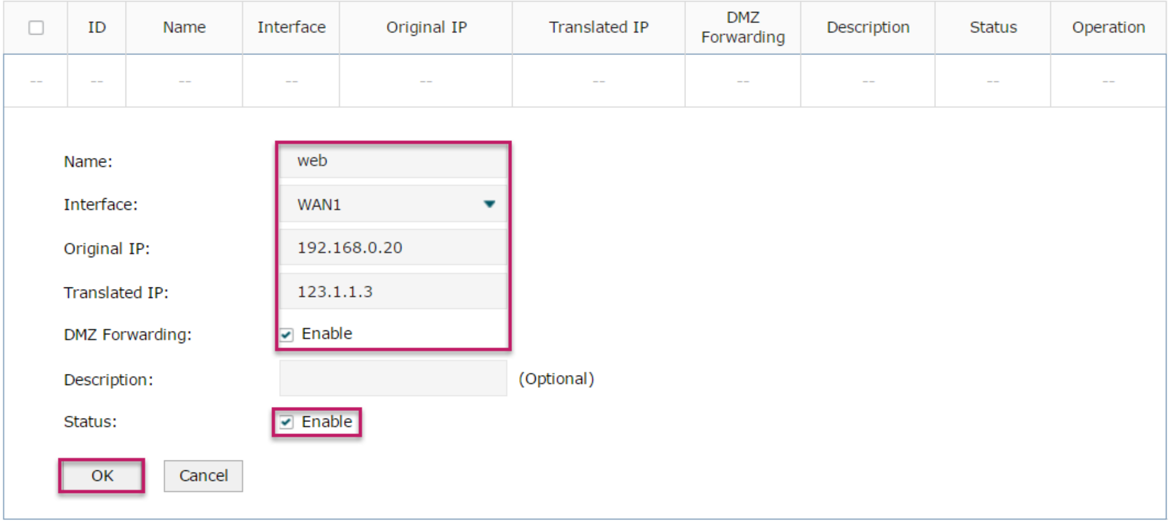
Name:	Market	
Destination IP:	172.16.20.0	
Subnet Mask:	255.255.255.0	
Next Hop:	192.168.0.10	
Interface:	LAN	
Metric:	0	(0-15)
Description:		(Optional)
Status:	☑ Enable	

■ Configuring the One-to-One NAT

1) Choose the menu **Transmission > NAT > One-to-One NAT** to load the configuration page, and click **Add**.

2) Add a One-to-One NAT entry for the web server: Specify the entry name as web, choose the interface as WAN1, and enter the orignal IP as 192.168.0.20, the translated IP as 123.1.1.3. Enable DMZ Forwarding, then keep Status of this entry as **Enable**. Click **OK**.

Figure 8-4 Adding a Multi-Nets Entry for RD Department



☐	ID	Name	Interface	Original IP	Translated IP	DMZ Forwarding	Description	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name:	web
Interface:	WAN1
Original IP:	192.168.0.20
Translated IP:	123.1.1.3
DMZ Forwarding:	☑ Enable
Description:	(Optional)
Status:	☑ Enable

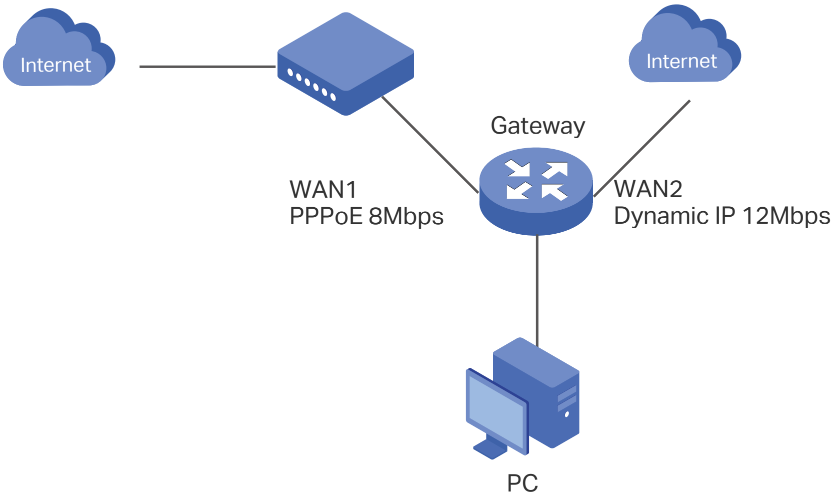
8.2 Example for Configuring Load Balancing

8.2.1 Network Requirements

To make good use of bandwidth, the network administrator decides to bind two WAN links using load balancing.

8.2.2 Network Topology

Figure 8-5 Network Topology



8.2.3 Configuration Scheme

To meet the requirement, configure WAN parameters on the gateway in order that the two WAN links can work properly and have access to the internet, then configure load balancing on the gateway to aggregate two WAN links.

8.2.4 Configuration Procedure

Follow the steps below to configure load balancing on the gateway:

- Configuring the WAN parameters

  For WAN1 port, configure the connection type as PPPoE, and specify Upstream and Downstream bandwidth for this link based on your ADSL bandwidth (You could consult your internet Service Provider for the bandwidth information).

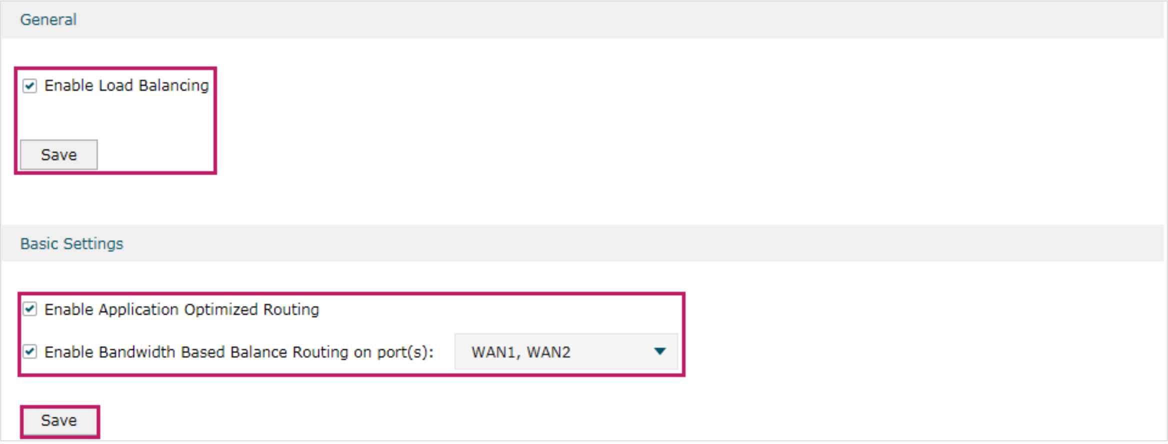
  For WAN2 port, configure the connection type as Dynamic IP, and specify Upstream and Downstream bandwidth for this link according to data that ISP provides.

  Make sure two WAN links can work properly and have access to the internet.

- Configuring the Load Balancing

  Choose the menu **Transmission> Load Balancing > Basic Settings** to load the configuration page. Enable Load Balancing globally, and click **Save**. Enable Application Optimized Routing, and enable Bandwidth Based Balancing Routing on WAN1 port and WAN2 port. Click **Save**.

Figure 8-6 Configuring the Load Balancing



General

☑ Enable Load Balancing

Basic Settings

☑ Enable Application Optimized Routing

☑ Enable Bandwidth Based Balance Routing on port(s): WAN1, WAN2

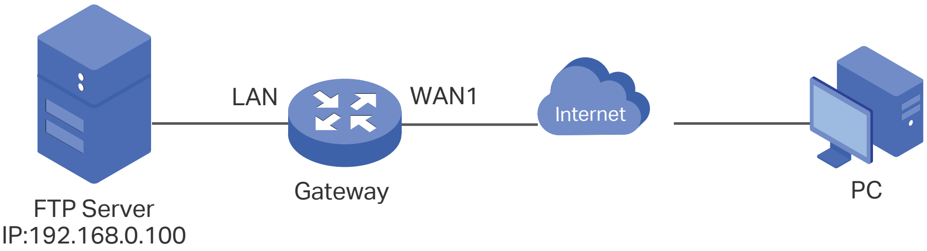
8.3 Example for Configuring Virtual Server

8.3.1 Network Requirements

The network administrator builds up a FTP server on the local network and wants to share it on the internet.

8.3.2 Network Topology

Figure 8-7 Network Topology



8.3.3 Configuration Scheme

In this scenario, both virtual server and DMZ host can be configured to meet the requirement. Here we take configuring Virtual Server as an example, owing to that for a DMZ host all ports are open which may result in unsafety. Configure the FTP server as a virtual server on the gateway so that the FTP server can be accessed by the internet user.

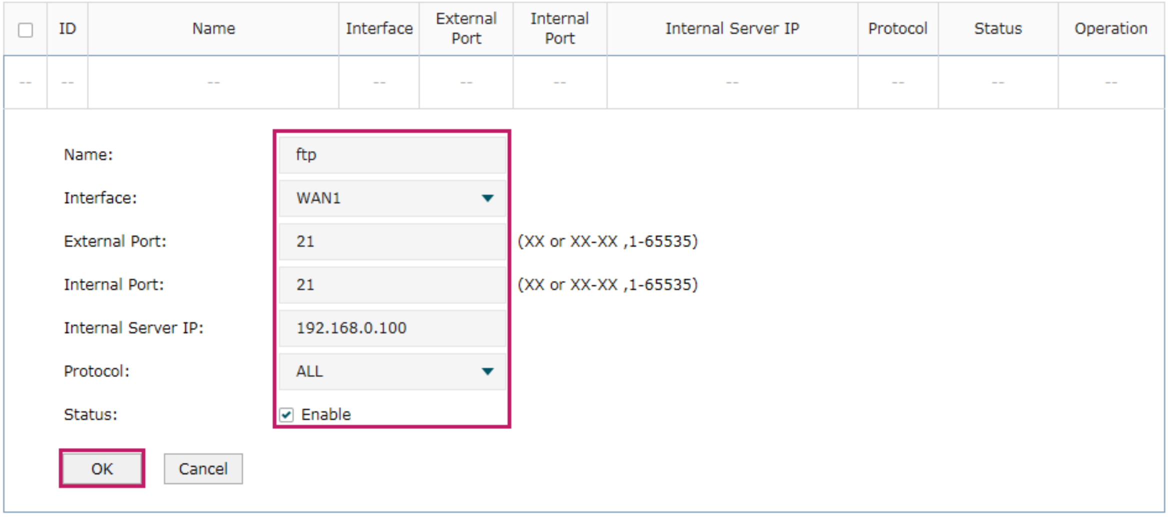
8.3.4 Configuration Procedure

Follow the steps below to configure virtual server on the gateway:

1) Choose the menu **Transmission > NAT > Virtual Servers** to load the configuration page, and click **Add**.

2) Specify the entry name as ftp, choose the interface as WAN1, and specify the internal/external port as 21, enter the IP address of FTP server (192.168.0.100) as the internal server IP. Select the protocol as All, then keep Status of this entry as **Enable**. Click **OK**.

Figure 8-8 Configuring the Virtual Server



□	ID	Name	Interface	External Port	Internal Port	Internal Server IP	Protocol	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name:	ftp	
Interface:	WAN1	
External Port:	21	(XX or XX-XX ,1-65535)
Internal Port:	21	(XX or XX-XX ,1-65535)
Internal Server IP:	192.168.0.100	
Protocol:	ALL	
Status:	☑ Enable	

8.4 Example for Configuring Policy Routing

8.4.1 Network Requirements

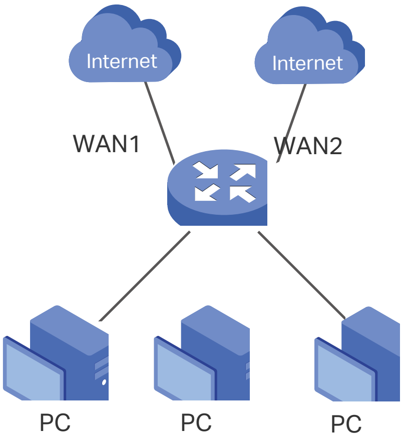
The network administrator has a gateway with 3 computers (192.168.0.2-192.168.0.4) connected to the LAN side, all computers are routed to internet by WAN1 port and WAN2 port, the requirements are as follows:

- WAN2 link is used to backup WAN1 link to keep an always on-line network.

- The two computers with IP addresses 192.168.0.2 and 192.168.0.3 are required to use WAN1 for web surfing, WAN2 for other internet activities.

8.4.1 Network Topology

Figure 8-9 Network Topology



8.4.2 Configuration Scheme

To meet the first requirement, configure link backup on the gateway. To meet the second requirement, configure policy routing rules for two computers which use 192.168.0.2 and 192.168.0.3. Note that link backup rule has a higher priority than policy routing rule.

8.4.3 Configuration Procedure

Follow the steps below to configure link backup and policy routing on the gateway:

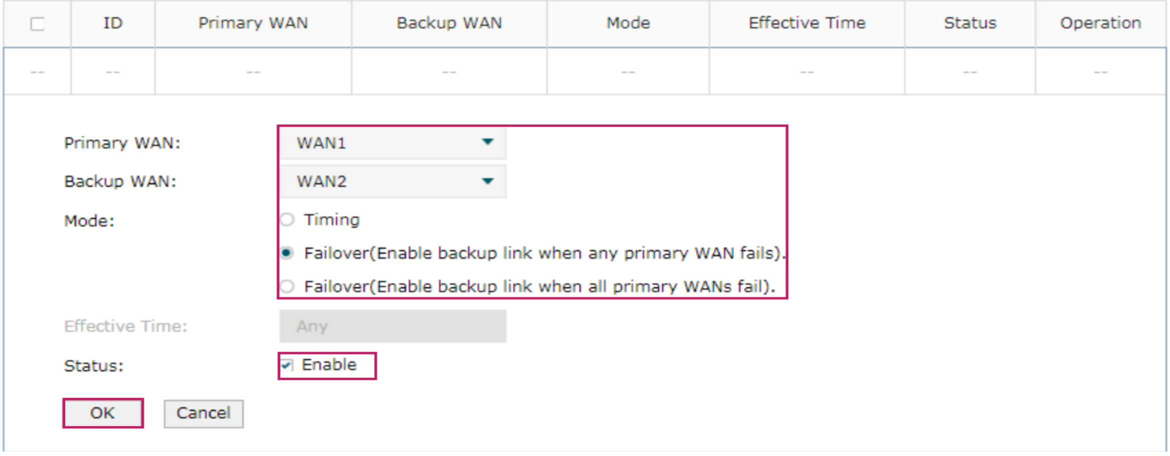
- Configuring the Link Backup

1) Choose the menu **Transmission > Load Balancing > Link Backup** to load the configuration page, and click **Add**.

2) Specify the primary WAN as WAN1, the backup WAN as WAN2 and the mode as **Failover (Enable backup link when any primary WAN fails)**, so that the backup WAN

will be enabled when the primary WAN failed. Keep Status of this entry as Enable. Click **OK**.

Figure 8-10 Configuring the Link Backup



□	ID	Primary WAN	Backup WAN	Mode	Effective Time	Status	Operation
--	--	--	--	--	--	--	--

Primary WAN: WAN1

Backup WAN: WAN2

Mode: ○ Timing
● Failover(Enable backup link when any primary WAN fails).
○ Failover(Enable backup link when all primary WANs fail).

Effective Time: Any

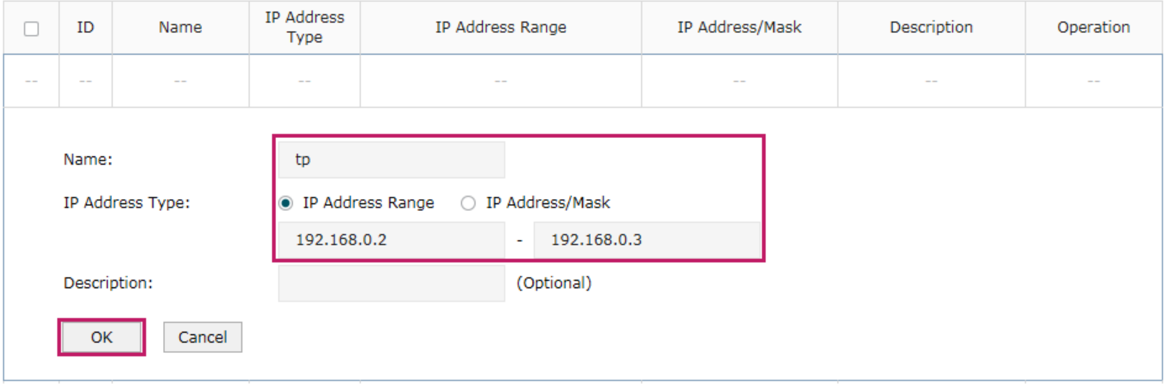
Status: ☑ Enable

OK Cancel

Configuring the Policy Routing Rules

1) Choose the menu **Preferences > IP Group > IP Address** to load the configuration page, and click **Add**. Specify the IP address name as tp, the IP address type as IP Address Range (192.168.0.2-192.168.0.3). Click **OK**.

Figure 8-11 Configuring the IP Address



□	ID	Name	IP Address Type	IP Address Range	IP Address/Mask	Description	Operation
--	--	--	--	--	--	--	--

Name: tp

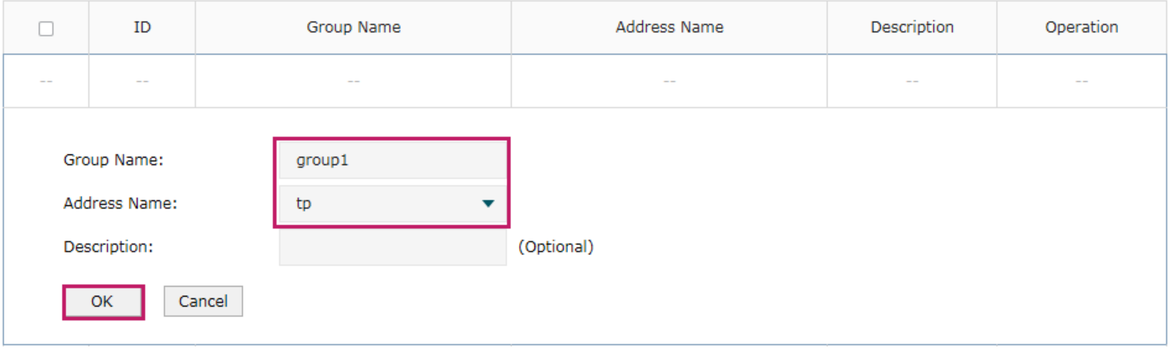
IP Address Type: ● IP Address Range ○ IP Address/Mask
192.168.0.2 - 192.168.0.3

Description: (Optional)

OK Cancel

2) Choose the menu **Preferences > IP Group > IP Address** to load the configuration page and click **Add**. Specify the IP group name as group1, the IP address name as tp to reference the IP address you have created. Click **OK**.

Figure 8-12 Configuring the IP Group



□	ID	Group Name	Address Name	Description	Operation
--	--	--	--	--	--

Group Name: group1

Address Name: tp

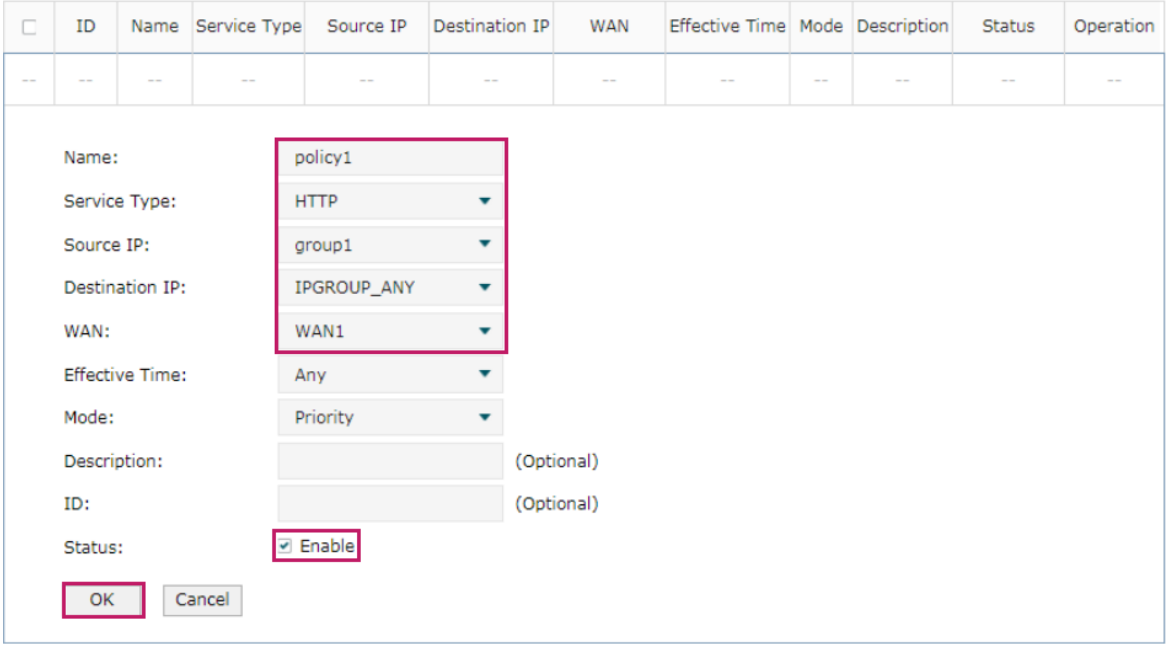
Description: (Optional)

OK Cancel

3) Choose the menu **Transmission > Routing > Policy routing** to load the configuration page, and click **Add**.

Specify the policy routing rule name as policy1, the service type as HTTP, the source IP as group1, the destination IP as IPGROUP_ANY which means no limit. Choose WAN1, and keep Status of this entry as **Enable**. Click **OK**.

Figure 8-13 Configuring the Policy Routing Rule 1

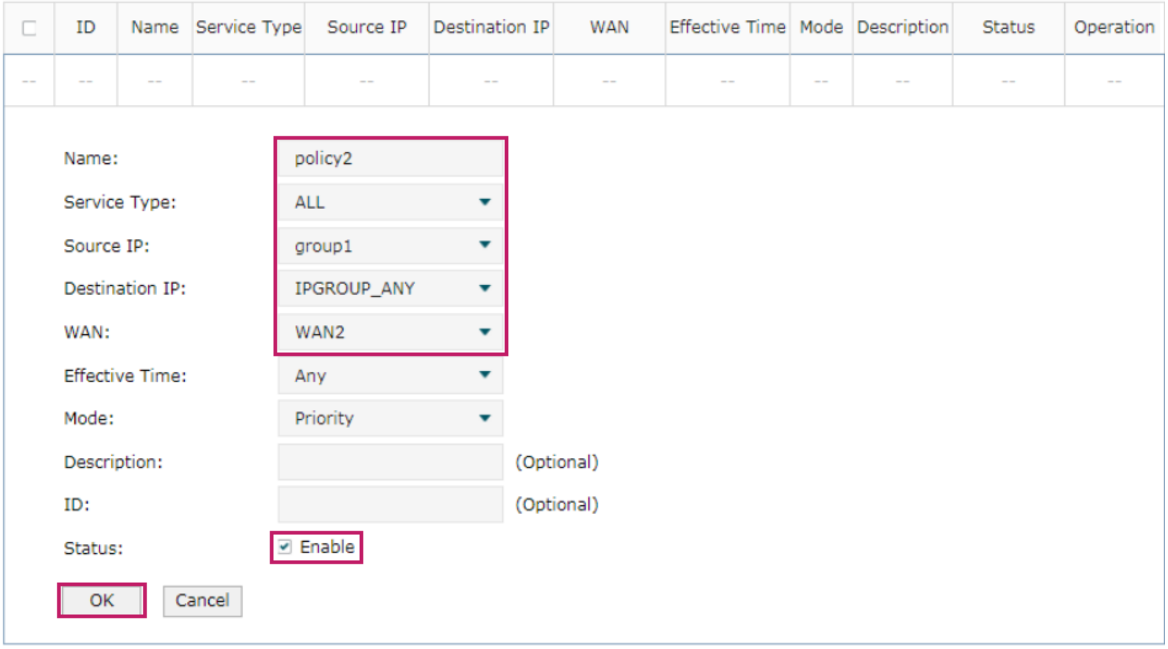


□	ID	Name	Service Type	Source IP	Destination IP	WAN	Effective Time	Mode	Description	Status	Operation
--	--	--	--	--	--	--	--	--	--	--	--

Name:	policy1
Service Type:	HTTP
Source IP:	group1
Destination IP:	IPGROUP_ANY
WAN:	WAN1
Effective Time:	Any
Mode:	Priority
Description:	(Optional)
ID:	(Optional)
Status:	☑ Enable

Specify the policy routing rule name as policy2, the service type as ALL, the source IP as group1, the destination IP as IPGROUP_ANY which means no limit. Choose WAN2, and keep Status of this entry as **Enable**. Click **OK**.

Figure 8-14 Configuring the Policy Routing Rule 2



□	ID	Name	Service Type	Source IP	Destination IP	WAN	Effective Time	Mode	Description	Status	Operation
--	--	--	--	--	--	--	--	--	--	--	--

Name:	policy2
Service Type:	ALL
Source IP:	group1
Destination IP:	IPGROUP_ANY
WAN:	WAN2
Effective Time:	Any
Mode:	Priority
Description:	(Optional)
ID:	(Optional)
Status:	☑ Enable

Part 9

Configuring Firewall

CHAPTERS

1 Firewall

1.1 Overview

Firewall is used to enhance the network security. It can prevent external network threats from spreading to the internal network, protect the internal hosts from ARP attacks, and control the internal users' access to the external network.

1.2 Supported Features

The Firewall module supports four functions: Anti ARP Spoofing, Attack Defense, and Access Control.

Anti ARP Spoofing

ARP (Address Resolution Protocol) is used to map IP addresses to the corresponding MAC addresses so that packets can be delivered to their destinations. However, since ARP is implemented with the premise that all the hosts and gateways are trusted, there are high security risks on real, complex networks. If attackers send ARP spoofing packets with false IP address-to-MAC address mapping entries, the device will update the ARP table based on the false ARP packets and record wrong mapping entries, which results in a breakdown of normal communication.

Anti ARP Spoofing can protect the network from ARP spoofing attacks. It works based on the IP-MAC Binding entries. These entries record the correct one-to-one relationships between IP addresses and MAC addresses. When receiving an ARP packet, the gateway checks whether it matches any of the IP-MAC Binding entries. If not, the gateway will ignore the ARP packets. In this way, the gateway maintains the correct ARP table.

In addition, the gateway provides the following two sub functions:

- Permitting the packets matching the IP-MAC Binding entries only and discarding other packets.

- Sending GARP packets to the hosts when it detects ARP attacks. The GARP packets can inform hosts of the correct ARP table, preventing their ARP tables from being falsified by ARP spoofing packets.

Attack Defense

Attacks on a network device can cause device or network paralysis. With the Attack Defense feature, the gateway can identify and discard various attack packets which are sent to the CPU, and limit the packet receiving rate. In this way, the gateway can protect itself and the connected network against malicious attacks.

The gateway provides two types of Attack Defense: Flood Defense and Packet Anomaly Defense. Flood Defense limits the receiving rate of the specific types of packets, and Packet Anomaly Defense discards the illegal packets directly.

MAC Filtering

MAC Filtering can drop or allow packets from certain devices passing through the gateway based on the MAC address of the devices. After the MAC filtering policy and MAC filtering list are configured, the gateway will apply the filter policy to the packets matching the MAC address, and thus limit network traffic and manage network access behaviors.

Access Control

Access Control can filter the packets passing through the gateway based on the Access Control rules. An Access Control rule includes a filter policy and some conditions, such as service type, receiving interface and effective time. The gateway will apply the filter policy to the packets matching these conditions, and thus to limit network traffic, manage network access behaviors and more.

Access Control can prevent various network attacks, such as attacks on TCP (Transmission Control Protocol) and ICMP (Internet Control Message Protocol) packets, and can also manage network access behaviors, such as controlling access to the internet.

Application Control

DPI (Deep Packet Inspection) helps you identify, analyze, and control the traffic at the application layer in the network. DPI engine includes the latest application identification signatures to track which applications are using the most bandwidth. You can better manage and distribute network traffic usage through DPI.

2 Firewall Configuration

In Firewall module, you can configure the following features:

- Anti ARP Spoofing
- Attack Defense
- MAC Filtering
- Access Control
- Application Control

2.1 Anti ARP Spoofing

To complete Anti ARP Spoofing configuration, there are two steps. First, add IP-MAC Binding entries to the IP-MAC Binding List. Then enable Anti ARP Spoofing for these entries.

Note:

In case Anti ARP Spoofing causes access problems to the currently connected devices, we recommend that you add and verify the IP-MAC Binding entries first before enabling Anti ARP Spoofing.

2.1.1 Adding IP-MAC Binding Entries

You can add IP-MAC Binding entries in two ways: manually and via ARP scanning.

- Adding IP-MAC Binding Entries Manually

You can manually bind the IP address, MAC address and interface together on the condition that you have got the related information of the hosts on the network.

- Adding IP-MAC Binding Entries via ARP Scanning

With ARP Scanning, the gateway sends the ARP request packets with the specific IP field to the hosts. Upon receiving the ARP reply packet, the gateway can get the IP address, MAC address and connected interface of the host.

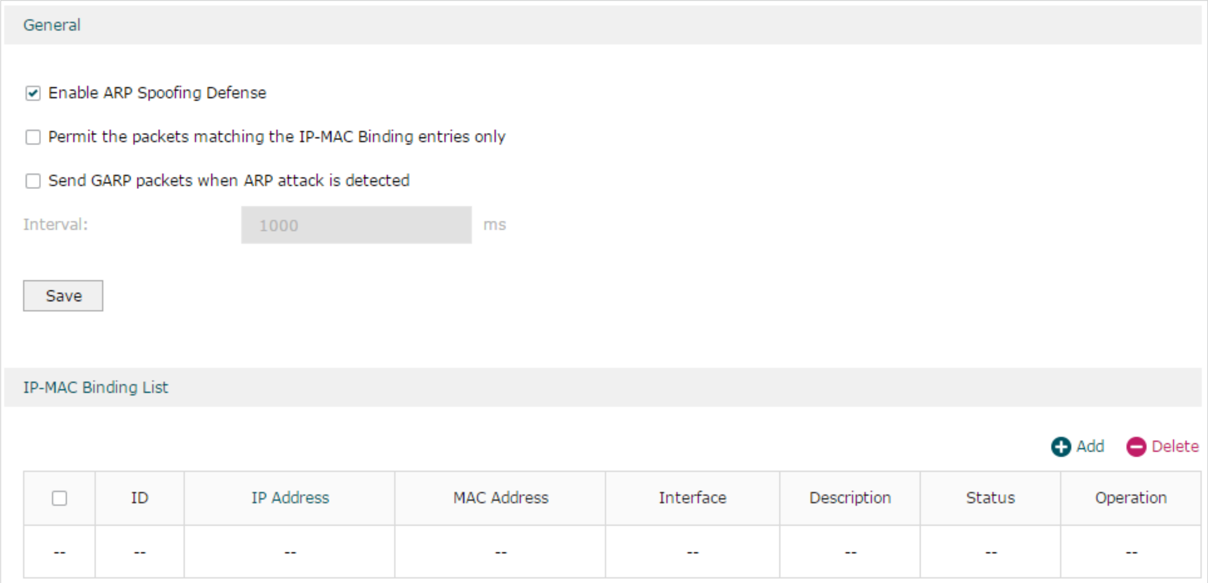
The following sections introduce these two methods in detail.

Adding IP-MAC Binding Entries Manually

Before adding entries manually, get the IP addresses and MAC addresses of the hosts on the network and make sure of their accuracy.

Choose the menu **Firewall > Anti ARP Spoofing > IP-MAC Binding** to load the following page.

Figure 2-1 IP-MAC Binding Page



General

☑ Enable ARP Spoofing Defense

□ Permit the packets matching the IP-MAC Binding entries only

□ Send GARP packets when ARP attack is detected

Interval: 1000 ms

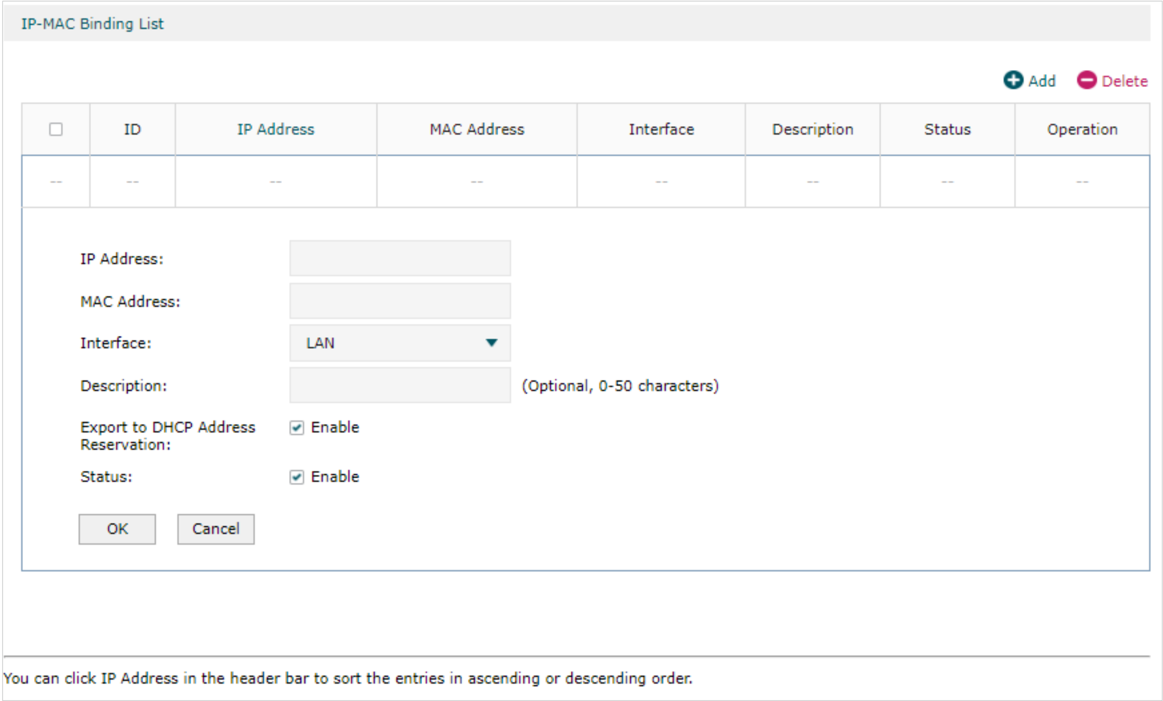
IP-MAC Binding List

□	ID	IP Address	MAC Address	Interface	Description	Status	Operation
--	--	--	--	--	--	--	--

Follow the steps below to add IP-MAC Binding entries manually. The entries will take effect on the LAN interface.

1) In the **IP-MAC Binding List** section, click **Add** to load the following page.

Figure 2-2 Add IP-MAC Binding Entries Manually



IP-MAC Binding List

□	ID	IP Address	MAC Address	Interface	Description	Status	Operation
--	--	--	--	--	--	--	--

IP Address:

MAC Address:

Interface: LAN

Description: (Optional, 0-50 characters)

Export to DHCP Address Reservation: ☑ Enable

Status: ☑ Enable

You can click IP Address in the header bar to sort the entries in ascending or descending order.

2) Configure the following parameters on this page.

IP Address	Enter an IP address to be bound.
MAC Address	Enter a MAC address to be bound.
Interface	Select the interface on which the entries will take effect.
Description	Enter a description for identification.
Export to DHCP Address Reservation	Whether to export the IP-MAC binding list to address reservation list.
Status	Enable this entry. Only when the status is Enable will this entry be effective.

3) Click **OK** and the added entry will be displayed in the list.

Adding IP-MAC Binding Entries via ARP Scanning

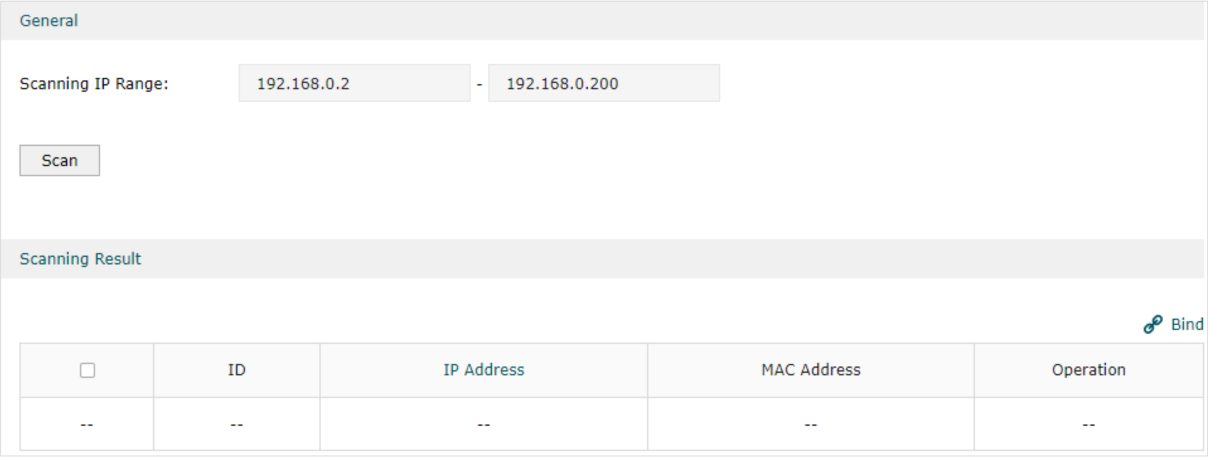
If you want to get the IP addresses and MAC addresses of the hosts quickly, you can use ARP Scanning to facilitate your operation.

Note:

Before using this feature, make sure that your network is safe and the hosts are not suffering from ARP attacks at present; otherwise, you may obtain incorrect IP-MAC Binding entries. If your network is being attacked, it's recommended to bind the entries manually.

Choose the menu **Firewall > Anti ARP Spoofing > ARP Scanning** to load the following page.

Figure 2-3 Add IP-MAC Binding Etries via ARP Scanning



General

Scanning IP Range: 192.168.0.2 - 192.168.0.200

Scan

Scanning Result

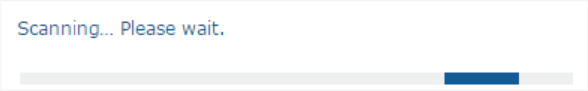
Bind

□	ID	IP Address	MAC Address	Operation
--	--	--	--	--

Follow the steps below to add IP-MAC Binding entries via ARP Scanning.

1) Click **Scan** and the following window will pop up.

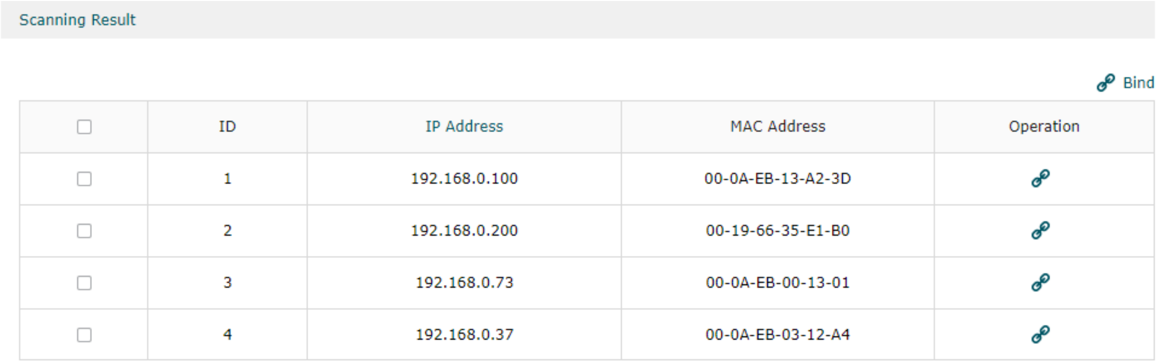
Figure 2-4 ARP Scanning Process



Scanning... Please wait.

2) Wait for a moment without any operation. The scanning result will be displayed in the following table. Click 🔗 to export the corresponding entry to the IP-MAC Binding table, or select multiple entries and click 🔗 Bind to export the entries to the IP-MAC Binding table in batch.

Figure 2-5 ARP Scanning Result



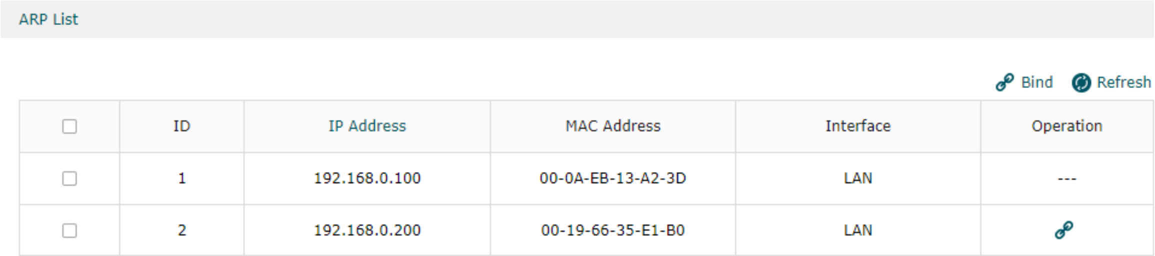
Scanning Result

Bind

□	ID	IP Address	MAC Address	Operation
□	1	192.168.0.100	00-0A-EB-13-A2-3D	🔗
□	2	192.168.0.200	00-19-66-35-E1-B0	🔗
□	3	192.168.0.73	00-0A-EB-00-13-01	🔗
□	4	192.168.0.37	00-0A-EB-03-12-A4	🔗

Also, you can go to **Firewall > Anti ARP Spoofing > ARP List** to view and bind the ARP Scanning entries. The ARP Scanning list displays all the historical scanned entries. Click 🔗 to export the corresponding entry to the IP-MAC Binding table, or select multiple entries and click 🔗 Bind to export the entries to the IP-MAC Binding table in batch.

Figure 2-6 ARP List



ARP List

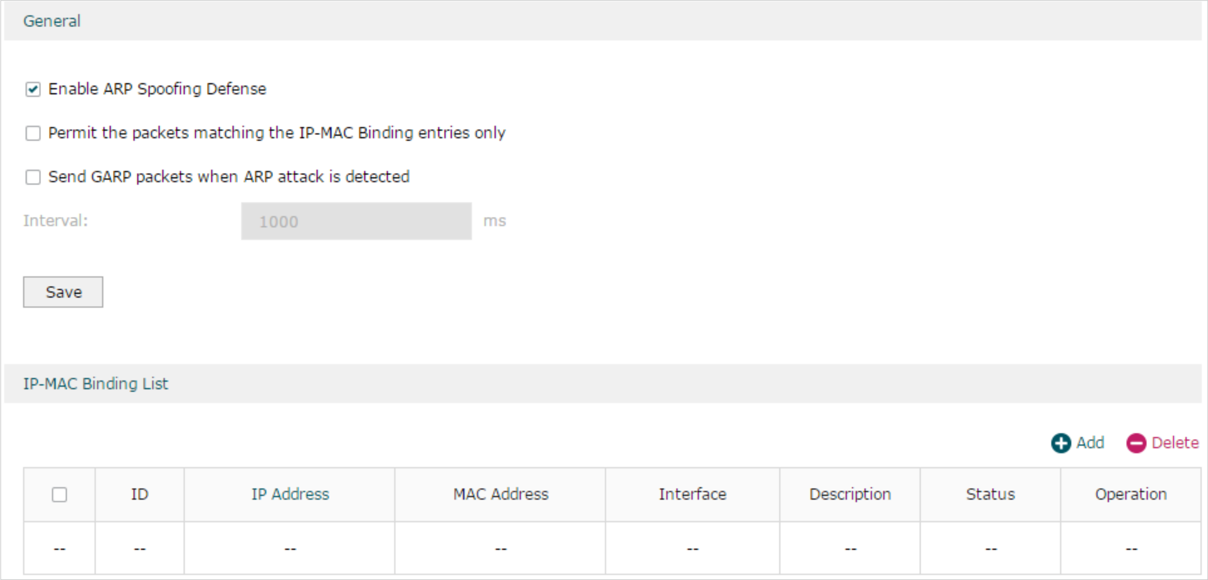
🔗 Bind Refresh

□	ID	IP Address	MAC Address	Interface	Operation
□	1	192.168.0.100	00-0A-EB-13-A2-3D	LAN	---
□	2	192.168.0.200	00-19-66-35-E1-B0	LAN	🔗

2.1.2 Enable Anti ARP Spoofing

Choose the menu **Firewall > Anti ARP Spoofing > IP-MAC Binding** to load the following page.

Figure 2-7 IP-MAC Binding-General Config



General

☑ Enable ARP Spoofing Defense

□ Permit the packets matching the IP-MAC Binding entries only

□ Send GARP packets when ARP attack is detected

Interval: 1000 ms

Save

IP-MAC Binding List

Add Delete

□	ID	IP Address	MAC Address	Interface	Description	Status	Operation
--	--	--	--	--	--	--	--

Follow the steps below to configure Anti ARP Spoofing rule:

1) In the **General** section, enable ARP Spoofing Defense globally. With this option enabled, the gateway can protect its ARP table from being falsified by ARP spoofing packets.

2) Choose whether to enable the two sub functions.

Permit the packets matching the IP-MAC Binding entries only

With this option enabled, when receiving a packet, the gateway will check whether the IP address, MAC address and receiving interface match any of the IP-MAC Binding entries. Only the matched packets will be forwarded.

Send GARP packets when ARP attack is detected	With this option enabled, the gateway will send GARP packets to the hosts if it detects ARP spoofing packets on the network. The GARP packets will inform the hosts of the correct ARP information, which is used to replace the wrong ARP information in the hosts.
Interval	If the **Send GARP packets when ARP attack is detected** is enabled, configure the time interval for sending GARP packets. The valid values are from 1 to 10000 milliseconds.

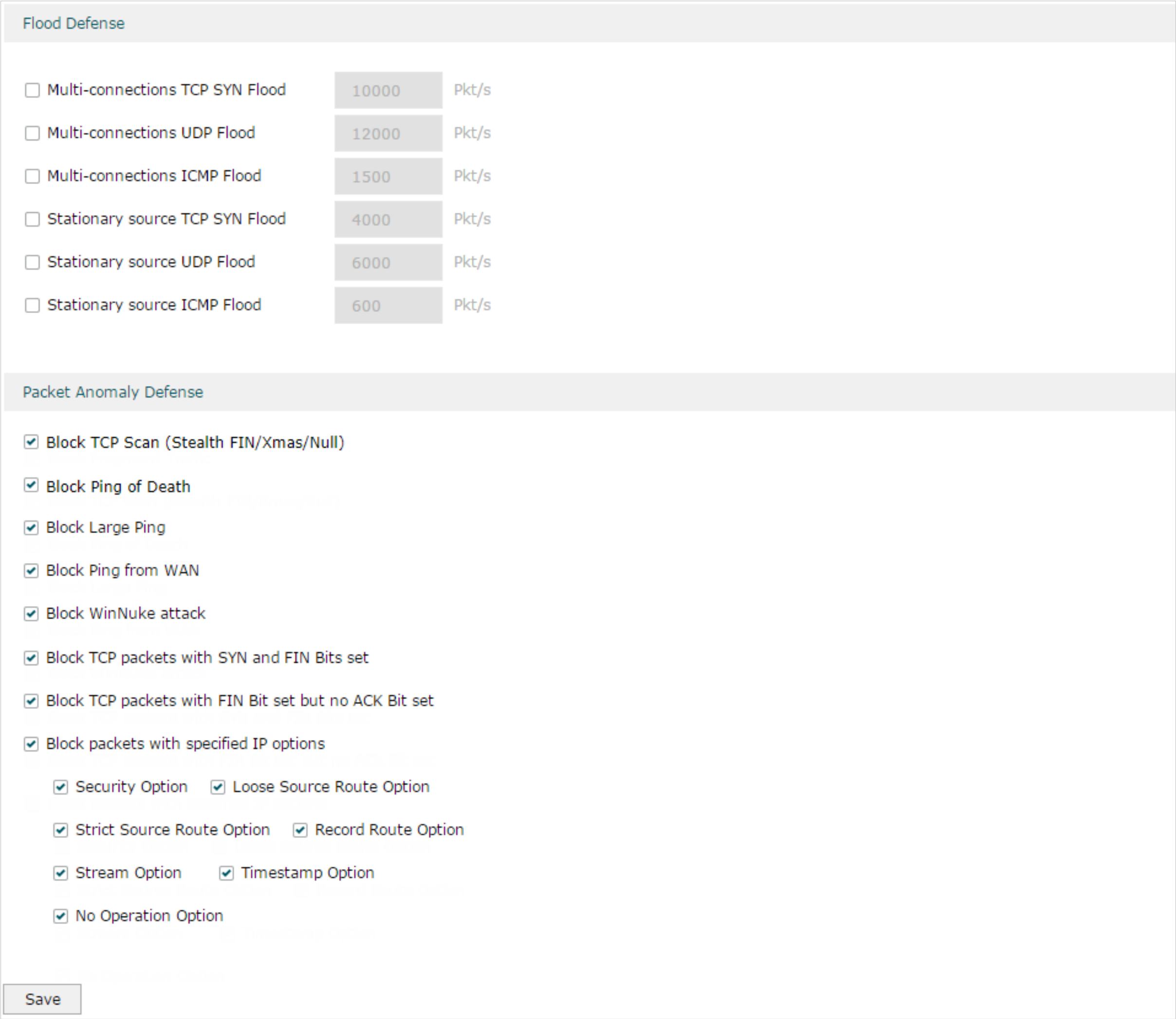
3) Click **Save**.

Note:

Before enabling "Permit the packets matching the IP-MAC Binding entries only", you should make sure that your management host is in the IP-MAC Binding list. Otherwise, you cannot log in to the Web management page of the gateway. If this happens, restore your gateway to factory defaults and then log in using the default login credentials.

2.2 Configuring Attack Defense

Choose the menu **Firewall > Attack Defense > Attack Defense** to load the following page.



Flood Defense

☐ Multi-connections TCP SYN Flood 10000 Pkt/s
☐ Multi-connections UDP Flood 12000 Pkt/s
☐ Multi-connections ICMP Flood 1500 Pkt/s
☐ Stationary source TCP SYN Flood 4000 Pkt/s
☐ Stationary source UDP Flood 6000 Pkt/s
☐ Stationary source ICMP Flood 600 Pkt/s

Packet Anomaly Defense

☑ Block TCP Scan (Stealth FIN/Xmas/Null)
☑ Block Ping of Death
☑ Block Large Ping
☑ Block Ping from WAN
☑ Block WinNuke attack
☑ Block TCP packets with SYN and FIN Bits set
☑ Block TCP packets with FIN Bit set but no ACK Bit set
☑ Block packets with specified IP options
☑ Security Option ☑ Loose Source Route Option
☑ Strict Source Route Option ☑ Record Route Option
☑ Stream Option ☑ Timestamp Option
☑ No Operation Option

Figure 2-8 Attack Defense

Follow the steps below to configure Attack Defense.

1) In the **Flood Defense** section, check the box and configure the corresponding parameters to enable your desired feature. By default, all the options are disabled. For details, refer to the following table:

Multi-connections TCP SYN Flood	With this feature enabled, the gateway will filter the subsequent TCP SYN packets if the number of this kind of packets reaches the specified threshold. The valid threshold ranges from 100 to 99999.
Multi-connections UDP Flood	With this feature enabled, the gateway will filter the subsequent UDP packets if the number of this kind of packets reaches the specified threshold. The valid threshold ranges from 100 to 99999.
Multi-connections ICMP Flood	With this feature enabled, the gateway will filter the subsequent ICMP packets if the number of this kind of packets reaches the specified threshold. The valid threshold ranges from 100 to 99999.

Stationary source TCP SYN Flood	With this feature enabled, the gateway will filter the subsequent stationary source TCP SYN packets if the number of this kind of packets reaches the specified threshold. The valid threshold ranges from 100 to 99999.
Stationary source UDP Flood	With this feature enabled, the gateway will filter the subsequent stationary source UDP SYN packets if the number of this kind of packets reaches the specified threshold. The valid threshold ranges from 100 to 99999.
Stationary source ICMP Flood	With this feature enabled, the gateway will filter the subsequent stationary source ICMP SYN packets if the number of this kind of packets reaches the specified threshold. The valid threshold ranges from 100 to 99999.

2) In the **Packet Anomaly Defense** section, directly check the box to enable your desired feature. By default, all the options are enabled. For details, refer to the following table:

Block TCP Scan (Stealth FIN/Xmas/Null)	With this option enabled, the gateway will filter the TCP scan packets of Stealth FIN, Xmas and Null.
Block Ping of Death	With this option enabled, the gateway will block Ping of Death attack. Ping of Death attack means that the attacker sends abnormal ping packets larger than 65535 bytes to cause system crash on the target computer.
Block Large Ping	With this option enabled, the gateway will block Large Ping attacks. Large Ping attack means that the attacker sends multiple ping packets larger than 1500 bytes to cause the system crash on the target computer.
Block Ping from WAN	With this option enabled, the gateway will block the ICMP request from WAN.
Block WinNuke attack	With this option enabled, the gateway will block WinNuke attacks. WinNuke attack refers to a remote denial-of-service attack (DoS) that affects some Windows operating systems, such as the Windows 95 and Windows N. The attacker sends a string of OOB (Out of Band) data to the target computer on TCP port 137, 138 or 139, causing system crash or Blue Screen of Death.
Block TCP packets with SYN and FIN Bits set	With this option enabled, the gateway will filter the TCP packets with both SYN Bit and FIN Bit set.
Block TCP packets with FIN Bit set but no ACK Bit set	With this option enabled, the gateway will filter the TCP packets with FIN Bit set but without ACK Bit set.
Block packets with specified IP options	With this option enabled, the gateway will filter the packets with specified IP options. You can choose the options according to your needs.

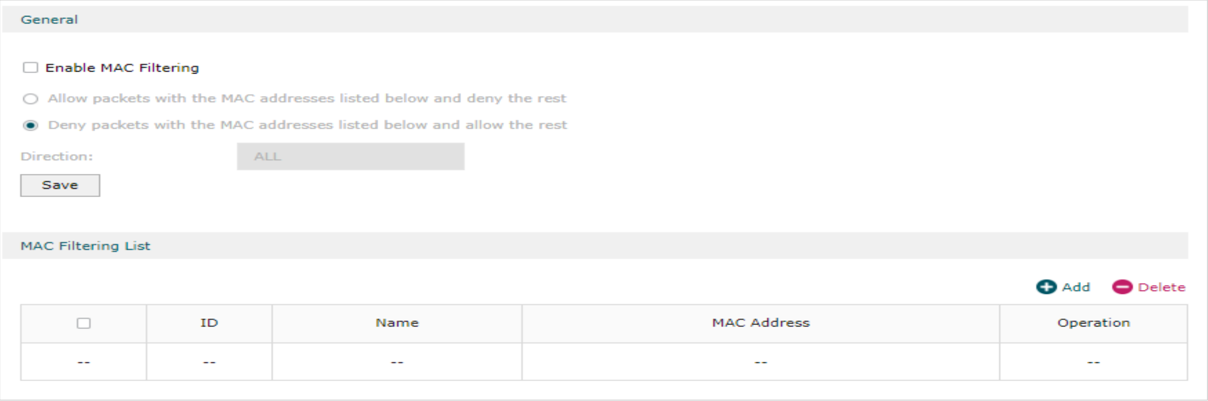
3) Click **Save** to save the settings.

2.3 Configuring MAC Filtering

MAC Filtering can drop or allow packets from certain devices passing through the gateway based on the MAC address of the devices. After the MAC filtering policy and MAC filtering list are configured, the gateway will apply the filter policy to the packets matching the MAC address, and thus limit network traffic and manage network access behaviors.

Choose the menu **Firewall > MAC Filtering > MAC Filtering** to load the following page.

Figure 2-9 MAC Filtering



General

□ Enable MAC Filtering

○ Allow packets with the MAC addresses listed below and deny the rest

● Deny packets with the MAC addresses listed below and allow the rest

Direction: ALL

Save

MAC Filtering List

Add Delete

□	ID	Name	MAC Address	Operation
--	--	--	--	--

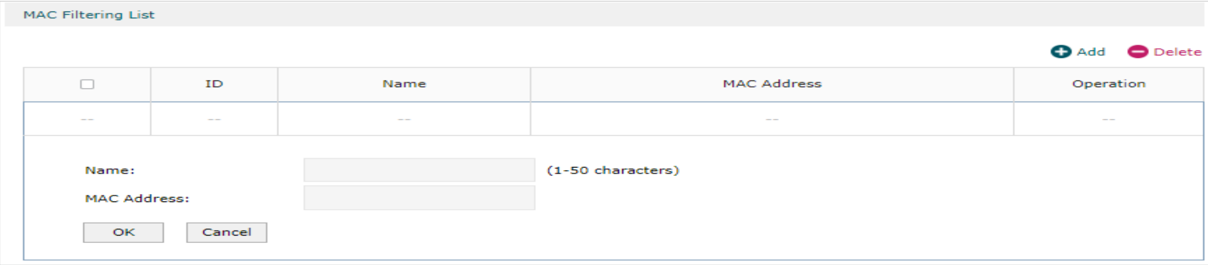
Follow the steps below to configure MAC Filtering.

1) In the **General** section, check the box to enable the MAC Filtering feature, configure the conresponding parameters and click **Save**.

Allow packets with the MAC addresses listed below and deny the rest	Select to allow packets with the listed MAC address to pass through the gateway, and packets with other MAC addresses will be dropped.
Deny packets with the MAC addresses listed below and allow the rest	Select to drop packets with the listed MAC address, and the packets with other MAC addresses will be allowed to pass through the gateway.
Direction	Select All when you want to apply the policy to traffic both from LAN to LAN and from LAN to WAN. Select LAN -> WAN when you want to apply the policy only to traffic from LAN to WAN.

2) In the **MAC Filtering List** section, click Add to load the following page.

Figure 2-10 MAC Filtering



MAC Filtering List

Add Delete

□	ID	Name	MAC Address	Operation
--	--	--	--	--

Name: (1-50 characters)

MAC Address:

OK Cancel

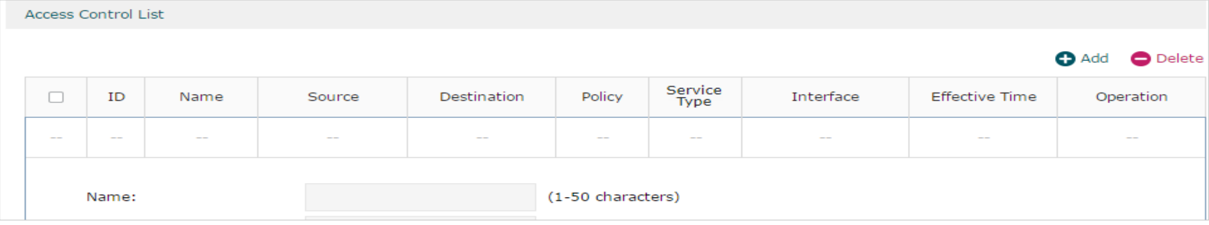
3) Specify the MAC name and address and click **OK**.

MAC Address	Specify the MAC address of the device, and the MAC filtering policy will be applied to traffic with the MAC address.

2.4 Configuring Access Control

Choose the menu **Firewall > Access Control > Access Control** and click **Add** to load the following page.

Figure 2-11 Access Control



Access Control List

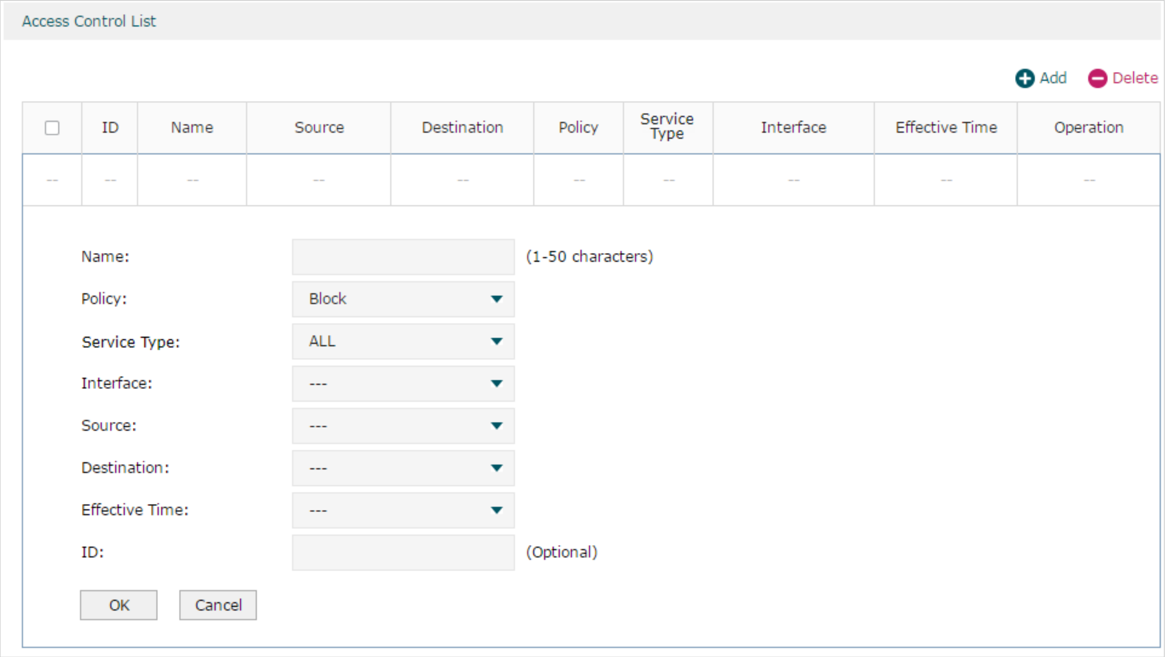
□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
--	--	--	--	--	--	--	--	--	--

Name: (1-50 characters)

This table displays the Access Control entries. Follow the steps below to add a new Access Control entry.

1) Click **Add** and the following page will appear.

Figure 2-12 Access Control



Access Control List

□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
--	--	--	--	--	--	--	--	--	--

Name:		(1-50 characters)
Policy:	Block	
Service Type:	ALL	
Interface:	---	
Source:	---	
Destination:	---	
Effective Time:	---	
ID:		(Optional)

2) Configure the required parameters and click **OK**:

Name	Specify a name for the rule. It can be 50 characters at most. The name of each entry cannot be repeated.
Policy	Select whether to block or allow the packets matching the rule to access the network.
Service Type	Select the effective service for the rule. The service referenced here can be created on the **Preferences > Service Type** page.
Direction	Select the effective traffic direction for the rule.

Source	Select an IP group to specify the source address range for the rule. The IP group referenced here can be created on the **Preferences > IP Group** page.
Destination	Select an IP group to specify the destination address range for the rule. The IP group referenced here can be created on the **Preferences > IP Group** page.
Effective Time	Select the effective time for the rule. The effective time referenced here can be created on the **Preferences > Time Range** page.
ID	Specify a rule ID. A smaller ID means a higher priority. This value is optional, and the newly added rule without this value configured will get the largest ID among all rules, which means the newly added rule has the lowest priority.

2.5 Configuring Application Control

To complete the application control configuration, follow these steps:

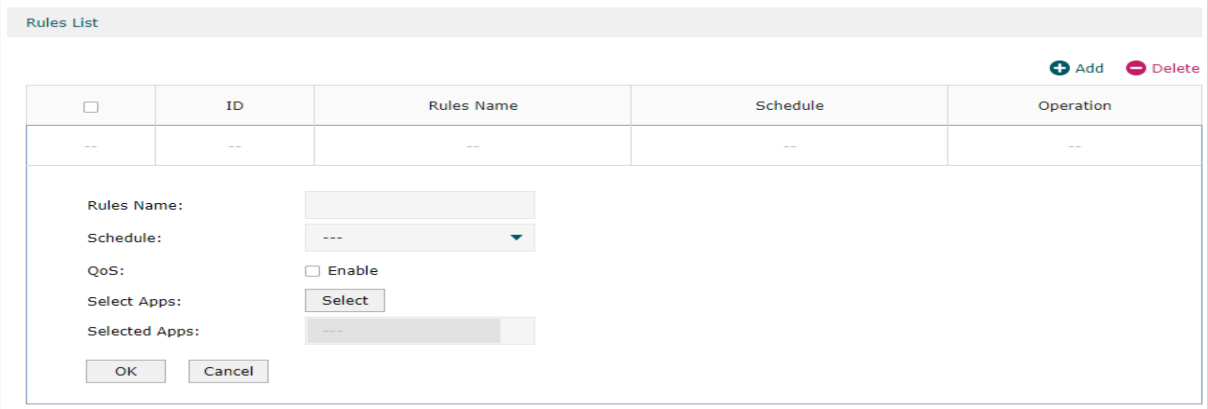
1) Create **Rules**. By adding a rule, you can predefine an application control policy that can be referenced to block specific applications or configure QoS for them.

2) Add **Application Filter**. By adding an Application Filter, you can predefine an application filtering policy that can be referenced.

3) Enable **Deep Packet Inspection** and **Assign Restriction**.

2.5.1 Create Rules

Choose the menu **Firewall > Application Control > Rules**, click **Add** to load the following page.



Rules List

□	ID	Rules Name	Schedule	Operation
--	--	--	--	--

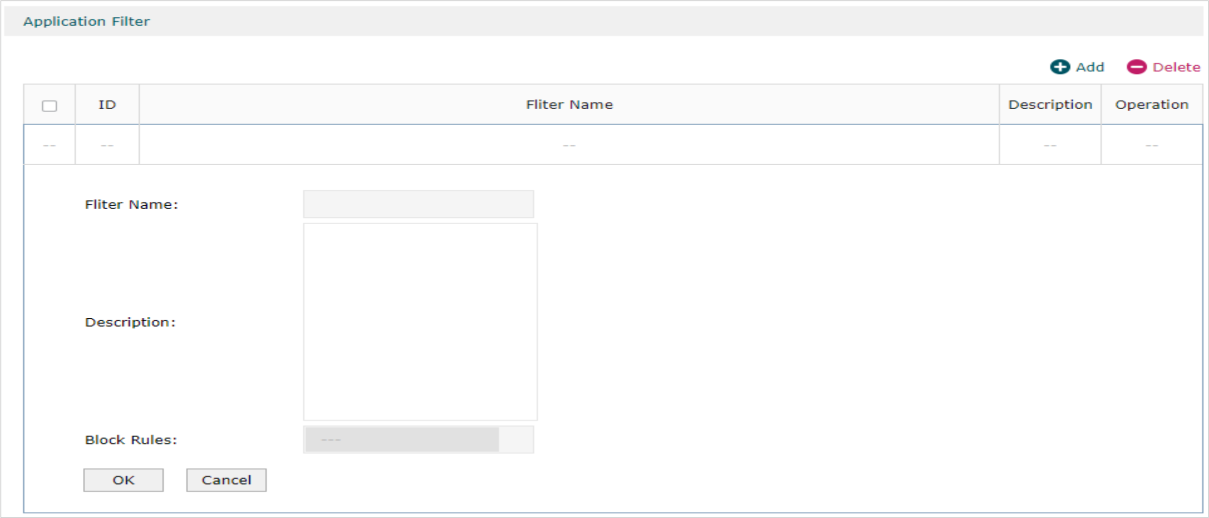
Rules Name:	
Schedule:	---
QoS:	□ Enable
Select Apps:	Select
Selected Apps:	---

Rules Name	Specify a name for the rule.
Schedule	Select the time range you set for the rule to take effect.
QoS	Choose whether to enable QoS or not. If you enable QoS, select the QoS Class.

Select Apps	Select the applications to which the rule will be applied. You can view the full application list on the **Firewall** > **Application Control** > **Application List** page.

2.5.2 Add Application Filter

Choose the menu **Firewall > Application Control > Application Filter**, click **Add** to load the following page.



Application Filter

☐	ID	Fliter Name	Description	Operation
--	--	--	--	--

Fliter Name:

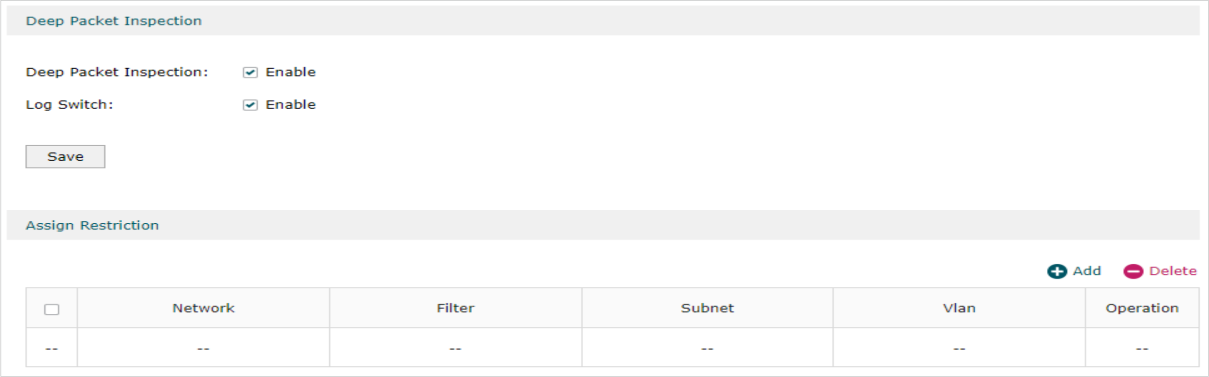
Description:

Block Rules: ---

Filter Name	Specify a name for the filter.
Description	Describes what the filter is for.
Block Rules	Select the predefined rules.

2.5.3 Enable Deep Packet Inspection

Choose the menu **Firewall > Application Control > DPI Settings** to load the following page.



Deep Packet Inspection

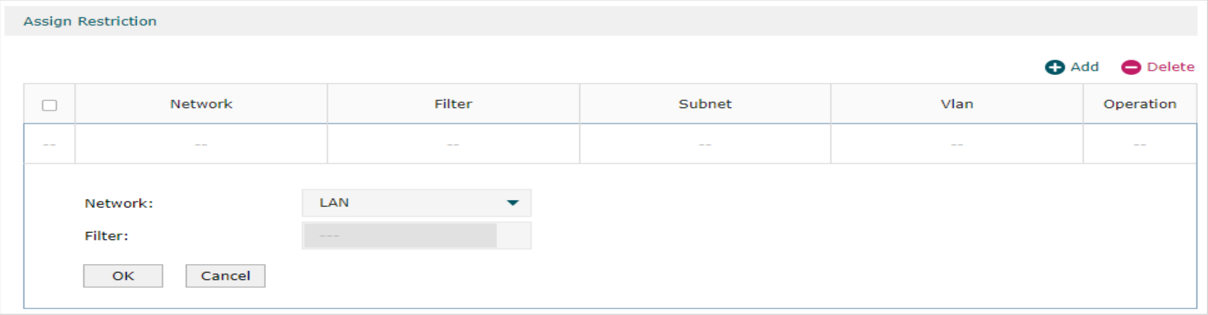
Deep Packet Inspection: ☑ Enable

Log Switch: ☑ Enable

Assign Restriction

☐	Network	Filter	Subnet	Vlan	Operation
--	--	--	--	--	--

Enable **Deep Packet Inspection**, and click **Save**. If **Log Switch** is enabled at the same time, the results of traffic analysis will be counted and retained. You can view the statistics in **Status** > **Traffic Statistics** > **DPI Statistics**. Click **Add** to assign restriction.



Assign Restriction

□	Network	Filter	Subnet	Vlan	Operation
--	--	--	--	--	--

Network: LAN

Filter: ---

Network	Select the LAN network that the restriction takes effect.
Filter	Select the filter applied to the restriction.

Click **OK** to apply the settings.

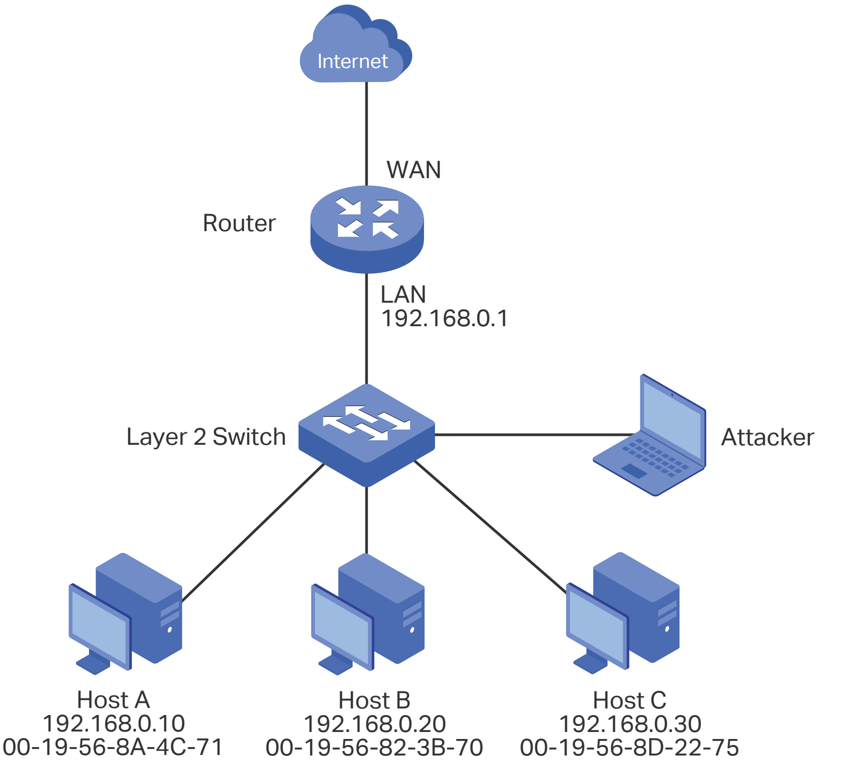
3 Configuration Examples

3.1 Example for Anti ARP Spoofing

3.1.1 Network Requirements

In the diagram below, several hosts are connected to the network via a layer 2 switch, and the gateway is the gateway of this network. Since there exists the possibility that the attacker will launch a series of ARP attacks, it is required to configure the gateway to protect itself and the terminal hosts from the ARP attacks.

Figure 3-1 Network Topology



3.1.2 Configuration Scheme

The attacker can launch three types of ARP attacks: cheating gateway, imitating gateway and cheating terminal hosts. The following section introduces the three ARP attacks and the corresponding solutions.

- Cheating Gateway

Cheating gateway attack is aimed at the gateway.

The attacker pretends to be legal terminal hosts and sends fake ARP packets to the gateway, cheating the gateway into recording wrong ARP maps of the hosts. As a result, packets from the gateway cannot be correctly sent to the hosts. To protect the gateway from this kind of attack, you can configure Anti ARP Spoofing on the gateway.

- Imitating Gateway and Cheating Hosts

These two attacks are aimed at the terminal hosts.

Imitating Gateway means that the attacker imitates the gateway and sends fake ARP packets to the hosts. As a result, the hosts record wrong ARP map of the gateway and cannot send packets to the gateway correctly.

Cheating Hosts means that the attacker pretends to be a legal host and sends fake ARP packets to other hosts. As a result, the cheated hosts record an incorrect ARP map of the legal host and cannot send packets to legal host correctly.

To protect the hosts from the attacks above, it is recommend to take both of the precautions below.

» Configure the firewall feature on the hosts.

» Configure the gateway to send GARP packets to the hosts when the gateway detects ARP attacks. The GARP packets will inform the hosts of the correct ARP maps, and the wrong ARP maps in the hosts will be replaced by the correct ones.

In conclusion, to protect the network from ARP attacks, we should make sure both the gateway and the hosts are configured with the relevant ARP defense features. Here we introduce how to configure Anti ARP Spoofing on the gateway. There are mainly three steps:

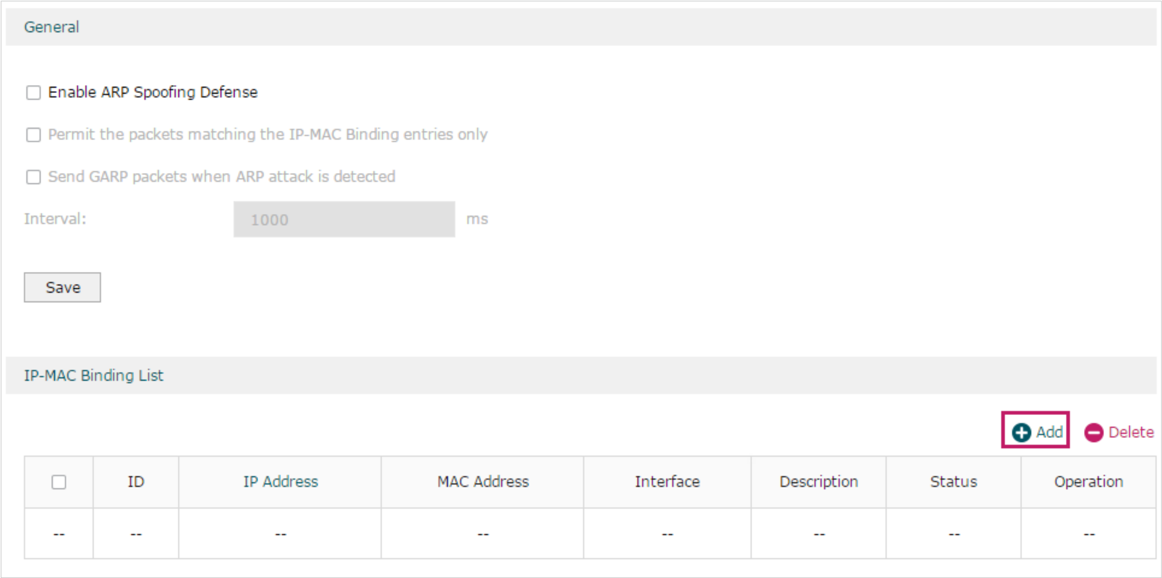
1) Get the IP and MAC addresses of the legal hosts and bind them to the IP-MAC Binding list.
2) Enable Anti ARP Spoofing.
3) Configure the gateway to send GARP packets when ARP attacks are detected.

3.1.3 Configuration Procedure

Follow the steps below to configure Anti ARP Spoofing on the gateway:

1) Choose the menu **Firewall > Anti ARP Spoofing > IP-MAC Binding** to load the following page. In the **IP-MAC Binding List** section, click **Add**.

Figure 3-2 Anti ARP Spoofing Page



General

☐ Enable ARP Spoofing Defense

☐ Permit the packets matching the IP-MAC Binding entries only

☐ Send GARP packets when ARP attack is detected

Interval: 1000 ms

Save

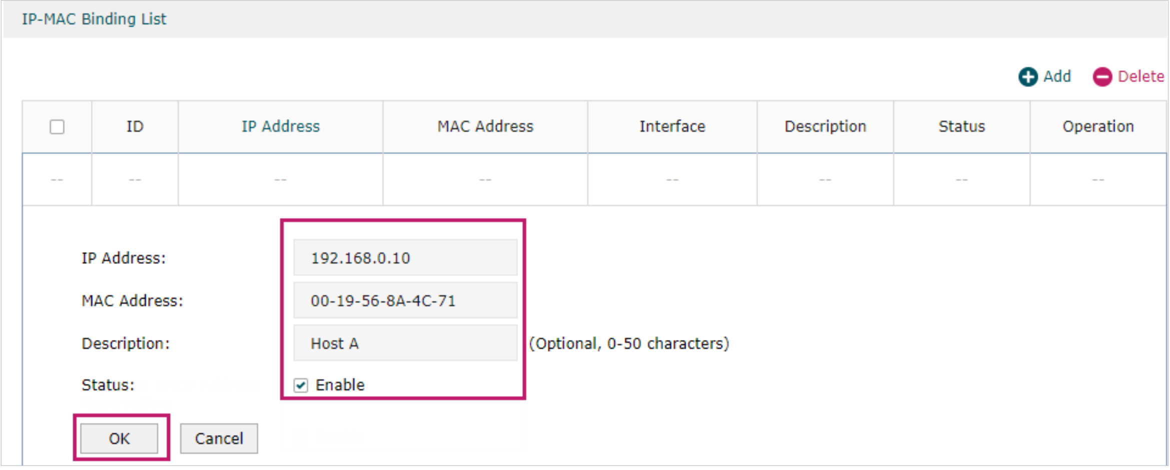
IP-MAC Binding List

Add Delete

☐	ID	IP Address	MAC Address	Interface	Description	Status	Operation
--	--	--	--	--	--	--	--

2) The following page will appear. Enter the IP address and MAC address of Host A, give a description "Host A" for this entry. Keep **Status** of this entry as "Enable". Click **OK**.

Figure 3-3 Add IP-MAC Binding Entry



IP-MAC Binding List

Add Delete

☐	ID	IP Address	MAC Address	Interface	Description	Status	Operation
--	--	--	--	--	--	--	--

IP Address: 192.168.0.10

MAC Address: 00-19-56-8A-4C-71

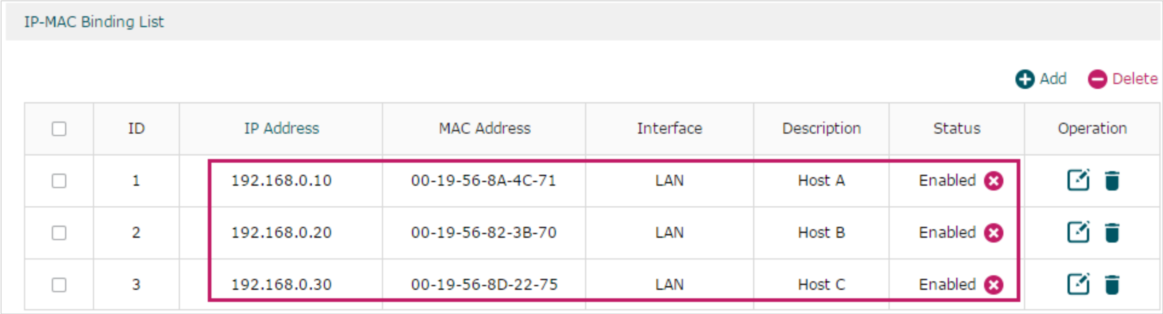
Description: Host A (Optional, 0-50 characters)

Status: ☑ Enable

OK Cancel

3) Add the IP-MAC Binding entries for Host B and Host C as introduced above, and verify your configurations.

Figure 3-4 Verify IP-MAC Binding Entires



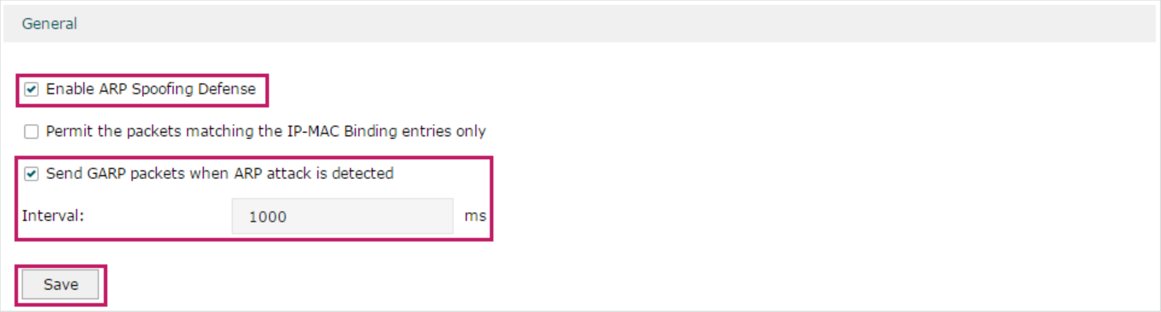
IP-MAC Binding List

Add Delete

☐	ID	IP Address	MAC Address	Interface	Description	Status	Operation
☐	1	192.168.0.10	00-19-56-8A-4C-71	LAN	Host A	Enabled ⊗	✎ 🗑
☐	2	192.168.0.20	00-19-56-82-3B-70	LAN	Host B	Enabled ⊗	✎ 🗑
☐	3	192.168.0.30	00-19-56-8D-22-75	LAN	Host C	Enabled ⊗	✎ 🗑

4) In the **General** section on the same page, check the boxes to enable **ARP Spoofing Defense** and **Send GARP packets when ARP attack is detected**, and keep the interval as 1000 milliseconds. Click **Save**.

Figure 3-5 Configure Anti ARP Spoofing



General

☑ Enable ARP Spoofing Defense

□ Permit the packets matching the IP-MAC Binding entries only

☑ Send GARP packets when ARP attack is detected

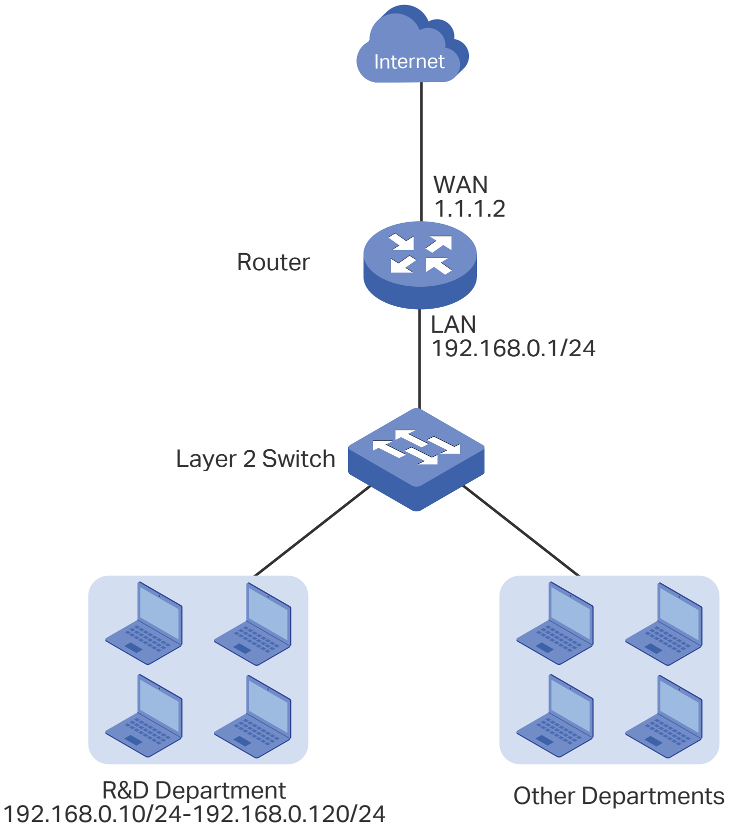
Interval: 1000 ms

3.2 Example for Access Control

3.2.1 Network Requirements

In the diagram below, the R&D and some other departments are connected to a layer 2 switch and access the internet via the gateway. To limit the acts of the R&D department users, such as sending emails with the exterior mailbox, it is required that the R&D users can only visit websites via HTTP and HTTPs on the internet at any time. For other departments, there is no limitation.

Figure 3-1 Network Topology



3.2.2 Configuration Scheme

To meet these requirements, we can configure Access Control rules on the gateway to filter the specific types of packets from R&D department: only the HTTP and HTTPs packets are allowed to be sent to the internet, and other types of packets are not allowed. The configuration overview is as follows:

1) Add an IP group for the R&D department in the **Preferences** module.

2) By default, the HTTP service type already exists, and you need to add HTTPs to the Service Type list in the **Preferences** module.

3) Create two rules to allow the HTTP and HTTPs packets from the R&D department to be sent to the WAN.

4) Since visiting the internet needs DNS service, add a rule to allow the DNS packets to be sent to the WAN. DNS service is already in the Service Type list by default.

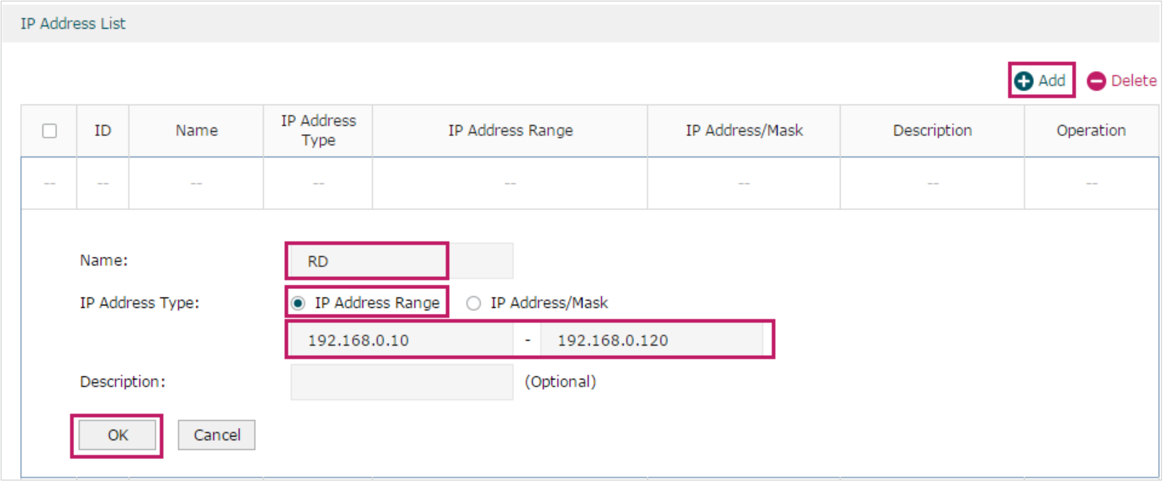
5) Create a rule to block all packets from the R&D department to the WAN. This rule should have the lowest priority among all the rules.

3.2.3 Configuration Procedure

Follow the steps below to complete the configuration:

1) Choose the menu **Preferences > IP Group > IP Address** to load the configuration page, and click **Add**. Specify a name RD, select **IP Address Range** and enter the IP address range of the R&D department. Click **OK**.

Figure 3-2 Configure IP Address Range



□	ID	Name	IP Address Type	IP Address Range	IP Address/Mask	Description	Operation
--	--	--	--	--	--	--	--

Name: RD

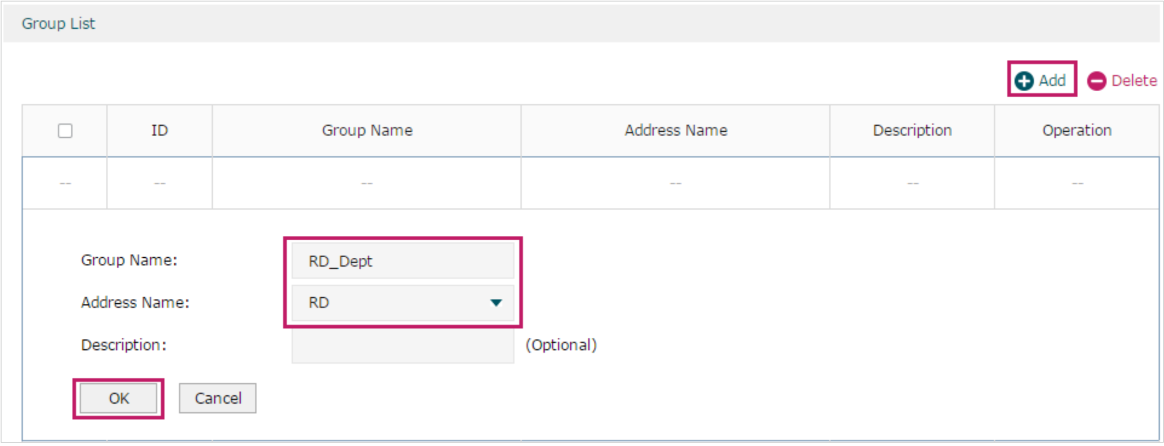
IP Address Type: ● IP Address Range ○ IP Address/Mask

192.168.0.10 - 192.168.0.120

Description: (Optional)

2) Choose the menu **Preferences > IP Group > IP Group** to load the configuration page, and click **Add**. Specify a group name “RD_Dept”, select the preset address range **"**RD” and click **OK**.

Figure 3-3 Configure IP Group



□	ID	Group Name	Address Name	Description	Operation
--	--	--	--	--	--

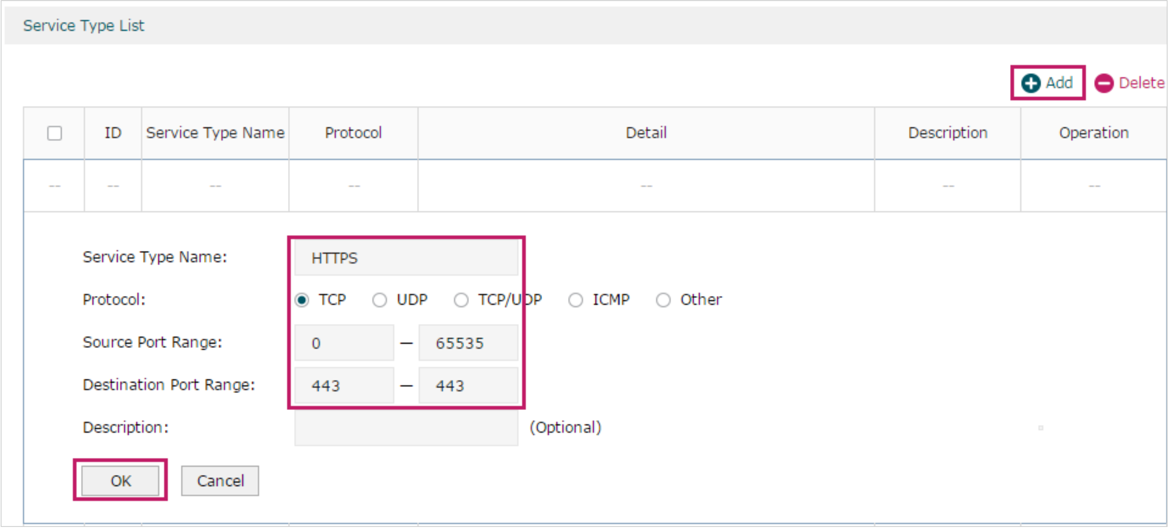
Group Name: RD_Dept

Address Name: RD

Description: (Optional)

3) Choose the menu **Preferences > Service Type > Service Type** to load the configuration page, and click **Add**. Specify the service type name as "HTTPS", select the protocol as "TCP", specify the source port range as "0-65535" and destination port range as "443-443", and click **OK**.

Figure 3-4 Configure HTTPS Service Type



□	ID	Service Type Name	Protocol	Detail	Description	Operation
--	--	--	--	--	--	--

Service Type Name: HTTPS

Protocol: ● TCP ○ UDP ○ TCP/UDP ○ ICMP ○ Other

Source Port Range: 0 — 65535

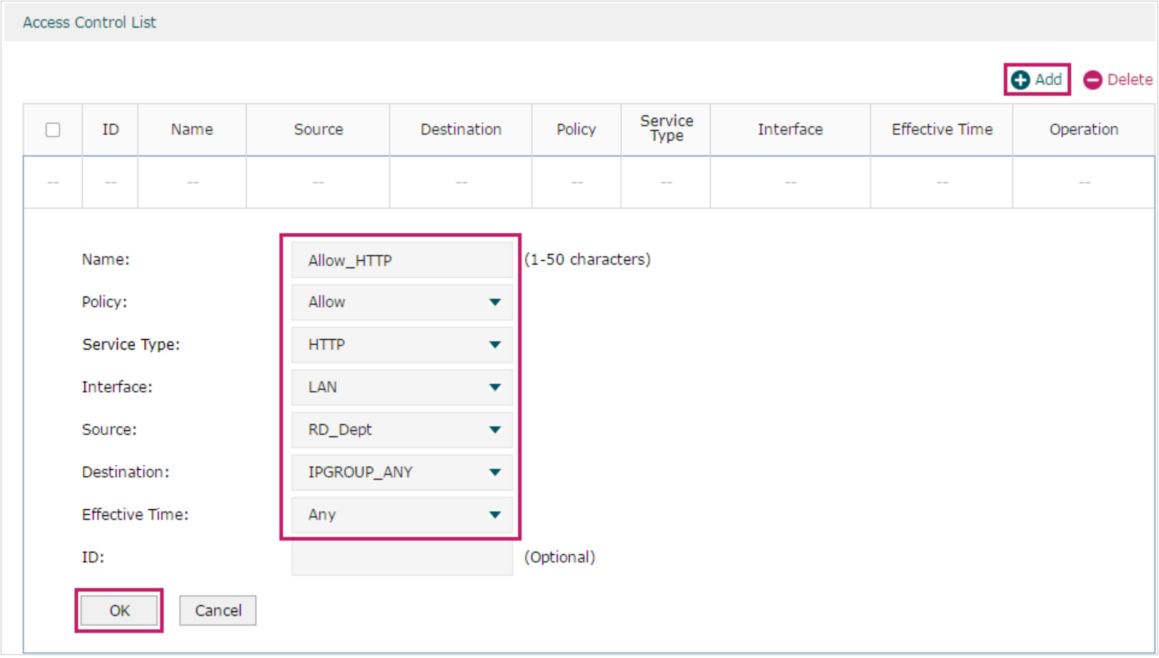
Destination Port Range: 443 — 443

Description: (Optional)

4) Choose the menu **Firewall > Access Control > Access Control** to load the configuration page, and click **Add**. Specify a name for this rule. Select "Allow" as the rule policy, "HTTP" as the service type, "LAN -> WAN" as the effective traffic direction, "RD_ Dept" as the source IP group, "IPGROUP_ANY" as the destination IP group, and "Any" as the effective time. Click **OK**.

This rule means that all the HTTP packets from the R&D department are allowed to be transmitted from LAN to the internet at any time.

Figure 3-5 Configure Allow Rule for HTTP Service



Access Control List

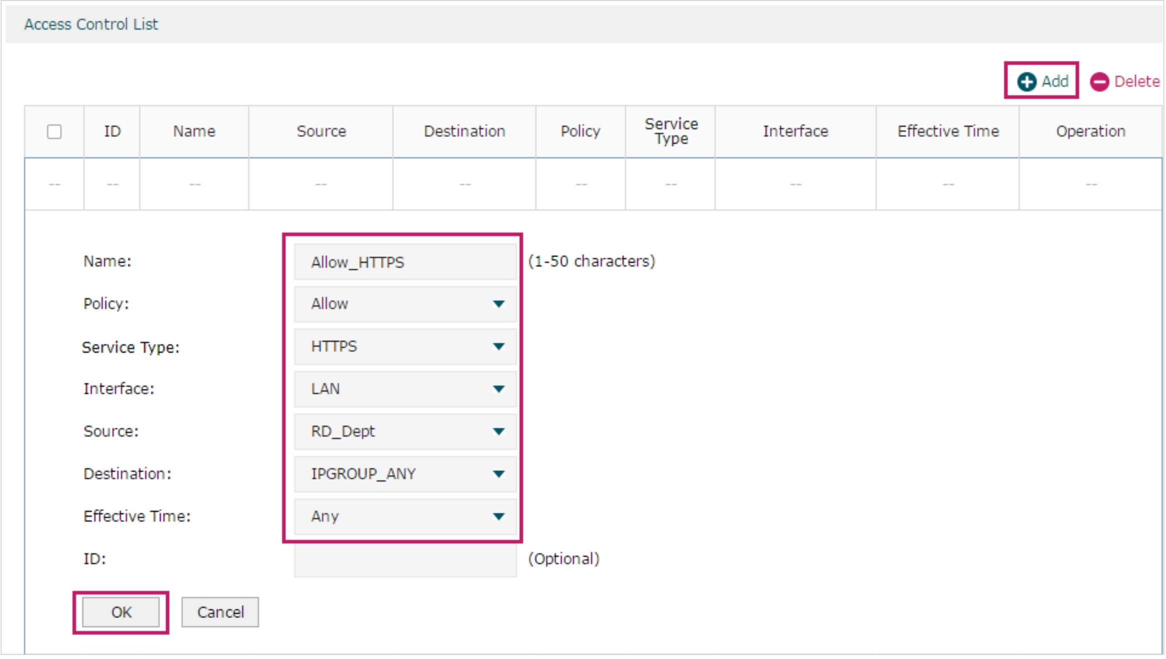
□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
--	--	--	--	--	--	--	--	--	--

Name:	Allow_HTTP	(1-50 characters)
Policy:	Allow	
Service Type:	HTTP	
Interface:	LAN	
Source:	RD_Dept	
Destination:	IPGROUP_ANY	
Effective Time:	Any	
ID:		(Optional)

5) Choose the menu **Firewall > Access Control > Access Control** to load the configuration page, and click **Add**. Specify a name for this rule. Select "Allow" as the rule policy, "HTTPS" as the service type, "LAN -> WAN" as the effective traffic direction, "RD_Dept" as the source IP group, "IPGROUP_ANY" as the destination IP group, and "Any" as the effective time. Click **OK**.

This rule means that all the HTTPS packets from the R&D department are allowed to be sent from the LAN to the internet at any time.

Figure 3-6 Configure Allow Rule for HTTPS Service



Access Control List

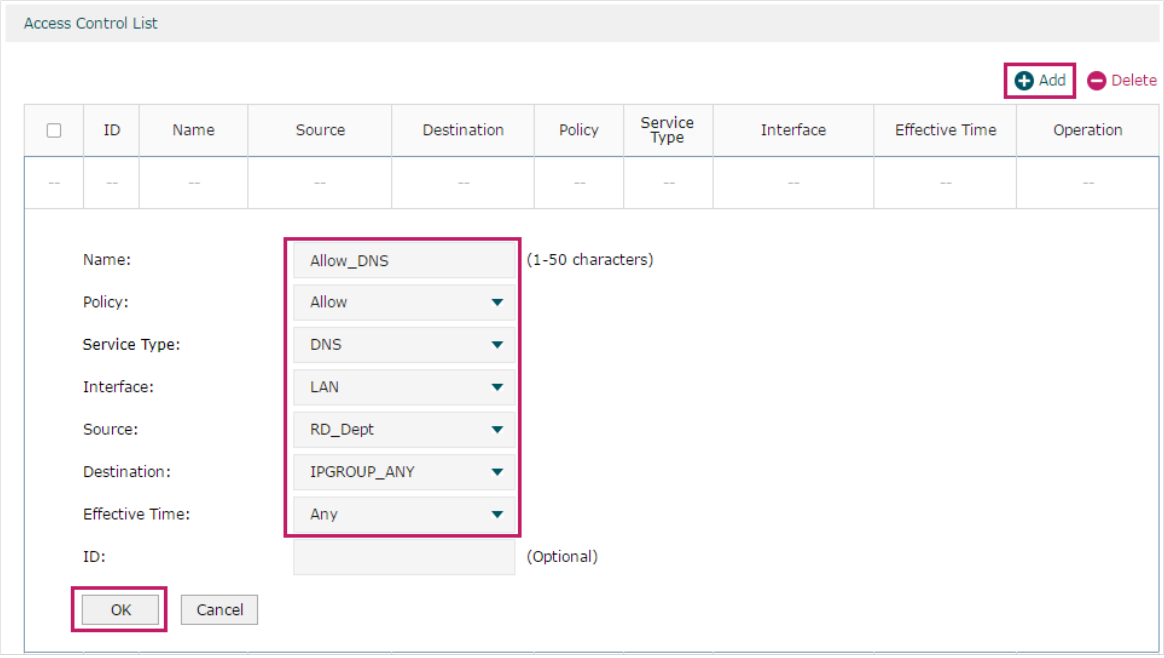
□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
--	--	--	--	--	--	--	--	--	--

Name:	Allow_HTTPS	(1-50 characters)
Policy:	Allow	
Service Type:	HTTPS	
Interface:	LAN	
Source:	RD_Dept	
Destination:	IPGROUP_ANY	
Effective Time:	Any	
ID:		(Optional)

6) Choose the menu **Firewall > Access Control > Access Control** to load the configuration page, and click **Add**. Specify a name for this rule. Select "Allow" as the rule policy, "DNS" as the service type, "LAN -> WAN" as the effective traffic direction, "RD_

Dept" as the source IP group, "IPGROUP_ANY" as the destination IP group, and "Any" as the effective time. Click **OK**.

This rule means that all DNS packets from the R&D department are allowed to be sent from the LAN to the internet at any time.



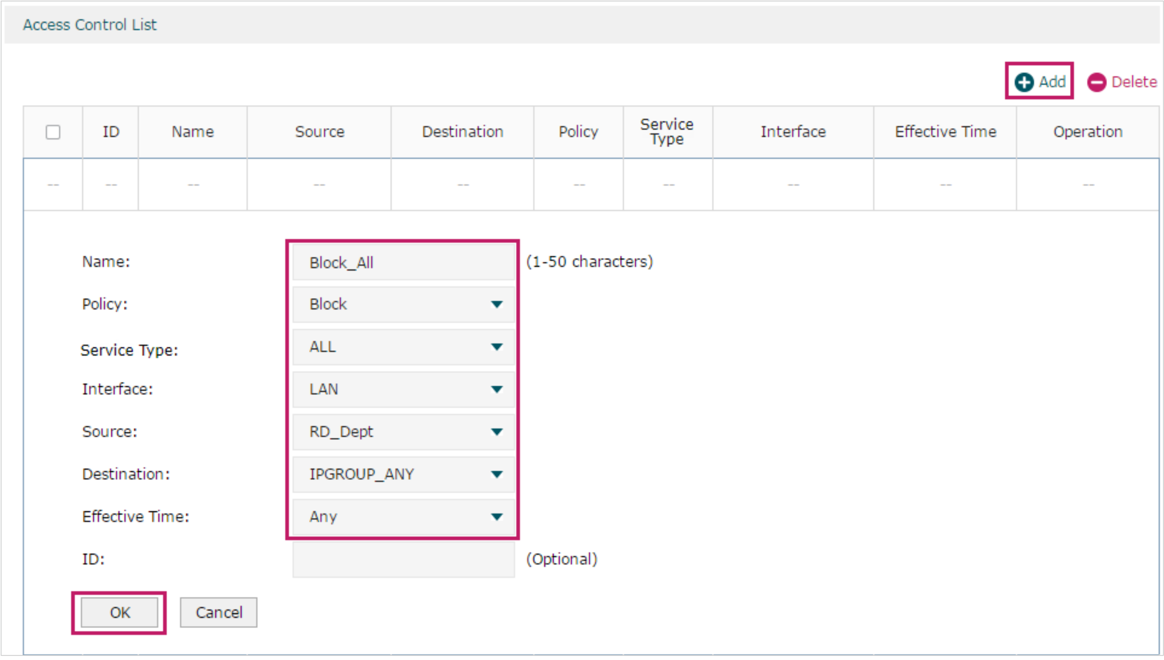
Access Control List

□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
--	--	--	--	--	--	--	--	--	--

Name:	Allow_DNS	(1-50 characters)
Policy:	Allow	
Service Type:	DNS	
Interface:	LAN	
Source:	RD_Dept	
Destination:	IPGROUP_ANY	
Effective Time:	Any	
ID:		(Optional)

7) Choose the menu **Firewall > Access Control > Access Control** to load the configuration page, and click **Add**. Specify a name for this rule. Select "Block" as the rule policy, "ALL" as the service type, "LAN -> WAN" as the effective traffic direction, "RD_Dept" as the source IP group, "IPGROUP_ANY" as the destination IP group, and "Any" as the effective time. Click **OK**.

This rule means that all packets from the R&D department are blocked from being sent from the LAN to the internet at all times.

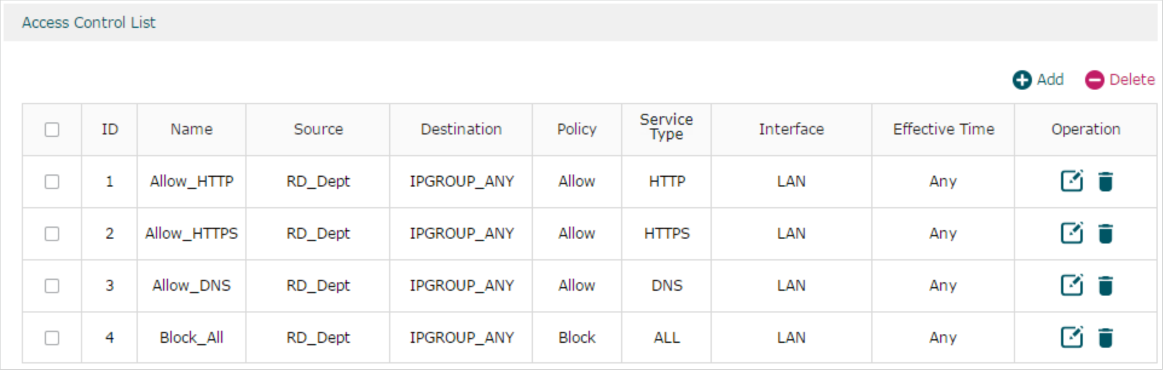


Access Control List

□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
--	--	--	--	--	--	--	--	--	--

Name:	Block_All	(1-50 characters)
Policy:	Block	
Service Type:	ALL	
Interface:	LAN	
Source:	RD_Dept	
Destination:	IPGROUP_ANY	
Effective Time:	Any	
ID:		(Optional)

8) Verify your configuration result. In the Access Control List, the rule with a smaller ID has a higher priority. Since the gateway matches the rules beginning with the highest priority, make sure the three Allow rules have the smaller ID numbers compared with the Block rule. In this way, the gateway checks whether the received packet matches the three Allow rules first, and only packets that do not match any of the Allow rules will be blocked.



□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
□	1	Allow_HTTP	RD_Dept	IPGROUP_ANY	Allow	HTTP	LAN	Any	
□	2	Allow_HTTPS	RD_Dept	IPGROUP_ANY	Allow	HTTPS	LAN	Any	
□	3	Allow_DNS	RD_Dept	IPGROUP_ANY	Allow	DNS	LAN	Any	
□	4	Block_All	RD_Dept	IPGROUP_ANY	Block	ALL	LAN	Any	

Part 10

Configuring Behavior Control

CHAPTERS

1 Behavior Control

1.1 Overview

With the Behavior Control feature, you can control the online behavior of local hosts. You can block specific hosts' access to specific websites using URLs or keywords, block HTTP posts and prevent certain types of files from being downloaded from the internet.

1.2 Supported Features

The Behavior Control module supports two features: Web Filtering and Web Security.

Web Filtering

Web Filtering is used to filter specific websites. The gateway provides two ways to filter websites: Web Group Filtering and URL Filtering.

- Web Group Filtering: You can configure multiple websites as a web group, and set a filtering rule for the group. More than one group can be created and several groups can share a same filtering rule.

- URL Filtering: You can directly set a filtering rule for specific entire URLs or keywords.

Web Security

Web Security is used to control the specific online behaviors of local users. You can configure this feature to block HTTP post, which means that the local users cannot log in, submit comments or perform any other operation which needs HTTP post. Also, you can prohibit local users from downloading specific types of files from the internet.

2 Behavior Control Configuration

In Behavior Control module, you can configure the following features:

- Web Filtering
- Web Security

2.1 Configuring Web Filtering

There are two methods to filter websites: Web Group Filtering and URL Filtering.

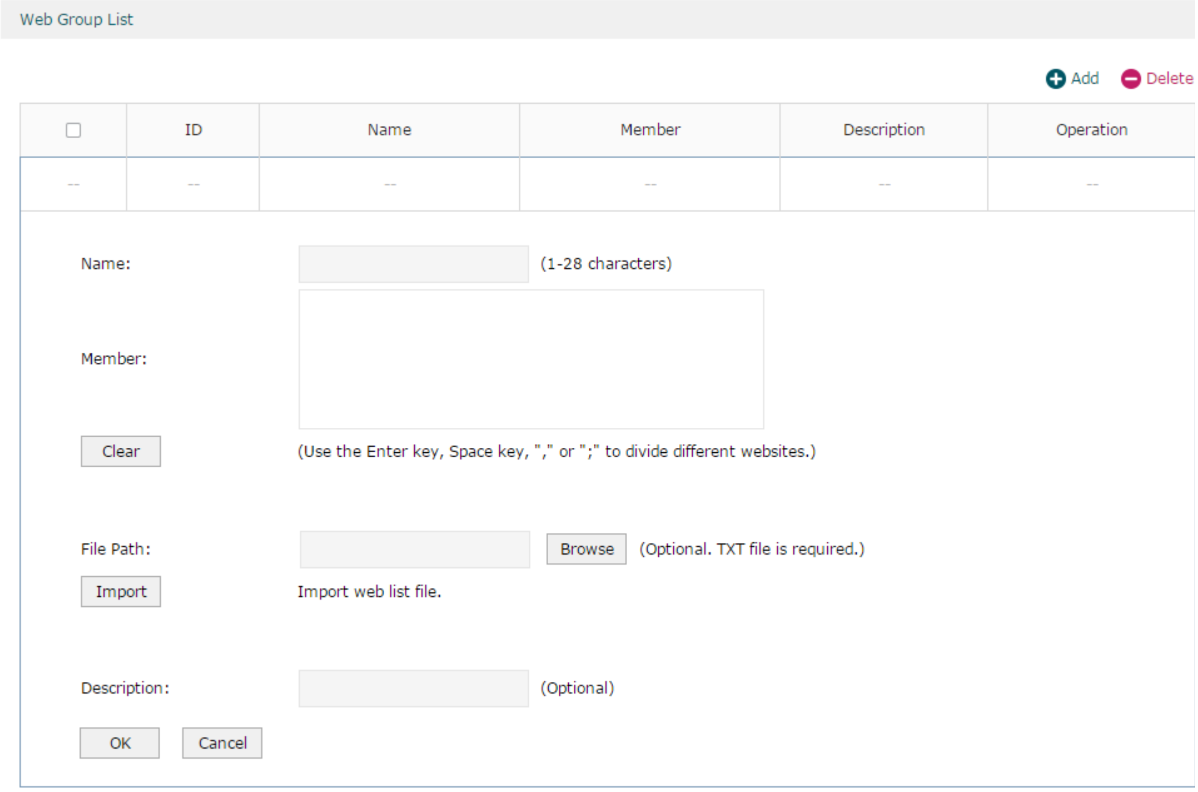
2.1.1 Configure Web Group Filtering

To configure Web Group Filtering, add one or more web groups first, and then add web group filtering entries using the created groups.

Add Web Groups

Choose the menu **Behavior Control> Web Filtering > Web Group** and click **Add** to load the following page.

Figure 2-1 Web Group Page



Web Group List

□	ID	Name	Member	Description	Operation
--	--	--	--	--	--

Name: (1-28 characters)

Member:

(Use the Enter key, Space key, "," or ";" to divide different websites.)

File Path: (Optional. TXT file is required.)

Import web list file.

Description: (Optional)

Configure the following parameters and click **OK**.

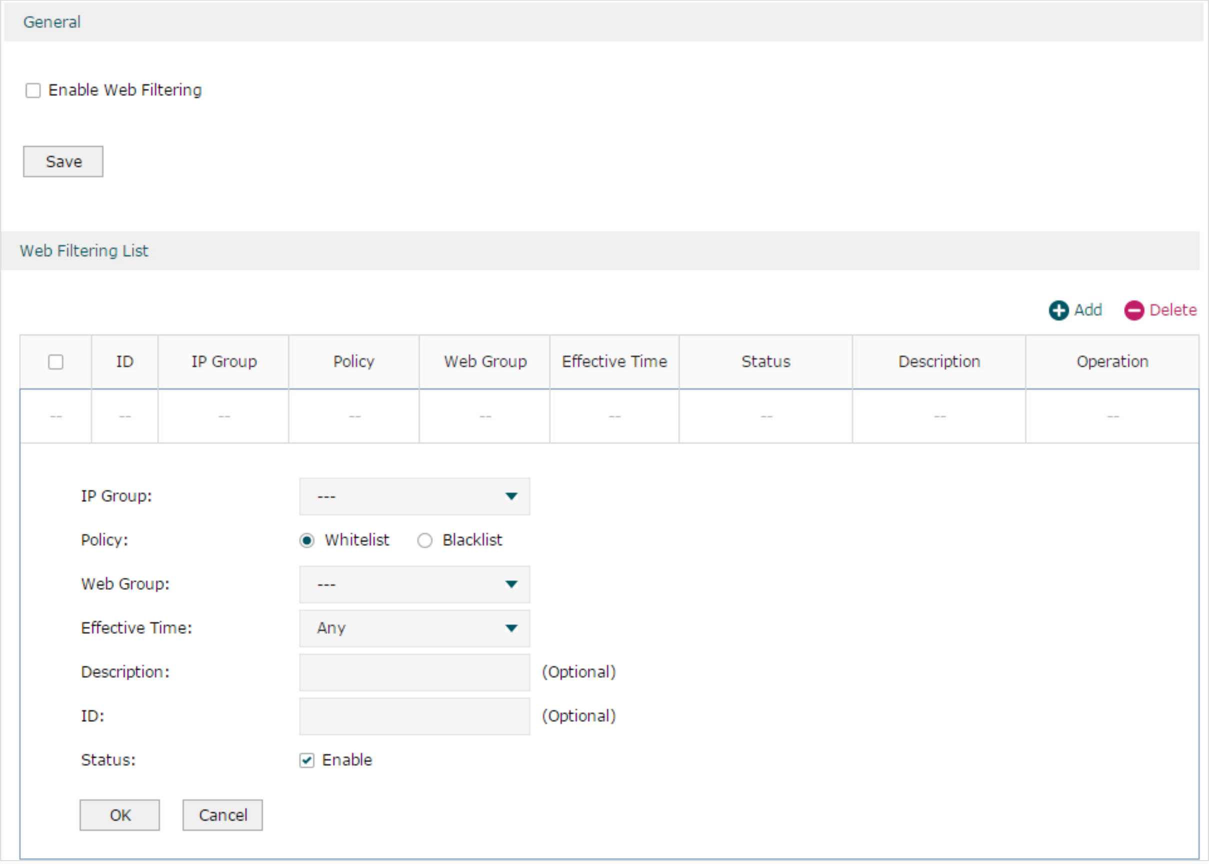
Name	Specify a name for the group. The name of each group cannot be repeated.
Member	Add one or more website members to the group. The format of the website members is “www.tp-link.com” or “*.tp-link.com”, in which “*” is a wildcard. Use Enter key, Space key, “,” or “;” to divide different websites.
File Path	Import member list in your TXT file from your host. The format is “www.tp-link.com” or “*.tp-link.com”, in which “*” is a wildcard. Use Enter key, Space key, “,” or “;” to divide different websites.
Description	Enter a brief description for the group.

Add Web Group Filtering Entries

Before configuring web group entries, go to the **Preferences** module to configure the IP Group and Effective Time according to your needs.

Choose the menu **Behavior Control > Web Filtering > Web Group Filtering** and click **Add** to load the following page.

Figure 2-2 Web Group Filtering Page



General

□ Enable Web Filtering

Save

Web Filtering List

Add Delete

□	ID	IP Group	Policy	Web Group	Effective Time	Status	Description	Operation
--	--	--	--	--	--	--	--	--

IP Group: ---

Policy: ● Whitelist ○ Blacklist

Web Group: ---

Effective Time: Any

Description: (Optional)

ID: (Optional)

Status: ☑ Enable

OK Cancel

Follow the steps below to add Web group filtering entries:

1) In the **Web Filtering List** section, configure the required parameters and click **OK**.

IP Group	Select an IP group for the rule. The IP group referenced here can be created on the **Preferences > IP Group** page.

Policy	Choose to allow or deny the websites that are in the selected web group(s).
Web Group	Select one or more web groups. The web group referenced here can be created on the **Behavior Control > Web Filtering > Web Group** page.
Effective Time	Select the effective time. The effective time referenced here can be created on the **Preferences > Time Range** page.
Description	Enter a brief description for the group.
ID	Specify a rule ID. A smaller ID means a higher priority. This value is optional. A newly added rule with this field left blank will get the largest ID among all rules, which means that the newly added rule has the lowest priority.
Status	Check the box to enable the rule.

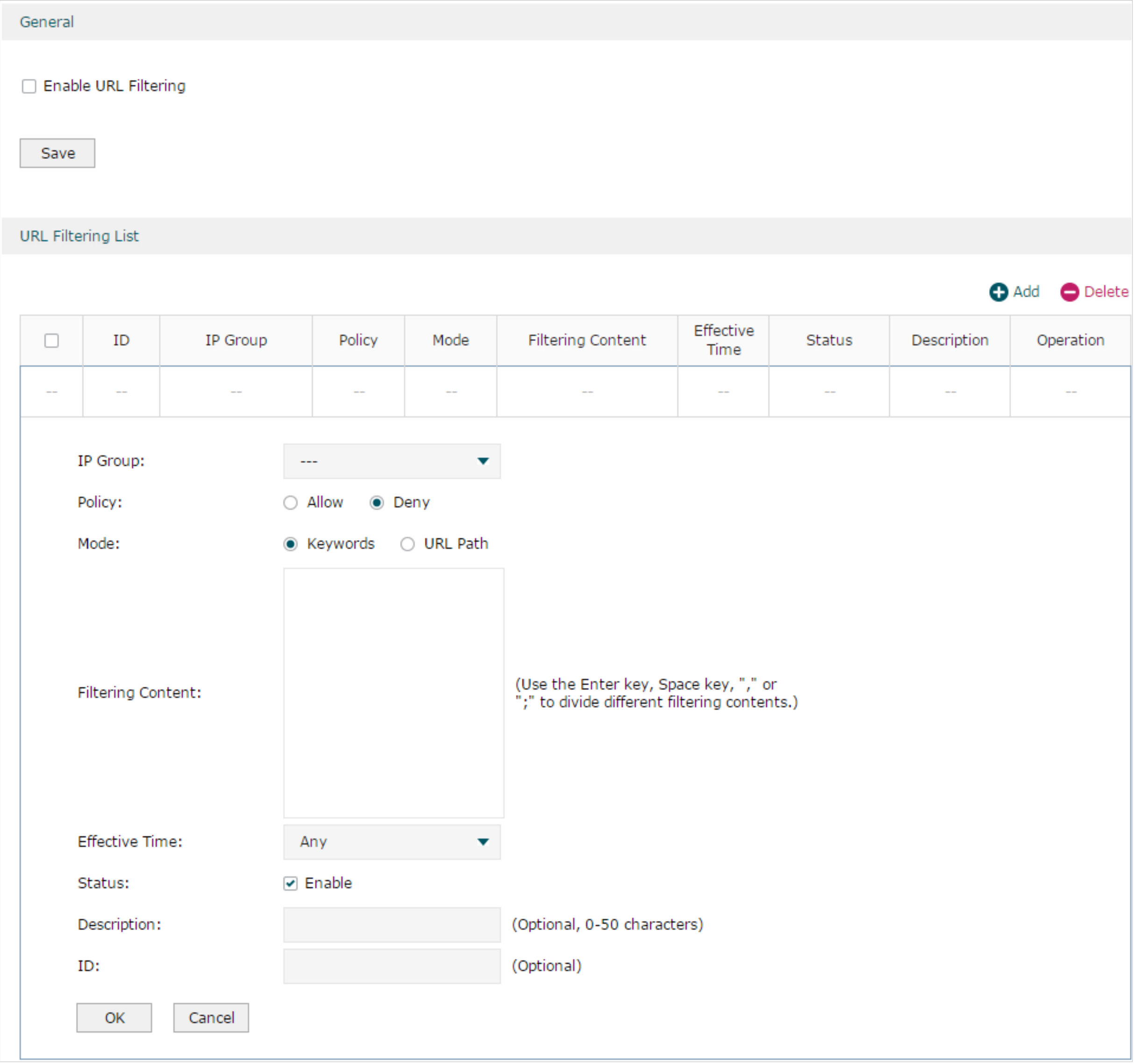
2) In the **General** section, enable Web Filtering. Click **Save**.

2.1.2 Configuring URL Filtering

Before configuring URL Filtering, go to the **Preferences** module to configure the IP Group and Effective Time according to your needs.

Choose the menu **Behavior Control > Web Filtering > URL Filtering** and click **Add** to load the following page.

Figure 2-3 URL Filtering Page



General

□ Enable URL Filtering

Save

URL Filtering List

Add Delete

□	ID	IP Group	Policy	Mode	Filtering Content	Effective Time	Status	Description	Operation
--	--	--	--	--	--	--	--	--	--

IP Group: ---

Policy: ○ Allow ● Deny

Mode: ● Keywords ○ URL Path

Filtering Content: (Use the Enter key, Space key, "," or ";" to divide different filtering contents.)

Effective Time: Any

Status: ☑ Enable

Description: (Optional, 0-50 characters)

ID: (Optional)

OK Cancel

Follow the steps below to configure URL filtering:

1) In the URL Filtering List section, click **Add** and configure the required parameters. Click **OK.**

IP Group	Select an IP group for the rule. The IP group referenced here can be created on the **Preferences > IP Group** page.
Policy	Choose to allow or deny the websites that match the filtering content.

Mode	Select the filtering mode. **Keywords**: If a website address contains any of the keywords, the policy will be applied to this website. **URL Path**: If a website address is the same as any of the entire URLs, the policy will be applied to this website.
Filtering Content	Add filtering contents. Use the Enter key, Space key, "," or ";" to divide different filtering contents. "." means that this rule will be applied to any website. For example, if you want to allow website A and deny other websites, you can add an Allow rule with the filtering content "A" and add a Deny rule with the filtering content ".". Note that "." rule should have the largest ID number, which means that it has the lowest priority.
Effective Time	Select the effective time. The effective time referenced here can be created on the **Preferences > Time Range** page.
Status	Check the box to enable the rule.
Description	Enter a brief description for the group.
ID	Specify a rule ID. A smaller ID means a higher priority. This value is optional. The newly added rule without this value configured will get the largest ID among all rules, which means that the newly added rule has the lowest priority.

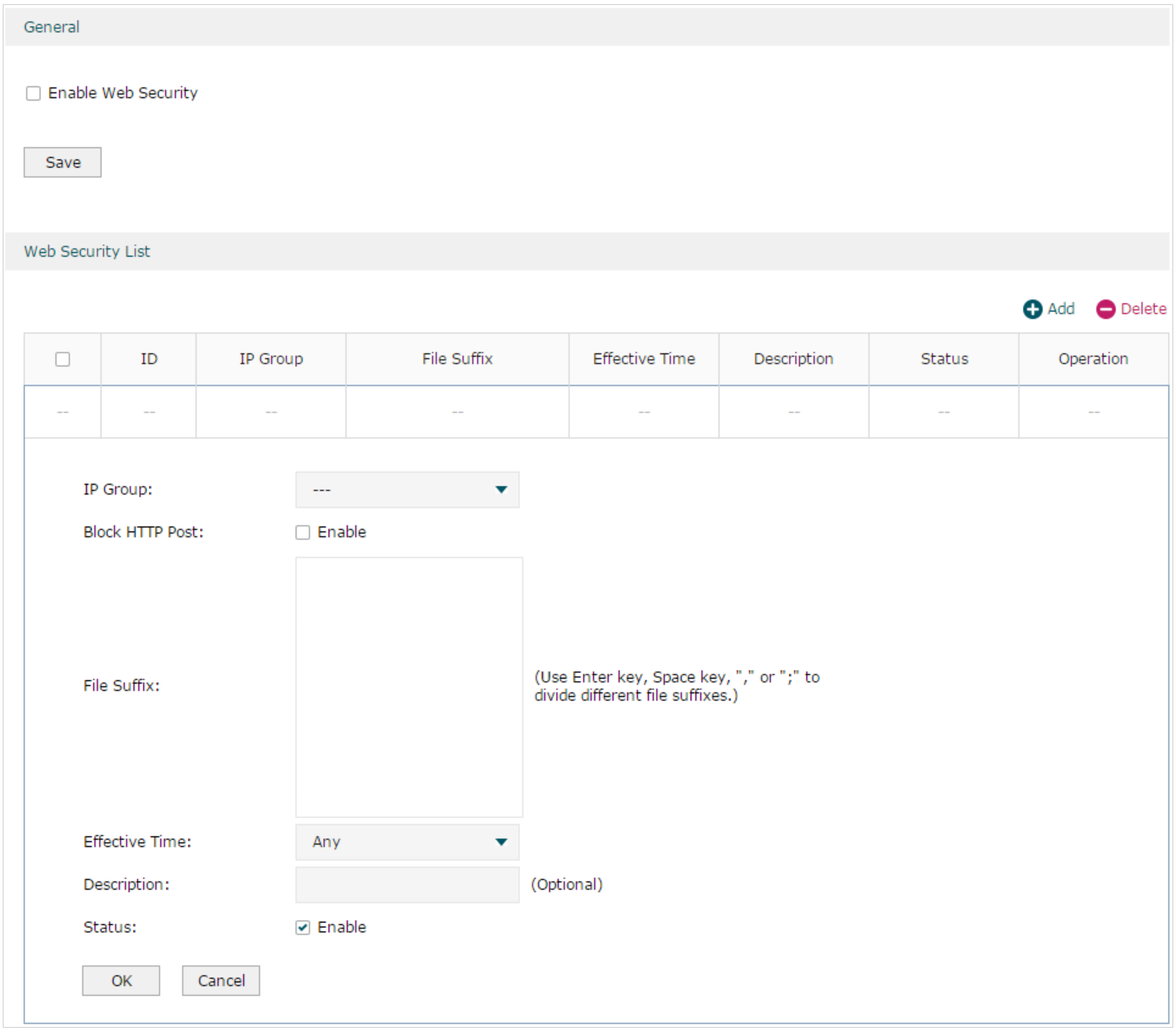
2) In the **General** section, enable URL filtering. Click **Save**.

2.2 Configuring Web Security

Before configuring Web Security, go to **Preferences** module to configure the IP Group and Effective Time according to your needs.

Choose the menu **Behavior Control > Web Security > Web Security** and click **Add** to load the following page.

Figure 2-4 Web Security Page



General

☐ Enable Web Security

Web Security List

☐	ID	IP Group	File Suffix	Effective Time	Description	Status	Operation
--	--	--	--	--	--	--	--

IP Group: ---

Block HTTP Post: ☐ Enable

File Suffix: (Use Enter key, Space key, "," or ";" to divide different file suffixes.)

Effective Time: Any

Description: (Optional)

Status: ☑ Enable

Follow the steps below to configure Web Security.

1) In the **Web Security List** section, configure the following parameters and click **OK** to add a Web Security rule.

IP Group	Select an IP group for the rule. The IP group referenced here can be created on the **Preferences > IP Group** page.
Block HTTP Post	With this option enabled, HTTP posts will be blocked. The hosts of the selected IP group cannot log in, submit comments or do any operation using HTTP post.

File Suffix	Enter file suffixes to specify the file types. Use Enter key, Space key, "," or ";" to divide different file suffixes. The hosts of the selected IP group cannot download these types of files from the internet.
Effective Time	Select the effective time. The effective time referenced here can be created on the **Preferences > Time Range** page.
Description	Enter a brief description for the group.
Status	Check the box to enable the rule.

2) In the **General** section, enable Web Security and click **Save**.

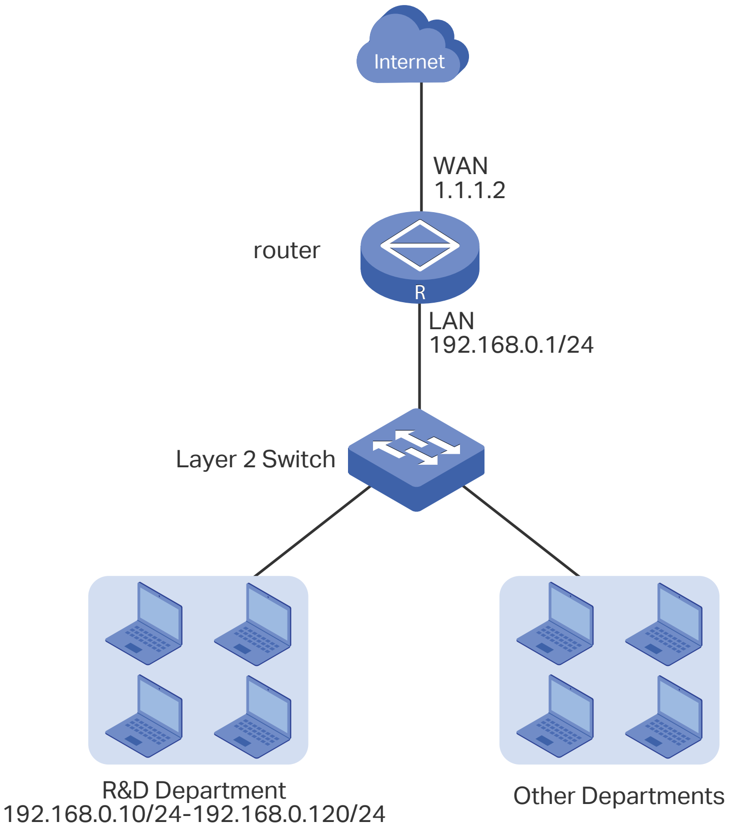
3 Configuration Examples

3.1 Example for Access Control

3.1.1 Network Requirements

In the diagram below, the R&D and some other departments are connected to a layer 2 switch and access the internet via the gateway. For data security purposes, it is required that the R&D department users can only visit the official website of the company, for example: https://www.tp-link.com. For other departments, there is no limitation of website access.

Figure 3-1 Network Topology



3.1.2 Configuration Scheme

We can configure Web Filtering to limit the website access of the specific hosts. Both Web Group Filtering and URL Filtering can achieve this. In this example, the configuration difference between Web Group Filtering and URL Filtering is as follows:

- In Web Group Filtering, you need to add the official website address to a web group before configuring the filtering rule.
- In URL Filtering, you can directly specify the official website address in the filtering rule.

Here we take Web Group Filtering as an example. The configuration overview is as follows:

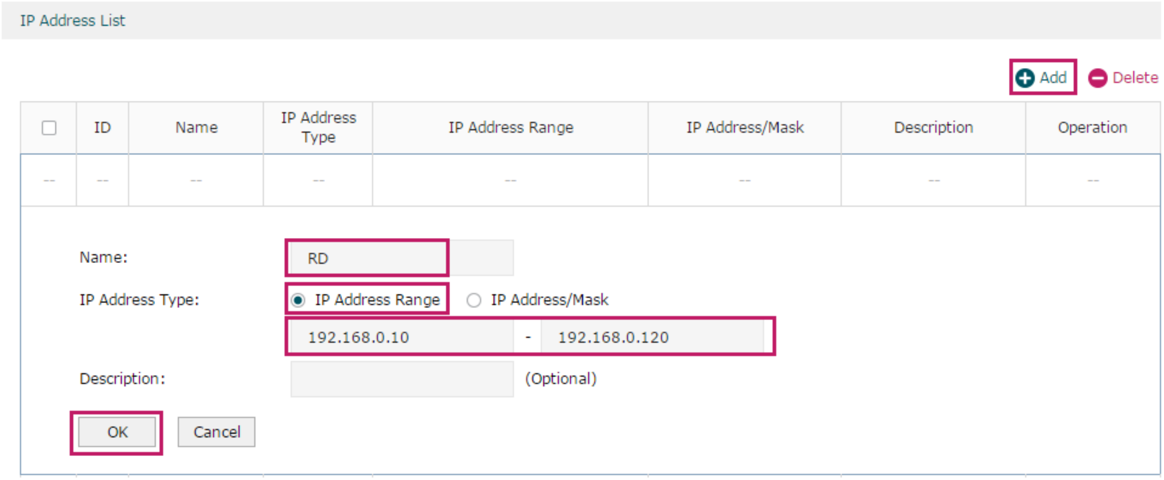
1) Add an IP group for the R&D department in the **Preferences** module.
2) Create a web group with the group member www.tp-link.com.
3) Add a Whitelist rule to allow the R&D department users to access www.tp-link.com.
4) Add a Blacklist rule to forbid the R&D department users from accessing all websites. Note that the priority of this rule should be lower than the Whitelist rule.

3.1.3 Configuration Procedure

Follow the steps below to complete the configuration:

1) Choose the menu **Preferences > IP Group > IP Address** to load the configuration page, and click **Add**. Specify a name “RD”, select **IP Address Range** and enter the IP address range of the R&D department. Click **OK**.

Figure 3-2 Configure IP Address Range



☐	ID	Name	IP Address Type	IP Address Range	IP Address/Mask	Description	Operation
--	--	--	--	--	--	--	--

Name: RD

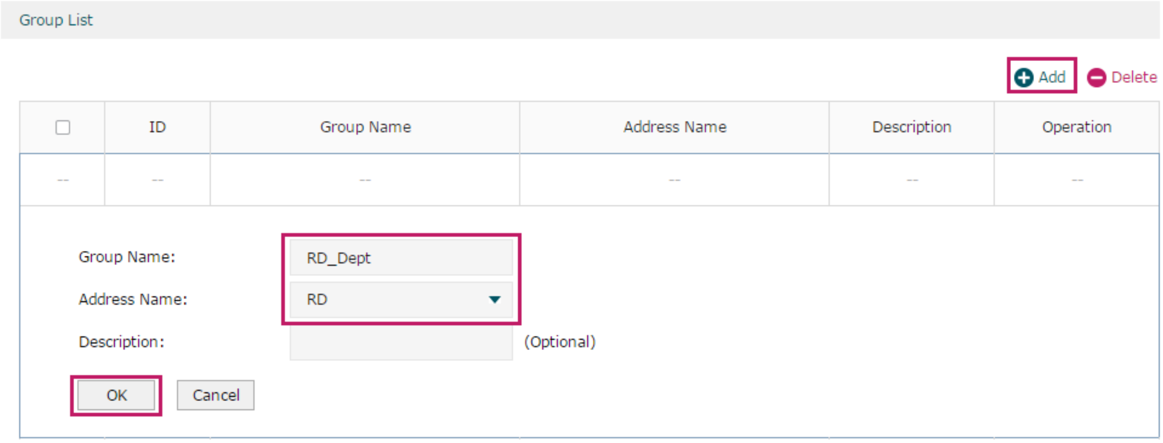
IP Address Type: ● IP Address Range ○ IP Address/Mask

192.168.0.10 - 192.168.0.120

Description: (Optional)

2) Choose the menu **Preferences > IP Group > IP Group** to load the configuration page, and click **Add**. Specify a group name “RD_Dept”, select the preset address range "RD" and click **OK**.

Figure 3-3 Configure IP Group



Group List

□	ID	Group Name	Address Name	Description	Operation
--	--	--	--	--	--

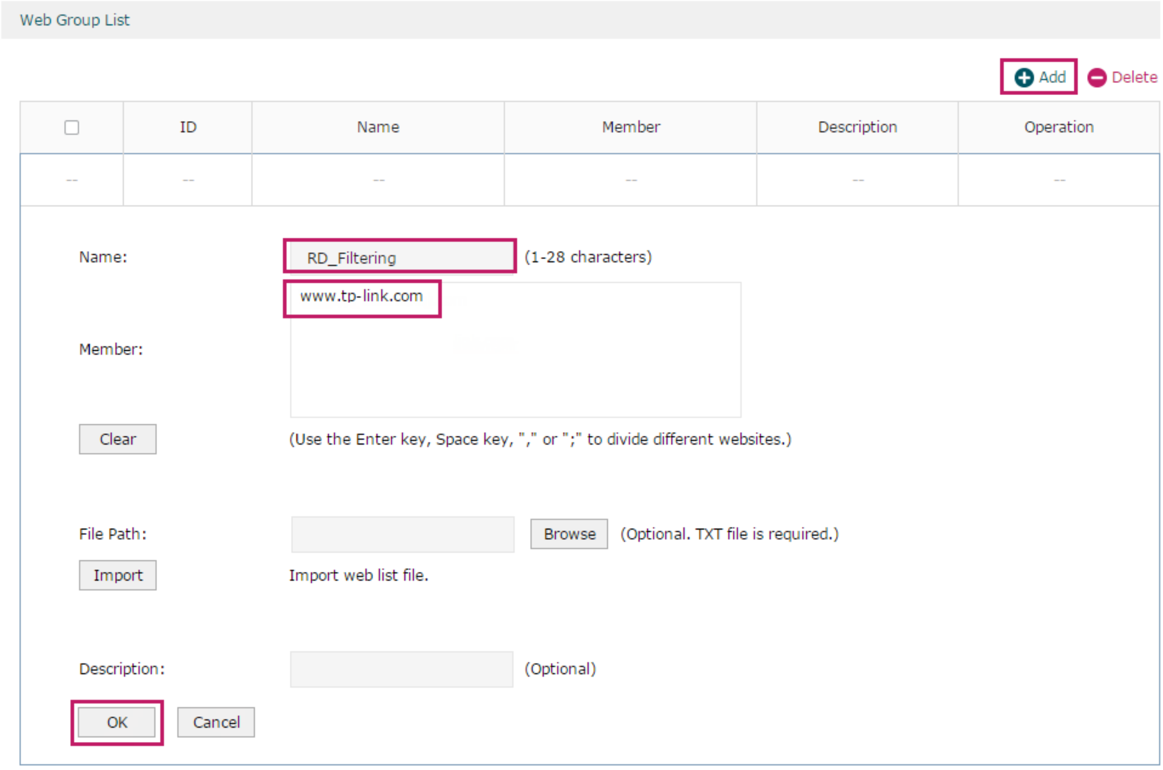
Group Name: RD_Dept

Address Name: RD

Description: (Optional)

3) Choose the menu **Behavior Control > Web Filtering > Web Group** to load the configuration page, and click **Add**. Specify a name "RD_Filtering" for this web group and add the member "www.tp-link.com". Click **OK**.

Figure 3-4 Configure Web Group



Web Group List

□	ID	Name	Member	Description	Operation
--	--	--	--	--	--

Name: RD_Filtering (1-28 characters)

Member: www.tp-link.com

(Use the Enter key, Space key, "," or ";" to divide different websites.)

File Path: (Optional. TXT file is required.)

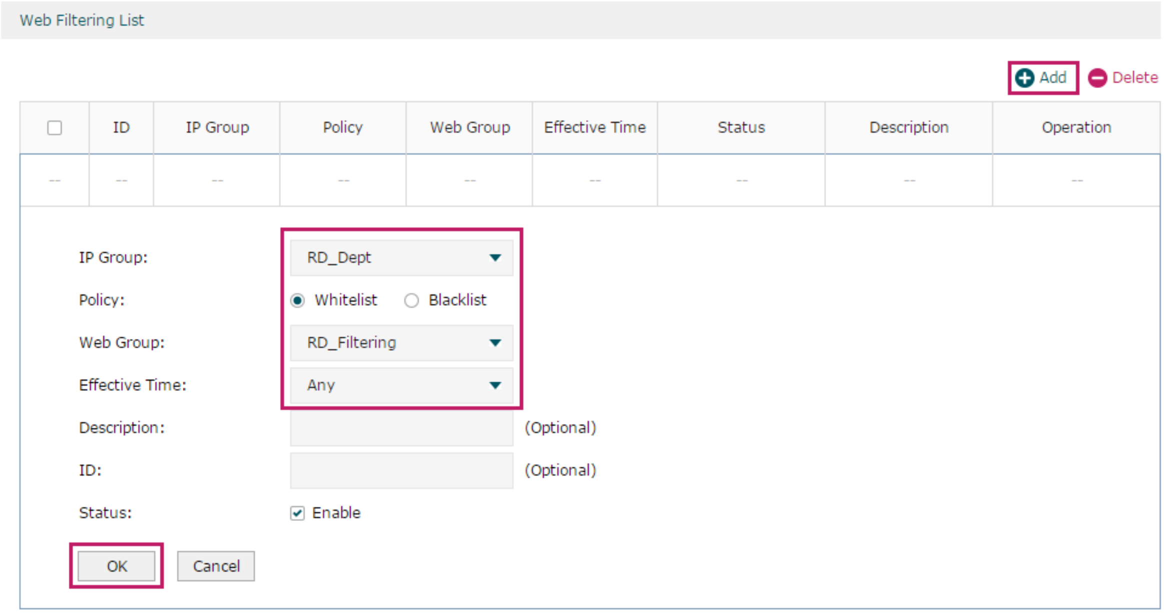
Import web list file.

Description: (Optional)

4) Choose the menu **Behavior Control > Web Filtering > Web Group Filtering** to load the configuration page, and click **Add**. Select "RD_Dept" as the **IP Group**, "Whitelist" as the **Policy**, "RD_Filtering" as the **Web Group**, and "Any" as the E**ffective Time**. Click **OK**.

This rule means that the hosts in the R&D department are allowed to access the website www.tp-link.com at any time.

Figure 3-5 Configure Whitelist Rule



Web Filtering List

□	ID	IP Group	Policy	Web Group	Effective Time	Status	Description	Operation
--	--	--	--	--	--	--	--	--

IP Group: RD_Dept

Policy: ● Whitelist ○ Blacklist

Web Group: RD_Filtering

Effective Time: Any

Description: (Optional)

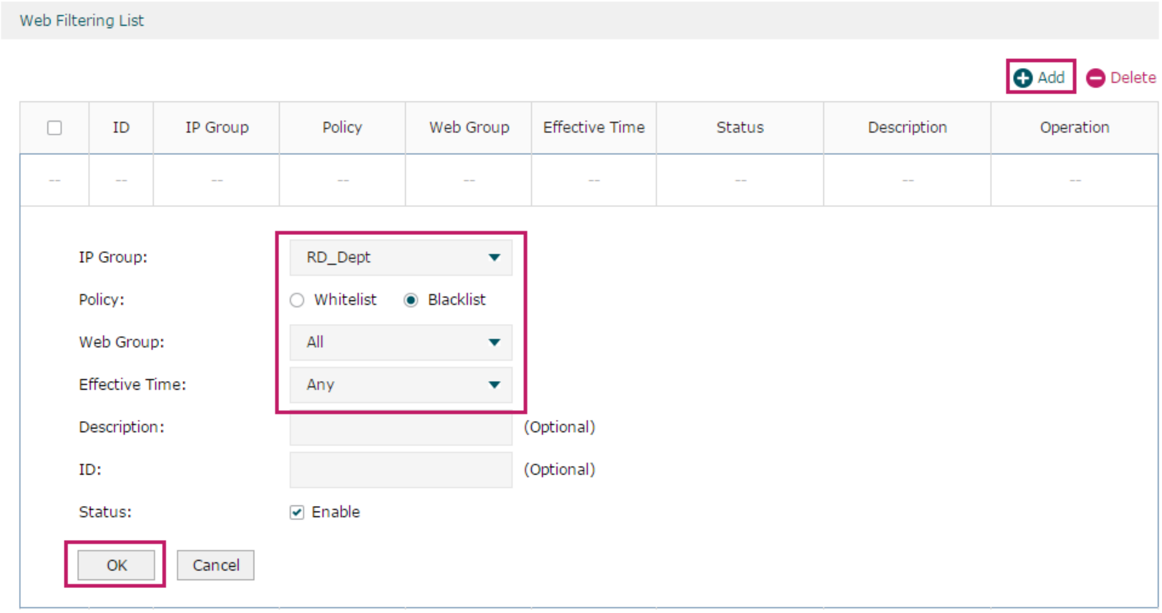
ID: (Optional)

Status: ☑ Enable

5) On the same page, click **Add**. Select "RD_Dept" as the **IP Group**, "Blacklist" as the **Policy**, "All" as the **Web Group**, and "Any" as the **Effective Time**. Click **OK**.

   This rule means that the hosts in the R&D department are denied access to all websites at all times.

Figure 3-6 Configure Blacklist Rule



Web Filtering List

□	ID	IP Group	Policy	Web Group	Effective Time	Status	Description	Operation
--	--	--	--	--	--	--	--	--

IP Group: RD_Dept

Policy: ○ Whitelist ● Blacklist

Web Group: All

Effective Time: Any

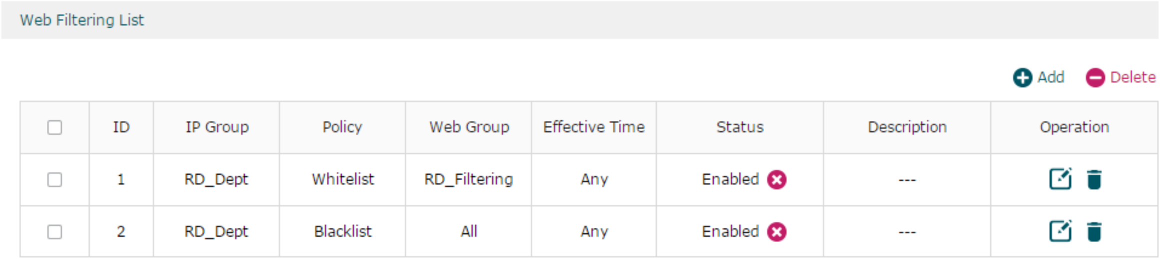
Description: (Optional)

ID: (Optional)

Status: ☑ Enable

6) On the same page, verify your configurations. In the Web Filtering List, the rule with a smaller ID has a higher priority. Since the gateway matches the rules beginning with the highest priority, make sure the Whitelist rule has the smaller ID number. In this way, the gateway allows the hosts to access the Whitelist website and denies them to access others.

Figure 3-7 Verify Configuration Result

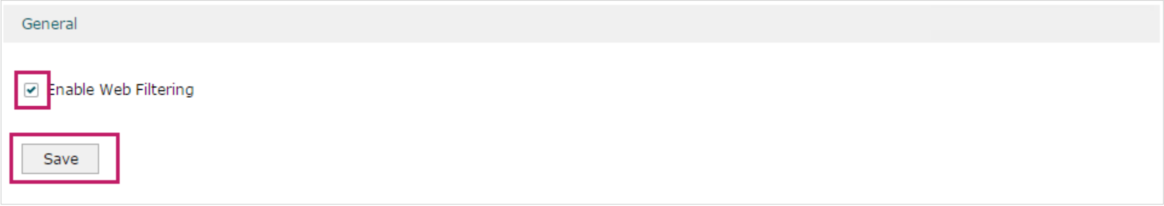


Web Filtering List

□	ID	IP Group	Policy	Web Group	Effective Time	Status	Description	Operation
□	1	RD_Dept	Whitelist	RD_Filtering	Any	Enabled ☒	---	
□	2	RD_Dept	Blacklist	All	Any	Enabled ☒	---	

7) In the **General** section on the same page, enable Web Filtering globally and click **Save**.

Figure 3-8 Enable Web Filtering



General

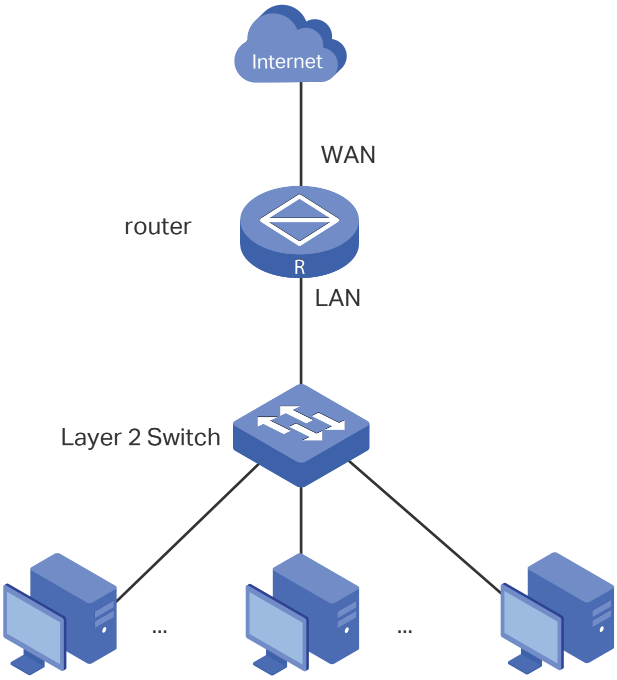
☑ Enable Web Filtering

3.2 Example for Web Security

3.2.1 Network Requirements

In the diagram below, the company's hosts are connected to a layer 2 switch and access the internet via the gateway. For security reasons, it is required that the users in the LAN cannot log in, submit comments or download rar files on the internet.

Figure 3-9 Network Topology



3.2.2 Configuration Scheme

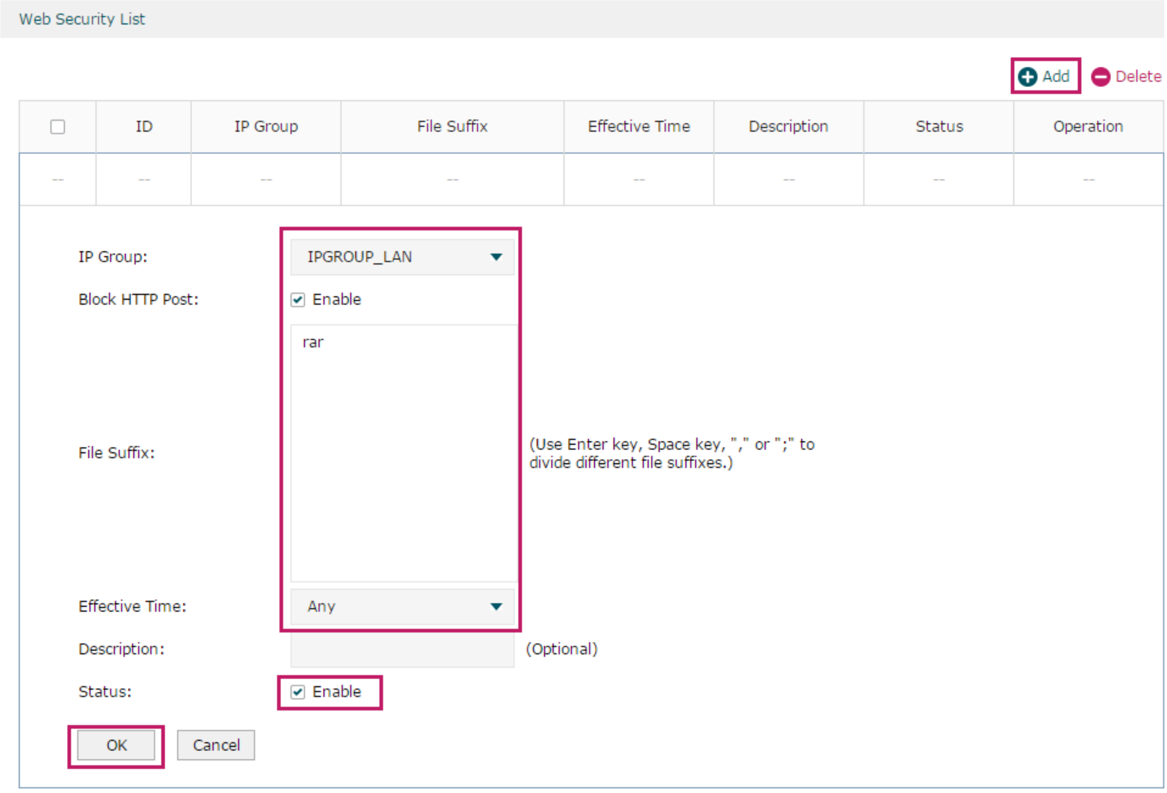
We can configure Web Security to meet these requirements. To block behaviors such as login and comment submitting, we can configure the gateway to block HTTP post; to block downloading of rar files, we can specify the suffix “rar” in the file suffix column.

3.2.3 Configuration Procedure

Follow the steps below to complete the configuration:

1) Choose the menu **Behavior Control > Web Security > Web Security** and click **Add** to load the following page. Select “IPGROUP_LAN” as the **IP Group**, enable **Block HTTP Post**, enter “rar” in the **File Suffix** filed, select “Any” as the **Effective Time**, and keep the **Status** as “Enable”. Click **OK**.

Figure 3-10 Configure Web Security Entry



Web Security List

Add Delete

□	ID	IP Group	File Suffix	Effective Time	Description	Status	Operation
--	--	--	--	--	--	--	--

IP Group: IPGROUP_LAN

Block HTTP Post: ☑ Enable

File Suffix: rar (Use Enter key, Space key, "," or ";" to divide different file suffixes.)

Effective Time: Any

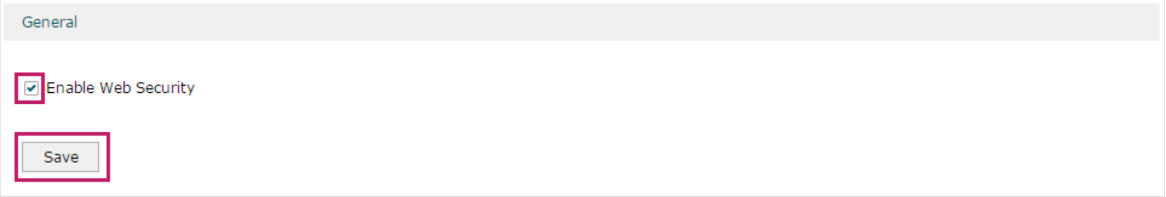
Description: (Optional)

Status: ☑ Enable

OK Cancel

2) In the **General** section on the same page, enable **Web Security** and click **Save**.

Figure 3-11 Enable Web Security



General

☑ Enable Web Security

Save

Part 11

Configuring VPN

CHAPTERS

1 VPN

1.1 Overview

VPN (Virtual Private Network) provides a means for secure communication between remote computers across a public WAN (Wide Area Network), such as the internet. Virtual indicates the VPN connection is based on the logical end-to-end connection instead of the physical end-to-end connection. Private indicates users can establish the VPN connection according to their requirements and only specific users are allowed to use the VPN connection.

The core of VPN is to realize tunnel communication, which fulfills the task of data encapsulation, data transmission and data decompression via the tunneling protocol. Common tunneling protocols are Layer 2 tunneling protocol and Layer 3 tunneling protocol.

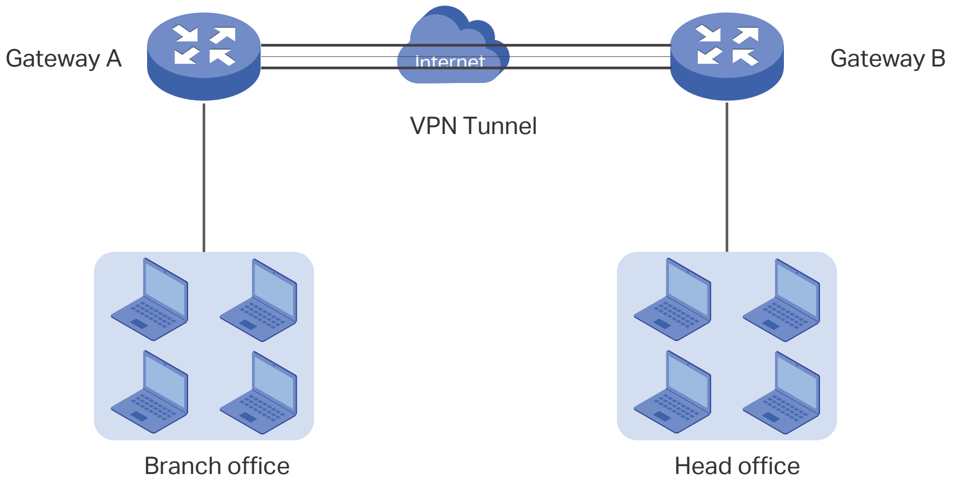
Depending on your network topology, there are two basic application scenarios: LAN-to-LAN VPN and Client-to-LAN VPN.

Depending on your network topology, there are two basic application scenarios: LAN-to-LAN VPN and Client-to-LAN VPN.

- LAN-to-LAN VPN

In this scenario, different private networks are connected together via the internet. For example, the private networks of the branch office and head office in a company are located at different places. LAN-to-LAN VPN can satisfy the demand that hosts in these private networks need to communicate with each other. The following figure shows the typical network topology in this scenario.

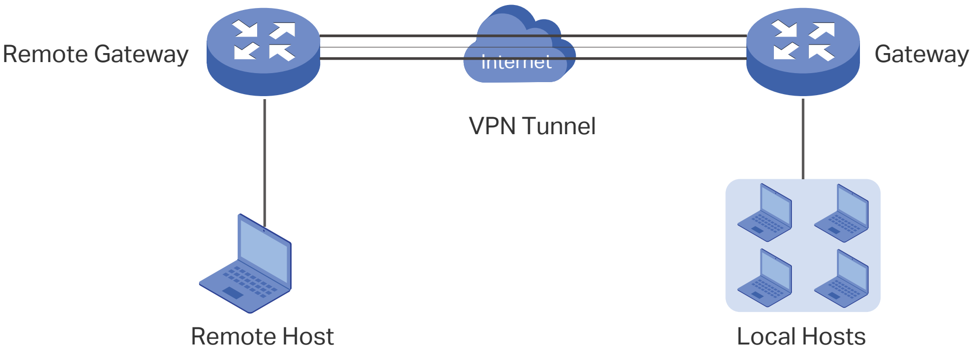
Figure 1-1 LAN-to-LAN VPN



- Client-to-LAN VPN

In this scenario, the remote host is provided with secure access to the local hosts. For example, an employee on business can access the private network of his company securely. Client-to-LAN VPN can satisfy this demand. The following figure shows the typical network topology in this scenario.

Figure 1-2 Client-to-LAN VPN



1.2 Supported Features

The gateway supports IPSec, L2TP, PPTP and OpenVPN.

IPsec

IPsec (IP Security) can provide security services such as data confidentiality, data integrity and data origin authentication at the IP layer. IPsec uses IKEv1 (Internet Key Exchange version 1) and IKEv2 (Internet Key Exchange version 2) to handle negotiation of protocols and algorithms based on the user-specified policy, and generate the encryption and authentication keys to be used by IPsec. IKEv1/IKEv2 negotiation includes two phases, that is IKEv1/IKEv2 Phase-1 and IKEv1/IKEv2 Phase-2. The basic concepts of IPsec are as follows:

- Proposal

Proposal is the security suite configured manually to be applied in IPsec IKEv1 negotiation. Specifically speaking, it refers to hash algorithm, symmetric encryption algorithm, asymmetric encryption algorithm applied in IKEv1 Phase-1, and security protocol, hash algorithm, symmetric encryption algorithm applied in IKEv1 Phase-2.

- Negotiation Mode

The negotiation mode configured for IKEv1 Phase-1 negotiation determines the role that the VPN gateway plays in the negotiation process. You can specify the negotiation mode as responder mode or initiator mode.

Responder Mode: In responder mode, the VPN gateway responds to the requests for IKEv1 negotiation and acts as the VPN server or the responder.

Initiator Mode: In initiator mode, the VPN gateway sends requests for IKEv1 negotiation and acts as the VPN client or the initiator.

- Exchange Mode

The exchange mode determines the way VPN gateways negotiate in IKEv1 Phase-1. You can specify the exchange mode as main mode or aggressive mode.

Main Mode: In main mode, the identification information for authentication is encrypted, thus enhancing security.

Aggressive Mode: In aggressive mode, less packets are exchanged, thus improving speed.

- Authentication ID Type

The authentication ID type determines the type of authentication identifiers applied in IKEv1 Phase-1. It includes the local ID type and the remote ID type. The local ID indicates the authentication identifier sent to the other end, and the remote ID indicates that expected from the other end. You can specify the authentication ID type as IP address or name.

IP Address: The gateway uses the IP address for authentication.

Name: The gateway uses the FQDN (Fully Qualified Domain Name) for authentication.

- Encapsulation Mode

The encapsulation mode determines how packets transfered in the VPN tunnel are encapsulated. You can select tunnel mode or transport mode as the encapsulation mode. For most users, it is recommended to use the tunnel mode.

- PFS

PFS (Perfect Forward Secrecy) determines whether the key generated in IKEv1 Phase-2 is relevant with that in IKEv1 Phase-1. You can specify PFS as none, dh1, dh2, or dh5. None indicates that no PFS is configured, and the key generated in IKEv1 Phase-2 is relevant with that in IKEv1 Phase-1, whereas dh1, dh2, or dh5 means different key exchange groups, which make the key generated in IKEv1 Phase-2 irrelevant with that in IKEv1 Phase-1.

GRE

GRE VPN encapsulates data packets of some network layer protocols, so that they can be transmitted in another network protocol. But GRE cannot encrypt packets, so it is usually used together with IPsec.

L2TP

L2TP (Layer 2 Tunneling Protocol) provides a way for a dial-up user to make a virtual PPP (Point-to-Point Protocol) connection to a VPN server. Because of the lack of confidentiality inherent in the L2TP protocol, it is often implemented along with IPsec. The basic concepts of L2TP are as follows:

- IPsec Encryption

IPsec encryption determines whether the traffic of the tunnel is encrypted with IPsec. You can select encrypted or unencrypted as the IPsec encryption. If encrypted is selected, a pre-shared key needs to be entered, and then the L2TP traffic will be encrypted with a default IPsec configuration. If unencrypted is selected, the VPN tunnel traffic will not be encrypted.

- Authentication

L2TP uses an account name and password for authentication on the VPN server. Only legal clients can set up a tunnel with the server, thus enhancing network security.

PPTP

PPTP (Point-to-Point Tunneling Protocol) is a network protocol that enables the secure transfer of data from a remote client to a private enterprise server by creating a VPN across TCP/IP-based data networks. PPTP supports on-demand, multi-protocol, virtual private networking over public networks, such as the internet. The basic concepts of PPTP are as follows:

- MPPE Encryption

MPPE (Microsoft Point-to-Point Encryption) scheme is a means of representing PPP packets in an encrypted form defined in RFC 3078. You can select encrypted or unencrypted as MPPE encryption. If encrypted is selected, the VPN tunnel traffic will be encrypted with RSA RC4 algorithm to ensure data confidentiality. If unencrypted is selected, the VPN tunnel traffic will not be encrypted.

- Authenticaiton

PPTP uses an account name and password for authentication on the VPN server. Only legal clients can set up a tunnel with the server, thus enhancing network security.

OpenVPN

OpenVPN uses OpenSSL (Open Secure Sockets Layer) for encryption of UDP and TCP for traffic transmission. OpenVPN uses a client-server connection to provide secure communications between a server and a remote client over the Internet.

WireGuard VPN

Wireguard VPN is a secure, fast and modern VPN protocol. It is based on the UDP protocol and uses modern encryption algorithms to improve work efficiency.

User Account List

This feature enables you to create VPN connection accounts for remote devices to connect to the VPN server. If the gateway acts as the L2TP/PPTP client, you don’t need to configure the L2TP/ PPTP user accounts on this page.

2 IPSec VPN Configuration

To complete the IPSec VPN configuration, follow these steps:

1) Configure the IPSec Policy.

2) Verify the connectivity of the IPSec VPN tunnel.

Configuration Guidelines

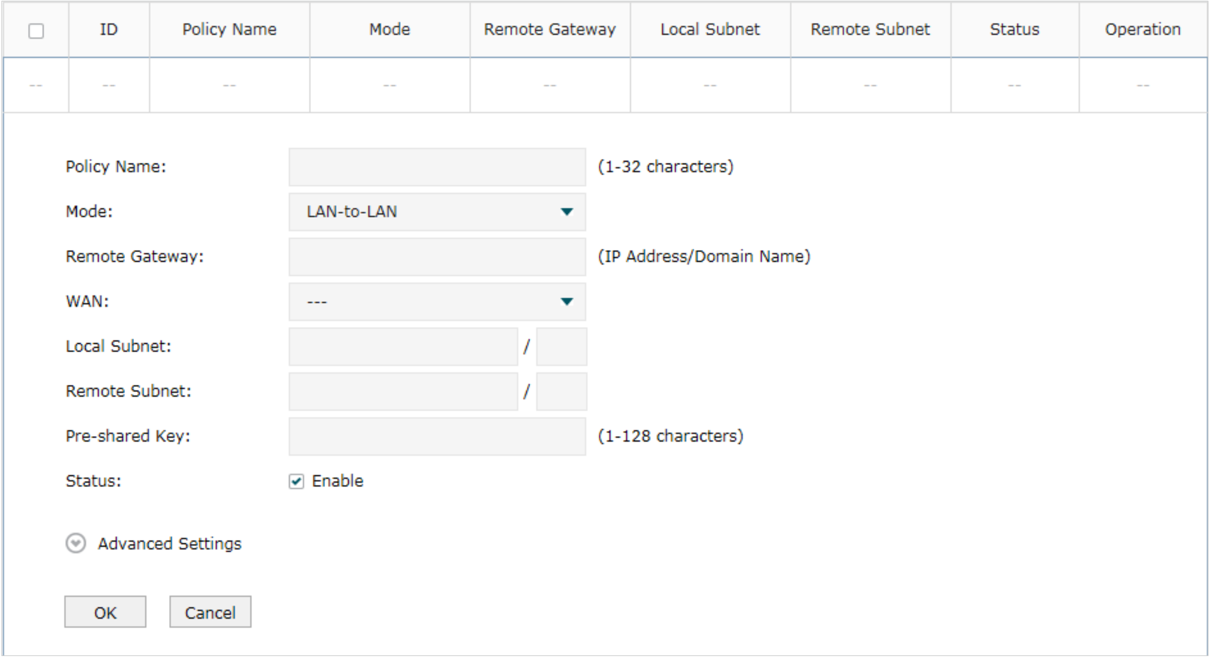
- For both ends of the VPN tunnel, the Pre-shared key, Proposal, Exchange Mode, and Encapsulation Mode should be identical.
- For both ends of the VPN tunnel, the Remote Gateway, Local/Remote Subnet, Local/Remote ID Type should be matched.

2.1 Configuring the IPSec Policy

2.1.1 Configuring the Basic Parameters

Choose the menu **VPN > IPSec > IPSec Policy** and click **Add** to load the following page.

Figure 2-1 Configuring the Basic Parameters



□	ID	Policy Name	Mode	Remote Gateway	Local Subnet	Remote Subnet	Status	Operation
--	--	--	--	--	--	--	--	--

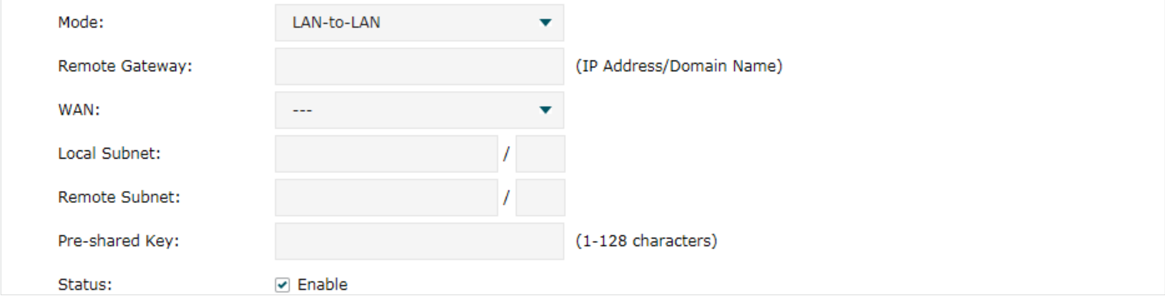
Policy Name:		(1-32 characters)
Mode:	LAN-to-LAN ▼	
Remote Gateway:		(IP Address/Domain Name)
WAN:	--- ▼	
Local Subnet:	/	
Remote Subnet:	/	
Pre-shared Key:		(1-128 characters)
Status:	☑ Enable	

Follow these steps to configure the basic parameters:

1) Specify the name of the IPSec Policy.

2) Configure the Network Mode. Select **LAN-to-LAN** when the network is connected to the other network. Select **Client-to-LAN** when a host is connected to the network.

When the **LAN-to-LAN** mode is selected, the following section will appear.



Mode: LAN-to-LAN

Remote Gateway: (IP Address/Domain Name)

WAN: ---

Local Subnet: /

Remote Subnet: /

Pre-shared Key: (1-128 characters)

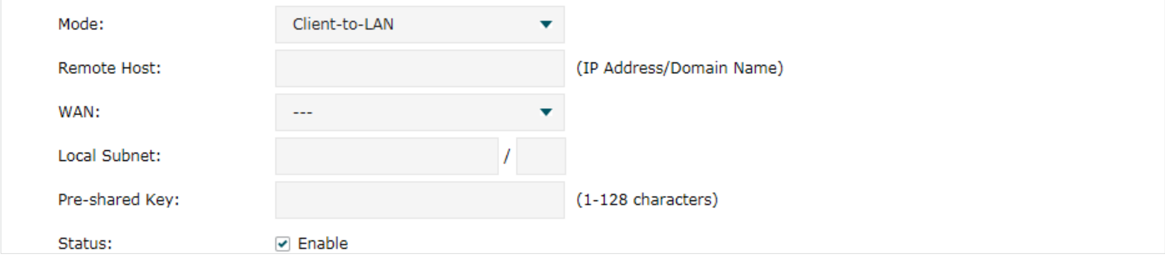
Status: ☑ Enable

Remote Gateway	Enter an IP address or a domain name (1 to 255 characters) as the remote gateway. 0.0.0.0 represents any IP address. Only when the negotiation mode is set to Responder Mode can you enter 0.0.0.0.
WAN	Specify the WAN port on which the IPSec tunnel is established.
Local Subnet	Specify the local network. (It's always the IP address range of LAN on the local side of the VPN tunnel.) It's formed from the IP address and subnet mask.
Remote Subnet	Specify the remote network. (It's always the IP address range of LAN on the remote peer of the VPN tunnel.) It's formed from the IP address and subnet mask.
Pre-shared Key	Specify the unique pre-shared key for both peers' authentication.
Status	Choose to enable the IPSec policy.

Note:

The Local Subnet and Remote Subnet should not be in the same network segment when choosing LAN-to-LAN as the VPN mode.

When the **Client-to-LAN** mode is selected, the following section will appear.



Mode: Client-to-LAN

Remote Host: (IP Address/Domain Name)

WAN: ---

Local Subnet: /

Pre-shared Key: (1-128 characters)

Status: ☑ Enable

Remote Host	Enter the IP address of the remote host. 0.0.0.0 represents any IP address.
WAN	Specify the WAN port on which the IPSec tunnel is established.
Local Subnet	Specify the local network. (This is the IP address range of the LAN on the local side of the VPN tunnel.) It's formed from the IP address and subnet mask.
Pre-shared Key	Specify the unique pre-shared key for both peers' authentication.

Status	Choose to enable the IPSec policy.

3) Click **OK**.

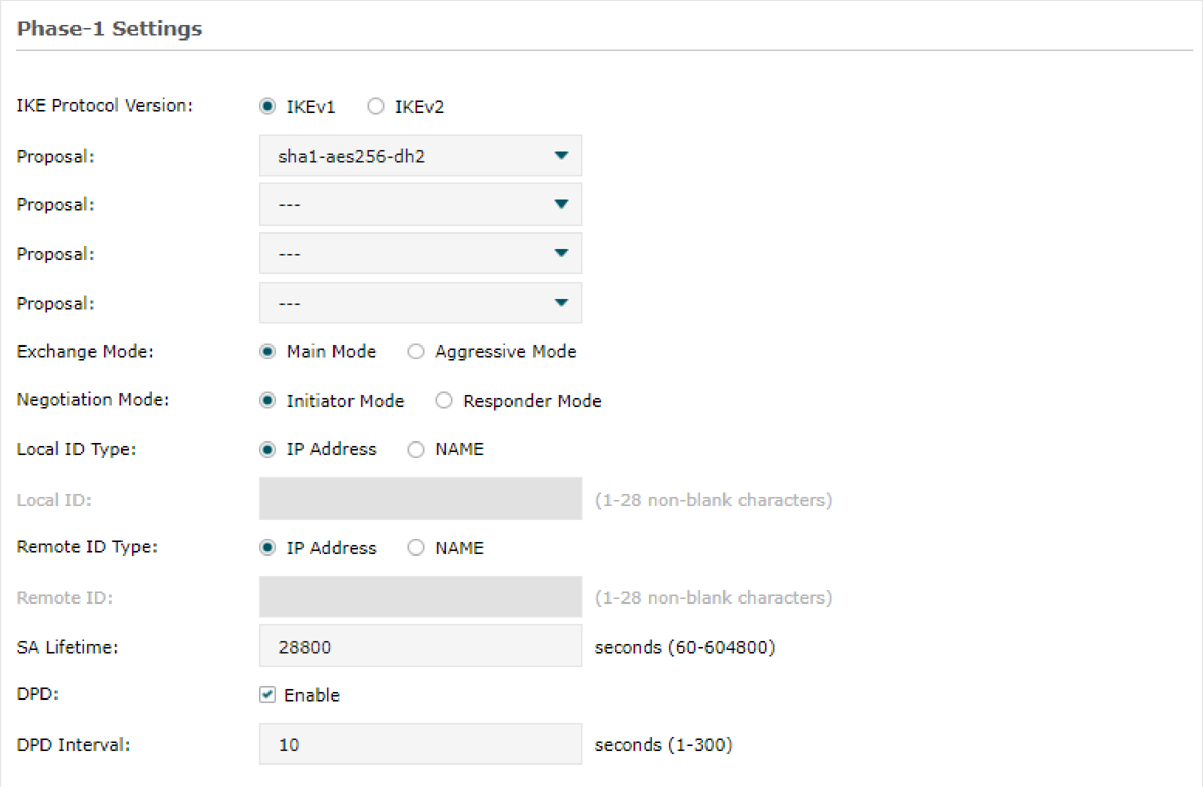
2.1.2 Configuring the Advanced Parameters

Advanced settings include IKEv1/IKEv2 phase-1 settings and IKEv1/IKEv2 phase-2 settings. Phase-1 is used to authenticate both sides of the communication and establish the IKE SA. Phase-2 is used to negotiate about keys and security related parameters, then establish the IPSec SA. It is suggested to keep the default advanced settings. You can complete the configurations according to your actual needs.

■ Configuring the IKE Phase-1 Parameters

Choose the menu **VPN > IPSec > IPSec Policy** and click **Advanced Settings** to load the following page.

Figure 2-2 Configuring the IKE Phase-1 Parameters



Phase-1 Settings

IKE Protocol Version: ● IKEv1 ○ IKEv2

Proposal: sha1-aes256-dh2

Proposal: ---

Proposal: ---

Proposal: ---

Exchange Mode: ● Main Mode ○ Aggressive Mode

Negotiation Mode: ● Initiator Mode ○ Responder Mode

Local ID Type: ● IP Address ○ NAME

Local ID: (1-28 non-blank characters)

Remote ID Type: ● IP Address ○ NAME

Remote ID: (1-28 non-blank characters)

SA Lifetime: 28800 seconds (60-604800)

DPD: ☑ Enable

DPD Interval: 10 seconds (1-300)

In the **Phase-1 Settings** section, configure the IKE phase-1 parameters and click **OK**.

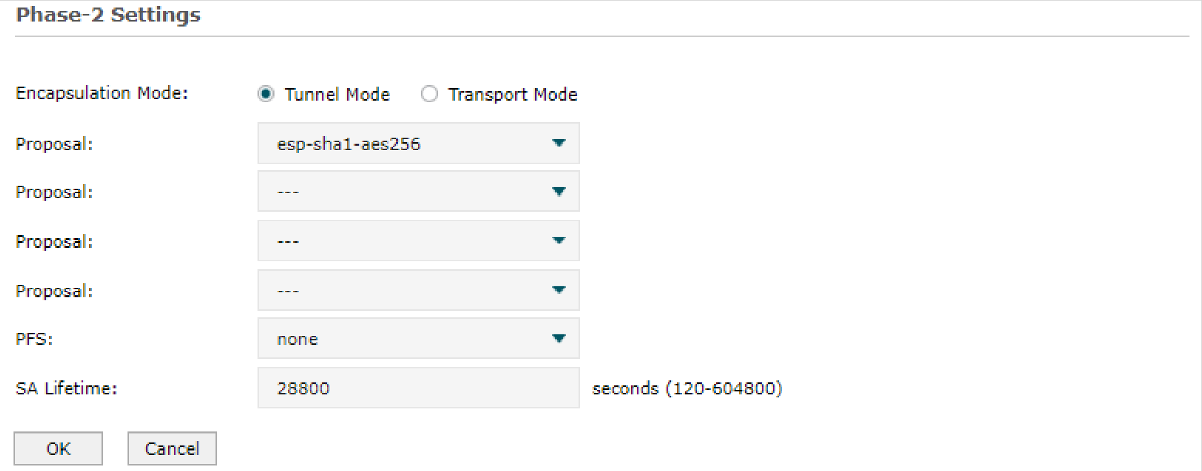
Proposal	Select the proposal for IKE negotiation phase 1 to specify the encryption algorithm, authentication algorithm and DH group. Up to four proposals can be selected.

Exchange Mode	Specify the IKE Exchange Mode as Main Mode or Aggressive Mode. By default, it is Main Mode. **Main Mode:** Main mode provides identity protection and exchanges more information, which applies to scenarios with higher requirements for identity protection. **Aggressive Mode:** Aggressive Mode establishes a faster connection but with lower security, which applies to scenarios with lower requirements for identity protection.
Negotiation Mode	Specify the IKE Negotiation Mode as Initiator Mode or Responder Mode. **Initiator Mode**: The local device initiates a connection to the peer. **Initiator Mode**: The local device initiates a connection to the peer.
Local ID Type	Specify the local ID type for IKE negotiation. **IP Address**: Use an IP address as the ID in IKE negotiation. It is the default type. **NAME**: Use a name as the ID in IKE negotiation. It refers to FQDN (Fully Qualified Domain Name).
Local ID	When the Local ID Type is configured as NAME, enter a name for the local device as the ID in IKE negotiation.
Remote ID Type	Specify the remote ID type for IKE negotiation. **IP Address**: Use an IP address as the ID in IKE negotiation. It is the default type. **NAME**: Use a name as the ID in IKE negotiation. It refers to FQDN (Fully Qualified Domain Name).
Remote ID	When the Remote ID Type is configured as NAME, enter a name of the remote peer as the ID in IKE negotiation .
SA Lifetime	Specify ISAKMP SA (Security Association) Lifetime in IKE negotiation. If the SA lifetime expired, the related ISAKMP SA will be deleted.
DPD	Check the box to enable or disable DPD (Dead Peer Detect) function. If enabled, the IKE endpoint can send a DPD request to the peer to inspect whether the IKE peer is alive.
DPD Interval	If DPD is triggered, specify the interval between sending DPD requests. If the IKE endpoint receives a response from the peer during this interval, it considers the peer alive. If the IKE endpoint does not receive a response during the interval, it considers the peer dead and deletes the SA.

Configuring the IKE Phase-2 Parameters

Choose the menu **VPN > IPSec > IPSec Policy** and click **Advanced Settings** to load the following page.

Figure 2-3 Configuring the IKE Phase-2 Parameters



Phase-2 Settings

Encapsulation Mode: ● Tunnel Mode ○ Transport Mode

Proposal: esp-sha1-aes256

Proposal: ---

Proposal: ---

Proposal: ---

PFS: none

SA Lifetime: 28800 seconds (120-604800)

In the **Phase-2 Settings** section, configure the IKE phase-2 parameters and click **OK**.

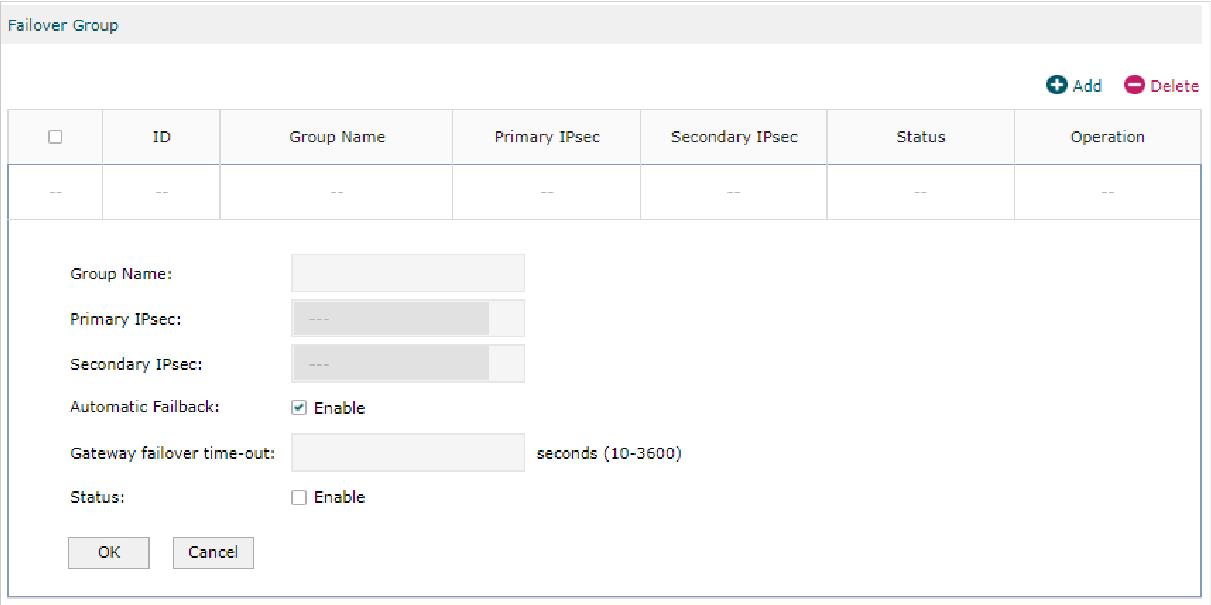
Encapsulation Mode	Specify the Encapsulation Mode as Tunnel Mode or Transport Mode. When both ends of the tunnel are hosts, either mode can be chosen. When at least one of the endpoints of a tunnel is a security gateway, tunnel mode is recommended to ensure safety.
Proposal	Select the proposal for IKE negotiation phase 2 to specify the encryption algorithm, authentication algorithm and protocol. Up to four proposals can be selected.
PFS	Select the DH group to enable PFS (Perfect Forward Security) for IKE mode, then the key generated in phase 2 will be irrelevant with the key in phase 1, which enhance the network security. If you select None, it means PFS is disabled and the key in phase 2 will be generated based on the key in phase 1.
SA Lifetime	Specify IPSec SA (Security Association) Lifetime in IKE negotiation. If the SA lifetime expired, the related IPSec SA will be deleted.

2.1.3 Configuring the Failover Group

You can two IPsec connections in a failover group. If the primary connection fails, the secondary connection in the group automatically takes over.

Choose the menu **VPN > IPSec > IPSec Policy**, add multiple connection in the **IPsec Policy List** section, and then in the **Failover Group** section, click **Add** to load the following page.

Figure 2-4 Configuring the Failover Group



Failover Group

Add Delete

□	ID	Group Name	Primary IPsec	Secondary IPsec	Status	Operation
--	--	--	--	--	--	--

Group Name:

Primary IPsec: ---

Secondary IPsec: ---

Automatic Failback: ☑ Enable

Gateway failover time-out: seconds (10-3600)

Status: □ Enable

OK Cancel

Follow these steps to configure the parameters, then click **OK**:

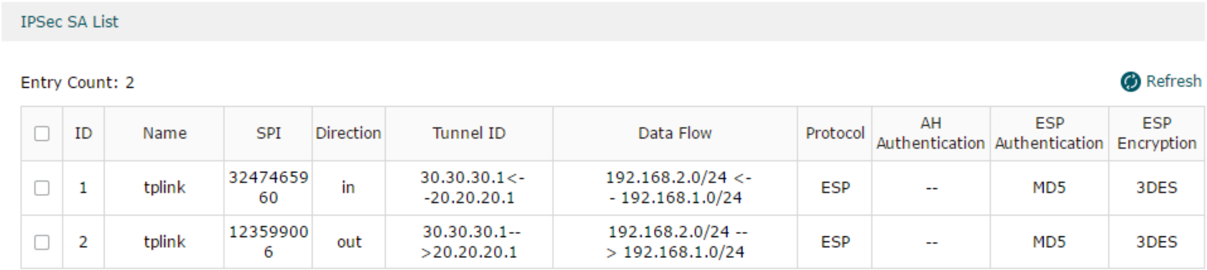
Group Name:	Give a name to identify the group.
Primary IPsec	Select a IP sec connection as the primary IPsec connection.
Secondary IPsec	Select a IP sec connection as the primary IPsec connection.
Automatic Failback	When enabled, the primary IPsec connection will be reused when it is restored,
Gateway failover time-out:	Set the time interval for the gateway to send a request to query the status of the primary IPsec connection.
Status:	Check the box to enable the group.

Note: The two IPsec connections are established to the same remote IP, and the related parameters should be the same.

2.2 Verifying the Connectivity of the IPSec VPN tunnel

Choose the menu **VPN > IPSec > IPSec SA** to load the following page.

Figure 2-5 IPSec SA List



IPSec SA List

Entry Count: 2

□	ID	Name	SPI	Direction	Tunnel ID	Data Flow	Protocol	AH Authentication	ESP Authentication	ESP Encryption
□	1	tplink	3247465960	in	30.30.30.1<--20.20.20.1	192.168.2.0/24 <-- 192.168.1.0/24	ESP	--	MD5	3DES
□	2	tplink	123599006	out	30.30.30.1-->20.20.20.1	192.168.2.0/24 --> 192.168.1.0/24	ESP	--	MD5	3DES

The **IPSec SA List** shows the information of the established IPSec VPN tunnel.

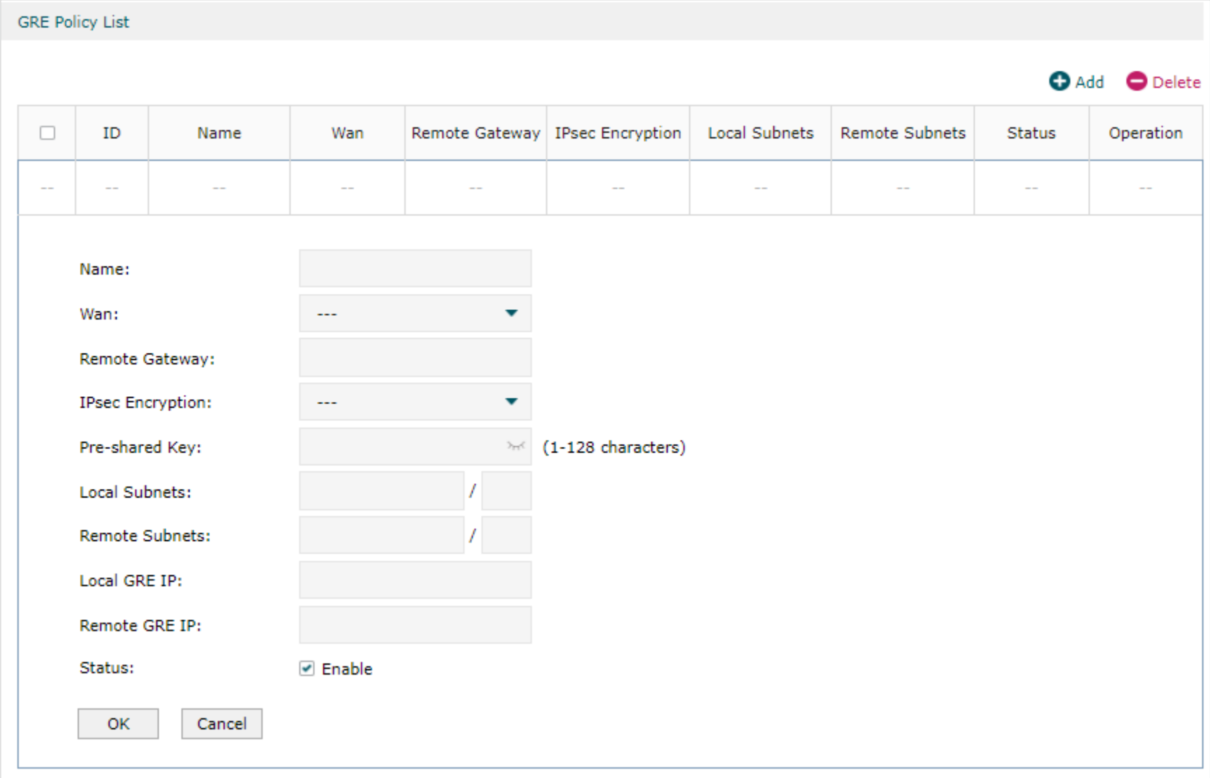
Name	Displays the name of the IPSec policy associated with the SA.
SPI	Displays the SPI (Security Parameter Index) of the SA, including outgoing SPI and incoming SPI. The SPI of each SA is unique.
Direction	Displays the direction (in: incoming/out: outgoing) of the SA.
Tunnel ID	Displays the IP addresses of the local and remote peers.
Data Flow	Displays the Local Subnet and Remote Subnet/host covered by the SA.
Protocol	Displays the authentication protocol and encryption protocol used by the SA.
AH Authentication	Displays the AH authentication algorithm used by the SA.
ESP Authentication	Displays the ESP authentication algorithm used by the SA.
ESP Encryption	Displays the ESP encryption algorithm used by the SA.

3 GRE VPN Configuration

To complete the GRE VPN configuration, make sure you have configured the IPsec VPN.

Choose the menu **VPN > GRE** to load the following page. Click **Add** to add a GRE policy.

Figure 3-1 Configuring GRE Policy



GRE Policy List

□	ID	Name	Wan	Remote Gateway	IPsec Encryption	Local Subnets	Remote Subnets	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name:	
Wan:	---
Remote Gateway:	
IPsec Encryption:	---
Pre-shared Key:	(1-128 characters)
Local Subnets:	/
Remote Subnets:	/
Local GRE IP:	
Remote GRE IP:	
Status:	☑ Enable

Name	Enter a name to identify the GRE VPN.
WAN	Specify the WAN port on which the GRE tunnel is established.
Remote Gateway	Enter an IP address as the remote gateway.
IPsec Encryption	Specify whether to enable the encryption for the tunnel. If enabled, the GRE tunnel will be encrypted by IPsec (GRE over IPsec).
Pre-shared Key	When the IPsec Encryption is configured as Encrypted, specify the Pre-shared Key for IKE authentication.
Local Subnet	Specify the local network. It's always the IP address range of LAN on the local side of the VPN tunnel. It's formed from the IP address and subnet mask. After the VPN tunnel is established, the peer can access the local subnet.
Remote Subnet	Specify the remote network. It's always the IP address range of LAN on the remote peer of the VPN tunnel. It's formed from the IP address and subnet mask. Only the traffic to the remote subnet will be forwarded through the VPN tunnel.

Local GRE IP	Specify the local virtual IP address for the GRE VPN. The IP should not be the same as the Remote Gateway IP, nor should it be in Local Subnet or Remote Subnet.
Remote GRE IP	Specify the remote virtual IP address for the GRE VPN. The IP should not be the same as the Remote Gateway IP, nor should it be in Local Subnet or Remote Subnet.
Status	Check the box to enable the GRE VPN.

4 L2TP Configuration

To complete the L2TP configuration, follow these steps:

1) Configure the VPN IP pool.

2) Configure L2TP globally.

3) Configure the L2TP server/client.

4) (Optional) Configure the L2TP users.

5) Verify the connectivity of the L2TP VPN tunnel.

Configuration Guidelines

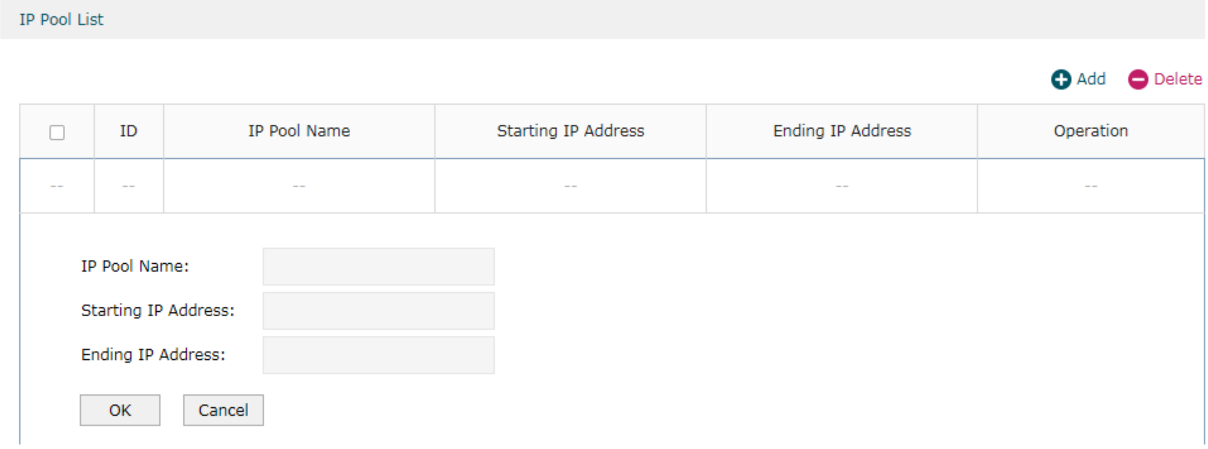
- When the network mode is configured as Client-to-LAN and the gateway acts as the L2TP server, you don't need to configure the L2TP client on the gateway.

- When the network mode is configured as LAN-to-LAN and the gateway acts as the L2TP client gateway, you don't need to configure the L2TP users on the gateway.

4.1 Configuring the VPN IP Pool

Choose the menu **Preferences> VPN IP Pool > VPN IP Pool** and click **Add** to load the following page.

Figure 4-1 Configuring the VPN IP Pool



□	ID	IP Pool Name	Starting IP Address	Ending IP Address	Operation
--	--	--	--	--	--

IP Pool Name:

Starting IP Address:

Ending IP Address:

Follow these steps to configure the VPN IP Pool:

1) Specify the name of the IP Pool.

2) Specify the starting IP address and ending IP address for the IP Pool.

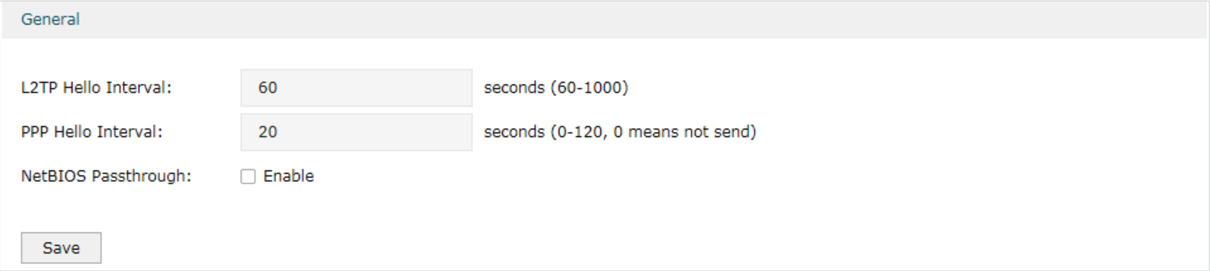
Note:

- The starting IP address should not be greater than the ending IP address.
- The ranges of IP Pools cannot overlap.

4.2 Configuring L2TP Globally

Choose the menu **VPN> L2TP > Global Config** to load the following page.

Figure 4-2 Configuring L2TP Globally



General

L2TP Hello Interval: 60 seconds (60-1000)

PPP Hello Interval: 20 seconds (0-120, 0 means not send)

NetBIOS Passthrough: □ Enable

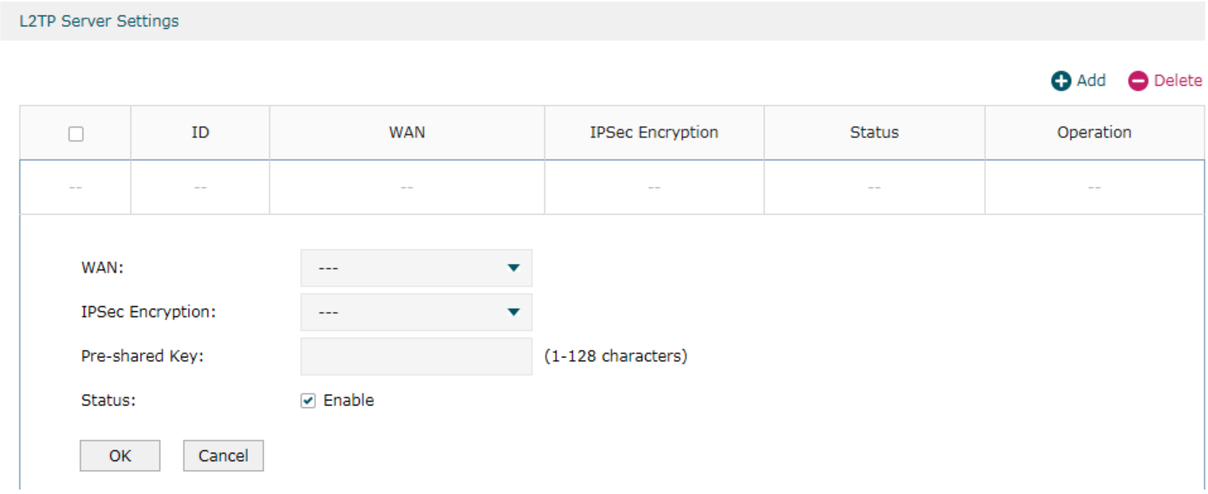
In the **General** section, configure L2TP parameters globally and click **Save**.

L2TP Hello Interval	Specify the time interval of sending L2TP peer detect packets.
PPP Hello Interval	Specify the time interval of sending PPP peer detect packets.
NetBIOS Passthrough	Enable NetBIOS Passthrough function to allow NetBIOS packets to be broadcasted through VPN tunnel.

4.3 Configuring the L2TP Server

Choose the menu **VPN> L2TP > L2TP Server** and click **Add** to load the following page.

Figure 4-3 Configuring the L2TP Server



L2TP Server Settings

□	ID	WAN	IPSec Encryption	Status	Operation
--	--	--	--	--	--

WAN: ---

IPSec Encryption: ---

Pre-shared Key: (1-128 characters)

Status: ☑ Enable

Follow these steps to configure the L2TP server:

1) Specify the WAN port used for L2TP tunnel.

2) Specify whether to enable the encryption for the tunnel.

IPSec Encryption	Specify whether to enable the encryption for the tunnel. If enabled, the L2TP tunnel will be encrypted by IPSec (L2TP over IPSec). If you choose Auto, the L2TP server will determine whether to encrypt the tunnel according to the client 's encryption settings.

3) Specify the Pre-shared Key for IKE authentication.

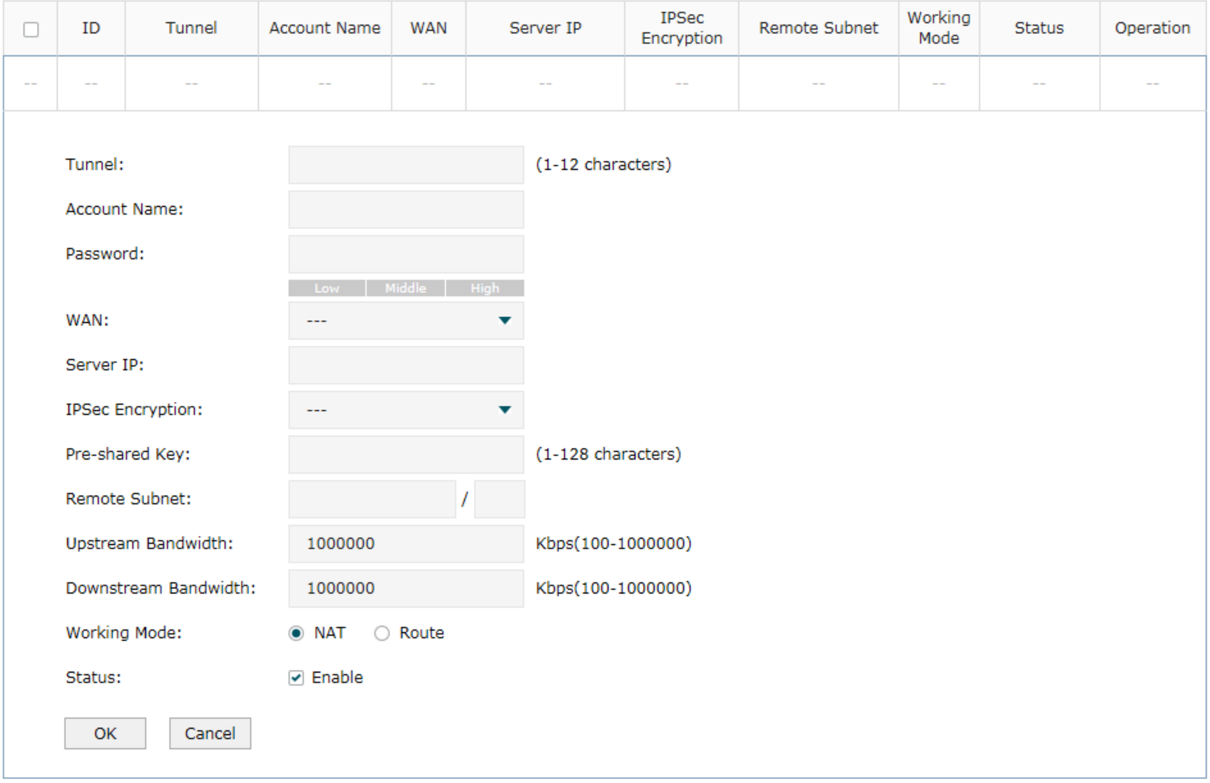
4) Enable the L2TP tunnel.

5) Click **OK**.

4.4 Configuring the L2TP Client

Choose the menu **VPN > L2TP > L2TP Client** and click **Add** to load the following page.

Figure 4-4 Configuring the L2TP Client



□	ID	Tunnel	Account Name	WAN	Server IP	IPSec Encryption	Remote Subnet	Working Mode	Status	Operation
--	--	--	--	--	--	--	--	--	--	--

Tunnel:		(1-12 characters)
Account Name:		
Password:	Low Middle High	
WAN:	---	
Server IP:		
IPSec Encryption:	---	
Pre-shared Key:		(1-128 characters)
Remote Subnet:	/	
Upstream Bandwidth:	1000000	Kbps(100-1000000)
Downstream Bandwidth:	1000000	Kbps(100-1000000)
Working Mode:	● NAT ○ Route	
Status:	☑ Enable	

Follow these steps to configure the L2TP client:

1) Specify the name of the L2TP tunnel and configure other relevant parameters of the L2TP client according to your actual network environment.

Tunnel	Specify the name of L2TP tunnel.

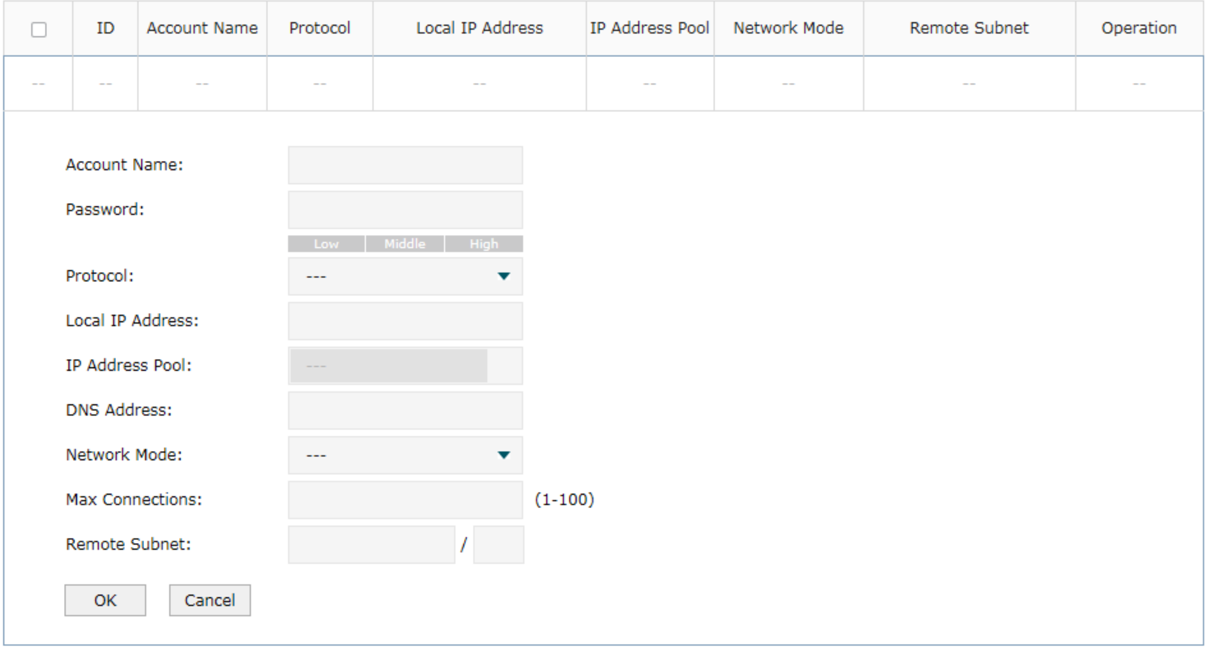
Account Name	Specify the account name of L2TP tunnel. It should be configured identically on server and client.
Password	Specify the password of L2TP tunnel. It should be configured identically on server and client.
WAN	Specify the WAN port used for L2TP tunnel.
Server IP	Specify the IP address or domain name of L2TP server.
IPSec Encryption	Specify whether to enable the encryption for the tunnel. If enabled, the L2TP tunnel will be encrypted by IPSec (L2TP over IPSec).
Pre-shared Key	Specify the Pre-shared Key for IKE authentication.
Remote Subnet	Specify the remote network. (It's always the IP address range of LAN on the remote peer of the VPN tunnel.) It's the combination of IP address and subnet mask.
Upstream Bandwidth	Specify the uptream limited rate in Kbps for L2TP tunnel.
Downstream Bandwidth	Specify the downstream limited rate in Kbps for L2TP tunnel.
Working Mode	Specify the Working Mode as NAT or Routing. **NAT**: NAT (Network Address Translation) mode allows the gateway to translate source IP address of L2TP packets to its WAN IP when forwarding L2TP packets. **Route**: Route mode allows the gateway to forward L2TP packets via routing protocol.
Status	Check the box to enable the L2TP tunnel.

2) Click **OK**.

4.5 (Optional) Configuring the L2TP Users

Choose the menu **VPN> Users > Users** and click **Add** to load the following page.

Figure 4-5 Configuring the L2TP User



□	ID	Account Name	Protocol	Local IP Address	IP Address Pool	Network Mode	Remote Subnet	Operation
--	--	--	--	--	--	--	--	--

Account Name:

Password:

Low Middle High

Protocol: ---

Local IP Address:

IP Address Pool: ---

DNS Address:

Network Mode: ---

Max Connections: (1-100)

Remote Subnet: /

OK Cancel

Follow these steps to configure the L2TP User:

1) Specify the account name and password of the L2TP User.

Account Name	Specify the account name used for the VPN tunnel. This parameter should be the same with that of the L2TP client.
Password	Specify the password of user. This parameter should be the same with that of the L2TP client.

2) Specify the protocol as L2TP and configure other relevant parameters cc.

Protocol	Specify the protocol for the VPN tunnel. There are two types: L2TP and PPTP.
Local IP Address	Specify the local IP address of the tunnel. You can enter the LAN IP of the local device.
IP Address Pool	Specify the IP address pool from which the IP address will be assigned to the VPN client. The IP Pool referenced here can be created on the **Preferences > VPN IP Pool** page.
DNS Address	Specify the DNS address to be assigned to the VPN client (8.8.8.8 for example).
Network Mode	Specify the network mode. There are two modes: **Client-to-LAN**: Select this option when the L2TP/PPTP client is a single host. **LAN-to-LAN**: Select this option when the L2TP/PPTP client is a VPN gateway. The tunneling request is always initiated by a device.

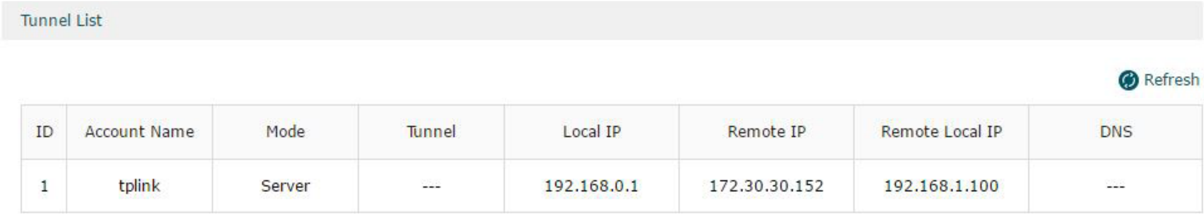
Max Connections	Specify the maximum number of connections that the tunnel can support.
Remote Subnet	Specify a remote network. (This is the IP address range of the LAN on the remote peer of the L2TP/PPTP tunnel.) It's the combination of IP address and subnet mask.

3) Click **OK**.

4.6 Verifying the Connectivity of L2TP VPN Tunnel

Choose the menu **VPN > L2TP > Tunnel List** to load the following page.

Figure 4-6 L2TP VPN Tunnel List



ID	Account Name	Mode	Tunnel	Local IP	Remote IP	Remote Local IP	DNS
1	tplink	Server	---	192.168.0.1	172.30.30.152	192.168.1.100	---

The **Tunnel List** shows the information of the established L2TP VPN tunnel.

Account Name	Displays the account name of L2TP tunnel.
Mode	Displays whether the device is server or client.
Tunnel	Displays the name of the tunnel when the gateway is an L2TP client.
Local IP	Displays the local IP address of the tunnel.
Remote IP	Displays the remote real IP address of the tunnel.
Remote Local IP	Displays the remote local IP address of the tunnel.
DNS	Displays the DNS address of the tunnel.

5 PPTP Configuration

To complete the PPTP configuration, follow these steps:

1) Configure the VPN IP pool.

2) Configure PPTP globally.

3) Configure the PPTP server/client.

4) (Optional) Configure the PPTP users.

5) Verify the connectivity of the PPTP VPN tunnel.

Configuration Guidelines

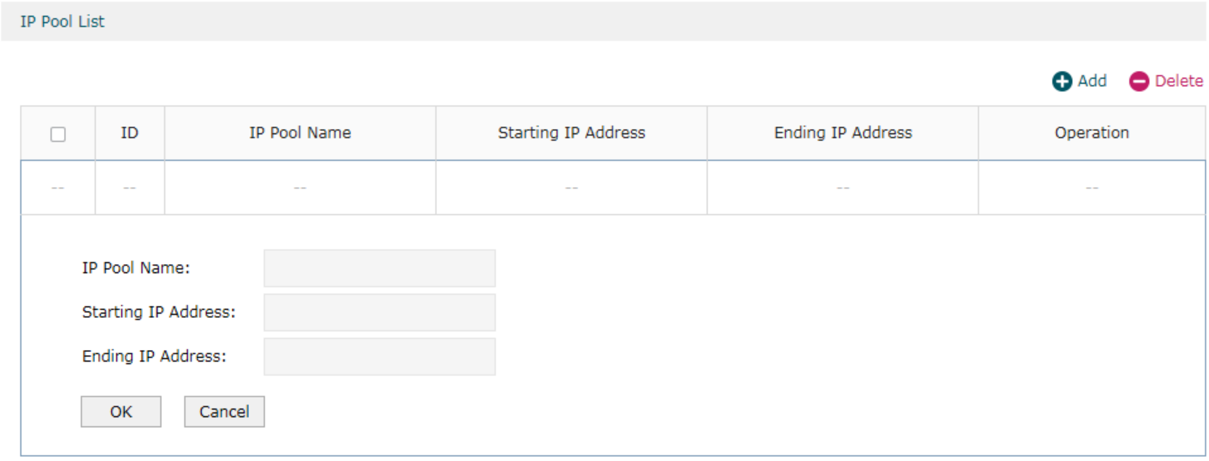
- When the network mode is configured as Client-to-LAN and the gateway acts as the PPTP server, you don’t need to configure a PPTP client on the gateway.

- When the network mode is configured as LAN-to-LAN and the gateway acts as the PPTP client gateway, you don’t need to configure PPTP users on the gateway.

5.1 Configuring the VPN IP Pool

Choose the menu **Preferences> VPN IP Pool > VPN IP Pool** and click **Add** to load the following page.

Figure 5-1 Configuring the VPN IP Pool



☐	ID	IP Pool Name	Starting IP Address	Ending IP Address	Operation
--	--	--	--	--	--

IP Pool Name:

Starting IP Address:

Ending IP Address:

Follow these steps to configure the VPN IP Pool:

1) Specify the name of the IP Pool.

2) Specify the starting IP address and ending IP address for the IP Pool.

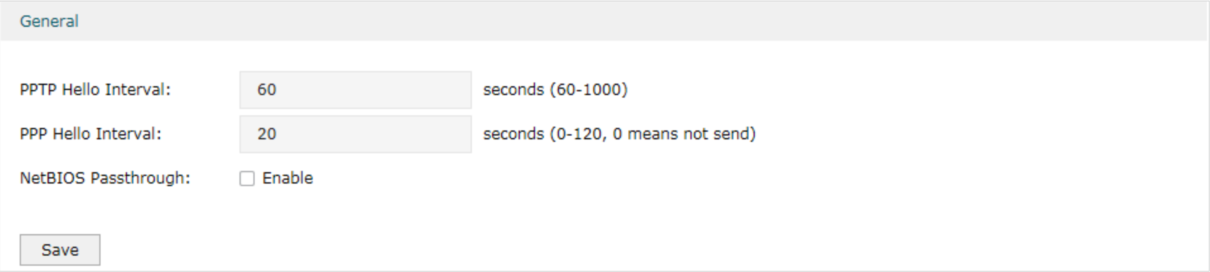
Note:

- The starting IP address should not be greater than the ending IP address.
- The ranges of IP Pools cannot overlap.

5.2 Configuring PPTP Globally

Choose the menu **VPN> PPTP > Global Config** to load the following page.

Figure 5-2 Configuring PPTP Globally



General

PPTP Hello Interval: 60 seconds (60-1000)

PPP Hello Interval: 20 seconds (0-120, 0 means not send)

NetBIOS Passthrough: □ Enable

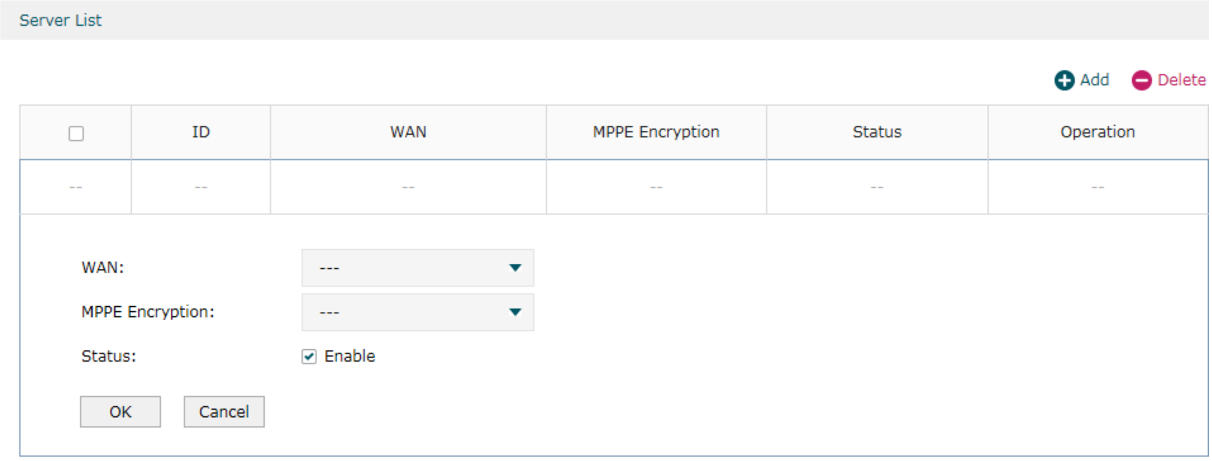
In the **General** section, configure PPTP parameters globally and click **Save**.

PPTP Hello Interval	Specify the time interval of sending PPTP peer detect packets.
PPP Hello Interval	Specify the time interval of sending PPP peer detect packets.
NetBIOS Passthrough	Enable NetBIOS Passthrough function to allow NetBIOS packets to be broadcasted through VPN tunnel.

5.3 Configuring the PPTP Server

Choose the menu **VPN> PPTP > PPTP Server** and click **Add** to load the following page.

Figure 5-3 Configuring the PPTP Server



Server List

□	ID	WAN	MPPE Encryption	Status	Operation
--	--	--	--	--	--

WAN: ---

MPPE Encryption: ---

Status: ☑ Enable

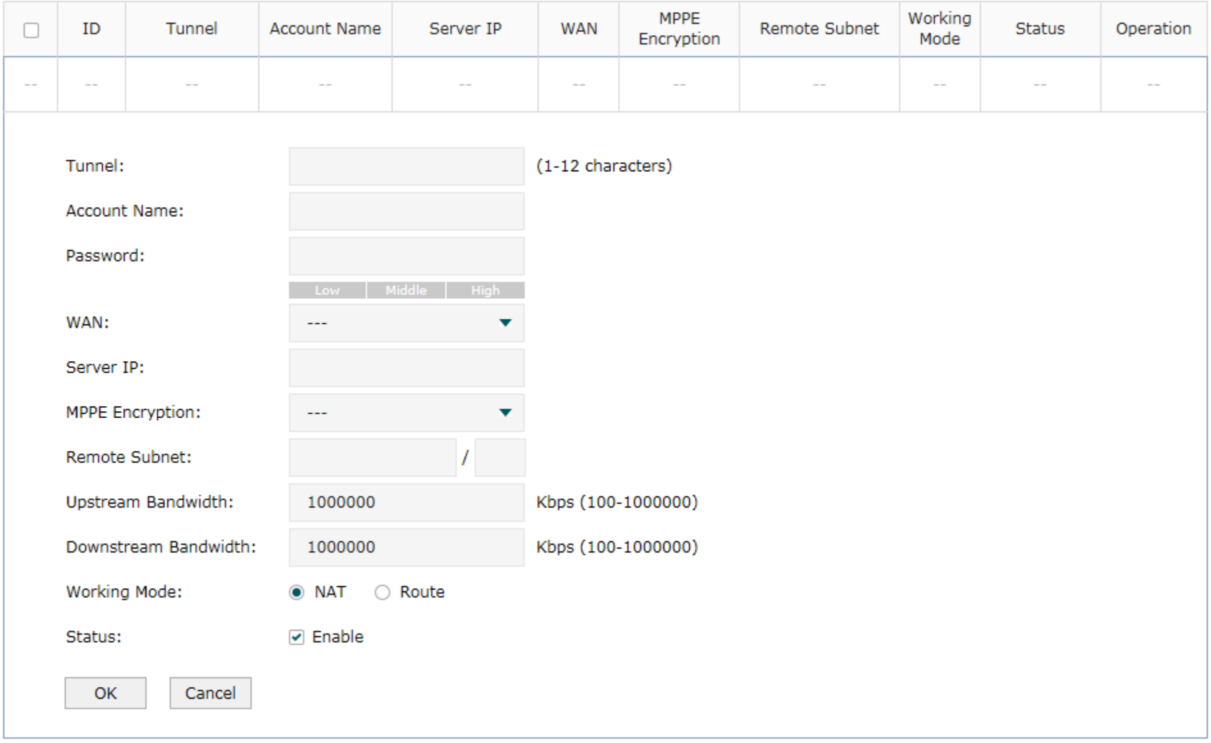
Follow these steps to configure the PPTP server:

1) Specify the WAN port used for PPTP tunnel.
2) Specify whether to enable the MPPE encryption for the PPTP tunnel.
3) Enable the PPTP tunnel.
4) Click **OK**.

5.4 Configuring the PPTP Client

Choose the menu **VPN > PPTP > PPTP Client** and click **Add** to load the following page.

Figure 5-4 Configuring the PPTP Client



□	ID	Tunnel	Account Name	Server IP	WAN	MPPE Encryption	Remote Subnet	Working Mode	Status	Operation
--	--	--	--	--	--	--	--	--	--	--

Tunnel:		(1-12 characters)
Account Name:		
Password:	Low Middle High	
WAN:	---	
Server IP:		
MPPE Encryption:	---	
Remote Subnet:	/	
Upstream Bandwidth:	1000000	Kbps (100-1000000)
Downstream Bandwidth:	1000000	Kbps (100-1000000)
Working Mode:	● NAT ○ Route	
Status:	☑ Enable	

Follow these steps to configure the PPTP client:

1) Specify the name of the PPTP tunnel and configure other relevant parameters of the PPTP client according to your actual network environment.

Tunnel	Specify the name of PPTP tunnel.
Account Name	Specify the account name of PPTP tunnel. It should be configured identically on server and client.
Password	Specify the password of PPTP tunnel. It should be configured identically on server and client.
WAN	Specify the WAN port used for PPTP tunnel.
Server IP	Specify the IP address or domain name of PPTP server.

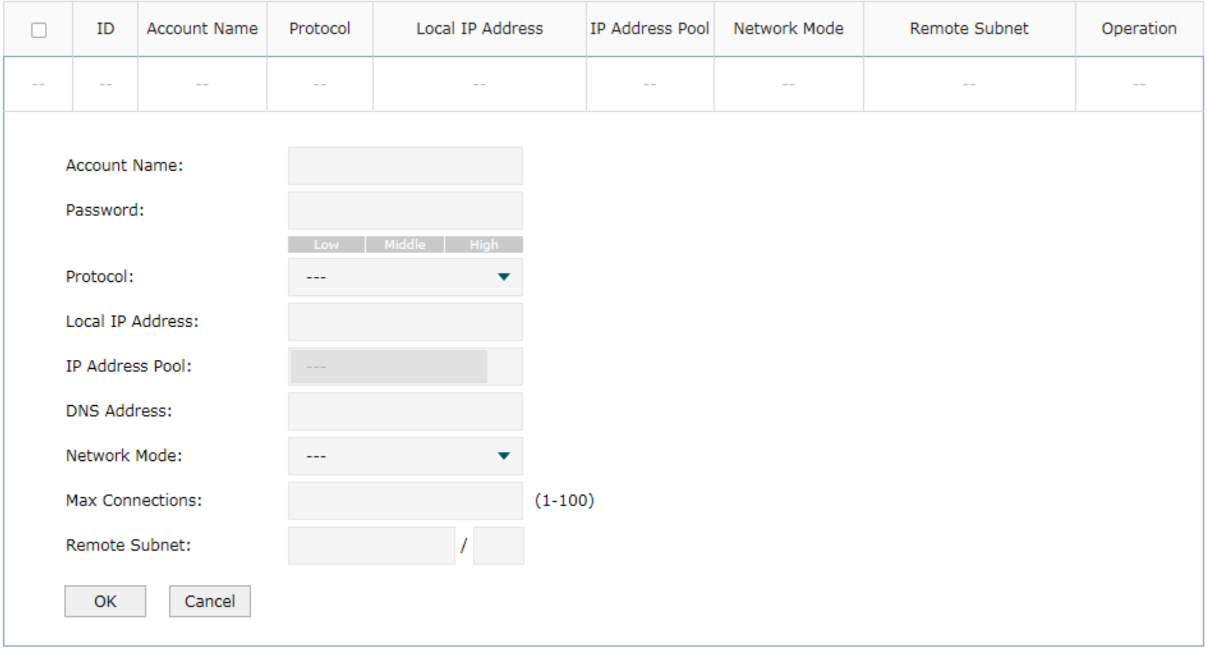
MPPE Encryption	Specify whether to enable the encryption for the tunnel. If enabled, the PPTP tunnel will be encrypted by MPPE.
Remote Subnet	Specify the remote network. (It's always the IP address range of LAN on the remote peer of the VPN tunnel.) It's the combination of IP address and subnet mask.
Upstream Bandwidth	Specify the uptream limited rate in Kbps for PPTP tunnel.
Downstream Bandwidth	Specify the downstream limited rate in Kbps for PPTP tunnel.
Working Mode	Specify the Working Mode as NAT or Routing. **NAT**: NAT (Network Address Translation) mode allows the gateway to translate source IP address of PPTP packets to its WAN IP when forwarding PPTP packets. **Route**: Route mode allows the gateway to forward PPTP packets via routing protocol.
Status	Check the box to enable the PPTP tunnel.

2) Click **OK**.

5.5 (Optional) Configuring the PPTP Users

Choose the menu **VPN > Users > Users** and click **Add** to load the following page.

Figure 5-5 Configuring the PPTP User



□	ID	Account Name	Protocol	Local IP Address	IP Address Pool	Network Mode	Remote Subnet	Operation
--	--	--	--	--	--	--	--	--

Account Name:

Password:

Low Middle High

Protocol: ---

Local IP Address:

IP Address Pool: ---

DNS Address:

Network Mode: ---

Max Connections: (1-100)

Remote Subnet: /

OK Cancel

Follow these steps to configure the PPTP User:

1) Specify the account name and password of the PPTP User.

Account Name	Specify the account name used for the VPN tunnel. This parameter should be the same as that of the PPTP client.
Password	Specify the password of users. This parameter should be the same as that of the PPTP client.

2) Specify the protocol as PPTP and configure other relevant parameters according to your actual network environment.

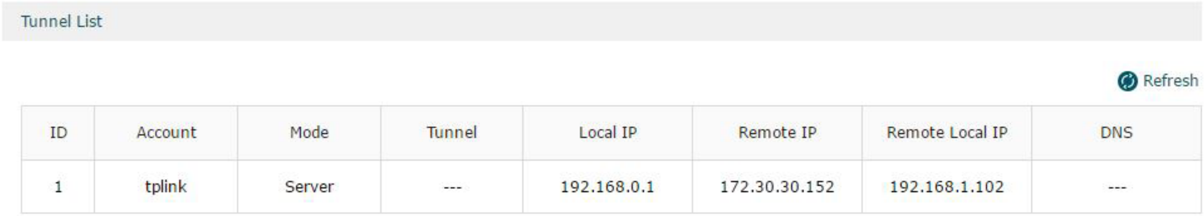
Protocol	Specify the protocol for the VPN tunnel. There are two types: L2TP and PPTP.
Local IP Address	Specify the local IP address of the tunnel. You can enter the LAN IP of the local device.
IP Address Pool	Specify the IP address pool from which the IP address will be assigned to the VPN client. The IP Pool referenced here can be created on the **Preferences > VPN IP Pool** page.
DNS Address	Specify the DNS address to be assigned to the VPN client (8.8.8.8 for example).
Network Mode	Specify the network mode. There are two modes: **Client-to-LAN**: Select this option when the PPTP/PPTP client is a single host. **LAN-to-LAN**: Select this option when the PPTP/PPTP client is a VPN gateway. The tunneling request is always initiated by a device.
Max Connections	Specify the maximum number of connections that the tunnel can support.
Remote Subnet	Specify a remote network. (This is the IP address range of the LAN on the remote peer of the PPTP/PPTP tunnel.) It's the combination of IP address and subnet mask.

3) Click **OK**.

5.6 Verifying the Connectivity of PPTP VPN Tunnel

Choose the menu **VPN> PPTP > Tunnel List** to load the following page.

Figure 5-6 PPTP VPN Tunnel List



Tunnel List

Refresh

ID	Account	Mode	Tunnel	Local IP	Remote IP	Remote Local IP	DNS
1	tplink	Server	---	192.168.0.1	172.30.30.152	192.168.1.102	---

The **Tunnel List** shows the information of the established PPTP VPN tunnel.

Account	Displays the account name of PPTP tunnel.
Mode	Displays whether the device is server or client.

Tunnel	Displays the name of the tunnel when the gateway is a PPTP client.
Local IP	Displays the local IP address of the tunnel.
Remote IP	Displays the remote real IP address of the tunnel.
Remote Local IP	Displays the remote local IP address of the tunnel.
DNS	Displays the DNS address of the tunnel.

6 OpenVPN Configuration

To complete the OpenVPN Configuration, follow these steps:

1) Configure the OpenVPN server/client.

2) Check the tunnel list to verify the connectivity of the OpenVPN tunnel.

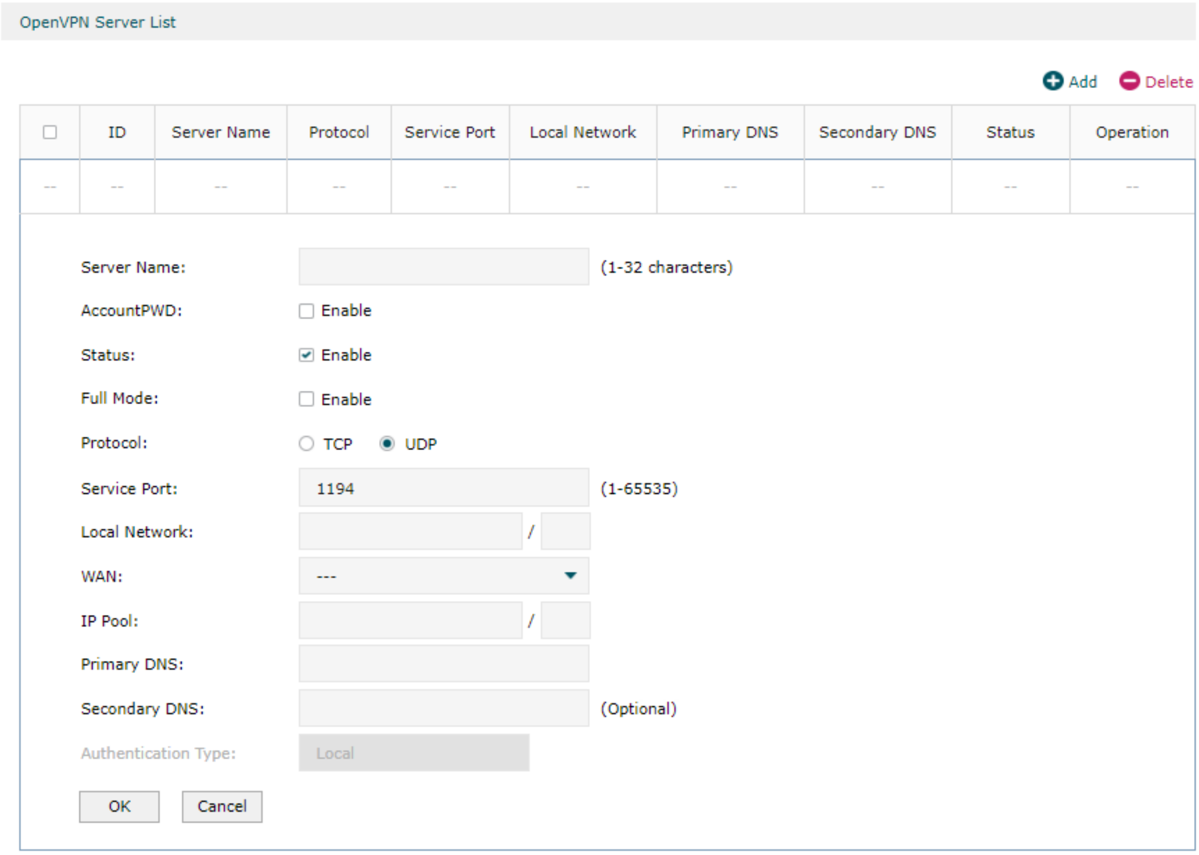
Configuration Guidelines

- If you only use the gateway as the OpenVPN server, you don’t need to configure the OpenVPN client.

6.1 Configuring the OpenVPN Server

Choose the menu **VPN > OpenVPN > OpenVPN Server** and click **Add** to load the following page.

Figure 6-1 Configuring the OpenVPN Server



OpenVPN Server List

□	ID	Server Name	Protocol	Service Port	Local Network	Primary DNS	Secondary DNS	Status	Operation
--	--	--	--	--	--	--	--	--	--

Server Name:		(1-32 characters)
AccountPWD:	□ Enable	
Status:	☑ Enable	
Full Mode:	□ Enable	
Protocol:	○ TCP ● UDP	
Service Port:	1194	(1-65535)
Local Network:	/	
WAN:	---	
IP Pool:	/	
Primary DNS:		
Secondary DNS:		(Optional)
Authentication Type:	Local	

Specify the name of the OpenVPN server, configure other relevant parameters according to your actual network environment, and click **OK**.

Server Name	Enter a name to identify the VPN server.
AccountPWD	When enabled, OpenVPN will use username/password to authenticate users.
Status	Check the box to enable the OpenVPN server.
Full Mode	Select this option to allow all client traffic to pass through the tunnel.
Protocol	Select the communication protocol for the gateway which works as an OpenVPN Server. Two communication protocols are available: TCP and UDP.
Service Port	Enter a VPN service port to which a VPN device connects. The default port is 1194.
Local Network	Select the network on the local side of the VPN tunnel. The VPN policy will be only applied to the selected local network.
WAN	Select the WAN port on which the VPN tunnel is established. Each WAN port supports only one OpenVPN tunnel when the gateway works as a OpenVPN server.
IP Pool	Enter the IP address and subnet mask to decide the range of the VPN IP pool. The VPN server will assign IP address to the remote host when the tunnel is established. You can specify any reasonable IP address that will not cause overlap with the IP address of the LAN on the local peer gateway.
Primary DNS	Specify the primary DNS server pushed to clients.
Secondary DNS	Specify the secondary DNS server pushed to clients.
Authentication Type	Specify the authentication method used by the OpenVPN server. Local: Use a built-in authentication server to authenticate when the tunnel is created. If you don't have an additional external server, you can choose local authentication. LDAP: Use an external LDAP server to authenticate when the tunnel is created.

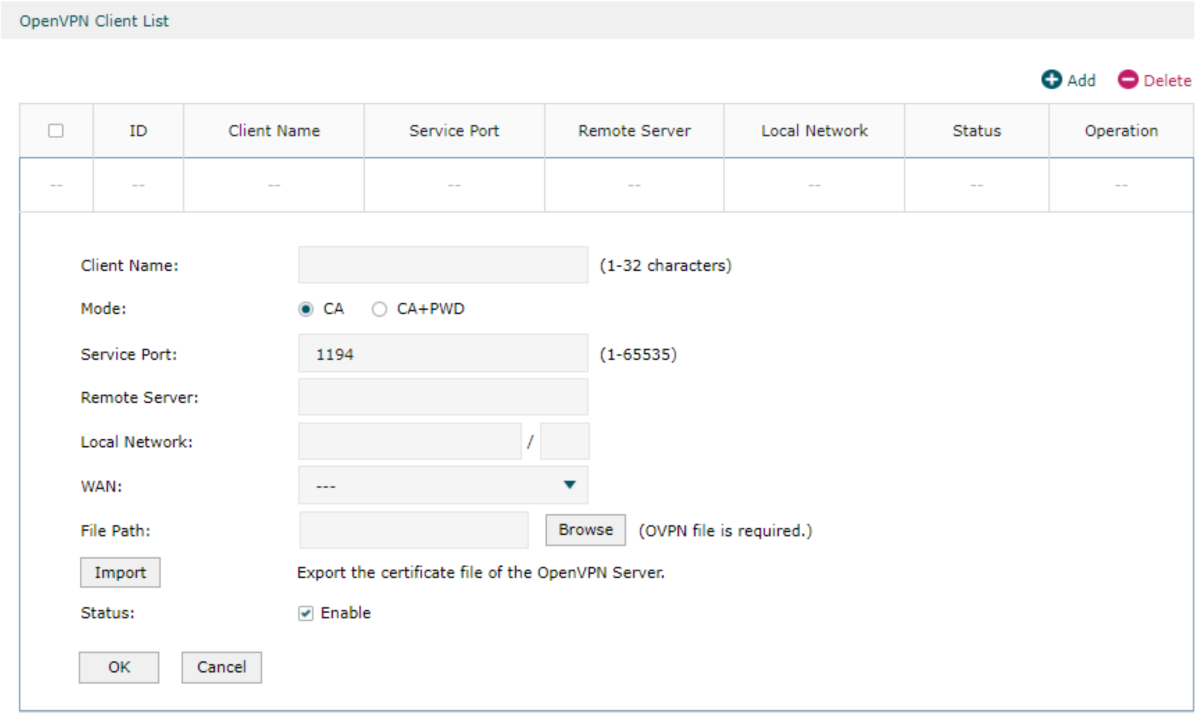
Note:

- After saving the settings, export the OpenVPN file that ends in .ovpn which is to be used by the remote client. The exported OpenVPN file contains the certificate and configuration information. It may take about 2 minutes to export the certificate.

6.2 Configuring the OpenVPN Client

Choose the menu **VPN > OpenVPN > OpenVPN Client** and click **Add** to load the following page. The gateway will act as an OpenVPN client to establish the VPN tunnel with the remote Server.

Figure 6-2 Configuring the OpenVPN Client



OpenVPN Client List

□	ID	Client Name	Service Port	Remote Server	Local Network	Status	Operation
--	--	--	--	--	--	--	--

Client Name: (1-32 characters)

Mode: ● CA ○ CA+PWD

Service Port: 1194 (1-65535)

Remote Server:

Local Network: /

WAN: ---

File Path: Browse (OVPN file is required.)

Import Export the certificate file of the OpenVPN Server.

Status: ☑ Enable

Specify the name of the OpenVPN client, configure other relevant parameters according to your actual network environment, and click **OK**.

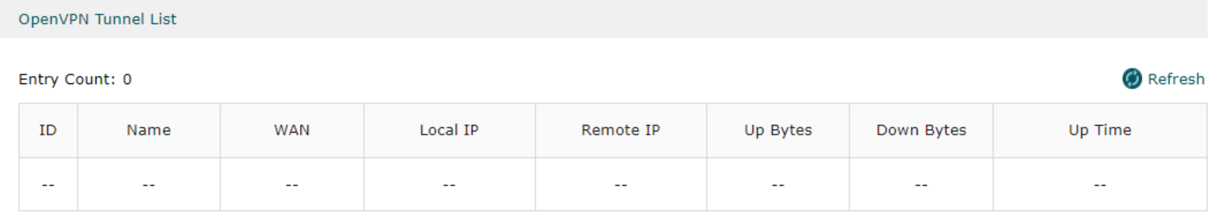
Client Name	Specify the name of OpenVPN client.
Mode	Select the authentication method used by the client. In ca mode, only the certificate file is required. In ca+pwd mode, additional username and password are required. Username - Enter the username required for client authentication. Password - Enter the password required for client authentication.
Service Port	Enter a VPN service port to which a VPN device connects. The default port is 1194.
Remote Server	Enter the IP address or domain name of the OpenVPN server.
Local Network	Select the network on the local side of the VPN tunnel. The VPN policy will be only applied to the selected local network.
WAN	Select the WAN port on which the VPN tunnel is established.

File Path	Browse the file to find the OpenVPN file that ends in .ovpn generated by the OpenVPN server.
Import	Click this button to import the OpenVPN file that ends in .ovpn generated by the OpenVPN server. Only one file can be imported. If the certificate file and configuration file are generated singly by the OpenVPN server, combine two files and import the whole file.
Status	Check the box to enable the OpenVPN client.

6.3 Viewing the OpenVPN Tunnel

Choose the menu **VPN > OpenVPN > OpenVPN Tunnel** to load the following page.

Figure 6-3 Viewing the OpenVPN Tunnel



OpenVPN Tunnel List

Entry Count: 0

ID	Name	WAN	Local IP	Remote IP	Up Bytes	Down Bytes	Up Time
--	--	--	--	--	--	--	--

Click **Refresh** to view the latest information.

Name	Displays the account name of OpenVPN server/client.
WAN	Displays the WAN port on which the VPN tunnel is established.
Local IP	Displays the assigned virtual local IP address of the tunnel.
Remote IP	Displays the assigned virtual local IP address of the tunnel.
Up Bytes	Displays the upstream throughput.
Down Bytes	Displays the downstream throughput.
Up Time	Displays how long the tunnel has been up.

7 WireGuard VPN Configuration

To complete the WireGuard VPN Configuration, follow these steps:

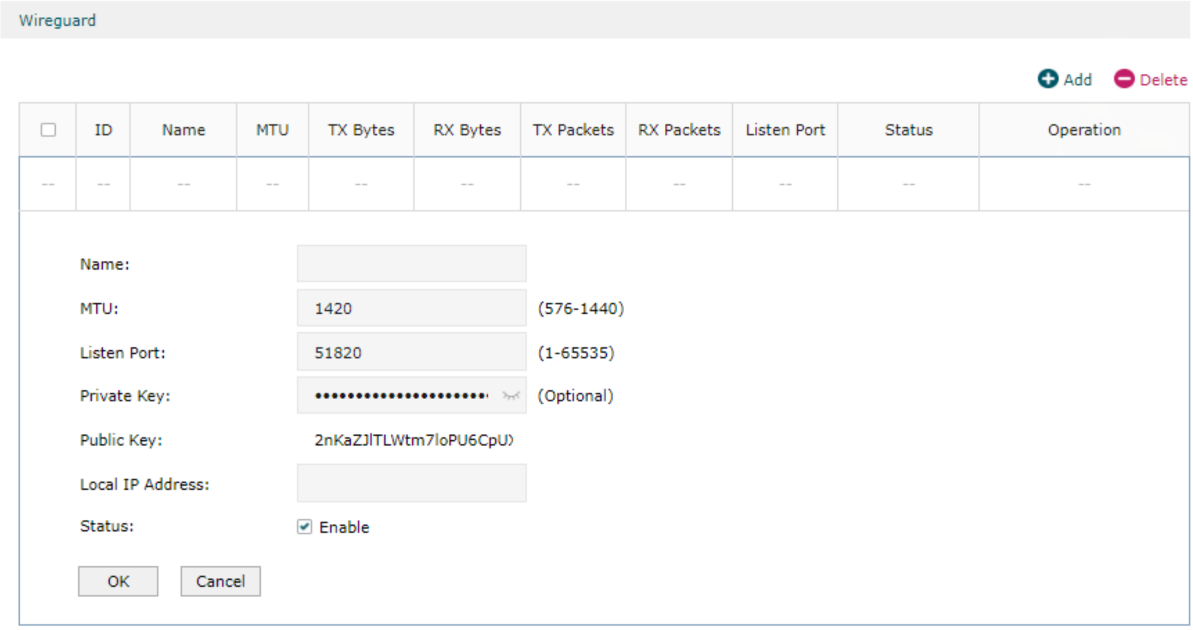
1) Configure the WireGuard Server.

2) Configure the Peers settings.

7.1 Configuring the WireGuard VPN Server

Choose the menu **VPN > WireGuard > WireGuard** and click **Add** to load the following page.

Figure 7-1 Configuring the WireGuard VPN Server



□	ID	Name	MTU	TX Bytes	RX Bytes	TX Packets	RX Packets	Listen Port	Status	Operation
--	--	--	--	--	--	--	--	--	--	--

Name:		
MTU:	1420	(576-1440)
Listen Port:	51820	(1-65535)
Private Key:	••••••••••••••••••••••	(Optional)
Public Key:	2nKaZJlTLWtm7loPU6CpU)	
Local IP Address:		
Status:	☑ Enable	

Specify the name of the WireGuard VPN server, configure other relevant parameters according to your actual network environment, and click **OK**.

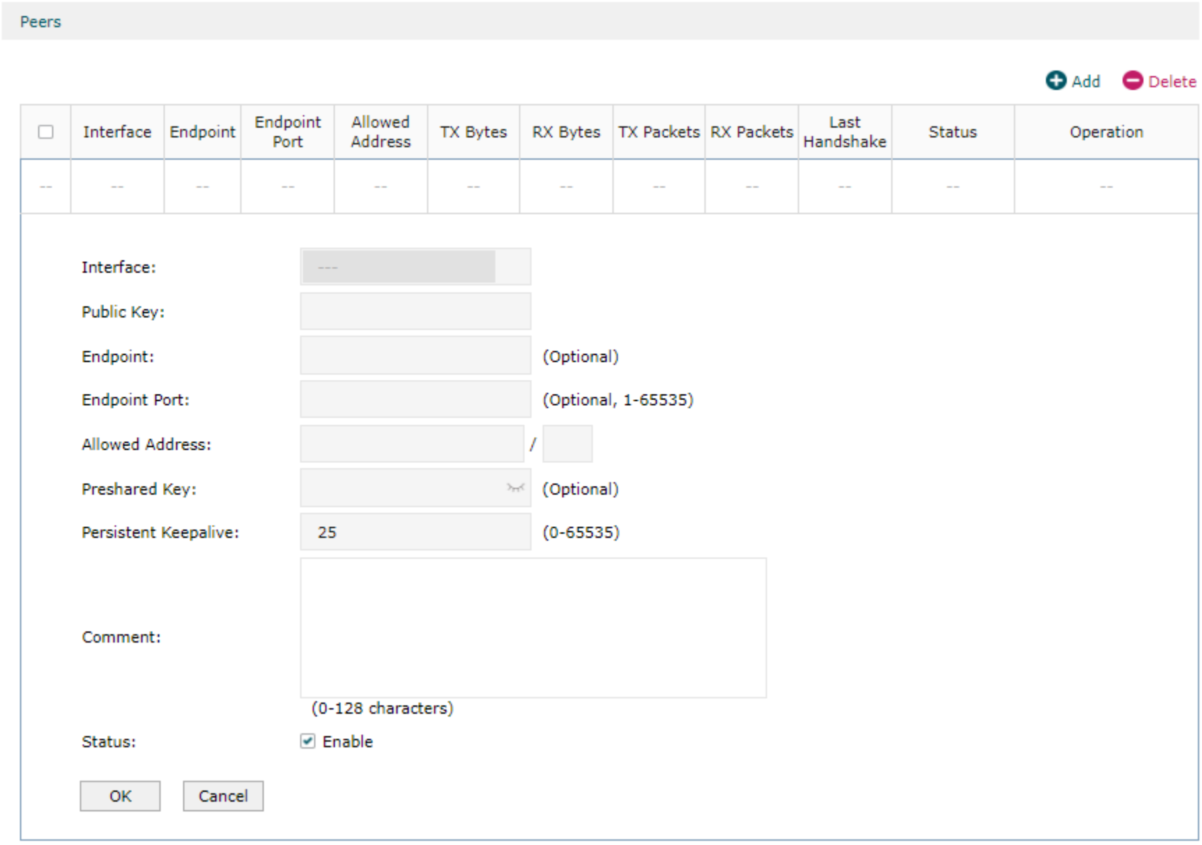
Name	Specify the name that identifies the Wireguard interface.
MTU	Specify the MTU value of the Wireguard interface. The default value 1420 is recommended.
Listen Port	Specify the port number that the Wireguard interface listens to.
Service Port	Enter a VPN service port to which a VPN device connects. The default port is 1194.
Private Key	Specify the private key of the Wireguard interface. The value will be automatically generated on the device, and you can also modify it manually.

Public Key	Specify the public key of the Wireguard interface. This field will be automatically generated based on the private key.
Local IP Address	Specify the IP address of the WireGuard interface. Please select a reserved address to avoid IP conflicts.
Status	Specify whether to enable the Wireguard interface.

7.2 Configuring the Peers Settings

Choose the menu **VPN > WireGuard > Peers** and click **Add** to load the following page.

Figure 7-2 Configuring the Peers



□	Interface	Endpoint	Endpoint Port	Allowed Address	TX Bytes	RX Bytes	TX Packets	RX Packets	Last Handshake	Status	Operation
--	--	--	--	--	--	--	--	--	--	--	--

Interface: ---

Public Key:

Endpoint: (Optional)

Endpoint Port: (Optional, 1-65535)

Allowed Address: /

Preshared Key: (Optional)

Persistent Keepalive: 25 (0-65535)

Comment: (0-128 characters)

Status: ☑ Enable

You should configure an Endpoint and an Endpoint Port for at least one peer gateway.

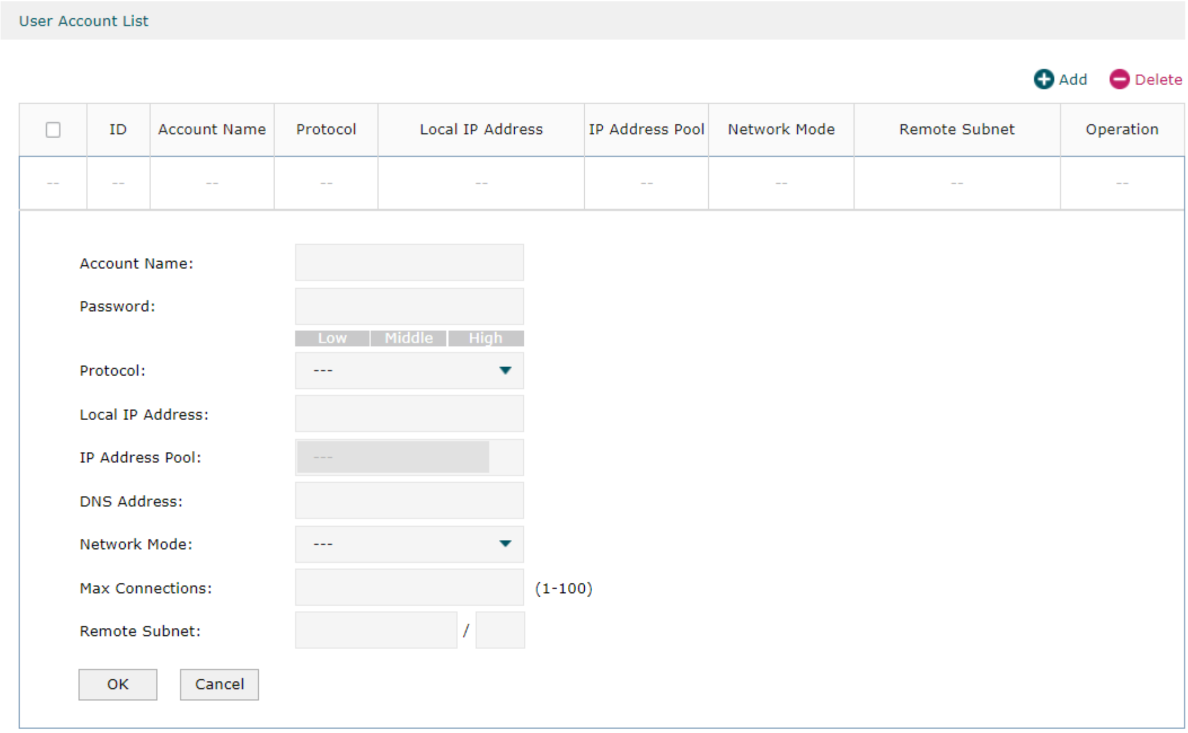
Interface	Specify the Wireguard interface to which the peer belongs.
Public key	Specify the public key of the peer.
Endpoint	Specify the IP address of the peer.
Endpoint Port	Specify the port number of the peer.

Allowed Address	Specify the address segment that allows traffic to pass through. Generally, you can fill in the subnet address of the peer.
Persistent Keepalive	Specify the tunnel keepalive packet interval.
Comment	Enter the description of the peer.
Status	Specify whether to enable the peer.

8 Users Configuration

To configure the accounts of users, Choose the menu **VPN > Users > Users** and click **Add** to load the following page.

Figure 8-1 Configuring the User Account



User Account List

□	ID	Account Name	Protocol	Local IP Address	IP Address Pool	Network Mode	Remote Subnet	Operation
--	--	--	--	--	--	--	--	--

Account Name:

Password:

Low Middle High

Protocol: ---

Local IP Address:

IP Address Pool: ---

DNS Address:

Network Mode: ---

Max Connections: (1-100)

Remote Subnet: /

Enter the account name and password, configure other relevant parameters according to your actual network environment, and click **OK**.

Account Name	Specify the account name used for the VPN tunnel.
Password	Specify the account password used for the VPN tunnel. Your VPN clients will use the account name and password for authentication.
Protocol	Specify the protocol for the VPN tunnel. There are two types: L2TP and PPTP.
Local IP Address	Specify the local virtual IP address for the VPN server. Please avoid using the IP address in the DHCP range, which may cause IP confliction, you can enter the LAN IP of the gateway. To find out the DHCP Range, go to Network > LAN > Network List and view the information of the desired network.
IP Address Pool	Specify the IP address pool from which the IP address will be assigned to the VPN client. The IP Pool referenced here can be created on the Preferences > VPN IP Pool page.
DNS Address	Specify the DNS address to be assigned to the VPN client (8.8.8.8 for example), you can enter the LAN IP of the gateway.

Part 12

Configuring SSL VPN

CHAPTERS

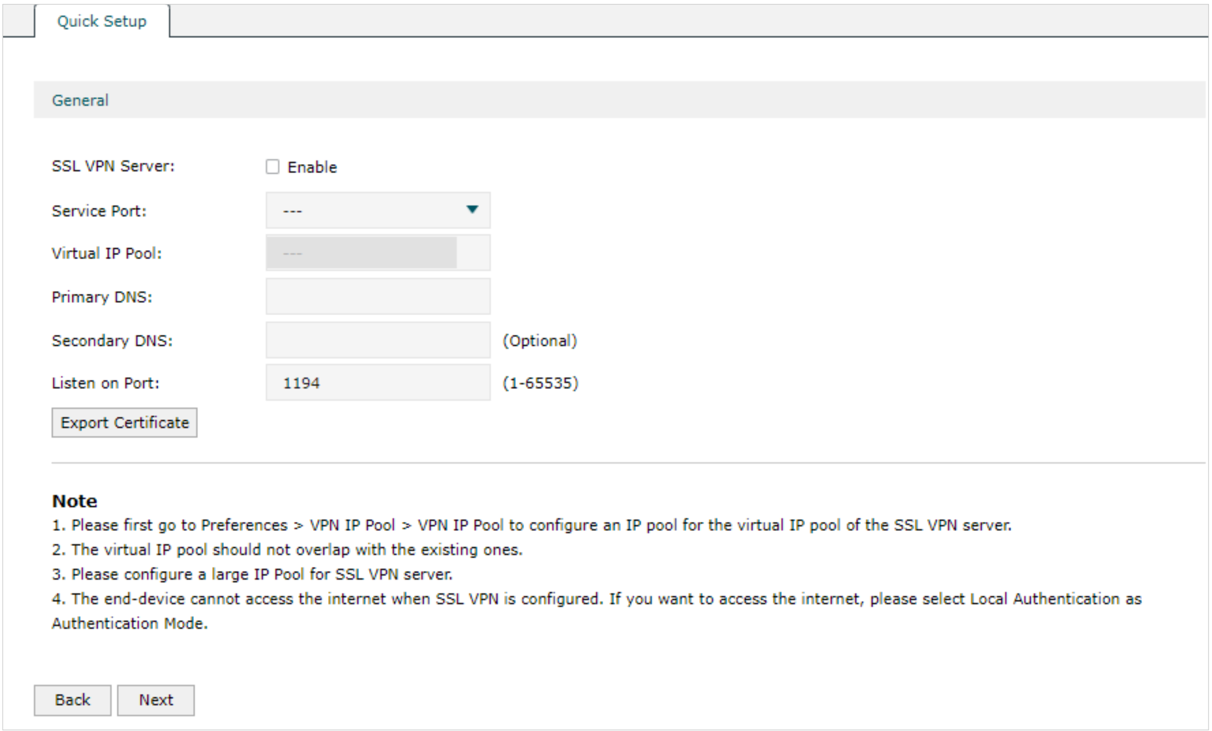
1 Overview

SSL VPN provides remote users the access to the enterprise network from anywhere on the Internet. The remote access is enabled through a Secure Socket Layer (SSL) VPN gateway.

2 Quick Setup

The quick setup will tell you how to configure the basic network parameters. To start quick setup, choose the menu **SSL VPN > Quick Setup > Quick Setup** and click start to load the following page.

Figure 2-1 Quick Setup



SSL VPN Server: □ Enable

Service Port: ---

Virtual IP Pool: ---

Primary DNS:

Secondary DNS: (Optional)

Listen on Port: 1194 (1-65535)

Note

1. Please first go to Preferences > VPN IP Pool > VPN IP Pool to configure an IP pool for the virtual IP pool of the SSL VPN server.
2. The virtual IP pool should not overlap with the existing ones.
3. Please configure a large IP Pool for SSL VPN server.
4. The end-device cannot access the internet when SSL VPN is configured. If you want to access the internet, please select Local Authentication as Authentication Mode.

Follow the quick setup to configure the SSL VPN.

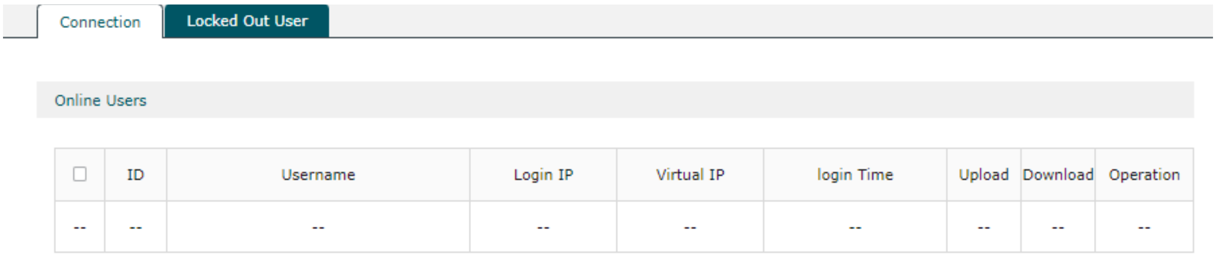
3 Status Configuration

This feature enables you to view the information of all the clients connected to the SSL VPN. You can also block or disconnect specific clients based on needs. Besides, you can view the currently locked out users, and add, delete or edit an entry.

3.1 Viewing the Status Information

Choose the menu **SSL VPN > Status > Connection** to load the following page.

Figure 3-1 Viewing the Status Information



Online Users

□	ID	Username	Login IP	Virtual IP	login Time	Upload	Download	Operation
--	--	--	--	--	--	--	--	--

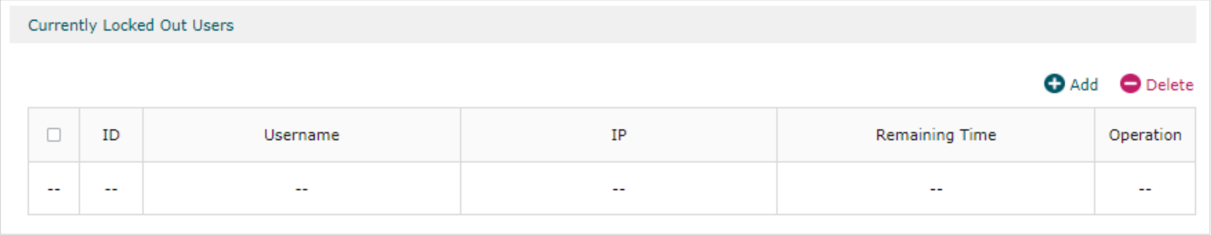
In the **Online Users** section, you can view the information of all the clients connected to the SSL VPN. You can also block or disconnect specific clients based on needs.

Username	Displays the username a client used for login.
Login IP	Displays the IP address of a client.
Virtual IP	Displays the virtual IP address assigned to a client by the SSL VPN server.
Login Time	Displays the time when a client logged in.
Upload	Displays the total upload traffic of a client.
Download	Displays the total download traffic of a client.
Operation	Block or disconnect a client. **Block:** Disconnect a client and put the client into the list of Locked Out Users. A locked out user cannot log in again. To enable Username Lockout or IP Lockout, go to **SSL VPN > SSL VPN Server > Advanced**. **Disconnect:** Disconnect a client for once.

3.2 Viewing Locked Out User

Choose the menu **SSL VPN>Status > Locked Out User** to load the following page.

Figure 3-2 Viewing Locked Out User



Currently Locked Out Users

□	ID	Username	IP	Remaining Time	Operation
--	--	--	--	--	--

In the **Currently Locked Out Users** section, you can view the currently locked out users, and add user and set the **Locked Out Duration**, delete or edit an entry.

Type	Displays locked out type.
Username	Displays the username of a locked out user.
IP	Displays the IP address of a locked out user.
Remaining Time	Displays the remaining effective time of a locked out entry.

Note:

- Before SSL VPN configuration, please go to **Preferences > VPN IP Pool > VPN IP Pool** to set a virtual IP pool for SSL VPN server.
- The SSL VPN will take effect after the configuration is completed.

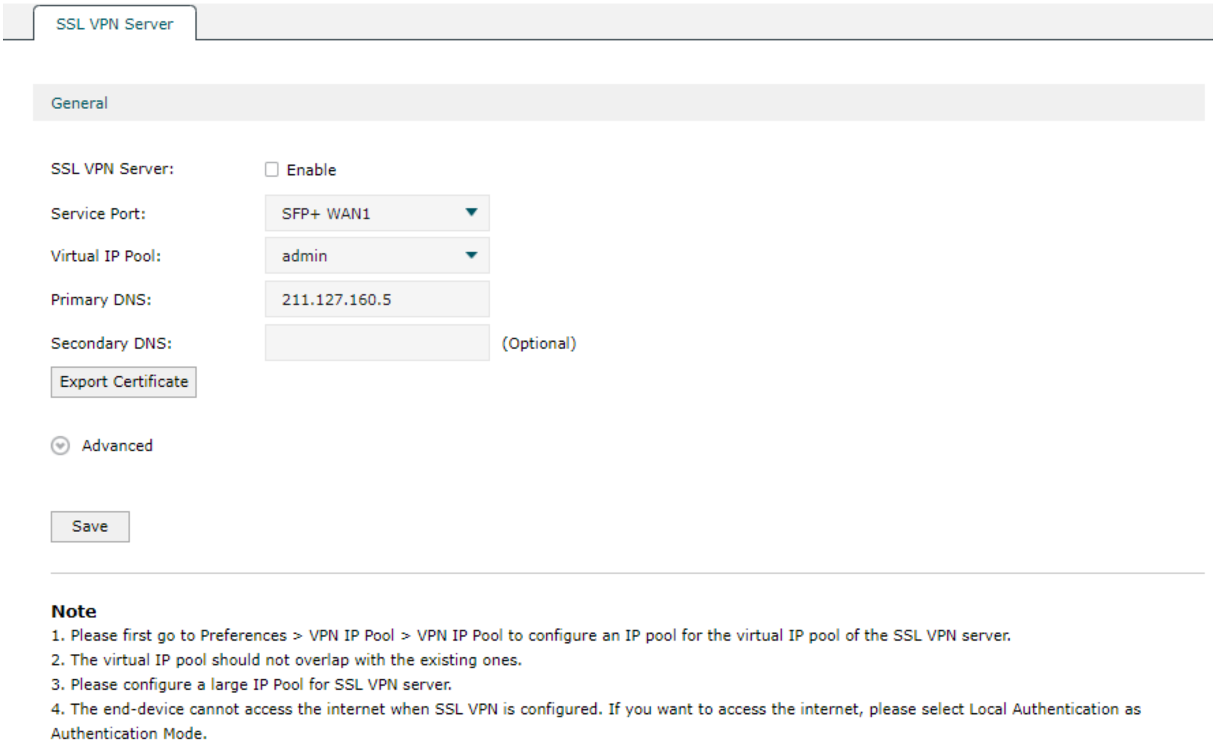
4 SSL VPN Server Configuration

In SSL VPN Server, you can enable the feature and configure the SSL VPN settings.

4.1 Configuring the SSL VPN Server

Choose the menu **SSL VPN > SSL VPN Server > SSL VPN Server** to load the following page.

Figure 4-1 Configuring the SSL VPN Server



SSL VPN Server: □ Enable

Service Port: SFP+ WAN1

Virtual IP Pool: admin

Primary DNS: 211.127.160.5

Secondary DNS: (Optional)

Note

1. Please first go to Preferences > VPN IP Pool > VPN IP Pool to configure an IP pool for the virtual IP pool of the SSL VPN server.
2. The virtual IP pool should not overlap with the existing ones.
3. Please configure a large IP Pool for SSL VPN server.
4. The end-device cannot access the internet when SSL VPN is configured. If you want to access the internet, please select Local Authentication as Authentication Mode.

Check the box to enable the feature, then configure the corrresponding parameters

Service Port	Select the port for the SSL VPN server to listen on, and the VPN tunnel will take effect on the port.
Virtual IP Pool	Select a virtual IP Pool, and the SSL VPN server will assign an IP address to a connected client within the pool. To create an IP Pool, go to **Preferences > VPN IP Pool > VPN IP Pool**. The number of IP addresses in the IP pool should not be less than 4.
Primary DNS	Specify the IP address of the DNS server. Please assign the LAN IP to the SSLVPN DNS server.

Secondary DNS	Specify the IP address of the DNS server. Please assign the LAN IP to the SSLVPN DNS server.
Listen on Port	Specify the port for the SSL VPN server to listen on. By default, it is 1194.
Authentication Type	Select the authentication for the clients. For RADIUS Authentication, go to **SSL VPN > Authentication** to configure.
Username Lockout	Block a client with the specific login username. **Max. Login Attempts:** Specify the maximum failed login attempts for a username. After the maximum attempt is reached, the username will be locked out. **Lock Duration:** Specify how long the username will be locked out.
IP Lockout	Block a client of the specific login IP. **Max. Login Attempts:** Specify the maximum failed login attempts for a username. After the maximum attempt is reached, the username will be locked out. **Lock Duration:** Specify how long the username will be locked out.
Idle Timeout	Enable the feature and the VPN tunnel will close automatically if there is no traffic for the specified amount of time.
Full Mode	Enable the feature and all traffic will go through the SSL VPN tunnel. When the feature is disabled, only the resource-related traffic will go through the tunnel.

Note:

- Please first go to **Preferences > VPN IP Pool > VPN IP Pool** to configure an IP pool for the virtual IP pool of the SSL VPN server.
- The virtual IP pool should not overlap with the existing ones.
- Please configure a large IP Pool for SSL VPN server.
- The end-device cannot access the internet when SSL VPN is configured. If you want to access the internet, please select Local Authentication as Authentication Mode.

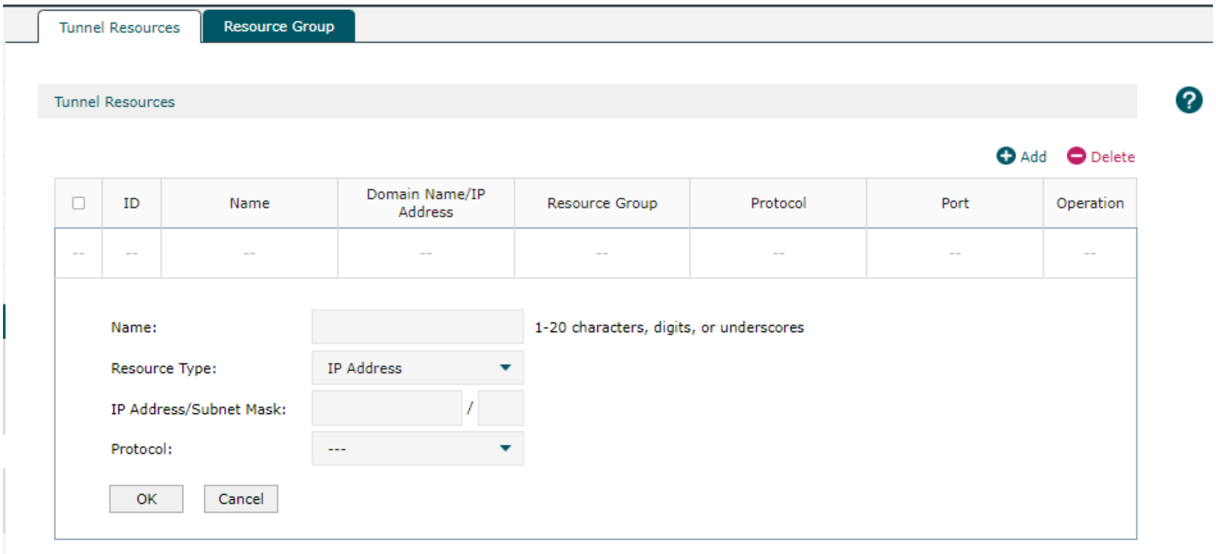
5 Resource Management

This feature enables you to configure the resources the clients can access through the VPN tunnel, including IP range and domain name, or add the multiple tunnel resources to a group for better management.

5.1 Configuring the Resources

Choose the menu **SSL VPN > Resource Management > Tunnel Resources** and click **Add** to load the following page.

Figure 5-1 Configuring the Resources



□	ID	Name	Domain Name/IP Address	Resource Group	Protocol	Port	Operation
--	--	--	--	--	--	--	--

Name: (1-20 characters, digits, or underscores)

Resource Type: IP Address

IP Address/Subnet Mask: /

Protocol: ---

Specify the name for the entry and configure other parameters, and click **OK**.

Resource Type

Select the type for the resources.

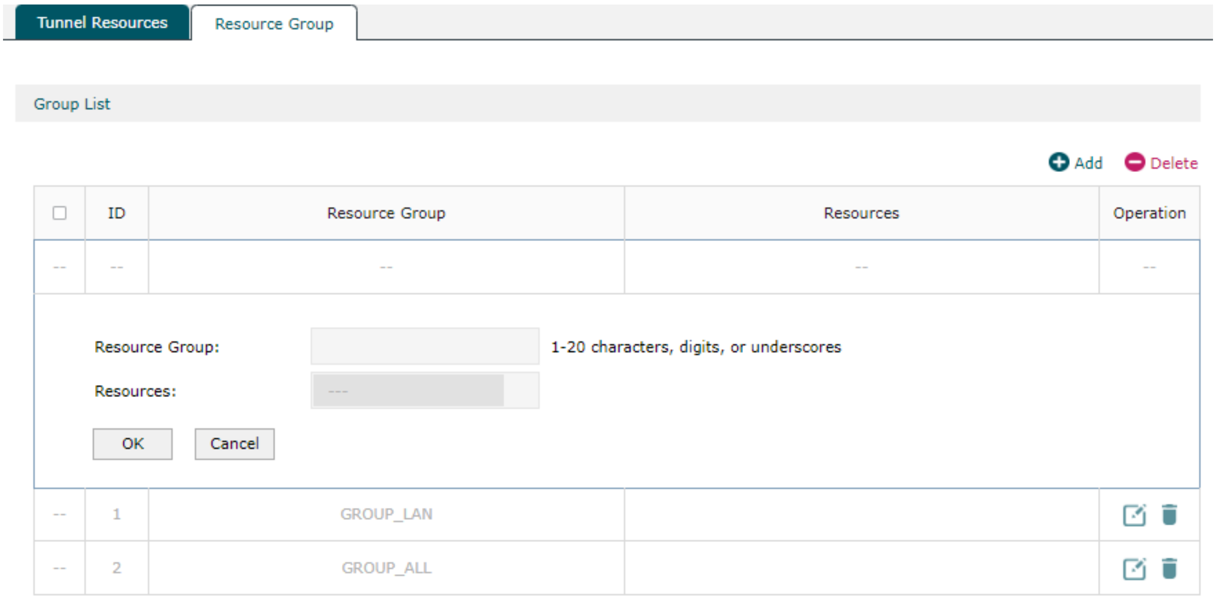
IP Address: Specify IP range the clients can access, and the protocols the clients can use to access.

Domain Name: Specify domain name the clients can access.

5.2 Grouping Tunnel Resources

Choose the menu **SSL VPN > Resource Management > Tunnel Resources** and click **Add** to load the following page.

Figure 5-2 Grouping Tunnel Resources



□	ID	Resource Group	Resources	Operation
--	--	--	--	--
--	1	GROUP_LAN		
--	2	GROUP_ALL		

Resource Group: 1-20 characters, digits, or underscores

Resources: ---

OK Cancel

Specify the name for the resource group, select the resources for the group, and click **OK**.

Note:

- A resource entry can be added to multiple resource groups, and the entry cannot be deleted after it is added to a resource group. If you want to delete a resource entry, please remove it from the resource group first.
- GROUP_LAN refers to the resources of the LAN segment.
- GROUP_ALL refers to the resources of all network segments.

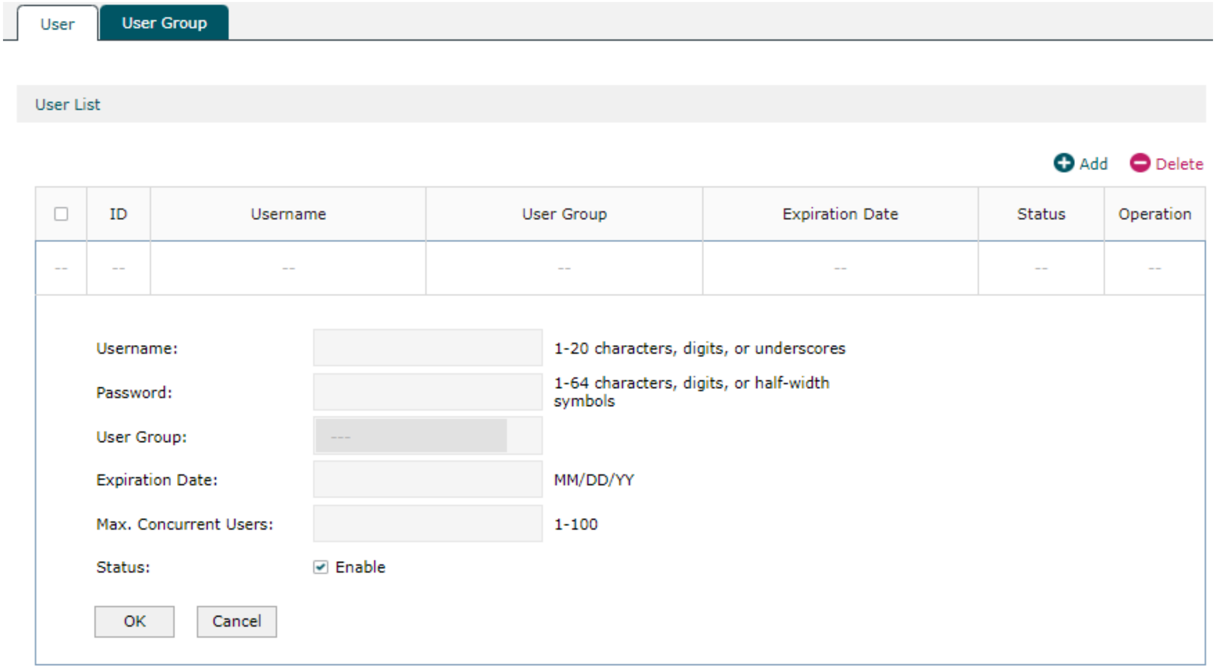
6 User Management

This feature enables you to view and configure all user settings of the SSL VPN, or add multiple users to a group for better management.

6.1 Adding the User List

Choose the menu **SSL VPN > User Management > User** and click **Add** to load the following page.

Figure 6-1 Adding the User List



☐	ID	Username	User Group	Expiration Date	Status	Operation
--	--	--	--	--	--	--

Username:		1-20 characters, digits, or underscores
Password:		1-64 characters, digits, or half-width symbols
User Group:	---	
Expiration Date:		MM/DD/YY
Max. Concurrent Users:		1-100
Status:	☑ Enable	

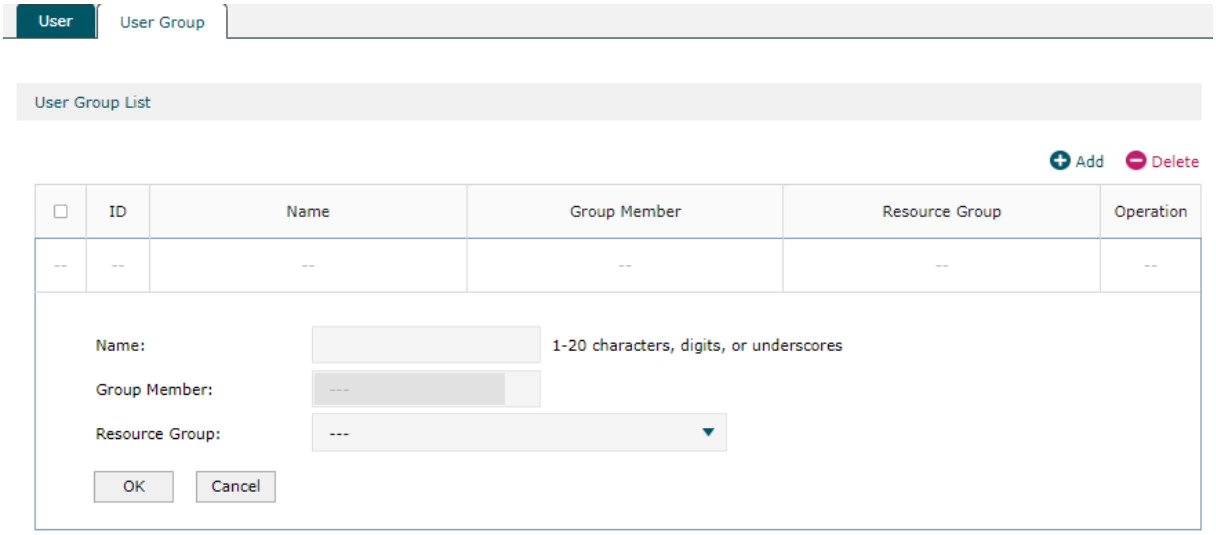
Configure relevaant parameters and click **OK**.

Username	Specify the username a client used for login.
Password	Specify the password a client used for login.
User Group	Select which group the user belongs to. A user can only be added to one user group.
Expiration Date	Specify when the user will expire.
Max. Concurrent Users	Specify the maximum number of clients using the username for login concurrently. After the maximum number is reached, new login attempts will be rejected.
Status	Displays the status of the user entry.

6.2 Grouping Users

Choose the menu **SSL VPN > User Management > User Group** and click **Add** to load the following page.

Figure 6-2 Grouping Users



□	ID	Name	Group Member	Resource Group	Operation
--	--	--	--	--	--

Name: 1-20 characters, digits, or underscores

Group Member: ---

Resource Group: ---

Specify the name for the user group, select the resources for the group, and click **OK**.

Name	Specify a name for the user group.
Group Member	Select the users you want to add into the group. All users in the group share the same resources.
Resource Group	Select the resource group for the user group.

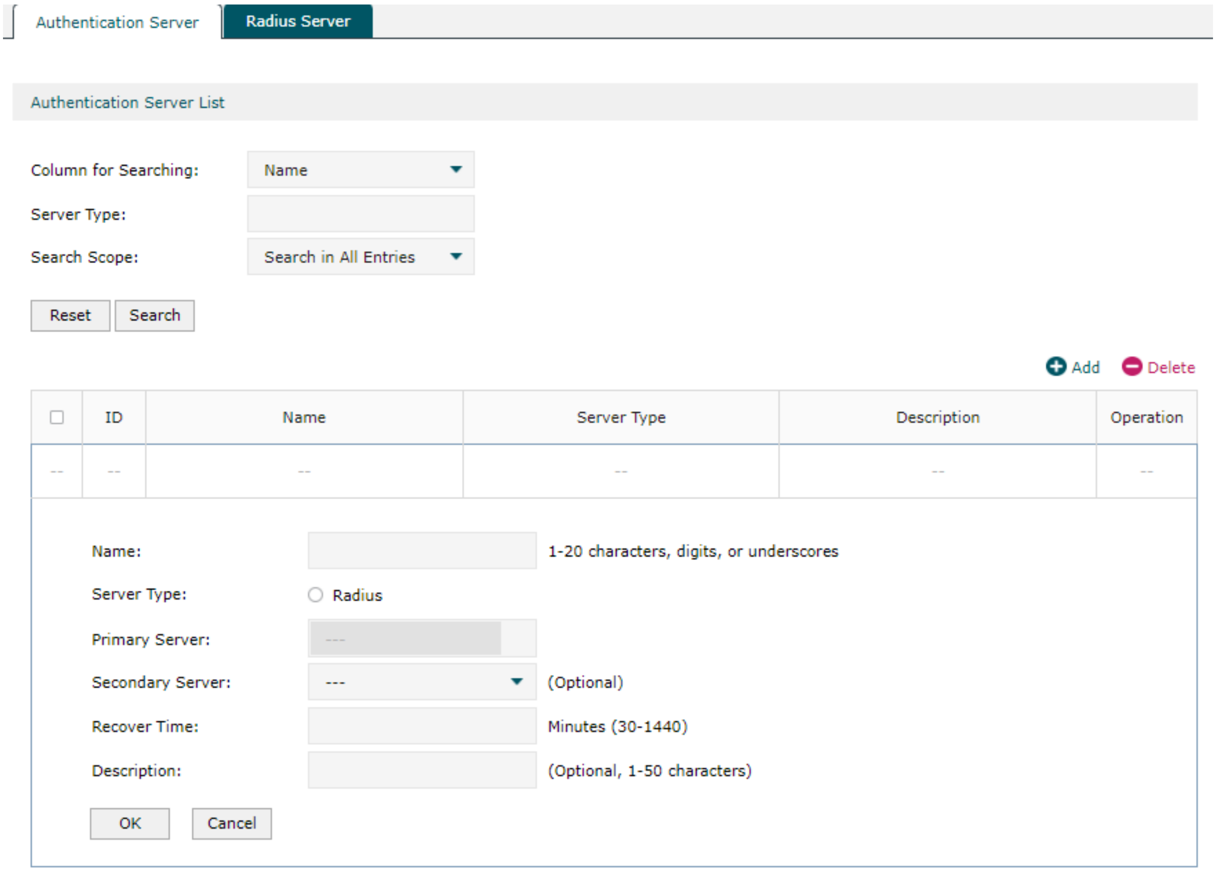
7 Authentication

This feature enables you to view and add authentication servers, or view and configure RADIUS server settings.

7.1 Adding the Authentication Server List

Choose the menu **SSL VPN > Authentication > Authentication Server** and click **Add** to load the following page.

Figure 7-1 Adding the Authentication Server List



Column for Searching: Name

Server Type:

Search Scope: Search in All Entries

□	ID	Name	Server Type	Description	Operation
--	--	--	--	--	--

Name: 1-20 characters, digits, or underscores

Server Type: ○ Radius

Primary Server: ---

Secondary Server: --- (Optional)

Recover Time: Minutes (30-1440)

Description: (Optional, 1-50 characters)

Specify a name for the authentication server, configure relevant parameters and click **OK**.

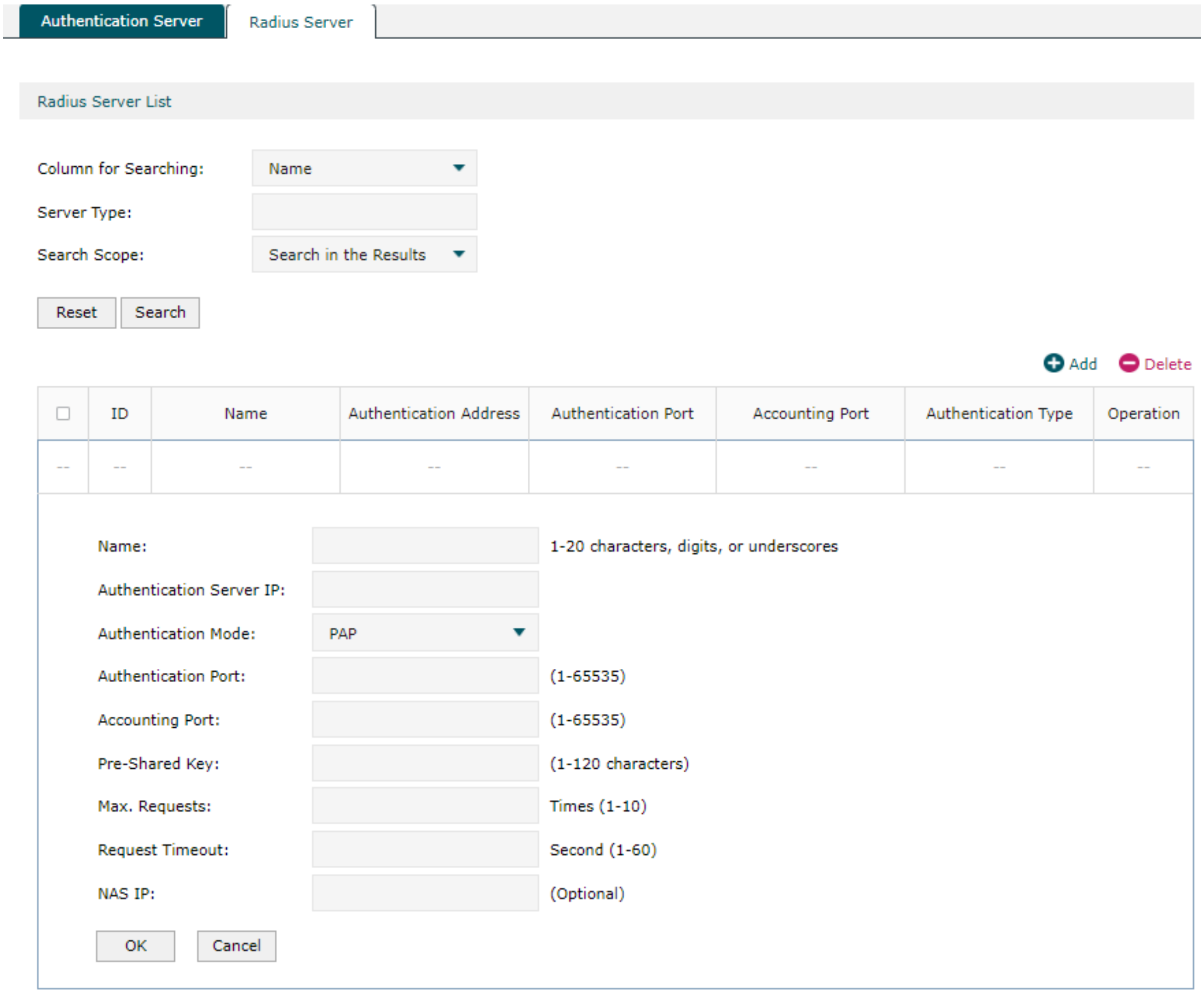
Server Type	Select the type for the authentication server. Currently, only RADIUS server is supported.
Primary Server	Specify the primary server for authentication.
Secondary Server	Specify the secondary server for authentication. When the primary server is down, the secondary server will be used.
Recover Time	Specify the interval to connect the primary server again when the primary server is down.
Description	Enter a description for the server.

Status	Displays the status of the user entry.

7.2 Configuring the Radius Server

Choose the menu **SSL VPN > Authentication > Radius Server** and click **Add** to load the following page.

Figure 7-2 Configuring the Radius Server



Column for Searching: Name

Server Type:

Search Scope: Search in the Results

□	ID	Name	Authentication Address	Authentication Port	Accounting Port	Authentication Type	Operation
--	--	--	--	--	--	--	--

Name: 1-20 characters, digits, or underscores

Authentication Server IP:

Authentication Mode: PAP

Authentication Port: (1-65535)

Accounting Port: (1-65535)

Pre-Shared Key: (1-120 characters)

Max. Requests: Times (1-10)

Request Timeout: Second (1-60)

NAS IP: (Optional)

Specify the name for the RADIUS server, configure relevant parameters and click **OK**.

Authentication Server IP	Specify the IP address of the RADIUS server.
Authentication Mode	Select the authentication protocol for the RADIUS server. Two authentication protocols are available: PAP and CHAP.
Authentication Port	Specify the UDP destination port on the authentication server for authentication requests. The recommended port is 1812.

Accounting Port	Specify the UDP destination port on the RADIUS server for accounting requests. The recommended port is 1813.
Pre-Shared Key	Specify the password that will be used to validate the communication between the gateway and the RADIUS authentication server.
Max. Request	Specify the maximum number of requests sent when no response is received.
Request Timeout	Specify the maximum interval for request timeout. After timeout, the request will be sent again.
NAS IP	Specify the IP address for the gateway to communicate with the RADIUS server.

Part 13

Configuring Authentication

CHAPTERS

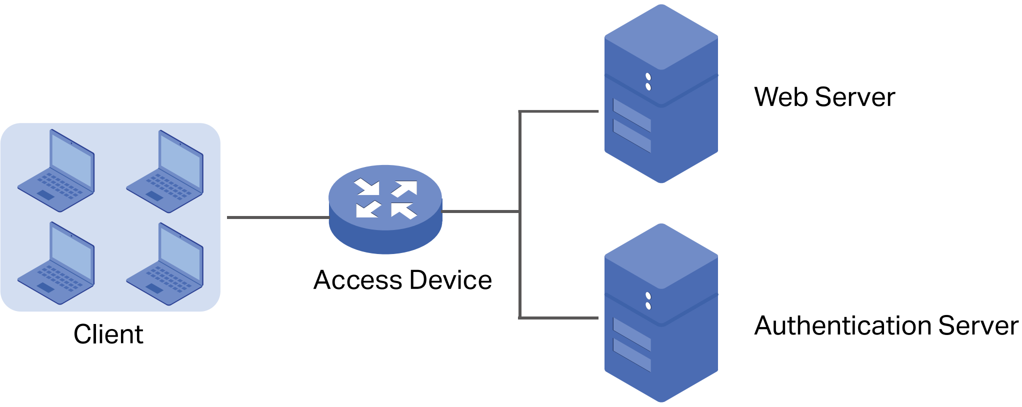
1 Overview

Portal authentication, also known as Web authentication, is usually deployed in a guest-access network (like a hotel or a coffee shop) to control the client's internet access. In portal authentication, all the client's HTTP requests will be redirected to an authentication page first. The client needs to enter the account information on the page to authenticate, then can visit the internet after the authentication succeeded.

1.1 Typical Topology

The typical topology of portal authentication is shown as below:

Figure 1-1 Topology of Portal Authentication



- Client

The end device that needs to be authenticated before permitted to access the internet.

- Access Device

The device that supports portal authentication. In this user guide, it means the gateway. The Access Device helps to: redirect all HTTP requests to the Web Server before authenticated; interact with the Authentication Server to authenticate the client during the authentication process; permit users to access the internet after the authentication succeeded.

- Web Server

The web server responds to client's HTTP requests, and returns an authentication login page.

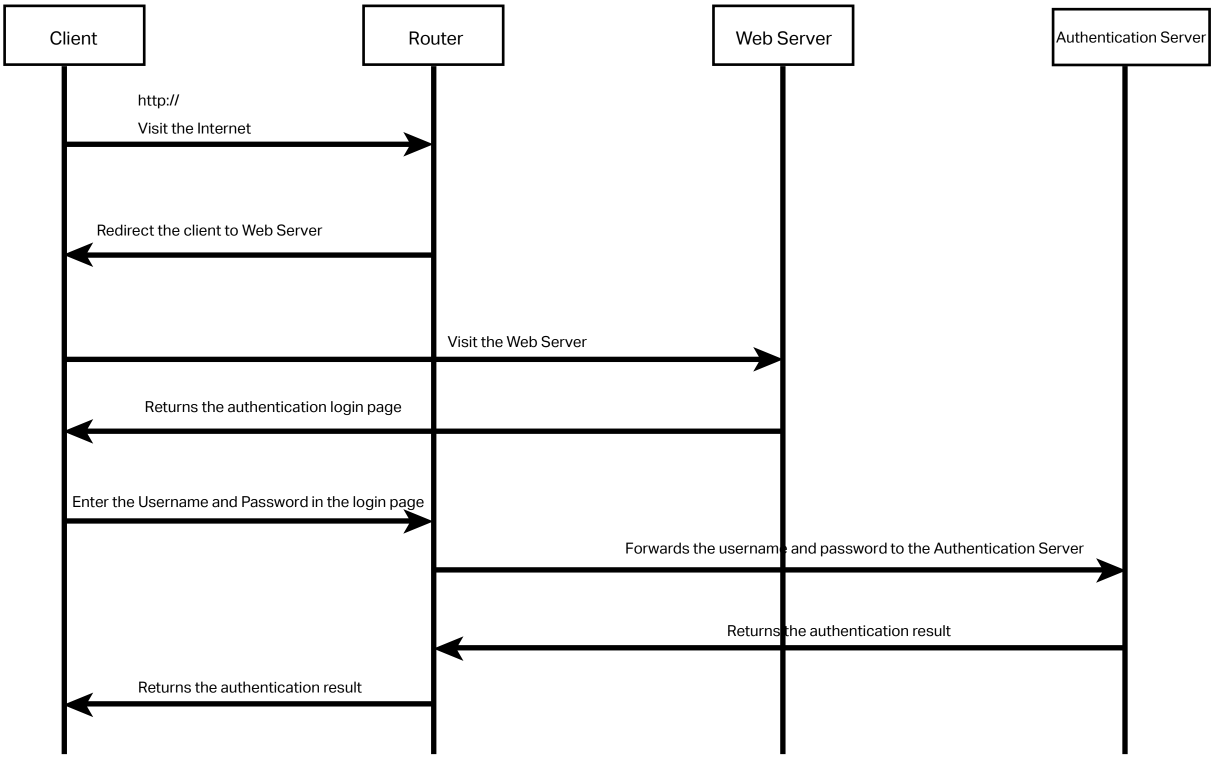
- Authentication Server

The authentication server records the information of the user's account, and interacts with the access device to authenticate clients.

1.2 Portal Authentication Process

The portal authentication process is shown as below:

Figure 1-2 Portal Authentication Process


Client
Router
Web Server
Authentication Server
http://
Visit the Internet
Redirect the client to Web Server
Visit the Web Server
Returns the authentication login page
Enter the Username and Password in the login page
Forwards the username and password to the Authentication Server
Returns the authentication result
Returns the authentication result

1) The client is connected to the gateway but not authenticated, and starts to visit the internet through HTTP;
2) The gateway redirects the client's HTTP request to the web server;
3) The client visits the web server;
4) The Web server returns the authentication login page to the client;
5) The client enters the username and password on the authentication login page;
6) The gateway forwards the username and password to the authentication server;
7) The authentication server returns the authentication result to the gateway;
8) The gateway replies to the client with the authentication result;
9) The client visits the internet after the authentication succeeded.

1.3 Supported Features

To configure portal authentication, you need to configure both the web server and the authentication server. The web server provides the authentication page for login; the authentication server records the account information and authenticates the clients.

1.3.1 Supported Web Server

The gateway has a built-in web server and also supports external web server. You can configure the authentication page either using the built-in server or the external server.

Custom Page

You can use the built-in web server and customize the authentication page on your gateway.

External Links

You can specify the external web server and configure the authentication page on the external web server.

1.3.2 Supported Authentication Server

The gateway provides three types of portal authentication:

Radius Authentication

In Radius authentication, you can specify an external Radius server as the authentication server. The user's account information are recorded in the Radius server.

Local Authentication

If you don't have an additional Radius server, you can choose local authentication. In local authentication, the gateway uses the built-in authentication server to authenticate. The built-in authentication server can record at most 500 local user accounts, and each account is can be used for at most 1024 clients to authenticate.

Onekey Online

In Onekey Online Authentication, users can access the network without entering any account information.

1.3.3 Guest Resources

Guest Resources is used to provide free resources for users before they pass the portal authentication.

2 Local Authentication Configuration

To configure local authentication, follow the steps:

1) Configure the authentication page.

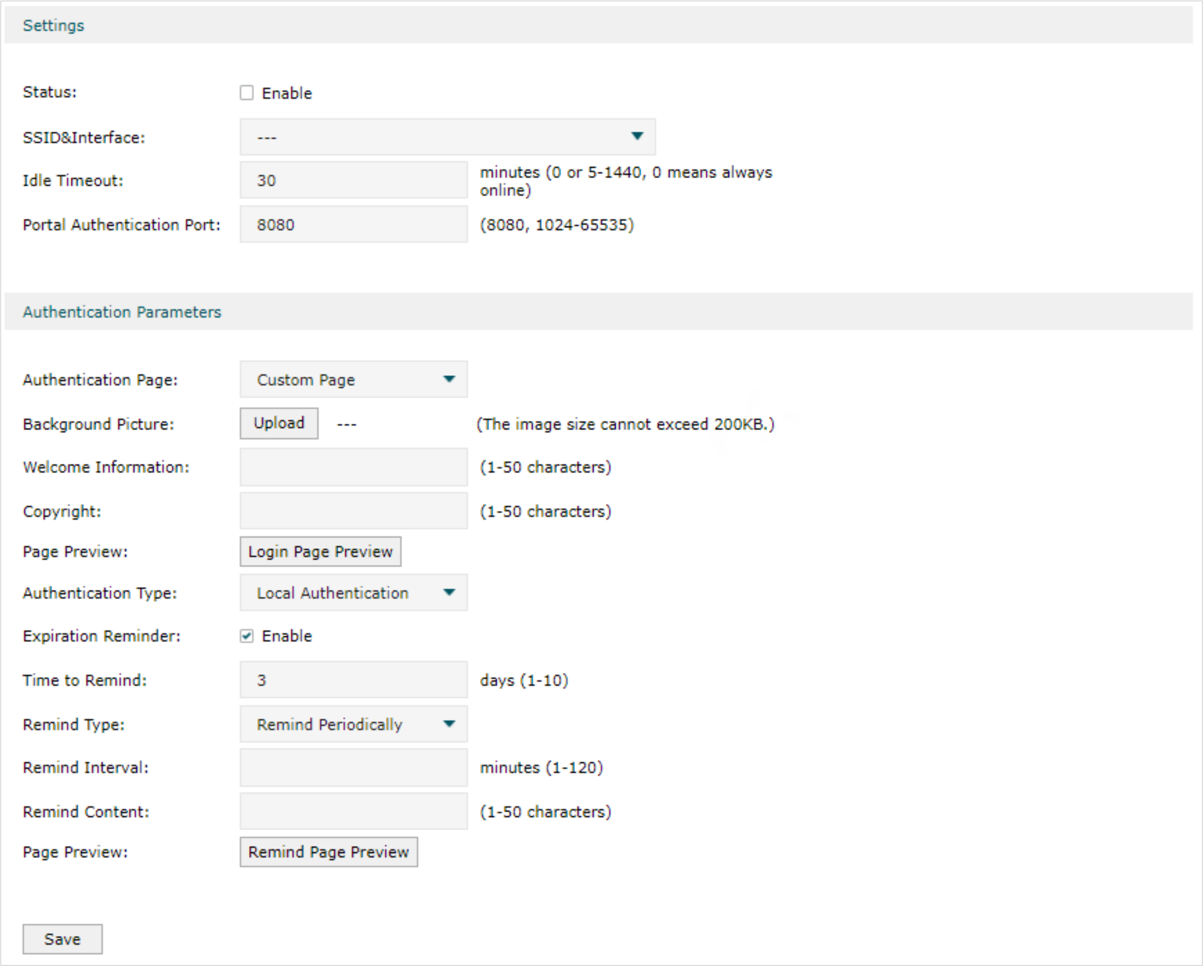
2) Configure the local user account.

2.1 Configuring the Authentication Page

The browser will redirect to the authentication page when the client try to access the internet. On the authentication page, the user need to enter the username and password to log in. After the authentication succeeded, the user can access the internet.

Choose the menu **Authentication** > **Authentication Settings** > **Web Authentication** to load the following page.

Figure 2-1 Configuring the Authentication Page



Settings

Status:	□ Enable	
SSID&Interface:	---	
Idle Timeout:	30	minutes (0 or 5-1440, 0 means always online)
Portal Authentication Port:	8080	(8080, 1024-65535)

Authentication Parameters

Authentication Page:	Custom Page	
Background Picture:	Upload ---	(The image size cannot exceed 200KB.)
Welcome Information:		(1-50 characters)
Copyright:		(1-50 characters)
Page Preview:	Login Page Preview	
Authentication Type:	Local Authentication	
Expiration Reminder:	☑ Enable	
Time to Remind:	3	days (1-10)
Remind Type:	Remind Periodically	
Remind Interval:		minutes (1-120)
Remind Content:		(1-50 characters)
Page Preview:	Remind Page Preview	

Follow these steps to configure authentication page:

1) In the **Settings** section, enable authentication status, configure the idle timeout and portal authentication port.

Status	Check the box to enable portal authentication.
SSID&Interface	Specify the valid wireless interface and the effective interface, and you can specify more than one. The selected LAN Network contains all clients of the SSIDs that belong to this LAN Network.
Idle Timeout	Specify the idle timeout. The client will be disconnected after the specified period (Idle Timeout) of inactivity, and is required to be authenticated again. Value 0 means the client will always keep online until the authentication timeout leased, even if the client remains inactive.
Portal Authentication Port	Enter the service port for portal authentication. The default setting is 8080.

2) In the **Authentication Parameters** section, configure the parameters of the authentication page.

Authentication Page	Choose the authentication page type. **Custom**: You can use the built-in web server to customize the authentication page by specifying the background picture, welcome information and copyright information. **External Links**: You can specify a external web server to provide the authentication page by entering the URL of the external web server.
Background Picture	Click the **Upload** button to choose a local image as the background picture of the custom authentication page.
Welcome Information	Specify the welcome information to be displayed on the custom authentication page.
Copyright	Specify the copyright information to be displayed on the custom authentication page.
Page Preview	Click the **Login Page Preview** button, and you can preview the customized authentication page.
Authentication URL	Specify the URL for authentication page if you choose the Authentication Page as “External Links“. The browser will redirect to this URL when the client starts the authentication.
Success Redirect URL	Specify the Success Redirect URL if you choose the Authentication Page as “External Links“. The browser will redirect to this URL after the authentication succeeded.
Fail redirect URL	Specify the Fail Redirect URL if you choose the Authentication Page as “External Links“. The browser will redirect to this URL if the authentication failed.

Note:

If the web server is not deployed in the LAN, you need to create a Guest Resource entry to ensure the client can access the external web server before the authentication succeeded. For the configuration of Guest Resource, go to Guest Resources Configuration.

3) Choose the authentication type, and configure the expiration reminder, then click **Save**.

Authentication Type	Choose the authentication type as Local Authentication.
Expiration Reminder	Check the box to enable expiration reminder. A remind page will appear to remind users when the online time is about to expire.
Time to Remind	Specify the number of days before the expiration date to remind users.
Remind Type	Specify the remind type. **Remind Once**: Remind the user only once after the authentication succeeded. **Remind Periodically**: Remind users at specified intervals during the remind period.
Remind Interval	Specify the interval at which the gateway reminds users if the remind type is specified as "Remind Periodically".
Remind Content	Specify the remind content. The content will be displayed on the Remind page.
Page Preview	Click the button to view the remind page.

2.2 Configuring the Local User Account

In Local authentication, the gateway uses the built-in authentication server to authenticate users. You need to configure the authentication accounts for the local users.

The gateway supports two types of local users:

Formal User: If you want to provide the user with network service for a long period of time (in days), you can create Formal User accounts for them.

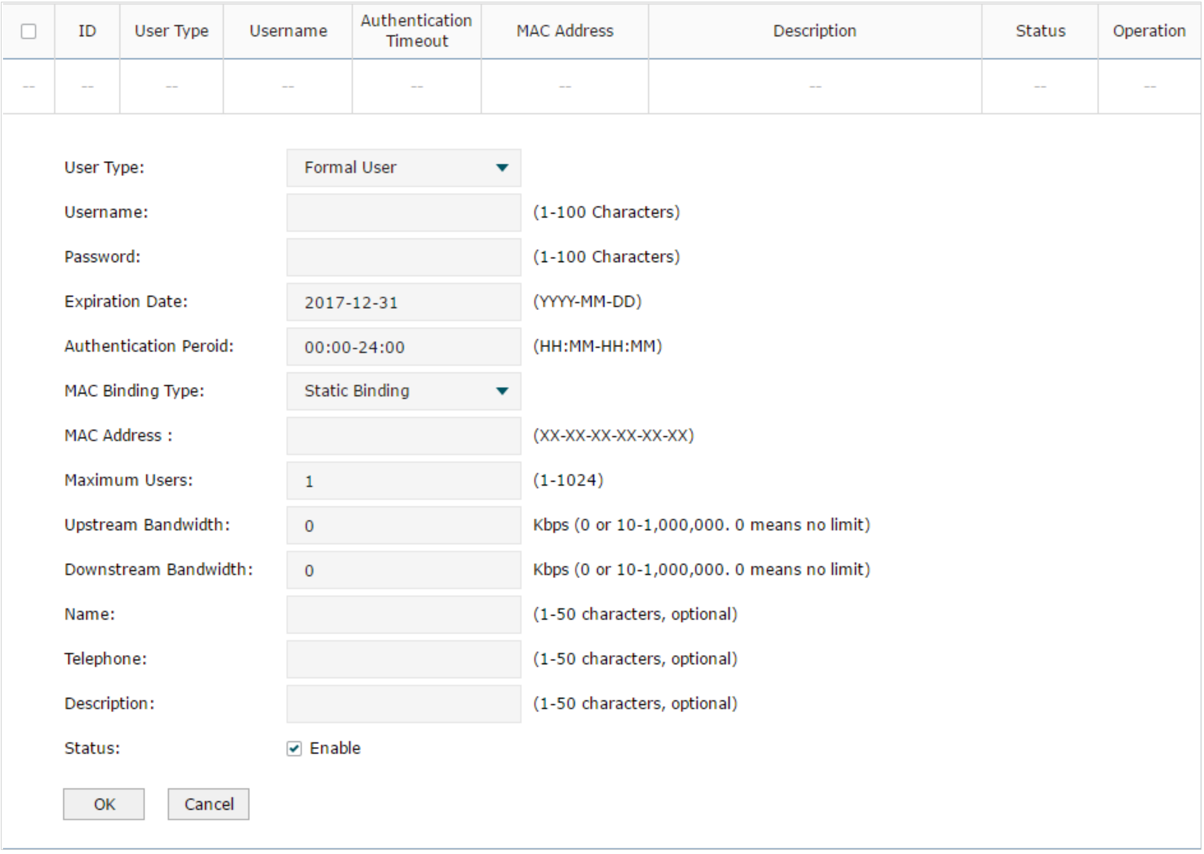
Free User: If you want to provide the user with network service for a short period of time (in minutes), you can create Free User accounts for them.

2.2.1 Configuring the Local User Account

- Configuring the Formal User Account

Choose the menu **Authentication** > **User Management** > **User Management** and click **Add** to load the following page.

Figure 2-2 Configuring the Formal User Account



□	ID	User Type	Username	Authentication Timeout	MAC Address	Description	Status	Operation
--	--	--	--	--	--	--	--	--

User Type:	Formal User ▼	
Username:		(1-100 Characters)
Password:		(1-100 Characters)
Expiration Date:	2017-12-31	(YYYY-MM-DD)
Authentication Peroid:	00:00-24:00	(HH:MM-HH:MM)
MAC Binding Type:	Static Binding ▼	
MAC Address :		(XX-XX-XX-XX-XX-XX)
Maximum Users:	1	(1-1024)
Upstream Bandwidth:	0	Kbps (0 or 10-1,000,000. 0 means no limit)
Downstream Bandwidth:	0	Kbps (0 or 10-1,000,000. 0 means no limit)
Name:		(1-50 characters, optional)
Telephone:		(1-50 characters, optional)
Description:		(1-50 characters, optional)
Status:	☑ Enable	

Specify the user type, configure the username and password for the formal user account, and configure the other corresponding parameters. Then click **OK**.

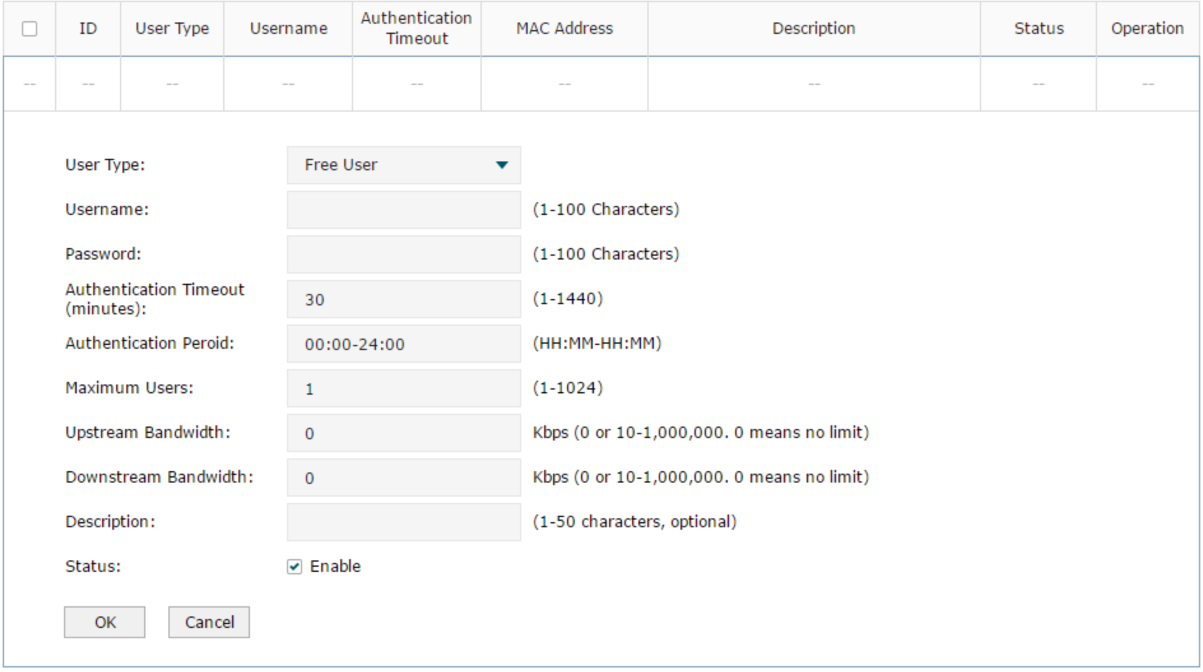
User Type	Specify the user type as Formal User.
Username / Password	Specify the username and password of the account. The username cannot be the same as any existing one.
Expiration Date	Specify the expiration date of the account. The formal user can use this account to authenticate before this date.
Authentication Peroid	Specify the period during which the client is allowed to be authenticated.
MAC Binding Type	Specify the MAC Binding type. There are three types of MAC Binding: No binding, Static Binding and Dynamic Binding. **No Binding**: The client’s MAC address will not be bound. **Static Binding**: Manually enter the MAC address of the client to be bound. Only the bound client is able to use the username and password to authenticate. **Dynamic Binding**: The MAC address of the first client that passes the authentication will be bound. Afterwards only the bound client is able to use the username and password to authenticate.
MAC Address	Enter the MAC address of the client to be bound if you choos the MAC Binding type as "Static Binding".

Maximum Users	Specify the maximum number of users that are allowed use this account to authenticate. Note: If the MAC Binding Type is either Static Binding or Dynamic Binding, only one client can use this username and password to authenticate,i.e., the bound client, even if the value of Maximum Users is configured to be greater than one.
Upstream Bandwidth / Downstream Bandwidth	(Optional) Specify the upstream / downstream bandwidth for the user. 0 means no limit.
Name	(Optional) Record the user's name.
Telephone	(Optional) Record the user's telephone number.
Description	(Optional) Enter a brief description for the user.
Status	Check the box to enable this account.

■ Configuring the Free User Account

Choose the menu **Authentication** > **User Management** > **User Management** and click **Add** to load the following page.

Figure 2-3 Configuring the Free User Account



□	ID	User Type	Username	Authentication Timeout	MAC Address	Description	Status	Operation
--	--	--	--	--	--	--	--	--

User Type:	Free User ▼	
Username:		(1-100 Characters)
Password:		(1-100 Characters)
Authentication Timeout (minutes):	30	(1-1440)
Authentication Peroid:	00:00-24:00	(HH:MM-HH:MM)
Maximum Users:	1	(1-1024)
Upstream Bandwidth:	0	Kbps (0 or 10-1,000,000. 0 means no limit)
Downstream Bandwidth:	0	Kbps (0 or 10-1,000,000. 0 means no limit)
Description:		(1-50 characters, optional)
Status:	☑ Enable	

Specify the user type, configure the username and password for the free user account, and configure the other corresponding parameters. Then click **OK**.

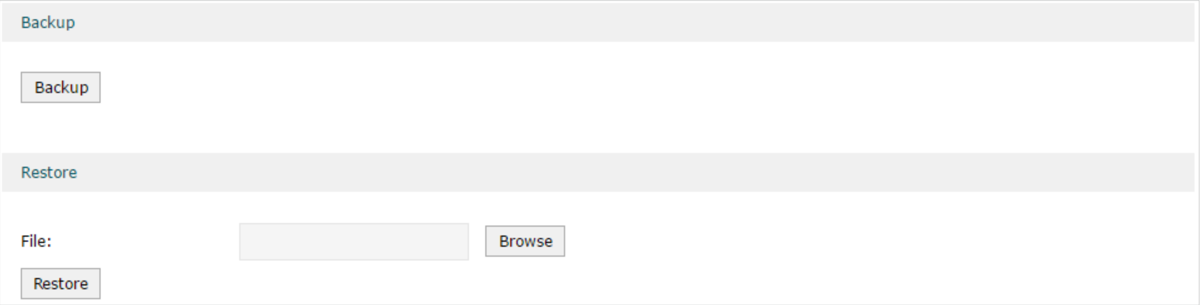
User Type	Specify the user type as Free User.

Username / Password	Specify the username and password of the user account. The username cannot be the same as any existing one.
Authentication Timeout	Specify the free duration of the account. The default value is 30 minutes.
Maximum Users	Specify the maximum number of users that are allowed to use this username and password to authenticate.
Upstream Bandwidth / Downstream Bandwidth	(Optional) Specify the upstream/downstream bandwidth for the user. 0 means no limit.
Status	Check the box to enable this account.

2.2.2 (Optional) Configuring the Backup of Local Users

Choose the menu **Authentication** > **User Management** > **Configuration Backup** to load the following page.

Figure 2-4 Configuring the Formal User



■ To backup local users' accounts

Click **Backup** button to backup all the local users accounts as a CSV file in ANSI coding format.

■ To restore local users' accounts

You can import the accounts to the gateway if you have backups. Click **Browse** to select the file path (the backup must be a CSV file), then click **Restore** to restore the accounts.

You can also manually add multiple local user accounts at a time:

1) Create an Excel file and add the local user accounts to it, then save the Excel file as a CSV file with ANSI coding format. You can click **Backup** to obtain a CSV file to view the correct format.

2) Click **Browse** to select the file path, then click **Restore** to restore the file.

Note:

Using Excel to open the CSV file may cause some numerical format changes, and the number may be displayed incorrectly. If you use Excel to edit the CSV file, please set the cell format as text.

3 Radius Authentication Configuration

To configure Radius Authentication, follow the steps:

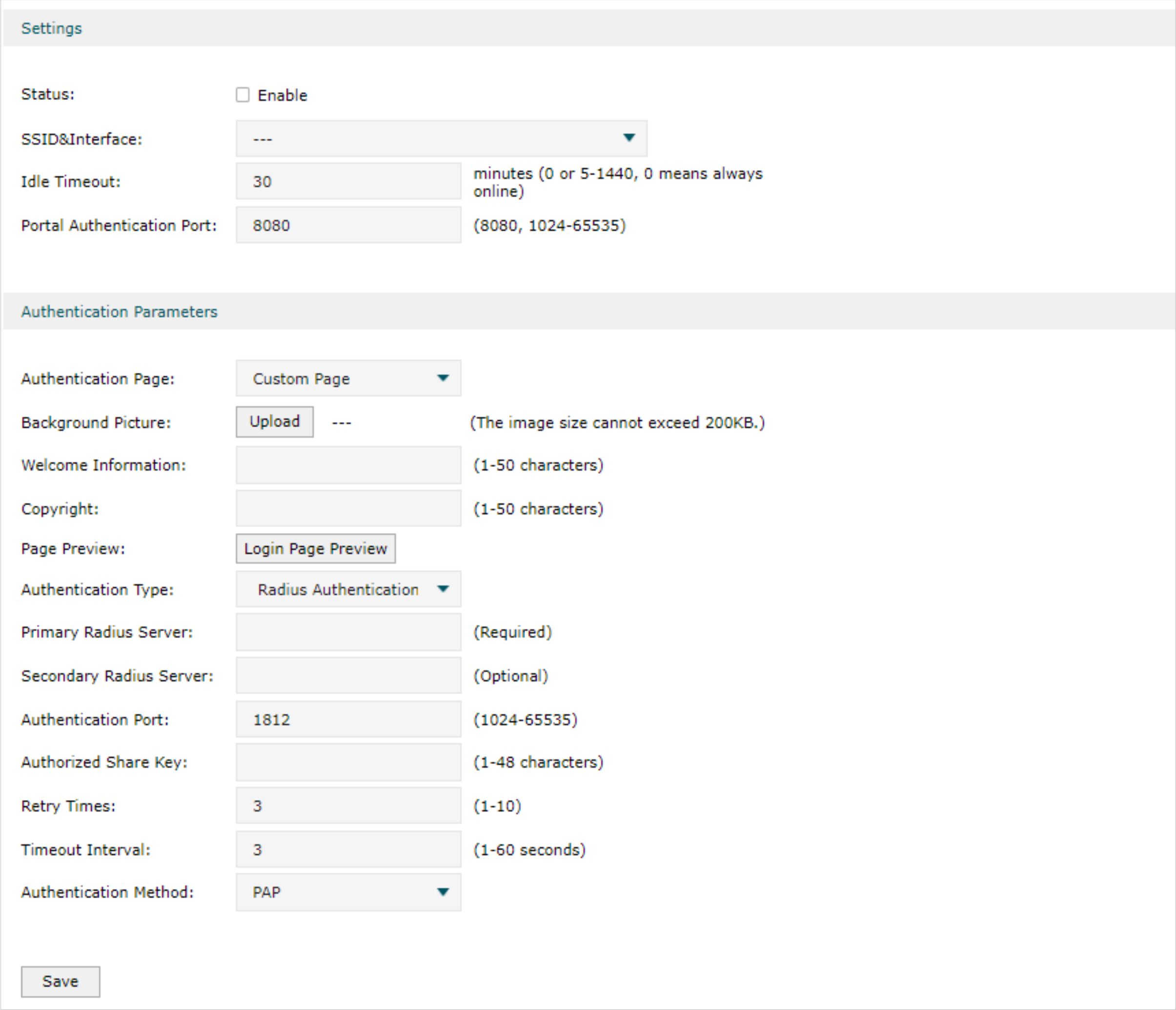
1) Configure the authentication page.

2) Specify the external Radius server and configure the corresponding parameters.

3.1 Configuring Radius Authentication

Choose the menu **Authentication** > **Authentication Settings** > **Web Authentication** to load the following page.

Figure 3-1 Configuring the Radius Authentication



Settings

Status:	□ Enable	
SSID&Interface:	---	
Idle Timeout:	30	minutes (0 or 5-1440, 0 means always online)
Portal Authentication Port:	8080	(8080, 1024-65535)

Authentication Parameters

Authentication Page:	Custom Page	
Background Picture:	Upload ---	(The image size cannot exceed 200KB.)
Welcome Information:		(1-50 characters)
Copyright:		(1-50 characters)
Page Preview:	Login Page Preview	
Authentication Type:	Radius Authentication	
Primary Radius Server:		(Required)
Secondary Radius Server:		(Optional)
Authentication Port:	1812	(1024-65535)
Authorized Share Key:		(1-48 characters)
Retry Times:	3	(1-10)
Timeout Interval:	3	(1-60 seconds)
Authentication Method:	PAP	

Follow these steps to configure Radius Authentication:

1) In the **Settings** section, enable the authentication status, configure the idle timeout and portal authentication port.

Status	Check the box to enable portal authentication.
SSID&Interface	Specify the valid wireless interface and the effective interface, and you can specify more than one. The selected LAN Network contains all clients of the SSIDs that belong to this LAN Network.
Idle Timeout	Specify the idle timeout. The client will be disconnected after the specified period (Idle Timeout) of inactivity, and is required to be authenticated again. Value 0 means the client will always keep online until the authentication timeout leased, even if the client remains inactive.
Portal Authentication Port	Enter the service port for portal authentication. The default setting is 8080.

2) In the **Authentication Parameters** section, configure the parameters of the authentication page.

Authentication Page	Choose the authentication page type. **Custom**: You can use the built-in web server to customize the authentication page by specifying the background picture, welcome information and copyright information. **External Links**: You can use external pages by specifying the external links as the authentication page.
Background Picture	Click the **Upload** button to choose a local image as the background picture of the custom authentication page.
Welcome Information	Specify the welcome information to be displayed on the custom authentication page.
Copyright	Specify the copyright information to be displayed on the custom authentication page.
Page Preview	Click the **Login Page Preview** button, and you can preview the customized authentication page
Authentication URL	Specify the URL for authentication page if you choose the Authentication Page as “External Links“. The browser will redirect to this URL when the client starts the authentication.
Success Redirect URL	Specify the Success Redirect URL if you choose the Authentication Page as “External Links“. The browser will redirect to this URL after the authentication succeeded.
Fail redirect URL	Specify the Fail Redirect URL if you choose the Authentication Page as “External Links“. The browser will redirect to this URL if the authentication failed.

Note:

If the web server is not deployed in the LAN, you need to create a Guest Resource entry to ensure the client can access the external web server before the authentication succeeded. For the configuration of Guest Resource, go to Guest Resources Configuration.

3) Specify the external Radius server and configure the corresponding parameters, then click **Save**.

Authentication Type	Choose the authentication type as Radius Authentication.
Primary Radius Server	Enter the IP address of the primary Radius server.
Secondary Radius Server	(Optional) Enter the IP address of the secondary Radius server. If the primary server is down, the secondary server will be effective.
Authentication Port	Enter the service port for Radius authentication. By default, it is 1812.
Authorized Share Key	Specify the authorized share key. This key should be the same configured in the Radius server.
Retry Times	Specify the number of times the gateway will retry sending authentication requests after the authentication failed.
Timeout Interval	Specify the timeout interval that the client can wait before the radius server replies.
Authentication Method	Specify the authentication protocol as PAP or CHAP.

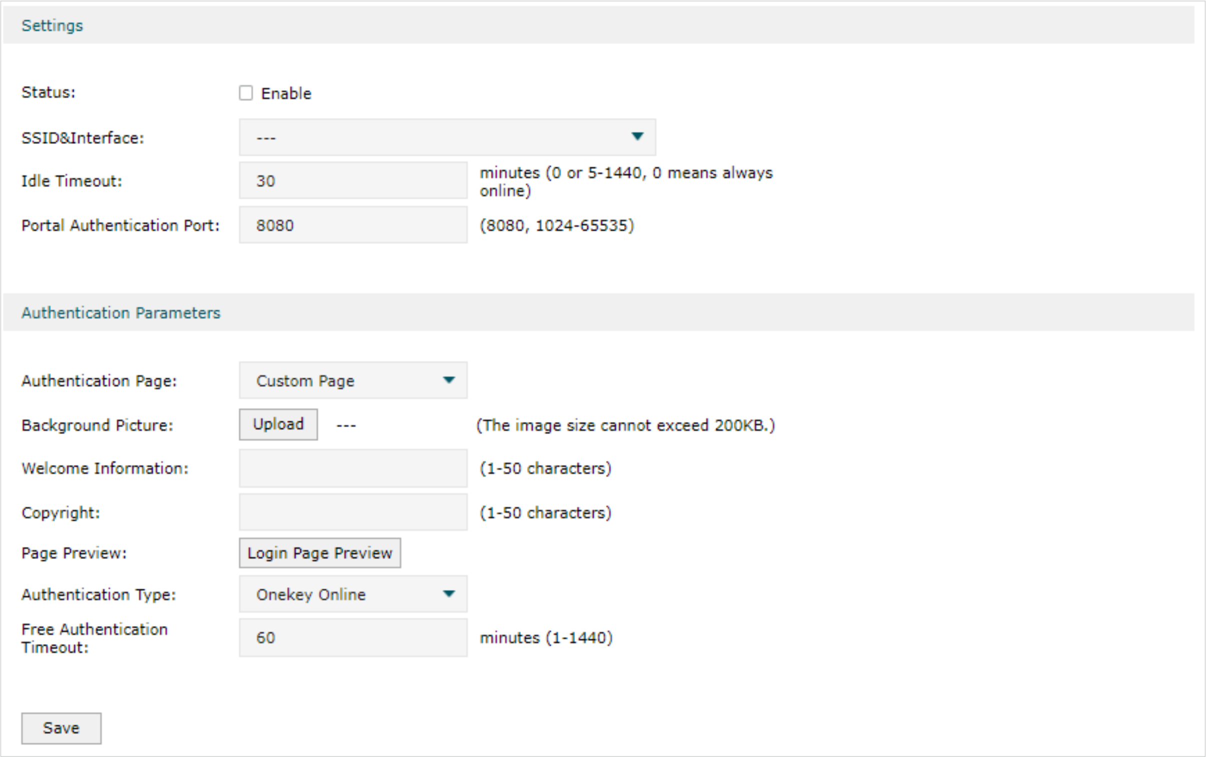
4 Onekey Online Configuration

In Onekey Online authentication, users only need to click the “Onekey online” button on the authentication page, then can access the internet. The username and password are not required.

4.1 Configuring the Authentication Page

Choose the menu **Authentication** > **Authentication Settings** > **Web Authentication** to load the following page.

Figure 4-1 Configuring the Web Authentication



Settings

Status: □ Enable

SSID&Interface: ---

Idle Timeout: 30 minutes (0 or 5-1440, 0 means always online)

Portal Authentication Port: 8080 (8080, 1024-65535)

Authentication Parameters

Authentication Page: Custom Page

Background Picture: Upload --- (The image size cannot exceed 200KB.)

Welcome Information: (1-50 characters)

Copyright: (1-50 characters)

Page Preview: Login Page Preview

Authentication Type: Onekey Online

Free Authentication Timeout: 60 minutes (1-1440)

Save

Follow these steps to configure Onekey Online Authentication:

1) In the **Settings** section, enable the authentication status, configure the idle timeout and portal authentication port.

Status	Check the box to enable portal authentication.
SSID&Interface	Specify the valid wireless interface and the effective interface, and you can specify more than one. The selected LAN Network contains all clients of the SSIDs that belong to this LAN Network.

Idle Timeout	Specify the idle timeout. The client will be disconnected after the specified period (Idle Timeout) of inactivity, and is required to be authenticated again. Value 0 means the client will always keep online until the authentication timeout leased, even if the client remains inactive.
Portal Authentication Port	Enter the service port for portal authentication. The default setting is 8080.

2) In the **Authentication Parameters** section, configure the parameters of the authentication page and choose the authentication type, then click **Save**.

Authentication Page	Choose the type of authentication page as Custom Page. Note: External Links is not available for Onekey Online.
Background Picture	Click the **Upload** button to choose a local image as the background picture of the custom authentication page.
Welcome Information	Specify the welcome information to be displayed on the custom authentication page.
Copyright	Specify the copyright information to be displayed on the custom authentication page.
Page Preview	Click the **Login Page Preview** button, and you can preview the customized authentication page
Authentication Type	Choose the authentication type as Onekey Online.
Free Authentication Timeout	Specify the free duration for Onekey Online. When the free duration expired, users can click “Onekey Online“ button on the authentication page to continue to visit the internet.

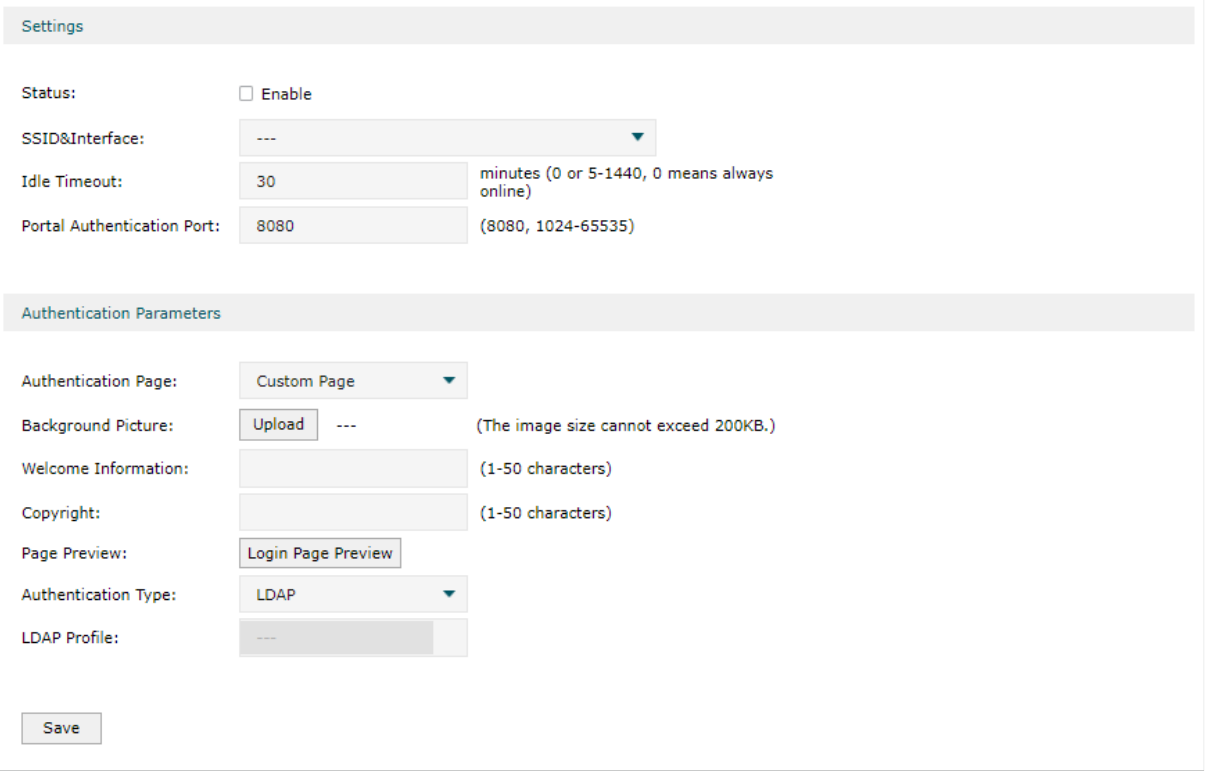
5 LDAP Configuration

LDAP Authentication allows you to bind the device to an LDAP server and use that server to authenticate LAN clients.

5.1 Configuring the Authentication Page

Choose the menu **Authentication** > **Authentication Settings** > **Web Authentication** to load the following page.

Figure 5-1 Configuring the Web Authentication



Settings

Status: □ Enable

SSID&Interface: ---

Idle Timeout: 30 minutes (0 or 5-1440, 0 means always online)

Portal Authentication Port: 8080 (8080, 1024-65535)

Authentication Parameters

Authentication Page: Custom Page

Background Picture: Upload --- (The image size cannot exceed 200KB.)

Welcome Information: (1-50 characters)

Copyright: (1-50 characters)

Page Preview: Login Page Preview

Authentication Type: LDAP

LDAP Profile: ---

Save

Follow these steps to configure Onekey Online Authentication:

1) In the **Settings** section, enable the authentication status, configure the idle timeout and portal authentication port.

Status	Check the box to enable portal authentication.
SSID&Interface	Specify the valid wireless interface and the effective interface, and you can specify more than one. The selected LAN Network contains all clients of the SSIDs that belong to this LAN Network.

Idle Timeout	Specify the idle timeout. The client will be disconnected after the specified period (Idle Timeout) of inactivity, and is required to be authenticated again. Value 0 means the client will always keep online until the authentication timeout leased, even if the client remains inactive.
Portal Authentication Port	Enter the service port for portal authentication. The default setting is 8080.

2) In the **Authentication Parameters** section, configure the parameters of the authentication page and choose the authentication type, then click **Save**.

Authentication Page	Choose the type of authentication page as Custom Page. Note: External Links is not available for Onekey Online.
Background Picture	Click the **Upload** button to choose a local image as the background picture of the custom authentication page.
Welcome Information	Specify the welcome information to be displayed on the custom authentication page.
Copyright	Specify the copyright information to be displayed on the custom authentication page.
Page Preview	Click the **Login Page Preview** button, and you can preview the customized authentication page
Authentication Type	Choose the authentication type as LDAP Online.
LDAP Profile	Select a profile from previously configured LDAP profiles.

6 Guest Resources Configuration

Guest resources are limited network resources provided for users before they pass the portal authentication.

You can configure the guest resources in two ways:

- Five Tuple Type

Specify the client and the network resources the client can visit based on the settings of IP address, MAC address, VLAN ID, service port and protocol. It is recommended to select Five Tuple Type when the IP address and service port of the free network resource are already known.

- URL Type

Specify the client and the network resources the client can visit based on the settings of the URL, IP address, MAC address and service port. It is recommended to select URL Type when the URL of the free network resource is already known.

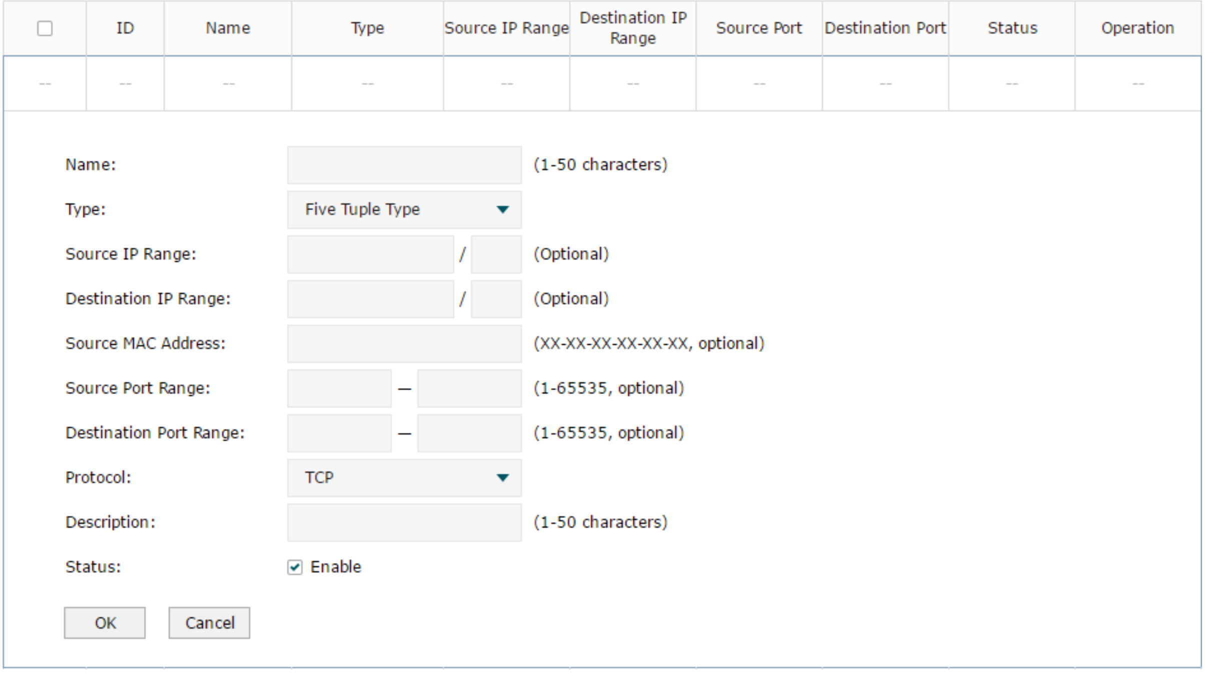
Note:

By default, the Guest Resource table is empty, which means all the clients cannot visit any network resource before they pass the portal authentication.

6.1 Configuring the Five Tuple Type

Choose the menu **Authentication** > **Authentication Settings** > **Guest Resources** and click **Add** to load the following page.

Figure 6-1 Configuring the Five Tuple Type



□	ID	Name	Type	Source IP Range	Destination IP Range	Source Port	Destination Port	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name: (1-50 characters)

Type: Five Tuple Type

Source IP Range: / (Optional)

Destination IP Range: / (Optional)

Source MAC Address: (XX-XX-XX-XX-XX-XX, optional)

Source Port Range: – (1-65535, optional)

Destination Port Range: – (1-65535, optional)

Protocol: TCP

Description: (1-50 characters)

Status: ☑ Enable

Specify the client and the network resources the client can visit by configuring the IP address, MAC address and service port, then click **OK**.

Name	Enter the name of the guest resource entry.
Type	Choose the guest resource type as Five Tuple Type.
Source IP Range	Specify the IP range of the client(s) by entering the network address and subnet mask bits. Only the specified clients can visit the guest resources.
Destination IP Range	Specify the IP range of the server(s) that provides the guest resources by entering the network address and subnet mask bits.
Source MAC Address	Enter the MAC address of the client.
Source Port Range	Enter the source service port range.
Destination Port Range	Enter the destination service port range.
Description	Enter a brief description for the Guest Resources entry to make it easier to search and manage.
Protocol	Specify the protocol as TCP or UDP for the Guest Resources.
Status	Check the box to enable the guest resource entry.

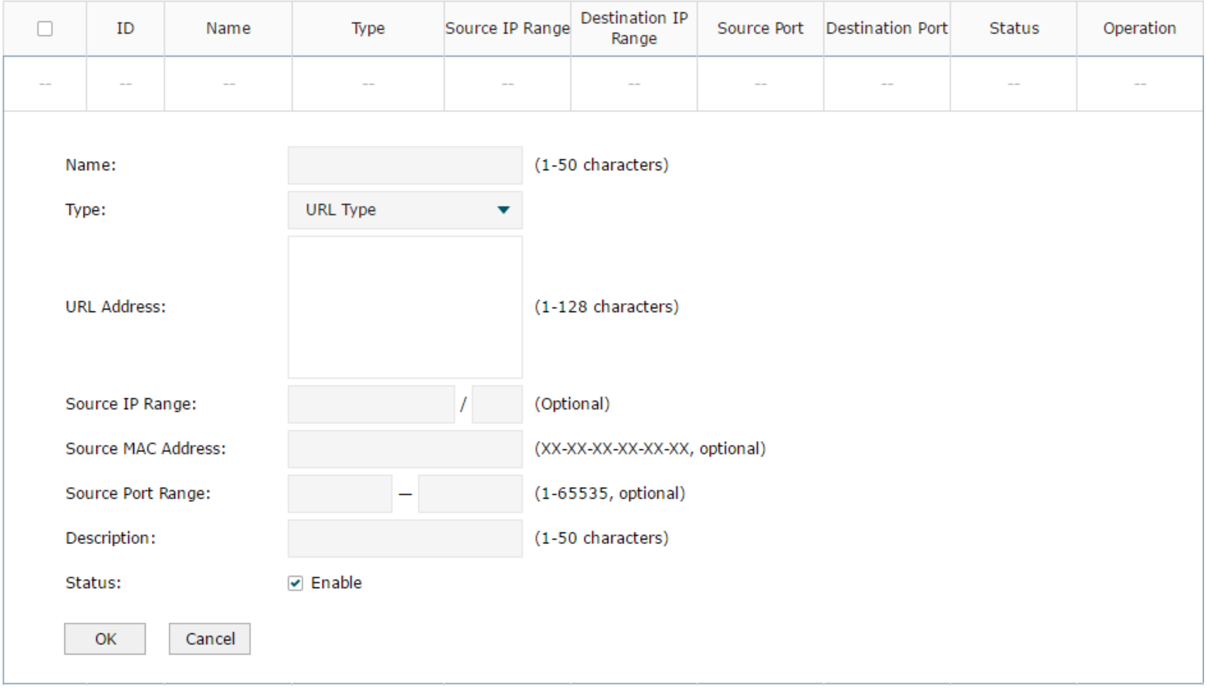
Note:

In a Guest Resource entry, if some parameter is left empty, it means the gateway will not restrict that parameter. For example, if the source IP range is left empty, it means all the clients can visit the specified guest resources.

6.2 Configuring the URL Type

Choose the menu **Authentication** > **Authentication Settings** > **Guest Resources** and click **Add** to load the following page.

Figure 6-1 Configuring the URL



□	ID	Name	Type	Source IP Range	Destination IP Range	Source Port	Destination Port	Status	Operation
--	--	--	--	--	--	--	--	--	--

Name:		(1-50 characters)
Type:	URL Type	
URL Address:		(1-128 characters)
Source IP Range:	/	(Optional)
Source MAC Address:		(XX-XX-XX-XX-XX-XX, optional)
Source Port Range:	–	(1-65535, optional)
Description:		(1-50 characters)
Status:	☑ Enable	

Specify the client and the network resources the client can visit by configuring the URL of the network resource and the parameters of the clients, then click **OK**.

Name	Enter the name of the guest resource entry.
Type	Choose the guest resource type as URL Type.
URL Address	Enter the URL address or IP address of the network resource that can be visited for free.
Source IP Range	Configure the IP range of the client(s) by entering the network address and subnet mask bits.
Source MAC Address	Enter the MAC address of the client.
Source Port Range	Enter the source service port range.

Description	Enter a brief description for the Guest Resources entry to make it easier to search and manage.
Status	Check the box to enable the guest resource entry.

Note:

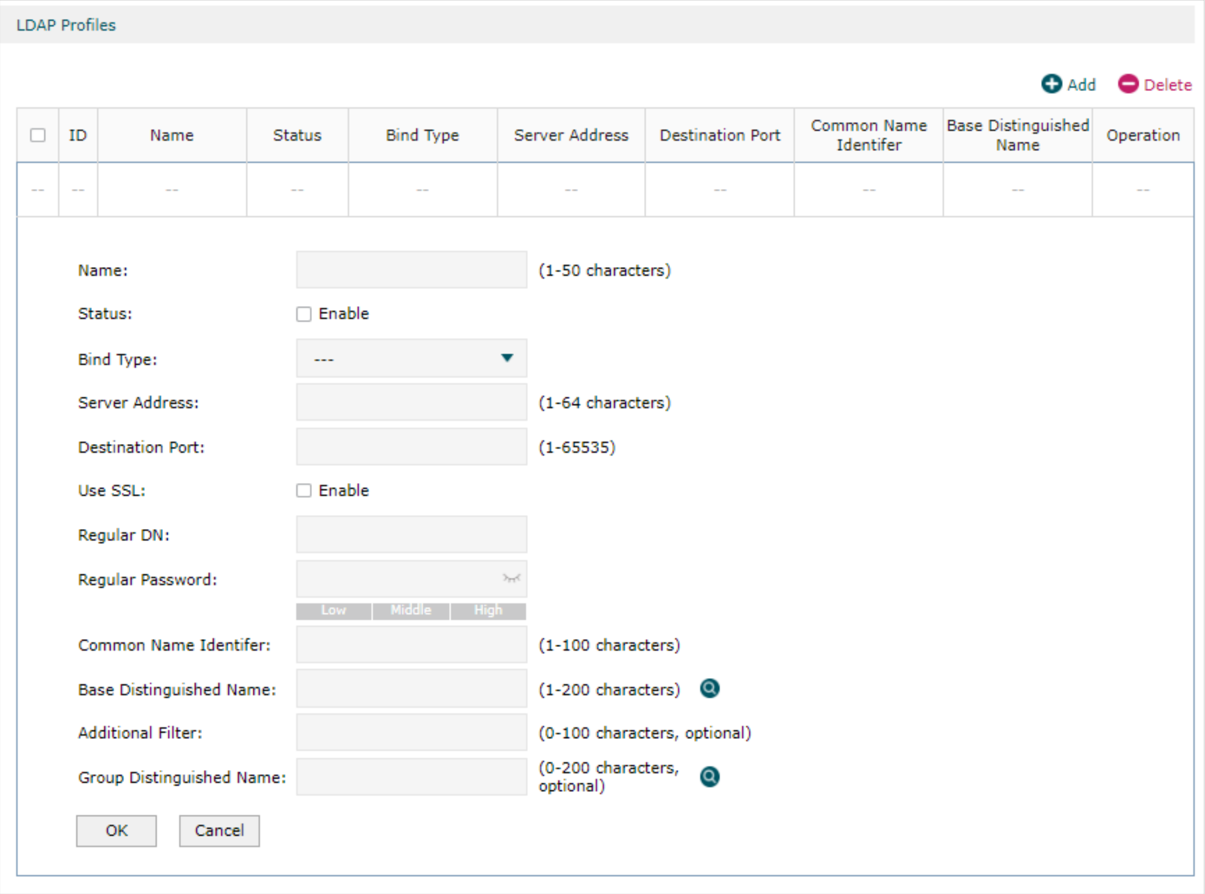
In a Guest Resource entry, if some parameter is left empty, it means the gateway will not restrict that parameter. For example, if the source IP range is left empty, it means all the clients can visit the specified guest resources.

7 Configuring LDAP Profiles

The Lightweight Directory Access Protocol (LDAP) is an industry standard protocol for maintaining and accessing directory information over a network. LDAP Authentication allows you to bind the device to an LDAP server and use that server to authenticate LAN clients.

Choose the menu **Authentication** > **LDAP** > **LDAP Profiles**, click **Add** to load the following page.

Figure 7-1 Configuring the Web Authentication



LDAP Profiles

□	ID	Name	Status	Bind Type	Server Address	Destination Port	Common Name Identifer	Base Distinguished Name	Operation
--	--	--	--	--	--	--	--	--	--

Name:		(1-50 characters)
Status:	□ Enable	
Bind Type:	---	
Server Address:		(1-64 characters)
Destination Port:		(1-65535)
Use SSL:	□ Enable	
Regular DN:		
Regular Password:	Low Middle High	
Common Name Identifer:		(1-100 characters)
Base Distinguished Name:		(1-200 characters)
Additional Filter:		(0-100 characters, optional)
Group Distinguished Name:		(0-200 characters, optional)

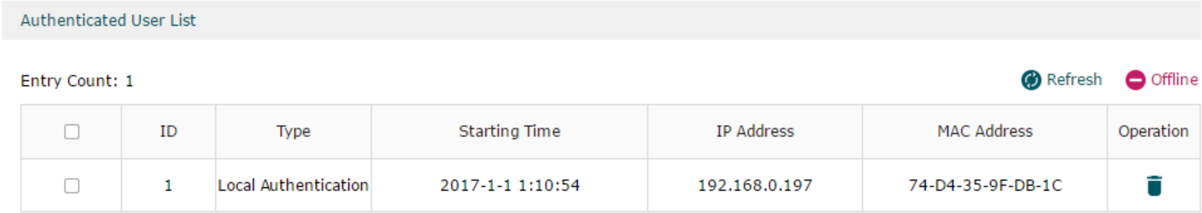
Name	Specify the name of the LDAP profile..
Status	Check the box to enable LDAP Authentication.
Bind Type	Select the LDAP Authentication mode: Anonymous Mode, Simple Mode, or Regular Mode.
Server Address	Enter the Host name or IP address of the LDAP server.
Destination Port	Enter the port ID of the LDAP server. By default, the port ID is 389 when SSL is disabled and 636 when SSL is enabled.
Use SSL	Determine whether to use SSL for LDAP communication.

Regular DN	Specify the distinguished name (DN) of the administrator account. This parameter is required in Regular mode.
Regular Password	Specify the password of the administrator account. This parameter is required in Regular mode.
Common Name Identifier	Specify the common name for user authentication. It is usually “cn”.
Base Distinguished Name	Specify the user identifier for user authentication. You can click the icon next to it to search and select from the LDAP directory tree.
Additional Filter	Specify the filter for user authentication. It is not supported in Simple Mode and is optional in other modes.
Group Distinguished Name	Specify the group identifier for user authentication. It is not supported in Simple Mode and is optional in other modes.

8 Viewing the Authentication Status

Choose the menu **Authentication** > **Authentication Status** > **Authentication Status** to load the following page.

Figure 8-1 Viewing the Authentication Status



Authenticated User List

Entry Count: 1

□	ID	Type	Starting Time	IP Address	MAC Address	Operation
□	1	Local Authentication	2017-1-1 1:10:54	192.168.0.197	74-D4-35-9F-DB-1C	🗑

Here you can view the clients that pass the portal authentication.

Type	Displays the authentication type of the client.
Starting Time	Displays the starting time of the authentication.
IP Address	Displays the client’s IP address.
MAC Address	Displays the client’s MAC address.

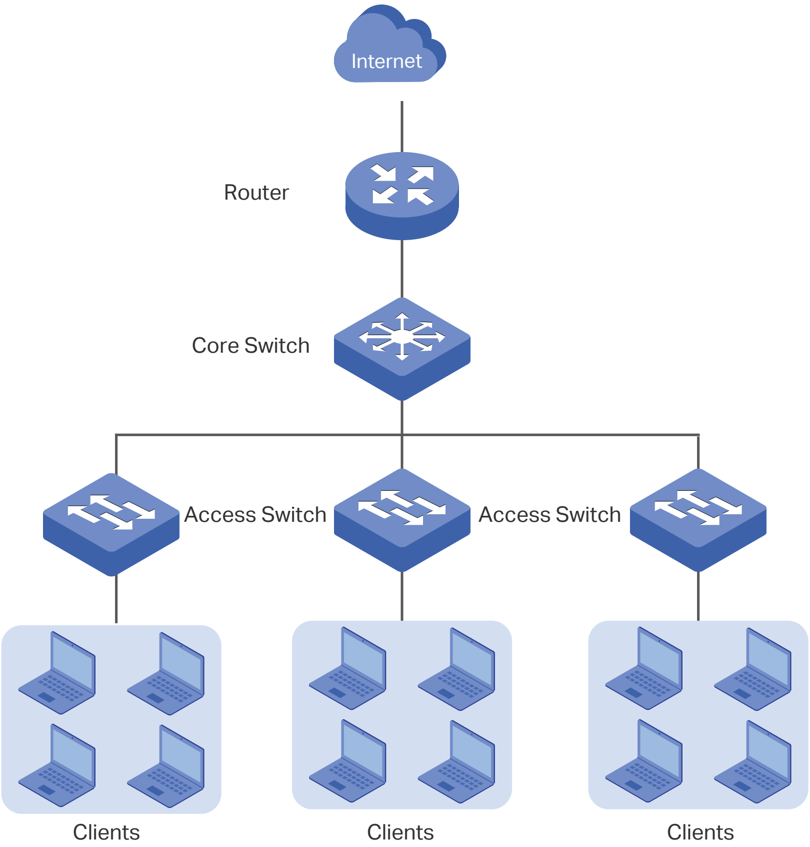
9 Configuration Example

Here we take the application of Local Authentication as an example.

9.1 Network Requirements

A hotel needs to offer internet service to the guests and push hotel advertisement. For network security, only the authorized guests can access the internet.

Figure 9-1 Network Topology



9.2 Configuration Scheme

For the hotel does not have an external Web server or Authentication server, it is recommended to choose Local Authentication to meet this requirement.

- To control the guests' internet access, you can create local user accounts for the guests. The guests need to use the accounts assigned to them to get authenticated, then can visit the internet. The other people cannot visit the internet through the hotel's network without authentication accounts.

- To push hotel advertisement, you can simply customize the authentication page by set the background picture and the welcome information.

9.3 Configuration Procedures

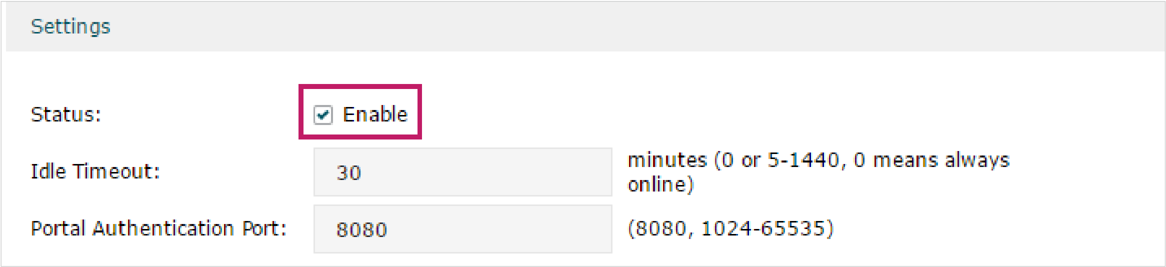
1) Enable Portal Authentication, choose the authentication type as Local Authentication, and customize the authentication page.
2) Create the authentication accounts for the guests.

9.3.1 Configuring the Authentication Page

Choose the menu **Authentication > Authentication Settings > Web Authentication** to load the following page.

1) Enable portal authentication, and keep the Idle Timeout and Portal Authentication Port as default settings.

Figure 9-2 Enable Portal Authentication

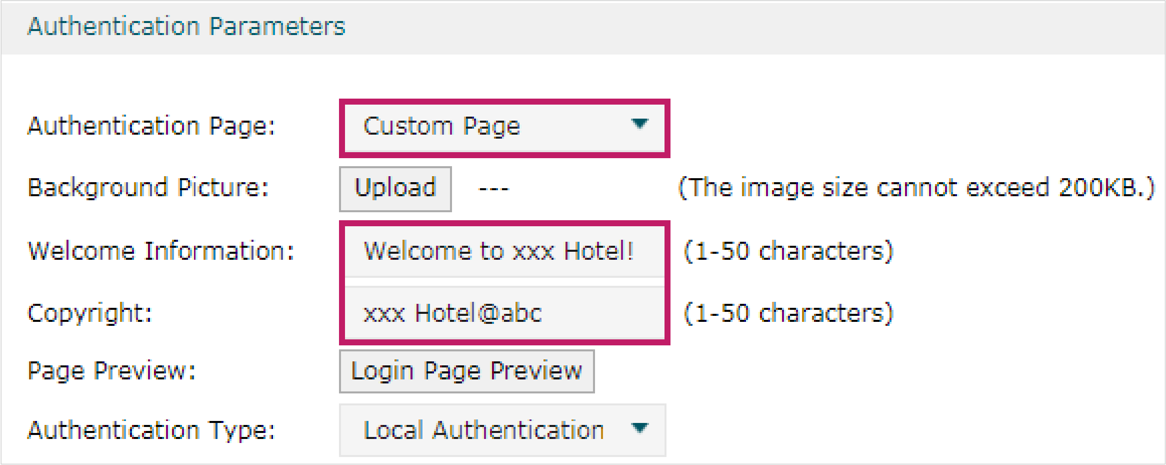


Settings

Status:	☑ Enable	
Idle Timeout:	30	minutes (0 or 5-1440, 0 means always online)
Portal Authentication Port:	8080	(8080, 1024-65535)

2) Choose the Authentication Page as Custom page, pick a picture of the hotel as the background picture on the authentication page, and specify the welcome information and copyright.

Figure 9-3 Customize the authentication page

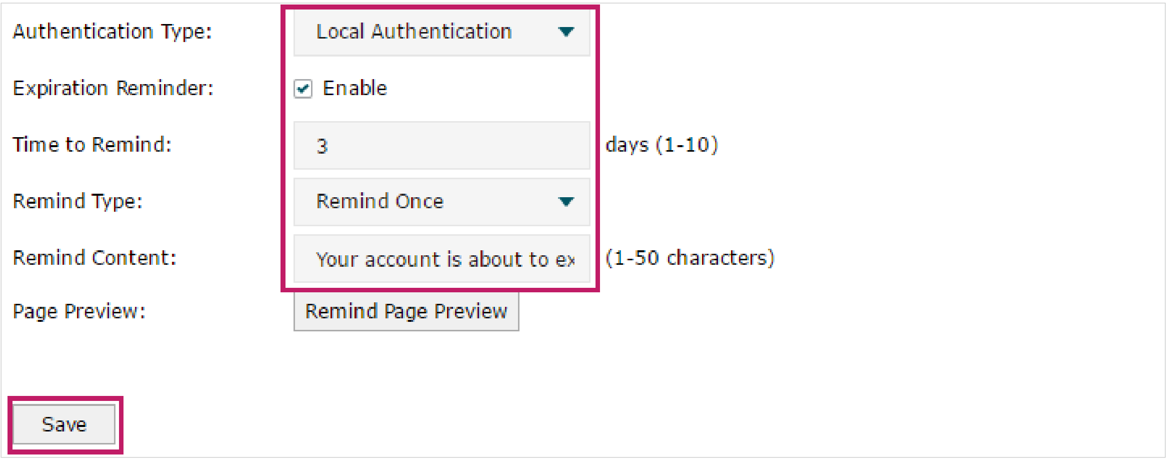


Authentication Parameters

Authentication Page:	Custom Page	
Background Picture:	Upload ---	(The image size cannot exceed 200KB.)
Welcome Information:	Welcome to xxx Hotel!	(1-50 characters)
Copyright:	xxx Hotel@abc	(1-50 characters)
Page Preview:	Login Page Preview	
Authentication Type:	Local Authentication	

3) Choose the Authentication Type as Local Authentication, and configure the parameters of expiration reminder. Then click **Save**.

Figure 9-4 Configure the authentication type and expiration reminder



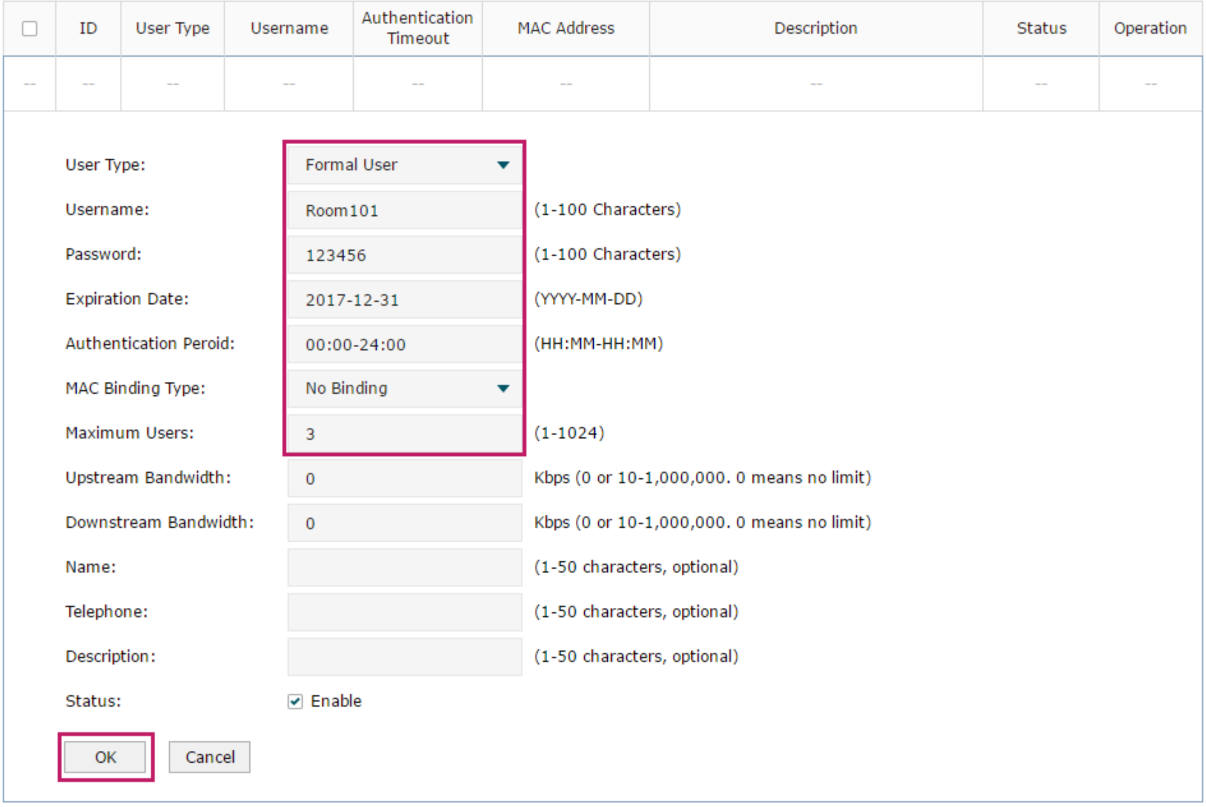
Authentication Type:	Local Authentication	
Expiration Reminder:	☑ Enable	
Time to Remind:	3	days (1-10)
Remind Type:	Remind Once	
Remind Content:	Your account is about to ex	(1-50 characters)
Page Preview:	Remind Page Preview	

9.3.2 Configuring Authentication Accounts for the Guests

Choose the menu **Authentication > User Management > User Management** to load the following page.

Here we take the configuration of Formal User account as an example. We create an account for the guests of room 101. The username is Room101 and the password is 123456, and at most three guests can use this account to authenticate. Then click **OK**.

Figure 9-5 Configure the Account for the guests



□	ID	User Type	Username	Authentication Timeout	MAC Address	Description	Status	Operation
--	--	--	--	--	--	--	--	--

User Type:	Formal User	
Username:	Room101	(1-100 Characters)
Password:	123456	(1-100 Characters)
Expiration Date:	2017-12-31	(YYYY-MM-DD)
Authentication Peroid:	00:00-24:00	(HH:MM-HH:MM)
MAC Binding Type:	No Binding	
Maximum Users:	3	(1-1024)
Upstream Bandwidth:	0	Kbps (0 or 10-1,000,000. 0 means no limit)
Downstream Bandwidth:	0	Kbps (0 or 10-1,000,000. 0 means no limit)
Name:		(1-50 characters, optional)
Telephone:		(1-50 characters, optional)
Description:		(1-50 characters, optional)
Status:	☑ Enable	

After all the configuration finished, the guest can use the account to authenticate and access the internet after the authentication succeeded.

Part 14

Managing Services

CHAPTERS

1 Services

1.1 Overview

The Services module incorporates two functions, Dynamic DNS (DDNS) and UPnP (Universal Plug and Play) to provide convenient network services.

1.2 Support Features

Dynamic DNS

Nowadays, network protocols such as PPPoE and DHCP are widely employed by ISPs to assign public IP addresses to users. The use of these protocols can cause the user's public IP address to change dynamically. DDNS is an internet service that ensures a fixed domain name can be used to access a network with a varying public IP address. This means the user's network can be more easily accessed by internet hosts.

UPnP

With the development of networking and advanced computing techniques, greater numbers of devices feature in networks. UPnP is designed to solve the problem of communication between these network devices. UPnP function allows devices dynamically discover and communicate with each other without additional configurations. For example, it allows the download of P2P software without opening ports.

mDNS

mDNS (Multicast DNS) Repeater can help mDNS request/reply packets spread across different network segments. With this function, services published using the mDNS protocol can be discovered across network segments.

Reboot Schedule

In Reboot Schedule, you can set schedules to reboot the connected devices periodically based on needs. You can configure the reboot schedule flexibly by creating multiple entries.

DNS Proxy

DNS Proxy provides the LAN side clients with the DNS query service. It forwards the DNS request from the LAN side clients to the selected upstream DNS server and forwards the DNS reply accordingly.

2 Dynamic DNS Configurations

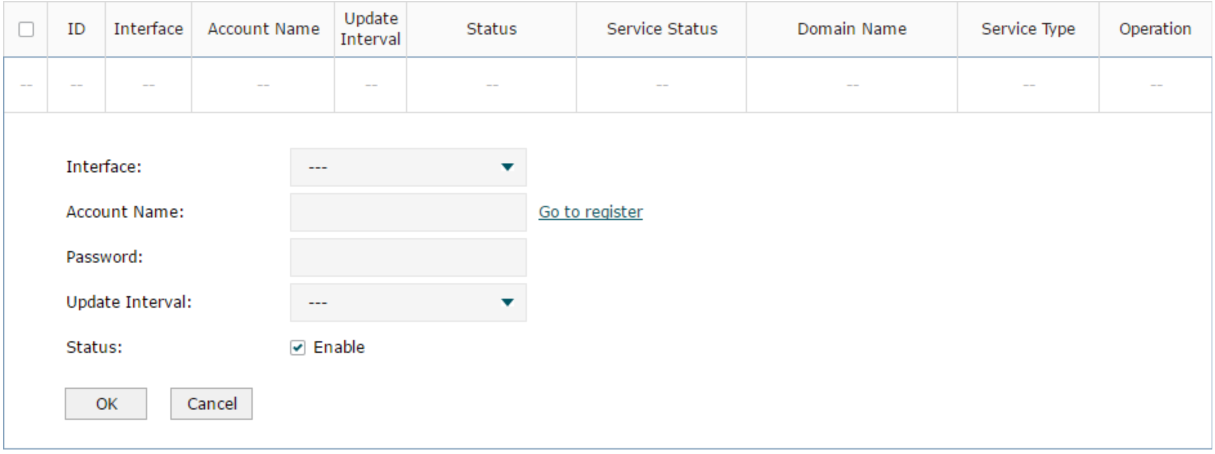
With Dynamic DNS configurations, you can:

- Configure and view Peanuthull DDNS
- Configure and view Comexe DDNS
- Configure and view DynDNS
- Configure and view NO-IP DDNS
- Custom DDNS

2.1 Configure and View Peanuthull DDNS

Choose the menu **Services** > **Dynamic DNS** > **Peanuthull** and click **Add** to load the following page.

Figure 2-1 Configure Peanuthull DDNS



□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Service Type	Operation
--	--	--	--	--	--	--	--	--	--

Interface: ---

Account Name: Go to register

Password:

Update Interval: ---

Status: ☑ Enable

Follow these steps to configure Peanuthull DDNS.

1) Click **Go to register** to visit the official website of Peanuthull, register an account and a domain name.

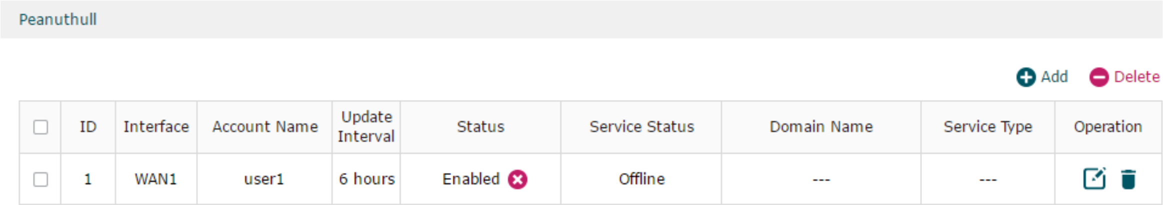
2) Configure the following parameters and click **OK**.

Interface	Select the interface for the DDNS service.
Account Name	Enter the account name of your DDNS account. You can click **Go to register** to visit the official website of Peanuthull to register an account.
Password	Enter the password of your DDNS account.
Update Interval	Specify the Update Interval that the device dynamically updates IP addresses for registered domain names.

Status	Check the box to enable the DDNS service.

3) View the DDNS status.

Figure 2-2 View the Status of Peanuthull DDNS



Peanuthull

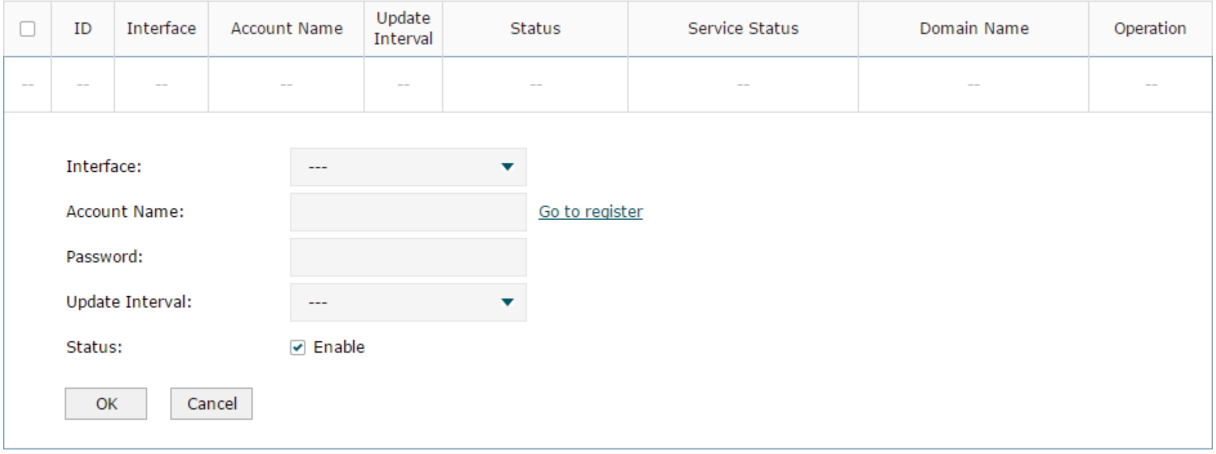
□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Service Type	Operation
□	1	WAN1	user1	6 hours	Enabled ☒	Offline	---	---	

Status	Displays whether the corresponding DDNS service is enabled.
Service Status	Displays the current status of DDNS service. **Offline:** DDNS service is offline. **Connecting:** DDNS client is connecting to the server. **Online:** DDNS is working normally. **Incorrect account name or password:** The account name or password is incorrect.
Domain Name	Displays the Domain Names obtained from the DDNS server.
Service Type	Displays the DDNS service type, including Professional service and Standard service.

2.2 Configure and View Comexe DDNS

Choose the menu **Services** > **Dynamic DNS** > **Comexe** and click **Add** to load the following page.

Figure 2-3 Configure Comexe DDNS



□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
--	--	--	--	--	--	--	--	--

Interface:	---
Account Name:	Go to register
Password:	
Update Interval:	---
Status:	☑ Enable

Follow these steps to configure Comexe DDNS.

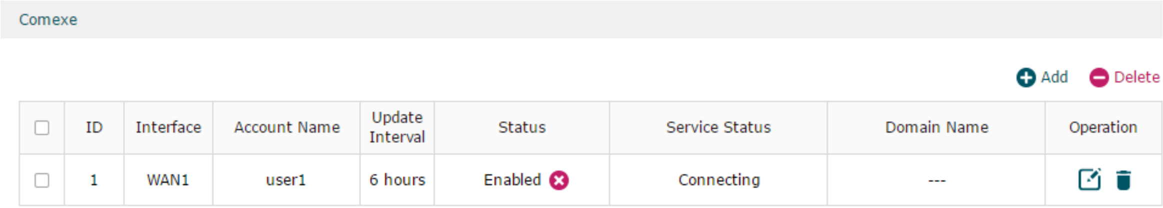
1) Click **Go to register** to visit the official website of Comexe, register an account and a domain name.

2) Configure the following parameters and click **OK**.

Interface	Select the interface for the DDNS service.
Account Name	Enter the account name of your DDNS account. You can click **Go to register** to visit the official website of Comexe to register an account.
Password	Enter the password of your DDNS account.
Update Interval	Specify the Update Interval that the device dynamically updates IP addresses for registered domain names.
Status	Check the box to enable the DDNS service.

3) View the DDNS status.

Figure 2-4 View the Status of Comexe DDNS



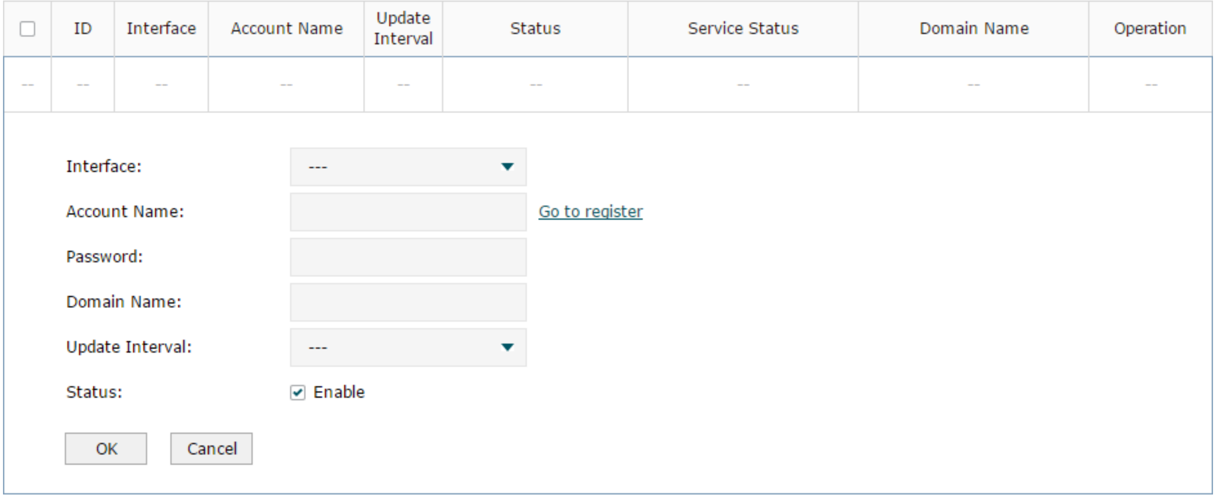
□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
□	1	WAN1	user1	6 hours	Enabled ☒	Connecting	---	

Status	Displays whether the corresponding DDNS service is enabled.
Service Status	Displays the current status of DDNS service. **Offline:** DDNS service is offline. **Connecting:** DDNS client is connecting to the server. **Online:** DDNS is working normally. **Incorrect account name or password:** The account name or password is incorrect.
Domain Name	Displays the Domain Names obtained from the DDNS server.

2.3 Configure and View DynDNS

Choose the menu **Services** > **Dynamic DNS** > **DynDNS** and click **Add** to load the following page.

Figure 2-5 Configure DynDNS



□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
--	--	--	--	--	--	--	--	--

Interface:	---	
Account Name:		Go to register
Password:		
Domain Name:		
Update Interval:	---	
Status:	☑ Enable	

OK Cancel

Follow these steps to configure DynDNS.

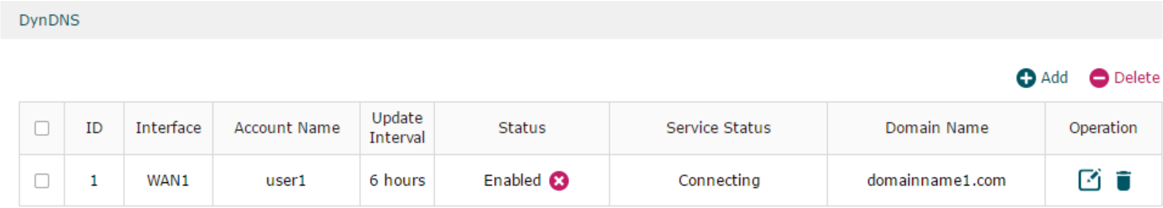
1) Click **Go to register** to visit the official website of DynDNS and register an account and a domain name.

2) Configure the following parameters and click **OK**.

Interface	Select the interface for the DDNS service.
Account Name	Enter the account name of your DDNS account. You can click **Go to register** to visit the official website of DynDNS to register an account.
Password	Enter the password of your DDNS account.
Domain Name	Specify the domain name that you registered with your DDNS service provider.
Update Interval	Specify the Update Interval that the device dynamically updates IP addresses for registered domain names.
Status	Check the box to enable the DDNS service.

3) View the DDNS status.

Figure 2-6 View the Status of DynDNS



DynDNS

□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
□	1	WAN1	user1	6 hours	Enabled ☒	Connecting	domainname1.com	

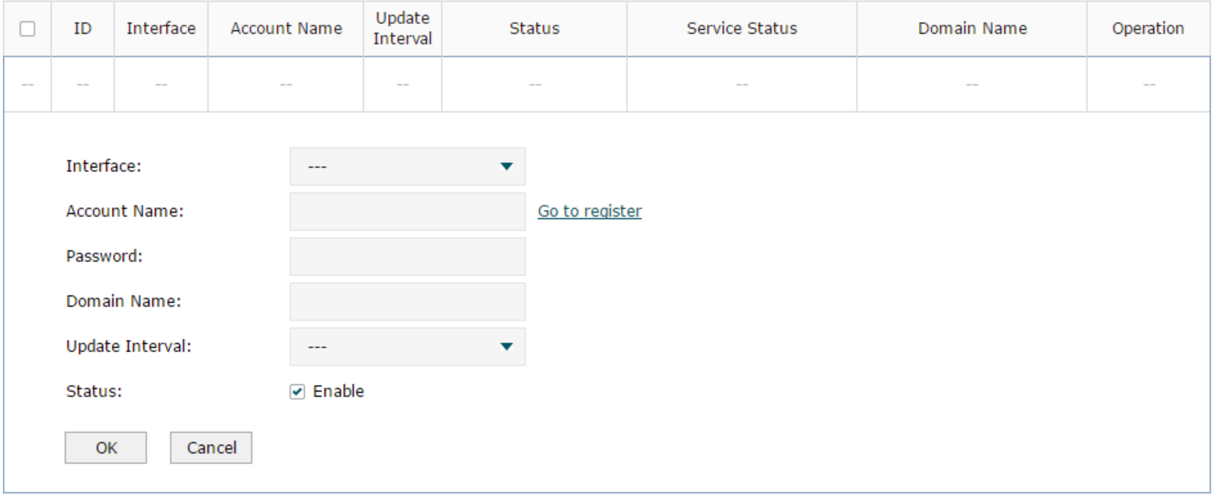
Status	Displays whether the corresponding DDNS service is enabled.

Service Status	Displays the current status of DDNS service. **Offline:** DDNS service is offline. **Connecting:** DDNS client is connecting to the server. **Online:** DDNS is working normally. **Incorrect account name or password:** The account name or password is incorrect. **Incorrect domain name:** The domain name is incorrect.
Domain Name	Displays the Domain Names obtained from the DDNS server.

2.4 Configure and View NO-IP DDNS

Choose the menu **Services** > **Dynamic DNS** > **NO-IP** and click **Add** to load the following page.

Figure 2-7 View NO-IP DDNS



☐	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
--	--	--	--	--	--	--	--	--

Interface: ---

Account Name: Go to register

Password:

Domain Name:

Update Interval: ---

Status: ☑ Enable

Follow these steps to configure NO-IP DDNS.

1) Click **Go to register** to visit the official website of NO-IP and register an account and a domain name.

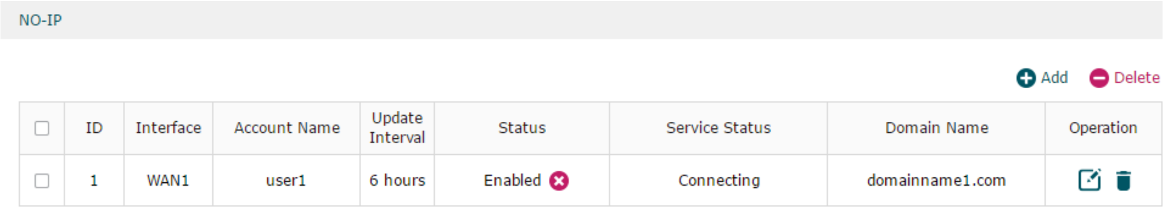
2) Configure the following parameters and click **OK**.

Interface	Select the interface for the DDNS service.
Account Name	Enter the account name of your DDNS account. You can click **Go to register** to visit the official website of NO-IP to register an account.
Password	Enter the password of your DDNS account.
Domain Name	Specify the domain name that you registered with your DDNS service provider.

Update Interval	Specify the Update Interval that the device dynamically updates IP addresses for registered domain names.
Status	Check the box to enable the DDNS service.

3) View the DDNS status.

Figure 2-8 View the Status of NO-IP DDNS



NO-IP

□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
□	1	WAN1	user1	6 hours	Enabled ☒	Connecting	domainname1.com	

Status	Displays whether the corresponding DDNS service is enabled.
Service Status	Displays the current status of DDNS service. **Offline:** DDNS service is offline. **Connecting:** DDNS client is connecting to the server. **Online:** DDNS is working normally. **Incorrect account name or password:** The account name or password is incorrect. **Incorrect domain name:** The domain name is incorrect.
Domain Name	Displays the Domain Names obtained from the DDNS server.

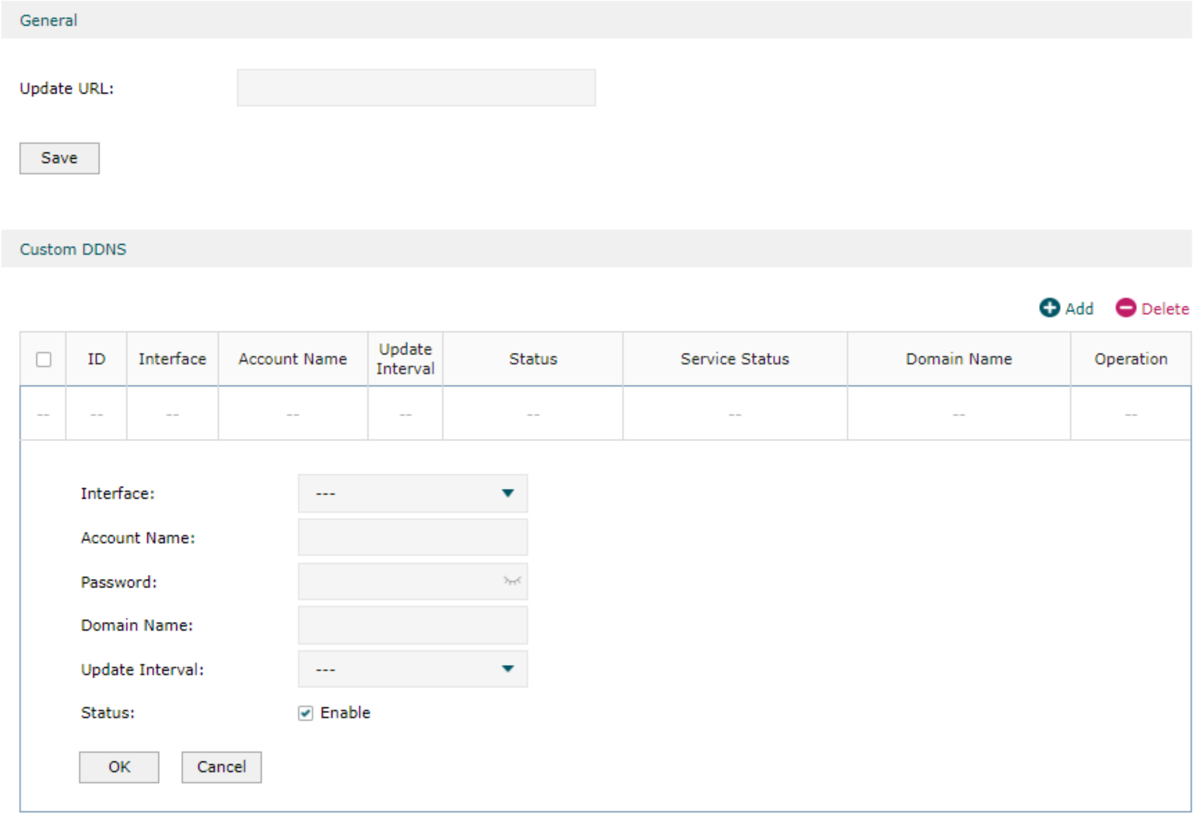
2.5 Custom DDNS

The router lists common DDNS service providers. If the service provider you registered at is not listed, you can add a custom DDNS entry.

1) Register at a service provider, and get your username, password, and domain name.

2) Choose the menu **Service** > **Dynamic DNS** > **Custom DDNS** and click **Add** to load the following page.

Figure 2-9 Custom DDNS



□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
--	--	--	--	--	--	--	--	--

Interface: ---

Account Name:

Password:

Domain Name:

Update Interval: ---

Status: ☑ Enable

3) Configure the following parameters and click **OK**.

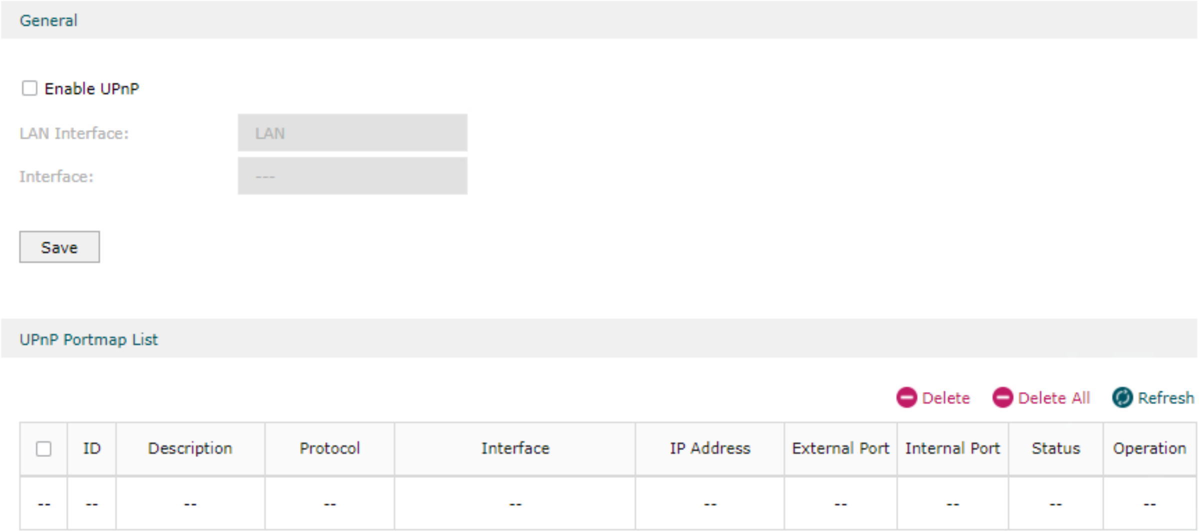
Update URL	Enter the URL provided by your DDNS service provider in format of http://[USERNAME]:[PASSWORD]@api.cp.easydns.com/dyn/tomato.php?hostname=[DOMAIN]&myip=[IP]. The router will automatically update user information to the service provider.
Interface	Select the WAN port which the DDNS entry applies to.
Account Name	Enter your account name for the service provider.
Password	Enter your password for the service provider.
Domain Name	Enter the domain name provided by your service provider. Remote users can use the domain name to access your local network through WAN port.
Update Interval	Specify the update interval to report the change of the WAN IP address for DDNS service.
Status	Click the checkbox to enable the entry.

3 UPnP Configuration

UPnP (Universal Plug and Play) is the networking protocol that allows devices to discover each other and then establish connections for communication. With the help of UPnP, It is convenient to realize seamless connections between the devices, especially from WAN to LAN.

Choose the menu **Services** > **UPnP** to load the following page.

Figure 3-1 Configure UPnP



General

□ Enable UPnP

LAN Interface: LAN

Interface: ---

UPnP Portmap List

□	ID	Description	Protocol	Interface	IP Address	External Port	Internal Port	Status	Operation
--	--	--	--	--	--	--	--	--	--

Follow these steps to configure UPnP.

1) Check the box to enable the **UPnP** function.

2) Specify the effective interfaces. Then click **Save**

3) (Optional) In the **UPnP Portmap List** section, view the portmap list.

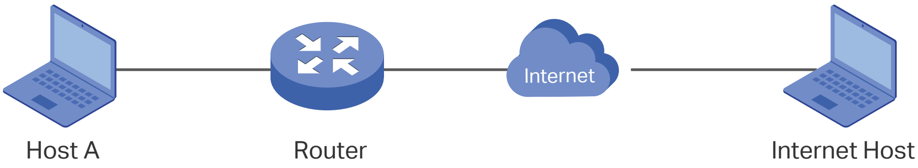
Description	Displays the description of the application using UPnP protocol.
Protocol	Displays the protocol type used in the process of UPnP.
Interface	Displays the interface used in the process of UPnP.
IP Address	Displays the IP address of the local host.
External Port	Displays the external port that is opened for the application by the router.
Internal Port	Displays the internal port that is opened for the application by the local host.
Status	Displays the status of the corresponding UPnP entry. **Enabled:** The mapping is active. **Disabled:** The mapping is inactive.

4 Configuration Example for Dynamic DNS

4.1 Network Requirement

Host A gets internet services from an ISP (Internet Service Provider) via a PPPoE dial-up connection. The user wants to visit the router's web management interface using another host on the internet.

Figure 4-1 Network Topology



4.2 Configuration Scheme

For security management, the internet hosts attempting to manage the router must be permitted by the router. Remote Management is used to manage the IP addresses of these hosts.

Because the user uses PPPoE to access the network, the public IP address of the router may be changed each time the dial-up connection is established. When the public IP address of the router changes, DDNS service ensures the DNS server rebinds the current domain name to the new IP address. This means the user can always reach the router using the same domain name, even if the public IP address has been changed.

4.3 Configuration Procedure

4.3.1 Specifying the IP Address of the Host

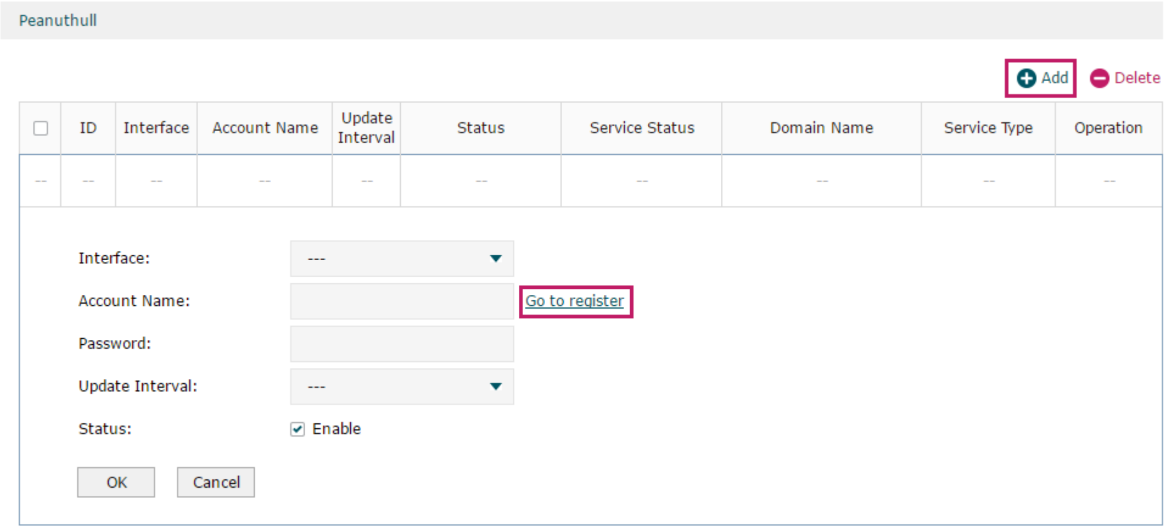
Before configuring DDNS, it is required to specify the IP address of the internet host for remote management. For details, go to **System Tools > Admin Setup > Remote Management** page.

4.3.2 Configuring the DDNS function

There are four DDNS servers supported by the router, we take Peanuthull DNS as an example here.

1) Choose the menu **Services > Dynamic DNS > Peanuthull** and click **Add** to load the following page. Click **Go to register** to register a domain name on the official website of Peanuthull.

Figure 4-2 Registering a Domain Name



Peanuthull

□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Service Type	Operation
--	--	--	--	--	--	--	--	--	--

Interface: ---

Account Name: Go to register

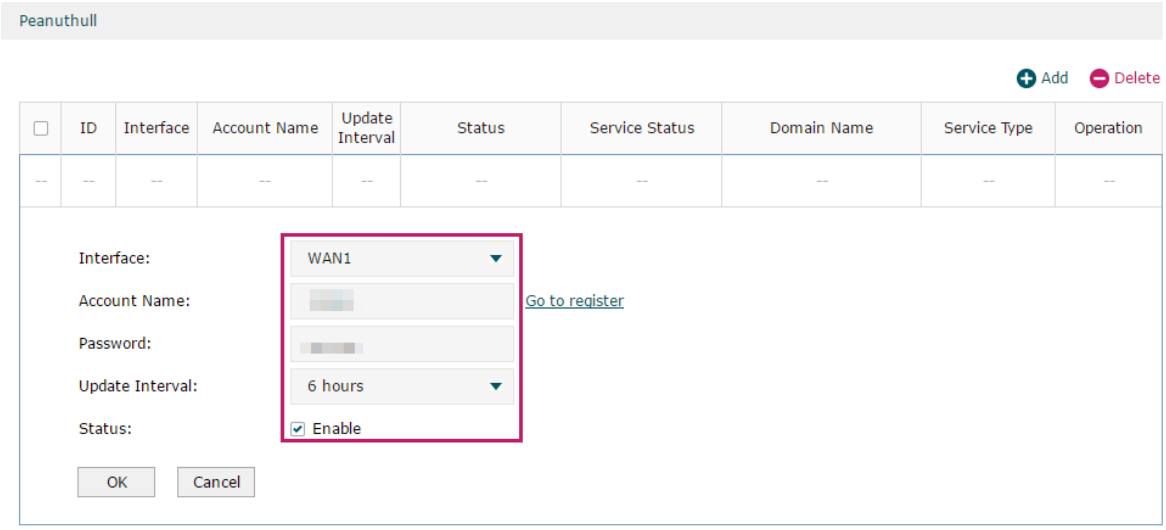
Password:

Update Interval: ---

Status: ☑ Enable

2) Set the Interface as WAN1, set the Update Interval as 6 hours, and enter the Account Name and Password previously registered before. Click **OK**.

Figure 4-3 Specifying Peanuthull DDNS Parameters



Peanuthull

□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Service Type	Operation
--	--	--	--	--	--	--	--	--	--

Interface: WAN1

Account Name: [redacted] Go to register

Password: [redacted]

Update Interval: 6 hours

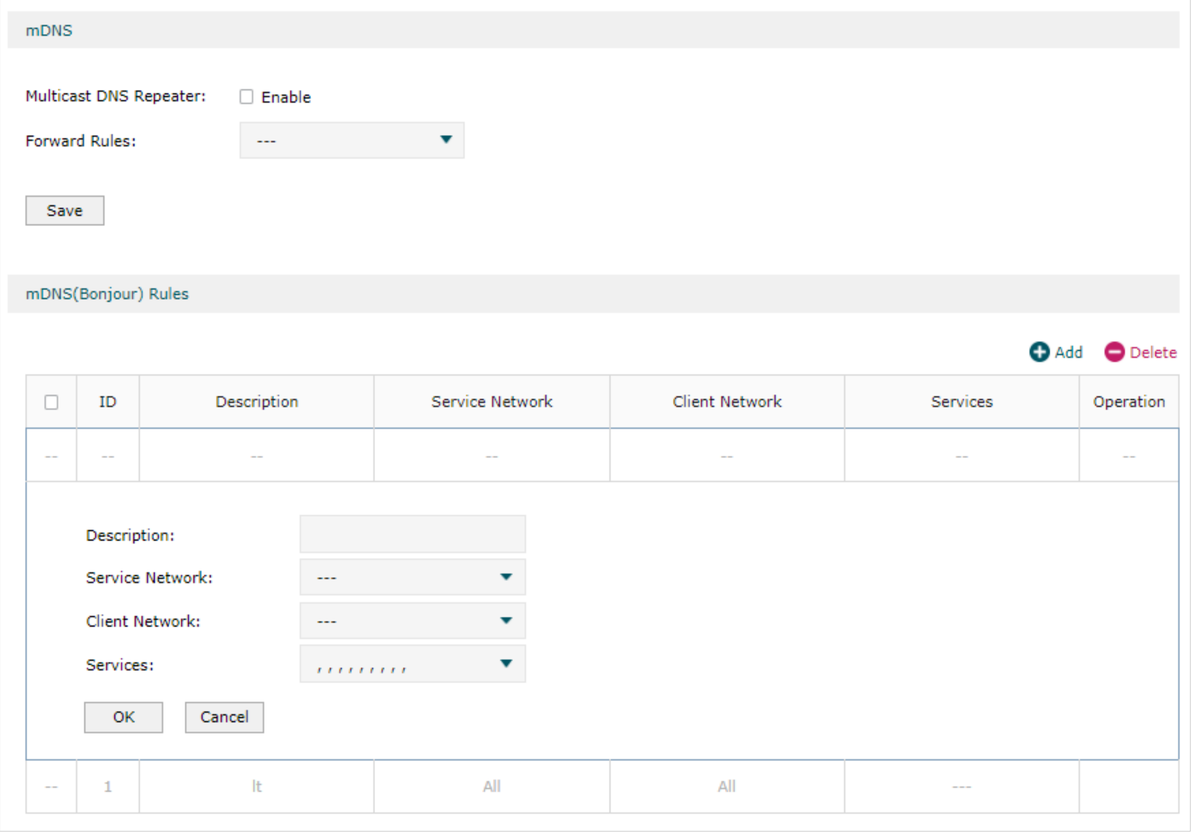
Status: ☑ Enable

5 mDNS Configuration

Enable Multicast DNS Repeater and specify the Forward Rules to determine the network segments that mDNS request/reply packets can cross, that is, the range of services that can be found across network segments. Bonjour is Apple's open zero-configuration network standard based on the mDNS protocol, which can automatically discover computers, devices and services on the IP network.

Choose the menu **Services** > **mDNS**, click **Add** to load the following page.

Figure 5-1 Configure mDNS Function



mDNS

Multicast DNS Repeater: □ Enable

Forward Rules: ---

mDNS(Bonjour) Rules

□	ID	Description	Service Network	Client Network	Services	Operation
--	--	--	--	--	--	--
--	1	lt	All	All	---	

Description:

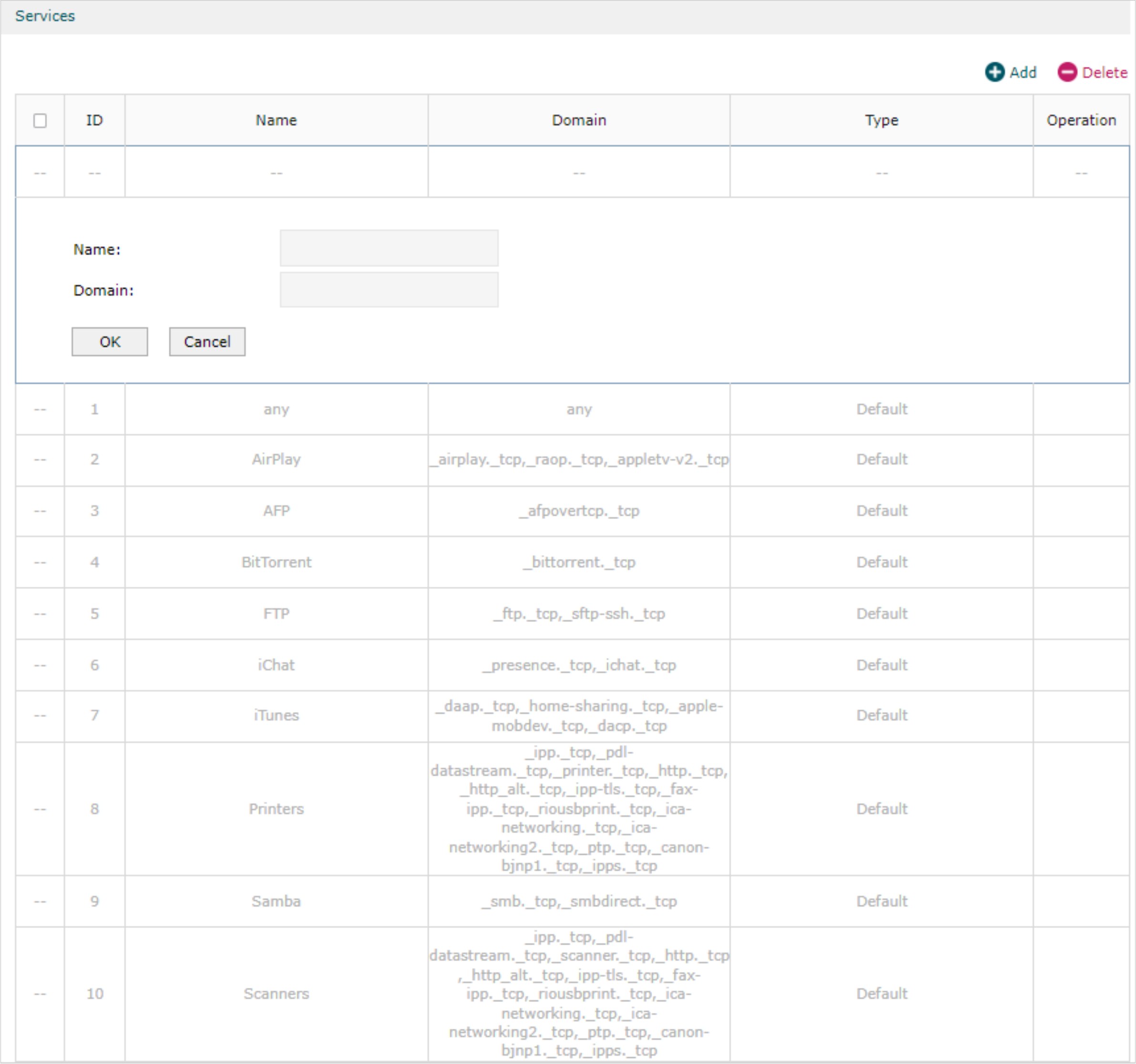
Service Network: ---

Client Network: ---

Services: , , , , , , , , ,

Multicast DNS Repeater	Check the box to enable the function.
Forward Rules	Select one or multiple mDNS (Bonjour) rules for forwarding mDNS request/reply packets.
Description	Give a name to the rule.
Service Network	Select a network, then its mDNS reply packets will be forwarded by the gateway.
Client Network	Select a network, then its mDNS request packets will be forwarded by the gateway.
Service	Select the service type, then the traffic of these services can be forwarded by the gateway.

In **Services** section, click **Add** and manage the service types supported by mDNS.



Services

□	ID	Name	Domain	Type	Operation
--	--	--	--	--	--

Name:

Domain:

□	ID	Name	Domain	Type	Operation
--	1	any	any	Default	
--	2	AirPlay	_airplay._tcp,_raop._tcp,_appletv-v2._tcp	Default	
--	3	AFP	_afpovertcp._tcp	Default	
--	4	BitTorrent	_bittorrent._tcp	Default	
--	5	FTP	_ftp._tcp,_sftp-ssh._tcp	Default	
--	6	iChat	_presence._tcp,_ichat._tcp	Default	
--	7	iTunes	_daap._tcp,_home-sharing._tcp,_apple-mobdev._tcp,_dacp._tcp	Default	
--	8	Printers	_ipp._tcp,_pdl-datastream._tcp,_printer._tcp,_http._tcp,_http_alt._tcp,_ipp-tls._tcp,_fax-ipp._tcp,_riousbprint._tcp,_ica-networking._tcp,_ica-networking2._tcp,_ptp._tcp,_canon-bjnp1._tcp,_ipps._tcp	Default	
--	9	Samba	_smb._tcp,_smbdirect._tcp	Default	
--	10	Scanners	_ipp._tcp,_pdl-datastream._tcp,_scanner._tcp,_http._tcp,_http_alt._tcp,_ipp-tls._tcp,_fax-ipp._tcp,_riousbprint._tcp,_ica-networking._tcp,_ica-networking2._tcp,_ptp._tcp,_canon-bjnp1._tcp,_ipps._tcp	Default	

Name Enter a name to identify the service

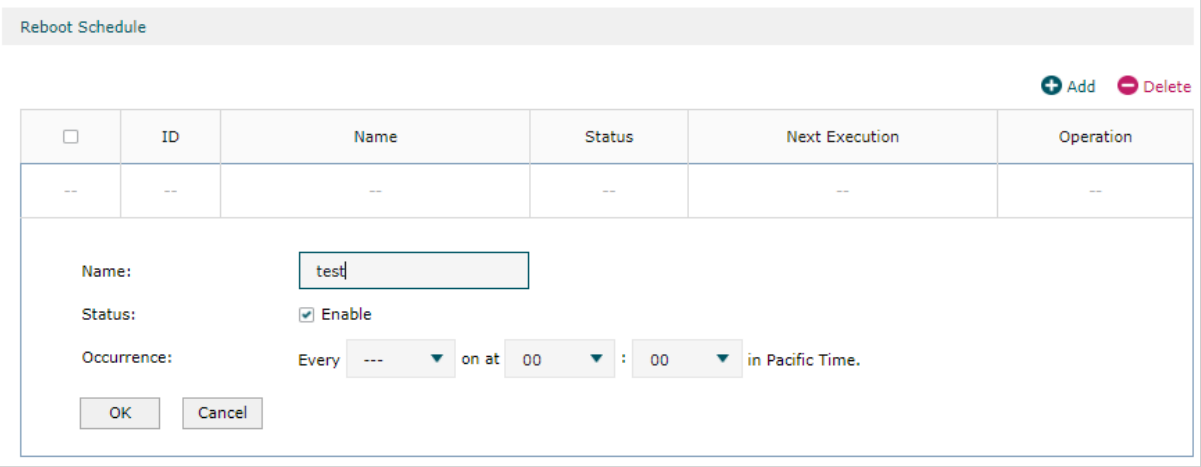
Status Enter the domain of the service.

6 Reboot Schedule

In Reboot Schedule, you can set schedules to reboot the connected devices periodically based on needs. You can configure the reboot schedule flexibly by creating multiple entries.

Choose the menu **Services** > **Reboot Schedule**, click **Add** to load the following page.

Figure 6-1 Configure Reboot Schedule



□	ID	Name	Status	Next Execution	Operation
--	--	--	--	--	--

Name: test

Status: ☑ Enable

Occurrence: Every --- ▼ on at 00 ▼ : 00 ▼ in Pacific Time.

Name	Enter a name to identify the reboot schedule entry.
Status	Click the checkbox to enable the reboot schedule entry.
Occurrence	Specify the date and time for the devices to reboot.

7 DNS Proxy

DNS Proxy provides the LAN side clients with the DNS query service. It forwards the DNS request from the LAN side clients to the selected upstream DNS server and forwards the DNS reply accordingly.

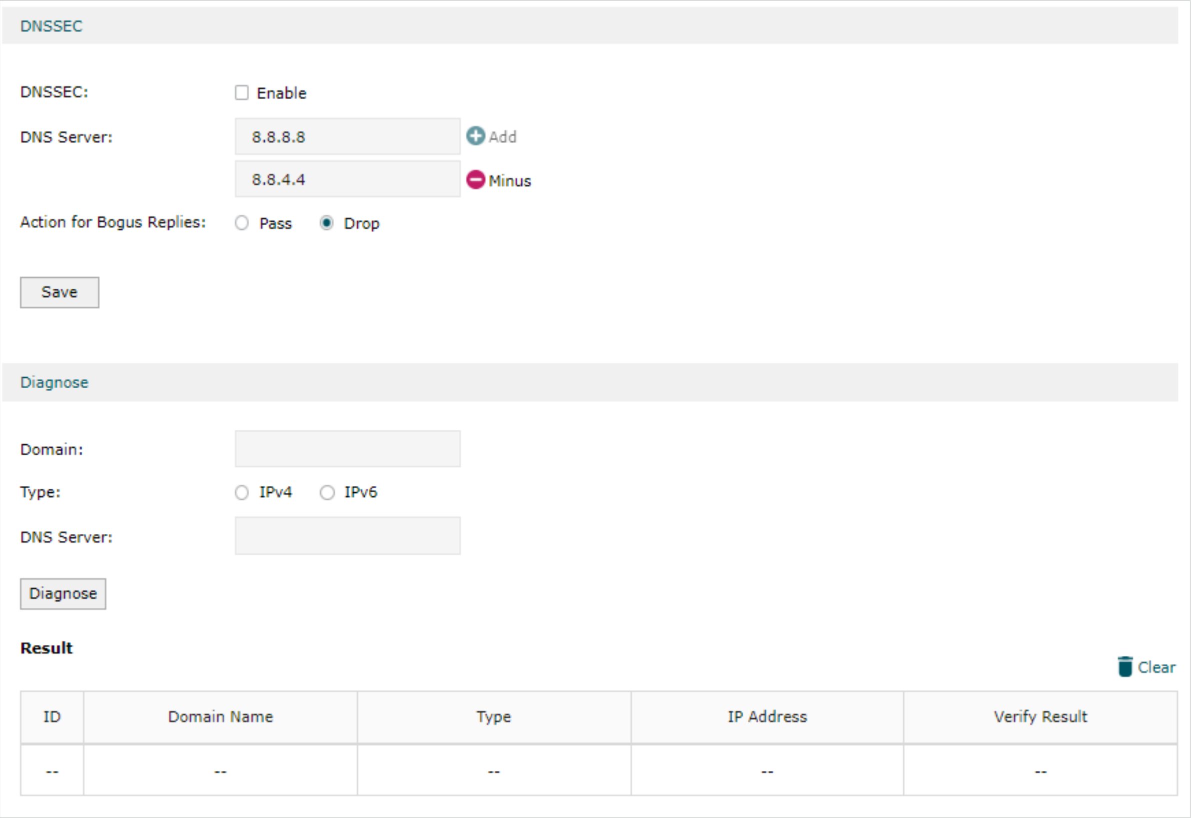
DNSSEC (DNS Security Extensions), DoT (DNS over TLS), and DoH (DNS over Https) are three security options for DNS Proxy. DNSSEC will verify the integrity of DNS records, and DoT / DoH will encrypt the query.

All of the three options need an upstream DNS server that supports them.

7.1 DNSSEC

Choose the menu **Services** > **DNS Proxy** > **DNSSEC** to load the following page.

Figure 7-1 Configure DNSSEC



DNSSEC

DNSSEC: □ Enable

DNS Server: 8.8.8.8 Add

8.8.4.4 Minus

Action for Bogus Replies: ○ Pass ● Drop

Save

Diagnose

Domain:

Type: ○ IPv4 ○ IPv6

DNS Server:

Diagnose

Result

Clear

ID	Domain Name	Type	IP Address	Verify Result
--	--	--	--	--

In **DNSSEC**, configure the following parameters.

DNSSEC	Check the box to enable the function.
DNS Server	Specify the IP address of the DNSSEC server. Up to 2 IP addresses can be configured.
Action for Bogus Replies	Specify the action for processing DNS reply packets whose signature verification fails.

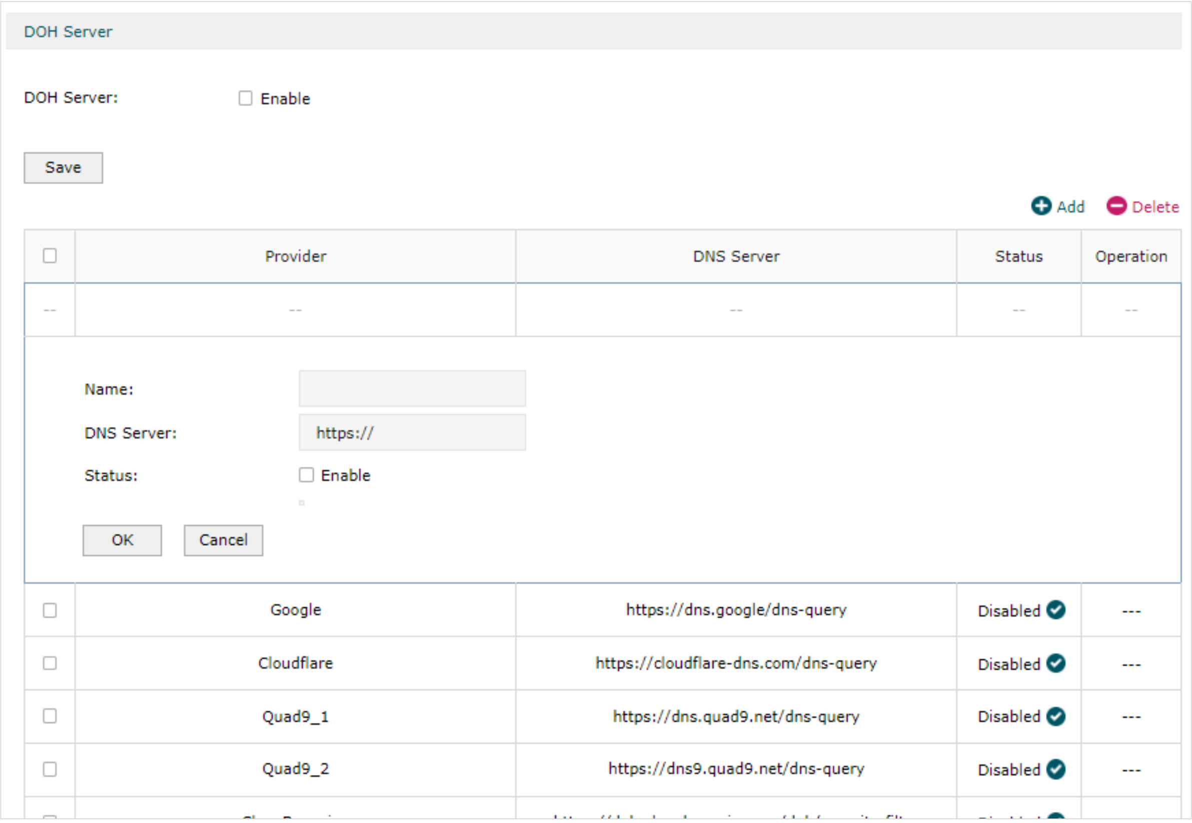
In **Diagnose** section, configure the following parameters.

Domain	Specify the domain name you want to query.
Type	Query the IPv4/IPv6 address corresponding to the domain name.
DNS Server	Specify the upstream DNS server used.
Diagnose	Click to diagnose the domain name and check the results. There may be three diagnostic results: Secure: The queried domain name has passed the DNSSEC signature verification. Bogus: The queried domain name has not passed the DNSSEC signature verification. The domain name authentication failed. Insecure: The device cannot verify the DNSSEC signature of the queried domain name.

7.2 DOH

Choose the menu **Services** > **DNS Proxy** > **DOH** to load the following page.

Figure 7-2 Configure DOH



DOH Server

DOH Server: □ Enable

Save

Add Delete

□	Provider	DNS Server	Status	Operation
--	--	--	--	--

Name:

DNS Server: https://

Status: □ Enable

OK Cancel

□	Provider	DNS Server	Status	Operation
□	Google	https://dns.google/dns-query	Disabled ✓	---
□	Cloudflare	https://cloudflare-dns.com/dns-query	Disabled ✓	---
□	Quad9_1	https://dns.quad9.net/dns-query	Disabled ✓	---
□	Quad9_2	https://dns9.quad9.net/dns-query	Disabled ✓	---

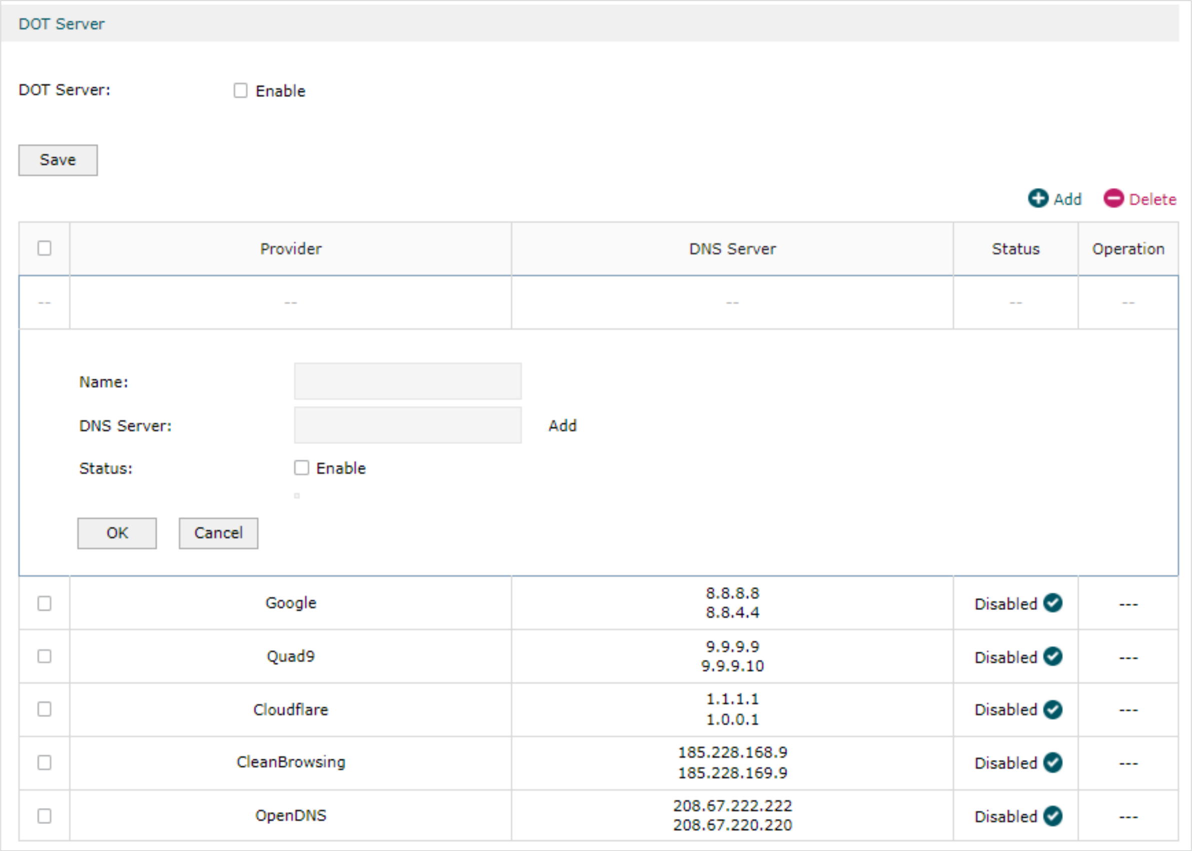
Enable the feature and click **Add** to create a new server entry.

DOH Server	Check the box to enable the DoH (DNS over Https) server.
Name	Specify the name of the server.
DNS Server	Specify the domain name of DNS Server. Only one server can be added.
Status	Specify whether to enable this server entry. Up to two server entries can be enabled at the same time.

7.3 DOT

Choose the menu **Services** > **DNS Proxy** > **DOT** to load the following page.

Figure 7-3 Configure DOT



DOT Server

DOT Server: □ Enable

□	Provider	DNS Server	Status	Operation
--	--	--	--	--
□	Google	8.8.8.8 8.8.4.4	Disabled ✓	---
□	Quad9	9.9.9.9 9.9.9.10	Disabled ✓	---
□	Cloudflare	1.1.1.1 1.0.0.1	Disabled ✓	---
□	CleanBrowsing	185.228.168.9 185.228.169.9	Disabled ✓	---
□	OpenDNS	208.67.222.222 208.67.220.220	Disabled ✓	---

Name:

DNS Server: Add

Status: □ Enable

Enable the feature and click **Add** to create a new server entry.

DOT Server	Check the box to enable the DoT (DNS over TLS) server.
Name	Specify the name of the server.
DNS Server	Specify the IP address of DNS Server. Up to two servers can be added.
Status	Specify whether to enable this server entry. Up to two server entries can be enabled at the same time.

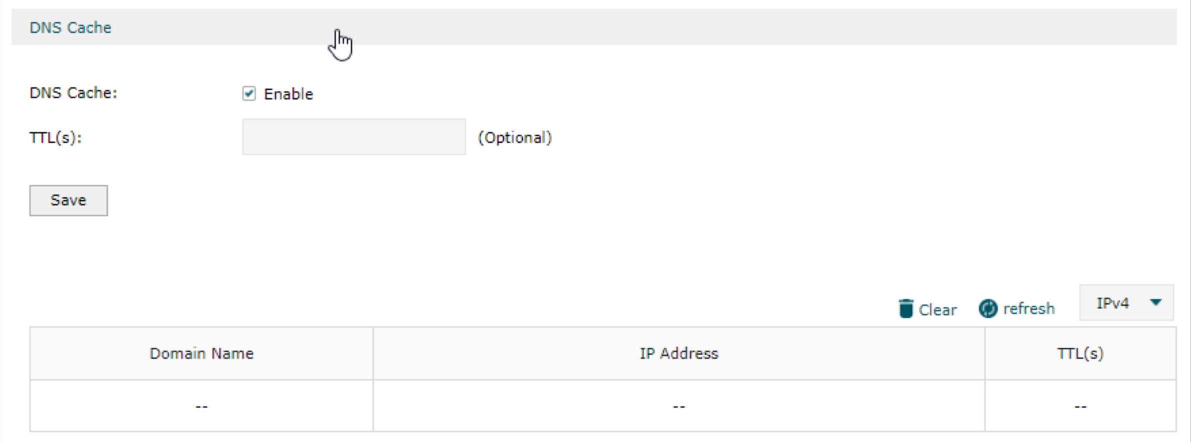
7.4 DNS Cache

DNS caching further speeds up domain name translation/resolution by handling it for recently visited addresses before the request is sent to the internet. Even if your network can use a large number of public DNS servers for translation/resolution, it’s still faster to have a local copy.

DNS Cache takes effect only when the gateway is used for DNS proxy. DNS Cache will be cleared if you perform the following operations:

- Edit the WAN or VPN settings (e.g., network reconfigurations).
- Edit the DNS Proxy settings (DNSSEC/DOT/DOH/DNS Cache).

1) Choose the menu **Services** > **DNS Proxy** > **DNS Cache to** load the following page.



DNS Cache

DNS Cache: ☑ Enable

TTL(s): (Optional)

Domain Name	IP Address	TTL(s)
--	--	--

2) Select the checkbox to enable DNS Cache.

3) (Optional) Specify the time to live (TTL) value in seconds. When the life cycle of the DNS entry exceeds the TTL value, the DNS cache will be automatically cleared. The range is 1–86400. If it’s not specified, the system will use the default TTL value of each DNS message

4) Check the DNS cache status in the cache list. You can clear the cache information if necessary.

Part 15

System Tools

CHAPTERS

1 System Tools

1.1 Overview

The System Tools module provides several system management tools for users to manage the gateway.

1.2 Support Features

Admin Setup

Admin Setup is used to configure the parameters for users' login. With this function, you can modify the login account, specify the IP subnet and mask for remote access and specify the HTTP and HTTPS server port.

Management

The Management section is used to manage the firmware and the configuration file of the gateway. With this function, you can reset the gateway, backup and restore the configuration file, reboot the gateway and upgrade the firmware.

SNMP

SNMP (Simple Network Management Protocol) is a standard network management protocol. It helps network managers to configure and monitor network devices. With SNMP, network managers can view and modify network device information, detect and analyze network error, and so on. The gateway supports SNMPv1 and SNMPv2c.

Diagnostics

Diagnostics is used to detect network errors and equipment failures. With this function, you can test the connectivity of the network with ping or traceroute command and inspect the gateway under the help of technicians.

Time Settings

Time Settings is used to configure the system time and the daylight saving time.

System Log

System Log is used to view the system log of the gateway. You can also configure the gateway to send the log to a server.

Mail Notification

In Mail Notification, you can configure mail-related parameters and choose the modules to apply these parameters to.

2 Admin Setup

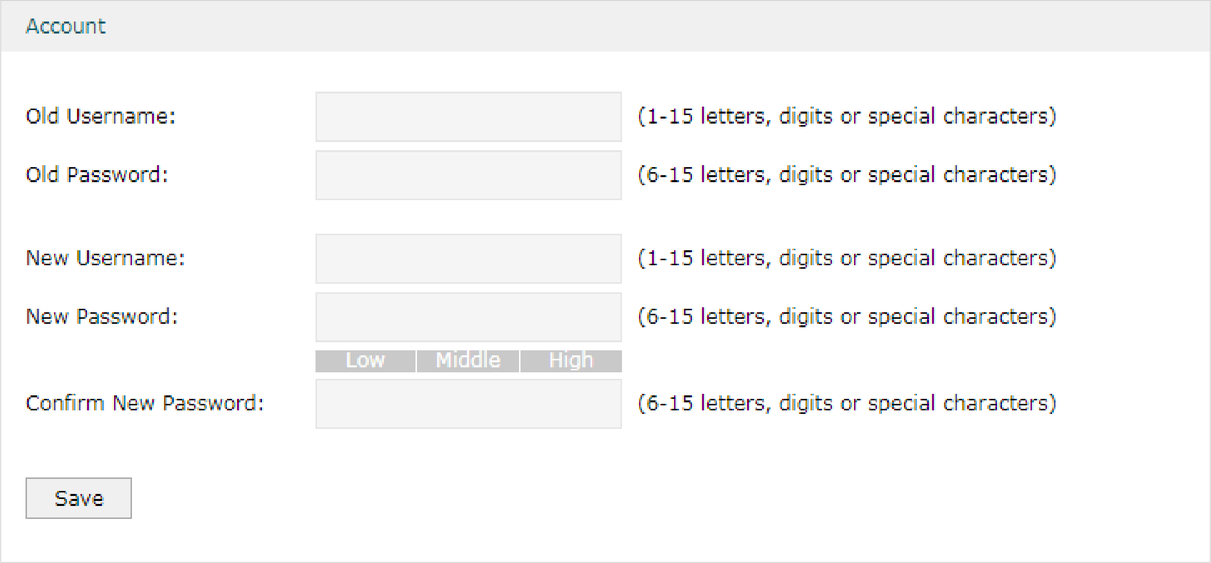
In Admin Setup module, you can configure the following features:

- Admin Setup
- Remote Management
- System Settings

2.1 Admin Setup

Choose the menu **System Tools** > **Admin Setup** > **Admin Setup** to load the following page.

Figure 2-1 Modifying the Admin Account



Account

Old Username: (1-15 letters, digits or special characters)

Old Password: (6-15 letters, digits or special characters)

New Username: (1-15 letters, digits or special characters)

New Password: (6-15 letters, digits or special characters)

Low | Middle | High

Confirm New Password: (6-15 letters, digits or special characters)

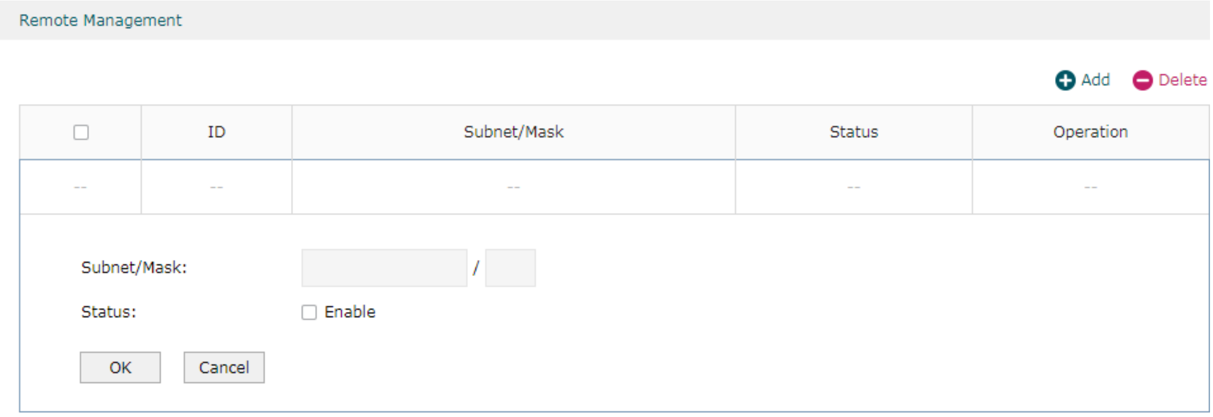
In the **Account** section, configure the following parameters and click **Save** to modify the admin account

Old Username	Enter the old username.
Old Password	Enter the old password.
New Username	Enter a new username.
New Password	Enter a new password.
Confirm New Password	Re-enter the new password for confirmation.

2.2 Remote Management

Choose the menu **System Tools** > **Admin Setup** > **Remote Management** and click **Add** to load the following page.

Figure 2-2 Configuring Remote Management



Remote Management

□	ID	Subnet/Mask	Status	Operation
--	--	--	--	--

Subnet/Mask: /

Status: □ Enable

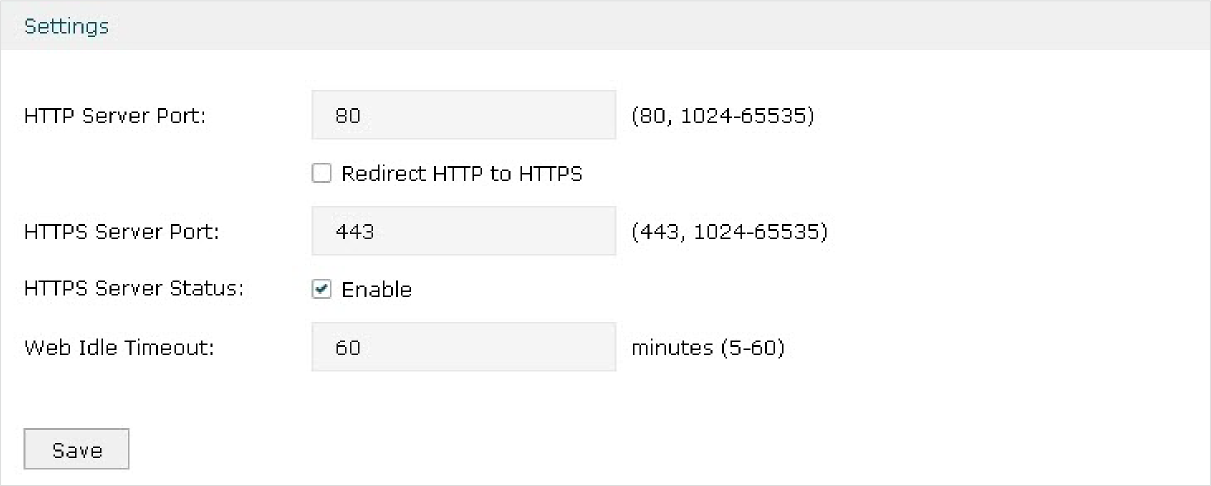
In the **Remote Management** section, configure the following parameters and click **OK** to specify the IP subnet and mask for remote management.

Subnet/Mask	Enter the IP Subnet and Mask of the remote host.
Status	Check the box to enable the remote management function for the remote host.

2.3 System Setting

Choose the menu **System Tools** > **Admin Setup** > **System Settings** to load the following page.

Figure 2-3 Configuring System Settings



Settings

HTTP Server Port: 80 (80, 1024-65535)

□ Redirect HTTP to HTTPS

HTTPS Server Port: 443 (443, 1024-65535)

HTTPS Server Status: ☑ Enable

Web Idle Timeout: 60 minutes (5-60)

In the **Settings** section, configure the following parameters and click **Save**.

HTTP Server Port	Enter the http server port for web management. The port number should be different from other servers'. The default setting is 80. After changing the http server port, you should access the interface by using IP address and the port number in the format of 192.168.0.1:1600.
Redirect HTTP to HTTPS	Check the box to enable the function, then you will access the web management interface by HTTPS protocol instead of HTTP protocol.
HTTPS Server Port	Enter the https server port for web management. The port number should be different from other servers'. The default setting is 443. After changing the https server port, you should access the interface by using IP address and the port number in the format of https://192.168.0.1:1800.
HTTPS Server Status	Check the box to enable HTTPS Server.
Web Idle Timeout	Enter a session timeout time for the device. The web session will log out for security if there is no operation within the session timeout time.

3 Controller Settings

To make your controller adopt your gateway, make sure the gateway can be discovered by the controller. Controller Settings enable your gateway to be discovered in either of the following scenarios.

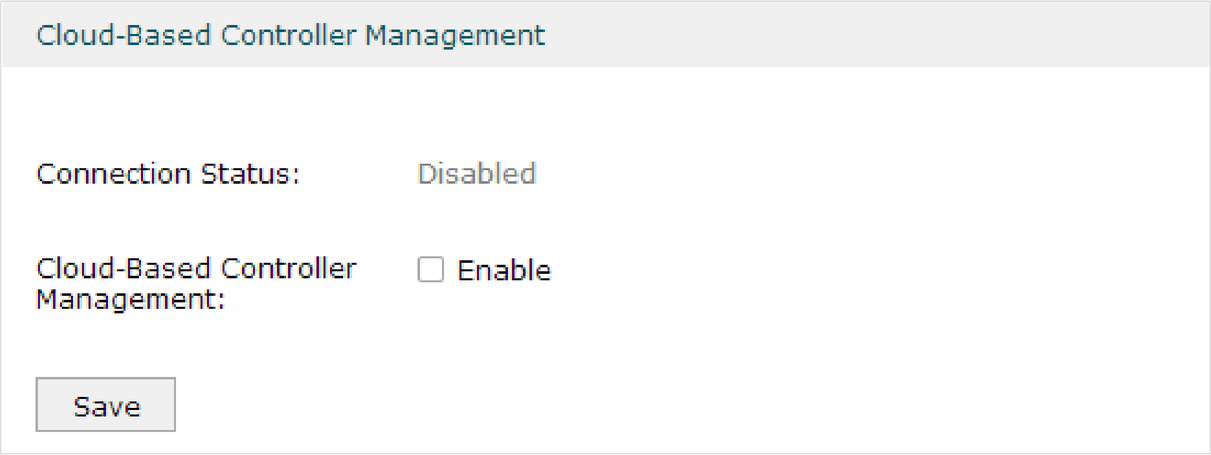
- If you are using Omada Cloud-Based Controller, Enable Cloud-Based Controller Management.
- If your gateway and controller are located in the same network, LAN and VLAN, the controller can discover and adopt the gateway without any controller settings. Otherwise, you need to inform the gateway of the controller's URL/IP address, and one possible way is to Configure Controller Inform URL.

For details about the whole procedure, refer to the User Guide of Omada SDN Controller. The guide can be found on the download center of our official website: https://www.tp-link.com/support/download/.

3.1 Enable Cloud-Based Controller Management

Choose the menu **System Tools** > **Controller Settings** page. In the Cloud-Based Controller Management section, enable Cloud-Based Controller Management and click **Save**. You can check the connection status on this page.

Figure 3-1 Cloud-Based Controller Management



Cloud-Based Controller Management

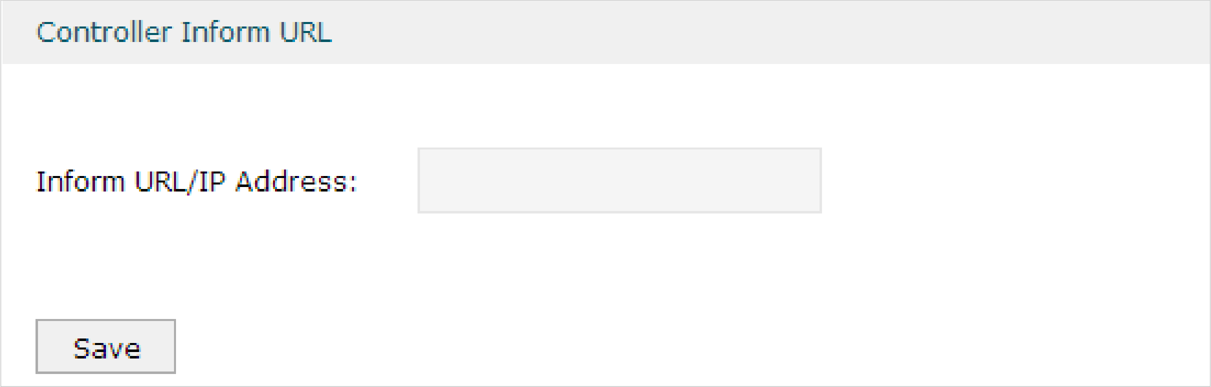
Connection Status: Disabled

Cloud-Based Controller Management: □ Enable

3.2 Configure Controller Inform URL

Choose the menu **System Tools** > **Controller Settings** page. In the Controller Inform URL section, inform the gateway of the controller's URL/IP address, and click **Save**. Then the gateway makes contact with the controller so that the controller can discover the gateway.

Figure 3-2 Cloud-Based Controller Management



Controller Inform URL

Inform URL/IP Address:

4 Management

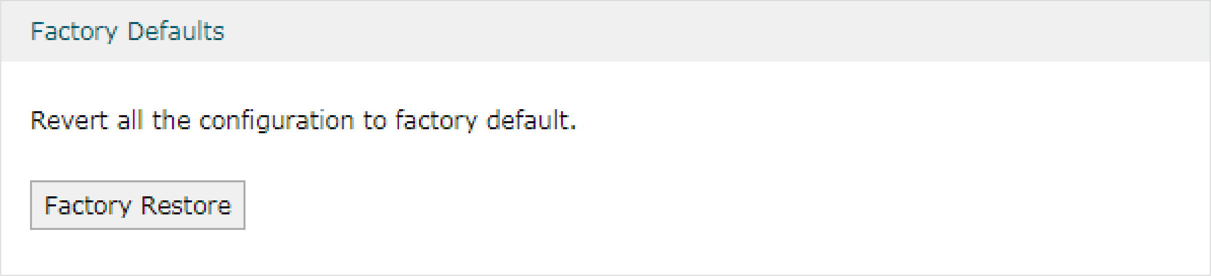
In Management module, you can configure the following features:

- Factory Default Restore
- Backup & Restore
- Reboot
- Firmware Upgrade

4.1 Factory Default Restore

Choose the menu **System Tools** > **Management** > **Factory Default Restore** to load the following page.

Figure 4-1 Reseting the Device



Factory Defaults

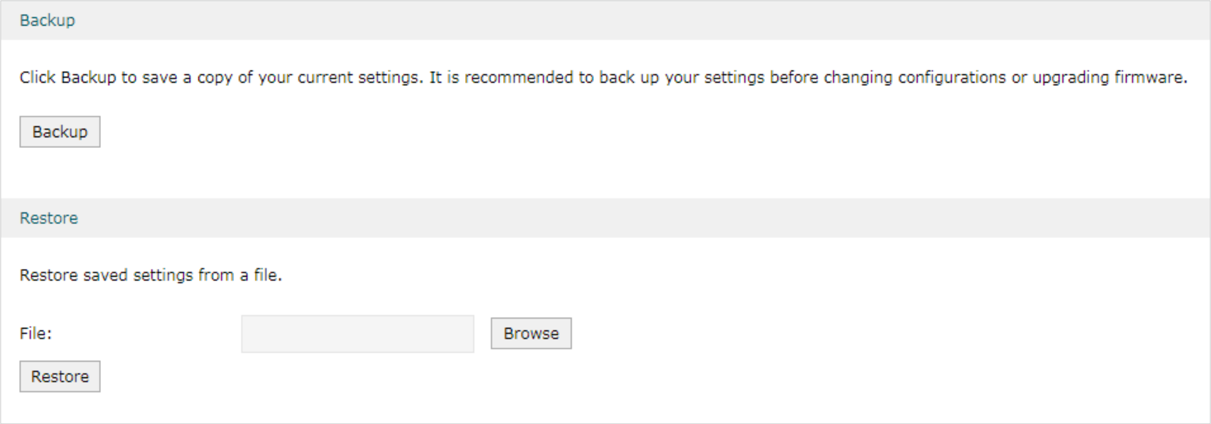
Revert all the configuration to factory default.

Click **Factory Restore** to reset the device.

4.2 Backup & Restore

Choose the menu **System Tools** > **Management** > **Backup & Restore** to load the following page.

Figure 4-2 Backup & Restore Page



Backup

Click Backup to save a copy of your current settings. It is recommended to back up your settings before changing configurations or upgrading firmware.

Restore

Restore saved settings from a file.

File:

Choose the corresponding operation according to your need:

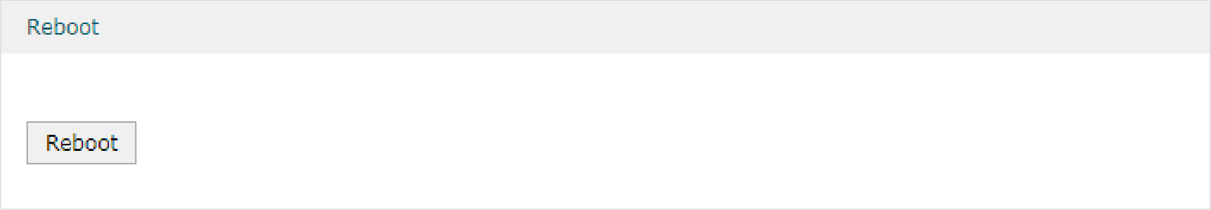
1) In the **Backup** section, click **Backup** to save your current configuration as a configuration file and export the file to the host.

2) In the **Restore** section, select one configuration file saved in the host and click **Restore** to import the saved configuration to your gateway.

4.3 Reboot

Choose the menu **System Tools** > **Management** > **Reboot** to load the following page.

Figure 4-3 Rebooting the Device

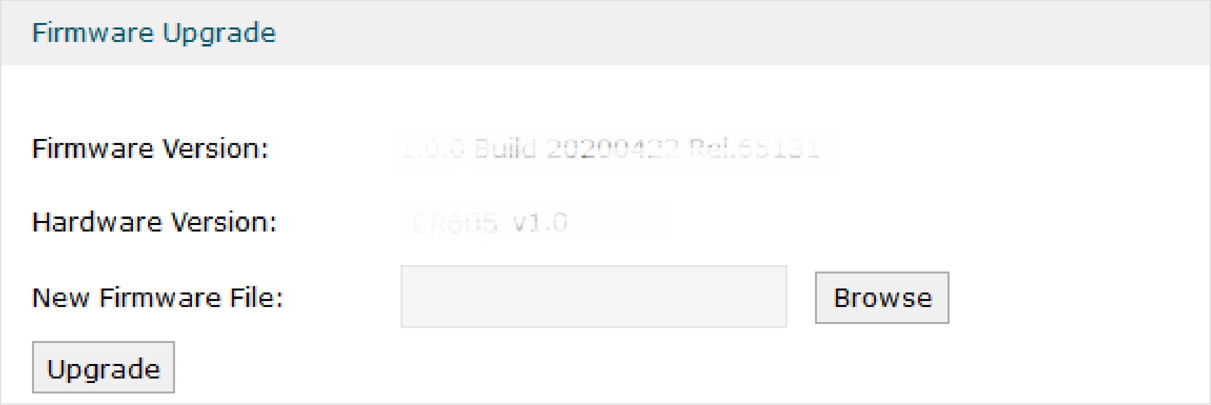


Click **Reboot** to reboot the device.

4.4 Firmware Upgrade

Choose the menu **System Tools** > **Management** > **Firmware Upgrade** to load the following page.

Figure 4-4 Configure System Settings



Firmware Upgrade

Firmware Version: 1.0.0 Build 20200422 Rel.65131

Hardware Version: ER605 v1.0

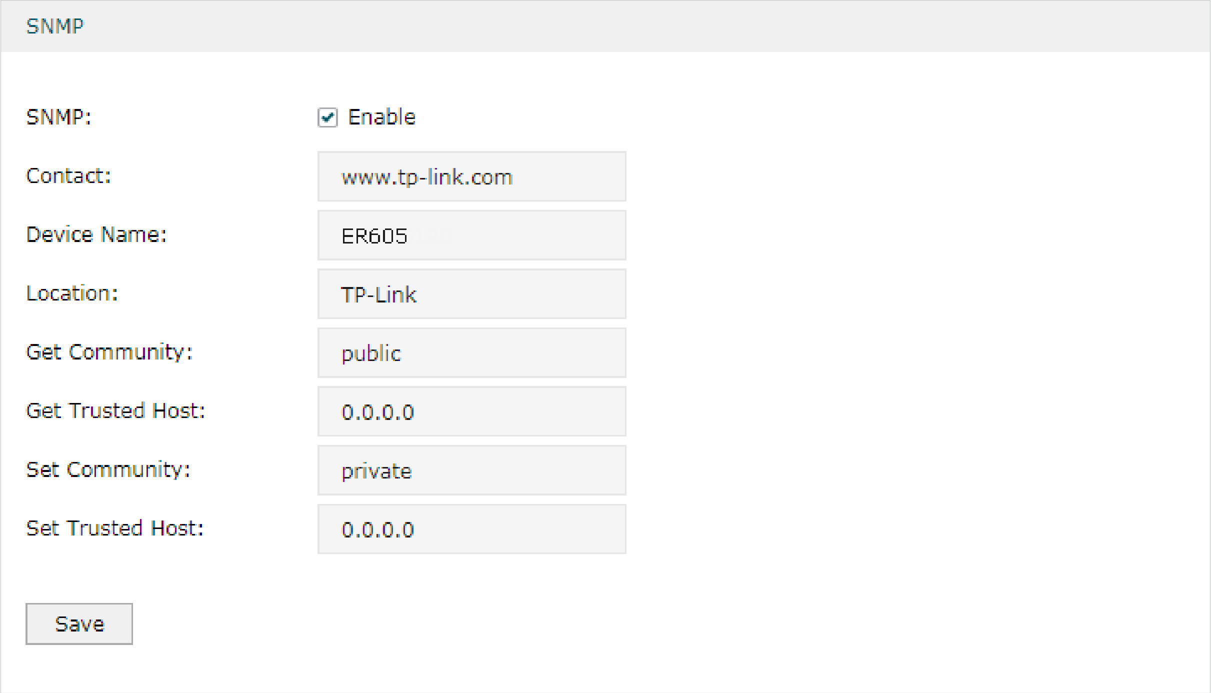
New Firmware File:

Select one firmware file and click **Upgrade** to upgrade the firmware of the device.

5 SNMP

Choose the menu **System Tools** > **SNMP** > **SNMP** to load the following page.

Figure 5-1 Configuring SNMP



SNMP

SNMP: ☑ Enable

Contact: www.tp-link.com

Device Name: ER605

Location: TP-Link

Get Community: public

Get Trusted Host: 0.0.0.0

Set Community: private

Set Trusted Host: 0.0.0.0

Follow these steps to configure the SNMP function:

1) Check the box to enable the SNMP function.

2) Configure the following parameters and click **Save**.

Contact	Enter the textual identification of the contact person for this the device, for example, contact or e-mail address.
Device Name	Enter a name for the device.
Location	Enter the location of the device. For example, the name can be composed of the building, floor number, and room location.
Get Community	Specify the community that has read-only access to the device's SNMP information.
Get Trusted Host	Enter the IP address that can serve as Get Community to read the SNMP information of this device.
Set Community	Specify the community who has the read and write right of the device's SNMP information.
Set Trusted Host	Enter the IP address that can serve as Set Community to read and write the SNMP information of this device.

6 Diagnostics

In Diagnostics module, you can configure the following features:

- Diagnostics
- Remote Assistance

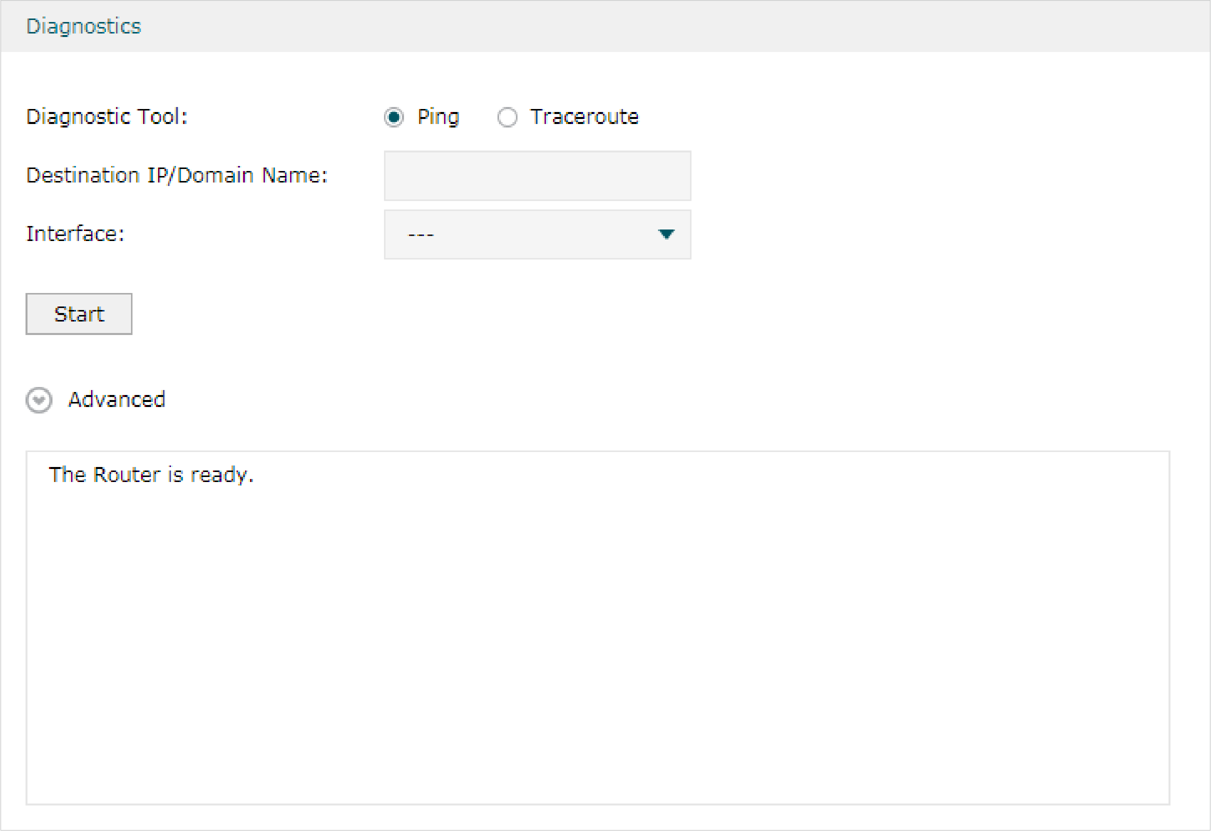
6.1 Diagnostics

Ping and traceroute are both used to test the connectivity between two devices in the network. In addition, ping can show the roundtrip time between the two devices directly and traceroute can show the IP address of gateways along the route path.

6.1.1 Configuring Ping

Choose the menu **System Tools** > **Diagnostics** > **Diagnostics** to load the following page.

Figure 6-1 Configuring Diagnostics



Diagnostics

Diagnostic Tool: ● Ping ○ Traceroute

Destination IP/Domain Name:

Interface: ---

The Router is ready.

Follow these steps to configure Diagnostics:

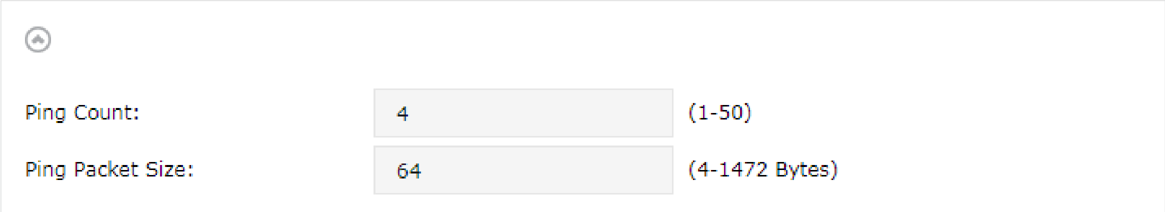
1) In **Diagnostics** section, select **Ping** and configure the following parameters.

Diagnostic Tool	Select **Ping** to test the connectivity between the gateway and the desired device.

Destination IP/ Domain Name	Enter the IP address or the domain name that you want to ping or tracert.
Interface	Select the interface that sends the detection packets.

2) (Optional) Click **Advanced** and the following section will appear.

Figure 6-2 Advanced Parameters for Ping Method



Ping Count: 4 (1-50)

Ping Packet Size: 64 (4-1472 Bytes)

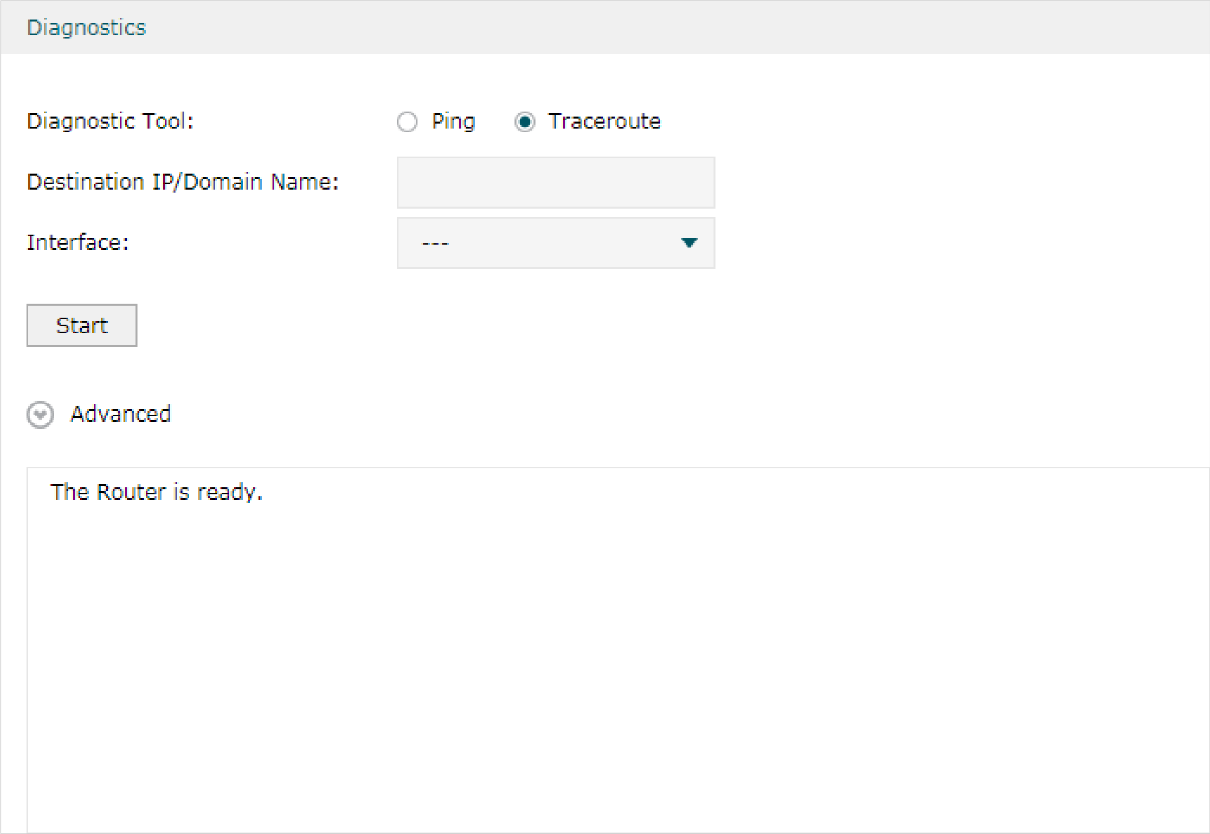
Ping Count	Specify the count of the test packets to be sent during the ping process.
Ping Packet Size	Specify the size of the test packets to be sent during the ping process.

3) Click **Start**.

6.1.2 Configuring Traceroute

Choose the menu **System Tools** > **Diagnostics** > **Diagnostics** to load the following page.

Figure 6-3 Configuring Diagnostics



Diagnostics

Diagnostic Tool: ○ Ping ● Traceroute

Destination IP/Domain Name:

Interface: ---

The Router is ready.

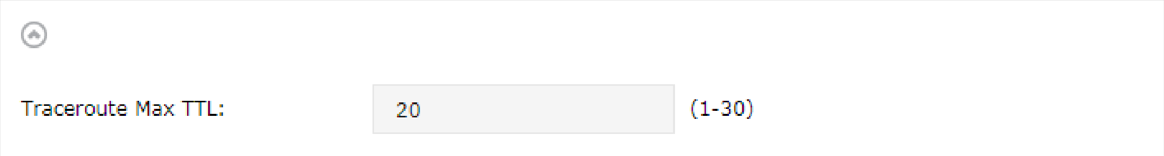
Follow these steps to configure Diagnostics:

1) In **Diagnostics** section, select **Traceroute** and configure the following parameters.

Diagnostic Tool	Select **Traceroute** to test the connectivity between the gateway and the desired device.
Destination IP/ Domain Name	Enter the IP address or the domain name that you want to ping or tracert.
Interface	Select the interface that sends the detection packets.

2) (Optional) Click **Advanced** and the following section will appear.

Figure 6-4 Advanced Parameters for Traceroute Method



Traceroute Max TTL: 20 (1-30)

Traceroute MAX TTL	Specify the traceroute max TTL (Time To Live) during the traceroute process. It is the maximum number of the route hops the test packets can pass through.

3) Click **Start**.

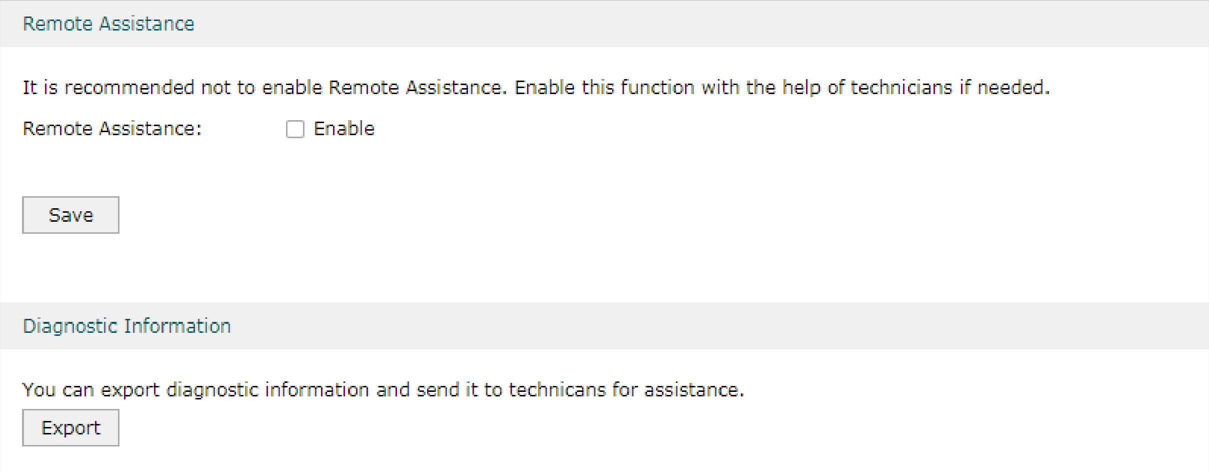
6.2 Remote Assistance

Note:

Please make contact with the technicians before trying to use this function.

Choose the menu **System Tools** > **Diagnostics** > **Remote Assistance** to load the following page.

Figure 6-5 Remote Assistance Page



Remote Assistance

It is recommended not to enable Remote Assistance. Enable this function with the help of technicians if needed.

Remote Assistance: □ Enable

Diagnostic Information

You can export diagnostic information and send it to technicans for assistance.

1) In the **Remote Assistance** section, check the box and click **Save** to enable the remote assistance function and then the technicians can access your gateway and help to solve the problems by SSH.

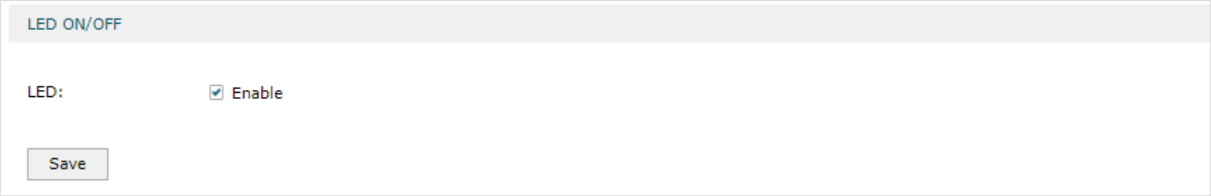
2) In the **Diagnostic Information** section, click **Export** to download a binary (.bin) file containing helpful information, and send it to the technicians for help.

7 LED Control

You can manually turn on or off the LED via a web browser.

Choose the menu **System Tools** > **LED Control**, check the box to turn on or off the LED.

Figure 7-1 Getting Automatically from the Internet



LED ON/OFF

LED: ☑ Enable

8 Time Settings

In Time Settings module, you can configure the following features:

- System Time
- Daylight Saving Time

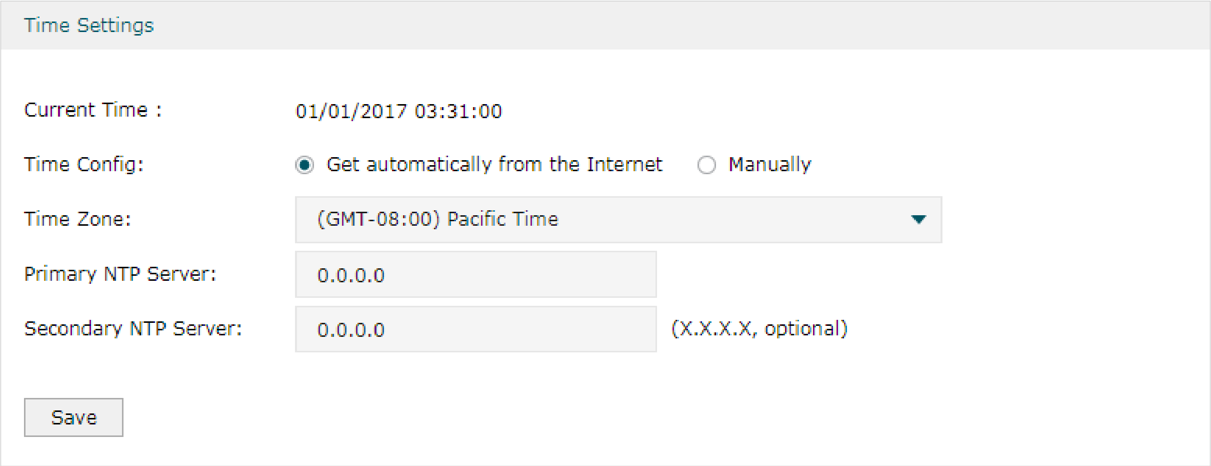
8.1 Setting the System Time

Choose one method to set the system time.

8.1.1 Getting time from the Internet Automatically

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 8-1 Getting Automatically from the Internet



Time Settings

Current Time : 01/01/2017 03:31:00

Time Config: ● Get automatically from the Internet ○ Manually

Time Zone: (GMT-08:00) Pacific Time

Primary NTP Server: 0.0.0.0

Secondary NTP Server: 0.0.0.0 (X.X.X.X, optional)

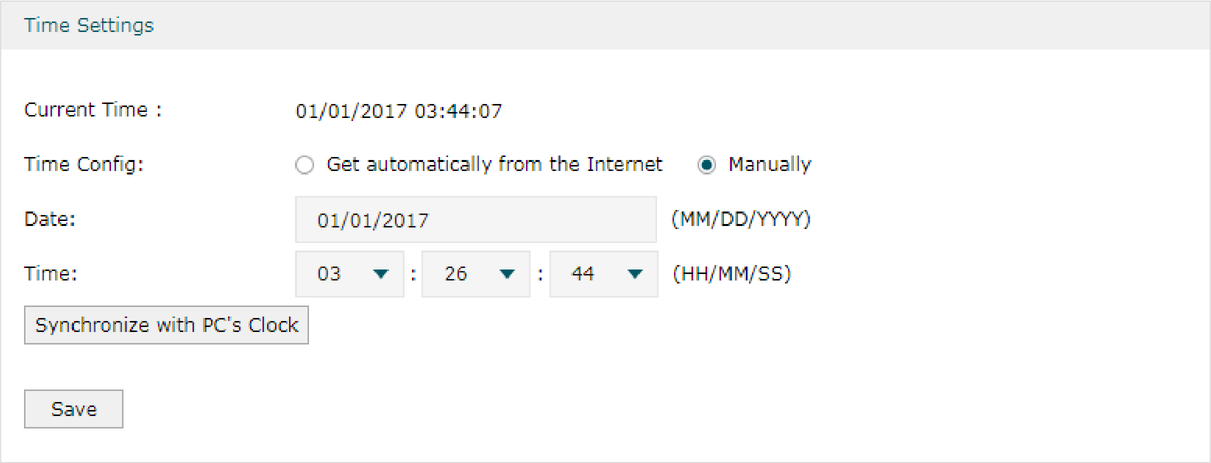
In the **Time Settings** section, configure the following parameters and click **Save**.

Current Time	Displays the current system time.
Time Config	Select **Get automatically from the Internet** to get the system time from the NTP server.
Time Zone	Select the time zone the device is in.
Primary NTP Server	Enter the IP address of the Primary NTP server.
Secondary NTP Server	Enter the IP address of the Secondary NTP server.

8.1.2 Setting the System Time Manually

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 8-2 Setting the System Time Manually



Time Settings

Current Time : 01/01/2017 03:44:07

Time Config: ○ Get automatically from the Internet ● Manually

Date: 01/01/2017 (MM/DD/YYYY)

Time: 03 : 26 : 44 (HH/MM/SS)

In the **Time Settings** section, configure the following parameters and click **Save**.

Current Time	Displays the current system time.
Time Config	Select **Manually** to set the system time manually.
Date	Specify the date of the system.
Time	Specify the time of the system.
Synchronize with PC's Clock	Synchronize the system time of the gateway with PC's clock.

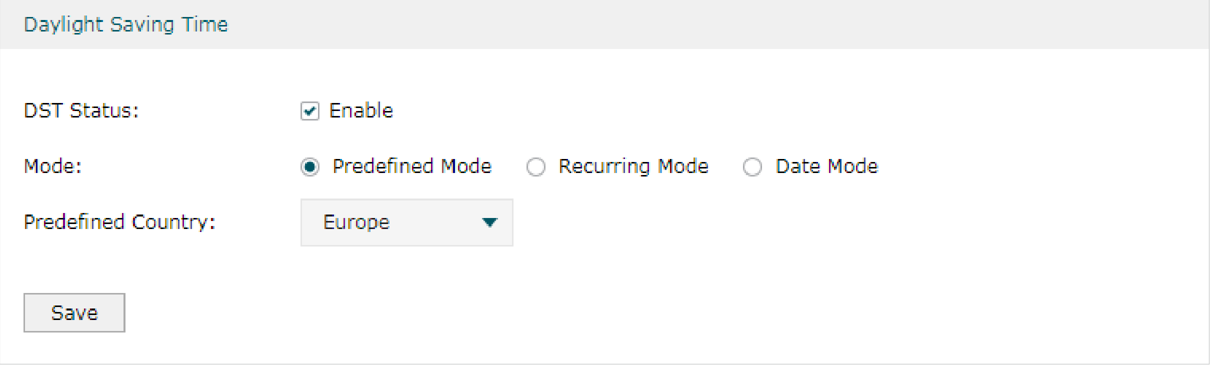
8.2 Setting the Daylight Saving Time

Choose one method to set the daylight saving time.

8.2.1 Predefined Mode

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 8-3 Predefined Mode Page



Daylight Saving Time

DST Status: ☑ Enable

Mode: ● Predefined Mode ○ Recurring Mode ○ Date Mode

Predefined Country: Europe

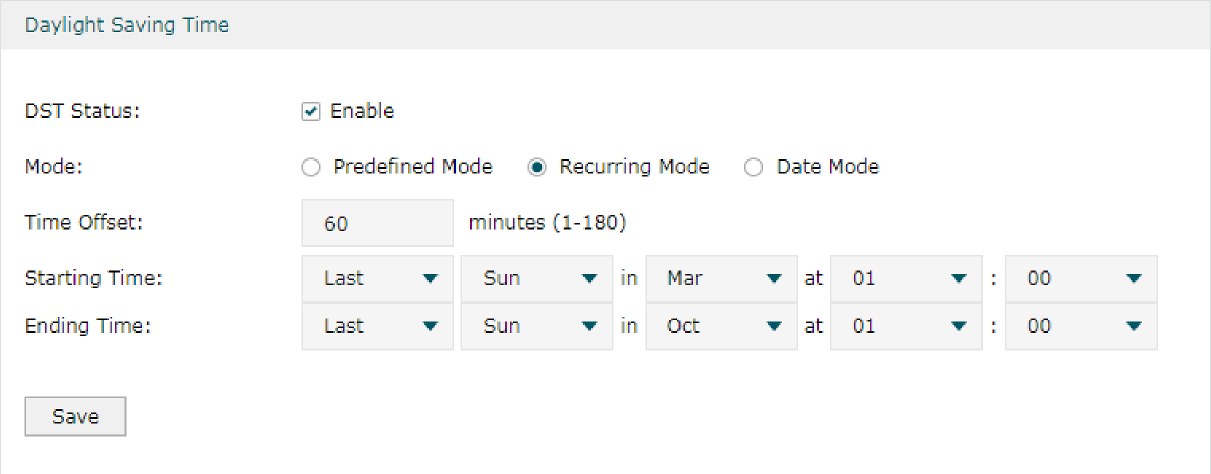
In the **Daylight Saving Time** section, select one predefined DST schedule and click **Save**.

DST Status	Check the box to enable the DST function.
Mode	Select **Predefined Mode** to choose a predefined daylight saving time.
USA	Select the Daylight Saving Time of the USA. It is from 2: 00 a.m. on the Second Sunday in March to 2:00 a.m. on the First Sunday in November
Europe	Select the Daylight Saving Time of Europe. It is from 1:00 a.m. on the Last Sunday in March to 1:00 a.m. on the Last Sunday in October.
Australia	Select the Daylight Saving Time of Australia. It is from 2:00 a.m. on the First Sunday in October to 3:00 a.m. on the First Sunday in April.
New Zealand	Select the Daylight Saving Time of New Zealand. It is from 2:00 a.m. on the Last Sunday in September to 3:00 a.m. on the First Sunday in April.

8.2.2 Recurring Mode

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 8-4 Recurring Mode Page



Daylight Saving Time

DST Status: ☑ Enable

Mode: ○ Predefined Mode ● Recurring Mode ○ Date Mode

Time Offset: 60 minutes (1-180)

Starting Time: Last Sun in Mar at 01 : 00

Ending Time: Last Sun in Oct at 01 : 00

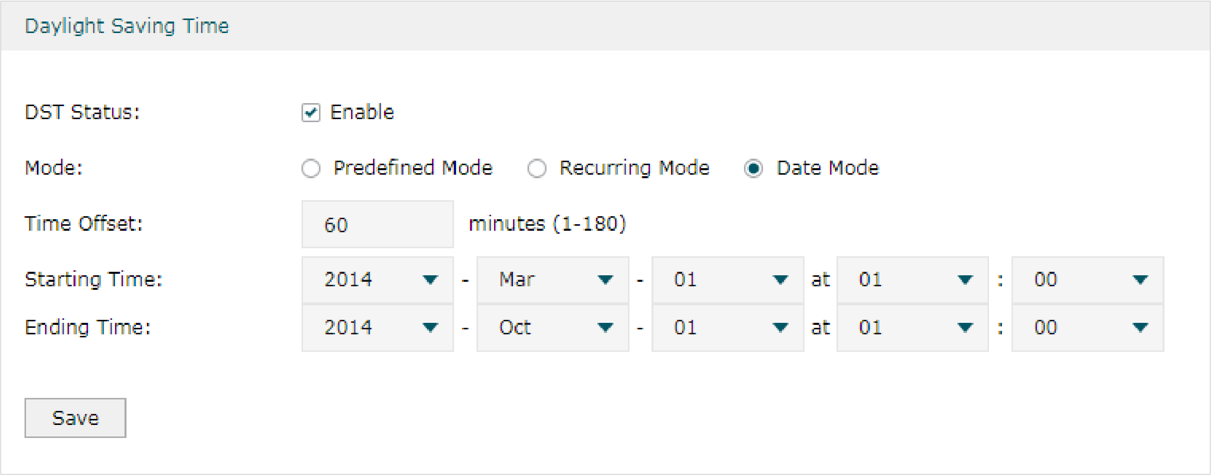
In the **Daylight Saving Time** section, configure the following parameters and click **Save**.

DST Status	Check the box to enable the DST function.
Mode	Select **Recurring Mode** to specify a cycle time range for the daylight saving time. This configuration will take effect every year.
Time Offset	Specify the time added in minutes when Daylight Saving Time takes effect.
Starting Time	Specify the starting time of Daylight Saving Time. The starting time is relative to standard time.
Ending Time	Specify the ending time of Daylight Saving Time. The ending time is relative to daylight saving time.

8.2.3 Date Mode

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 8-5 Date Mode Page



Daylight Saving Time

DST Status: ☑ Enable

Mode: ○ Predefined Mode ○ Recurring Mode ● Date Mode

Time Offset: 60 minutes (1-180)

Starting Time: 2014 - Mar - 01 at 01 : 00

Ending Time: 2014 - Oct - 01 at 01 : 00

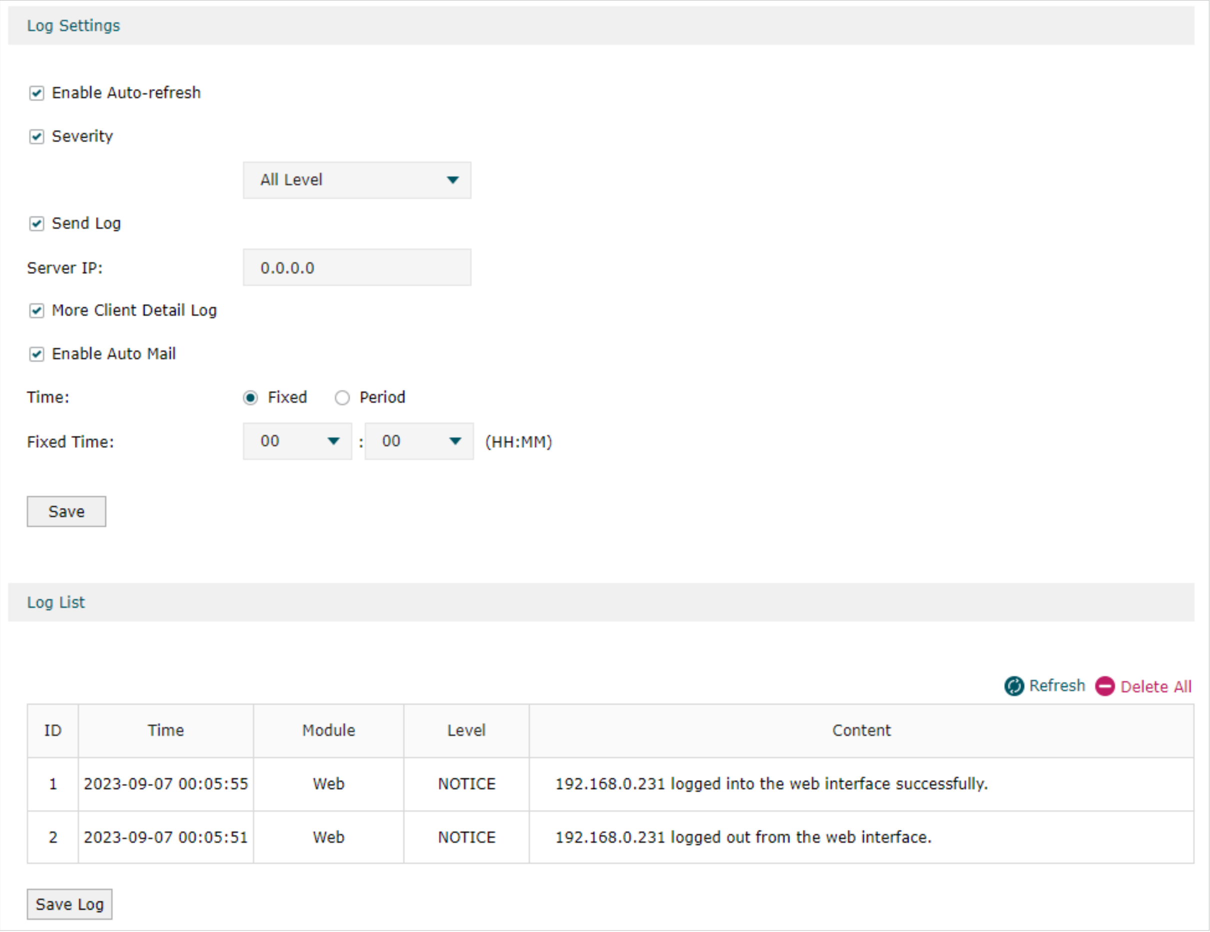
In the **Daylight Saving Time** section, select one predefined DST schedule and click **Save**.

DST Status	Check the box to enable the DST function.
Mode	Select Date Mode to specify an absolute time range for the daylight saving time.
Time Offset	Specify the time added in minutes when Daylight Saving Time takes effect.
Starting Time	Specify the starting time of Daylight Saving Time. The starting time is relative to standard time.
Ending Time	Specify the ending time of Daylight Saving Time. The ending time is relative to daylight saving time.

9 System Log

Choose the menu **System Tools** > **System Log** > **System Log** to load the following page.

Figure 9-1 System Log Page



Log Settings

☑ Enable Auto-refresh

☑ Severity

All Level ▼

☑ Send Log

Server IP: 0.0.0.0

☑ More Client Detail Log

☑ Enable Auto Mail

Time: ● Fixed ○ Period

Fixed Time: 00 ▼ : 00 ▼ (HH:MM)

Save

Log List

Refresh Delete All

ID	Time	Module	Level	Content
1	2023-09-07 00:05:55	Web	NOTICE	192.168.0.231 logged into the web interface successfully.
2	2023-09-07 00:05:51	Web	NOTICE	192.168.0.231 logged out from the web interface.

Save Log

Follow these steps to view the system log:

1) In the **Log Settings** section, configure the following parameters and click **Save**.

Enable Auto-refresh	Check the box to enable this function and the page will refresh automatically every 10 seconds.

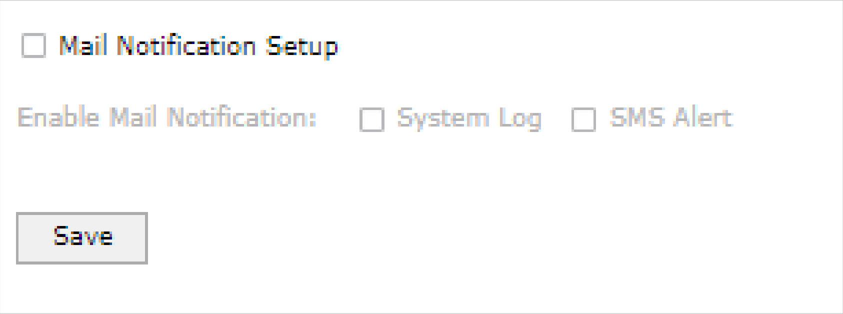
Severity	Enable Severity and specify the importance of the logs you want to view in the log list. **ALL Level**: Logs of all levels. **EMERGENCY**: Errors that render the gateway unusable, such as hardware errors. **ALERT**: Errors that must be resolved immediately, such as flash write errors. **CRITICAL**: Errors that put the system at risk, such as a failure to release memory. **ERROR**: Generic errors. **WARNING**: Warning messages, such as WinNuke attack warnings. **NOTICE**: Important notifications, such as IKE policy mismatches. **INFO**: Informational messages. **DEBUG**: Debug-level notifications, such as when the gateway receives a DNS packet.
Send Log	Enable the Send Log function and then the newly generated logs will be sent to the specified server.
Server IP	Specify the IP address of the server that the logs will be sent to.
More Client Detail Log	With the feature enabled, the logs of clients will be sent to the Syslog Server.
Enable Auto Mail	With the Mail Server, the device can send the system logs. You need to enable Mail Notification Setup in System Tools > Mail Notification, configure related parameters and check System Log in Enable Mail Notification.
Time	Specify the frequency or period to send the system log.
Fixed	Send the system log at a fixed time.
Period	Send the system log on a regular basis.
Fixed Time	Specify when the system log will be sent.
Period Time	Specify how often the system log will be sent.

2) (Optional) Click **Save Log** to save the current logs to the host.

10 Mail Notification

Choose the menu **System Tools** > **Mail Notification** to load the following page.

Figure 10-1 Mail Notification Page

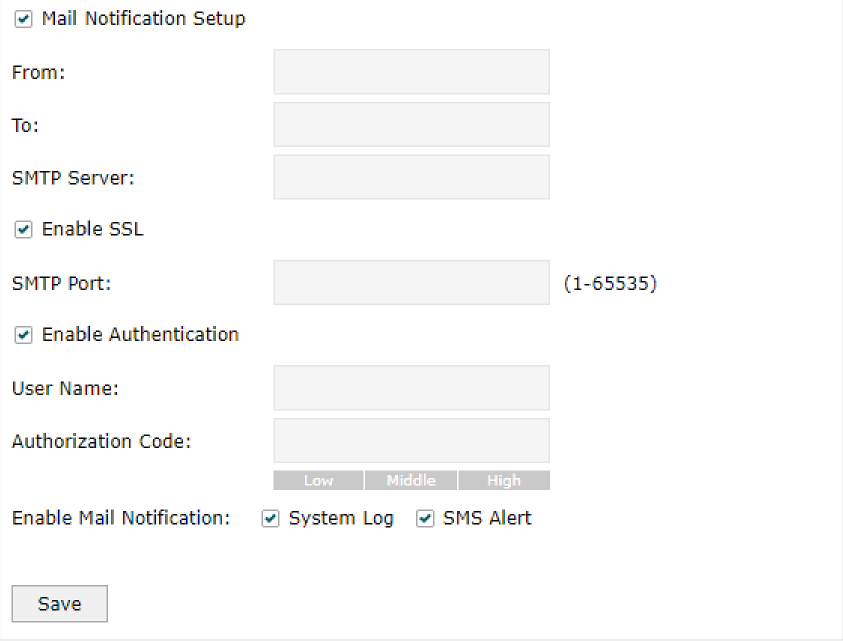


□ Mail Notification Setup

Enable Mail Notification: □ System Log □ SMS Alert

Follow these steps to set up main notification:

1) Enable **Mail Notification Setup**, configure the following parameters and click **Save**.



☑ Mail Notification Setup

From:

To:

SMTP Server:

☑ Enable SSL

SMTP Port: (1-65535)

☑ Enable Authentication

User Name:

Authorization Code:

Enable Mail Notification: ☑ System Log ☑ SMS Alert

Mail Notification Setup	Check the box to enable Mail Notification. Once enabled, you need to configure related parameters that will be used in System Log or SMS Alert..
From	Enter the email address used for sending the system log.
To	Enter the recipient's email address, which can be the same as or different from the sender's email address.
SMTP Server	Enter the domain name or IP address of the SMTP server.
Enable SSL	Enable this feature, and the data will be transmitted based on the SSL protocol
Enable Authentication	Enable this feature if the login of the mailbox requires a username and authorization code.

User Name	Enter the email address used for sending the system log.
Authorization Code	Enter the authorization code that enables a third party to log in to the mailbox. Note that the authorization code is not the mailbox's password.
Enable Mail Notification	Configure related parameters, which will be used by the checked modules. System Log - When enabled, you can set the log information to be automatically sent by email in System Tools > System Log. SMS Alert - When enabled, if you select the second or third option in SMS > SMS Settings > SMS Inbox, an email reminder will be sent when the SMS inbox is full information.