User Guide

Omada Gigabit VPN Router

CONTENTS

About This Guide

Accessing the Router

Viewing Status Information

Configuring Network

Configuring Preferences

Configuring Transmission

Configuring Firewall

Configuring Behavior Control

Configuring VPN

Configuring Authentication

Managing Services

System Tools

About This Guide

This User Guide provides information for managing Omada Gigabit 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 Router

CHAPTERS

1 Determine the Management Method

Before building your network, choose a proper method to manage your router based on your actual network situation. The router 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 router can be centrally configured and monitored via Omada SDN Controller.

To prepare the router 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 router using the GUI (Graphical User Interface, also called web interface in this text). The router uses two built-in web servers, HTTP server and HTTPS server, for user authentication.

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

Note:

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

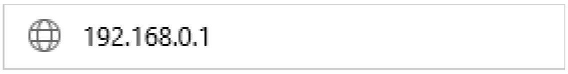
2 Web Interface Access

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

1) Connect a PC to a LAN port of the router 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 the default management address http://192.168.0.1 in the address field of the browser, then press the Enter key.

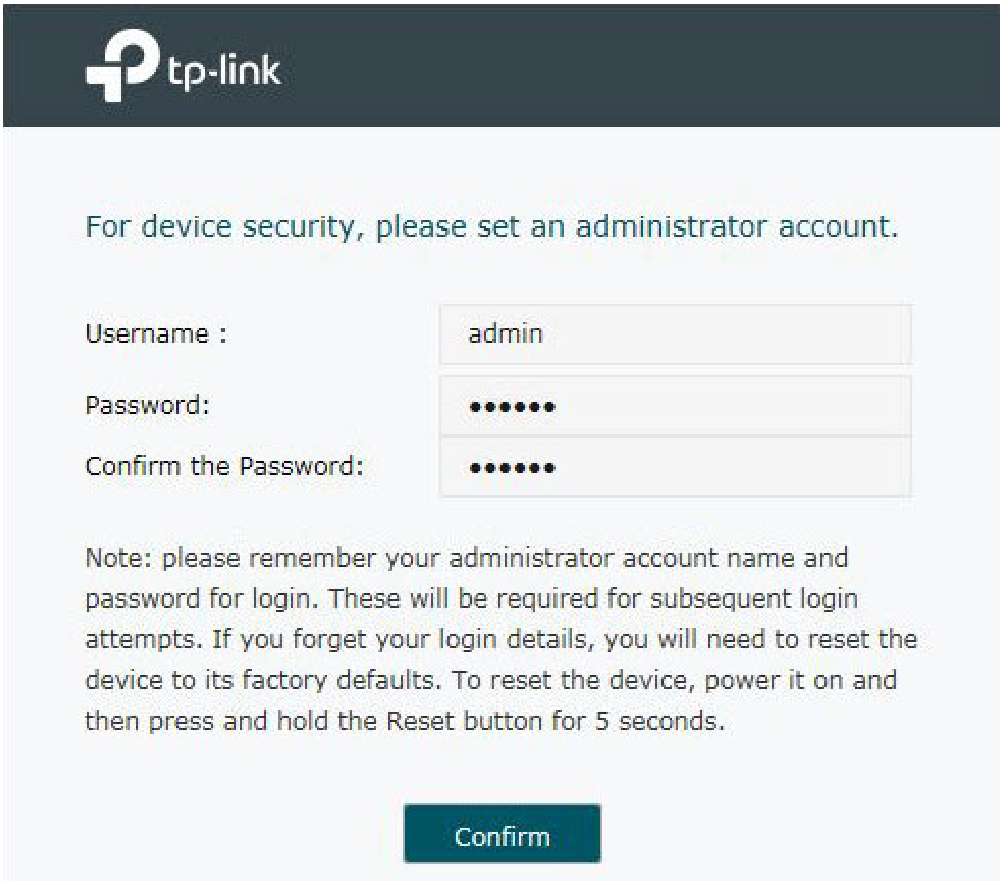
Figure 2-1 Enter the router's IP Address In the Browser



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

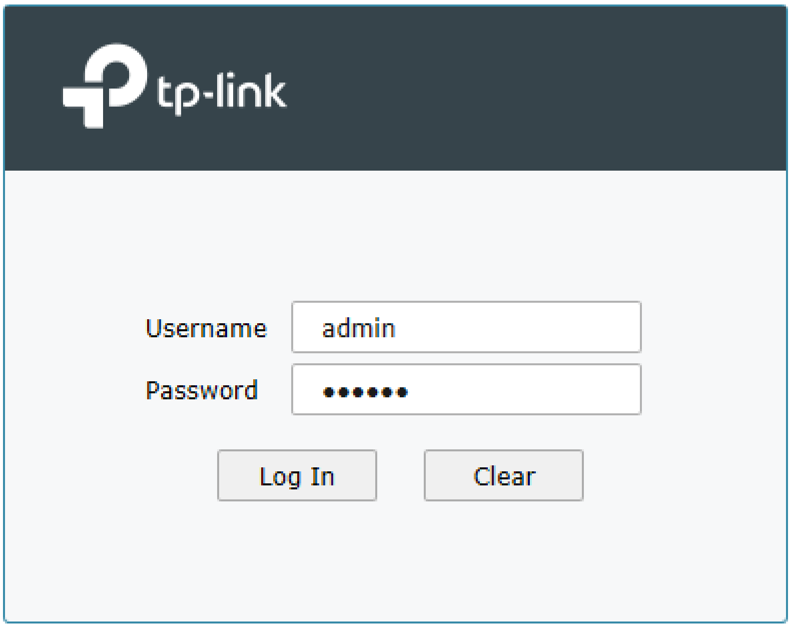
Password: ●●●●●●

Confirm the Password: ●●●●●●

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

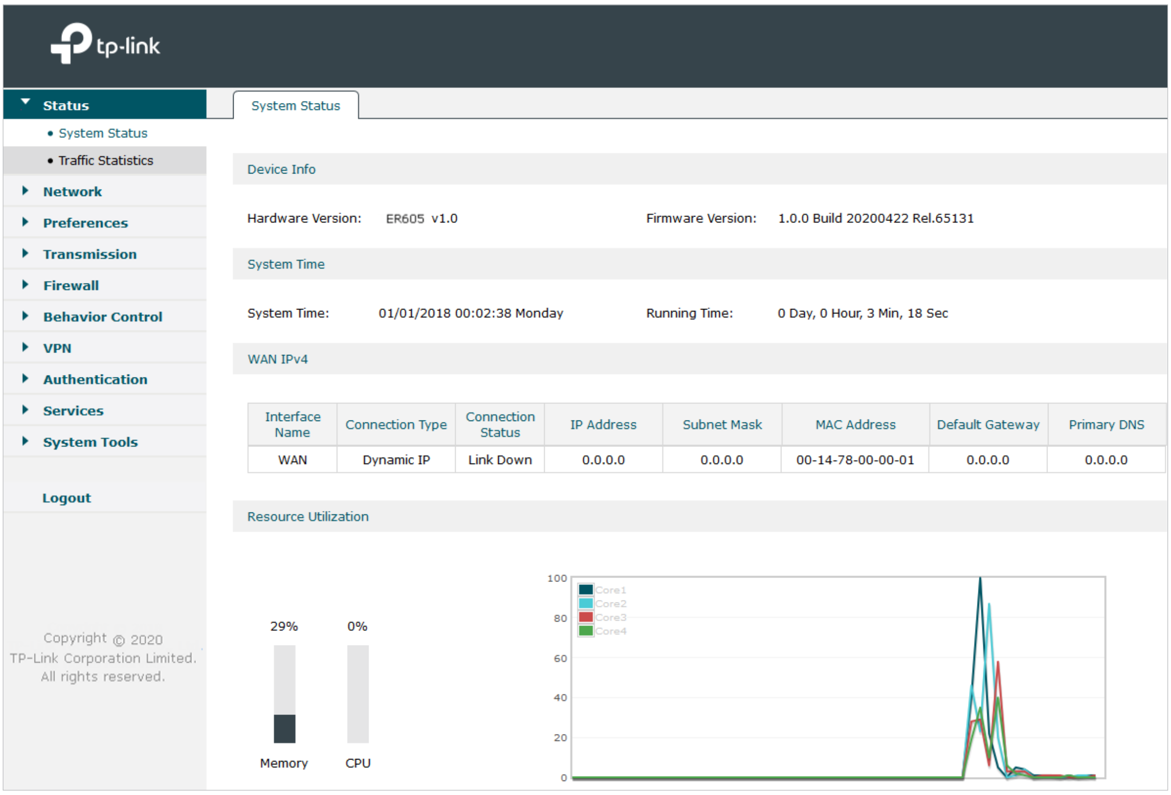


Username: admin

Password: ••••••

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

Figure 2-4 Web Interface



Device Info

Hardware Version: ER605 v1.0

Firmware Version: 1.0.0 Build 20200422 Rel.65131

System Time

System Time: 01/01/2018 00:02:38 Monday

Running Time: 0 Day, 0 Hour, 3 Min, 18 Sec

WAN IPv4

Interface Name	Connection Type	Connection Status	IP Address	Subnet Mask	MAC Address	Default Gateway	Primary DNS
WAN	Dynamic IP	Link Down	0.0.0.0	0.0.0.0	00-14-78-00-00-01	0.0.0.0	0.0.0.0

Resource Utilization

Part 2

Viewing Status Information

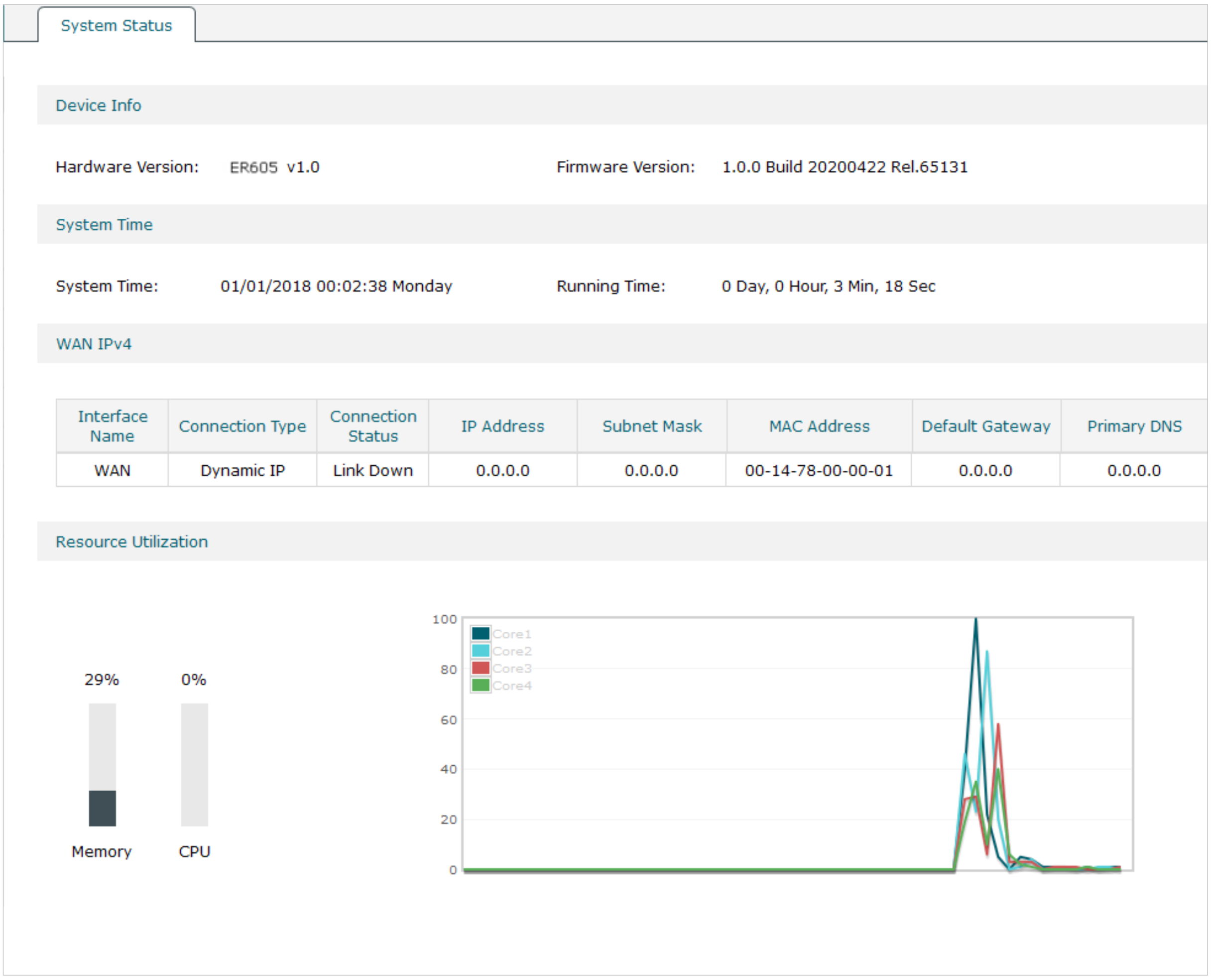
CHAPTERS

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



System Status

Device Info

Hardware Version: ER605 v1.0

Firmware Version: 1.0.0 Build 20200422 Rel.65131

System Time

System Time: 01/01/2018 00:02:38 Monday

Running Time: 0 Day, 0 Hour, 3 Min, 18 Sec

WAN IPv4

Interface Name	Connection Type	Connection Status	IP Address	Subnet Mask	MAC Address	Default Gateway	Primary DNS
WAN	Dynamic IP	Link Down	0.0.0.0	0.0.0.0	00-14-78-00-00-01	0.0.0.0	0.0.0.0

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.

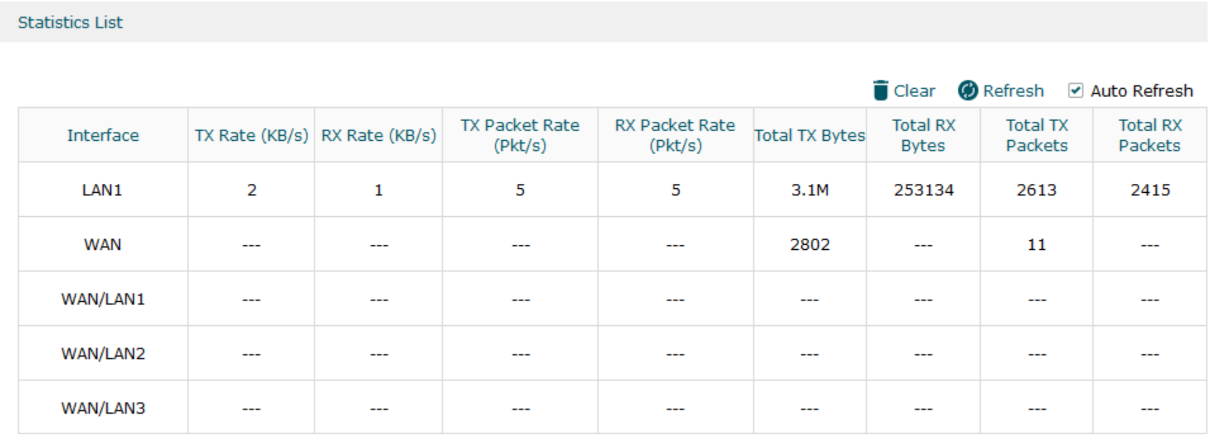
With the Traffic Statistics function, you can:

- 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



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
LAN1	2	1	5	5	3.1M	253134	2613	2415
WAN	---	---	---	---	2802	---	11	---
WAN/LAN1	---	---	---	---	---	---	---	---
WAN/LAN2	---	---	---	---	---	---	---	---
WAN/LAN3	---	---	---	---	---	---	---	---

View the detailed traffic information of each interface in the statistics list.

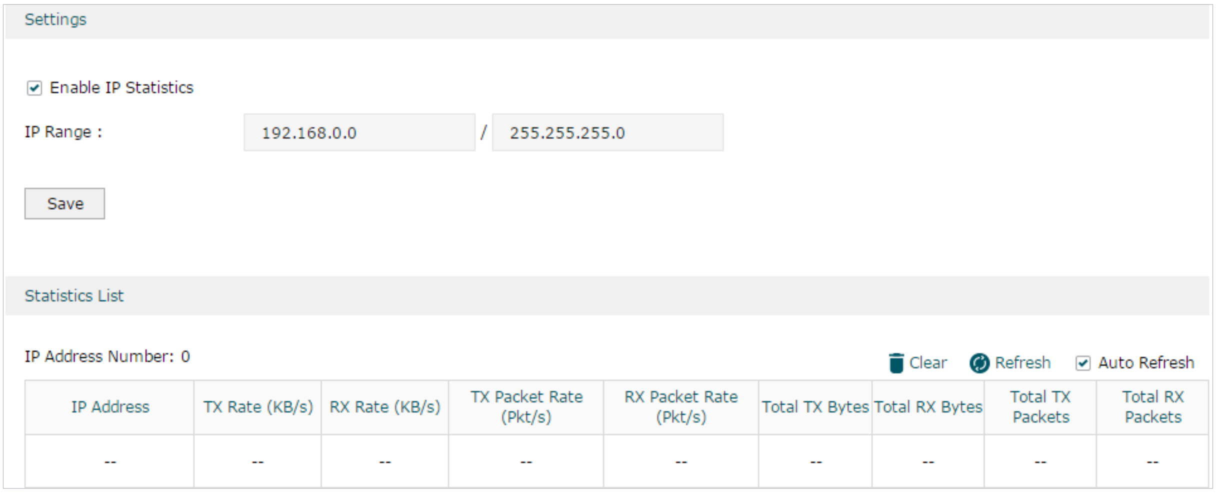
TX Rate (KB/s)	Displays the rate for transmitting data in kilobytes per second.
RX Rate (KB/s)	Displays the rate for receiving data in kilobytes per second.
TX Packet Rate (Pkt/s)	Displays the rate for transmitting data in packets per second.
RX Packet Rate (Pkt/s)	Displays the rate for receiving data 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 : 192.168.0.0 / 255.255.255.0

Statistics List

IP Address Number: 0

☑ 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
--	--	--	--	--	--	--	--	--

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.

Total TX Packets	Displays the number of packets transmitted by the user who owns the IP address.
Total RX Packets	Displays the number 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.

Part 3

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

You can configure up to four WAN ports for your network. Each WAN port has its own internet connection, providing link backup and load balancing.

LAN

For LAN configuration, you can configure the LAN IP address and DHCP (Dynamic Host Configuration Protocol) server. With its DHCP server enabled, the router can automatically assign IP addresses to hosts in the LAN.

MAC

You can change the default MAC address of the WAN port or LAN 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

The router supports 802.1Q VLAN, which can divide the LAN into multiple VLANs, helping manage the network more effectively.

2 WAN Configuration

You can configure multiple WAN ports for your network. Each WAN port can have its own WAN connection, providing link backup and load balancing.

To complete WAN configuration, follow these steps:

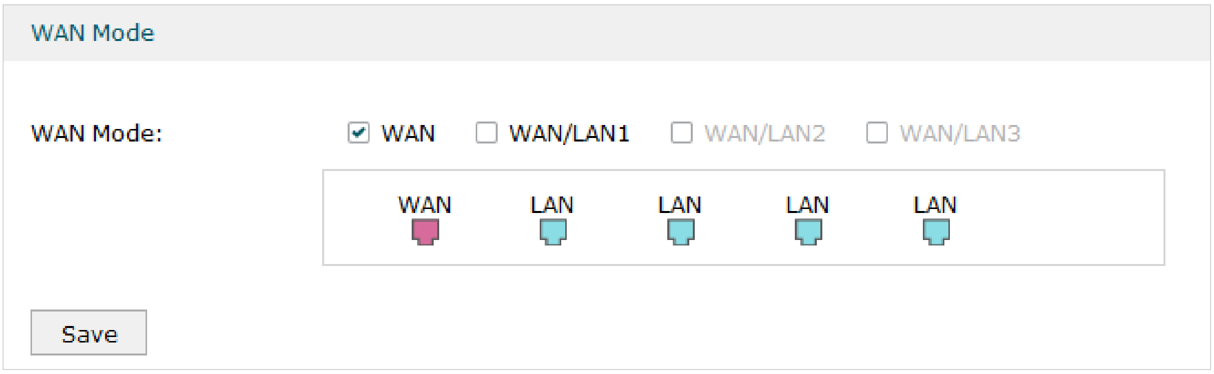
1) Configure the number of WAN ports.

2) Configure the WAN connection.

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 ☐ WAN/LAN1 ☐ WAN/LAN2 ☐ WAN/LAN3

WAN Mode	Click the check box to enable the port as a WAN port. To configure multiple WAN ports, enable the ports one by one. For certain devices, you can configure one SFP port as the WAN port.

Note:

The router will reboot after switching the WAN mode.

2.2 Configuring the WAN Connection

The router supports five connection types: **Static IP, Dynamic IP, PPPoE, L2TP, 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: 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.

L2TP: If your ISP provides you with an L2TP account, choose L2TP.

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

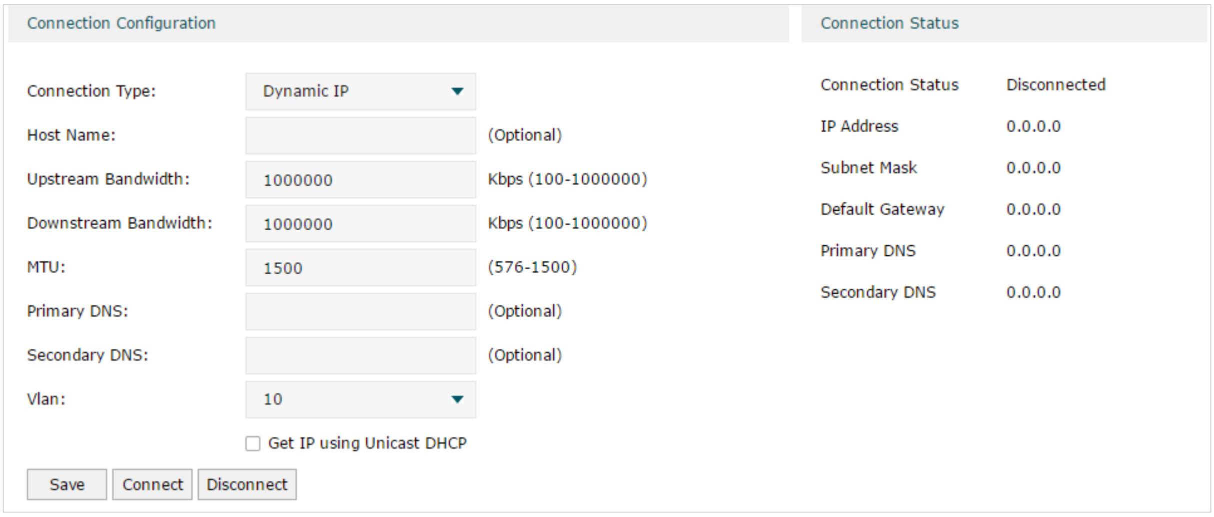
Note:

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** to load the following page.

Figure 2-2 Configuring the Dynamic IP



Connection Configuration

Connection Type: Dynamic IP ▼

Host Name: (Optional)

Upstream Bandwidth: 1000000 Kbps (100-1000000)

Downstream Bandwidth: 1000000 Kbps (100-1000000)

MTU: 1500 (576-1500)

Primary DNS: (Optional)

Secondary DNS: (Optional)

Vlan: 10 ▼

□ Get IP using Unicast DHCP

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**.

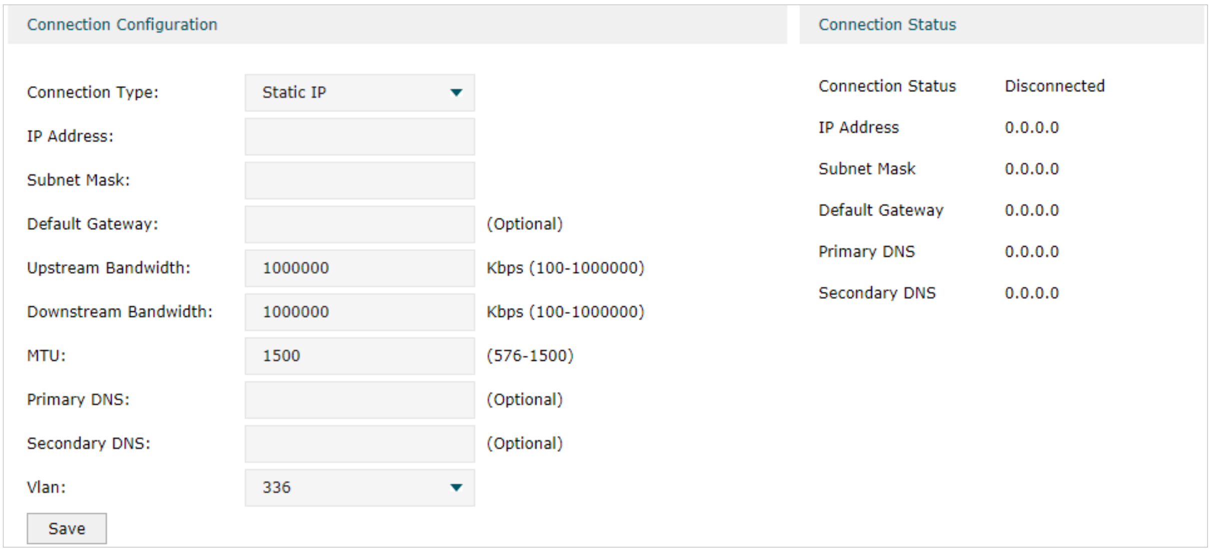
Connection Type	Choose the connection type as Dynamic IP if your ISP automatically assigns the IP address.
Host Name	(Optional) Enter a name for the router. It is null by default.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. The value configured here is the upper limit of the “Maximum Upstream Bandwidth” on **Transmission > Bandwidth Control > Bandwidth Control** page, to make “Bandwidth Control” take effect, please ensure this parameter is set correctly.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. The value configured here is the upper limit of the “Maximum Downstream Bandwidth” on **Transmission > Bandwidth Control > Bandwidth Control** page, to make “Bandwidth Control” take effect, please ensure this parameter is set correctly.
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. By default, the WAN port is automatically assigned to a VLAN, and 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 create the corresponding VLAN first and configure its egress rule as TAG, then manually add the WAN port to that VLAN. To create 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 even with a normal network connection. This option is not required generally.
Connect/ Disconnect	Click the button to active/terminate the connection.

Configuring the Static IP

Choose the menu **Network** > **WAN** > **WAN** 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:	336	

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**.

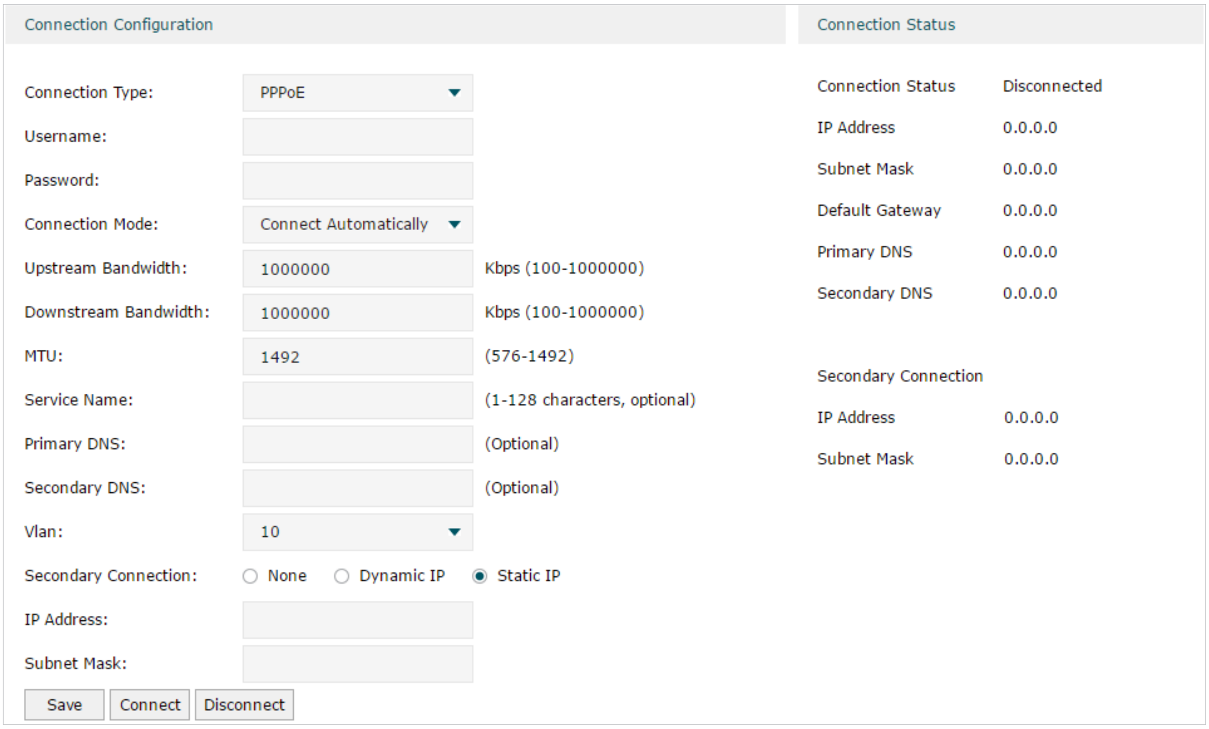
Connection Type	Choose the connection type as Static IP if your ISP has offered you a fixed IP address.
IP Address	Enter the IP address provided by your ISP.
Subnet Mask	Enter the subnet mask provided by your ISP.
Default Gateway	Enter the default gateway provided by your ISP.

Upstream Bandwidth	Specify the downstream bandwidth of the WAN port. The value configured here is the upper limit of the “Maximum Downstream Bandwidth” on **Transmission > Bandwidth Control > Bandwidth Control** page, to make “Bandwidth Control” take effect, please ensure this parameter is set correctly.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. The value configured here is the upper limit of the “Maximum Downstream Bandwidth” on **Transmission > Bandwidth Control > Bandwidth Control** page, to make “Bandwidth Control” take effect, please ensure this parameter is set correctly.
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, you don’t need to manually configure it unless required by your ISP. By default, the WAN port is automatically assigned to a VLAN, and 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 create the corresponding VLAN first and configure its egress rule as TAG, then manually add the WAN port to that VLAN. To create VLANs, go to **Network** > **VLAN** > **VLAN.**

Configuring the PPPoE

Choose the menu **Network** > **WAN** > **WAN** 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)
Service Name:		(1-128 characters, optional)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	10	
Secondary Connection:	○ None ○ Dynamic IP ● Static IP	
IP Address:		
Subnet Mask:		

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**.

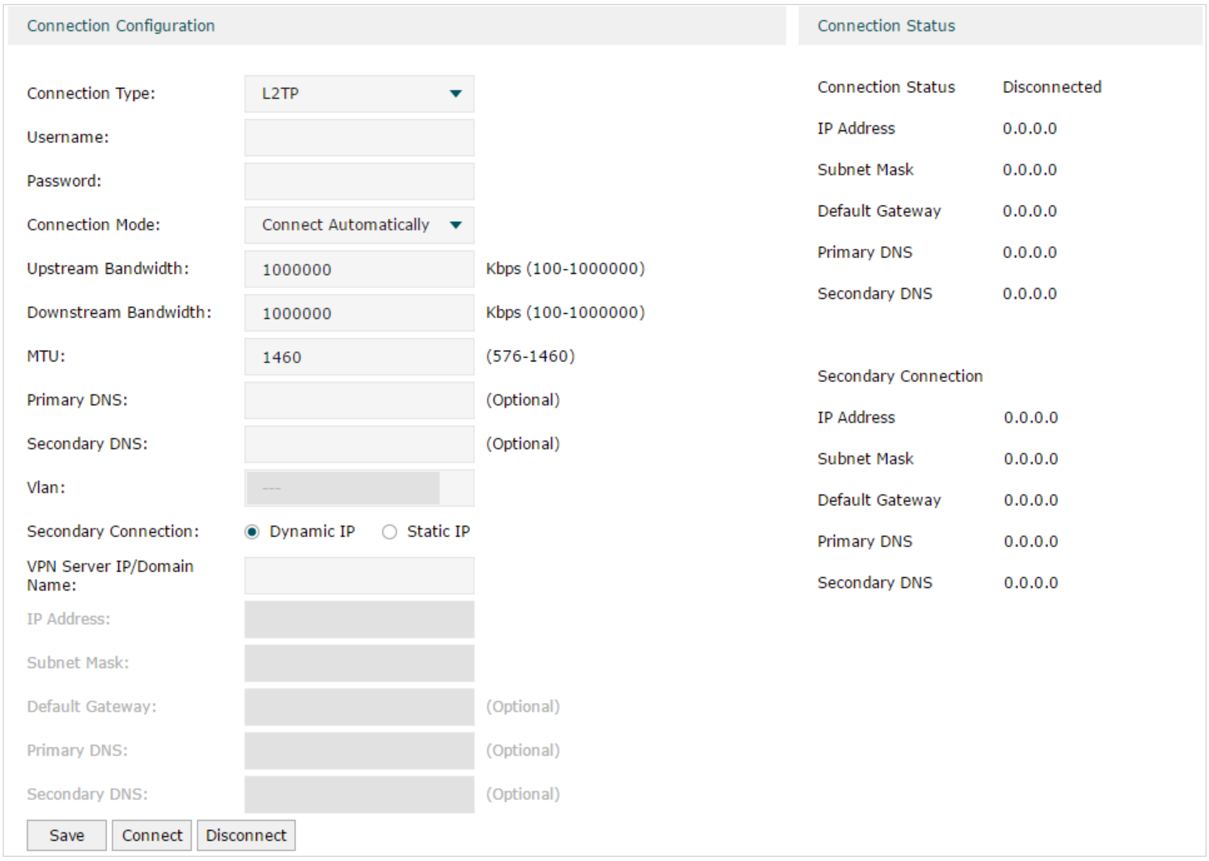
Connection Type	Choose the connection type as PPPoE if your ISP provides you with a PPPoE account.
Username	Enter the PPPoE username provided by your ISP.
Password	Enter the PPPoE password provided by your ISP.
Connection Mode	Choose the connection mode, including **Connect Automatically**, **Connect Manually** and **Time-Based.** **Connect Automatically:** The router will activate the connection automatically when the router reboots or the connection is down. **Connect Manually:** You can manually activate or terminate the connection. **Time-Based:** During the specified period, the router will automatically activate the connection.
Time	Choose the effective time range when the **Connection Mode** is chosen as **Time-Based**. To create the time range, go to **Preferences** > **Time Range > Time Range**.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. The value configured here is the upper limit of the "Maximum Upstream Bandwidth" on **Transmission > Bandwidth Control > Bandwidth Control** page, to make "Bandwidth Control" take effect, please ensure this parameter is set correctly.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. The value configured here is the upper limit of the "Maximum Downstream Bandwidth" on **Transmission > Bandwidth Control > Bandwidth Control** page, to make "Bandwidth Control" take effect, please ensure this parameter is set correctly.
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.
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, you don't need to manually configure it unless required by your ISP. By default, the WAN port is automatically assigned to a VLAN, and 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 create the corresponding VLAN first and configure its egress rule as TAG, then manually add the WAN port to that VLAN. To create VLANs, go to **Network** > **VLAN** > **VLAN.**

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** 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)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	---	
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.

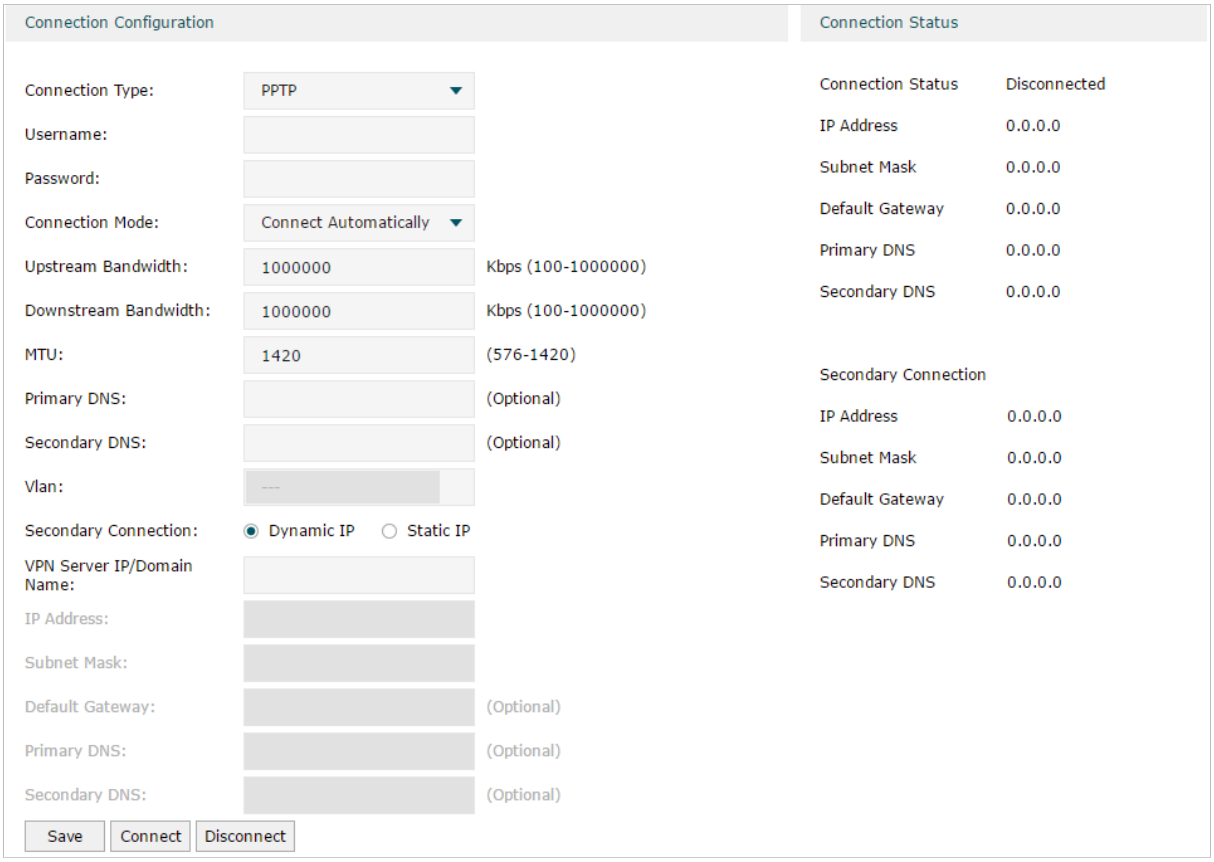
Connection Mode	Choose the connection mode, including **Connect Automatically**, **Connect Manually** and **Time-Based.** **Connect Automatically:** The router will activate the connection automatically when the router reboots or the connection is down. **Connect Manually:** You can manually activate or terminate the connection. **Time-Based:** During the specified period, the router will automatically activate the connection.
Time	Choose the effective time range when the **Connection Mode** is chosen as **Time-Based**. To create the time range, go to **Preferences** > **Time Range > Time Range**.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. The value configured here is the upper limit of the "Maximum Upstream Bandwidth" on **Transmission > Bandwidth Control > Bandwidth Control** page, to make "Bandwidth Control" take effect, please ensure this parameter is set correctly.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. The value configured here is the upper limit of the "Maximum Downstream Bandwidth" on **Transmission > Bandwidth Control > Bandwidth Control** page, to make "Bandwidth Control" take effect, please ensure this parameter is set correctly.
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, you don't need to manually configure it unless required by your ISP. By default, the WAN port is automatically assigned to a VLAN, and 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 create the corresponding VLAN first and configure its egress rule as TAG, then manually add the WAN port to that VLAN. To create VLANs, go to **Network** > **VLAN** > **VLAN.**
Secondary Connection	Select the secondary connection type provided by your ISP. If you select the secondary connection type as Static IP, you need to configure IP Address, Subnet Mask, Default Gateway, Primary/Second DNS. The secondary connection is required for L2TP connection. The router will get some necessary information after the secondary connection succeeded. These information will be used in the L2TP connection process.
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** 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)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Vlan:	---	
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 router will activate the connection automatically when the router reboots or the connection is down. **Connect Manually:** You can manually activate or terminate the connection. **Time-Based:** During the specified period, the router will automatically activate the connection.
Time	Choose the effective time range when the **Connection Mode** is chosen as **Time-Based**. To create the time range, go to **Preferences** > **Time Range > Time Range**.
Upstream Bandwidth	Specify the upstream bandwidth of the WAN port. The value configured here is the upper limit of the "Maximum Upstream Bandwidth" on **Transmission > Bandwidth Control > Bandwidth Control** page, to make "Bandwidth Control" take effect, please ensure this parameter is set correctly.
Downstream Bandwidth	Specify the downstream bandwidth of the WAN port. The value configured here is the upper limit of the "Maximum Downstream Bandwidth" on **Transmission > Bandwidth Control > Bandwidth Control** page, to make "Bandwidth Control" take effect, please ensure this parameter is set correctly.
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 manually configure it unless required by your ISP. By default, the WAN port is automatically assigned to a VLAN by default, and 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 create the corresponding VLAN first and configure its egress rule as TAG, then manually add the WAN port to that VLAN. To create VLANs, go to **Network** > **VLAN** > **VLAN.**
Secondary Connection	Select the secondary connection type provided by your ISP. If you select the secondary connection type as Static IP, you need to configure IP Address, Subnet Mask, Default Gateway, Primary/Second DNS. The secondary connection is required for PPTP connection. The router will get some necessary information after the secondary connection succeeded. These information will be used in the PPTP connection process.
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 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".

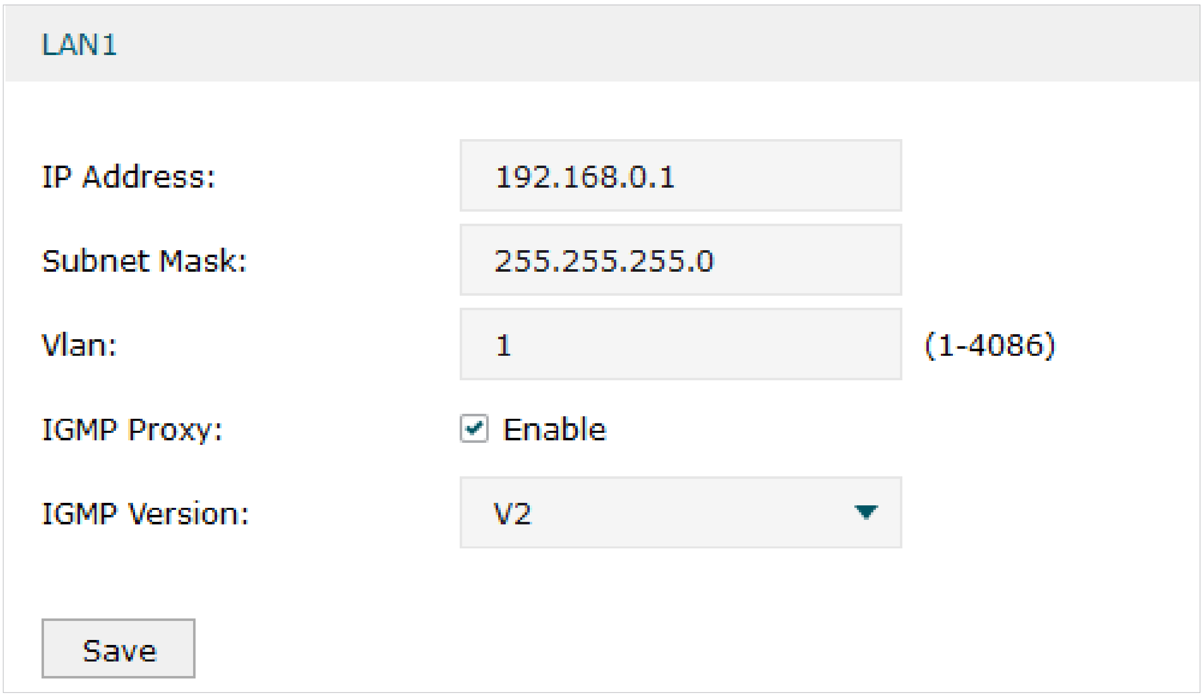
For LAN configuration, you can:

- Configure the IP address of the LAN port.
- Configure the DHCP server.

3.1 Configuring the IP Address of the LAN Port

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

Figure 3-1 Configuring the LAN IP Address



LAN1

IP Address: 192.168.0.1

Subnet Mask: 255.255.255.0

Vlan: 1 (1-4086)

IGMP Proxy: ☑ Enable

IGMP Version: V2

Enter the IP address of the LAN port, and click **Save**.

IP Address	Enter the IP address of the LAN port. This IP address is the default gateway of the LAN clients, and the IP addresses of all the LAN clients should be in the same subnet with this LAN IP address.
Subnet Mask	Enter the subnet mask of the LAN port.

Vlan	Specify the VLAN of the LAN port, only the clients in the specified VLAN can access and manage the router.
IGMP Proxy	Check the box to enable IGMP Proxy. IGMP Proxy sends IGMP querier packets to the LAN ports to detect if there is any multicast member connected to the LAN ports.
IGMP Version	Choose the IGMP version as V2 or V3. The default is IGMP V2.

Note:

- Changing the IP address of LAN port will automatically redirect the browser to the new management page. If the redirecting failed, please try to reconnect your PC to the router to automatically get a new IP address, or configure a proper static IP address manually.
- Changing the IP address of the LAN port may affect some related functions, like the IP pool of the DHCP server.

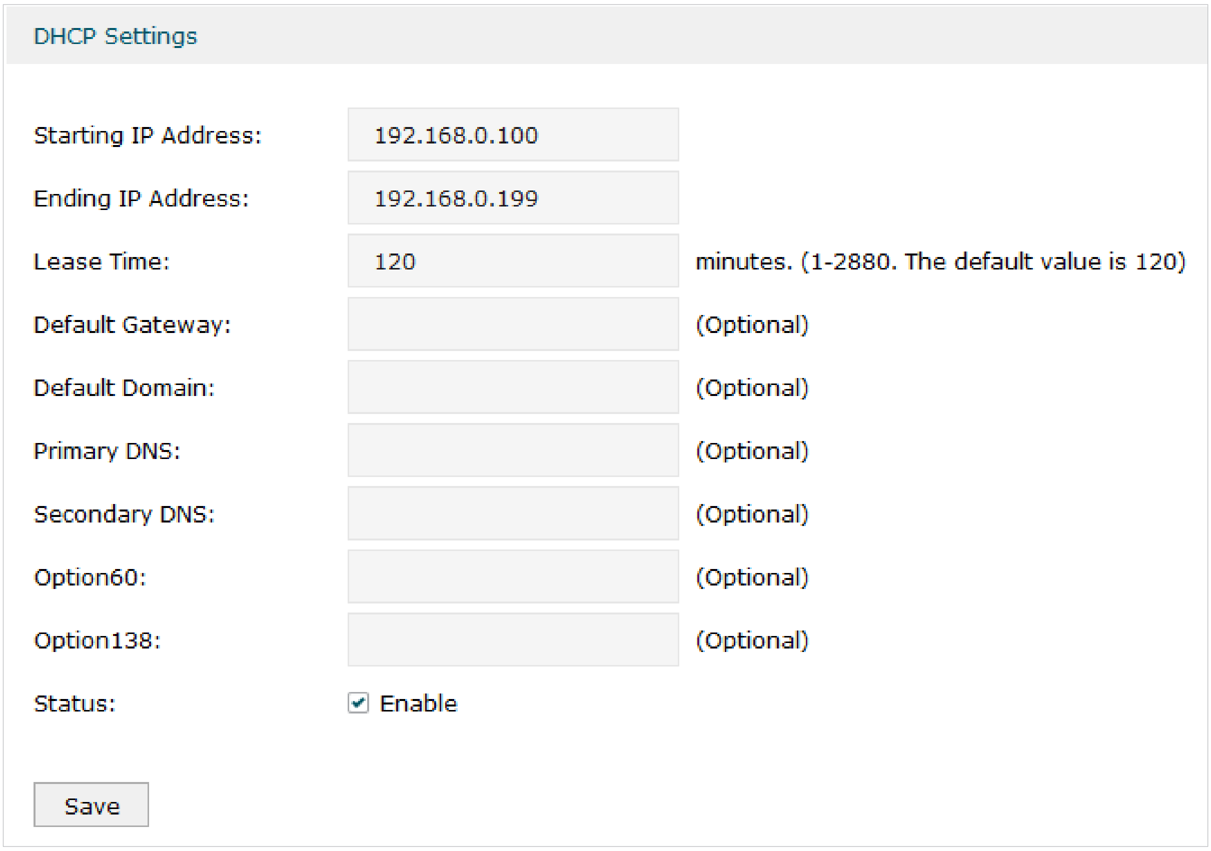
3.2 Configuring the DHCP Server

You can configure an IP address pool for the DHCP server to assign IP addresses. When clients send requests to the DHCP server, the server will automatically assign IP addresses and the corresponding parameters to the clients. Moreover, if you want to reserve an IP address for a certain client, you can use **Address Reservation** to bind the IP address with the client’s MAC address, and the bound IP address will always be assigned to that client.

■ Configuring the DHCP Server

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

Figure 3-2 Configuring the DHCP Server



DHCP Settings

Starting IP Address:	192.168.0.100	
Ending IP Address:	192.168.0.199	
Lease Time:	120	minutes. (1-2880. The default value is 120)
Default Gateway:		(Optional)
Default Domain:		(Optional)
Primary DNS:		(Optional)
Secondary DNS:		(Optional)
Option60:		(Optional)
Option138:		(Optional)
Status:	☑ Enable	

Configure the parameters of the DHCP server, then click **Save**.

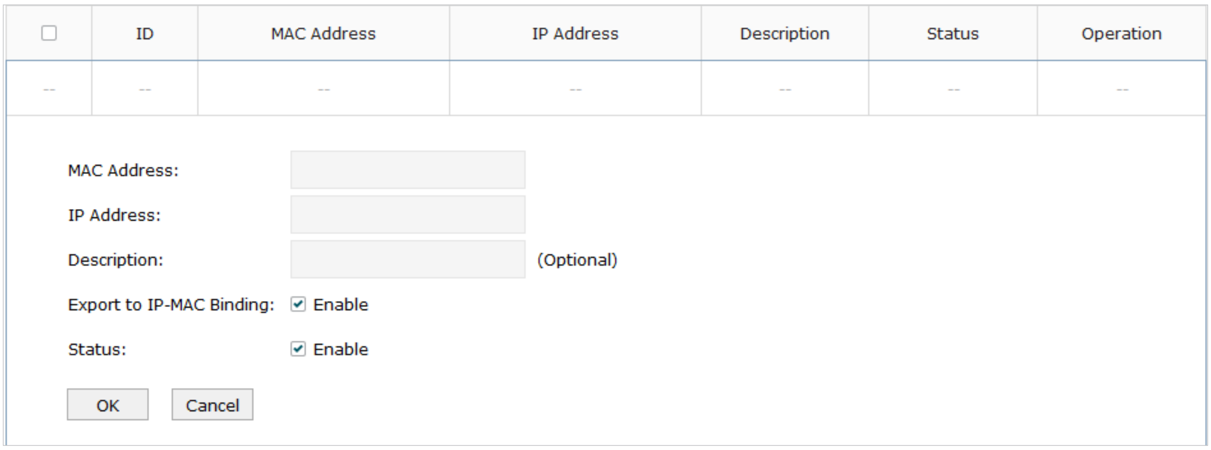
Starting/Ending IP Address	Enter the starting IP address and ending IP address of the DHCP server's IP pool. The IP pool defines the IP range that can be assigned to the clients in the LAN. **Note**: The starting IP address and ending IP address should be in the same subnet with the IP address of the 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 failed, the client will have to stop using that IP address when the lease finally expired, and try to get a new IP address from the other DHCP servers.
Default Gateway	(Optional) It is recommended to enter the IP address of the LAN port.
Default Domain	(Optional) Enter the domain name of your network.
Primary/ Secondary DNS	(Optional) Enter the DNS server address provided by your ISP. If you are not clear, please consult your ISP.

Option 60	(Optional) Specify the option 60 for device identification. Mostly it is used under the scenario where the clients apply for different IP addresses from different servers according to the needs. By default, it is TP-LINK. If a client requests option 60, the server will respond a packet containing the option 60 configured here. And then the client will compare the received option 60 with its own. If they are the same, the client will accept the IP address assigned by the server, otherwise the assigned IP address will not be accepted.
Option 138	(Optional) Specify the option 138, which can be configured as the management IP address of an Omada controller. If the APs in the local network request this option, the server will respond a packet containing this option to inform the APs of the controller's IP address.
Status	Check the box to enable the DHCP server.

■ Configuring the Address Reservation

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

Figure 3-3 Configuring the Address Reservation



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

MAC Address:

IP Address:

Description: (Optional)

Export to IP-MAC Binding: ☑ Enable

Status: ☑ Enable

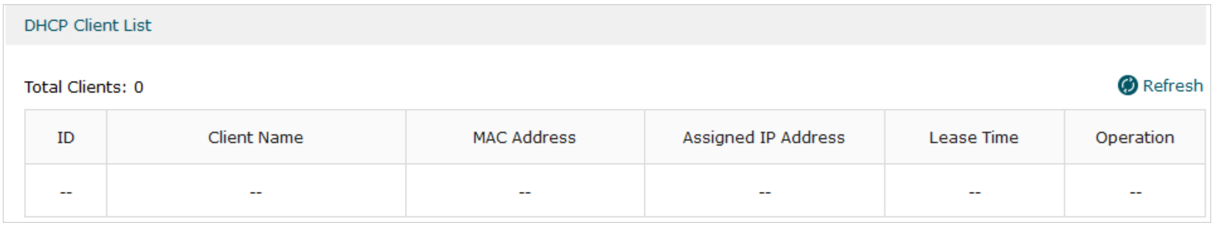
Enter the MAC address of the client and the IP address to be reserved, then click **OK**.

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.

3.3 Viewing the DHCP Client List

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

Figure 3-4 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 name of the client.
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 MAC Configuration

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

- Configure the MAC Address of the WAN port

In the condition that your ISP has bound the 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 as the same as that of the previous dial-up device for a normal internet connection.

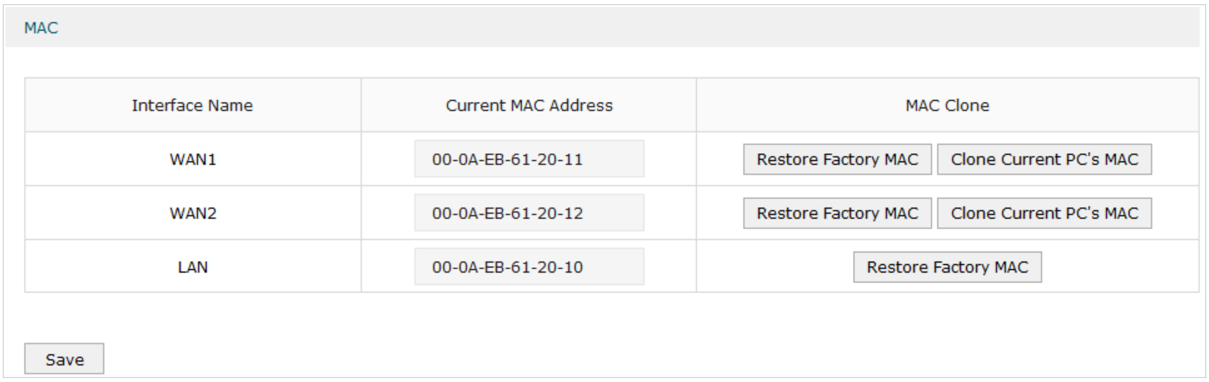
- Configure the MAC Address of the LAN port

In a complex network where all the devices are ARP bound, if you want to replace the current router with this router, you can just set the MAC address of this router's LAN port as the same as that of the previous router, which can avoid all the devices under this network node to update their ARP binding tables.

4.1 Configuring MAC Address

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

Figure 4-1 Configuring MAC Address



MAC

Interface Name	Current MAC Address	MAC Clone
WAN1	00-0A-EB-61-20-11	Restore Factory MAC Clone Current PC's MAC
WAN2	00-0A-EB-61-20-12	Restore Factory MAC Clone Current PC's MAC
LAN	00-0A-EB-61-20-10	Restore Factory MAC

Configure the MAC address of the WAN port or LAN 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 or LAN port.

MAC Clone	**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:

To avoid a MAC address conflict in the LAN, it is not permitted to set the MAC address of the router's LAN port as the MAC address of the current management PC.

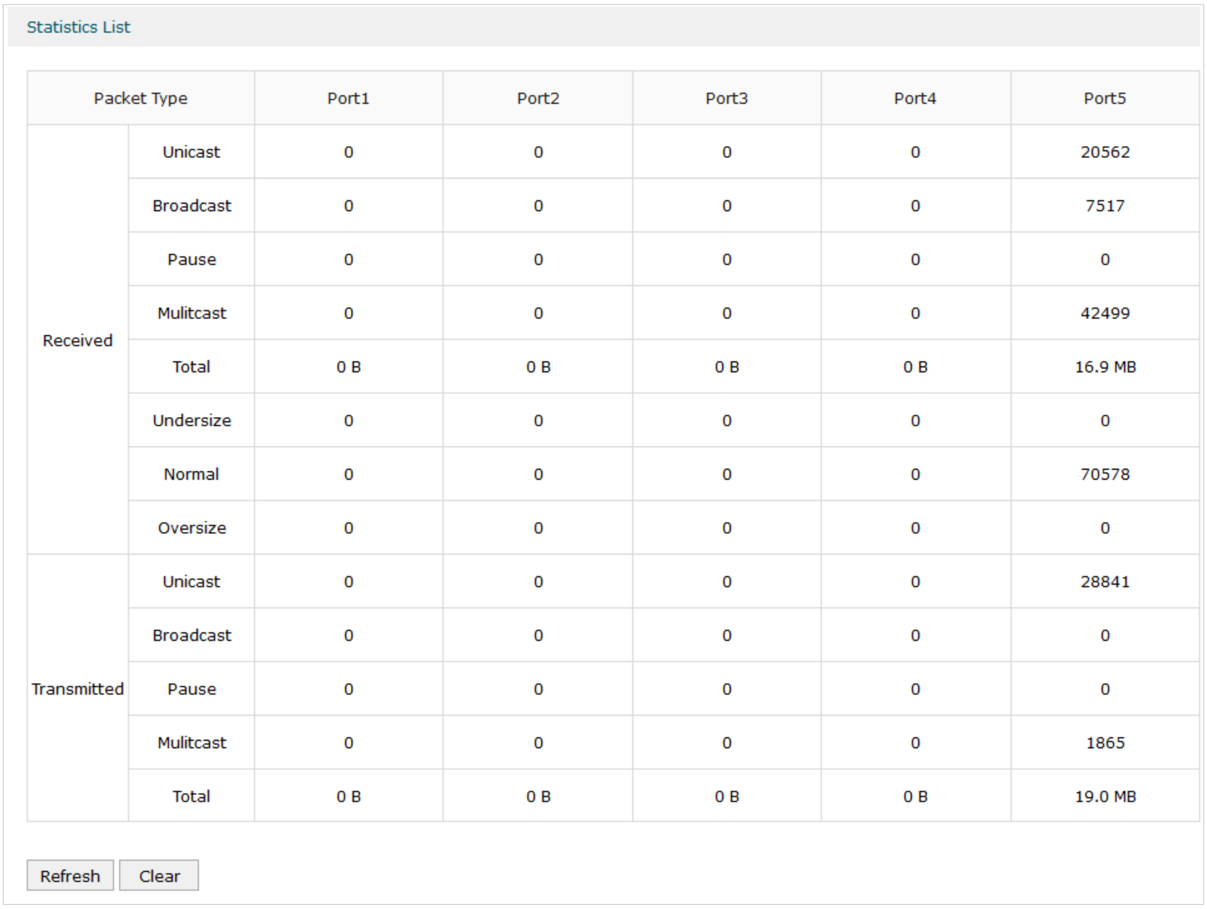
5 Switch Configuration

The router provides some basic switch port management function, including **Statistics**, **Port Mirror**, **Rate Control**, **Port Config** and **Port Status**. **Statistics** and **Rate Control** are available only for certain devices.

5.1 Viewing the Statistics (only for certain devices)

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

Figure 5-1 Viewing the Statistics



Statistics List

Packet Type		Port1	Port2	Port3	Port4	Port5
Received	Unicast	0	0	0	0	20562
	Broadcast	0	0	0	0	7517
	Pause	0	0	0	0	0
	Mulitcast	0	0	0	0	42499
	Total	0 B	0 B	0 B	0 B	16.9 MB
	Undersize	0	0	0	0	0
	Normal	0	0	0	0	70578
	Oversize	0	0	0	0	0
Transmitted	Unicast	0	0	0	0	28841
	Broadcast	0	0	0	0	0
	Pause	0	0	0	0	0
	Mulitcast	0	0	0	0	1865
	Total	0 B	0 B	0 B	0 B	19.0 MB

Statistics displays the detailed traffic information of each port, which allows you to monitor the traffic and locate faults promptly.

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).

Note:

Error Frame: The frames that have a false checksum.

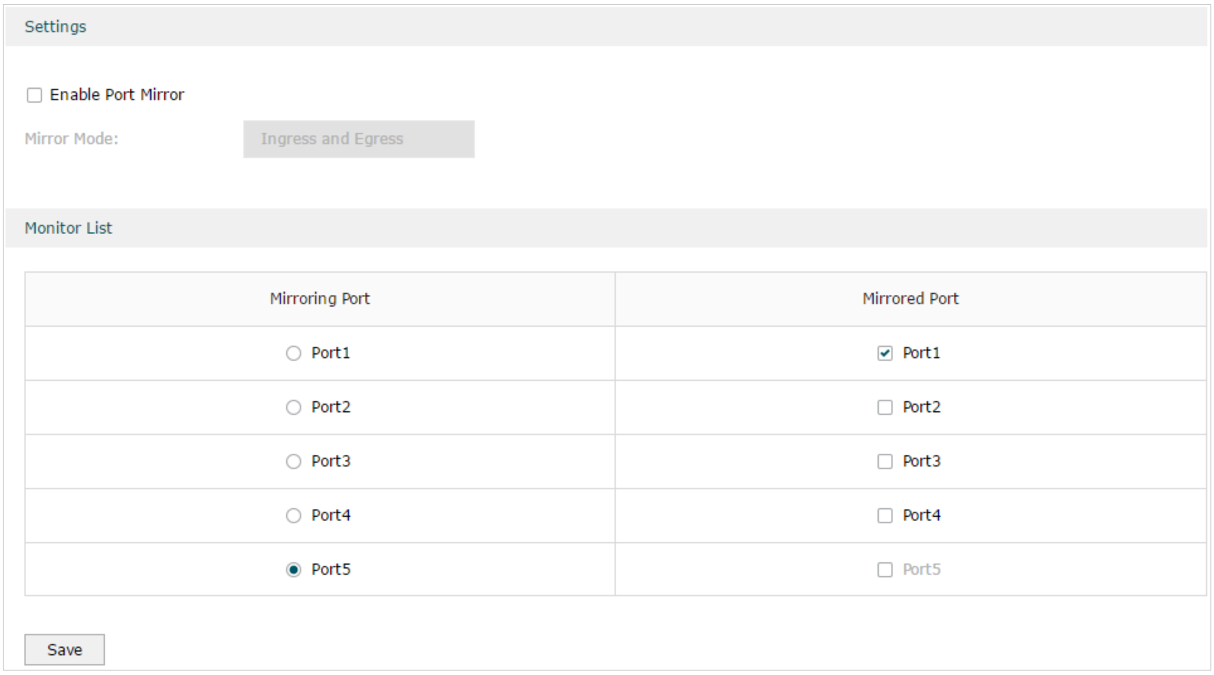
Maximum frame length: The maximum frame length supported by the router. For untagged frames, it's 1518 bytes long; for tagged packets, it's 1522 bytes long.

5.2 Configuring Port Mirror

Port Mirror function allows the router to forward packet copies of the monitored port(s) 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 5-2 Configuring Port Mirror



Settings

□ Enable Port Mirror

Mirror Mode: Ingress and Egress

Monitor List

Mirroring Port	Mirrored Port
○ Port1	☑ Port1
○ Port2	□ Port2
○ Port3	□ Port3
○ Port4	□ Port4
● Port5	□ Port5

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.

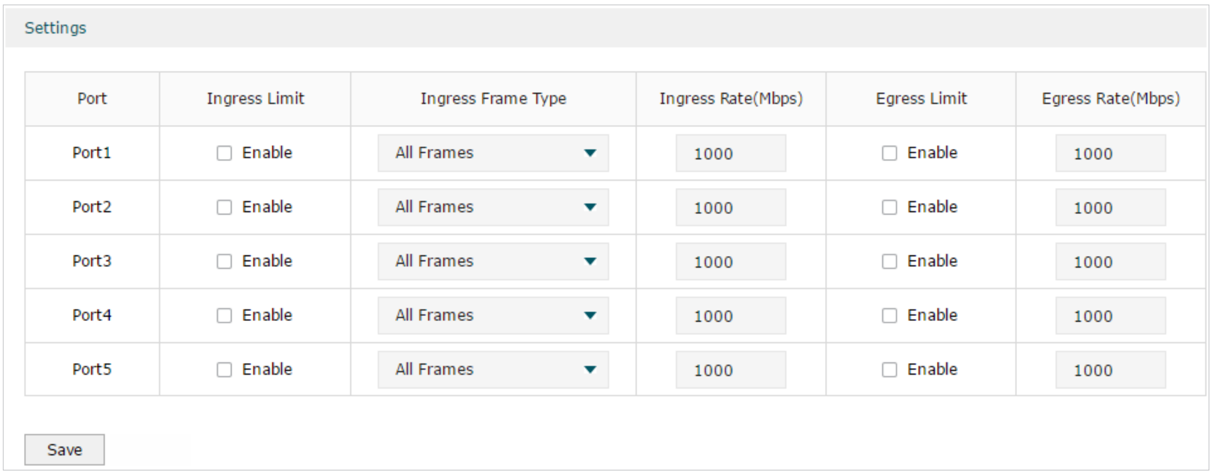
Usually, the mirrored ports are the ports to be monitored.

5.3 Configuring Rate Control (only for certain devices)

Rate Control enables you to control the traffic rate for the specific packets on each port to manage your network.

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

Figure 5-3 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
Port4	□ Enable	All Frames	1000	□ Enable	1000
Port5	□ 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.

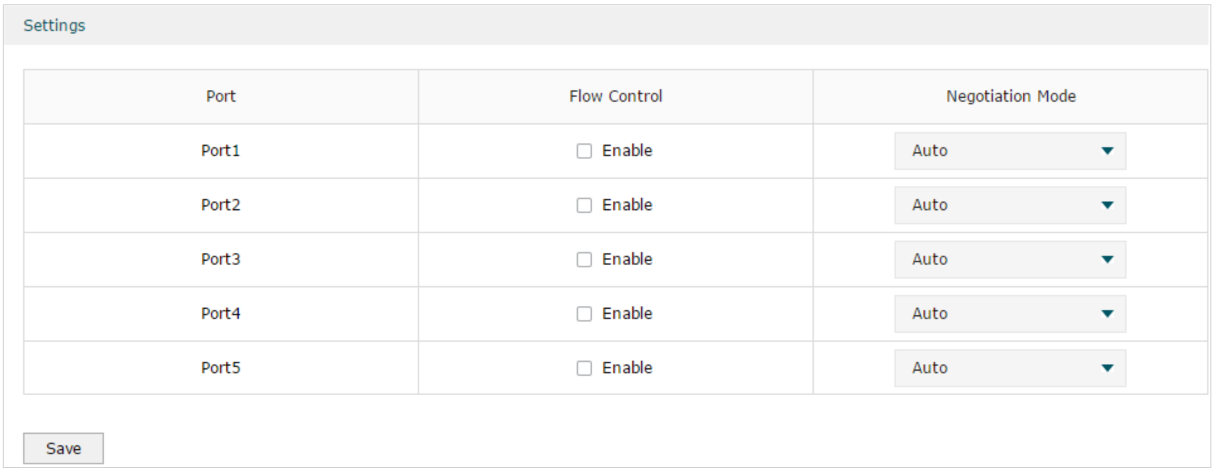
Ingress Frame Type	Specify the ingress frame type to be limited. It is All Frames by default. **All Frames**: The ingress rate of all frames is limited. **Broadcast**: The ingress rate of broadcast frames is limited.
Ingress Rate (Mbps)	Specify the limit rate for the ingress packets.
Egress Limit	Check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

5.4 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 5-4 Configuring Flow Control and Negotiation



Settings

Port	Flow Control	Negotiation Mode
Port1	□ Enable	Auto
Port2	□ Enable	Auto
Port3	□ Enable	Auto
Port4	□ Enable	Auto
Port5	□ Enable	Auto

Configure the flow control and negotiation mode for a port.

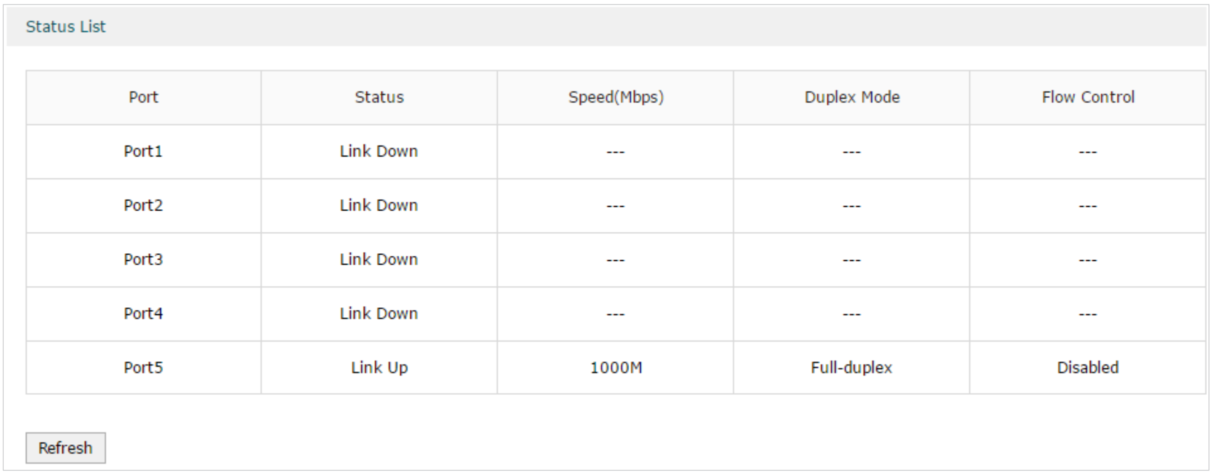
Flow Control	Check the box to enable the flow control function. Flow Control is the process of managing the data transmission of the sender to avoid the receiver getting overloaded.

Negotiation Mode	Select the negotiation mode for the port. You can set the mode as **Auto**, or manually set the speed and duplex mode for the port. It is recommended to configure both devices of a link to work in Auto-Negotiation mode or manually configure them to work in the same speed and duplex mode. If the two devices at both sides work in Auto mode, they will advertise their speed and duplex abilities to each other, and negotiate the optimal speed and duplex mode. If the local device works in Auto mode while the peer device does not, the local device will automatically detect and match the speed with the peer device. The local device will work in half-duplex mode, no matter what duplex mode the peer device is in.

5.5 Viewing Port Status

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

Figure 5-5 Viewing Port Status



Status List

Port	Status	Speed(Mbps)	Duplex Mode	Flow Control
Port1	Link Down	---	---	---
Port2	Link Down	---	---	---
Port3	Link Down	---	---	---
Port4	Link Down	---	---	---
Port5	Link Up	1000M	Full-duplex	Disabled

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.

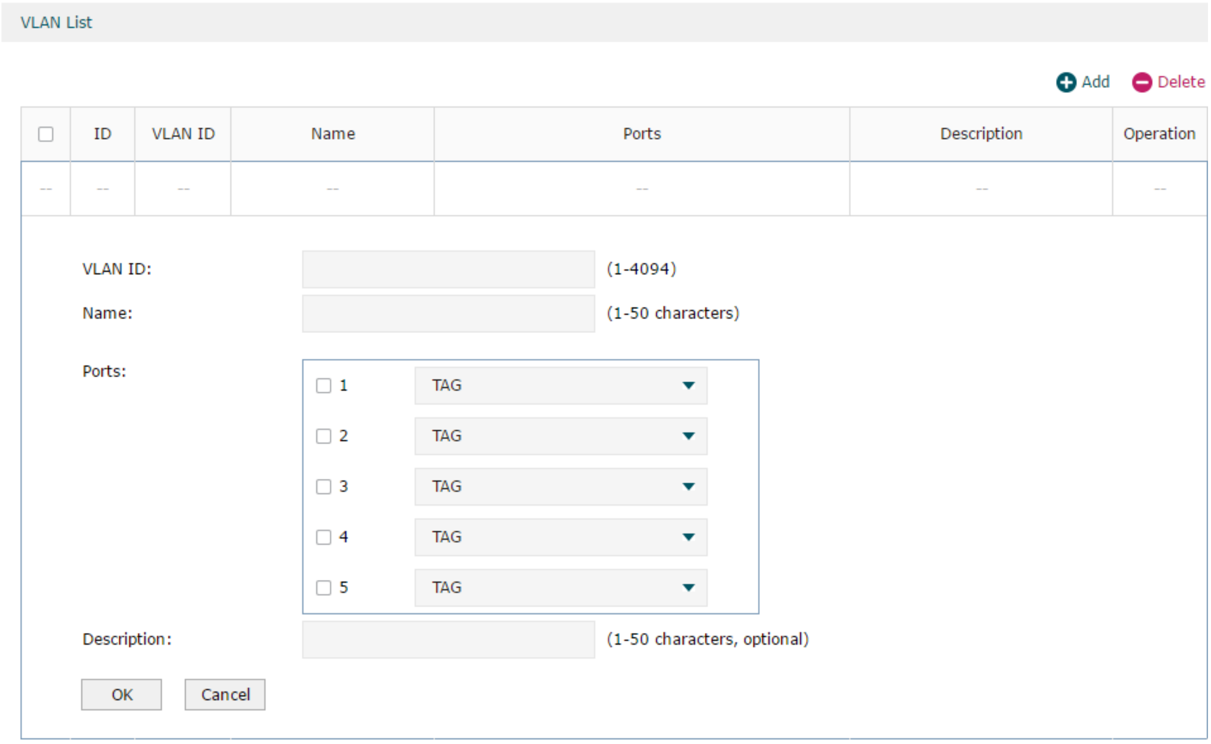
6 VLAN Configuration

The router supports 802.1Q VLAN, which can divide a LAN into multiple logical LANs. Each logical LAN is a VLAN. Hosts in the same VLAN can communicate with each other. However, hosts in different VLANs cannot communicate directly. Therefore, broadcast packets can be limited to within the VLAN.

6.1 Creating a VLAN

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

Figure 6-1 Creating a VLAN



VLAN List

⊕ Add ⊖ Delete

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

VLAN ID: (1-4094)

Name: (1-50 characters)

Ports:

□ 1	TAG
□ 2	TAG
□ 3	TAG
□ 4	TAG
□ 5	TAG

Description: (1-50 characters, optional)

OK Cancel

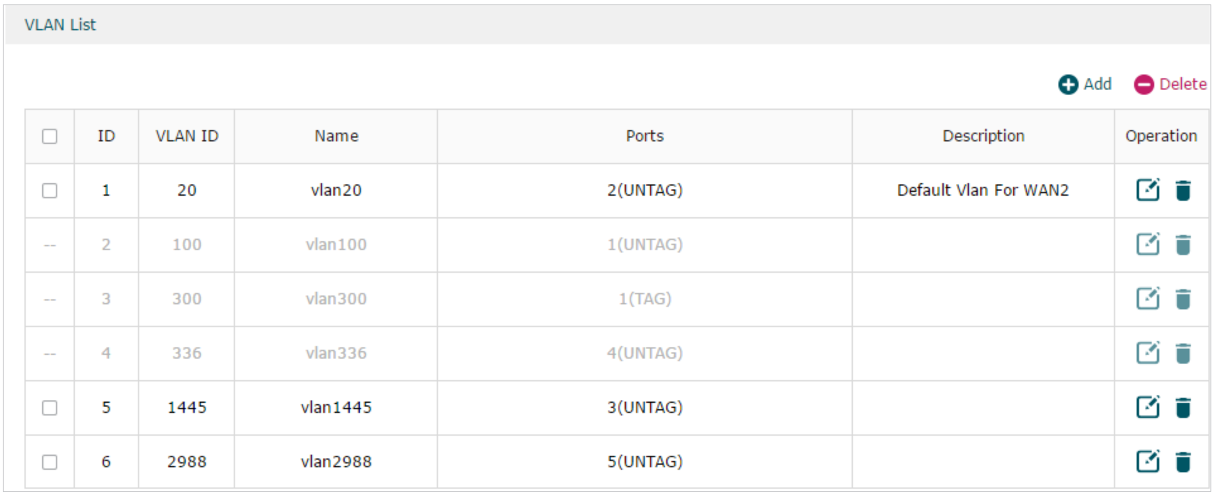
Create a VLAN and add the port(s) to the VLAN, then click **OK**.

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 select the port 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.
Description	(Optional) Enter a brief description for easy management and searching.

Viewing the VLANs

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

Figure 6-2 Viewing the VLAN



□	ID	VLAN ID	Name	Ports	Description	Operation
□	1	20	vlan20	2(UNTAG)	Default Vlan For WAN2	
--	2	100	vlan100	1(UNTAG)		
--	3	300	vlan300	1(TAG)		
--	4	336	vlan336	4(UNTAG)		
□	5	1445	vlan1445	3(UNTAG)		
□	6	2988	vlan2988	5(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.

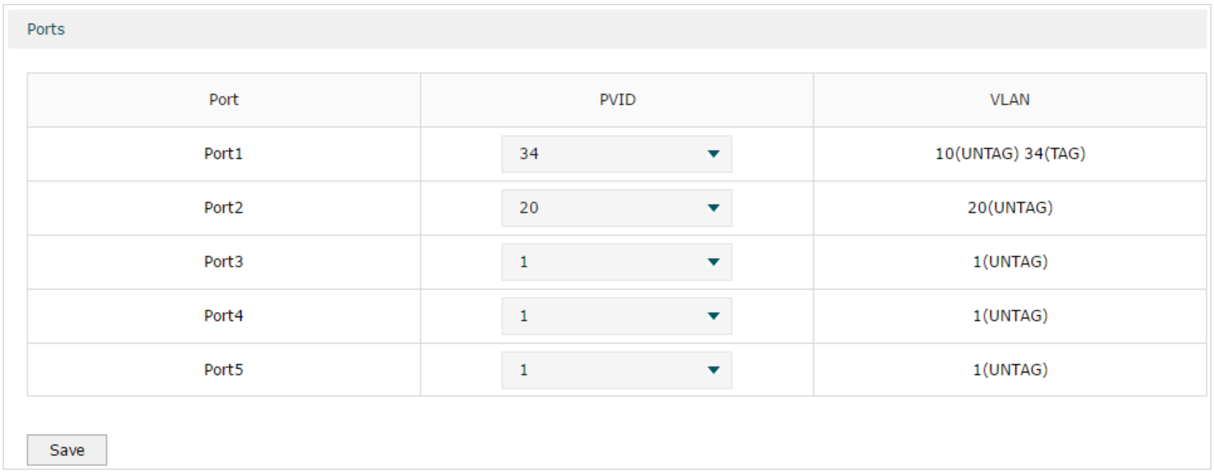
Note:

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.

6.2 Configuring the PVID of a Port

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

Figure 6-3 Configuring the PVID



Ports

Port	PVID	VLAN
Port1	34	10(UNTAG) 34(TAG)
Port2	20	20(UNTAG)
Port3	1	1(UNTAG)
Port4	1	1(UNTAG)
Port5	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.

Part 4

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

IP groups configured here can be used as effective IP addresses for multiple functions like Bandwidth Control, Session Limit , Policy Routing and so on.

To complete IP Group configuration, follow these steps:

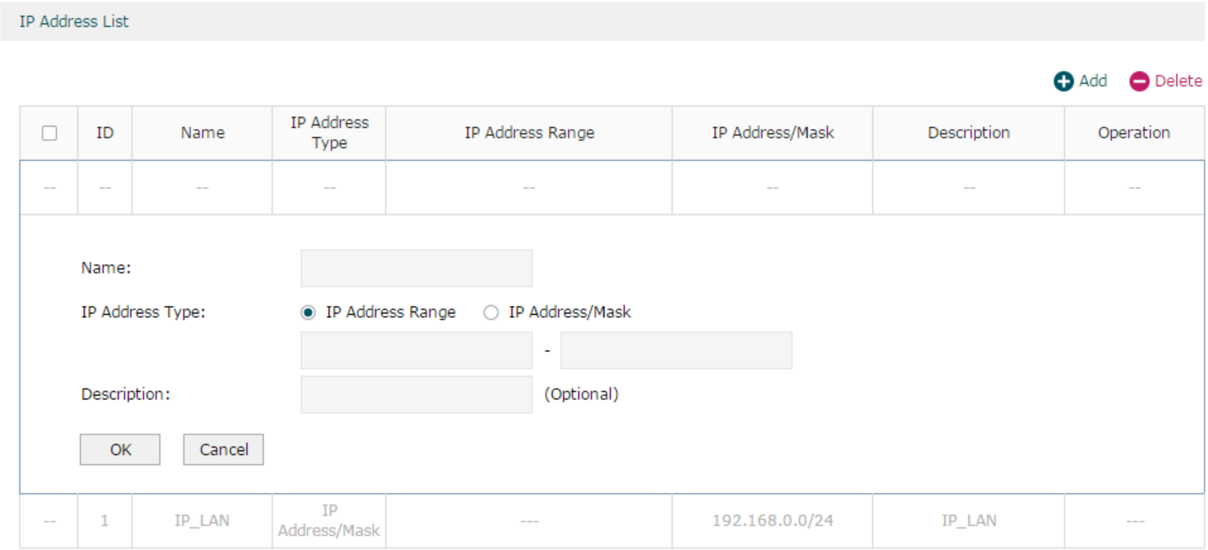
1) Add IP address entries.

2) Add IP address entries to an IP group.

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.

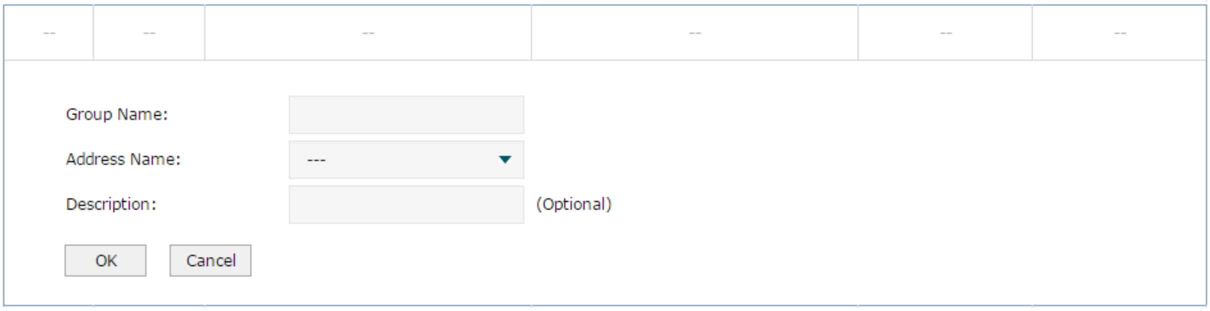
Name	Enter a name for the IP address entry. Only letters, digits or underscores are allowed.
IP Address Type	Choose a type and enter the IP address in the corresponding format. Two types are provided: **IP Address Range**: Specify a starting IP address and an ending IP address. **IP Address/Mask**: Specify a network address and the subnet mask.
Description	(Optional) Enter an brief description of this IP address entry to make identifying it easier.

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



Group Name:

Address Name: ---

Description: (Optional)

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 entries as the members of the group from the drop-down list. It is multi-optional. If no IP address entries are selected, the rule that references this IP group will have no effect on any IP addresses.
Description	(Optional) Enter an brief description of this IP group to make identifying it easier.

2) Click **OK**.

You can also choose an existing IP group and click ✎ to add or remove the IP address members.

Note:

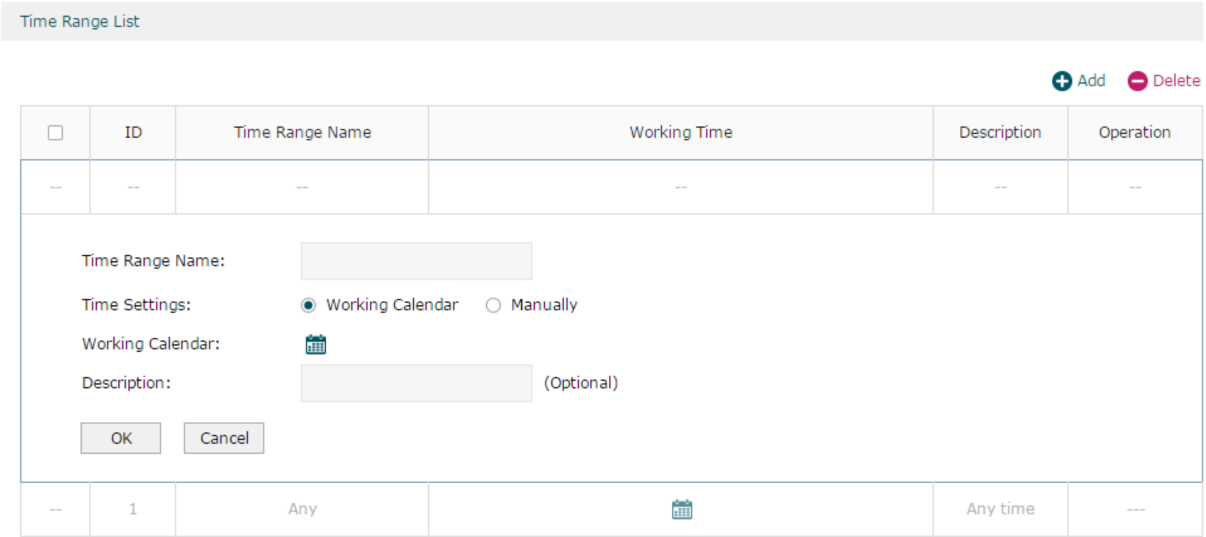
An IP group that is being referenced by a rule cannot be deleted.

3 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 3-1 Add a Time Range Entry



□	ID	Time Range Name	Working Time	Description	Operation
--	--	--	--	--	--
--	1	Any	📅	Any time	---

Time Range Name:

Time Settings: ● Working Calendar ○ Manually

Working Calendar: 📅

Description: (Optional)

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.

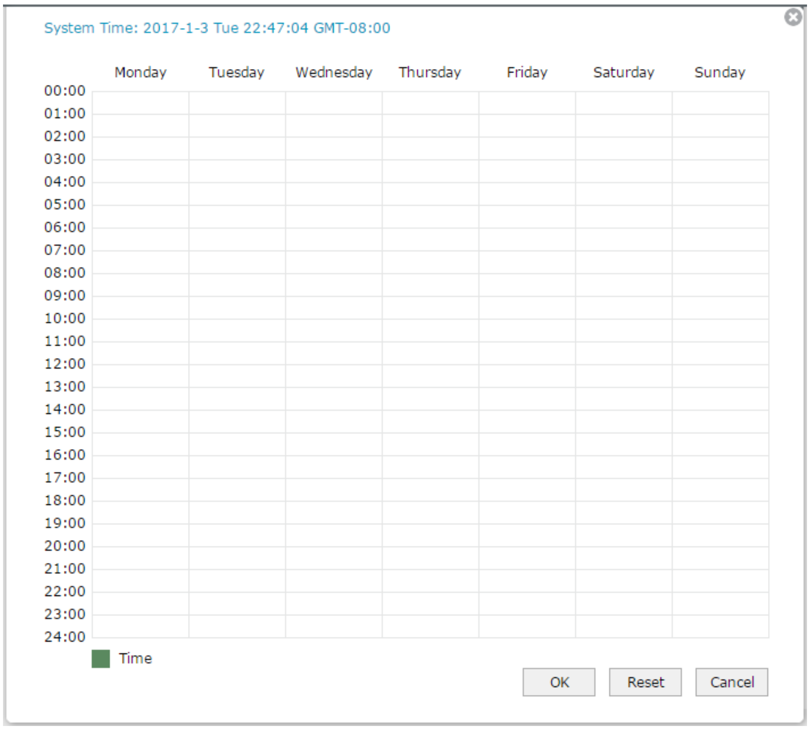
2) Choose a mode to set the time range. Two modes are provided: Working Calendar and Manually.

- 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 3-2 Working Calendar Mode



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

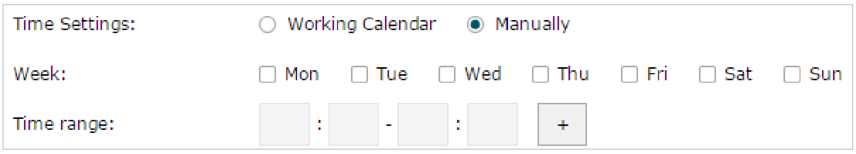
Select the time slices and click **OK** to set the time range. You can click the time slices, or alternatively drag the areas to select or deselect the time slices.

- 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 3-3 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:

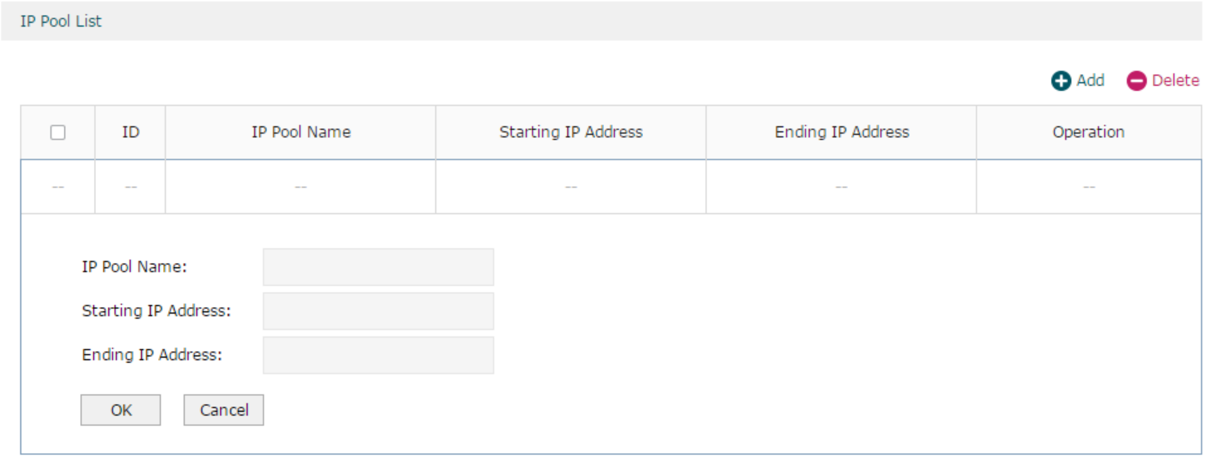
A time range entry that is being referenced by a rule cannot be deleted.

4 VPN IP Pool Configuration

The VPN IP pools configured here can be used as the VPN IP address pools when configuring L2TP VPN and PPTP VPN.

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

Figure 4-1 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:

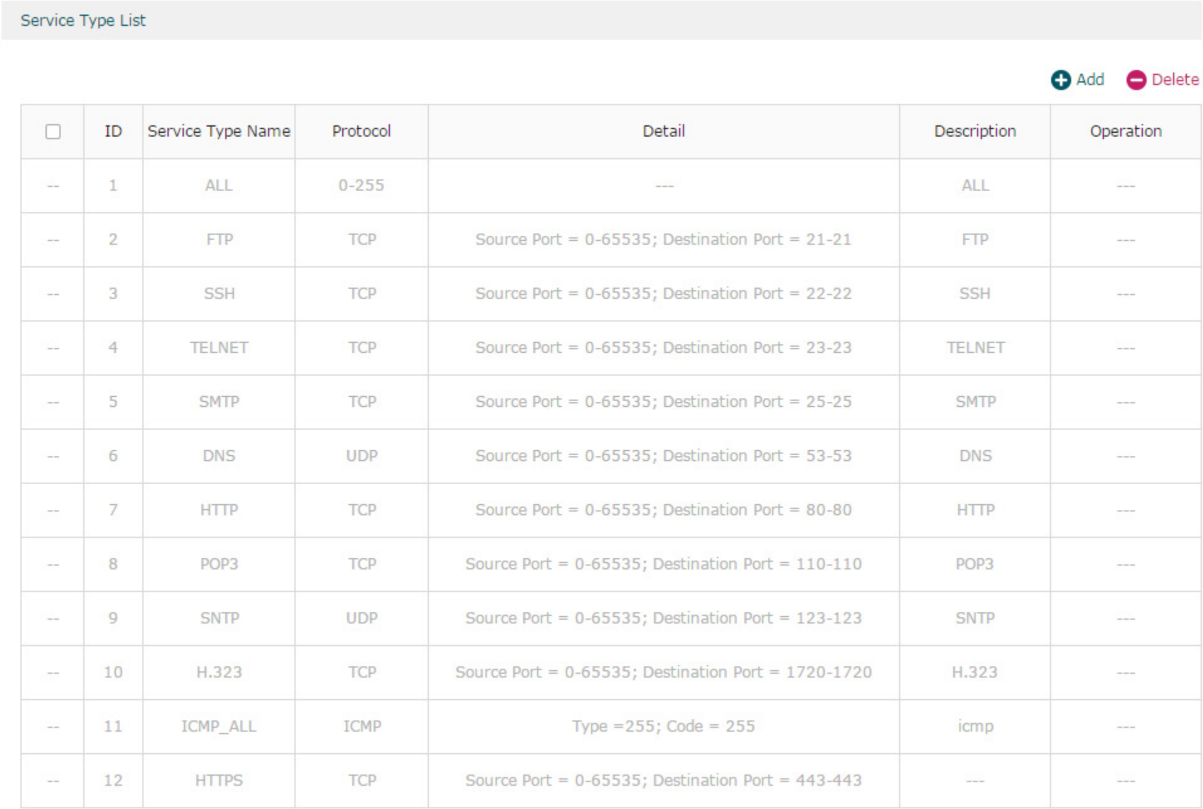
An IP pool entry that is being referenced by a rule cannot be deleted.

5 Service Type Configuration

The service type entries configured here can be used as part of the matching conditions when configuring the Access Control rules in Firewall.

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

Figure 5-1 Service Type List



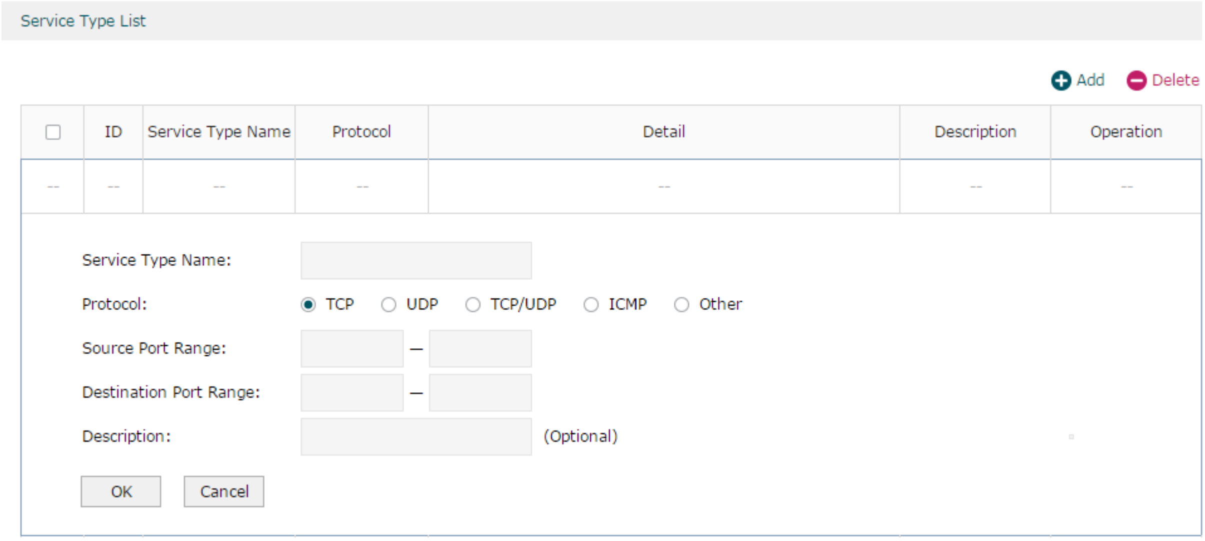
Service Type List

□	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 5-2 Add a Service Type Entry



Service Type List

Add Delete

□	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)

OK Cancel

Follow these steps to add a service type entry:

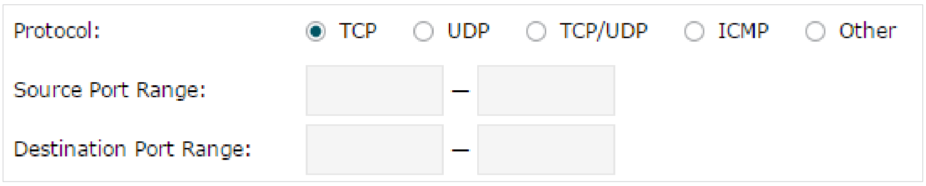
1) Enter a name for the service type.

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 5-3 TCP/UDP Protocol



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

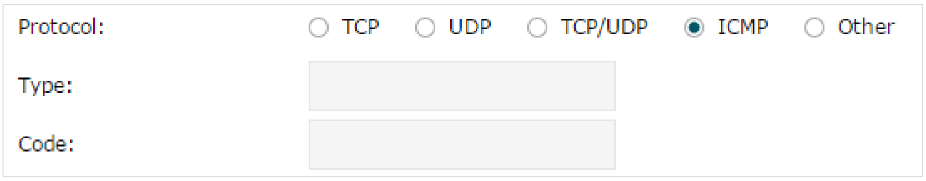
Source Port Range: —

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 5-4 ICMP Protocol



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

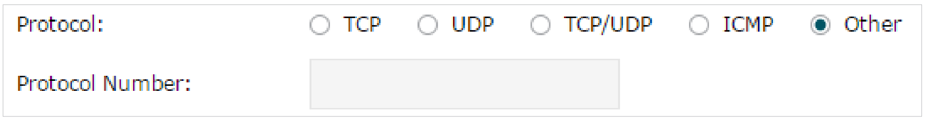
Type:

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 5-5 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.

Part 5

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 router 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 router can record the IP address of the host, when the data from the internet returns to the external ports, the router 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

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

Session Limit

The amount of TCP and UDP sessions supported by the router is finite. If some local hosts transmit too many TCP and UDP sessions to the public network, the communication quality of the other local hosts will be affected, thus it is necessary to limit the sessions of those hosts.

Load Balancing

You can configure the traffic sharing mode of the WAN ports to optimize the resource utilization.

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 router in forwarding data packets to the specific destination.

2 NAT Configurations

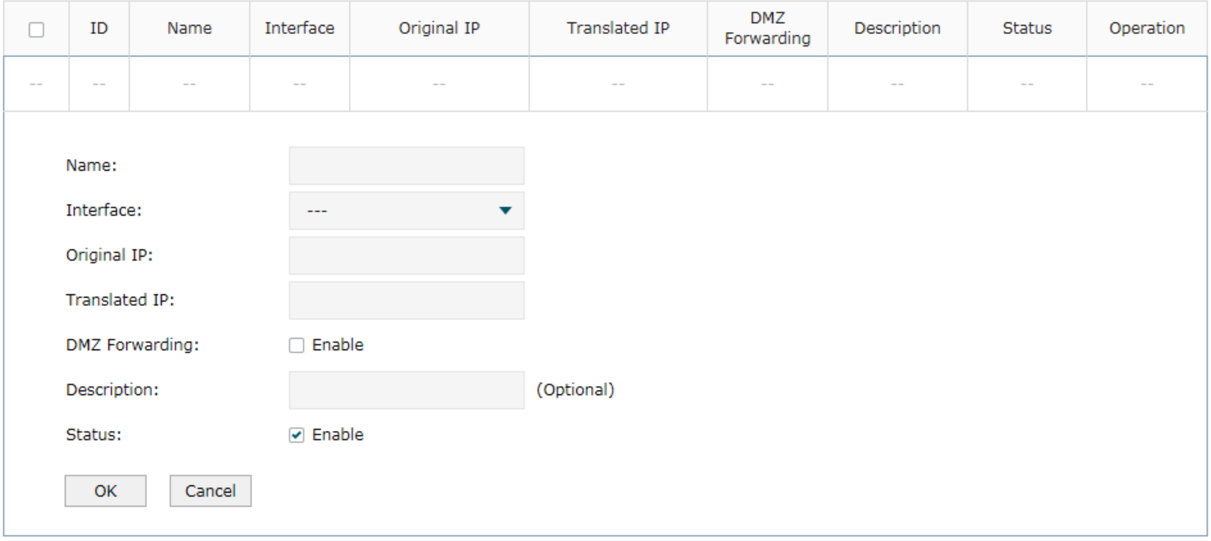
With NAT configurations, you can:

- 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

OK Cancel

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. If you choose multiple ports, the entry will be applied to all selected ports simultaneously.
Original IP	Specify the original IP address for the rule. The original IP address cannot be the broadcast address, network address or IP address of the interface.

Translated IP	Specify the translated IP address for the rule. The translated IP address cannot be the broadcast address, network address or IP address of the 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	Give a description for the rule entry to facilitate your management.
Status	Check the box to enable the rule.

2) Click **OK**.

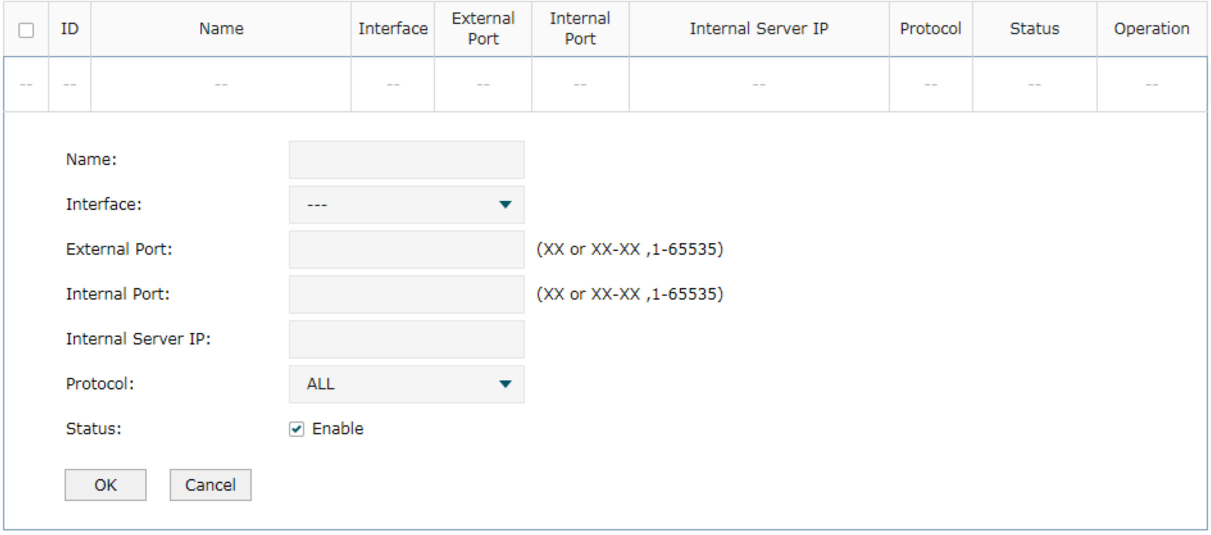
Note:

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

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 the router provided for accessing external network. The ports or port ranges cannot overlap with those of other virtual server rules.
Internal Port	Specify the service port or port range of the LAN host as virtual server.

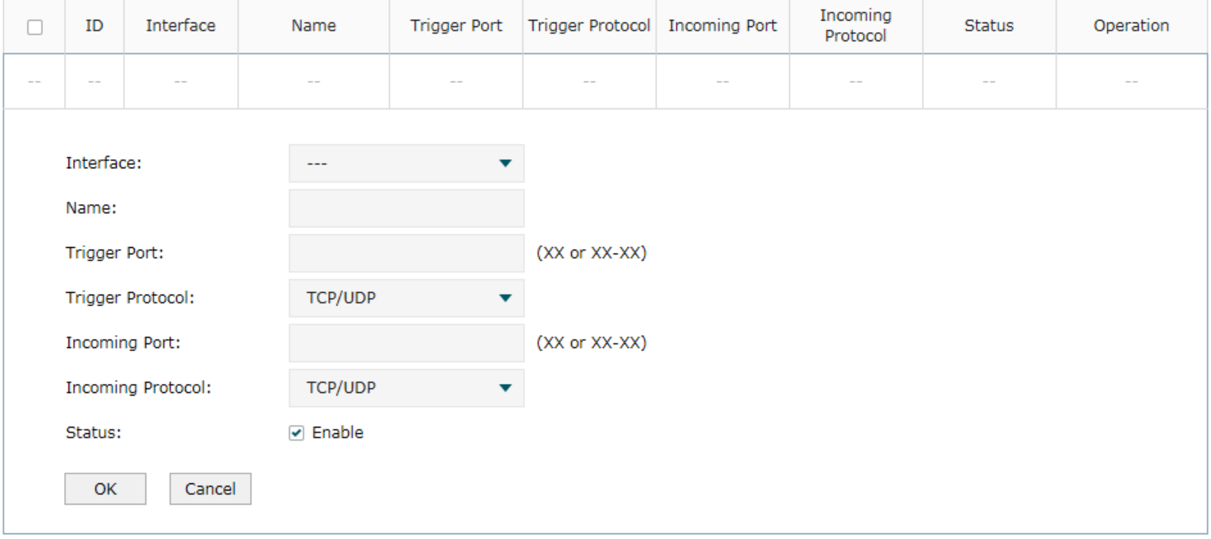
Internal Server IP	Enter the IP address of the specified internal server for the entry. All the requests from the internet to the specified LAN port will be redirected to this host.
Protocol	Specify the protocol used for the entry.
Status	Check the box to enable the rule.

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. Each entry supports at most 5 groups of trigger ports. For example, you can enter 1-2, 3-4, 5-6, 7-8, 8-9. Note that the ports or port ranges cannot overlap with those of other port triggering rules.
Trigger Protocol	Specify the trigger protocol for the trigger port.
Incoming Port	Enter the incoming port or port range. Each entry supports at most 5 groups of incoming ports. For example, you can enter 1-2, 3-4, 5-6, 7-8, 8-9. Note that the ports or port ranges cannot overlap with those of other port triggering rules.
Incoming Protocol	Specify the incoming protocol for the incoming port.

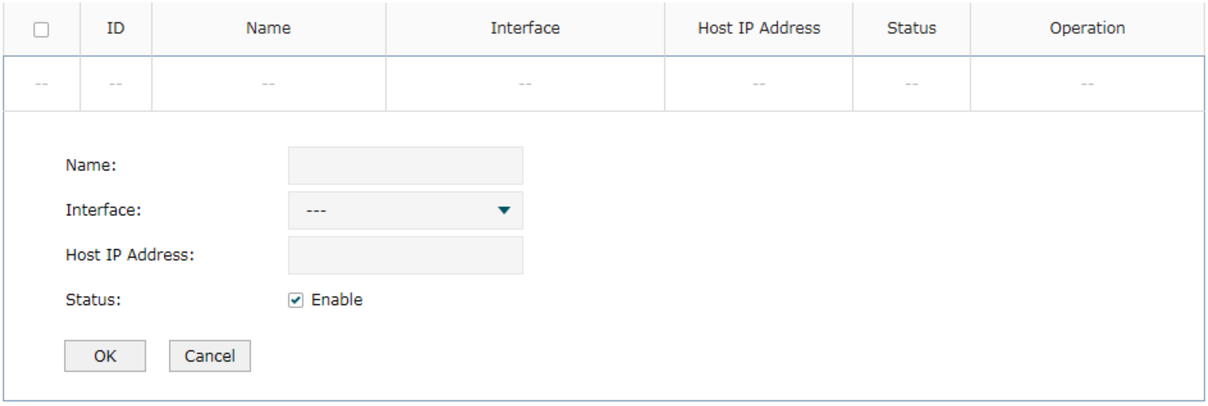
Status	Check the box to enable the rule.

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.

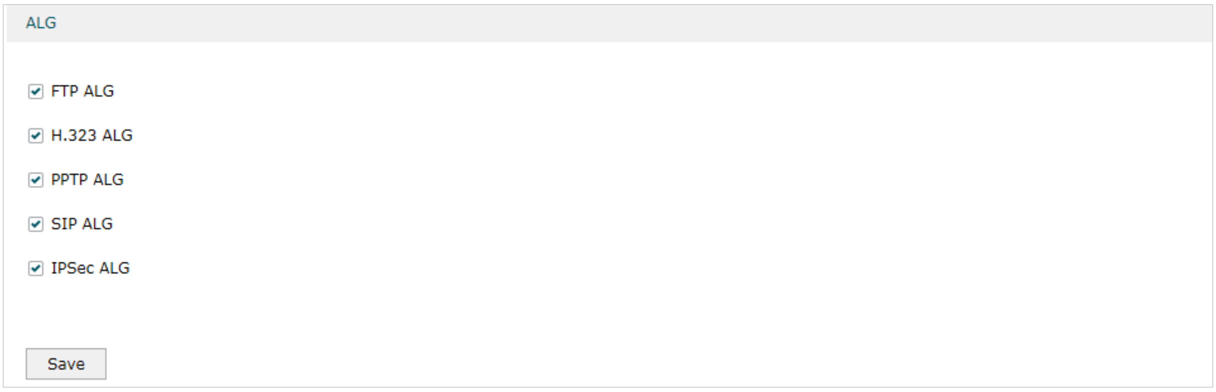
Interface	Specify the effective interface for the rule. If you choose multiple ports, the entry will be applied to all selected ports simultaneously.
Host IP Address	Specify the host IP address for NAT-DMZ.
Status	Check the box to enable the rule.

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

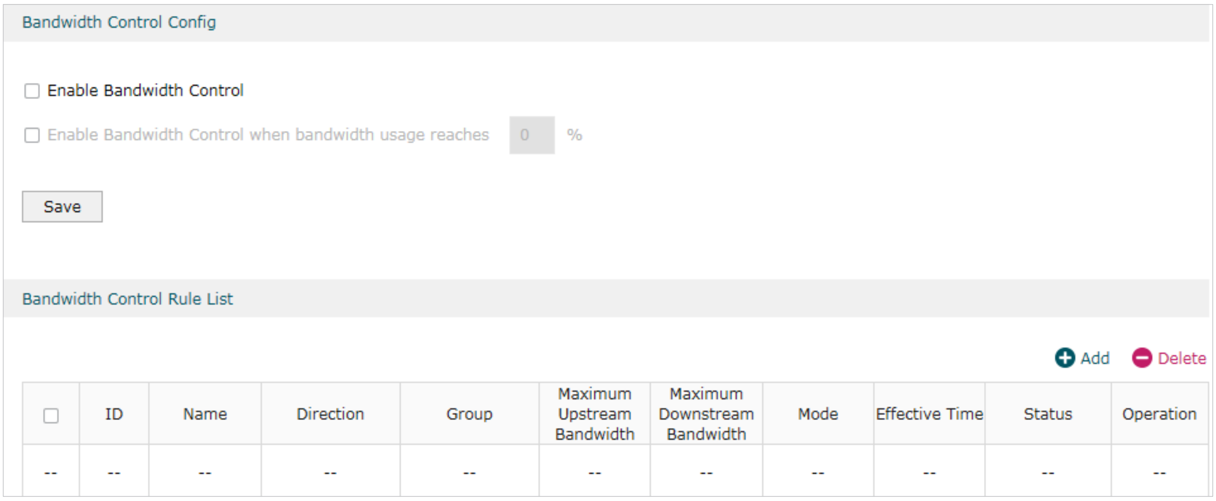
Enable related ALG according to your needs and click **Save**.

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
--	--	--	--	--	--	--	--	--	--	--

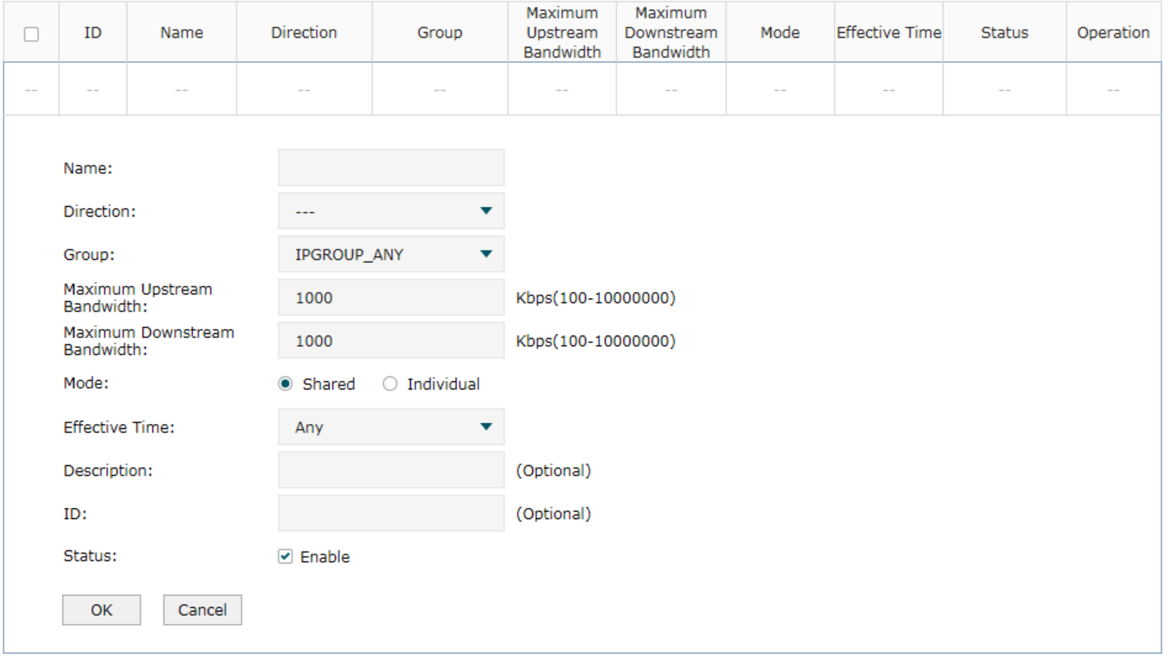
Follow these steps to configure the Bandwidth Control rule:

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

Enable Bandwidth Control	Check the box to enable Bandwidth Control globally.
Enable Bandwidth Control	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	Specify the address group for the rule to define the controlled users. The IP group referenced here can be created on the **Preferences > IP Group > IP Group** page.
Maximum Upstream Bandwidth	Specify the Maximum Upstream Bandwidth in Kbps for the rule.
Maximum Downstream Bandwidth	Specify the Maximum Downstream Bandwidth in Kbps for the rule.
Mode	Specify the bandwidth control mode for the address group. Individual means the bandwidth of each user is equal to the current bandwidth of this entry. Shared means the total bandwidth of all controlled IP addresses is equal to the current bandwidth of this entry.
Effective Time	Specify the time for the rule to take effect. Any means it always takes effect. The time range referenced here can be created on the **Preference > Time Range > Time Range** page.
Description	Enter a brief description for the rule.
ID	Append the rule to the right position to give a priority for the rule.
Status	Check the box to enable the rule.

4 Session Limit Configurations

To complete Session Limit configuration, follow these steps:

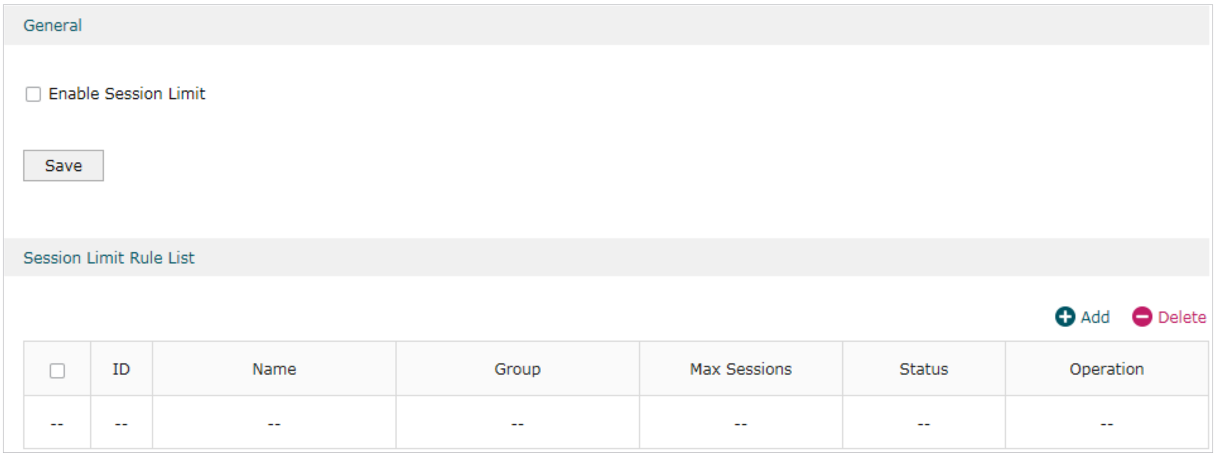
1) Configure session limit.

2) View the session limit information.

4.1 Configuring Session Limit

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

Figure 4-1 Configuring the Session Limit



General

□ Enable Session Limit

Save

Session Limit Rule List

Add Delete

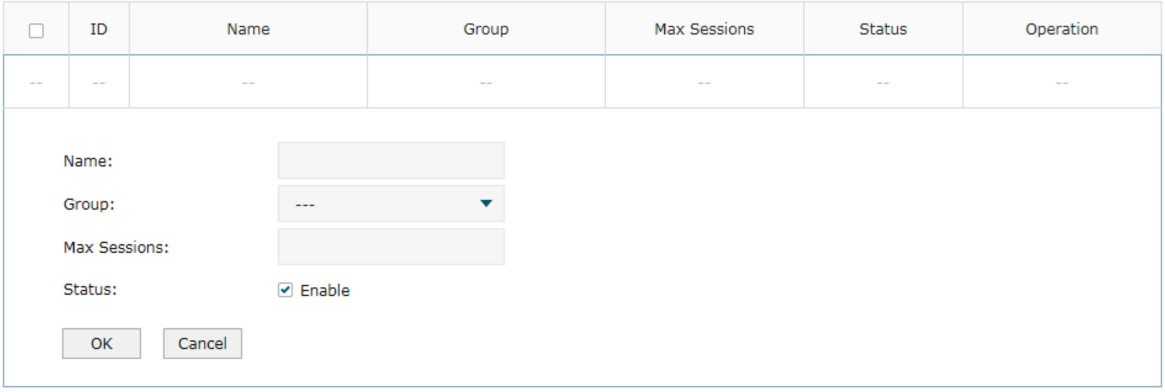
□	ID	Name	Group	Max Sessions	Status	Operation
--	--	--	--	--	--	--

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 4-2 Add Session Limit rules



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

Name:

Group: ---

Max Sessions:

Status: ☑ Enable

OK Cancel

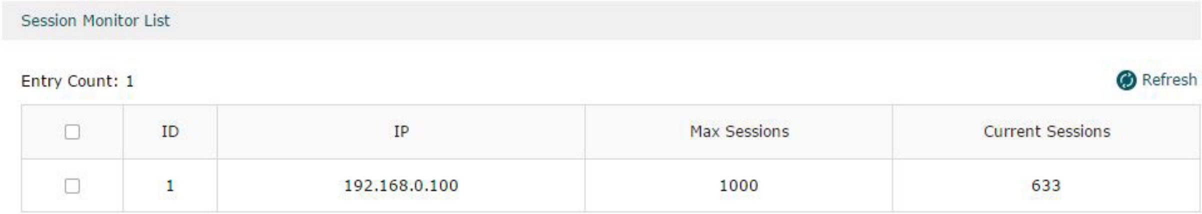
Specify the name of the Session Limit rule and configure other related parameters. Then click **OK**.

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 > IP Group** page.
Max Sessions	Specify the max sessions for the controlled users.
Status	Check the box to enable the rule.

4.2 Viewing the Session Limit Information

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

Figure 4-3 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.

5 Load Balancing Configurations

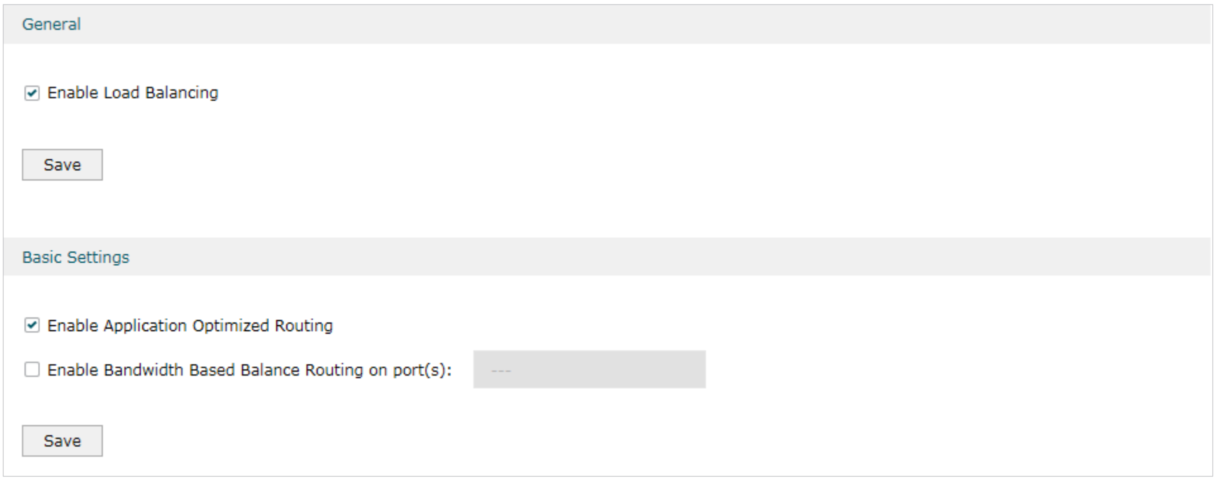
With load balancing configurations, you can:

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

5.1 Configuring the Load Balancing

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

Figure 5-1 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**.

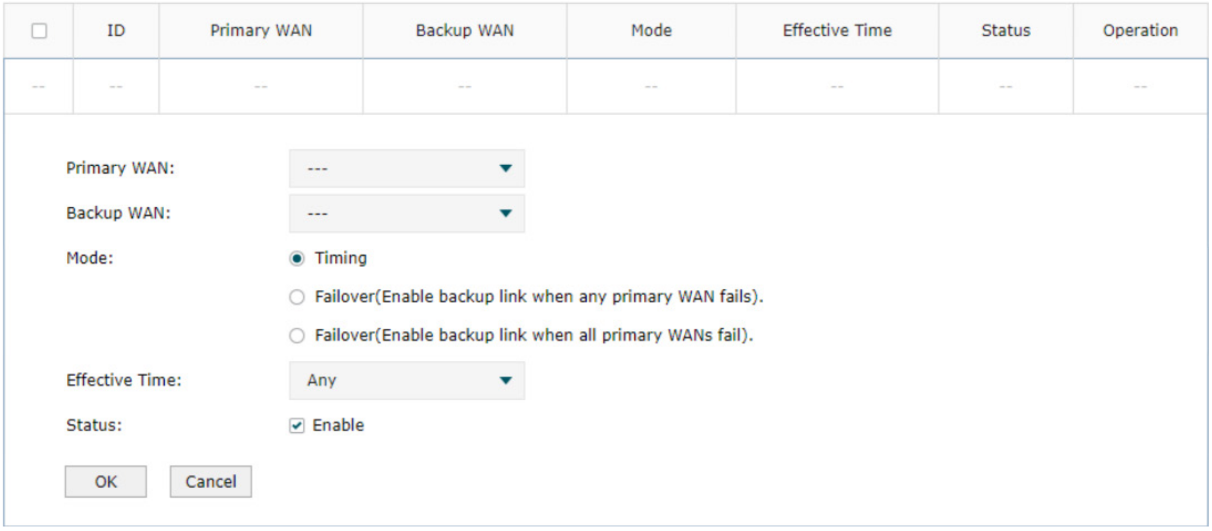
Enable Application Optimized Routing	With Application Optimized Routing enabled, the router will consider the source IP address and destination IP address (or destination port) of the packets as a whole and record the WAN port they pass through. Then the packets with the same source IP address and destination 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 to enable Bandwidth Based Balance Routing.

5.2 Configuring the Link Backup

With Link Backup function, the router 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 5-2 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**.

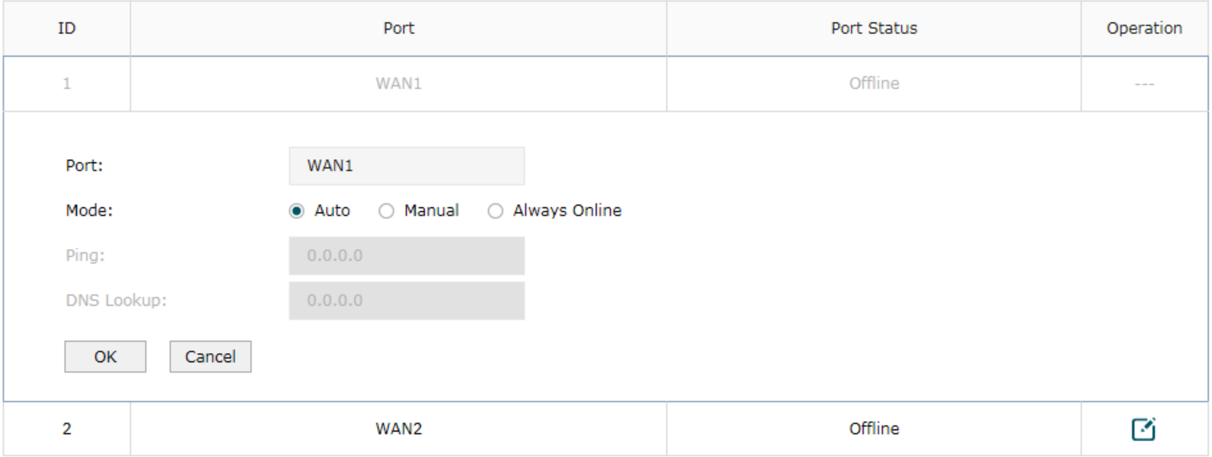
Primary WAN	Specify the primary WAN port. You can choose one primary WAN port, or choose multiple primary WAN ports to perform load balance.
Backup WAN	Specify the backup WAN port to back up the traffic for the primary WAN port under the specified condition.
Mode	Specify the mode as Timing or Failover. **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. **Failover(Enable backup link when all primary WANs fail)**: Link Backup will be enabled only when all primary WANs fail.
Effective Time	Specify the time for the rule to take effect. “Any” means it takes effect at any time. The time range referenced here can be created on the **Preference > Time Range > Time Range** page.
Status	Check the box to enable the rule.

5.3 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 5-3 Configuring the Online Detection



ID	Port	Port Status	Operation
1	WAN1	Offline	---

Port: WAN1

Mode: ● Auto ○ Manual ○ Always Online

Ping: 0.0.0.0

DNS Lookup: 0.0.0.0

OK Cancel

ID	Port	Port Status	Operation
2	WAN2	Offline	✎

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.

6 Routing Configurations

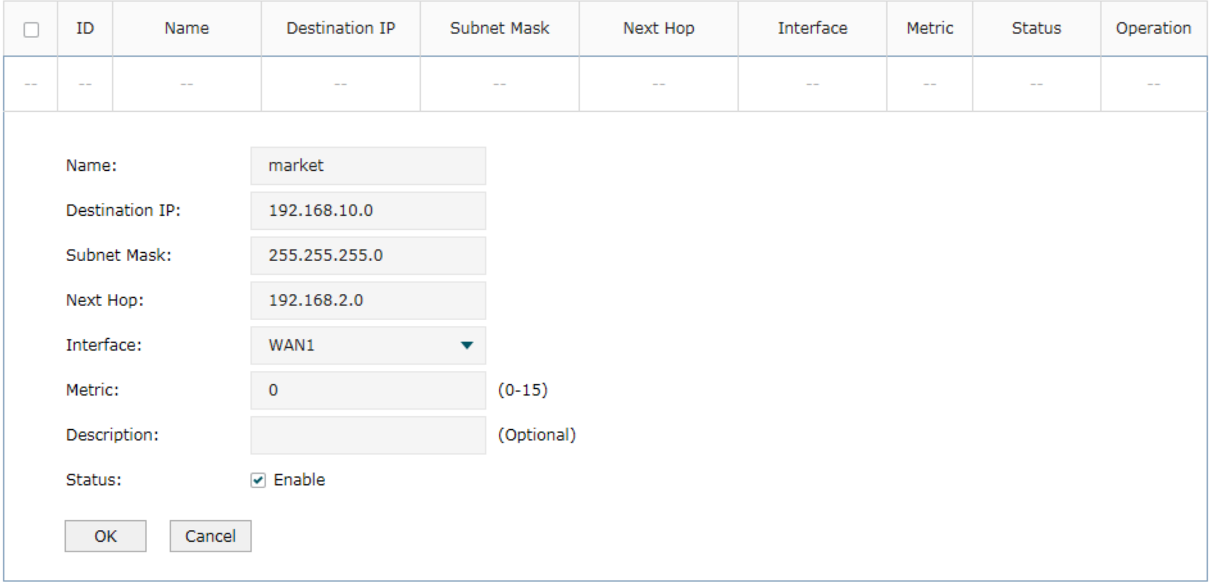
With routing configurations, you can:

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

6.1 Configuring the Static Routing

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

Figure 6-1 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**.

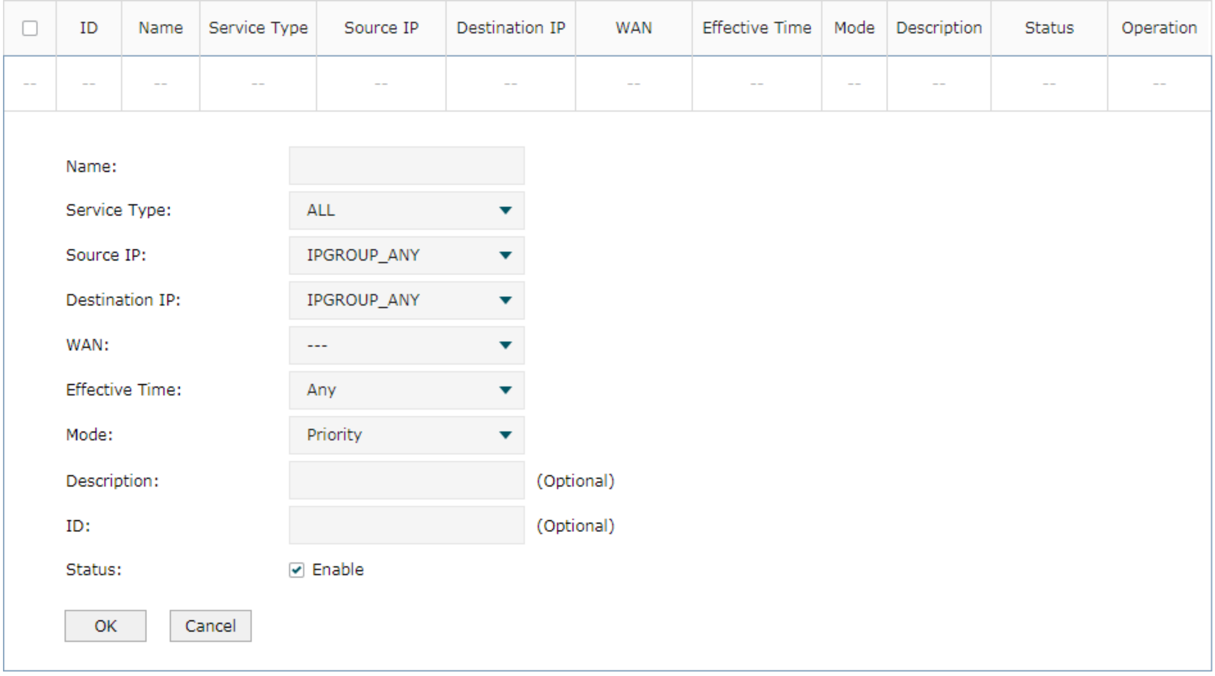
Destination IP	Specify the destination IP address the route leads to.
Subnet Mask	Specify the subnet mask of the destination network.
Next Hop	Specify the IP address to which the packet should be sent next.
Interface	Specify the physical network interface through which this route is accessible.
Metric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

6.2 Configuring the Policy Routing

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

Figure 6-2 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**.

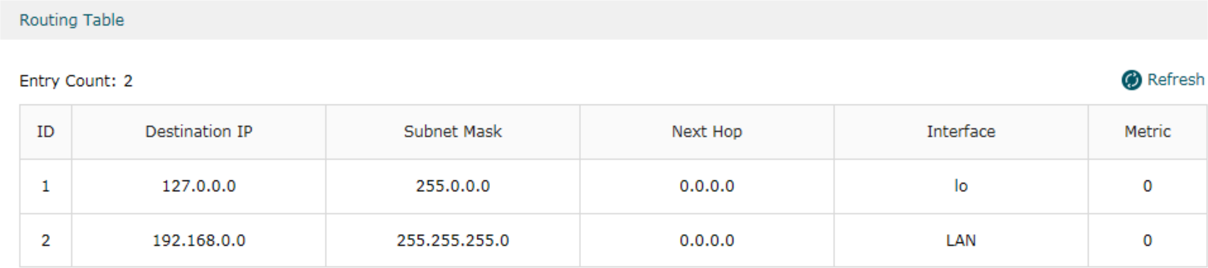
Service Type	Specify the service type for the rule.
Source IP	Enter the source IP range for the rule. 0.0.0.0 - 0.0.0.0 means any IP is acceptable.
Destination IP	Enter the destination IP range for the rule. 0.0.0.0 - 0.0.0.0 means any IP is acceptable.
WAN	Specify the outcoming port for the rule. If 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.

6.3 Viewing the Routing Table

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

Figure 6-3 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 Configuration Examples

7.1 Example for Configuring NAT

7.1.1 Network Requirements

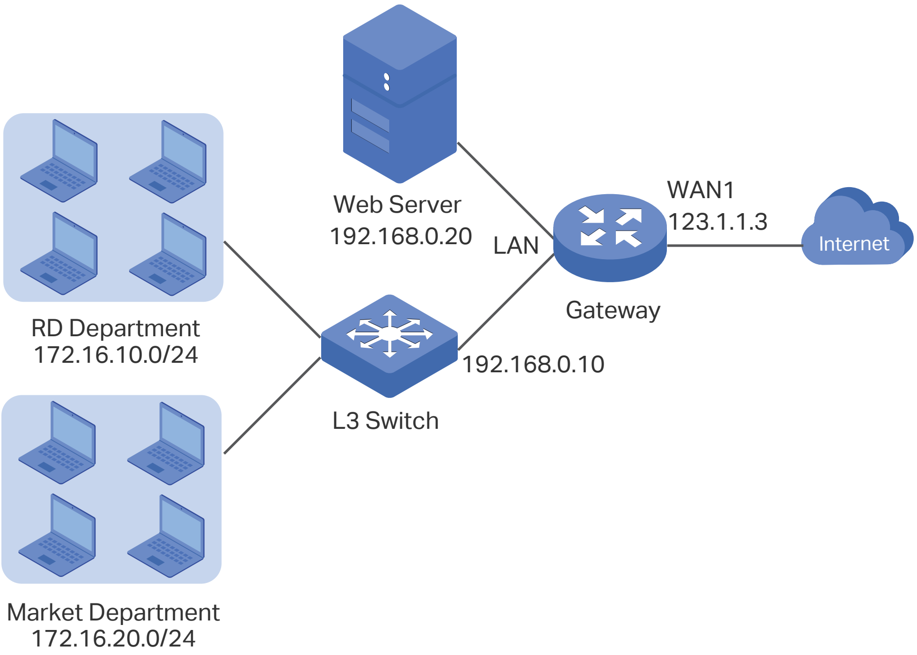
A company has two departments: Market Department and RD department. Each department is assigned to an individual subnet. The company has the following requirements:

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

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

7.1.2 Network Topology

Figure 7-1 Network Topology



7.1.3 Configuration Scheme

To meet the first requirement, configure static routing on the gateway to make sure the router 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 router, 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.

7.1.4 Configuration Procedure

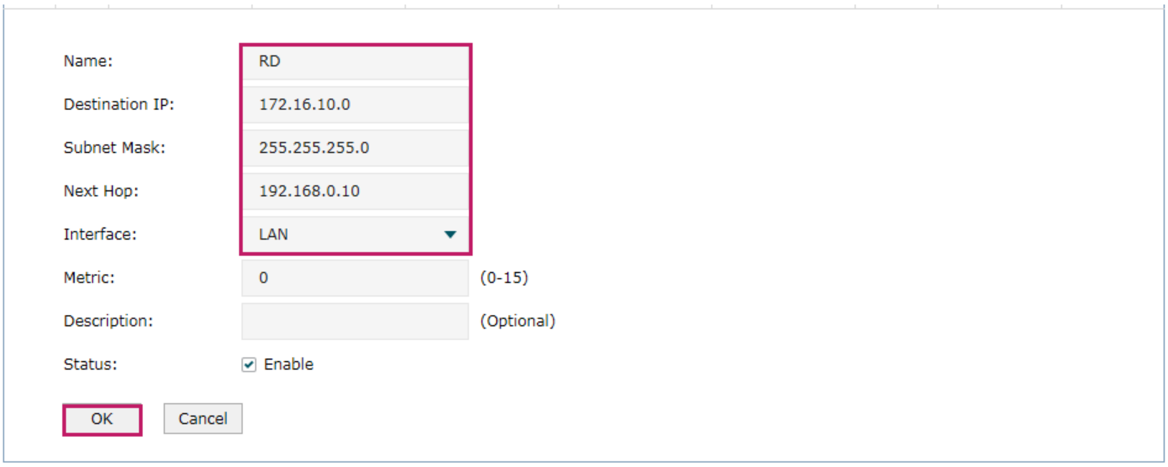
Follow the steps below to configure NAT on the router:

■ 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 7-2 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

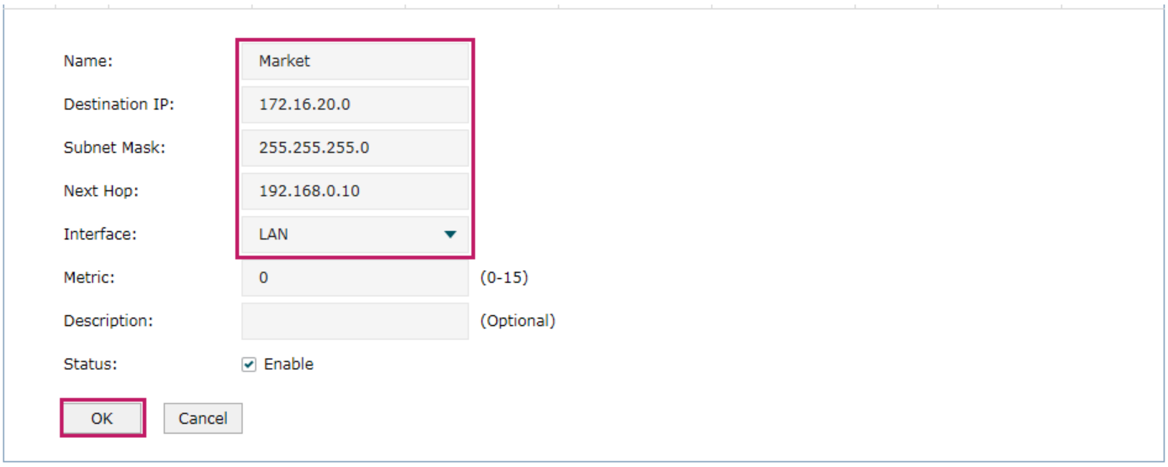
Interface: LAN

Metric: 0 (0-15)

Description: (Optional)

Status: ☑ Enable

Figure 7-3 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)

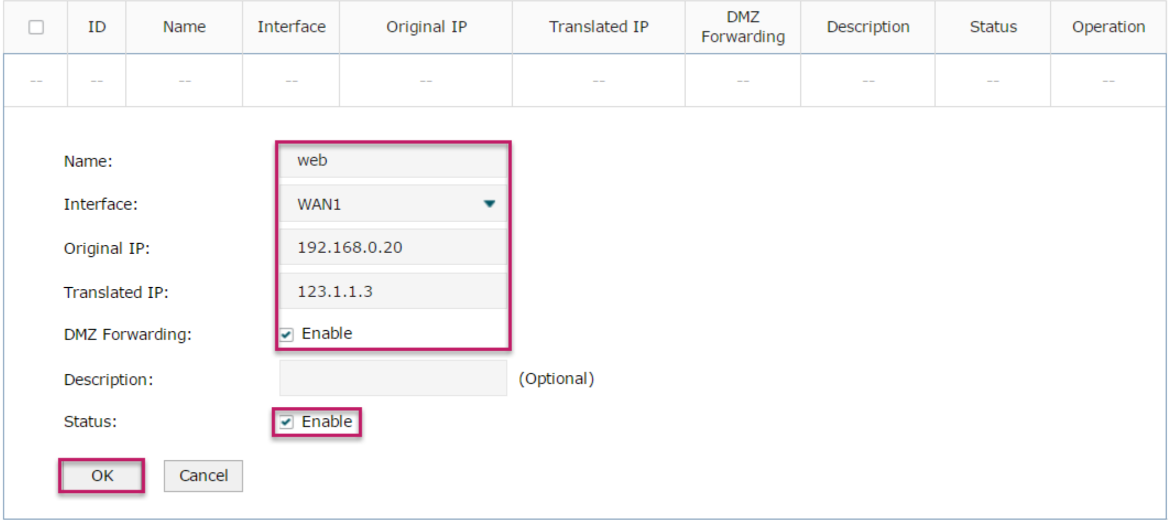
Status: ☑ Enable

■ 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 7-4 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

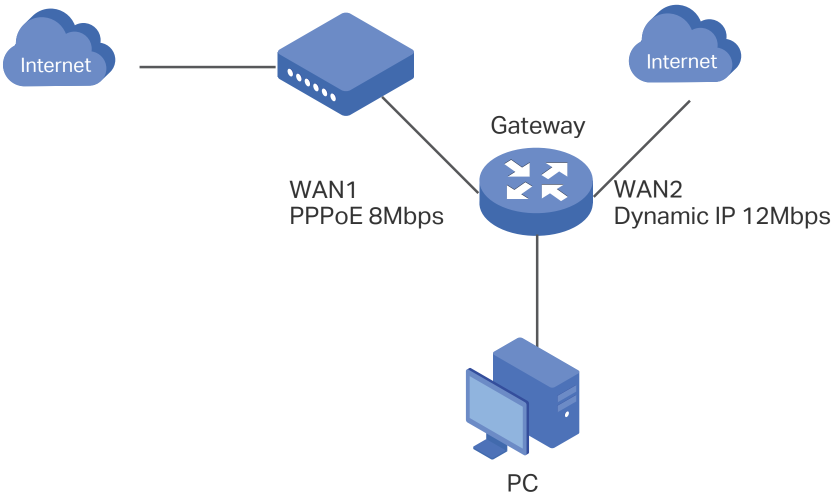
7.2 Example for Configuring Load Balancing

7.2.1 Network Requirements

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

7.2.2 Network Topology

Figure 7-5 Network Topology



7.2.3 Configuration Scheme

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

7.2.4 Configuration Procedure

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

- 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).

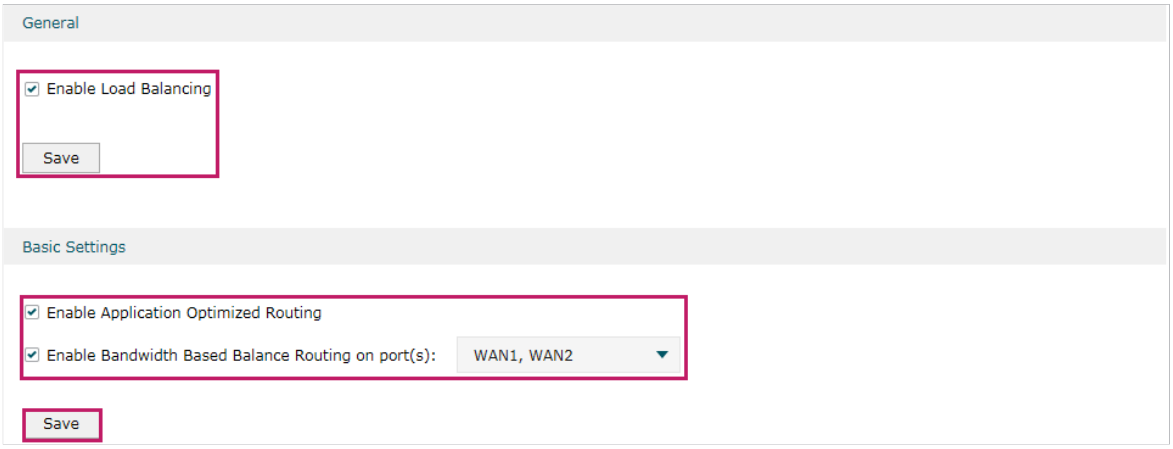
  For WAN2 port, configure the connection type as Dynamic IP, and specify Upstream and Downstream bandwidth for this link according to data that ISP provides.

  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 7-6 Configuring the Load Balancing



General

☑ Enable Load Balancing

Save

Basic Settings

☑ Enable Application Optimized Routing

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

Save

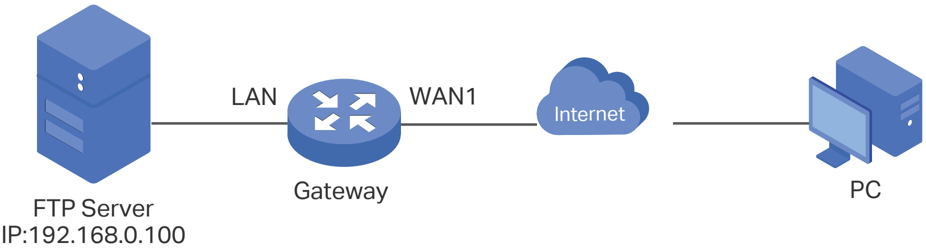
7.3 Example for Configuring Virtual Server

7.3.1 Network Requirements

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

7.3.2 Network Topology

Figure 7-7 Network Topology



7.3.3 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 router so that the FTP server can be accessed by the internet user.

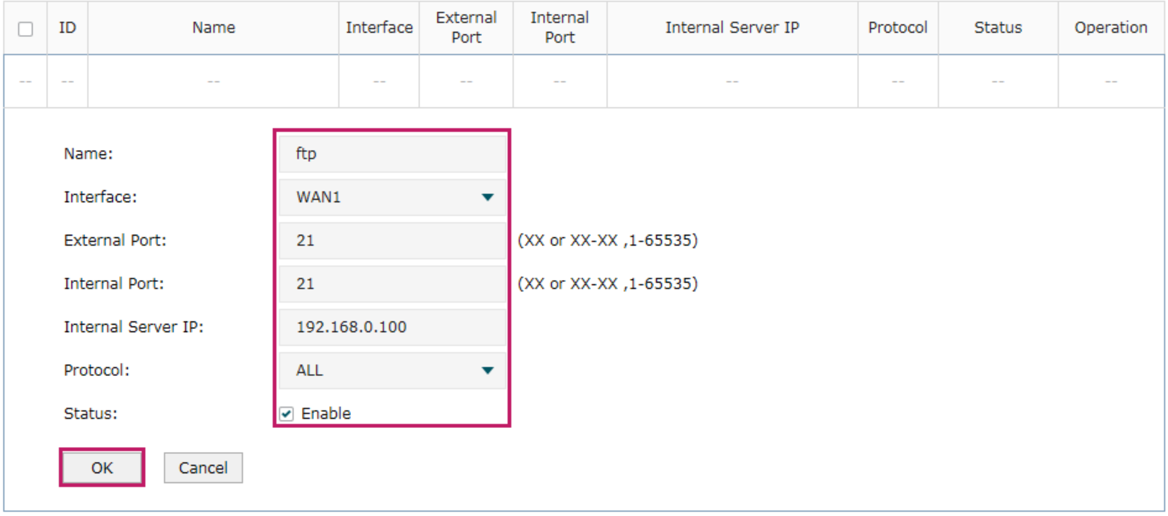
7.3.4 Configuration Procedure

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

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 7-8 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

7.4 Example for Configuring Policy Routing

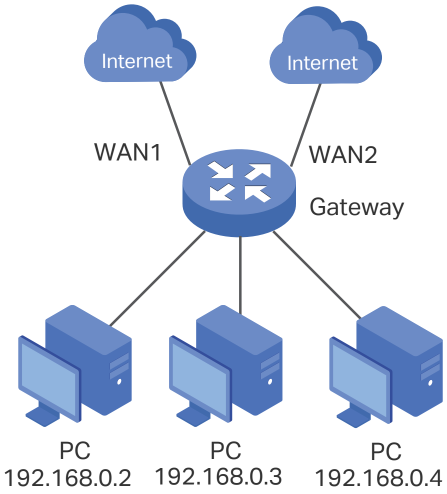
7.4.1 Network Requirements

The network administrator has a router 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.

7.4.1 Network Topology

Figure 7-9 Network Topology



7.4.2 Configuration Scheme

To meet the first requirement, configure link backup on the router. 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.

7.4.3 Configuration Procedure

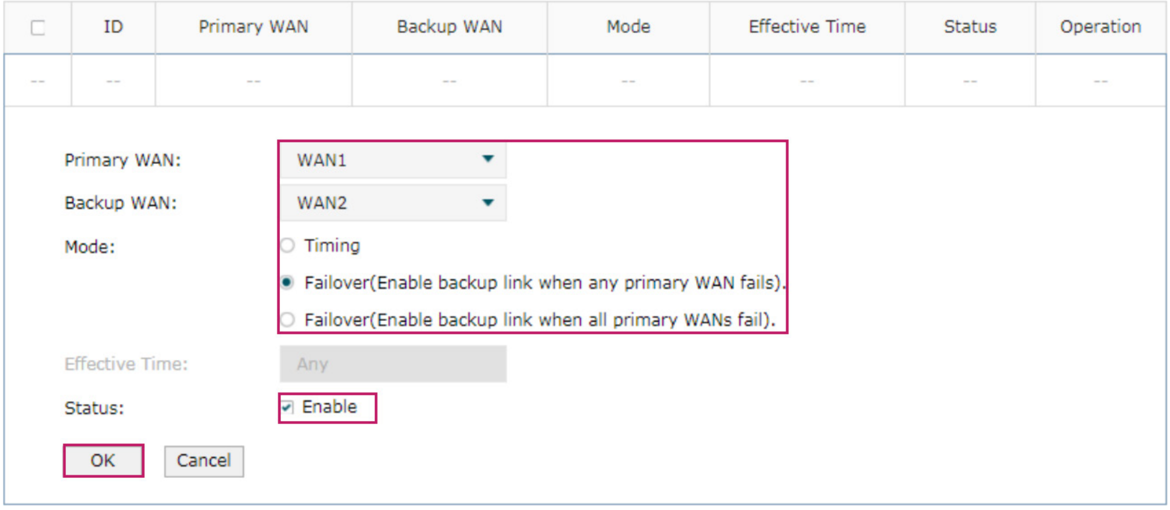
Follow the steps below to configure link backup and policy routing on the router:

- 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 7-10 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).

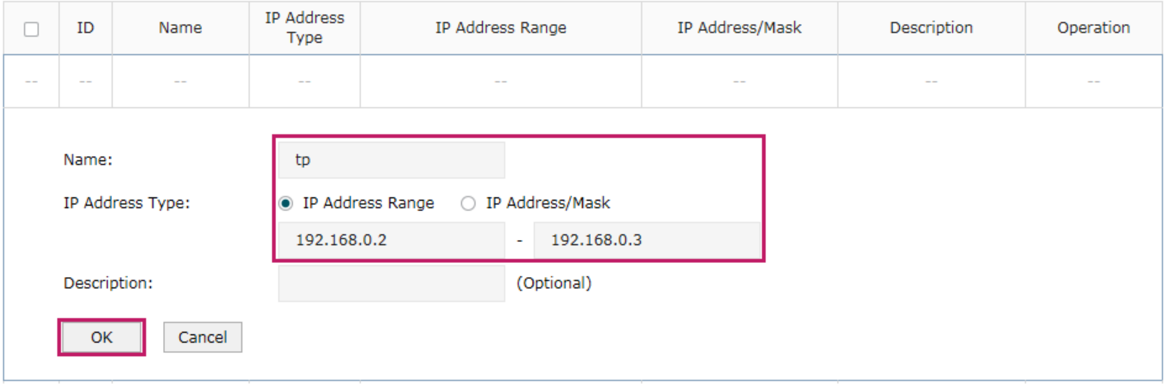
Effective Time: Any

Status: ☑ Enable

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 7-11 Configuring the IP Address



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

Name: tp

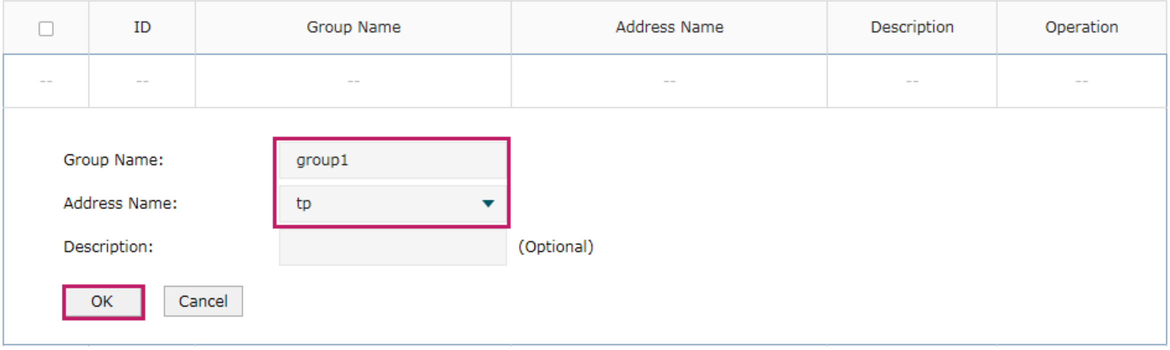
IP Address Type: ● IP Address Range ○ IP Address/Mask

192.168.0.2 - 192.168.0.3

Description: (Optional)

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 7-12 Configuring the IP Group



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

Group Name: group1

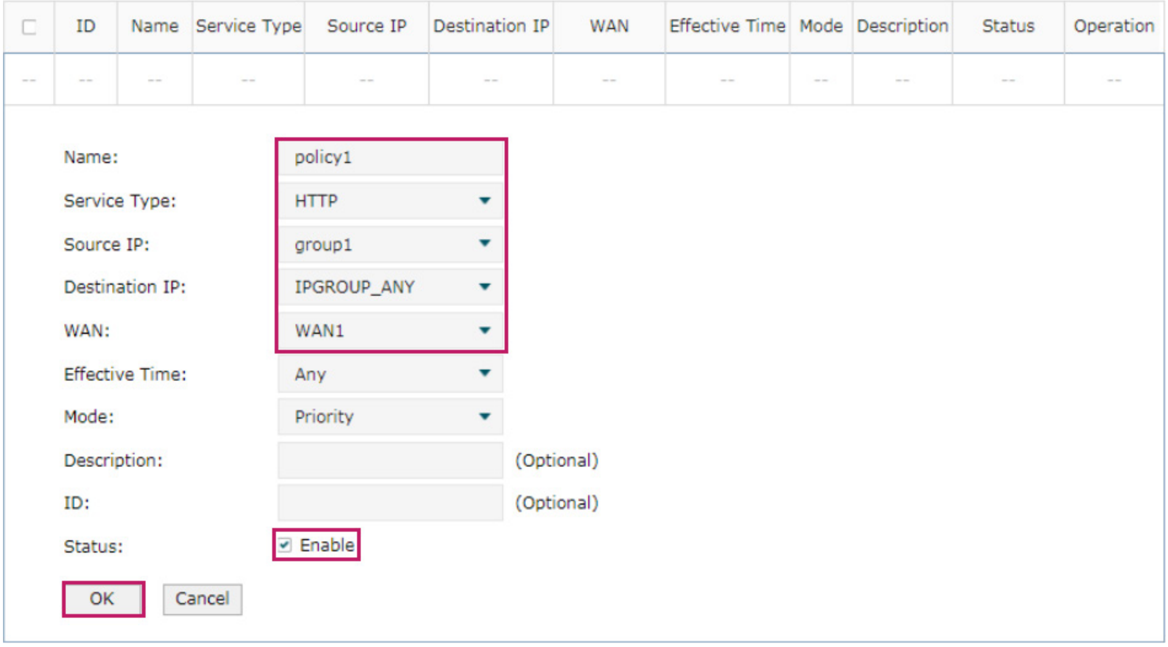
Address Name: tp

Description: (Optional)

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 7-13 Configuring the Policy Routing Rule 1

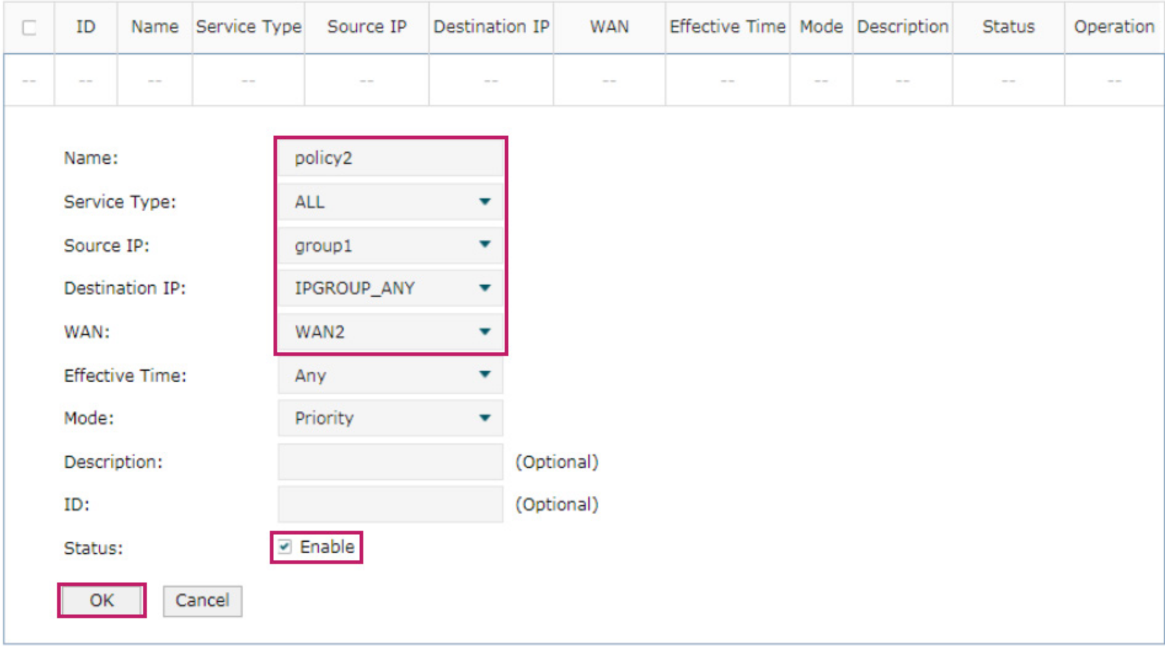


□	ID	Name	Service Type	Source IP	Destination IP	WAN	Effective Time	Mode	Description	Status	Operation
--	--	--	--	--	--	--	--	--	--	--	--

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 7-14 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 6

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 routers 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 router checks whether it matches any of the IP-MAC Binding entries. If not, the router will ignore the ARP packets. In this way, the router maintains the correct ARP table.

In addition, the router 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 router can identify and discard various attack packets which are sent to the CPU, and limit the packet receiving rate. In this way, the router can protect itself and the connected network against malicious attacks.

The router 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.

Access Control

Access Control can filter the packets passing through the router 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 router 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.

2 Firewall Configuration

In Firewall module, you can configure the following features:

- Anti ARP Spoofing
- Attack Defense
- Access 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 router sends the ARP request packets with the specific IP field to the hosts. Upon receiving the ARP reply packet, the router can get the IP address, MAC address and connected interface of the host.

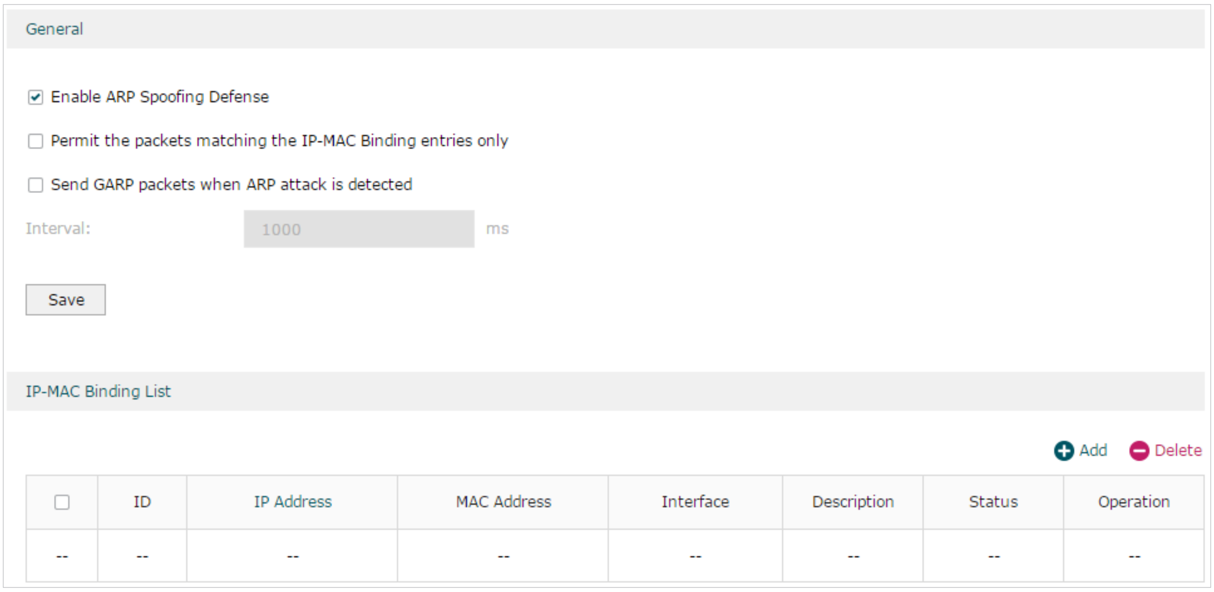
The following sections introduce these two methods in detail.

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

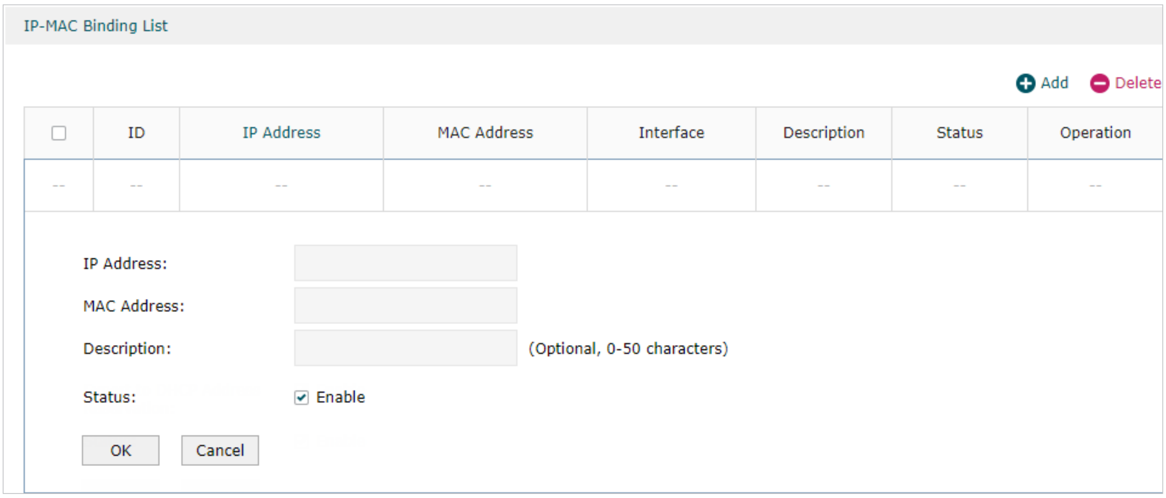
IP-MAC Binding List

□	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:

Description: (Optional, 0-50 characters)

Status: ☑ Enable

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.

Description	Give a description for identification.
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.

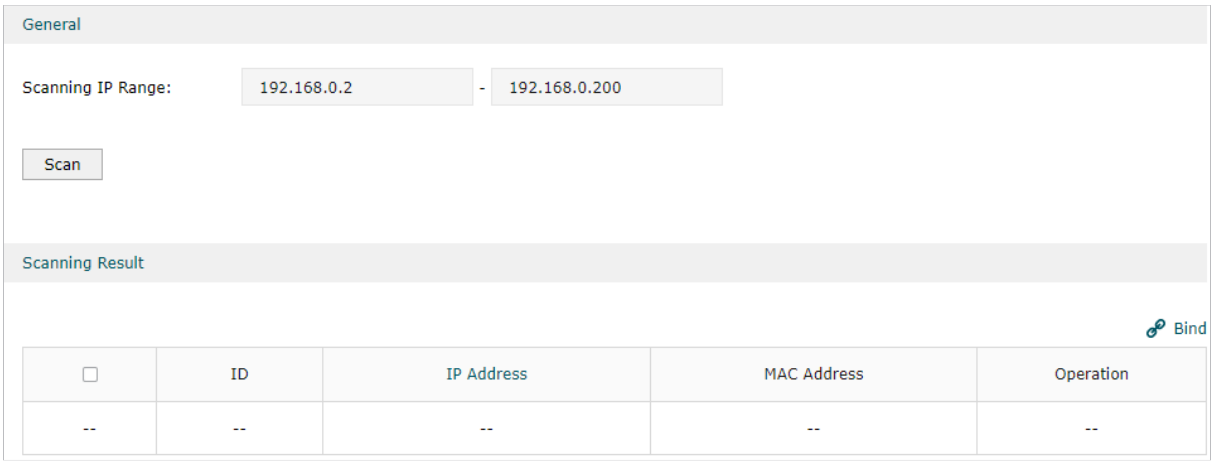
Adding IP-MAC Binding Entries via ARP Scanning

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

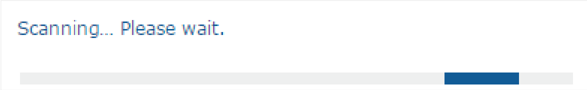
🔗 Bind

□	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.

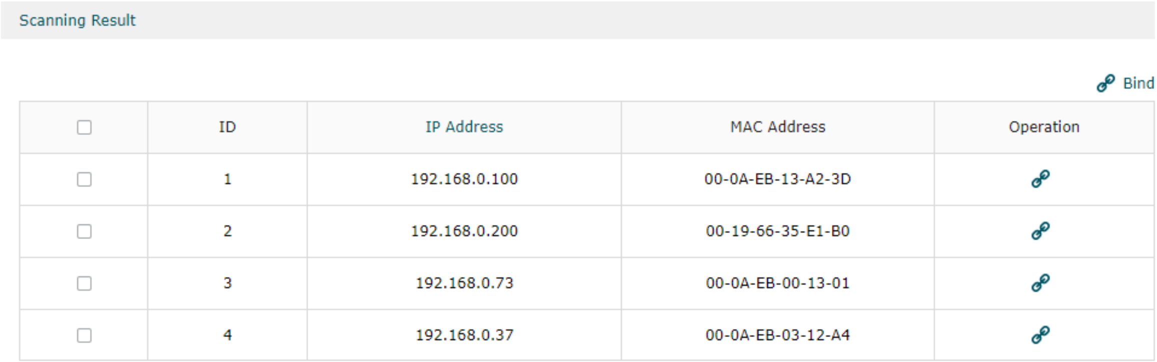
Figure 2-4 ARP Scanning Process



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



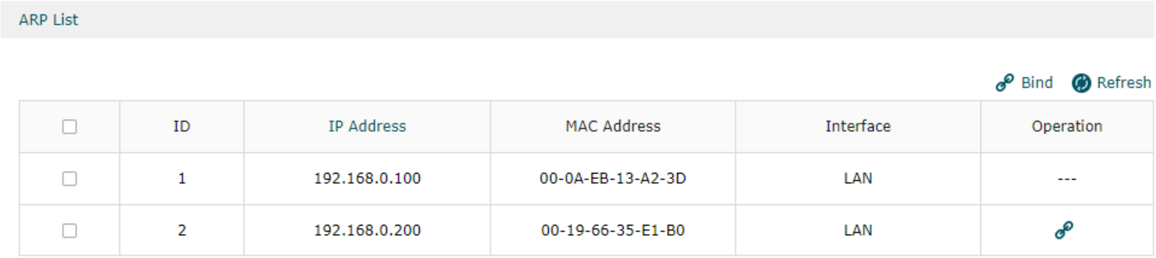
Scanning Result

🔗 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

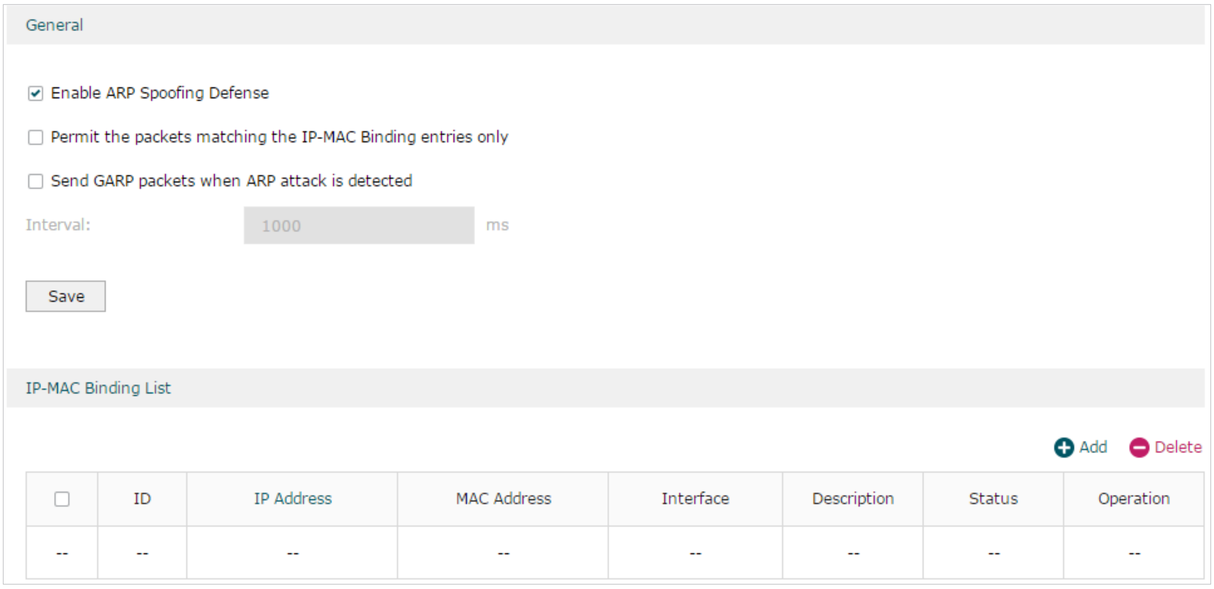
🔗 Bind Refresh

□	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 router 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 router 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 router 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**.

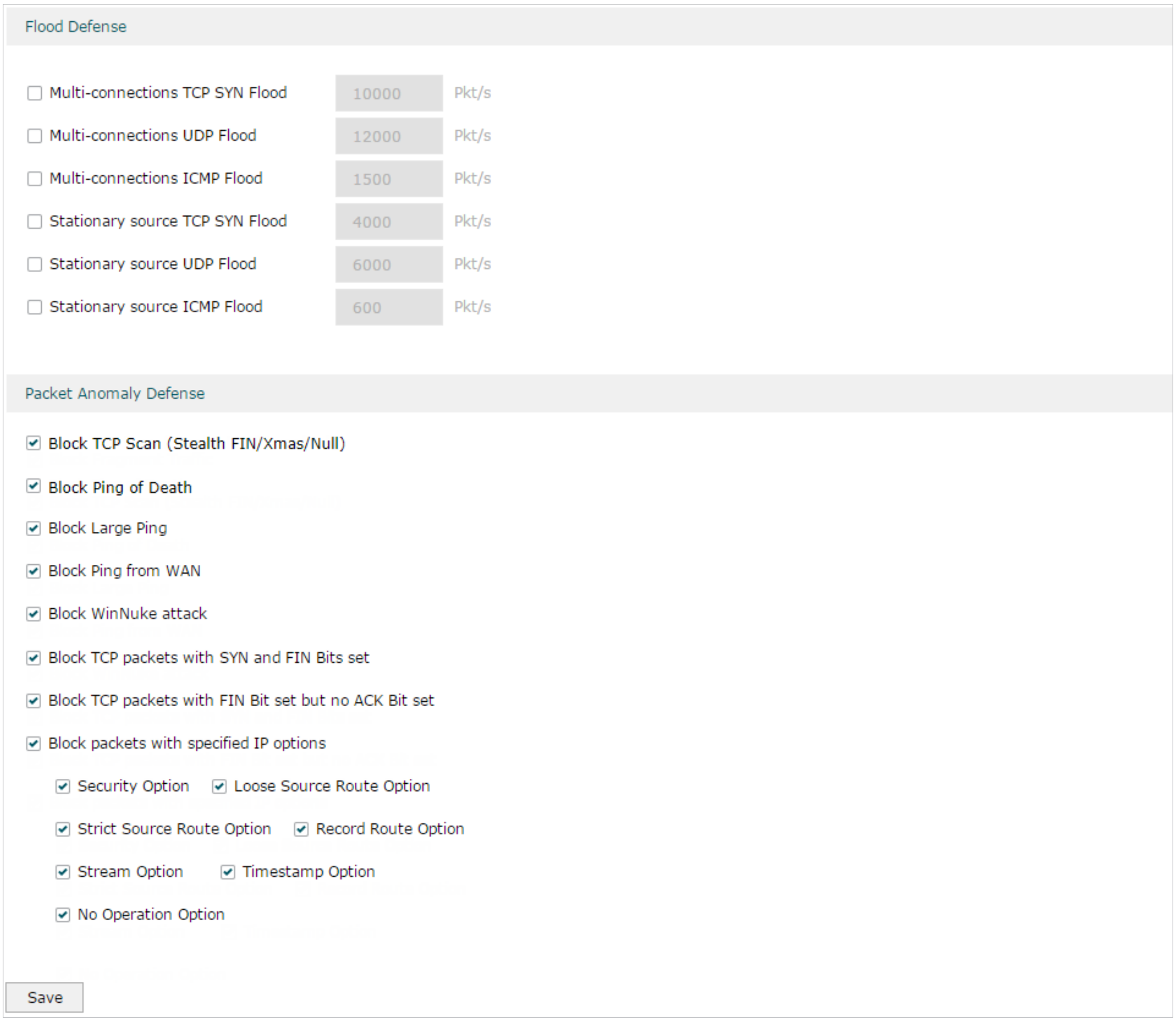
Note:

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 router. If this happens, restore your router 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.

Figure 2-8 Attack Defense



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

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 router 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 router 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 router 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 router 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 router 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 router 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:

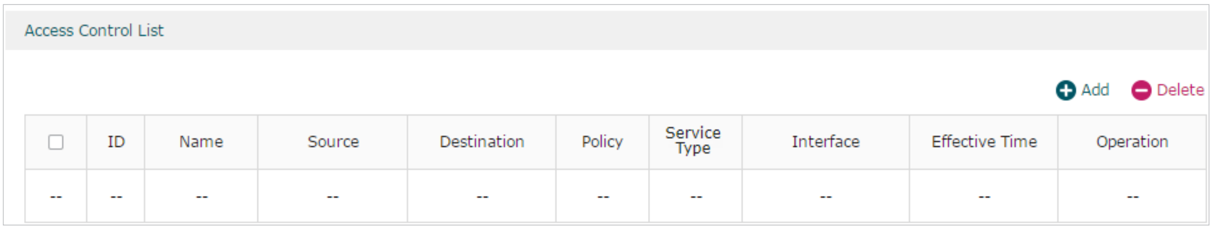
Block TCP Scan (Stealth FIN/Xmas/Null)	With this option enabled, the router will filter the TCP scan packets of Stealth FIN, Xmas and Null.
Block Ping of Death	With this option enabled, the router will block Ping of Death attack. Ping of Death attack means that the attacker sends abnormal ping packets larger than 65535 bytes to cause system crash on the target computer.
Block Large Ping	With this option enabled, the router 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 router will block the ICMP request from WAN.
Block WinNuke attack	With this option enabled, the router 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 router 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 router 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 router 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 Access Control

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

Figure 2-9 Access Control



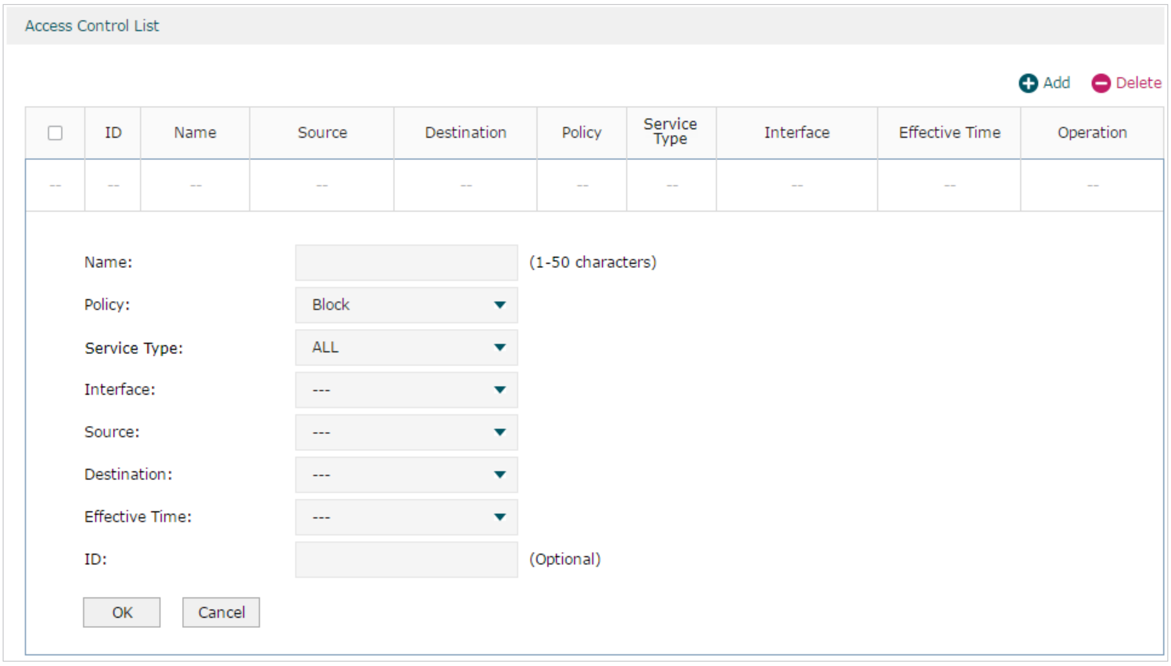
Access Control List

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

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 2-10 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.
Interface	Select the effective interface 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.

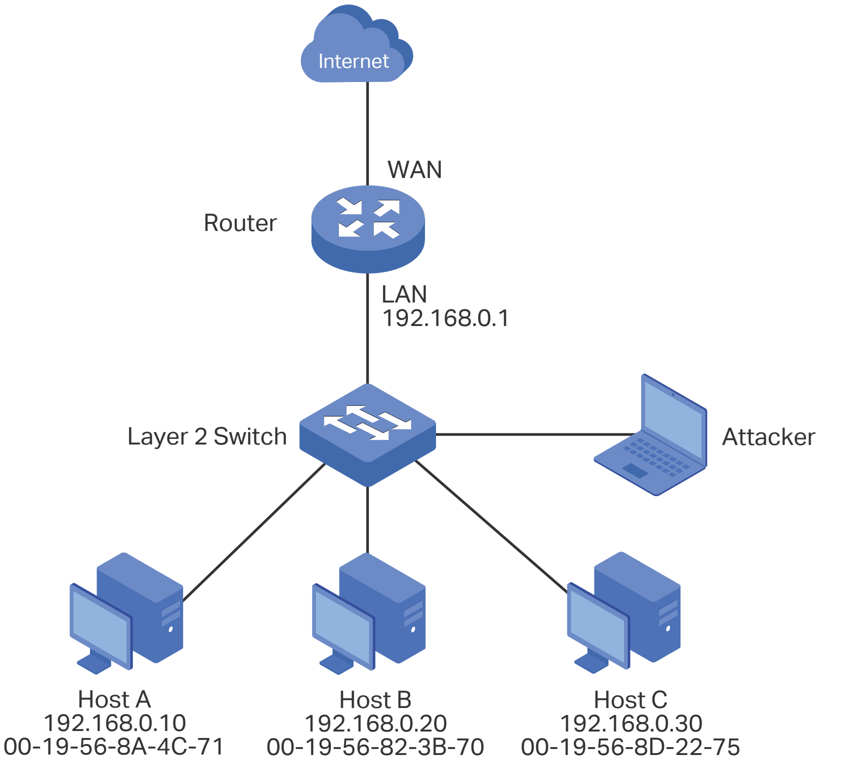
3 Configuration Examples

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 router 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 router 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 router, 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 router.

The attacker pretends to be legal terminal hosts and sends fake ARP packets to the router, cheating the router 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 router from this kind of attack, you can configure Anti ARP Spoofing on the router.

- 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 router 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 router to send GARP packets to the hosts when the router 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 router and the hosts are configured with the relevant ARP defense features. Here we introduce how to configure Anti ARP Spoofing on the router. 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.

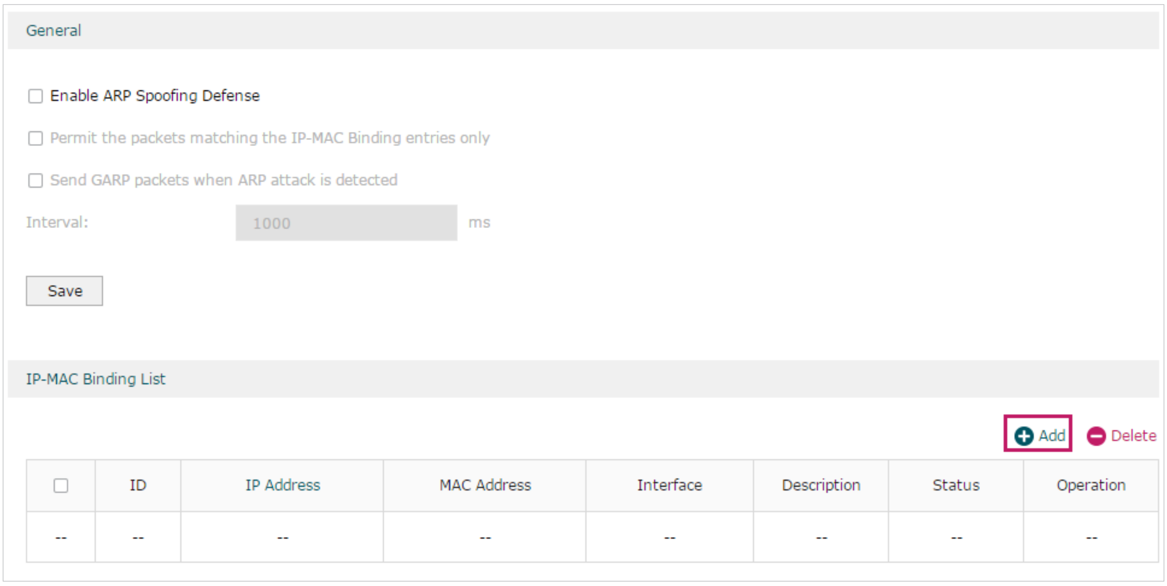
3) Configure the router to send GARP packets when ARP attacks are detected.

3.1.3 Configuration Procedure

Follow the steps below to configure Anti ARP Spoofing on the router:

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

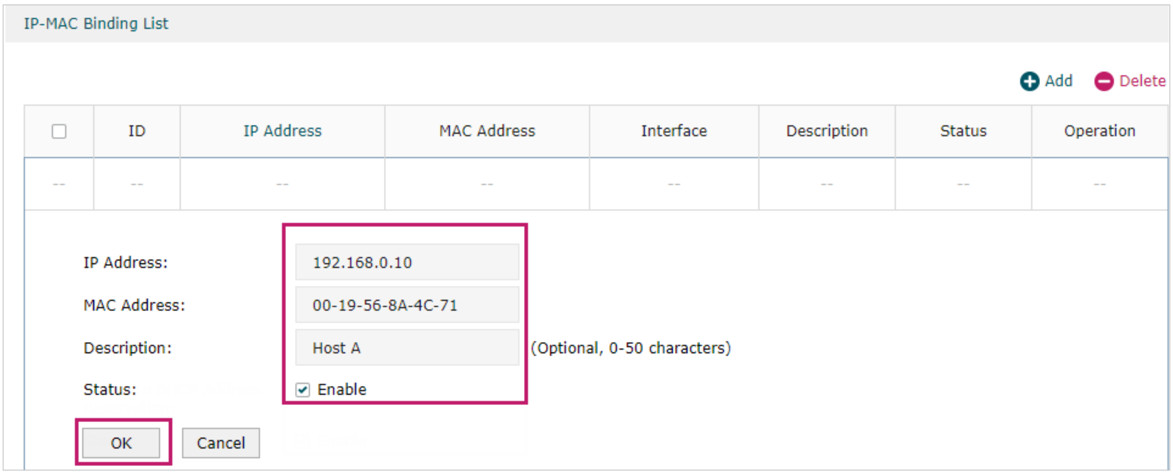
Interval: 1000 ms

IP-MAC Binding List

□	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

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

IP Address: 192.168.0.10

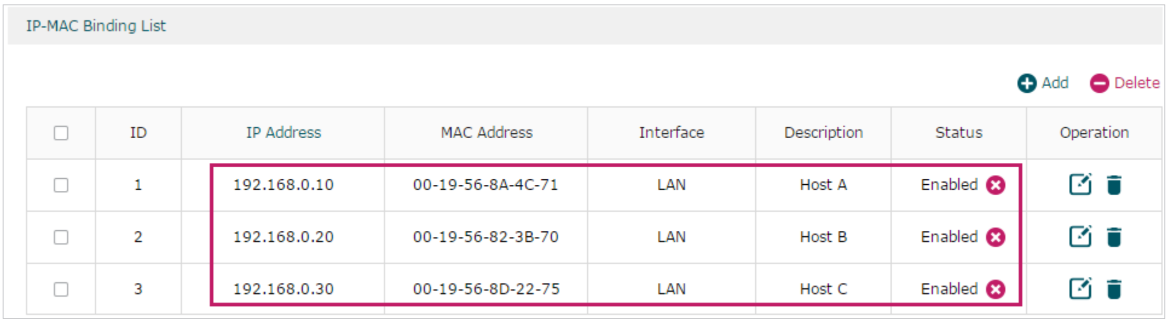
MAC Address: 00-19-56-8A-4C-71

Description: Host A (Optional, 0-50 characters)

Status: ☑ Enable

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

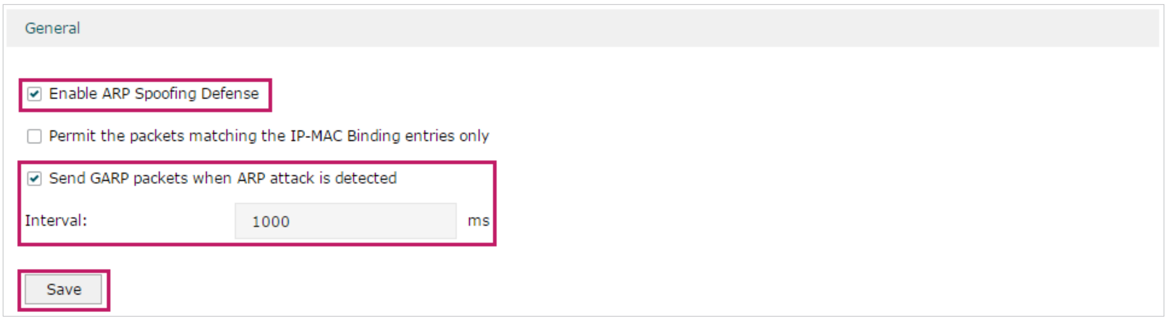


IP-MAC Binding List

□	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

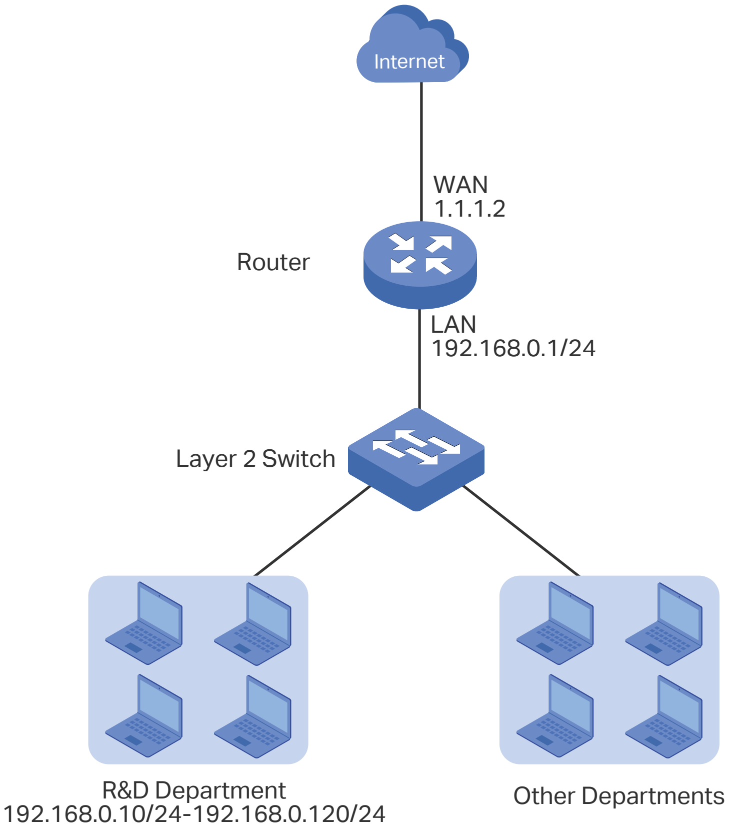
Interval: 1000 ms

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 router. 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 router 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.

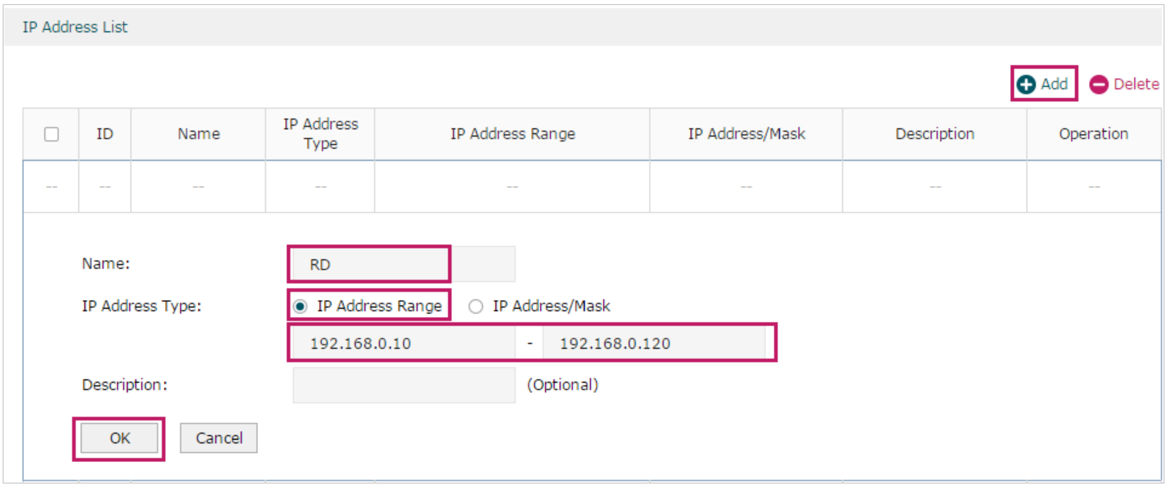
5) Create a rule to block all packets from the R&D department to the WAN. This rule should have the lowest priority among all the rules.

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



IP Address List

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

Name: RD

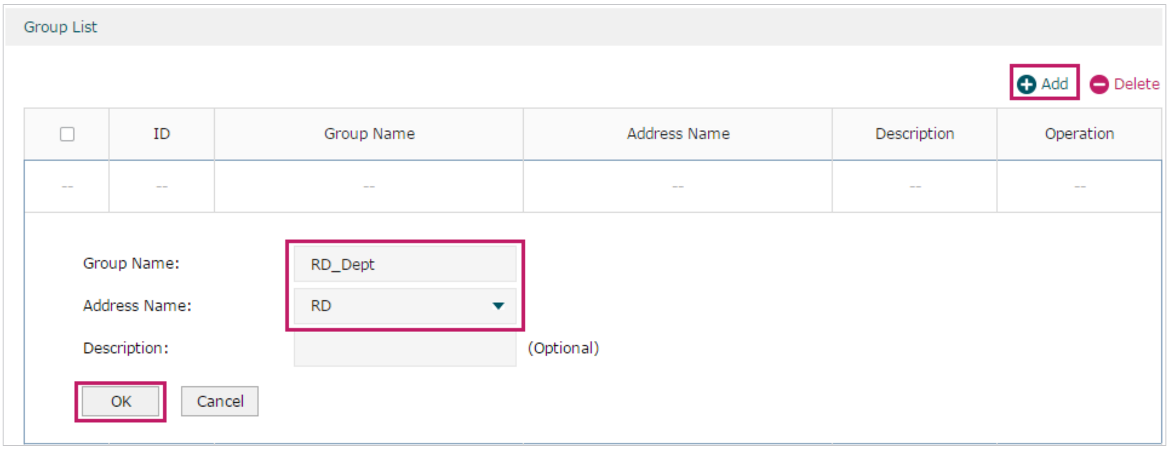
IP Address Type: ● IP Address Range ○ IP Address/Mask

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

⊕ Add ⊖ Delete

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

Group Name: RD_Dept

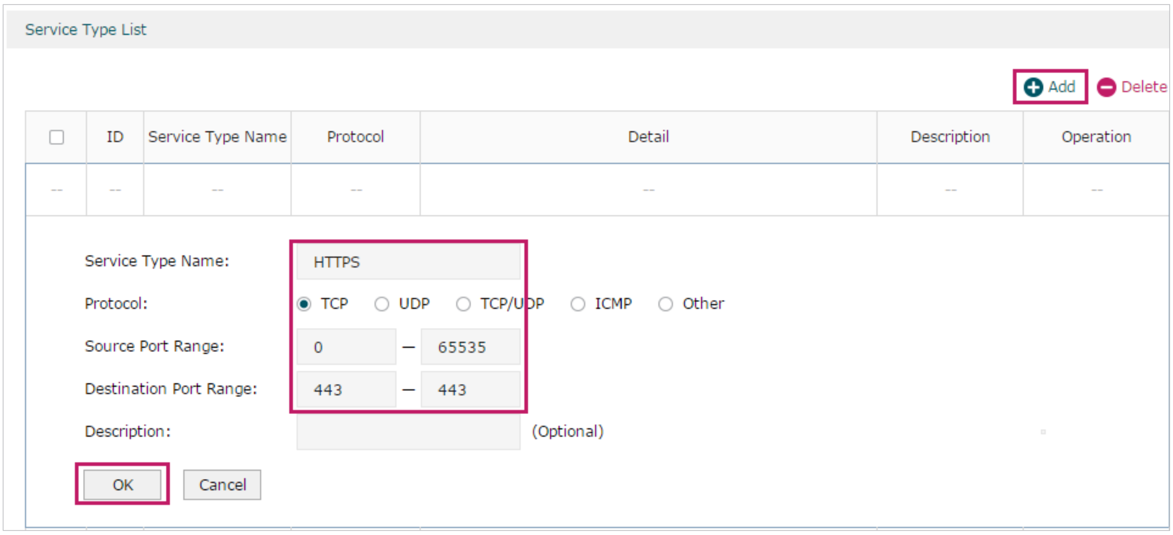
Address Name: RD

Description: (Optional)

OK Cancel

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



Service Type List

⊕ Add ⊖ Delete

□	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

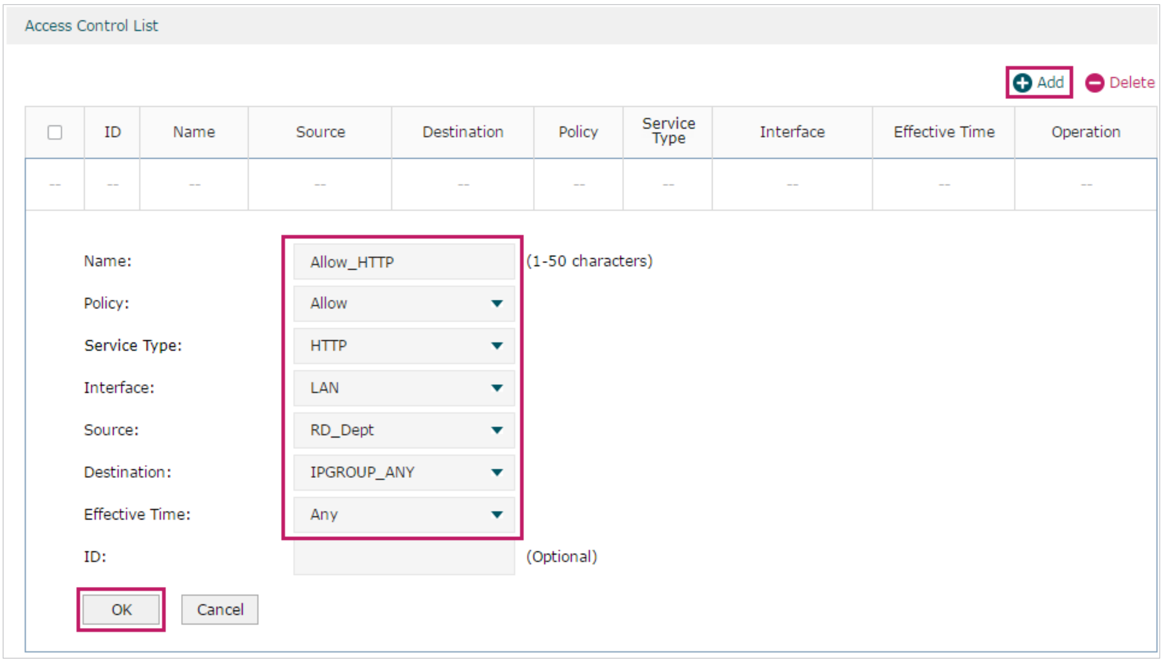
Description: (Optional)

OK Cancel

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" as the effective interface, "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

⊕ Add ⊖ Delete

□	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

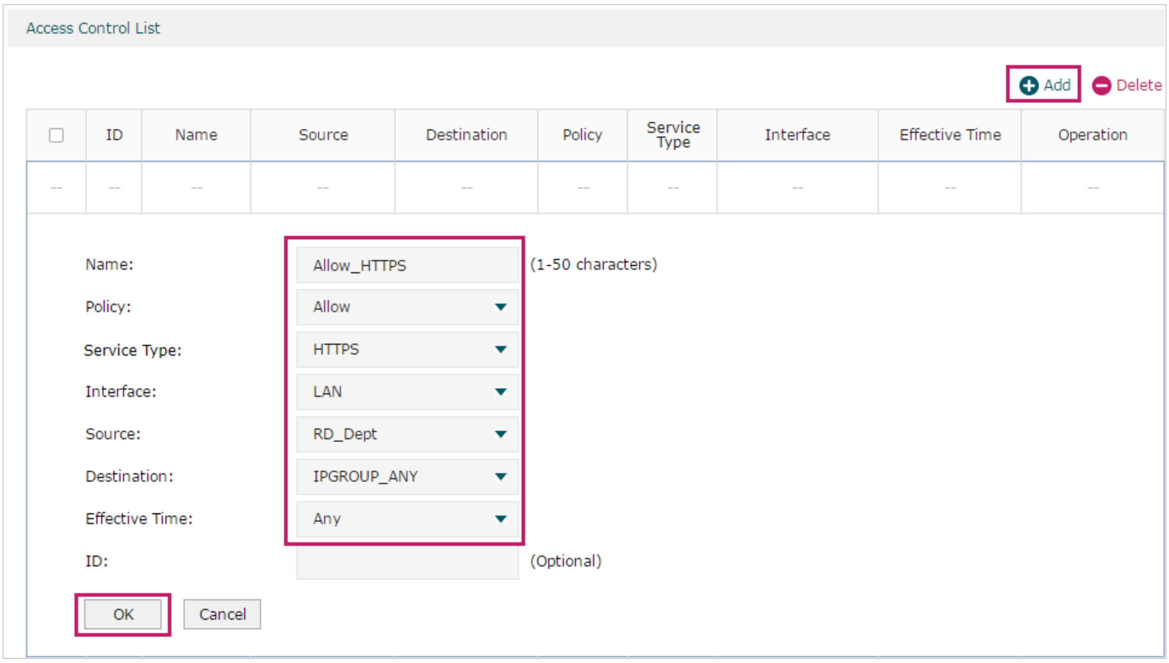
ID: (Optional)

OK Cancel

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" as the effective interface, "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

⊕ Add ⊖ Delete

□	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)

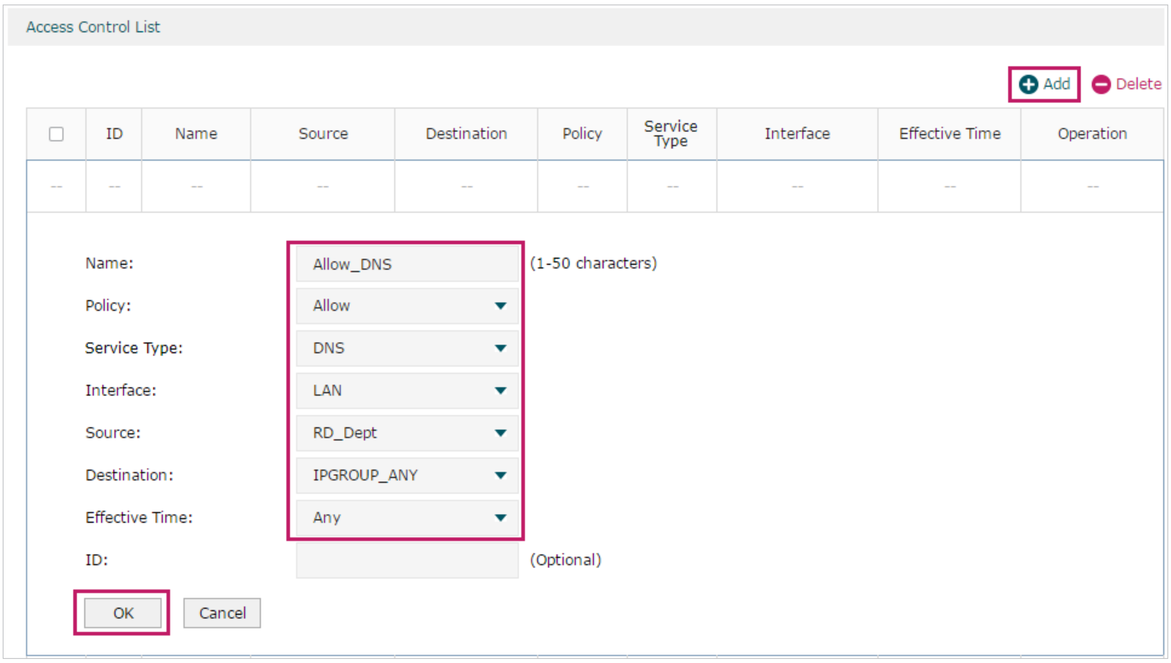
OK Cancel

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" as the effective interface, "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.

Figure 3-7 Configure Allow Rule for DNS Service



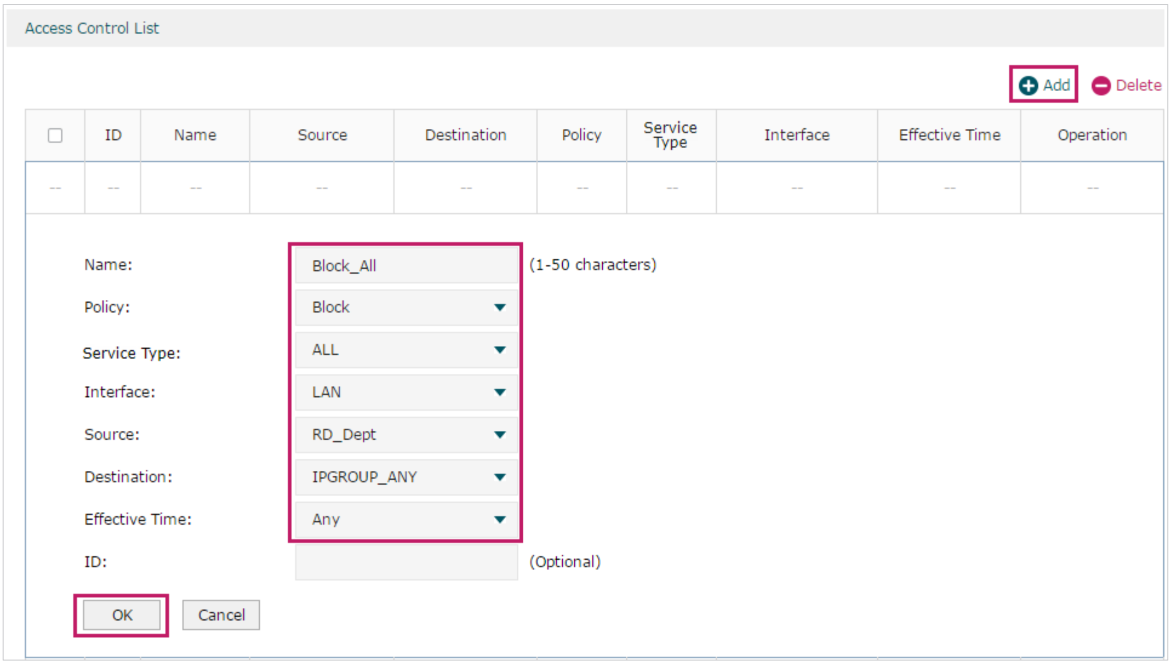
□	ID	Name	Source	Destination	Policy	Service Type	Interface	Effective Time	Operation
--	--	--	--	--	--	--	--	--	--

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” as the effective interface, “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.

Figure 3-8 Configure Block Rule for ALL Services



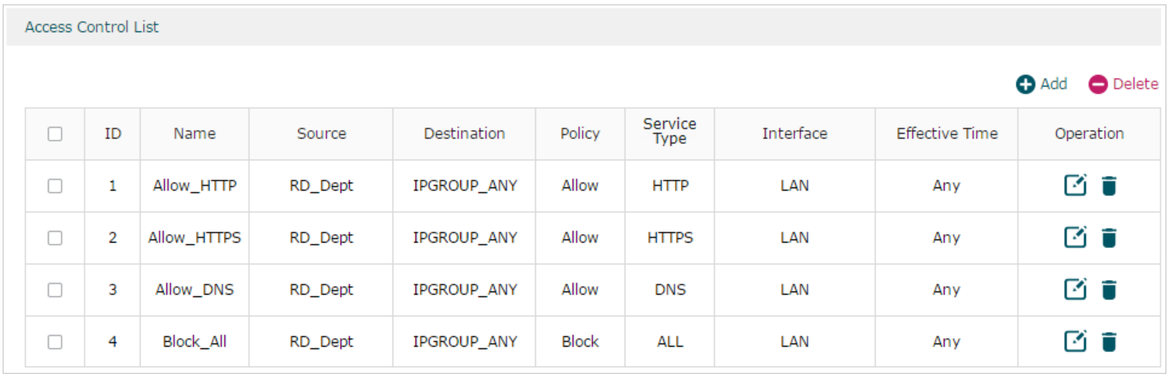
Access Control List

□	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 router 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 router 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.

Figure 3-9 Verify Configuration Result



Access Control List

□	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 7

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 router 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.

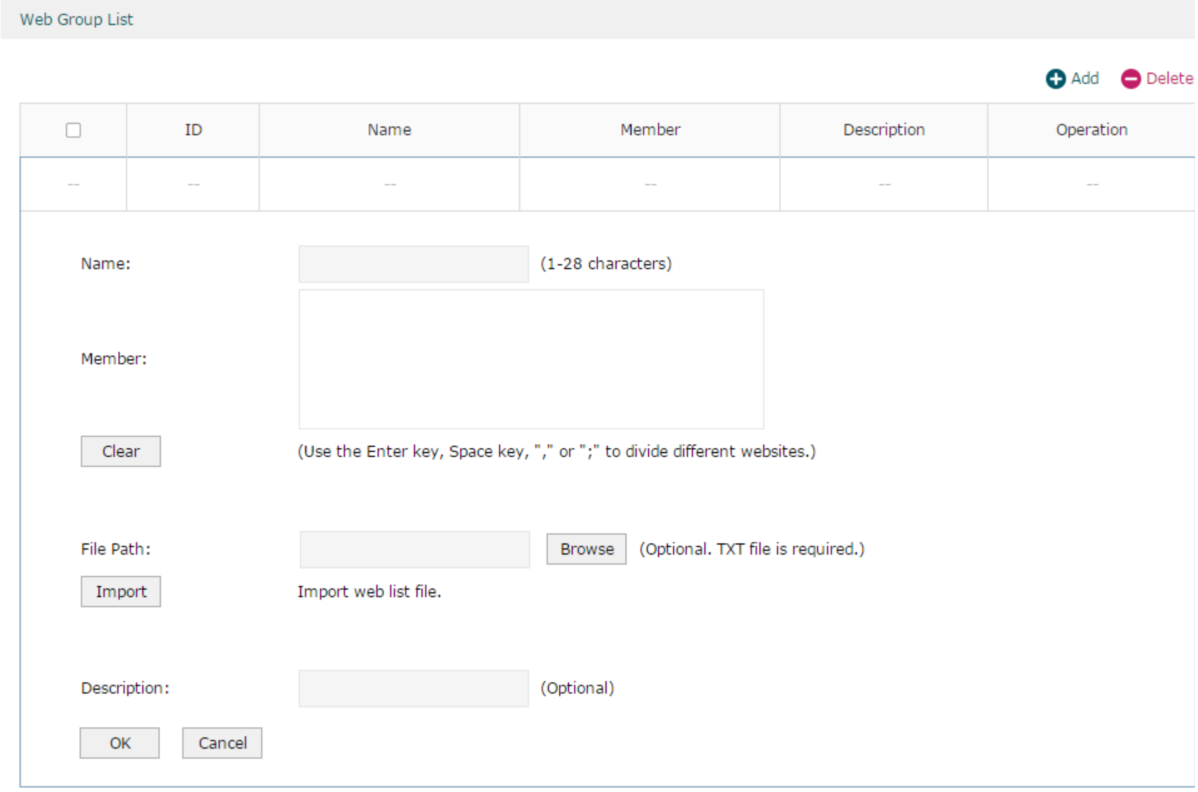
2.1.1 Configure Web Group Filtering

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**.

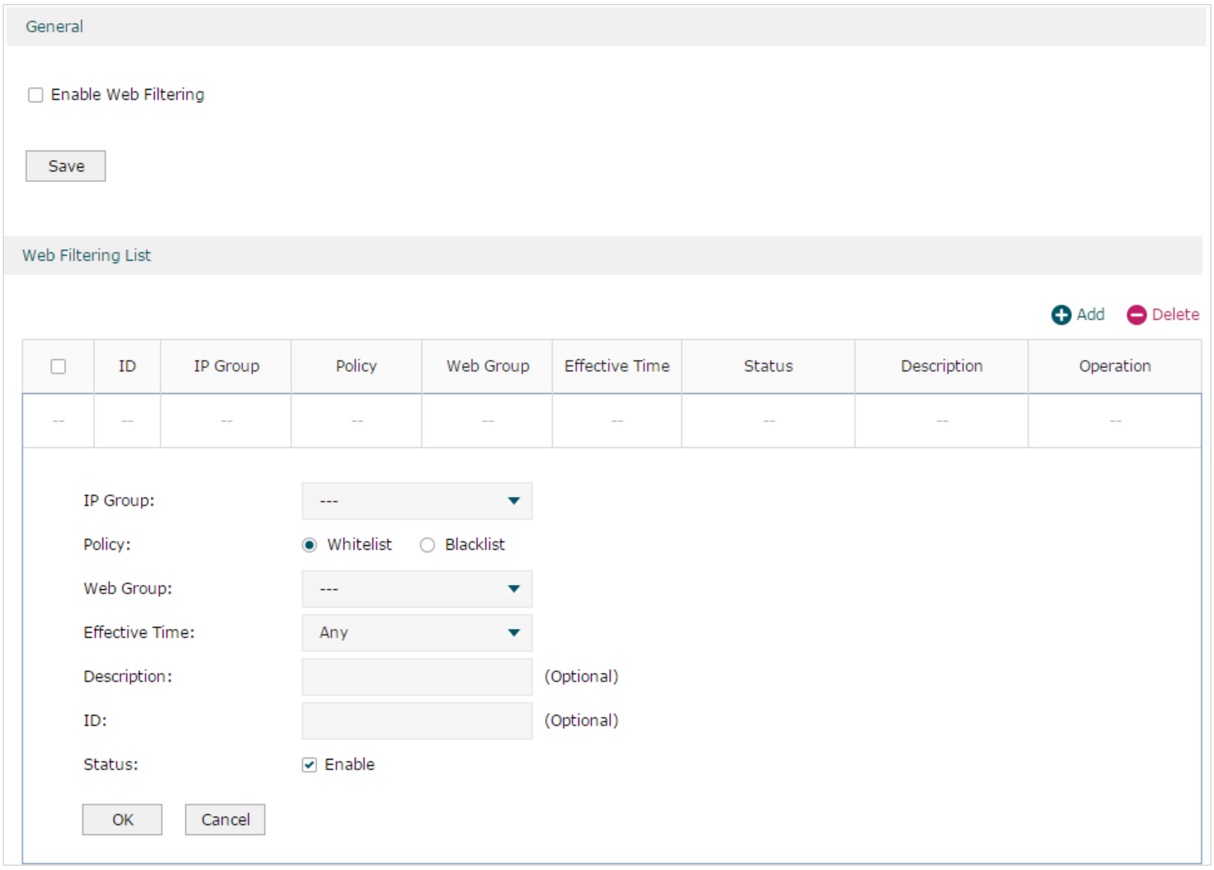
Name	Specify a name for the group. The name of each group cannot be repeated.
Member	Add one or more website members to the group. The format of the website members is “www.tp-link.com” or “*.tp-link.com”, in which “*” is a wildcard. Use Enter key, Space key, “,” or “;” to divide different websites.
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.

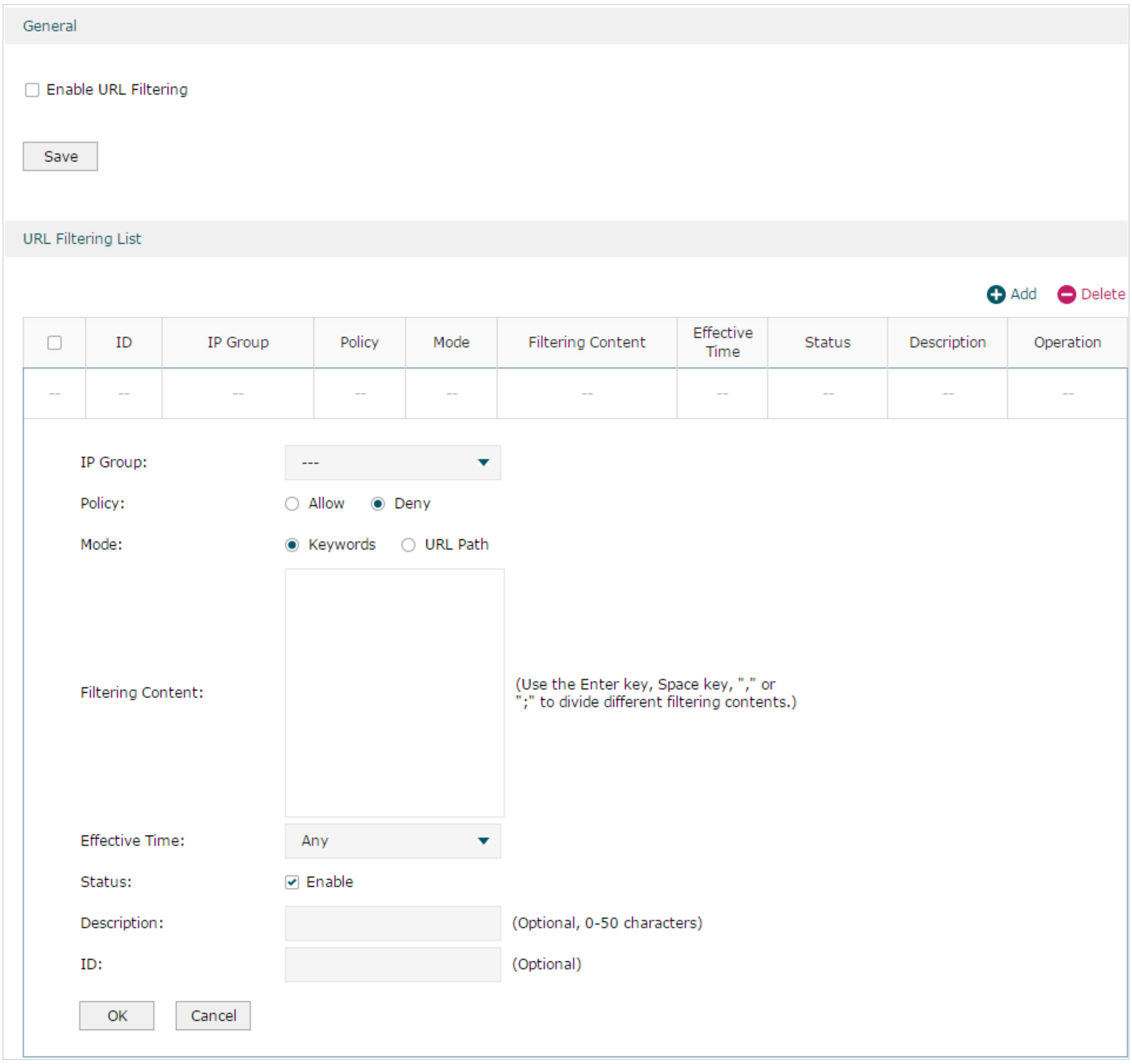
2) In the **General** section, enable Web Filtering. Click **Save**.

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

□	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.

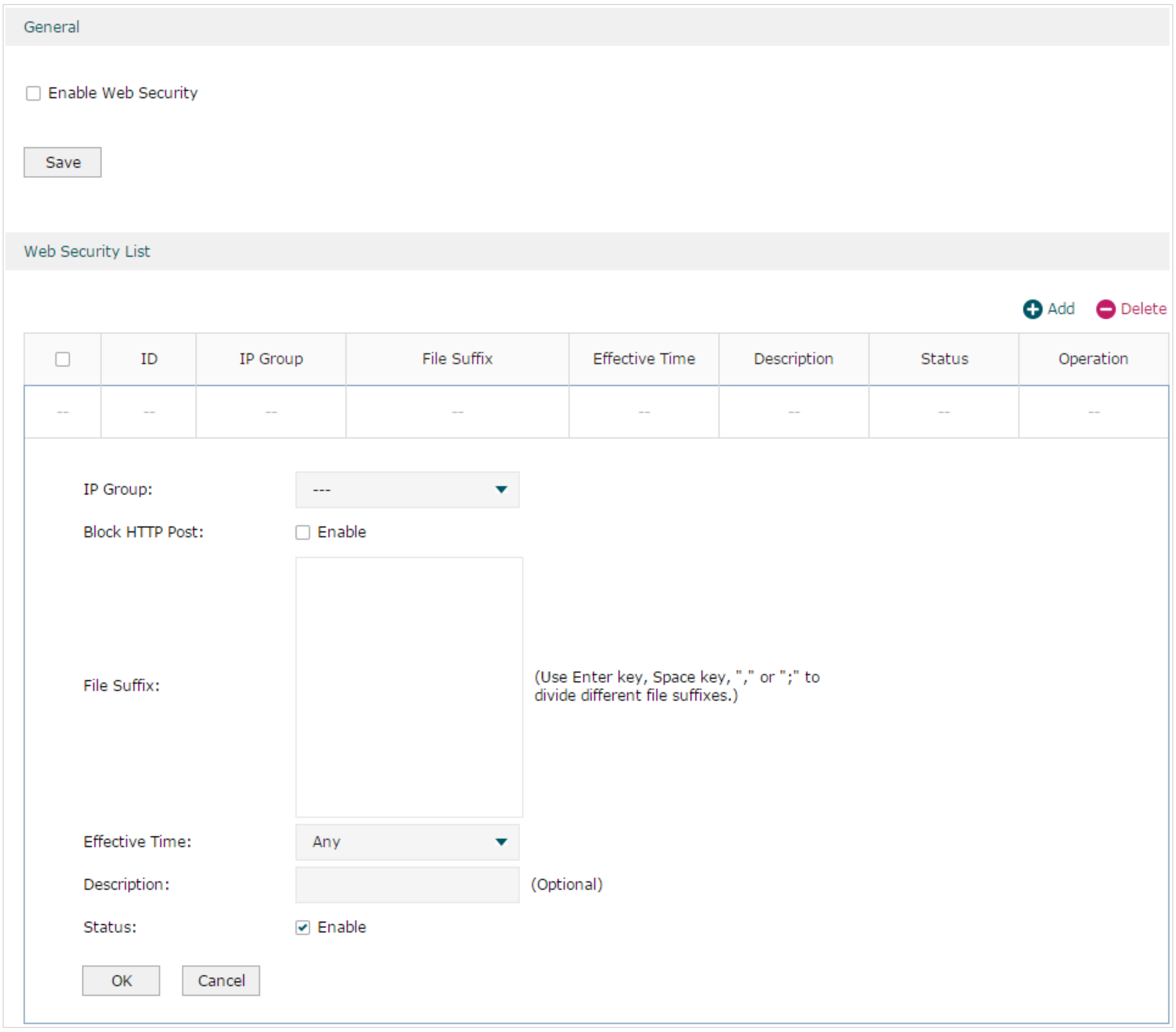
2) In the **General** section, enable URL filtering. Click **Save**.

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**.

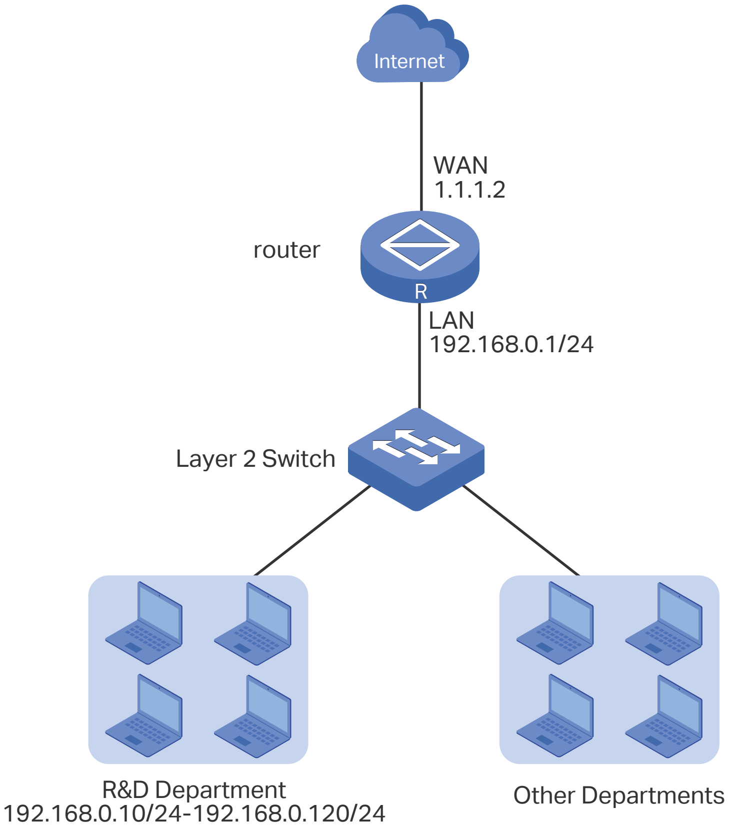
3 Configuration Examples

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 router. 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.

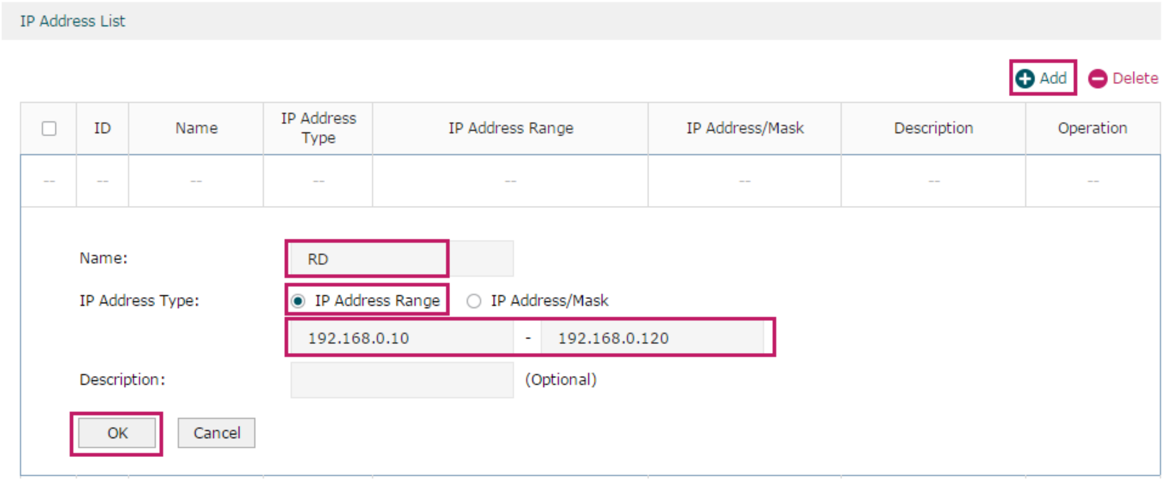
4) Add a Blacklist rule to forbid the R&D department users from accessing all websites. Note that the priority of this rule should be lower than the Whitelist rule.

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



IP Address List

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

Name: RD

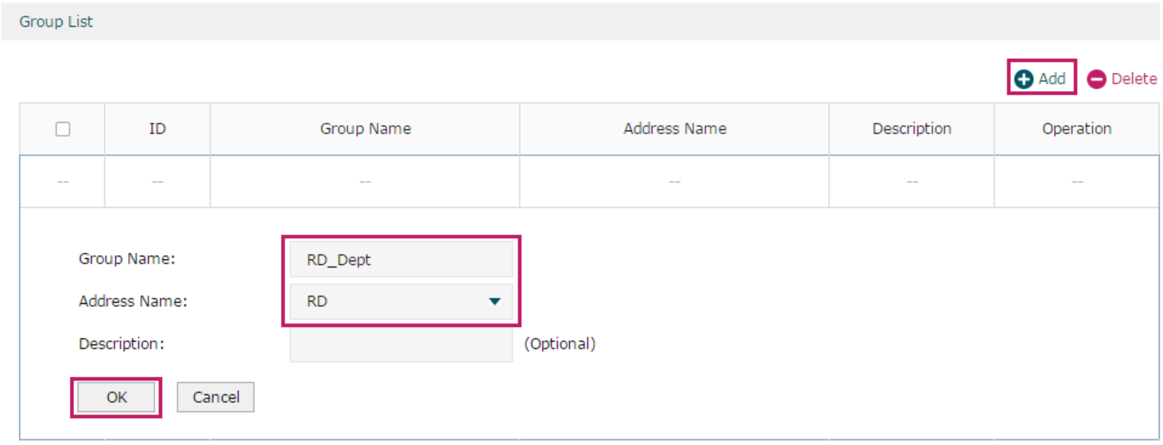
IP Address Type: ● IP Address Range ○ IP Address/Mask

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
--	--	--	--	--	--

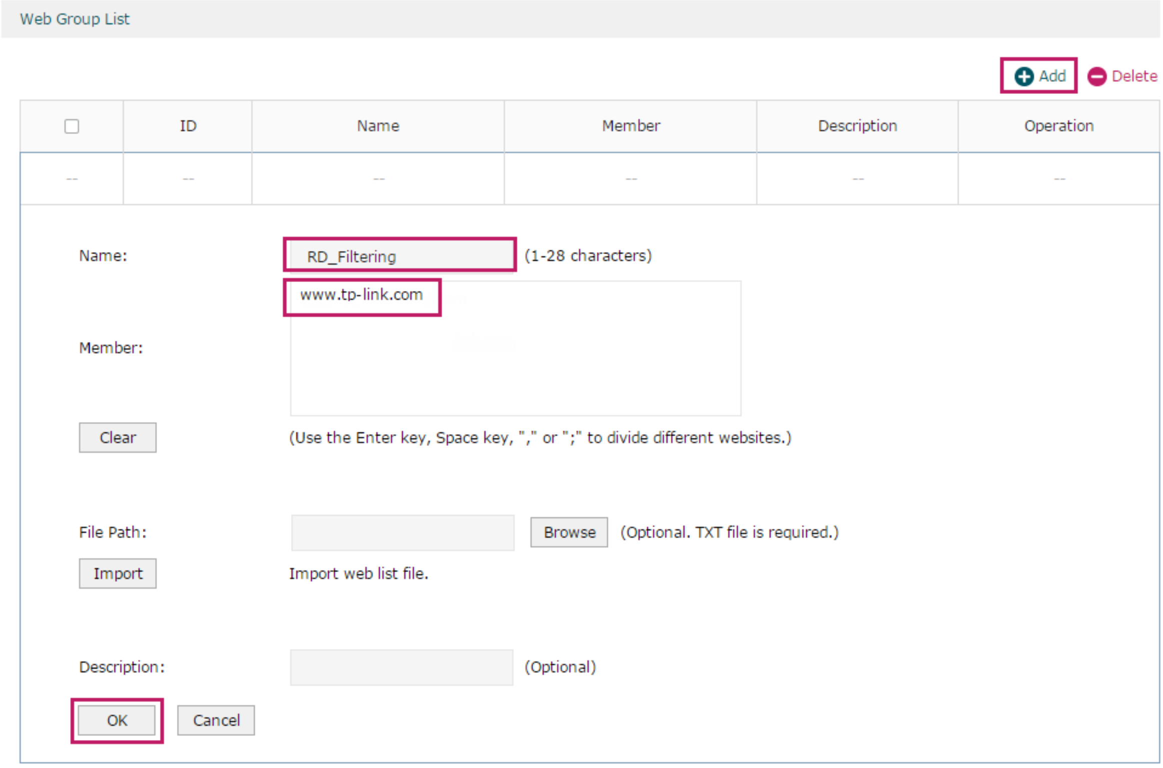
Group Name: RD_Dept

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



□	ID	Name	Member	Description	Operation
--	--	--	--	--	--

Name: RD_Filtering (1-28 characters)

Member: www.tp-link.com

Clear (Use the Enter key, Space key, "," or ";" to divide different websites.)

File Path: Browse (Optional. TXT file is required.)

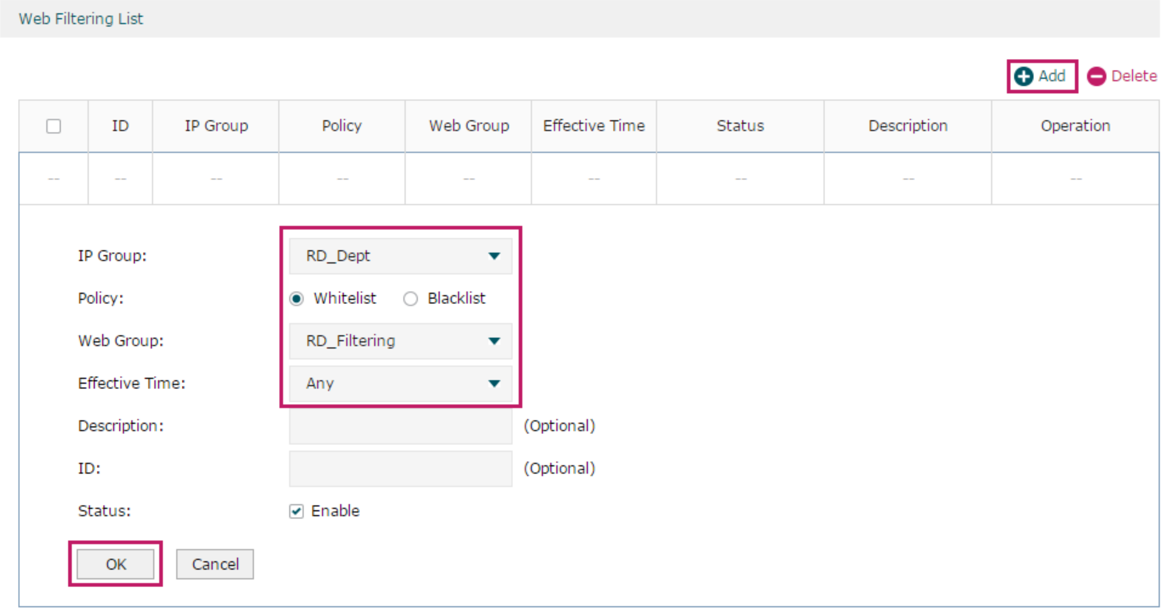
Import Import web list file.

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



□	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)

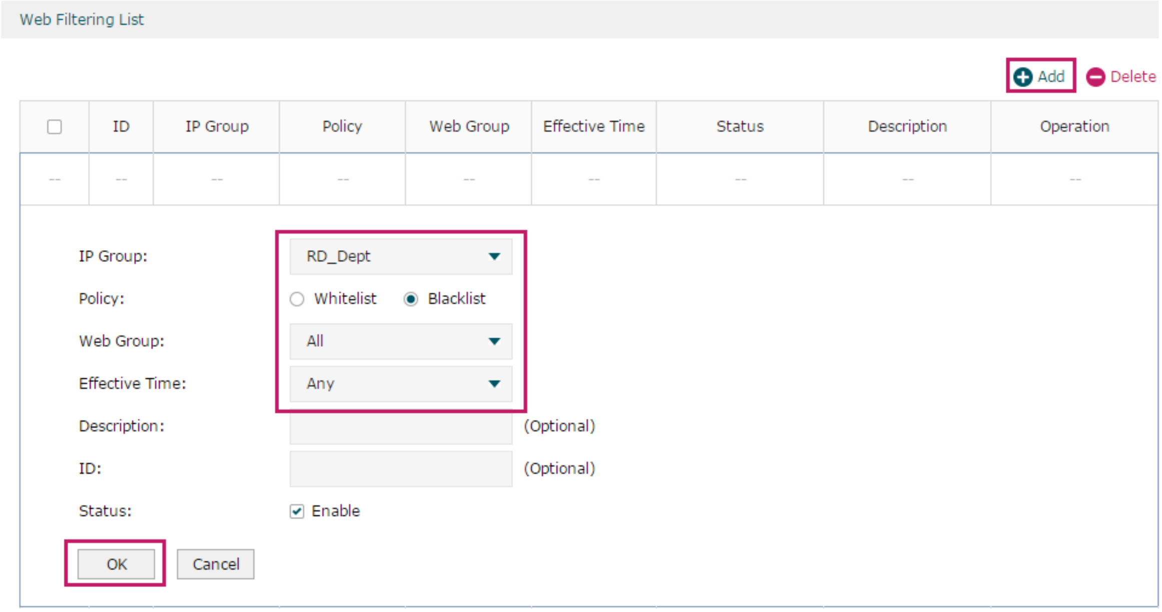
ID: (Optional)

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

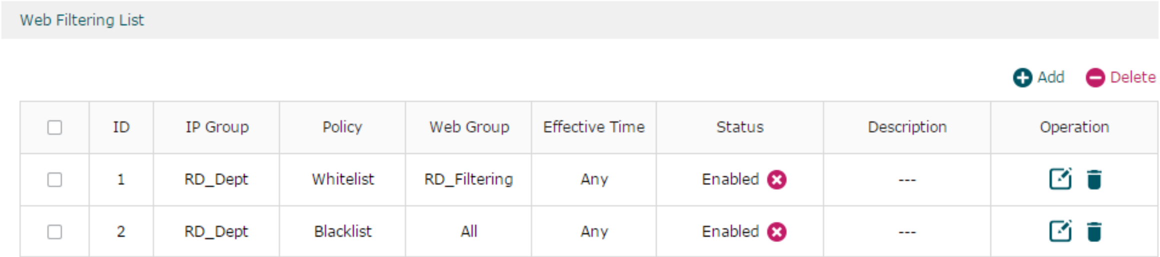
Description: (Optional)

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 router matches the rules beginning with the highest priority, make sure the Whitelist rule has the smaller ID number. In this way, the router allows the hosts to access the Whitelist website and denies them to access others.

Figure 3-7 Verify Configuration Result

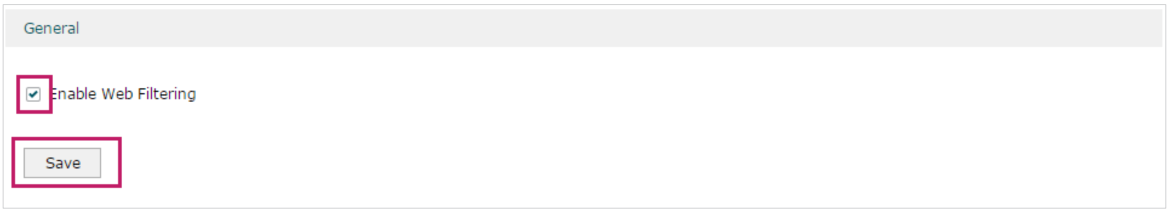


Web Filtering List

□	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

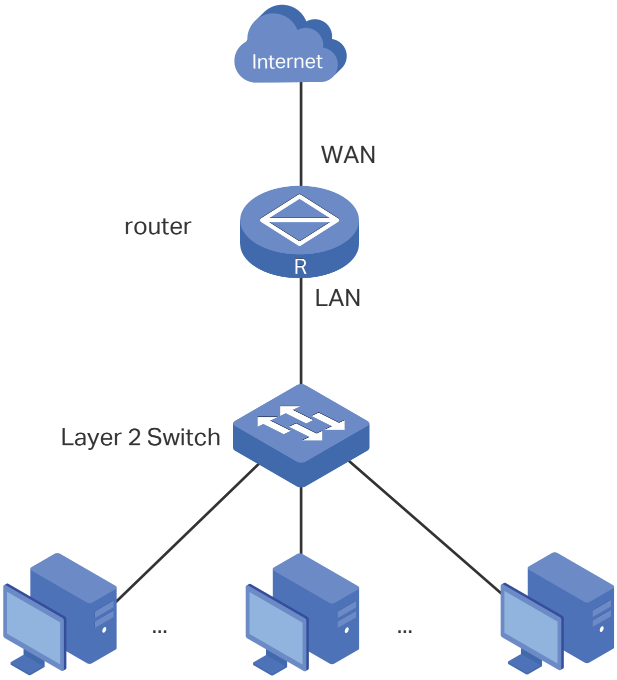
☑ Enable Web Filtering

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 router. 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

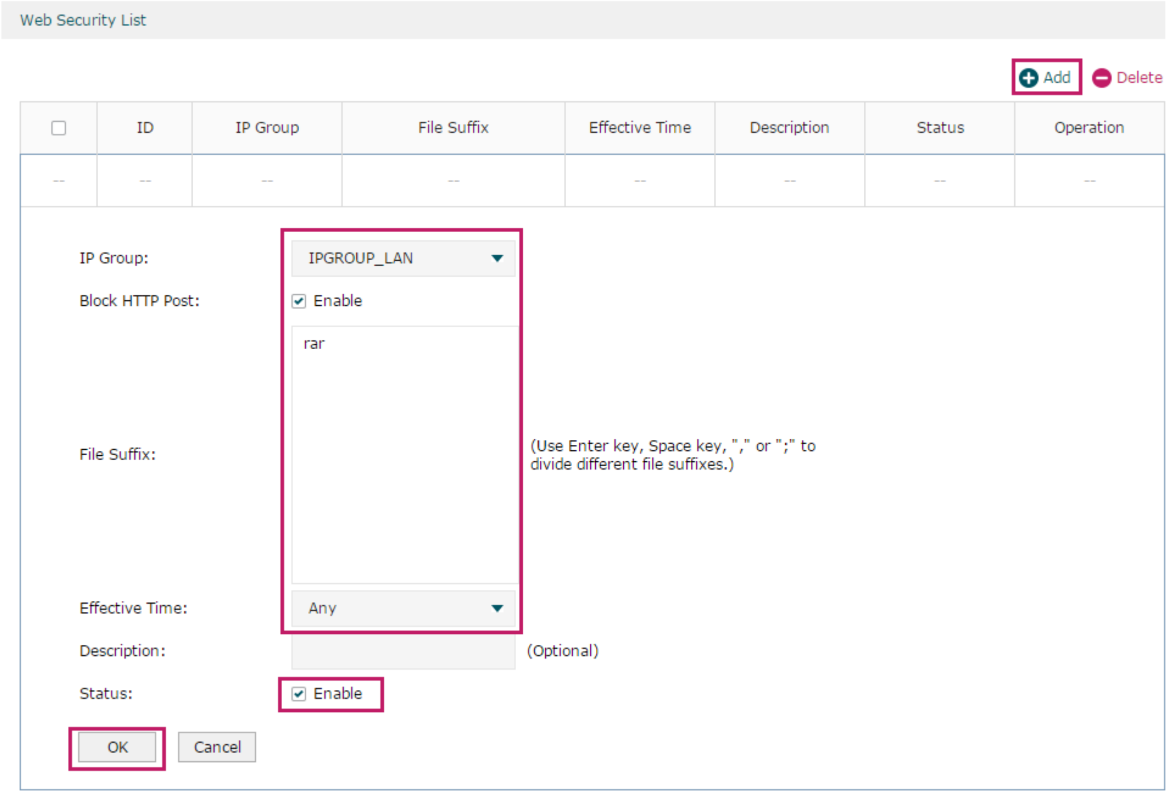
We can configure Web Security to meet these requirements. To block behaviors such as login and comment submitting, we can configure the router to block HTTP post; to block downloading of rar files, we can specify the suffix "rar" in the file suffix column.

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

□	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.)

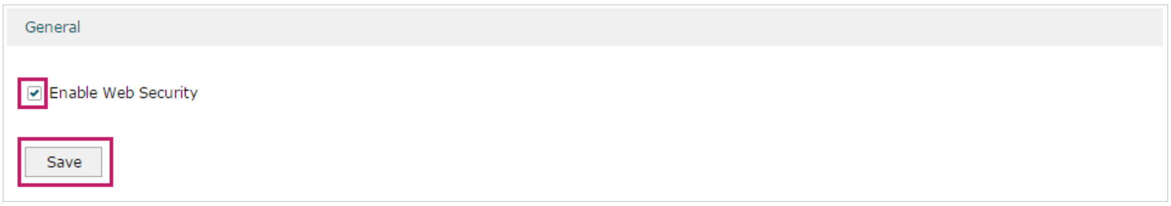
Effective Time: Any

Description: (Optional)

Status: ☑ Enable

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

Part 8

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.

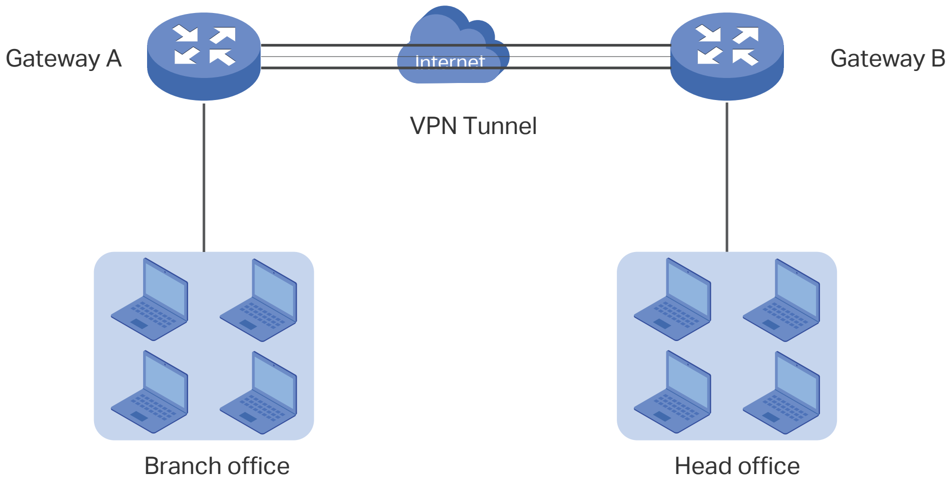
Depending on your network topology, there are two basic application scenarios: LAN-to-LAN VPN and Client-to-LAN VPN.

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.

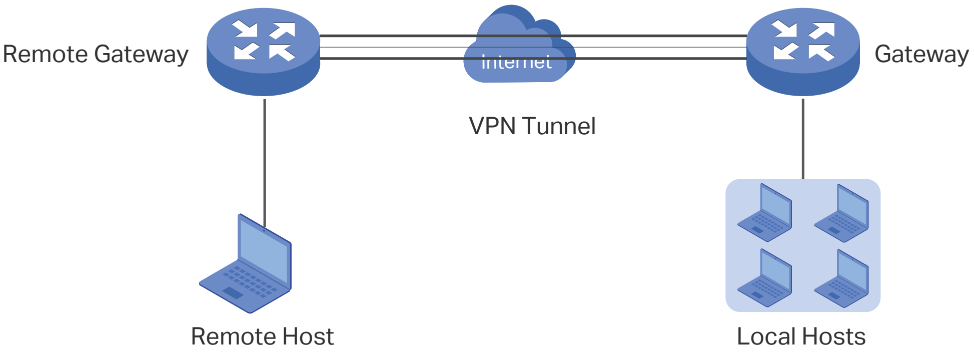
Figure 1-1 LAN-to-LAN VPN



- 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 router supports Layer 2 tunneling protocol (PPTP, L2TP) and Layer 3 tunneling protocol (IPSec).

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) 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 negotiation includes two phases, that is IKEv1 Phase-1 and IKEv1 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 router plays in the negotiation process. You can specify the negotiation mode as responder mode or initiator mode.

Responder Mode: In responder mode, the VPN router responds to the requests for IKEv1 negotiation and acts as the VPN server or the responder.

Initiator Mode: In initiator mode, the VPN router sends requests for IKEv1 negotiation and acts as the VPN client or the initiator.

- Exchange Mode

The exchange mode determines the way VPN routers 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 router uses the IP address for authentication.

Name: The router 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.

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.

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.

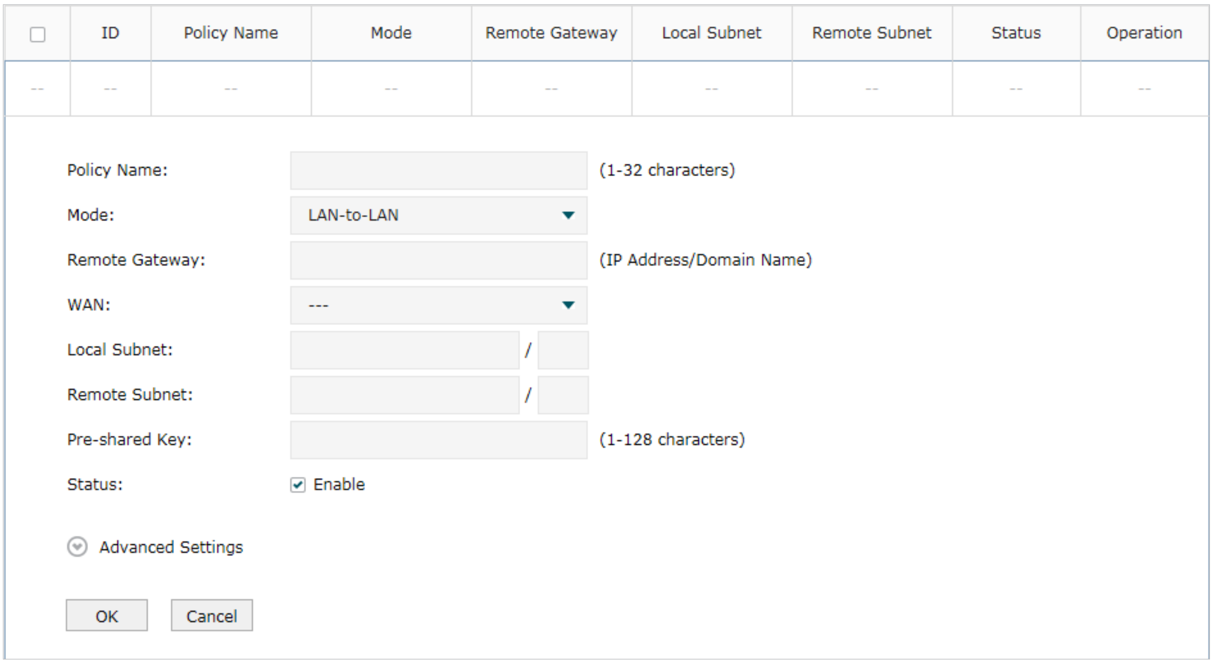
- For both ends of the VPN tunnel, the Remote Gateway, Local/Remote Subnet, Local/Remote ID Type should be matched.

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)

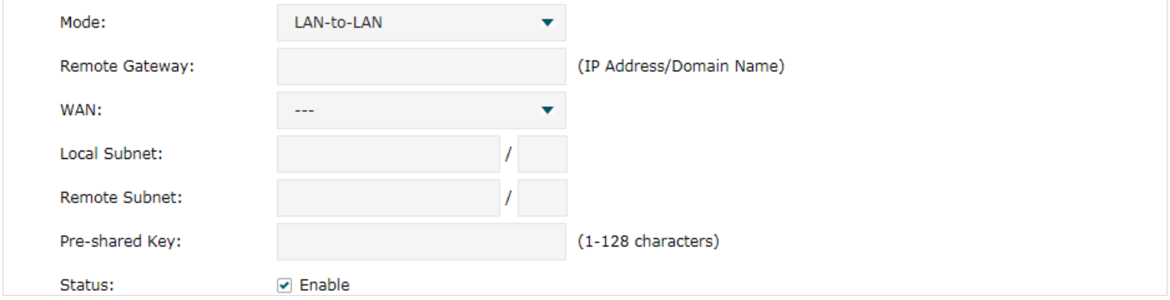
Status: ☑ Enable

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.



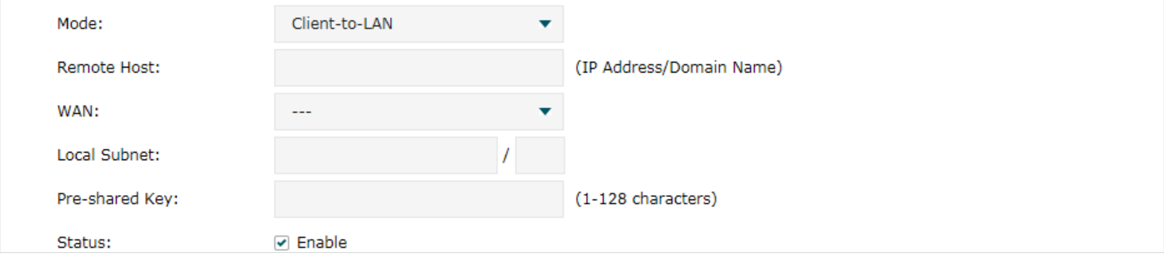
Mode:	LAN-to-LAN ▼	
Remote Gateway:		(IP Address/Domain Name)
WAN:	--- ▼	
Local Subnet:	/	
Remote Subnet:	/	
Pre-shared Key:		(1-128 characters)
Status:	☑ Enable	

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**.

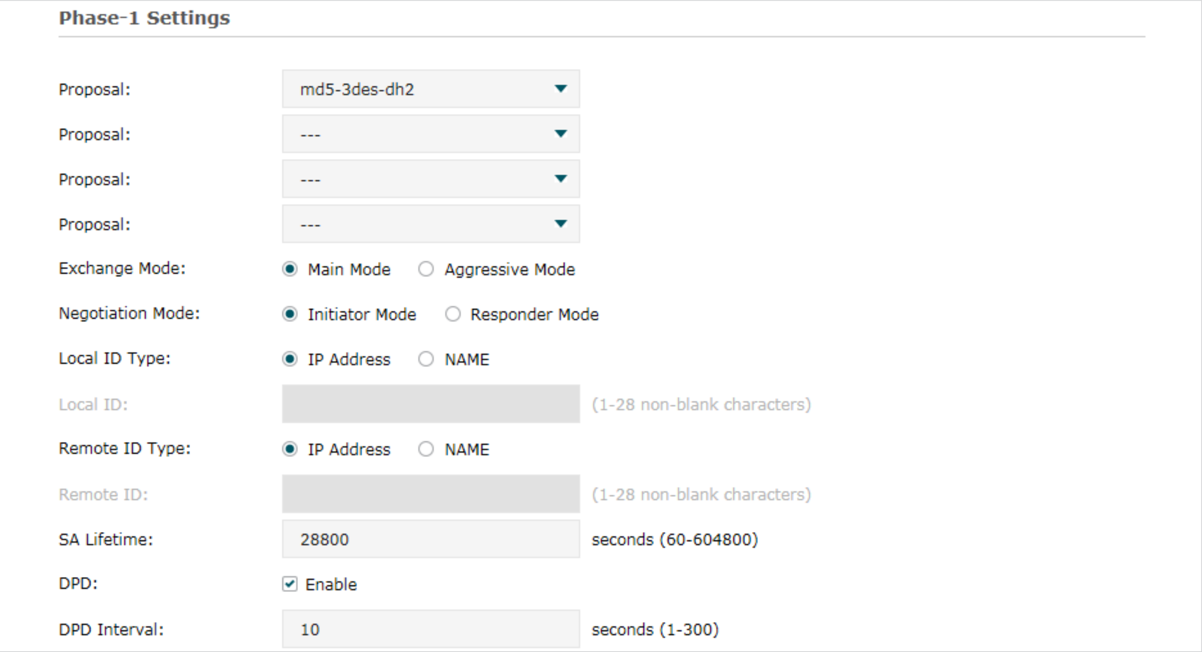
2.1.2 Configuring the Advanced Parameters

Advanced settings include IKEv1 phase-1 settings and IKEv1 phase-2 settings. IKEv1 phase-1 is used to authenticate both sides of the communication and establish the IKE SA. IKEv1 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

Proposal:	md5-3des-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**.

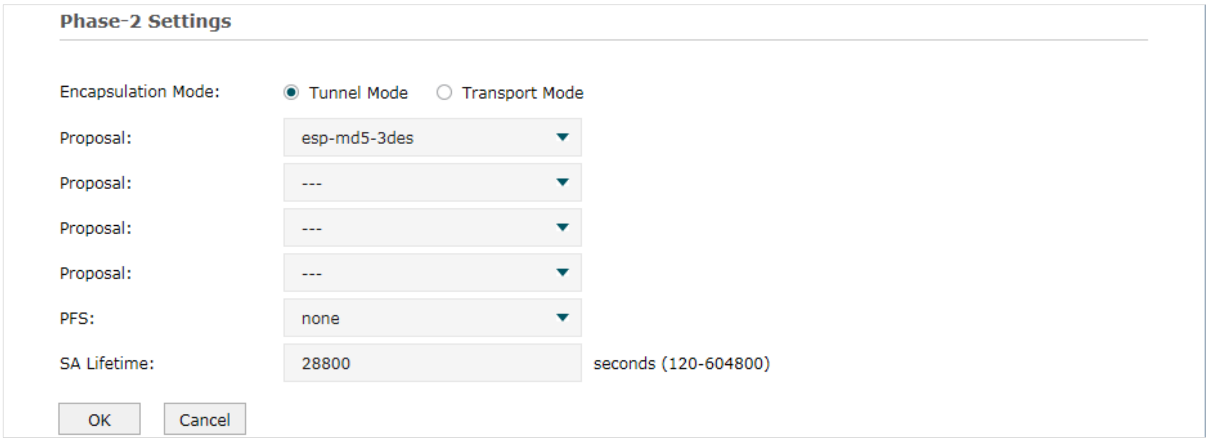
Proposal	Select the proposal for IKE negotiation phase 1 to specify the encryption algorithm, authentication algorithm and DH group. Up to four proposals can be selected.
Exchange Mode	Specify the IKE Exchange Mode as Main Mode or Aggressive Mode. By default, it is Main Mode. **Main Mode:** Main mode 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 means that the local device initiates a connection to the peer. Responder Mode means that the local device waits for the connection request initiated by the peer. You can keep this parameter as default.
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-md5-3des

Proposal: ---

Proposal: ---

Proposal: ---

PFS: none

SA Lifetime: 28800 seconds (120-604800)

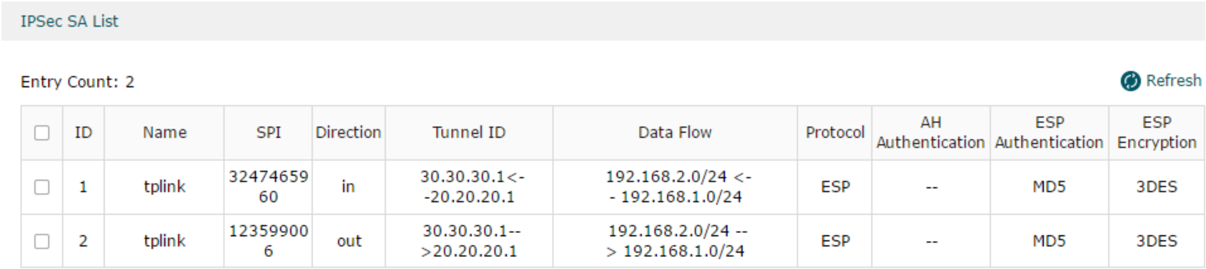
In the **Phase-2 Settings** section, configure the IKE phase-2 parameters and click **OK**.

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.

2.2 Verifying the Connectivity of the IPSec VPN tunnel

Choose the menu **VPN > IPSec > IPSec SA** to load the following page.

Figure 2-4 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 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

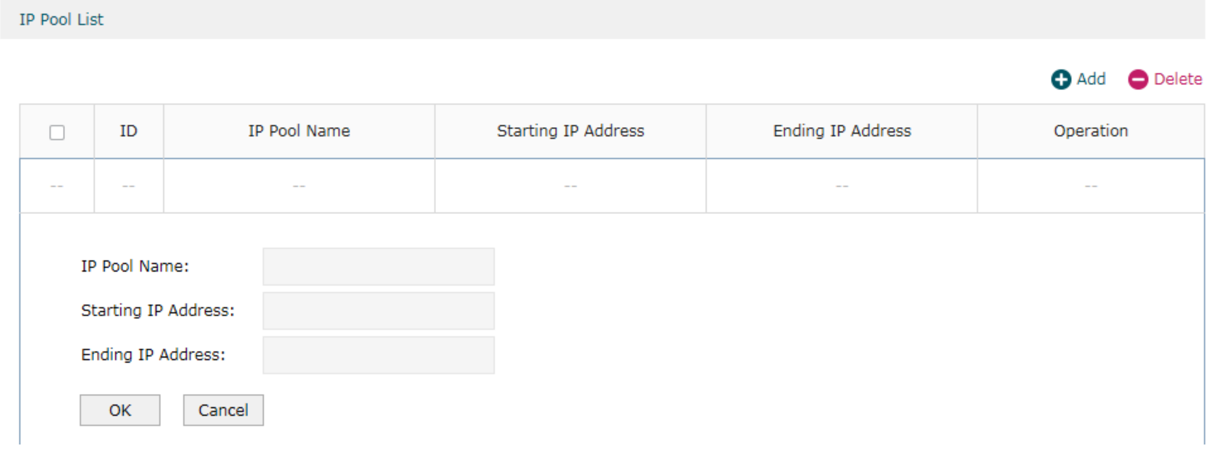
- When the network mode is configured as Client-to-LAN and the router acts as the L2TP server, you don't need to configure the L2TP client on the router.

- When the network mode is configured as LAN-to-LAN and the router acts as the L2TP client gateway, you don't need to configure the L2TP users on the router.

3.1 Configuring the VPN IP Pool

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

Figure 3-1 Configuring the VPN IP Pool



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

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.

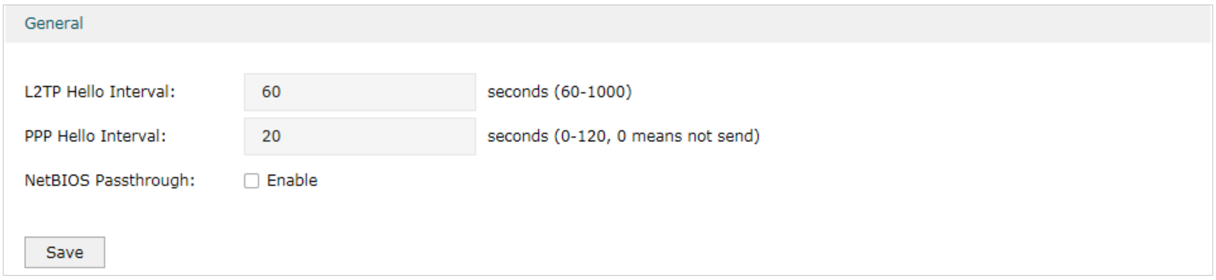
Note:

- The starting IP address should not be greater than the ending IP address.
- The ranges of IP Pools cannot overlap.

3.2 Configuring L2TP Globally

Choose the menu **VPN> L2TP > Global Config** to load the following page.

Figure 3-2 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

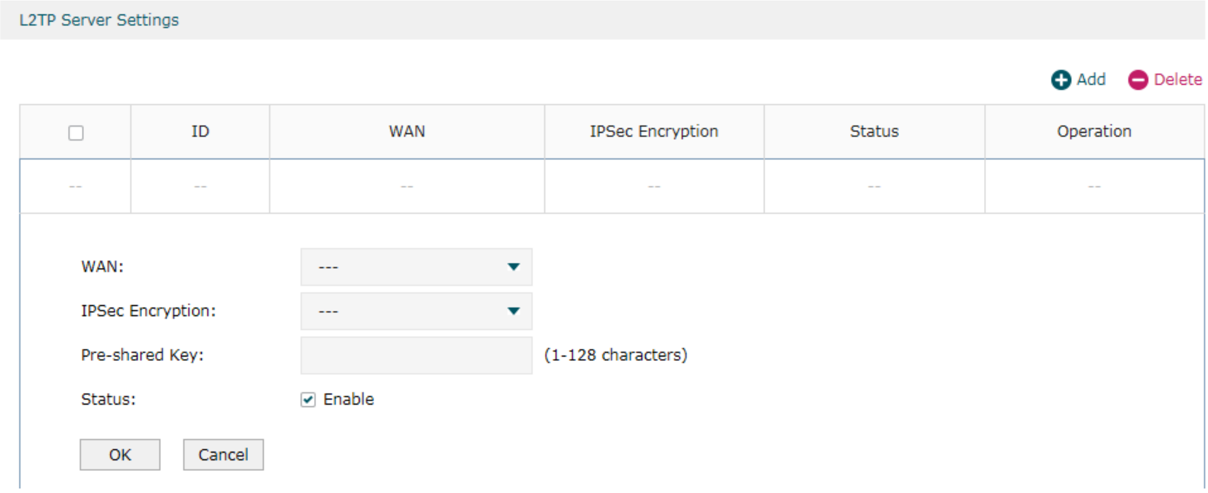
In the **General** section, configure L2TP parameters globally and click **Save**.

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.

3.3 Configuring the L2TP Server

Choose the menu **VPN> L2TP > L2TP Server** and click **Add** to load the following page.

Figure 3-3 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.

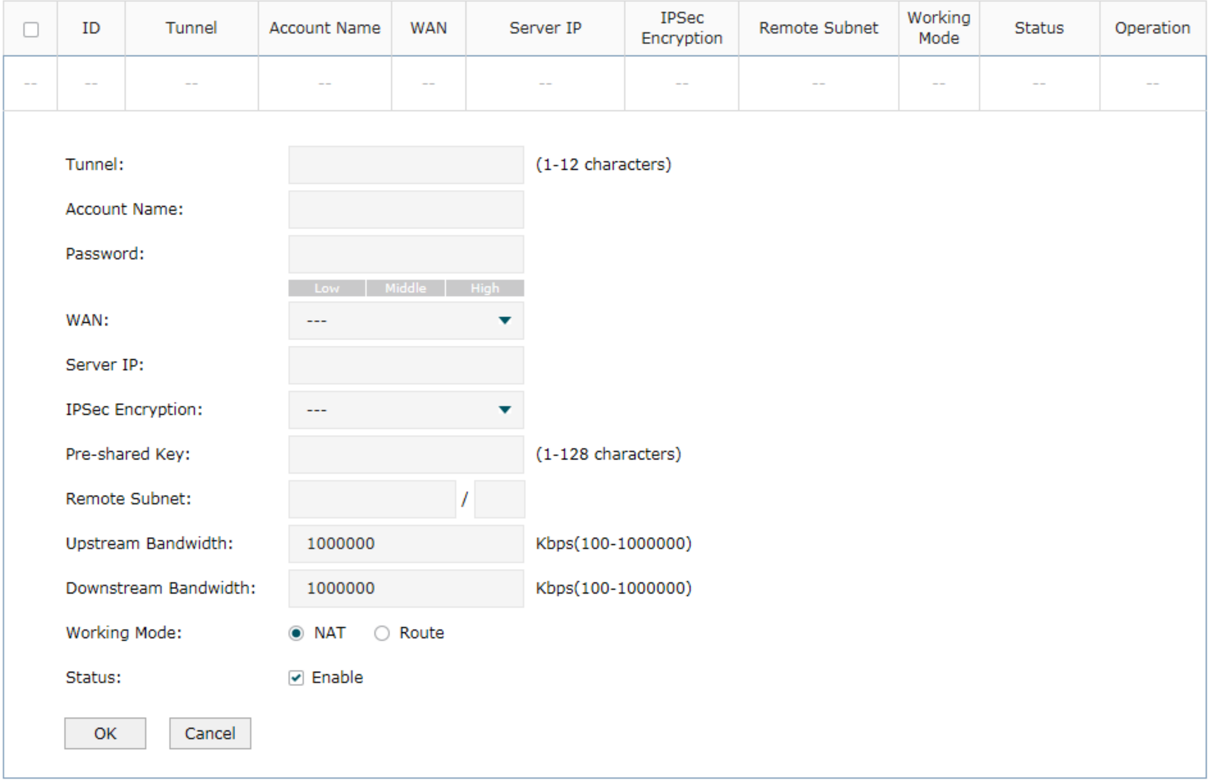
4) Enable the L2TP tunnel.

5) Click **OK**.

3.4 Configuring the L2TP Client

Choose the menu **VPN > L2TP > L2TP Client** and click **Add** to load the following page.

Figure 3-4 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.

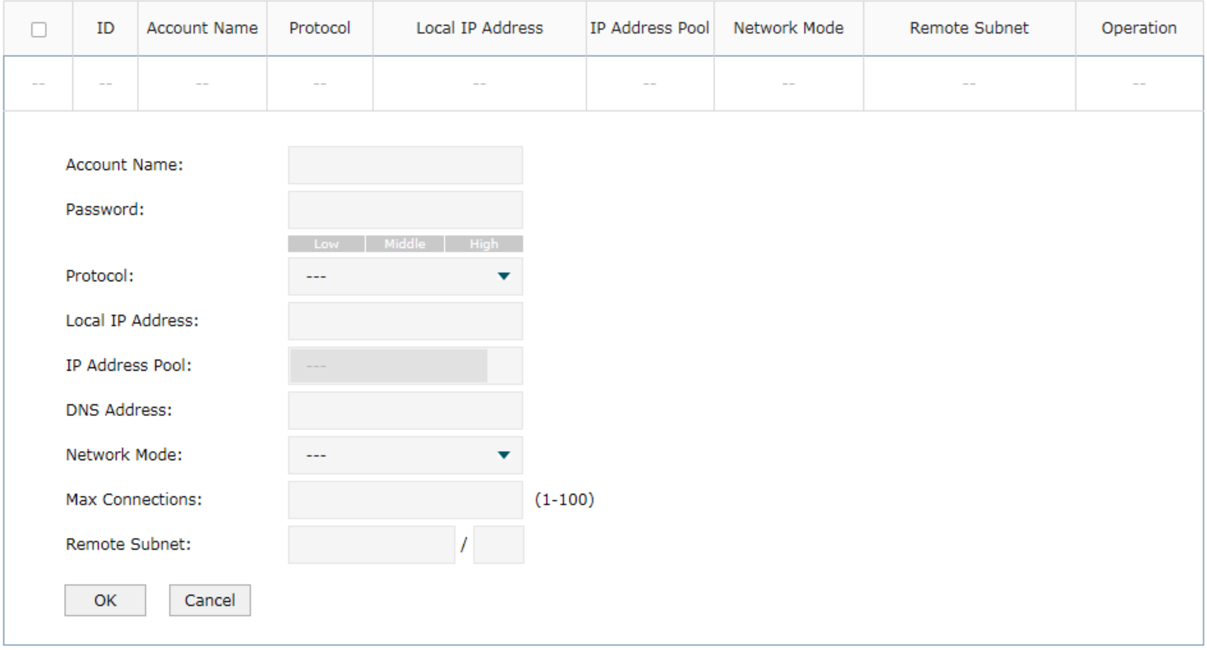
Account Name	Specify the account name of L2TP tunnel. It should be configured identically on server and client.
Password	Specify the password of L2TP tunnel. It should be configured identically on server and client.
WAN	Specify the WAN port used for L2TP tunnel.
Server IP	Specify the IP address or domain 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 router to translate source IP address of L2TP packets to its WAN IP when forwarding L2TP packets. **Route**: Route mode allows the router to forward L2TP packets via routing protocol.
Status	Check the box to enable the L2TP tunnel.

2) Click **OK**.

3.5 (Optional) Configuring the L2TP Users

Choose the menu **VPN> Users > Users** and click **Add** to load the following page.

Figure 3-5 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 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).

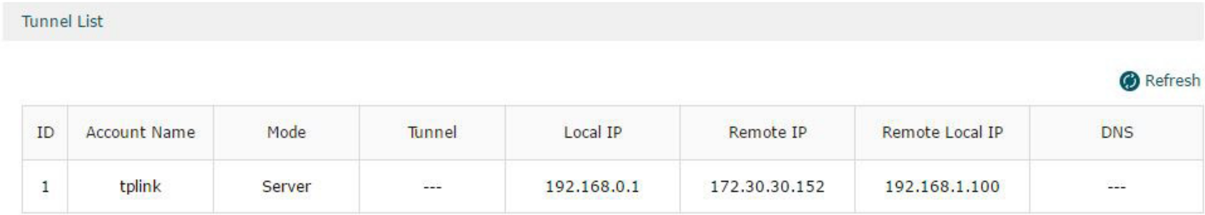
Network Mode	Specify the network mode. There are two modes: **Client-to-LAN**: Select this option when the L2TP/PPTP client is a single host. **LAN-to-LAN**: Select this option when the L2TP/PPTP client is a VPN gateway. The tunneling request is always initiated by a device.
Max Connections	Specify the 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**.

3.6 Verifying the Connectivity of L2TP VPN Tunnel

Choose the menu **VPN > L2TP > Tunnel List** to load the following page.

Figure 3-6 L2TP VPN Tunnel List



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 router 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.

4 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

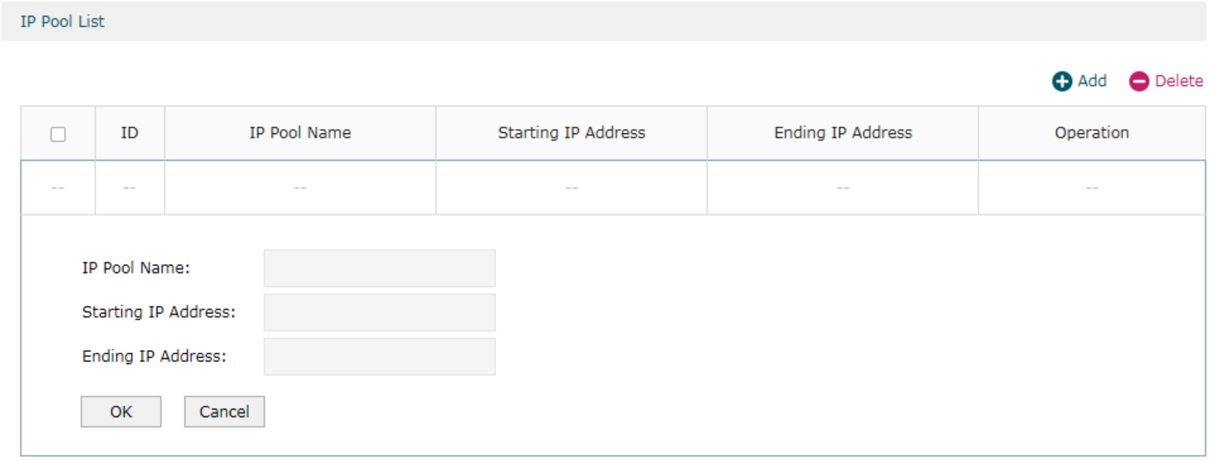
- When the network mode is configured as Client-to-LAN and the router acts as the PPTP server, you don't need to configure a PPTP client on the router.

- When the network mode is configured as LAN-to-LAN and the router acts as the PPTP client gateway, you don't need to configure PPTP users on the router.

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



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 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.

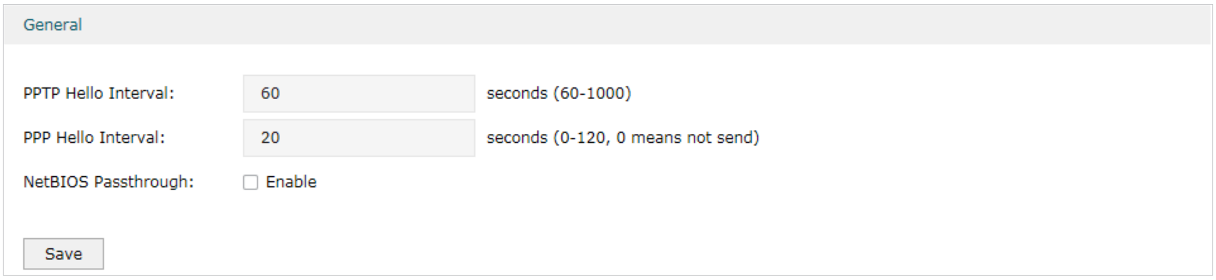
Note:

- The starting IP address should not be greater than the ending IP address.
- The ranges of IP Pools cannot overlap.

4.2 Configuring PPTP Globally

Choose the menu **VPN> PPTP > Global Config** to load the following page.

Figure 4-2 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

Save

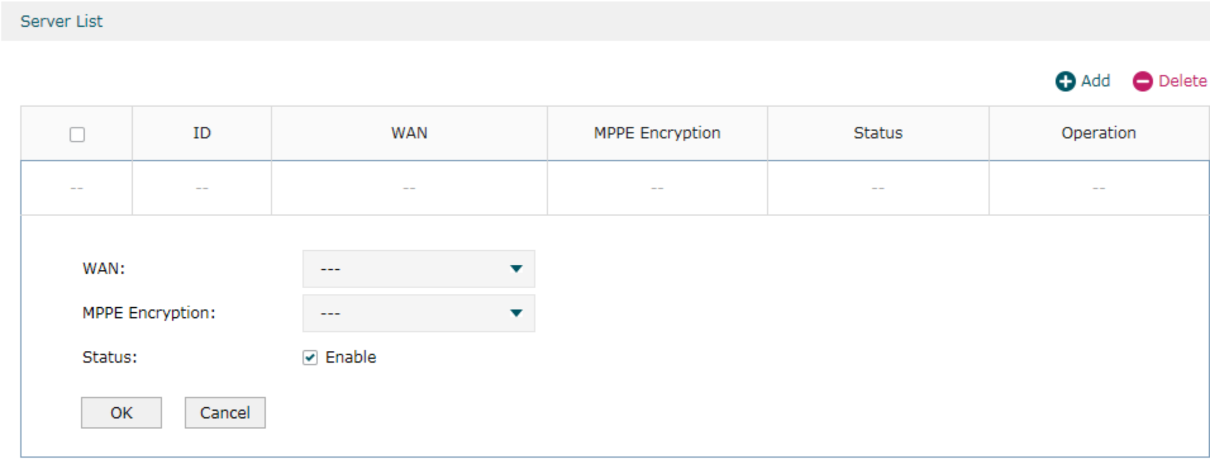
In the **General** section, configure PPTP parameters globally and click **Save**.

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.

4.3 Configuring the PPTP Server

Choose the menu **VPN> PPTP > PPTP Server** and click **Add** to load the following page.

Figure 4-3 Configuring the PPTP Server



Server List

Add Delete

□	ID	WAN	MPPE Encryption	Status	Operation
--	--	--	--	--	--

WAN: ---

MPPE Encryption: ---

Status: ☑ Enable

OK Cancel

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.

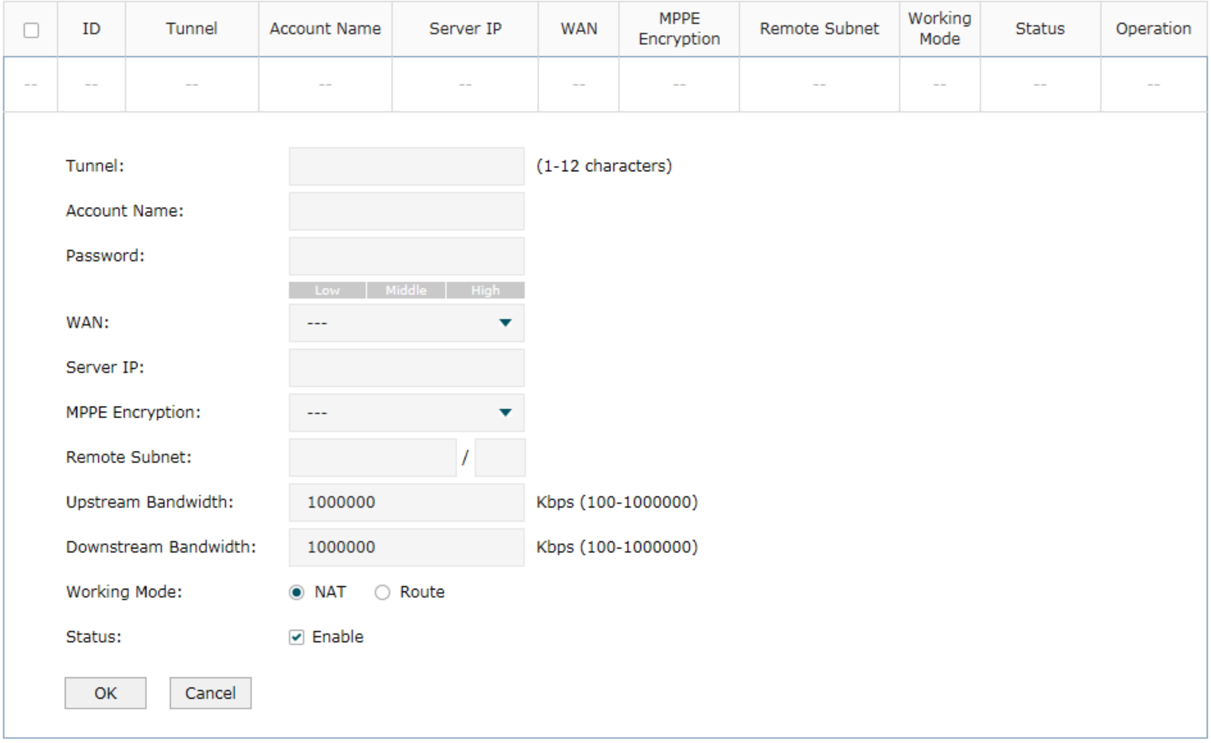
3) Enable the PPTP tunnel.

4) Click **OK**.

4.4 Configuring the PPTP Client

Choose the menu **VPN > PPTP > PPTP Client** and click **Add** to load the following page.

Figure 4-4 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

OK Cancel

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.

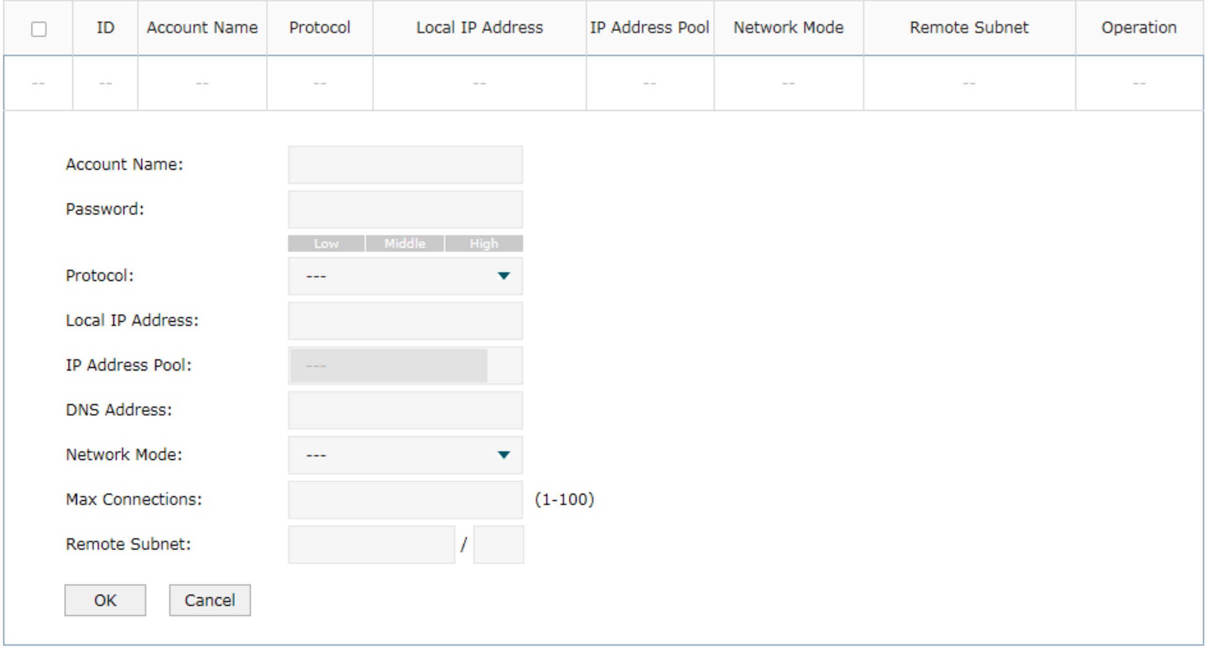
MPPE Encryption	Specify whether to enable the encryption for the tunnel. If enabled, the PPTP tunnel will be encrypted by MPPE.
Remote Subnet	Specify the remote network. (It's always the IP address range of LAN on the remote peer of the VPN tunnel.) It's the combination of IP address and subnet mask.
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 router to translate source IP address of PPTP packets to its WAN IP when forwarding PPTP packets. **Route**: Route mode allows the router to forward PPTP packets via routing protocol.
Status	Check the box to enable the PPTP tunnel.

2) Click **OK**.

4.5 (Optional) Configuring the PPTP Users

Choose the menu **VPN > Users > Users** and click **Add** to load the following page.

Figure 4-5 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.

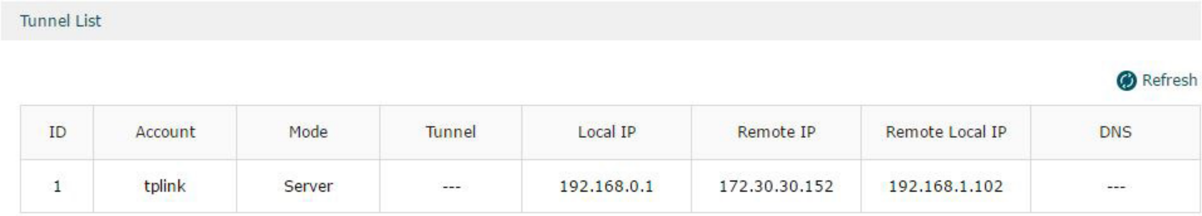
Protocol	Specify the protocol for the VPN tunnel. There are two types: L2TP and PPTP.
Local IP Address	Specify the local IP address of the tunnel. You can enter the LAN IP of the local device.
IP Address Pool	Specify the IP address pool from which the IP address will be assigned to the VPN client. The 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**.

4.6 Verifying the Connectivity of PPTP VPN Tunnel

Choose the menu **VPN> PPTP > Tunnel List** to load the following page.

Figure 4-6 PPTP VPN Tunnel List



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 router 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.

5 Configuration Examples

Note:

For more information about how to implement VPN in different scenarios, refer to the Configuration Guide for VPN.

5.1 Example for Configuring IPSec VPN

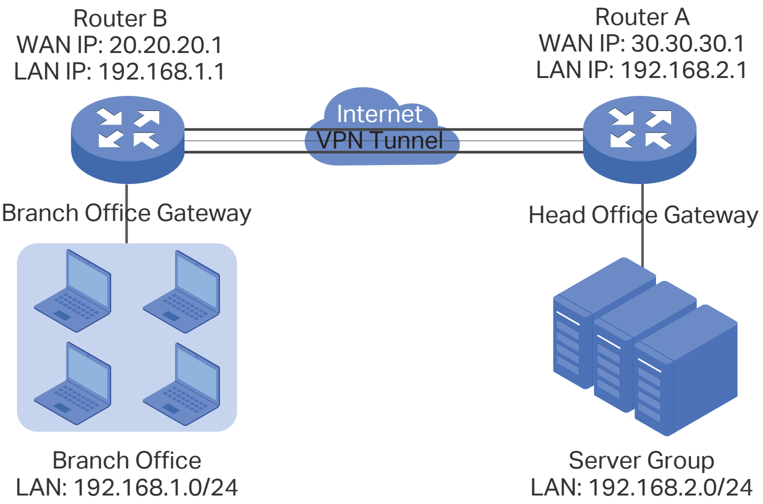
5.1.1 Network Requirements

A business requires a highly secure connection between one of the branch offices and the head office. Thus we can build the site-to-site IPSec VPN tunnel between the branch office and the head office to establish the virtual private connection.

5.1.2 Network Topology

As is shown below, computers in the branch office are connected to the Branch Office Router B via the LAN port, and the internal server group is connected to the Head Office Router A via the LAN port.

Figure 5-1 Site-to-Site IPSec VPN Topology



5.1.3 Configuration Scheme

To meet the requirements, configure IPSec policy on Router A and Router B. (As the network topology above shows, two VPN routers are connected via the internet, so the network mode should be configured as LAN-to-LAN.) Then verify whether the IPSec VPN tunnel is established successfully.

The following section provides the configuration procedure.

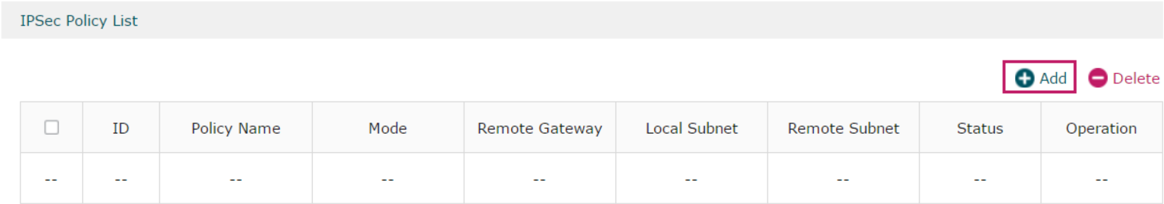
5.1.4 Configuration Procedure

Follow the steps below to configure IPSec policy on Router A and Router B:

■ Configuring the Router A

1) Choose the menu **VPN > IPSec > IPSec Policy** to load the following page. Click **Add**.

Figure 5-2 IPSec Policy List

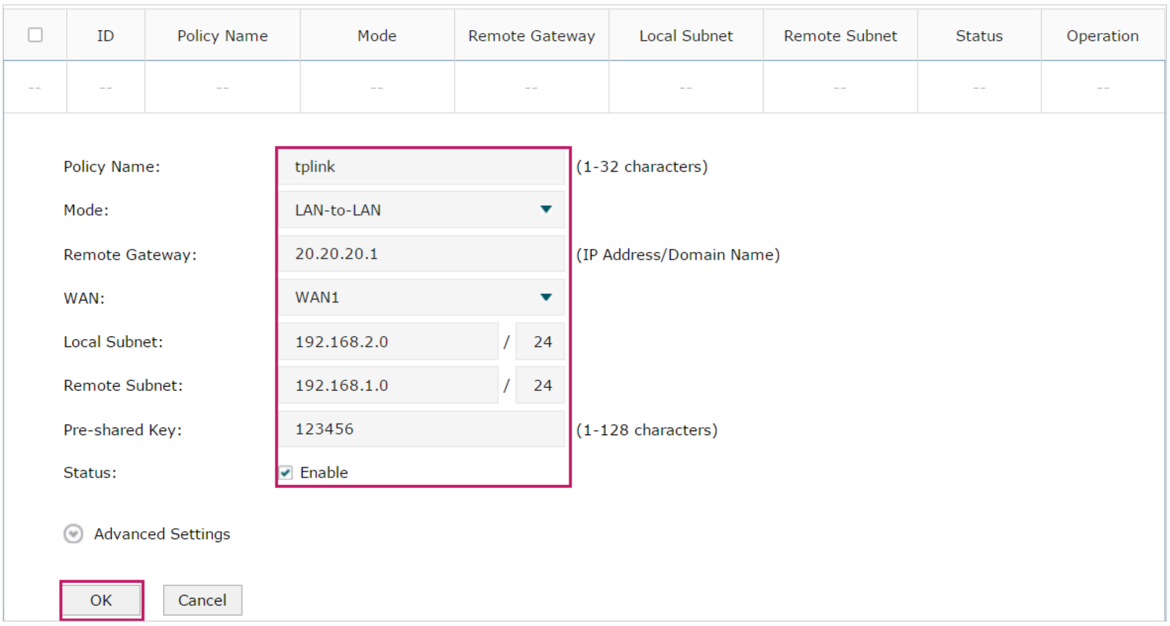


IPSec Policy List

□	ID	Policy Name	Mode	Remote Gateway	Local Subnet	Remote Subnet	Status	Operation
--	--	--	--	--	--	--	--	--

2) The following page will appear. Specify the IPSec Policy Name as **tplink** and configure the Mode as **LAN-to-LAN** as the network is connected to the other network, then configure other relevant parameters. Keep **Enable** selected as the Status of this entry. Click **OK**.

Figure 5-3 Configuring the IPSec Policy



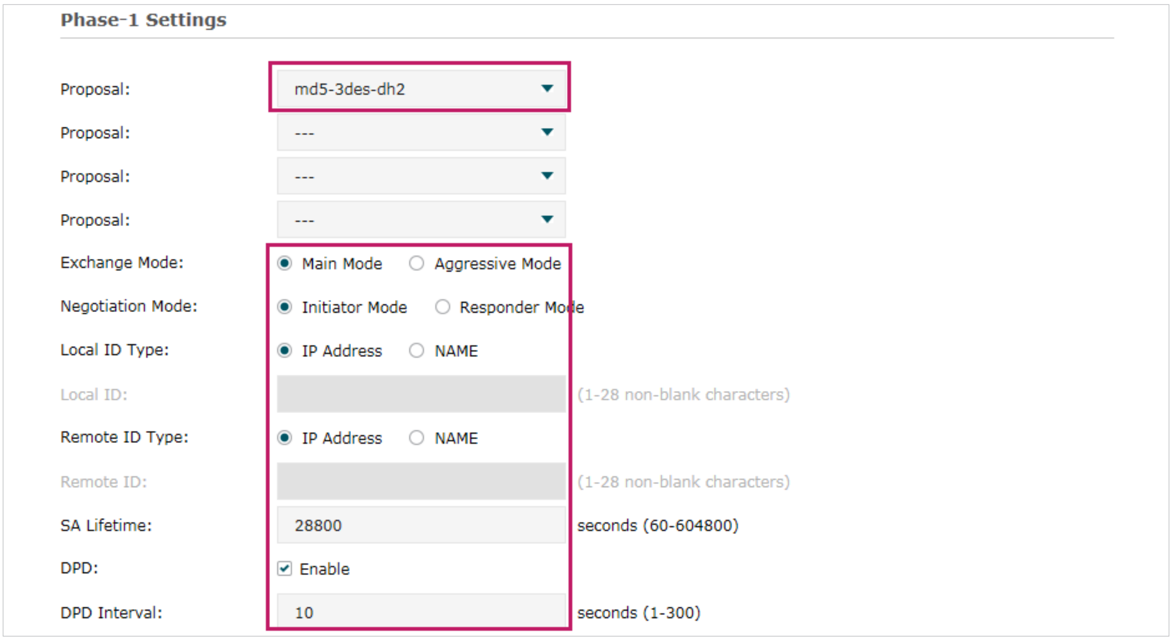
□	ID	Policy Name	Mode	Remote Gateway	Local Subnet	Remote Subnet	Status	Operation
--	--	--	--	--	--	--	--	--

Policy Name:	tplink	(1-32 characters)
Mode:	LAN-to-LAN	
Remote Gateway:	20.20.20.1	(IP Address/Domain Name)
WAN:	WAN1	
Local Subnet:	192.168.2.0 / 24	
Remote Subnet:	192.168.1.0 / 24	
Pre-shared Key:	123456	(1-128 characters)
Status:	☑ Enable	

3) Choose the menu **VPN > IPSec > IPSec Policy** and click **Advanced Settings** to load the following page. Advanced settings include IKEv1 phase-1 settings and IKEv1 phase-2 settings. You can keep the default advanced settings.

In the **Phase-1 Settings** section, configure the IKE phase-1 parameters and click **OK**.

Figure 5-4 Configuring the IKE Phase-1 Parameters

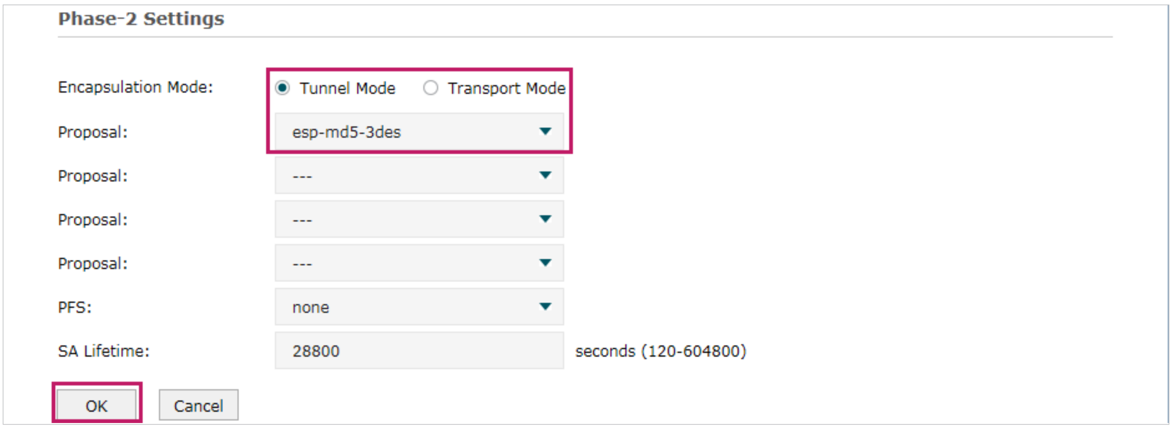


Phase-1 Settings

Proposal:	md5-3des-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-2 Settings** section, configure the IKE phase-2 parameters and click **OK**.

Figure 5-5 Configuring the IKE Phase-2 Parameters



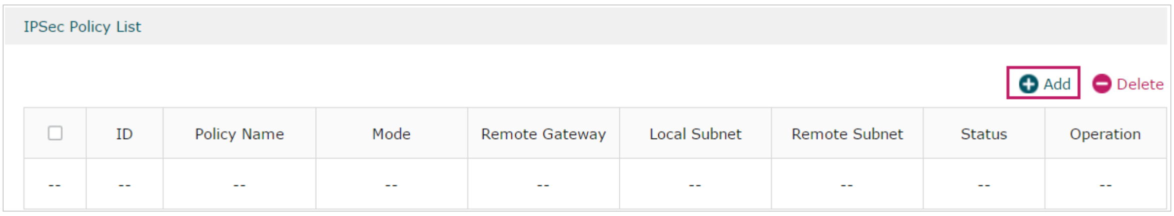
Phase-2 Settings

Encapsulation Mode:	● Tunnel Mode ○ Transport Mode	
Proposal:	esp-md5-3des	
Proposal:	---	
Proposal:	---	
Proposal:	---	
PFS:	none	
SA Lifetime:	28800	seconds (120-604800)

Configuring the Router B

1) Choose the menu **VPN > IPSec > IPSec Policy** to load the following page. Click **Add**.

Figure 5-6 IPSec Policy List

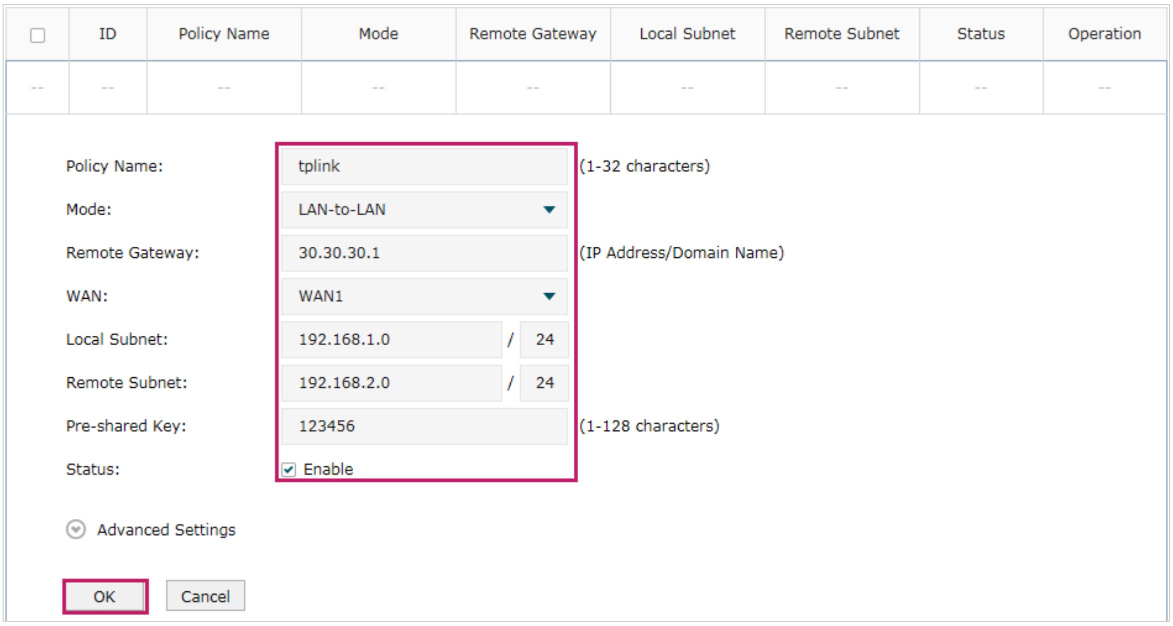


IPSec Policy List

□	ID	Policy Name	Mode	Remote Gateway	Local Subnet	Remote Subnet	Status	Operation
--	--	--	--	--	--	--	--	--

2) The following page will appear. Specify the IPSec Policy Name as **tplink** and configure the Mode as **LAN-to-LAN** as the network is connected to the other network, then configure other relevant parameters. Keep **Enable** selected as the Status of this entry. Click **OK**.

Figure 5-7 Configuring the IPSec Policy



□	ID	Policy Name	Mode	Remote Gateway	Local Subnet	Remote Subnet	Status	Operation
--	--	--	--	--	--	--	--	--

Policy Name: tplink (1-32 characters)

Mode: LAN-to-LAN

Remote Gateway: 30.30.30.1 (IP Address/Domain Name)

WAN: WAN1

Local Subnet: 192.168.1.0 / 24

Remote Subnet: 192.168.2.0 / 24

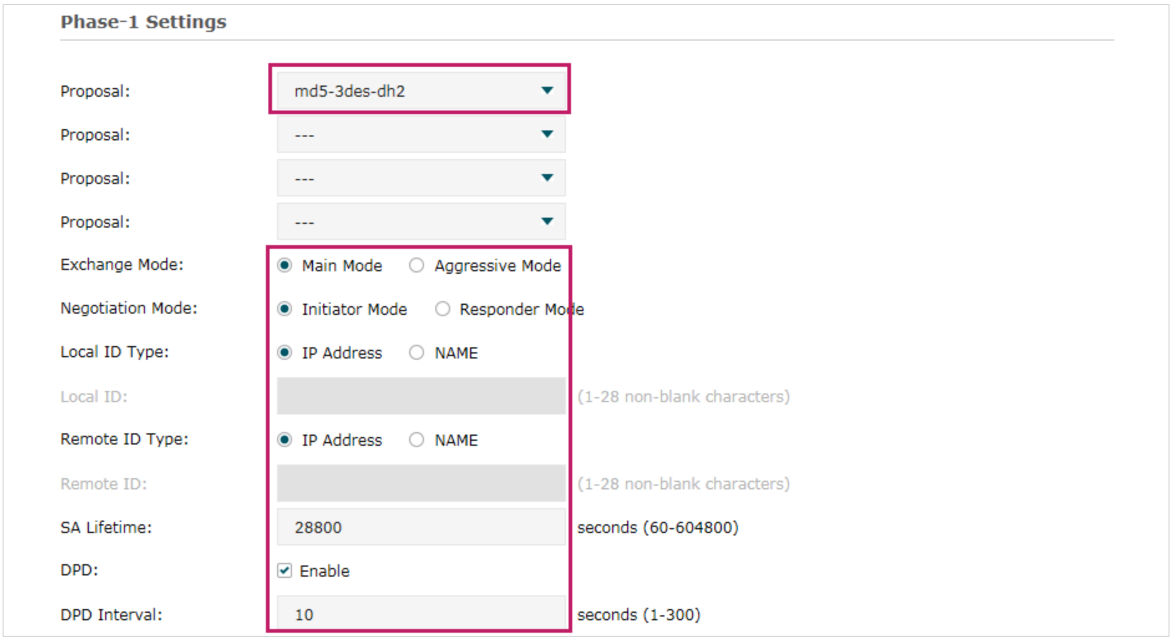
Pre-shared Key: 123456 (1-128 characters)

Status: ☑ Enable

3) Choose the menu **VPN > IPSec > IPSec Policy** and click **Advanced Settings** to load the following page. Advanced settings include IKEv1 phase-1 settings and IKEv1 phase-2 settings. You can keep the default advanced settings.

In the **Phase-1 Settings** section, configure the IKE phase-1 parameters and click **OK**.

Figure 5-8 Configuring the IKE Phase-1 Parameters



Phase-1 Settings

Proposal: md5-3des-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)

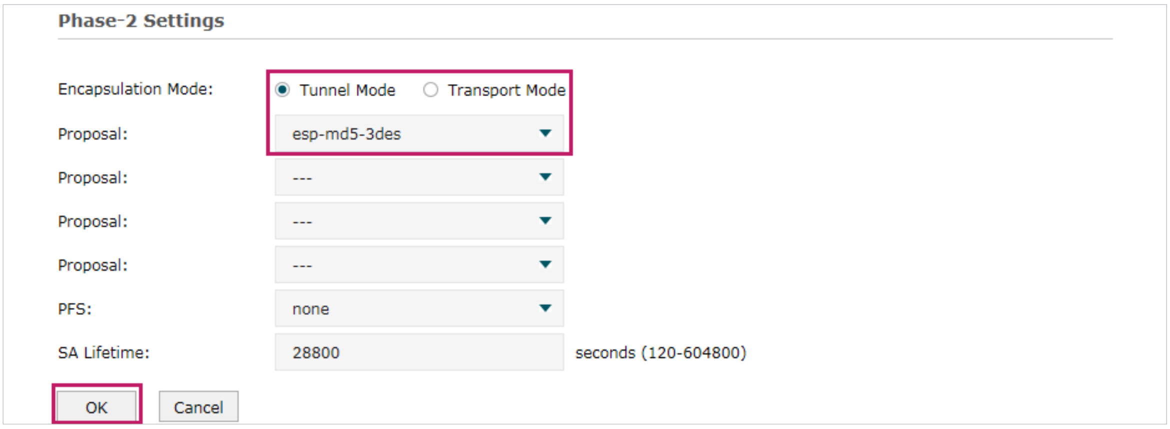
SA Lifetime: 28800 seconds (60-604800)

DPD: ☑ Enable

DPD Interval: 10 seconds (1-300)

In the **Phase-2 Settings** section, configure the IKE phase-2 parameters and click **OK**.

Figure 5-9 Configuring the IKE Phase-2 Parameters



Phase-2 Settings

Encapsulation Mode: ● Tunnel Mode ○ Transport Mode

Proposal: esp-md5-3des

Proposal: ---

Proposal: ---

Proposal: ---

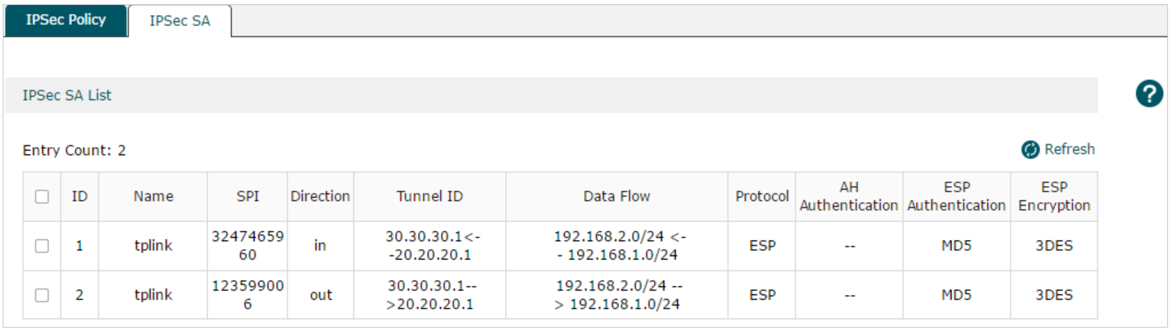
PFS: none

SA Lifetime: 28800 seconds (120-604800)

- Verifying the connectivity of the IPSec VPN tunnel

On Router A or Router B, choose the menu **VPN > IPSec > IPSec SA** to view the information of the established IPSec VPN tunnel. Here we take Router A for example.

Figure 5-10 Viewing the IPSec SA



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

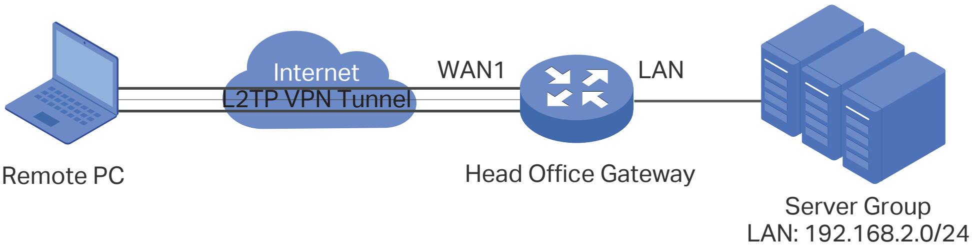
5.2 Example for Configuring L2TP VPN

5.2.1 Network Requirements

Employees out of the office need to communicate with the head office and access the internal resources at any time. And the communication data needs to be well protected. Thus we can build the remote access VPN tunnel between the employees on official business and the gateway device of the head office.

In this scenario, both PPTP and L2TP can be used. Here we take L2TP VPN as an example.

Figure 5-11 Remote Access L2TP VPN Topology



5.2.2 Configuration Scheme

To meet the requirements, configure L2TP server on the router, and configure L2TP client on the remote PC. For the remote PC, use Windows built-in L2TP software or third-party L2TP software to connect to L2TP server. Then verify whether the L2TP VPN tunnel is established successfully.

The following section provides the configuration procedure.

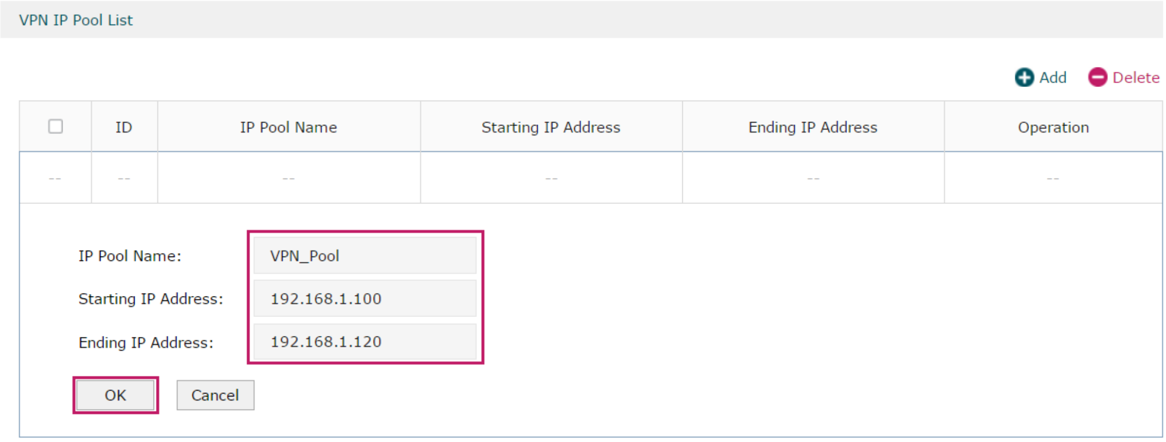
5.2.3 Configuration Procedure

Follow the steps below to configure L2TP VPN on the router and Remote PC:

■ Configuring the Router

1) Choose the menu **Preferences > VPN IP Pool > VPN IP Pool** to load the configuration page, and click **Add**. Specify the pool name as VPN_Pool, and enter the starting/ending IP address.

Figure 5-12 Configuring the VPN IP Pool



VPN IP Pool List

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

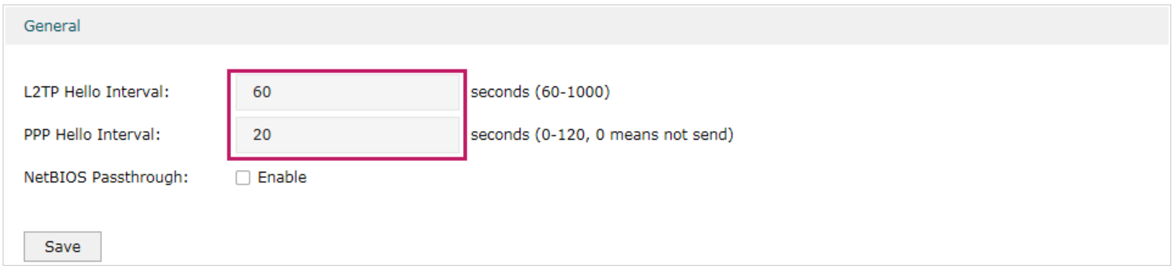
IP Pool Name: VPN_Pool

Starting IP Address: 192.168.1.100

Ending IP Address: 192.168.1.120

2) Choose the menu **VPN> L2TP > Global Config** to load the following page. You can keep the L2TP/PPP hello interval as the default value.

Figure 5-13 Configuring L2TP Globally



General

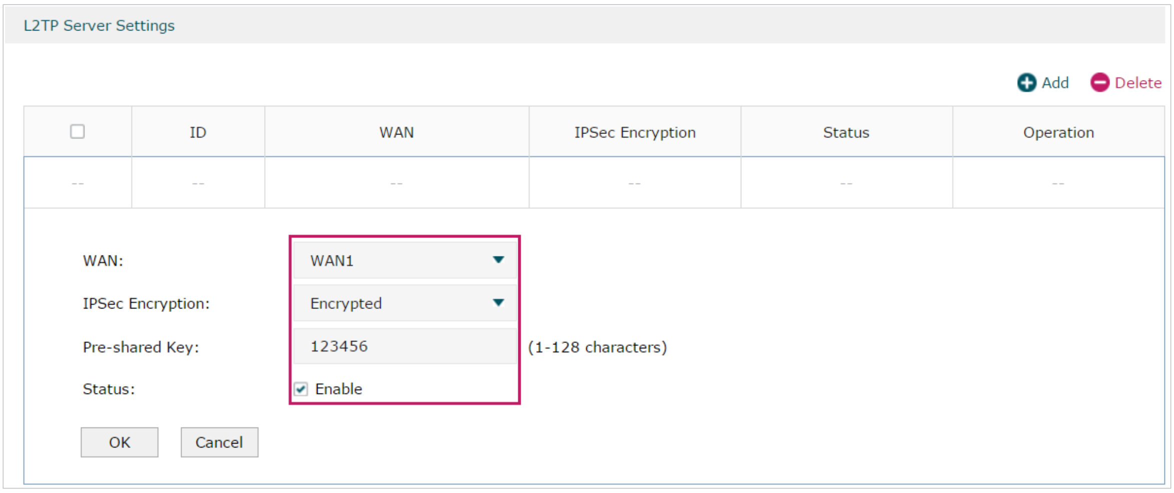
L2TP Hello Interval: 60 seconds (60-1000)

PPP Hello Interval: 20 seconds (0-120, 0 means not send)

NetBIOS Passthrough: □ Enable

3) Choose the menu **VPN> L2TP > L2TP Server** to load the configuration page, and click **Add**. Specify WAN1 as the outgoing interface of L2TP VPN tunnel, enable IPSec encryption and specify the pre-shared key as 123456.

Figure 5-14 Configuring the L2TP Server



L2TP Server Settings

□	ID	WAN	IPSec Encryption	Status	Operation
--	--	--	--	--	--

WAN: WAN1

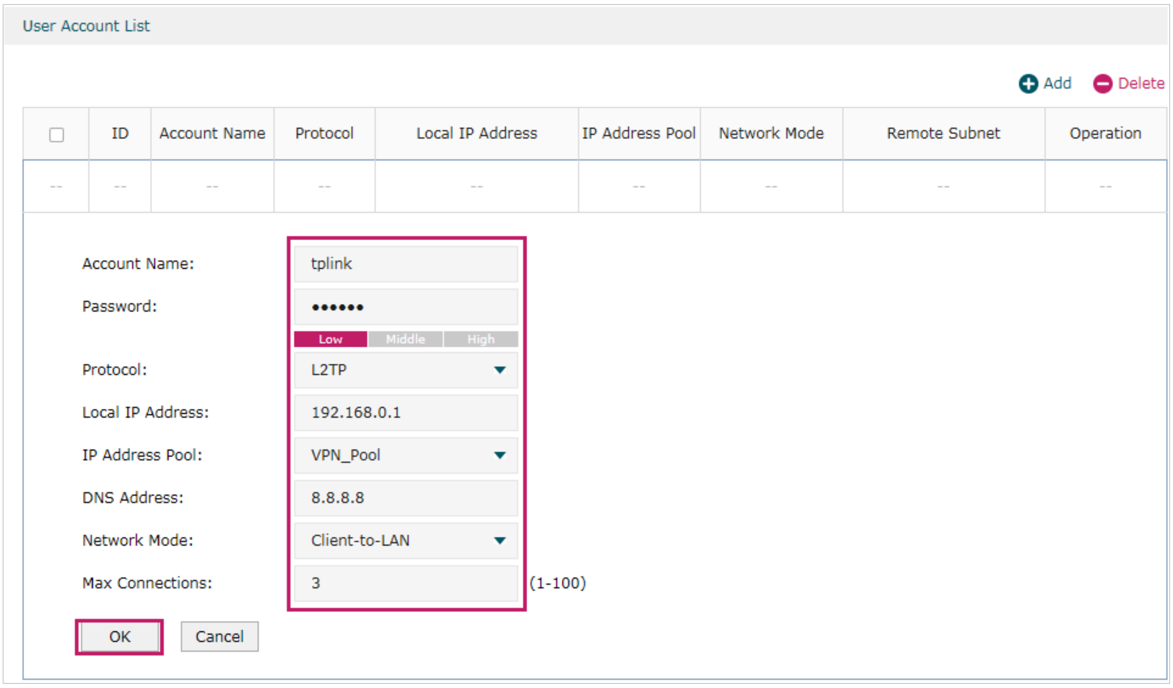
IPSec Encryption: Encrypted

Pre-shared Key: 123456 (1-128 characters)

Status: ☑ Enable

4) Choose the menu **VPN> Users > Users** to load the configuration page, and click **Add**. Specify the account name as tplink, and enter the password 123456. Select the protocol as L2TP, specify the LAN IP (192.168.0.1) as the local IP address of the router, select VPN_Pool as the IP address pool to assign an IP address for the L2TP client, enter the DNS address (for example, 8.8.8.8), select the network mode as Client-to-LAN as the VPN router is connected to a host, specify the max connections as 3, then click **OK**.

Figure 5-15 Configuring the VPN User



User Account List

□	ID	Account Name	Protocol	Local IP Address	IP Address Pool	Network Mode	Remote Subnet	Operation
--	--	--	--	--	--	--	--	--

Account Name: tplink

Password: ••••••

Protocol: L2TP

Local IP Address: 192.168.0.1

IP Address Pool: VPN_Pool

DNS Address: 8.8.8.8

Network Mode: Client-to-LAN

Max Connections: 3 (1-100)

Configuring the Remote PC

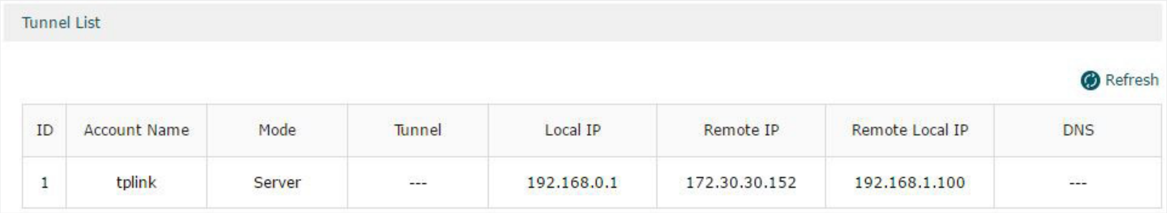
For remote PC, use Windows built-in L2TP software or third-party L2TP software to connect to L2TP server. For more information, you can refer to our official website:

https://www.tp-link.com/us/faq-1629.html

- Verifying the connectivity of the L2TP VPN tunnel

On the router, choose the menu **VPN > L2TP > Tunnel List** to verify the connectivity of the L2TP VPN tunnel.

Figure 5-16 Viewing the L2TP VPN Tunnel



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	---

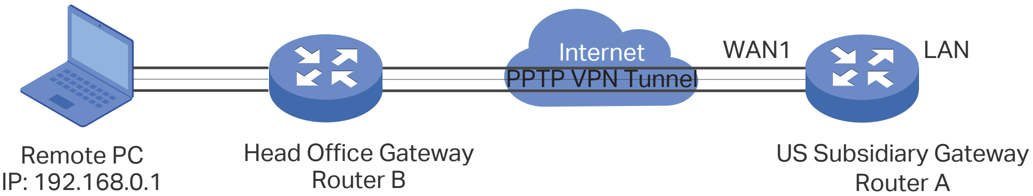
5.3 Example for Configuring PPTP VPN

5.3.1 Network Requirements

The employees at headquarters need to access the network resources through the server at the US subsidiary via a secure connection. Thus we can build the remote access VPN tunnel between the employees at headquarter and the gateway device of the US subsidiary.

In this scenario, both PPTP and L2TP can be used. Here we take PPTP VPN as an example.

Figure 5-17 Remote Access PPTP VPN Topology



5.3.2 Configuration Scheme

To meet the requirements, configure PPTP server on Router A, and configure PPTP client on the remote PC. For the remote PC, use Windows built-in PPTP software or third-party PPTP software to connect to the PPTP server. Then verify whether the PPTP VPN tunnel is established successfully.

The following section provides the configuration procedure.

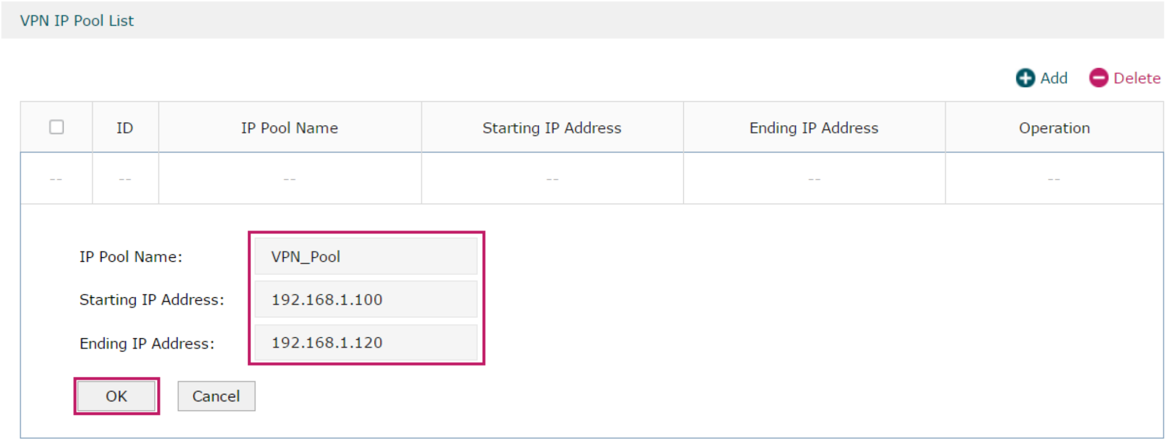
5.3.3 Configuration Procedure

Follow the steps below to configure PPTP VPN on Router A and PC:

- Configuring Router A

1) Choose the menu **Preferences > VPN IP Pool > VPN IP Pool** to load the configuration page, and click **Add**. Specify the pool name as VPN_Pool, and enter the starting/ending IP address.

Figure 5-18 Configuring the VPN IP Pool



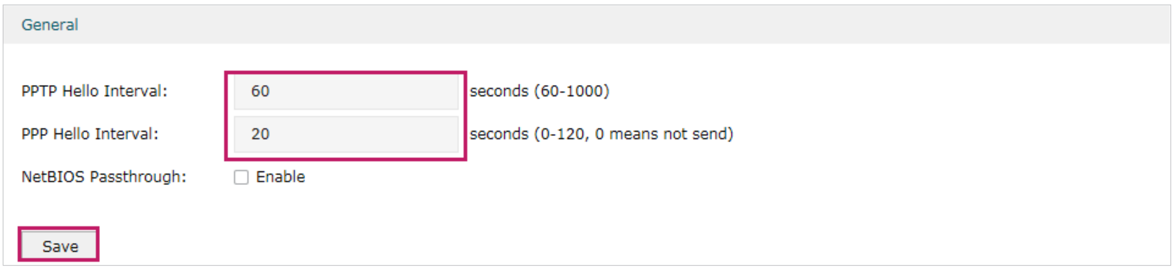
VPN IP Pool List

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

IP Pool Name:	VPN_Pool
Starting IP Address:	192.168.1.100
Ending IP Address:	192.168.1.120

2) Choose the menu **VPN> PPTP > Global Config** to load the following page. You can keep the PPTP/PPP hello interval as the default value.

Figure 5-19 Configuring PPTP Globally

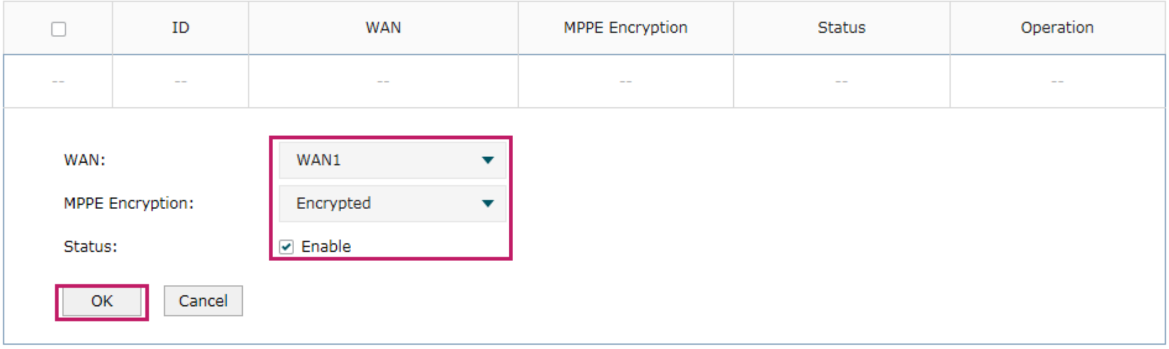


General

PPTP Hello Interval:	60 seconds (60-1000)
PPP Hello Interval:	20 seconds (0-120, 0 means not send)
NetBIOS Passthrough:	□ Enable

3) Choose the menu **VPN> PPTP > PPTP Server** to load the configuration page, and click **Add**. Specify WAN1 as the outgoing interface of PPTP VPN tunnel, enable MPPE encryption.

Figure 5-20 Configuring the PPTP Server

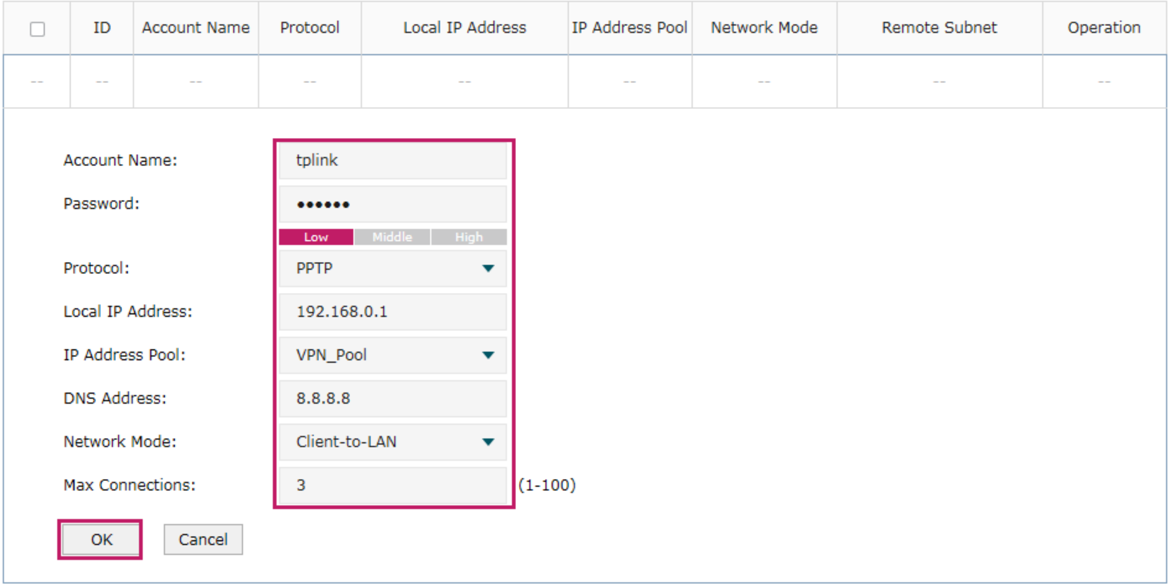


□	ID	WAN	MPPE Encryption	Status	Operation
--	--	--	--	--	--

WAN:	WAN1
MPPE Encryption:	Encrypted
Status:	☑ Enable

4) Choose the menu **VPN> Users > Users** to load the configuration page, and click **Add**. Specify the account name as tplink, and enter the password 123456. Select the protocol as PPTP, specify the LAN IP (192.168.0.1) as the local IP address of the router, select VPN_Pool as the IP address pool to assign an IP address for the PPTP client, enter the DNS address (for example, 8.8.8.8), select the network mode **LAN-to-LAN** as the network is connected to the other network, specify the max connections as 3, then click **OK**.

Figure 5-21 Configuring the VPN User



□	ID	Account Name	Protocol	Local IP Address	IP Address Pool	Network Mode	Remote Subnet	Operation
--	--	--	--	--	--	--	--	--

Account Name:	tplink	
Password:	●●●●●●	
	Low Middle High	
Protocol:	PPTP	
Local IP Address:	192.168.0.1	
IP Address Pool:	VPN_Pool	
DNS Address:	8.8.8.8	
Network Mode:	Client-to-LAN	
Max Connections:	3	(1-100)

Configuring the Remote PC

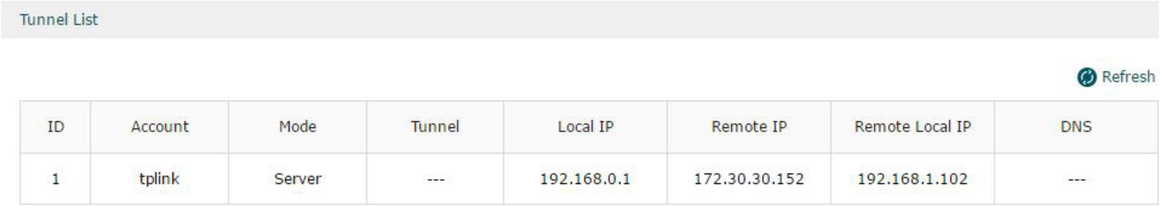
For remote PC, use Windows built-in PPTP software or third-party PPTP software to connect to PPTP server. For more information, you can refer to our official website:

https://www.tp-link.com/us/faq-1629.html

Verifying the connectivity of the PPTP VPN tunnel

On the router, choose the menu **VPN> PPTP > Tunnel List** to verify the connectivity of the PPTP VPN tunnel.

Figure 5-22 Viewing the PPTP VPN Tunnel



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	---

Part 9

Configuring Authentication

CHAPTERS

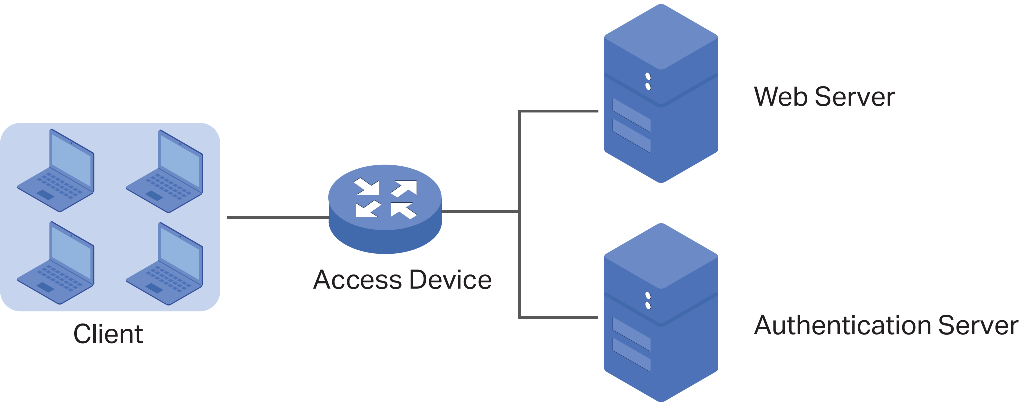
1 Overview

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 router. 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.

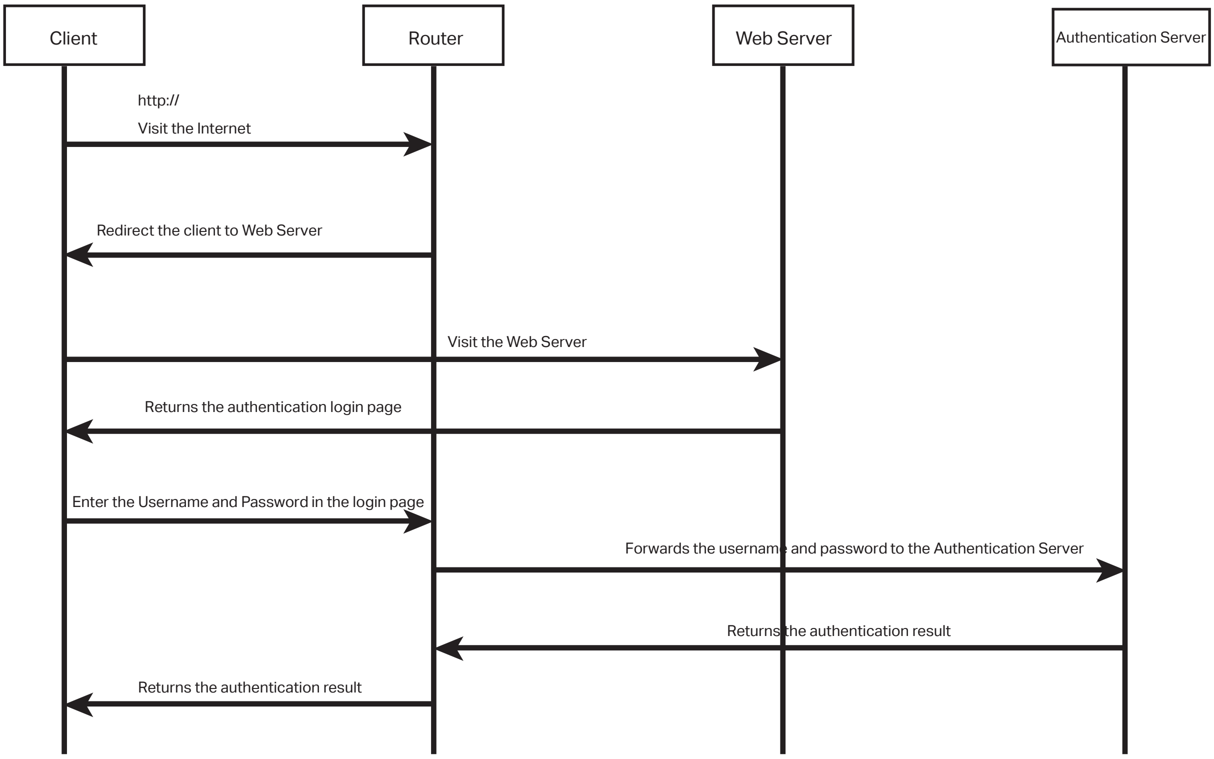
- Authentication Server

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 router but not authenticated, and starts to visit the internet through HTTP;
2) The router 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 router forwards the username and password to the authentication server;
7) The authentication server returns the authentication result to the router;
8) The router 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 router 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 router.

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 router 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 router 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.

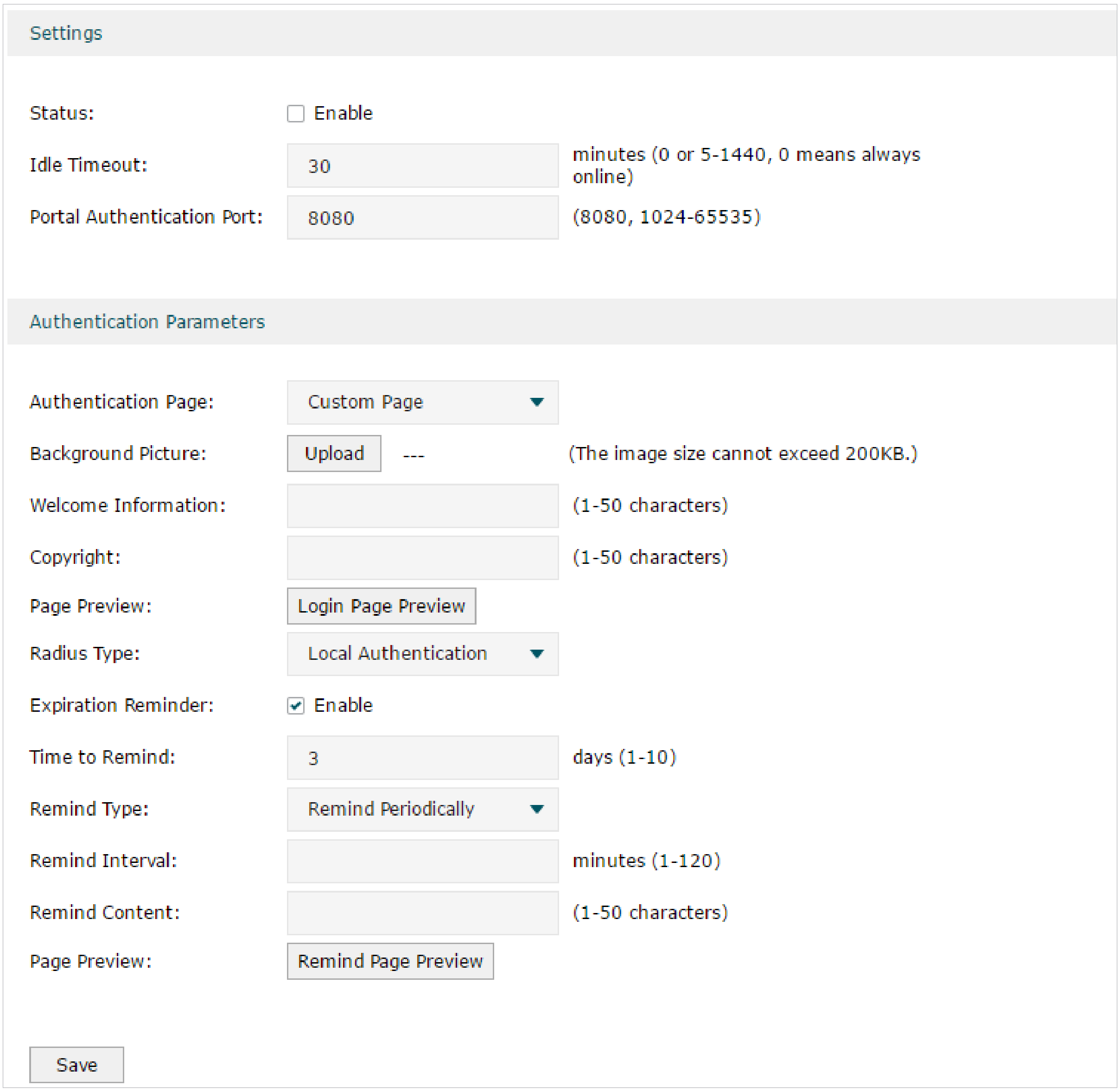
2) Configure the local user account.

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

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

Radius 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

Save

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.
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 router 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 router uses the built-in authentication server to authenticate users. You need to configure the authentication accounts for the local users.

The router 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.

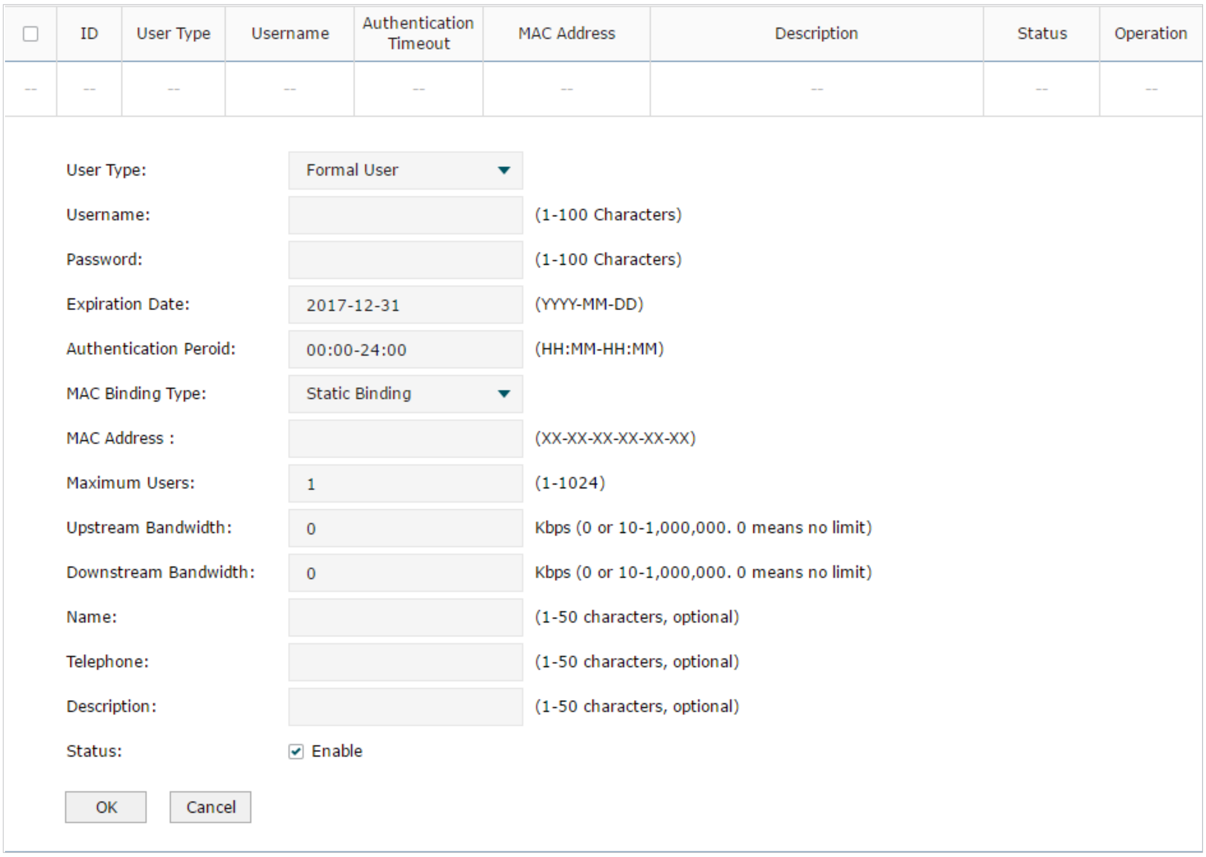
Free User: If you want to provide the user with network service for a short period of time (in minutes), you can create Free User accounts for them.

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**.

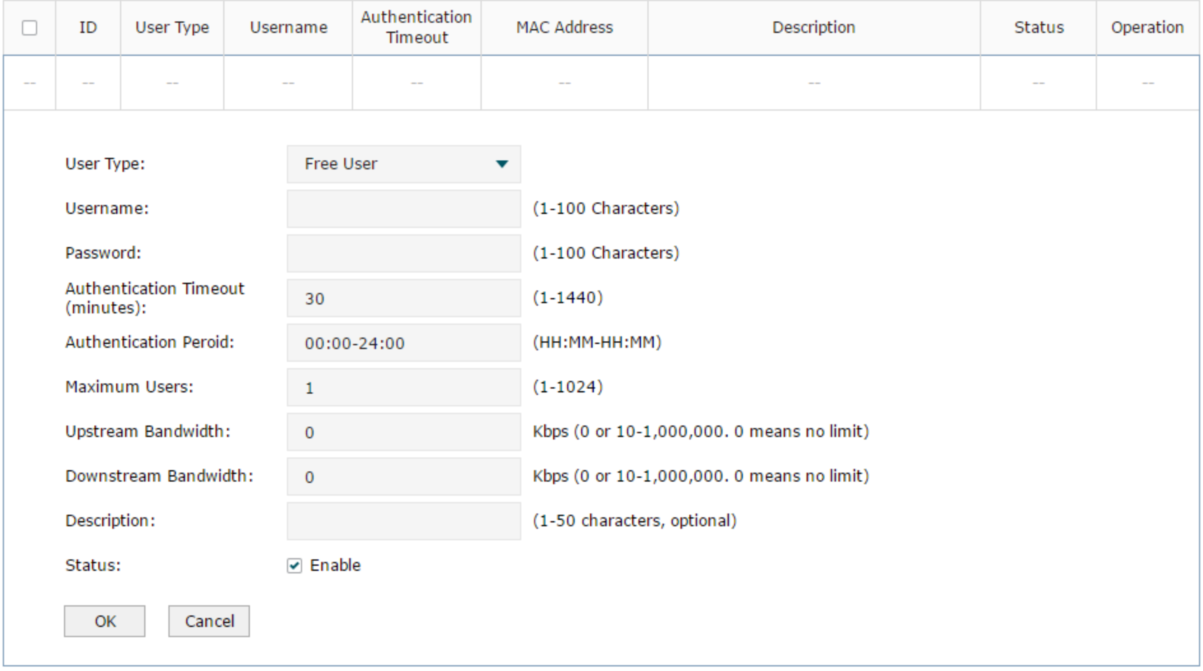
User Type	Specify the user type as Formal User.
Username / Password	Specify the username and password of the account. The username cannot be the same as any existing one.
Expiration Date	Specify the expiration date of the account. The formal user can use this account to authenticate before this date.
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**.

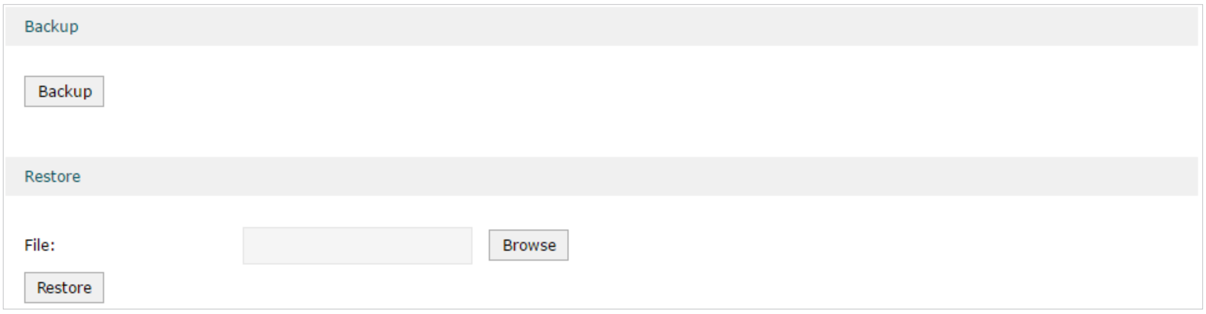
User Type	Specify the user type as Free User.

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 router 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:

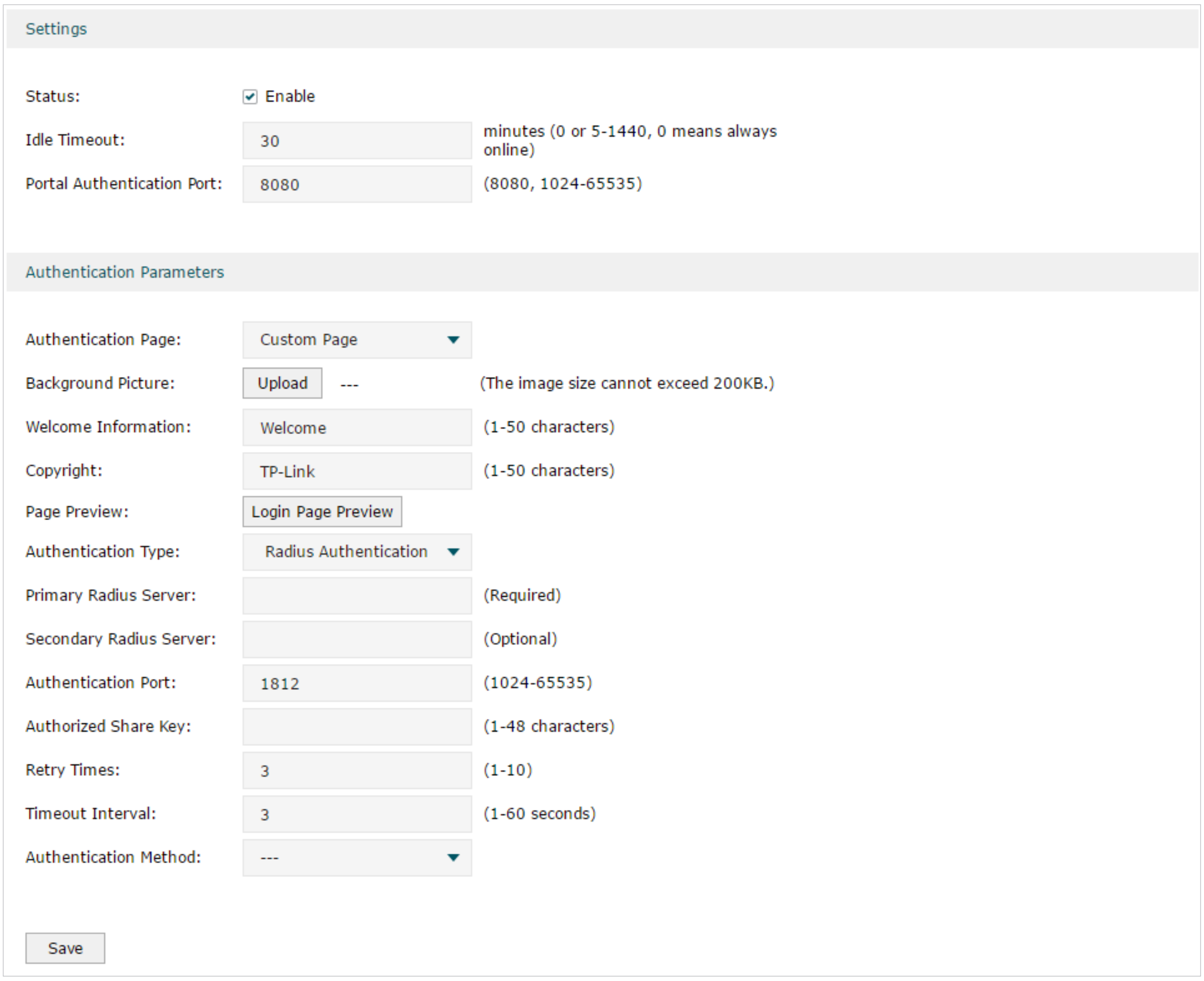
1) Configure the authentication page.

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

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: Welcome (1-50 characters)

Copyright: TP-Link (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: ---

Save

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.

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 router 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.

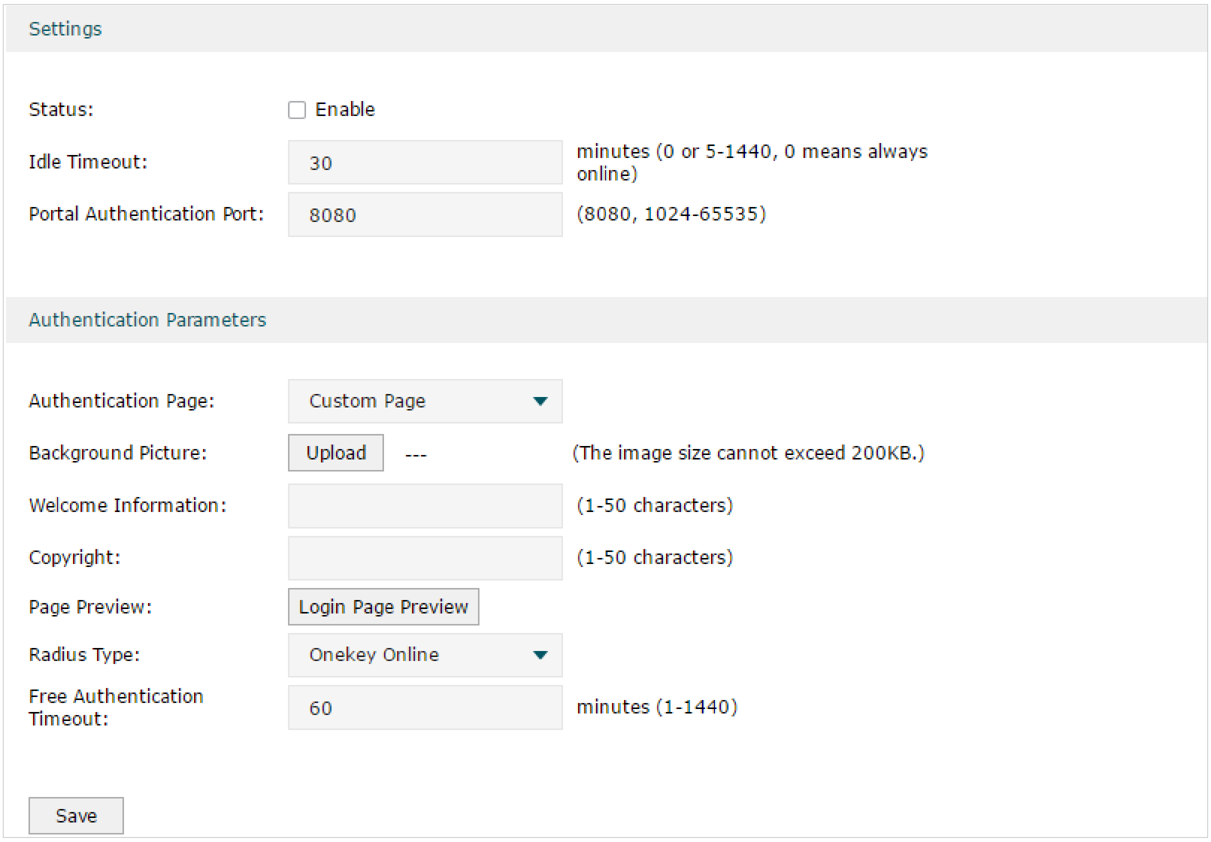
4 Onekey Online Configuration

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

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

Radius Type: Onekey Online

Free Authentication Timeout: 60 minutes (1-1440)

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.
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 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.

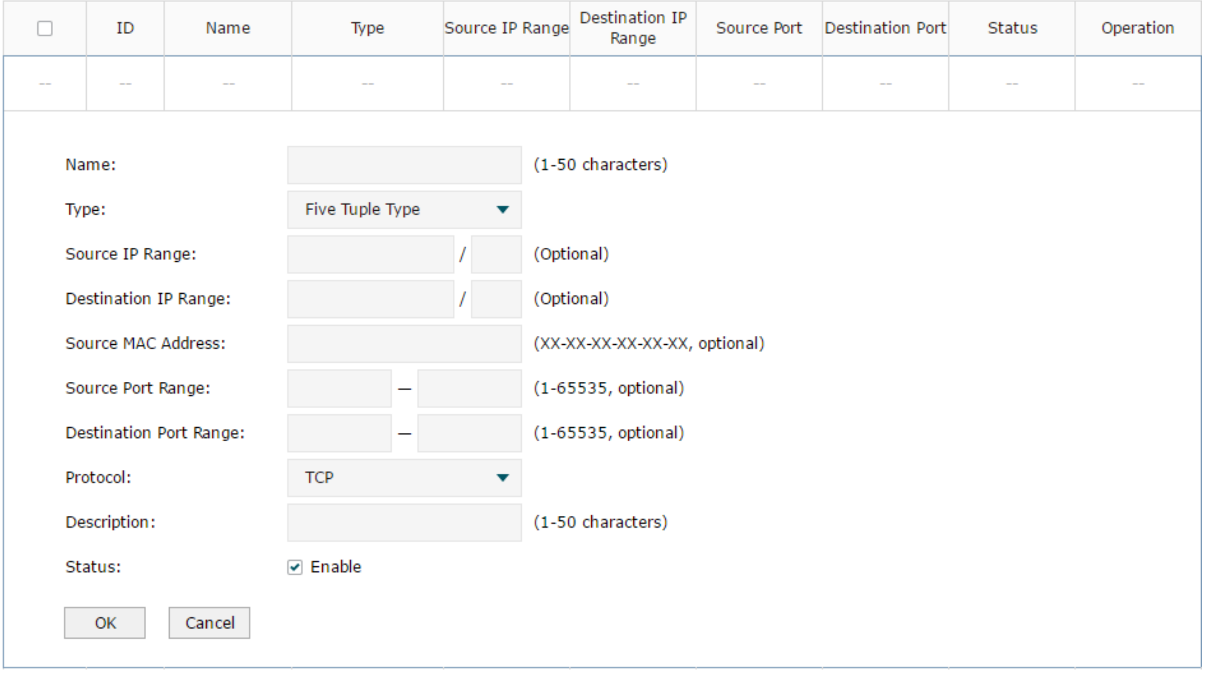
Note:

By default, the Guest Resource table is empty, which means all the clients cannot visit any network resource before they pass the portal authentication.

5.1 Configuring the Five Tuple Type

Choose the menu **Authentication** > **Authentication Settings** > **Guest Resources** and click **Add** to load the following page.

Figure 5-1 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.

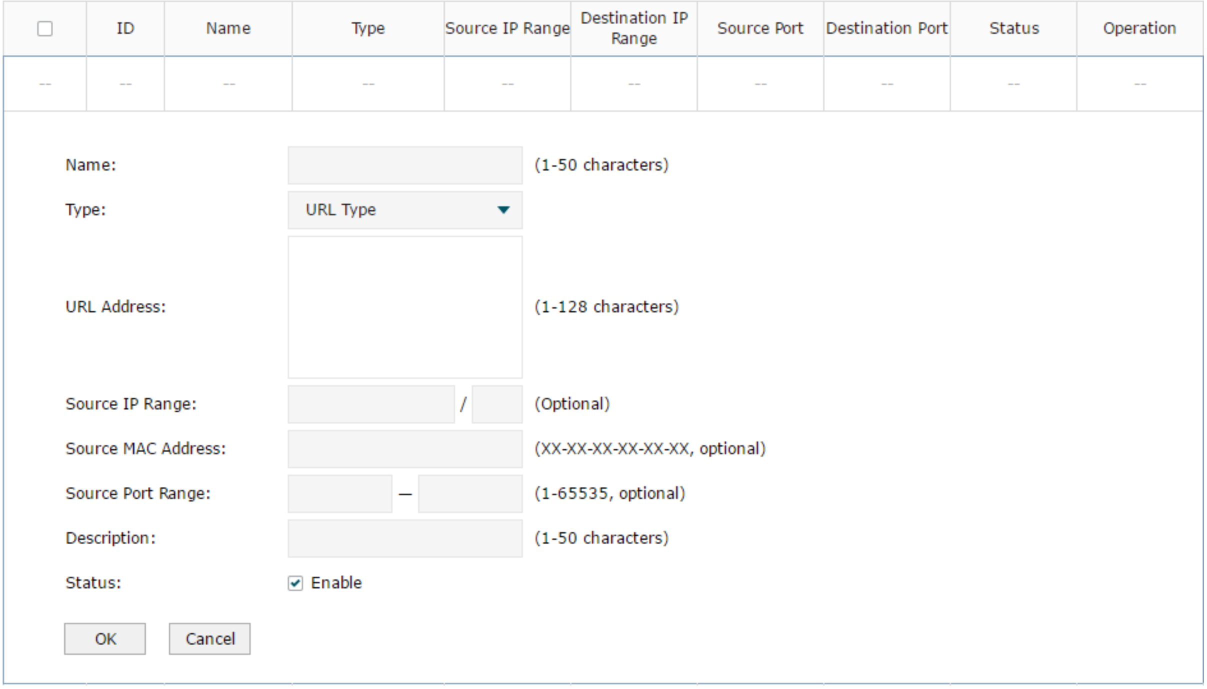
Note:

In a Guest Resource entry, if some parameter is left empty, it means the router 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.

5.2 Configuring the URL Type

Choose the menu **Authentication** > **Authentication Settings** > **Guest Resources** and click **Add** to load the following page.

Figure 5-1 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	

OK Cancel

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.

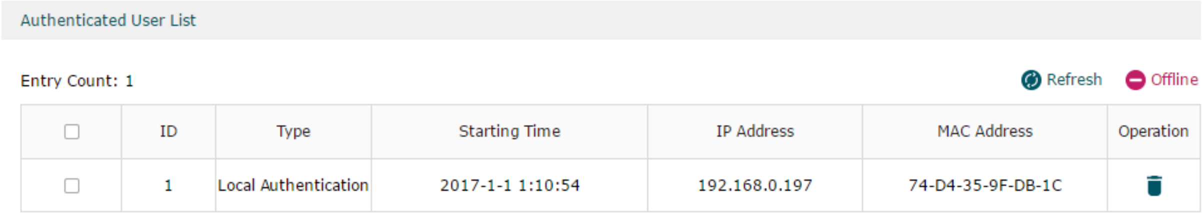
Note:

In a Guest Resource entry, if some parameter is left empty, it means the router 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 Viewing the Authentication Status

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

Figure 6-1 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.

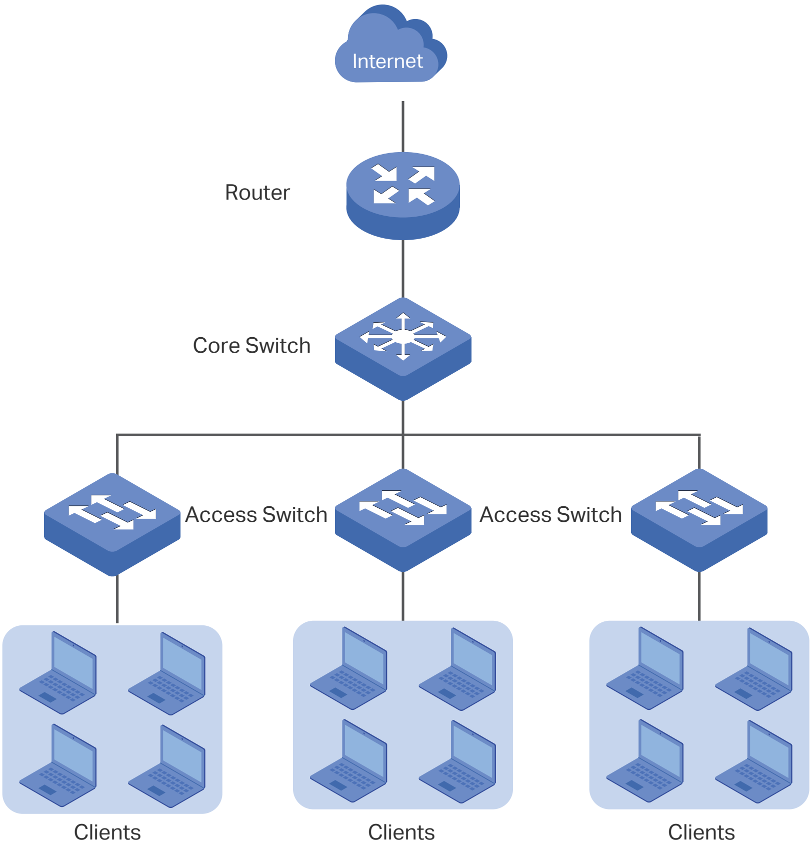
7 Configuration Example

Here we take the application of Local Authentication as an example.

7.1 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 7-1 Network Topology



7.2 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.

7.3 Configuration Procedures

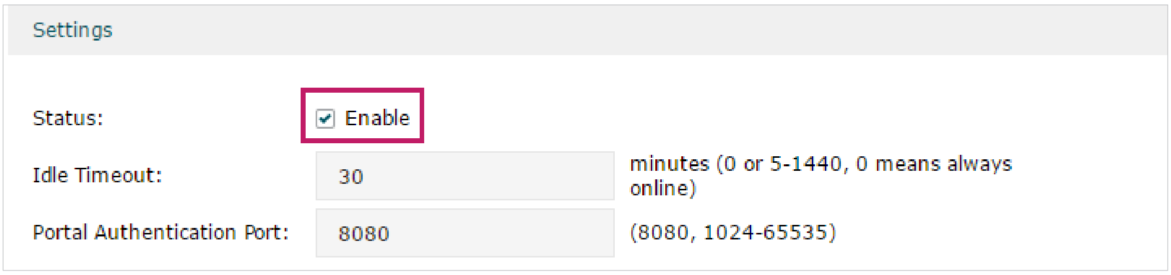
1) Enable Portal Authentication, choose the authentication type as Local Authentication, and customize the authentication page.
2) Create the authentication accounts for the guests.

7.3.1 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 7-2 Enable Portal Authentication

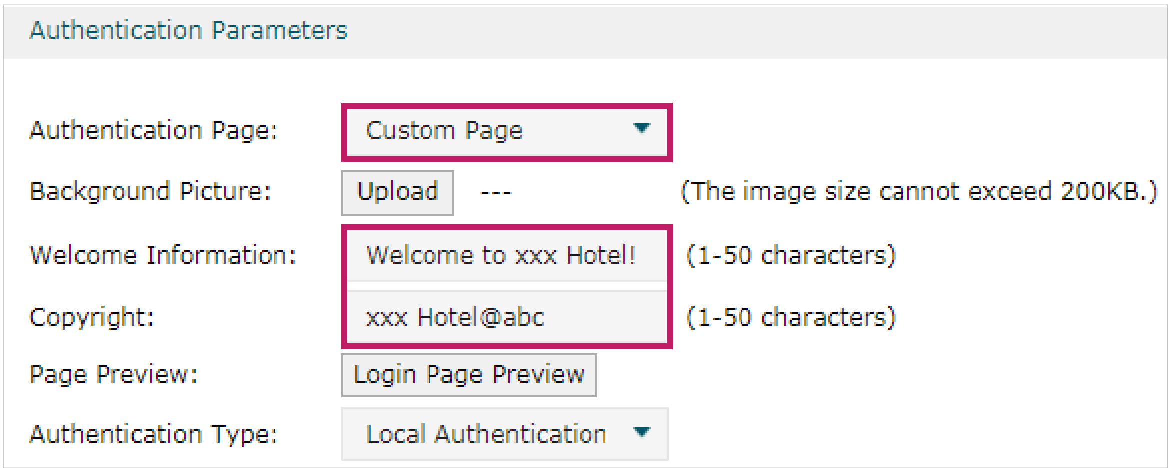


Settings

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 7-3 Customize the authentication page

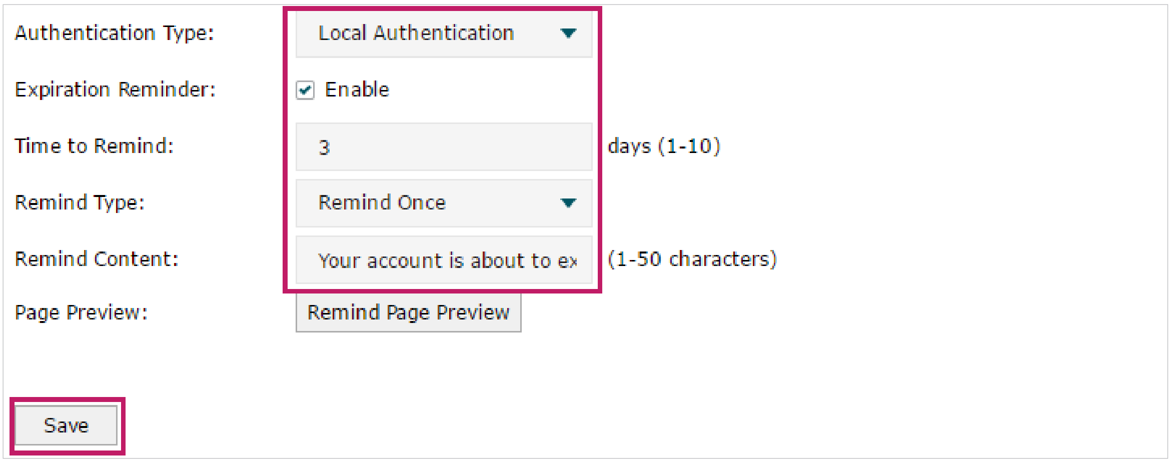


Authentication Parameters

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 7-4 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	

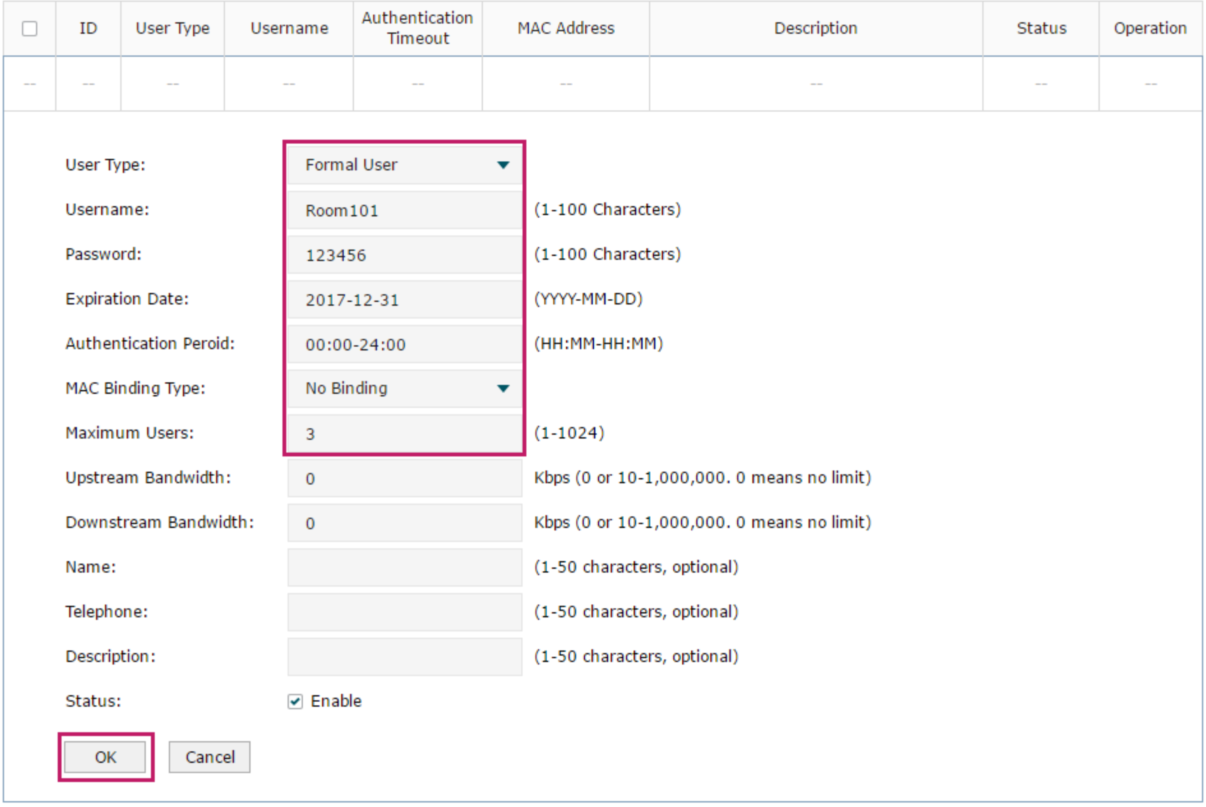
Save

7.3.2 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 7-5 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	

OK Cancel

After all the configuration finished, the guest can use the account to authenticate and access the internet after the authentication succeeded.

Part 10

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.

2 Dynamic DNS Configurations

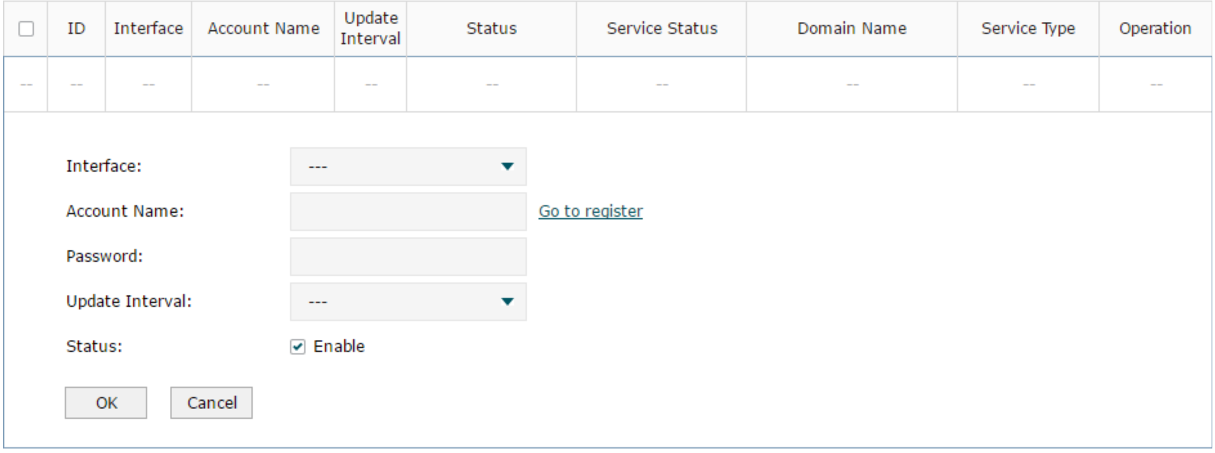
With Dynamic DNS configurations, you can:

- Configure and view Peanuthull DDNS
- Configure and view Comexe DDNS
- Configure and view DynDNS
- Configure and view NO-IP DDNS

2.1 Configure and View Peanuthull DDNS

Choose the menu **Service** > **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.

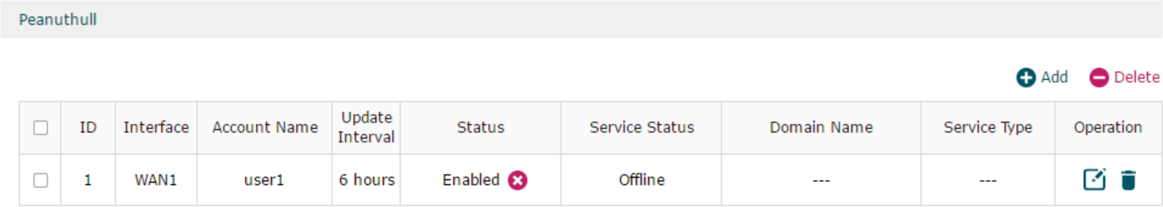
1) Click **Go to register** to visit the official website of Peanuthull, register an account and a domain name.

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

Add Delete

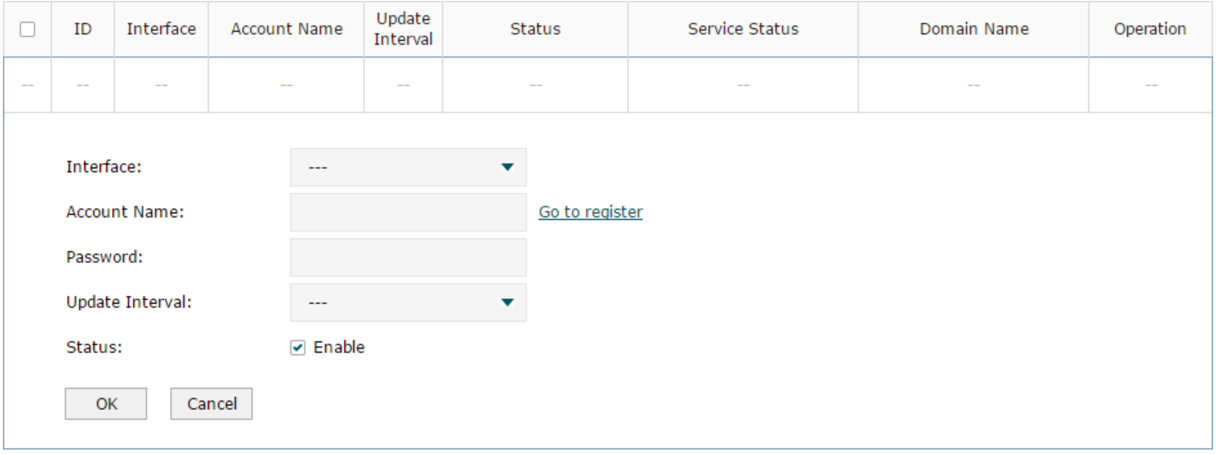
□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Service Type	Operation
□	1	WAN1	user1	6 hours	Enabled ☒	Offline	---	---	

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 **Service** > **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

OK Cancel

Follow these steps to configure Comexe DDNS.

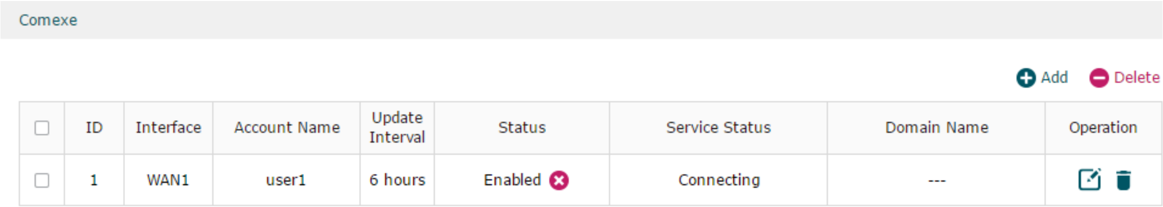
1) Click **Go to register** to visit the official website of Comexe, register an account and a domain name.

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



Comexe

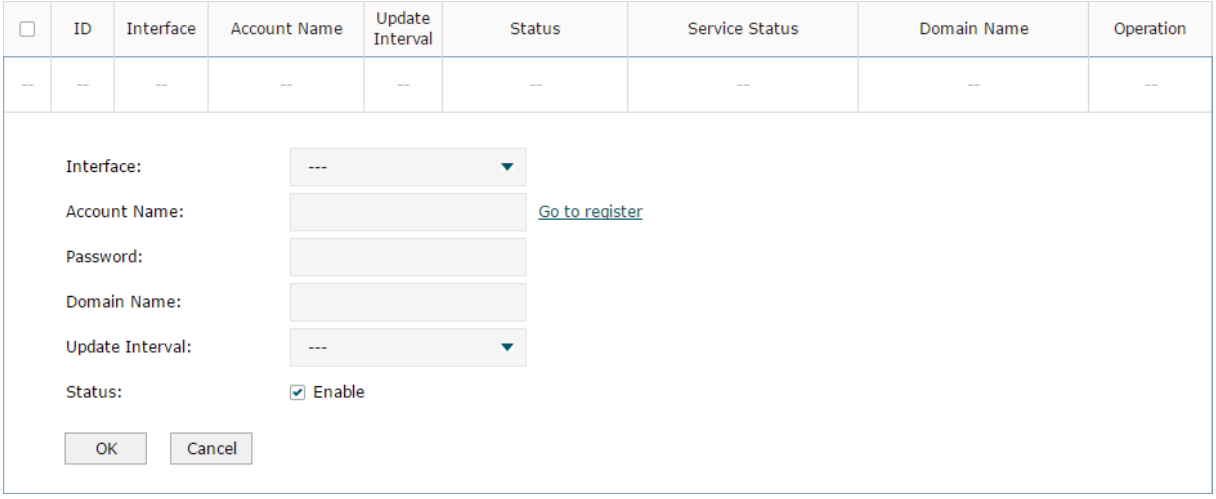
□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
□	1	WAN1	user1	6 hours	Enabled ☒	Connecting	---	

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 **Service** > **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

Follow these steps to configure DynDNS.

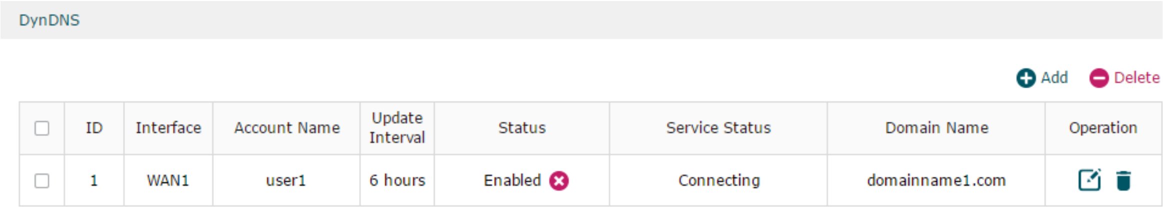
1) Click **Go to register** to visit the official website of DynDNS and register an account and a domain name.

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	

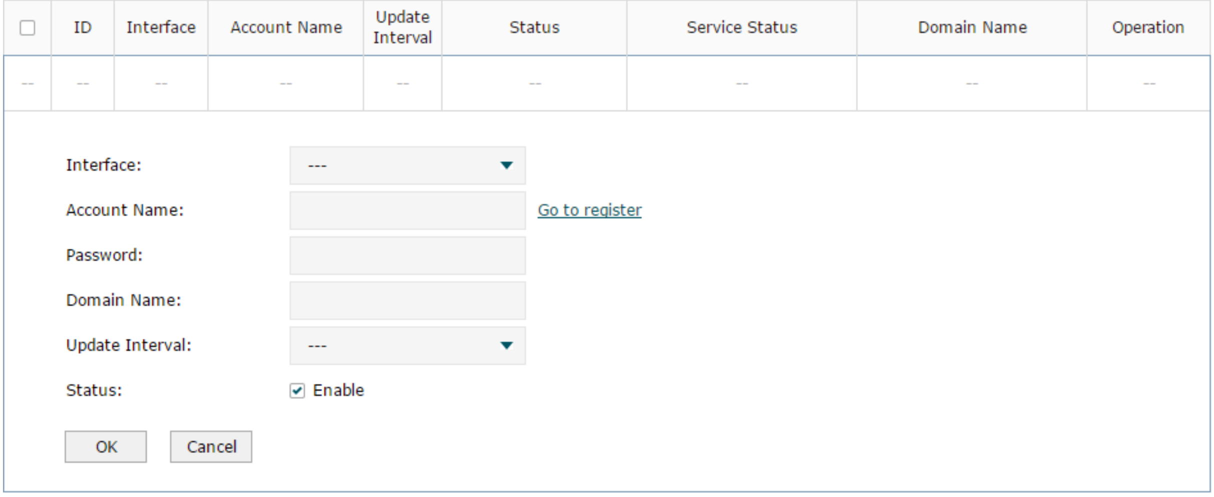
Status	Displays whether the corresponding DDNS service is enabled.

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 **Service** > **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.

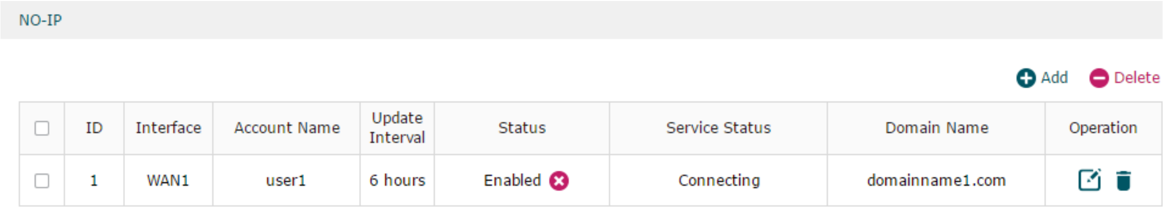
2) Configure the following parameters and click **OK**.

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



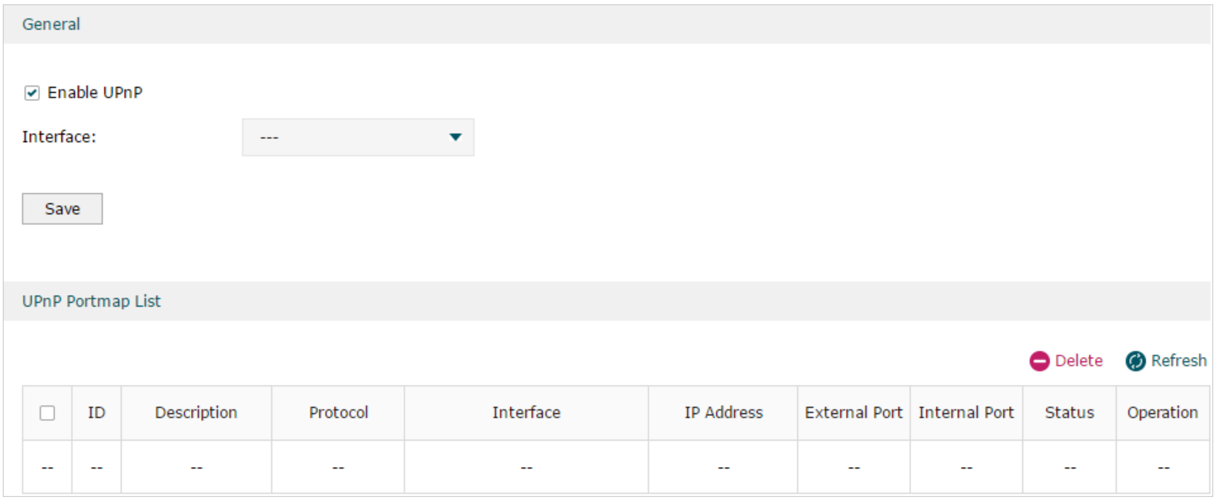
□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Operation
□	1	WAN1	user1	6 hours	Enabled ☒	Connecting	domainname1.com	

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.

3 UPnP Configuration

Choose the menu **Service** > **UPnP** to load the following page.

Figure 3-1 Configure UPnP Function



General

☑ Enable UPnP

Interface: ---

Save

UPnP Portmap List

Delete Refresh

□	ID	Description	Protocol	Interface	IP Address	External Port	Internal Port	Status	Operation
--	--	--	--	--	--	--	--	--	--

Follow these steps to configure UPnP function:

1) In the **General** section, enable the UPnP function and select the interface. Then click **Save.**

Enable UPnP	Check the box to enable the UPnP function.
Interface	Select the interface for the UPnP function.

2) (Optional) In the **UPnP Portmap List** section, view the portmap list.

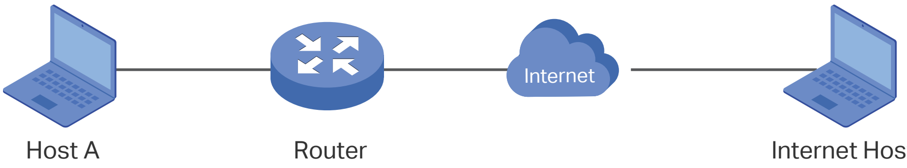
Description	Displays the description of the application using UPnP protocol.
Protocol	Displays the protocol type used in the process of UPnP.
Interface	Displays the interface used in the process of UPnP.
IP Address	Displays the IP address of the local host.
External Port	Displays the external port that 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

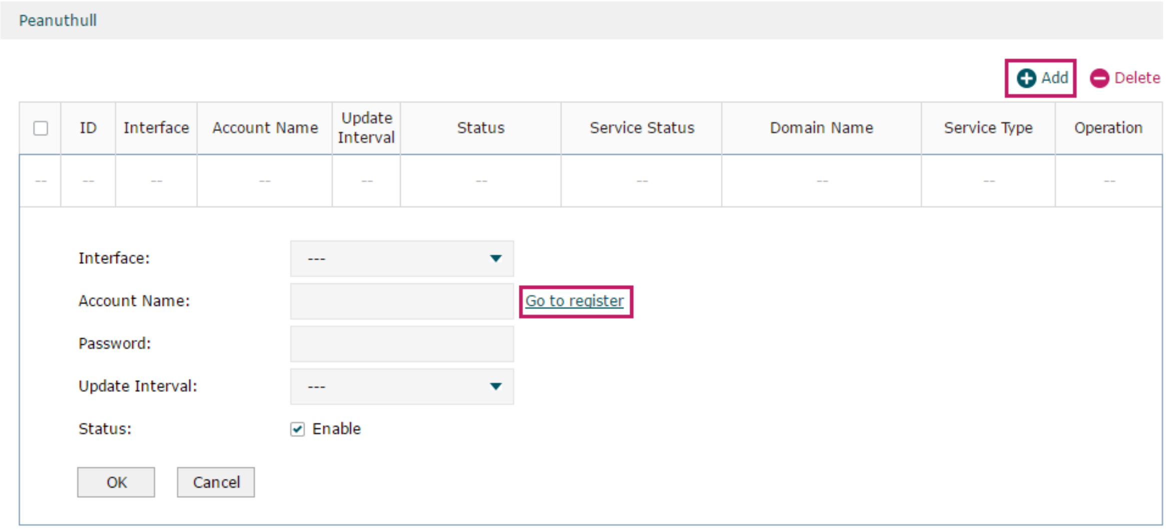
Before configuring DDNS, it is required to specify the IP address of the internet host for remote management. For details, go to **System Tools > Admin Setup > Remote Management** page.

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

Add Delete

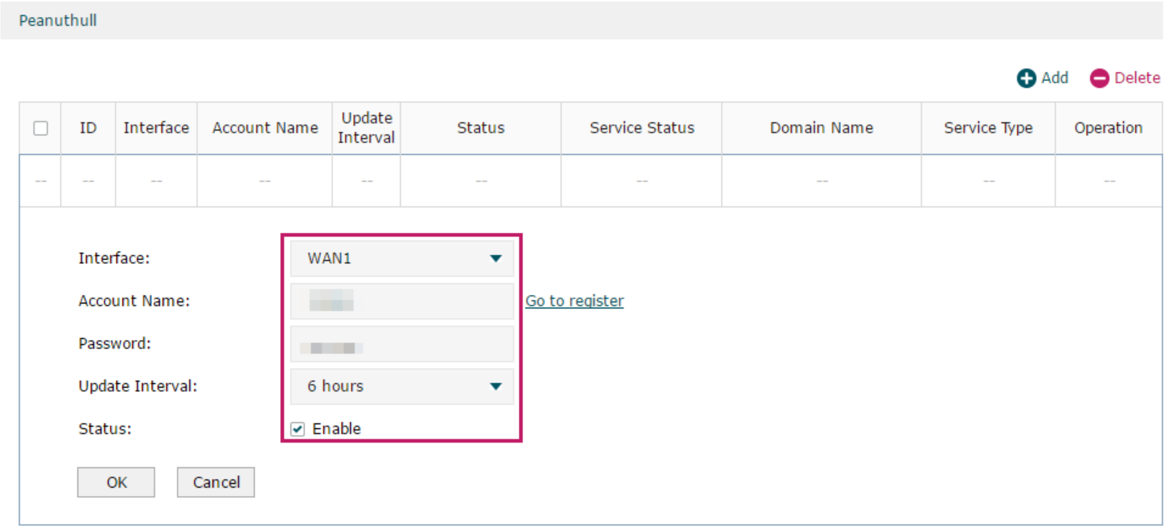
□	ID	Interface	Account Name	Update Interval	Status	Service Status	Domain Name	Service Type	Operation
--	--	--	--	--	--	--	--	--	--

Interface:	---	
Account Name:		Go to register
Password:		
Update Interval:	---	
Status:	☑ Enable	

OK Cancel

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

Add Delete

□	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	

OK Cancel

Part 11

System Tools

CHAPTERS

1 System Tools

1.1 Overview

The System Tools module provides several system management tools for users to manage the router.

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 router. With this function, you can reset the router, backup and restore the configuration file, reboot the router 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 router 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 router 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 router. You can also configure the router to send the log to a server.

2 Admin Setup

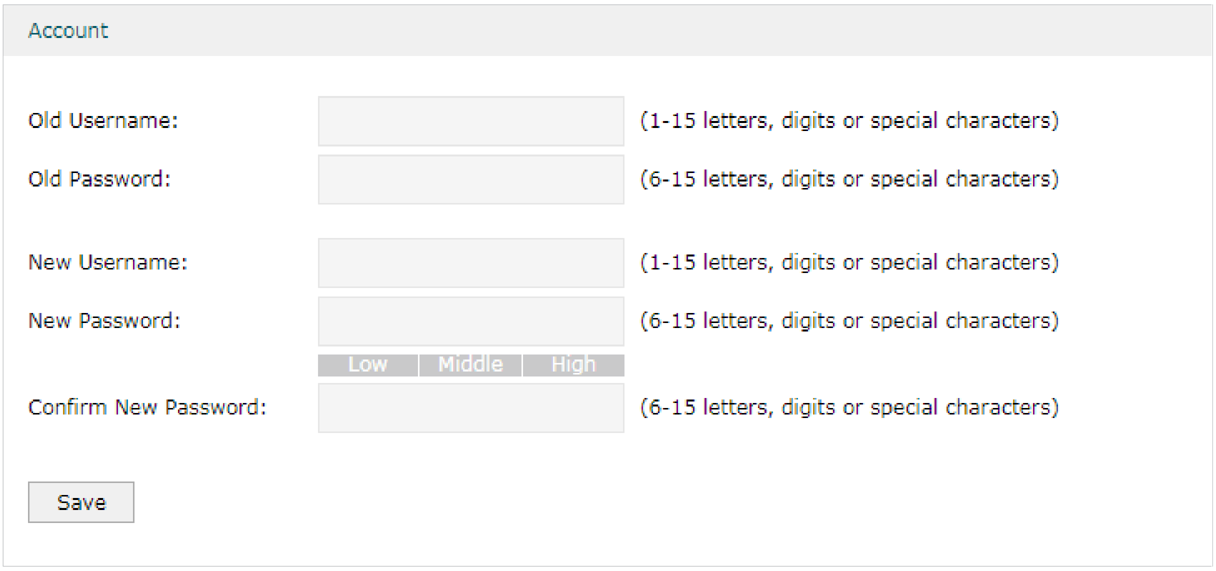
In Admin Setup module, you can configure the following features:

- 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)

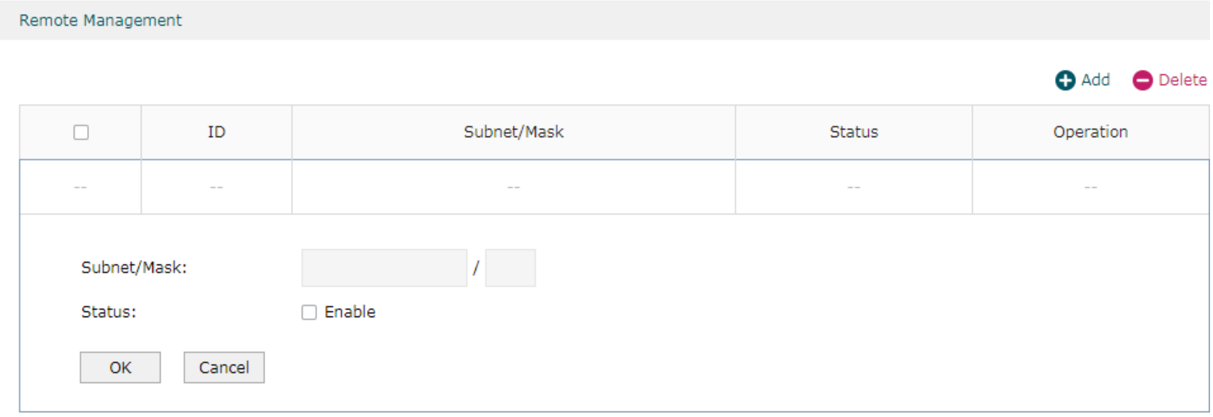
In the **Account** section, configure the following parameters and click **Save** to modify the admin account

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



□	ID	Subnet/Mask	Status	Operation
--	--	--	--	--

Subnet/Mask: /

Status: □ Enable

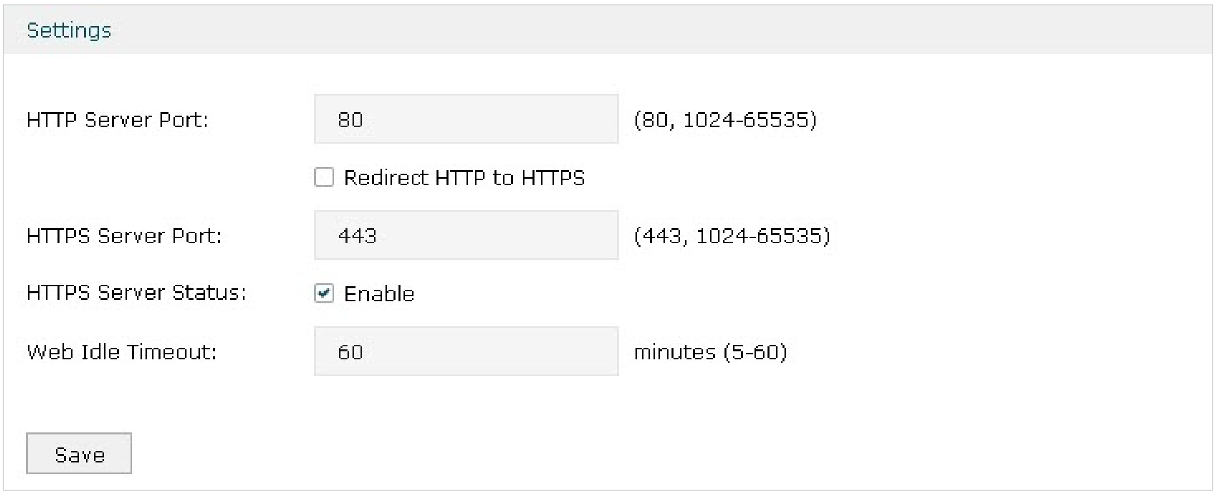
In the **Remote Management** section, configure the following parameters and click **OK** to specify the IP subnet and mask for remote management.

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



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 router, make sure the router can be discovered by the controller. Controller Settings enable your router to be discovered in either of the following scenarios.

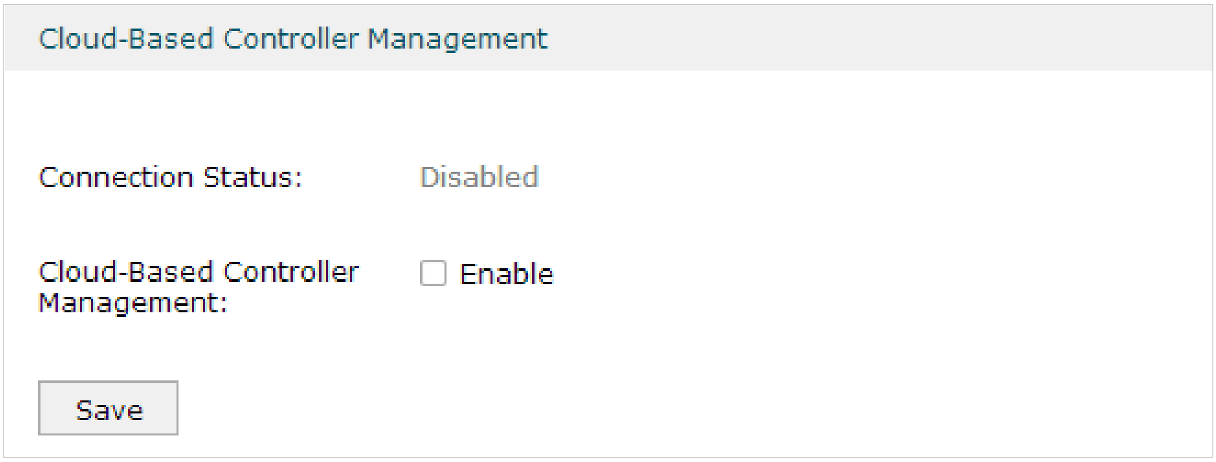
- If you are using Omada Cloud-Based Controller, Enable Cloud-Based Controller Management.
- If your router and controller are located in the same network, LAN and VLAN, the controller can discover and adopt the router without any controller settings. Otherwise, you need to inform the router of the controller's 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

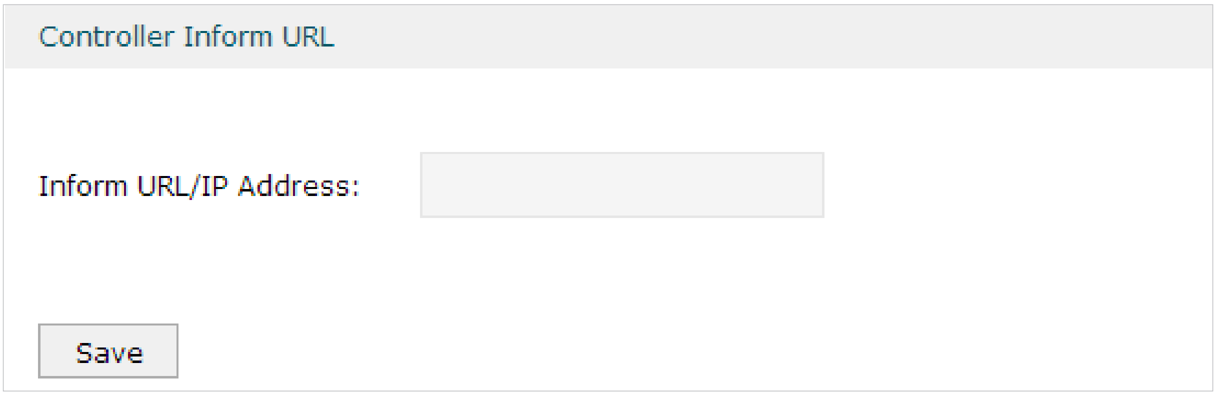
Connection Status: Disabled

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 router of the controller's URL/IP address, and click **Save**. Then the router makes contact with the controller so that the controller can discover the router.

Figure 3-2 Cloud-Based Controller Management


Controller Inform URL

Inform URL/IP Address:

4 Management

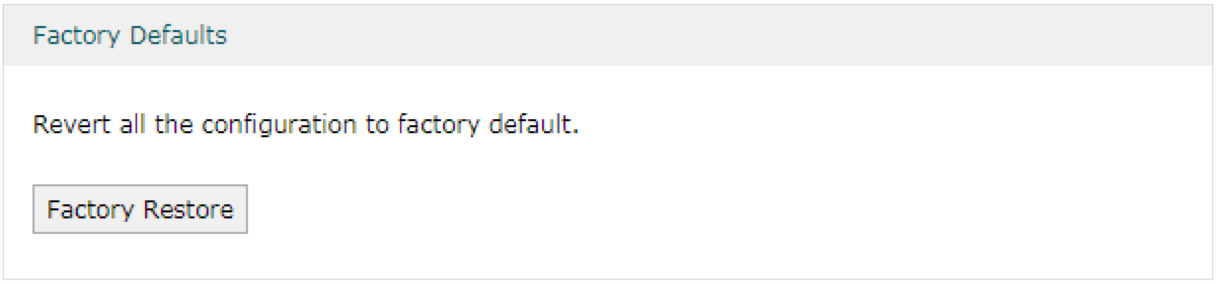
In Management module, you can configure the following features:

- 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

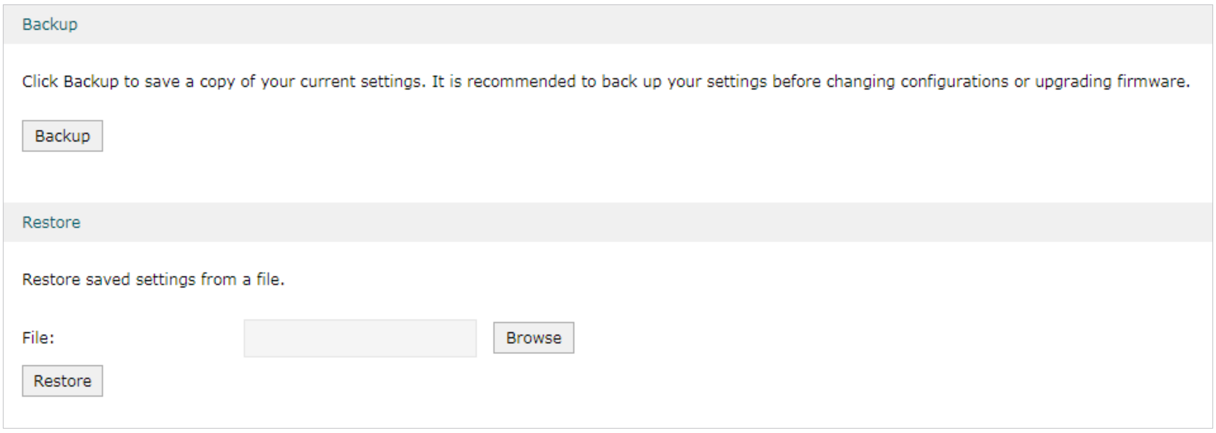
Revert all the configuration to factory default.

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:

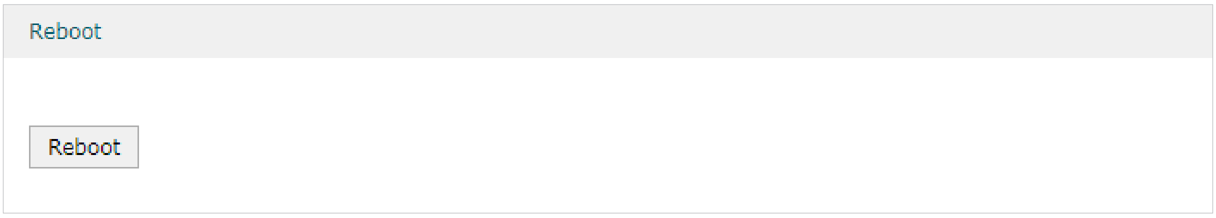
Choose the corresponding operation according to your need:

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 router.

4.3 Reboot

Choose the menu **System Tools** > **Management** > **Reboot** to load the following page.

Figure 4-3 Rebooting the Device

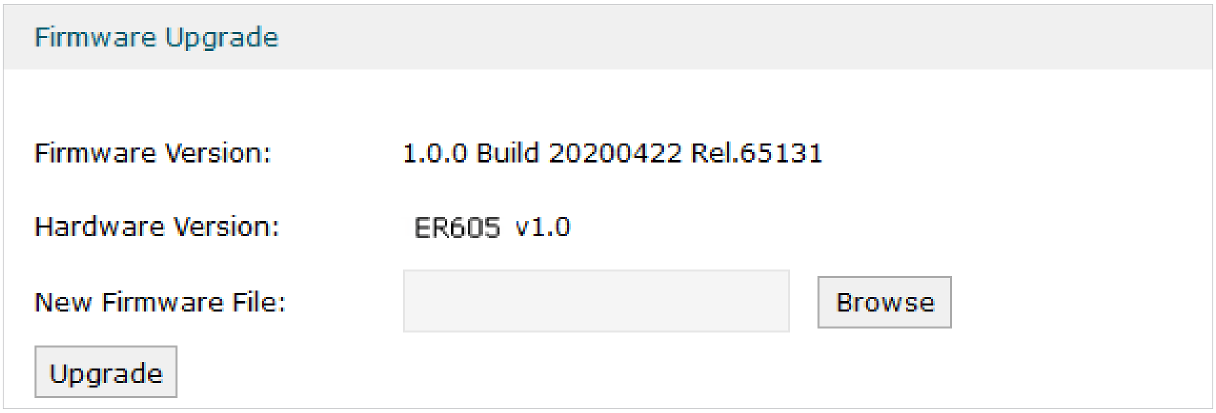


Click **Reboot** to reboot the device.

4.4 Firmware Upgrade

Choose the menu **System Tools** > **Management** > **Firmware Upgrade** to load the following page.

Figure 4-4 Configure System Settings



Firmware Version: 1.0.0 Build 20200422 Rel.65131

Hardware Version: ER605 v1.0

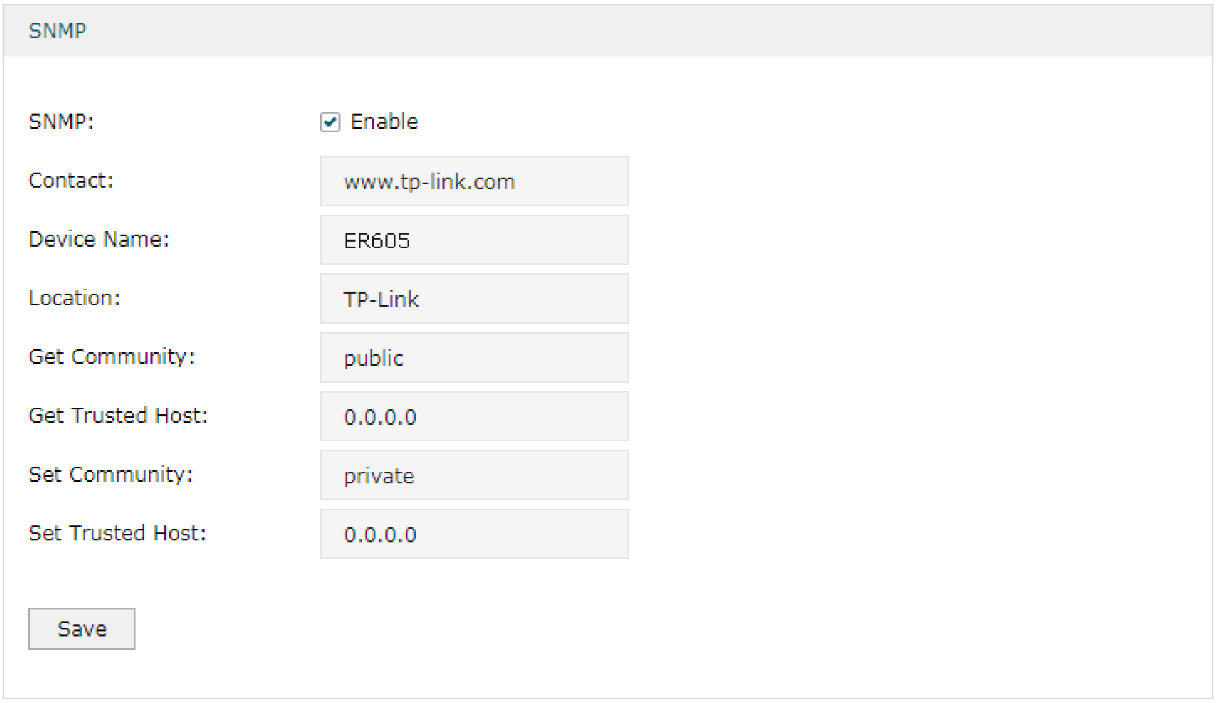
New Firmware File:

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

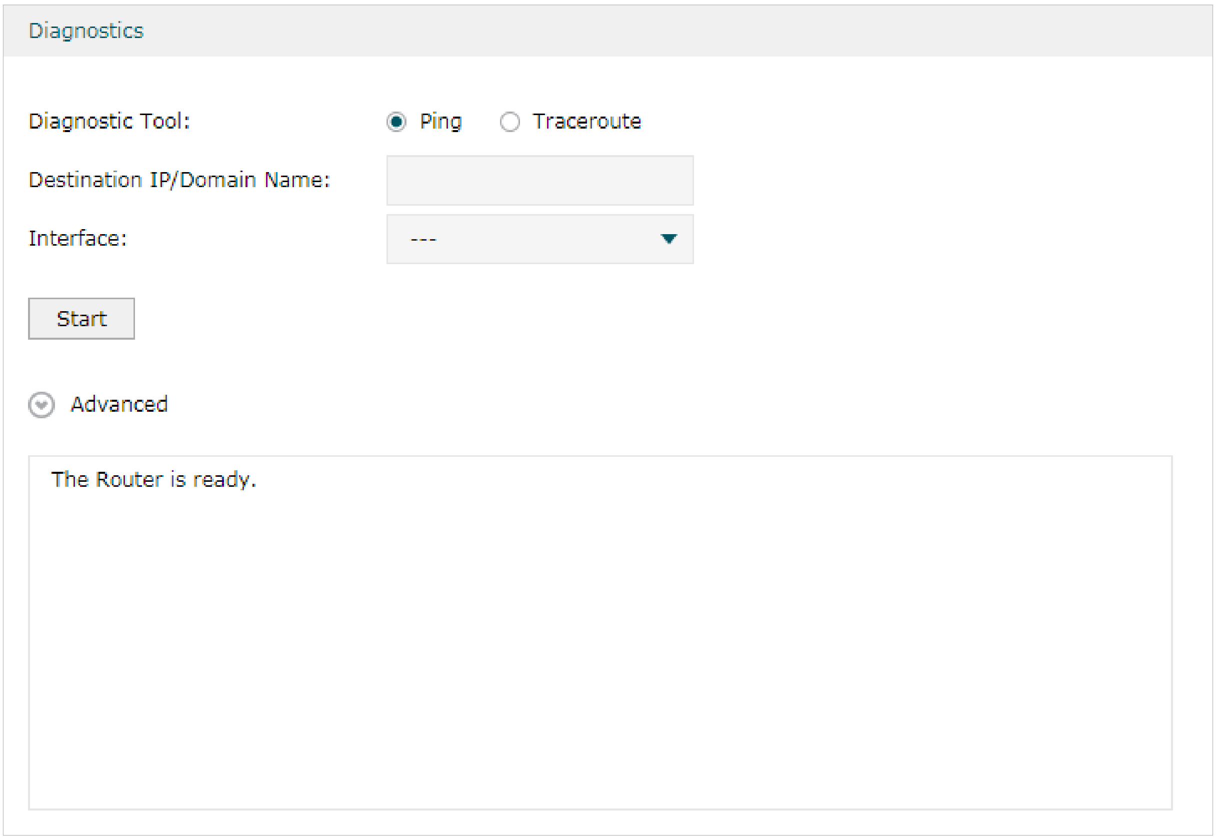
6.1 Diagnostics

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 routers 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:

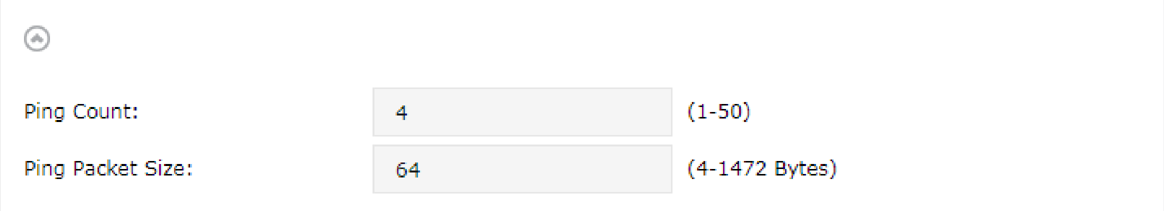
1) In **Diagnostics** section, select **Ping** and configure the following parameters.

Diagnostic Tool	Select **Ping** to test the connectivity between the router 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)

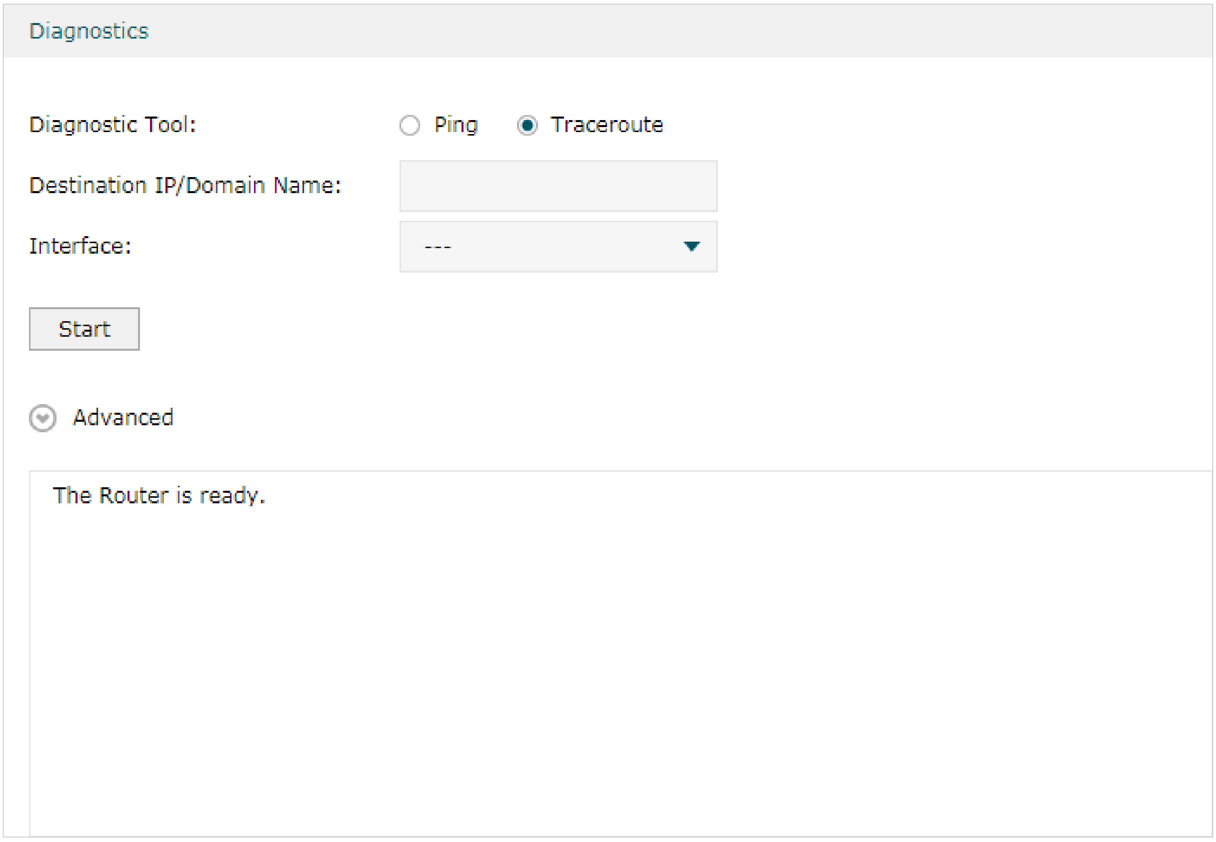
Ping Count	Specify the count of the test packets to be sent during the ping process.
Ping Packet Size	Specify the size of the test packets to be sent during the ping process.

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.

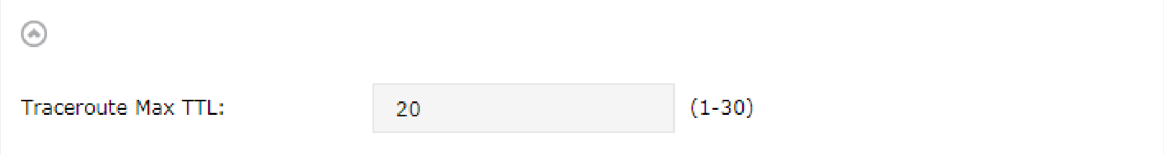
Follow these steps to configure Diagnostics:

1) In **Diagnostics** section, select **Traceroute** and configure the following parameters.

Diagnostic Tool	Select **Traceroute** to test the connectivity between the router 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**.

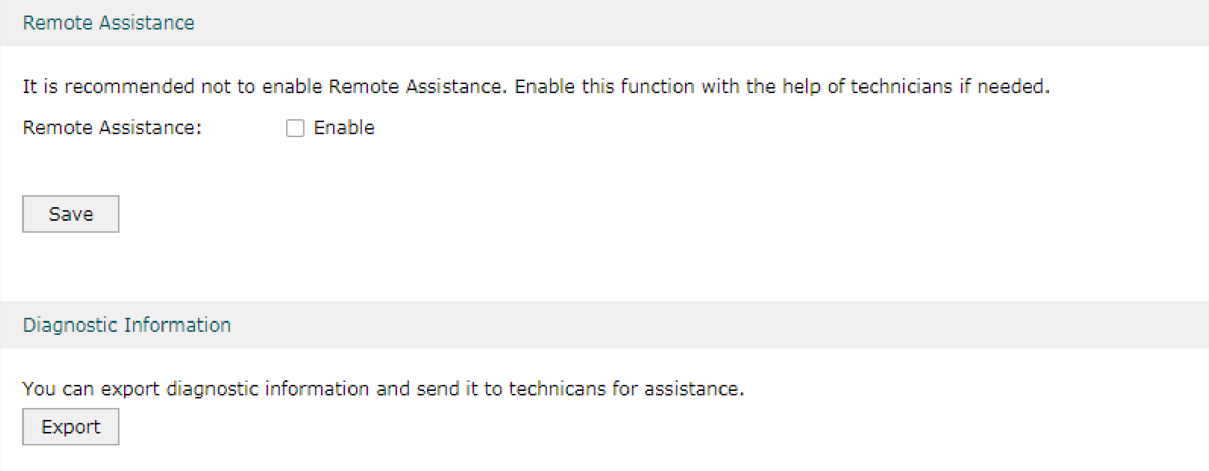
6.2 Remote Assistance

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 router 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 Time Settings

In Time Settings module, you can configure the following features:

- System Time
- Daylight Saving Time

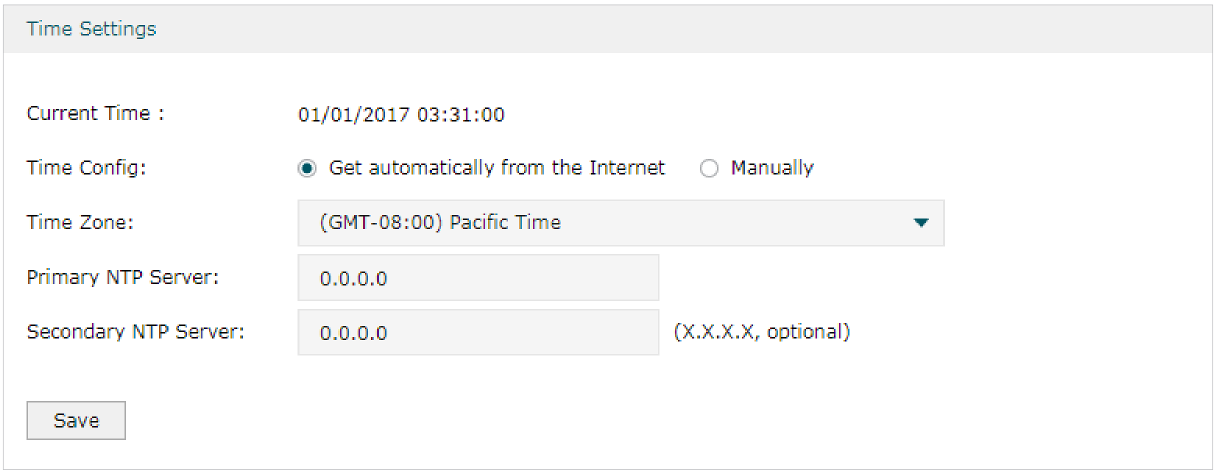
7.1 Setting the System Time

Choose one method to set the system time.

7.1.1 Getting time from the Internet Automatically

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 7-1 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)

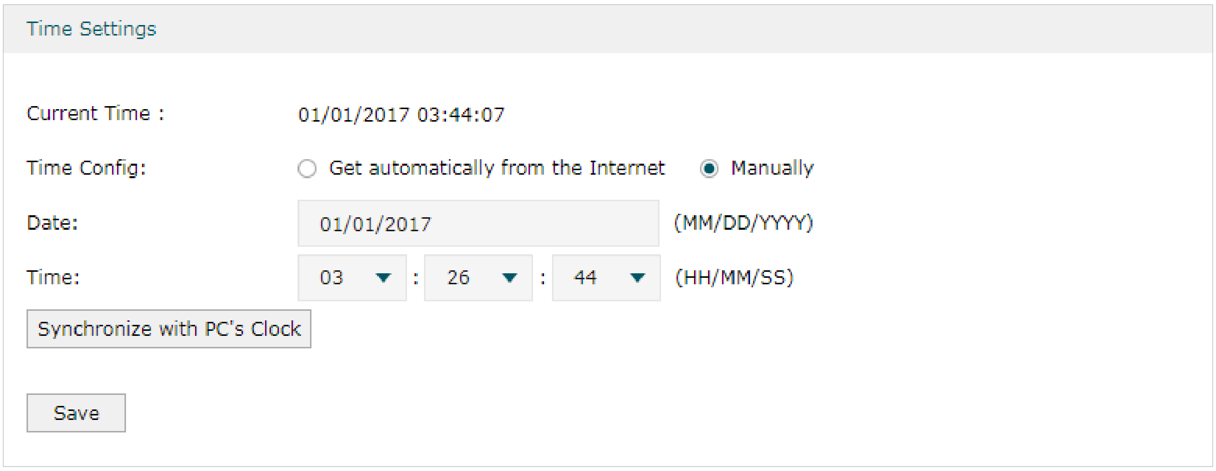
In the **Time Settings** section, configure the following parameters and click **Save**.

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.

7.1.2 Setting the System Time Manually

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 7-2 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 router with PC's clock.

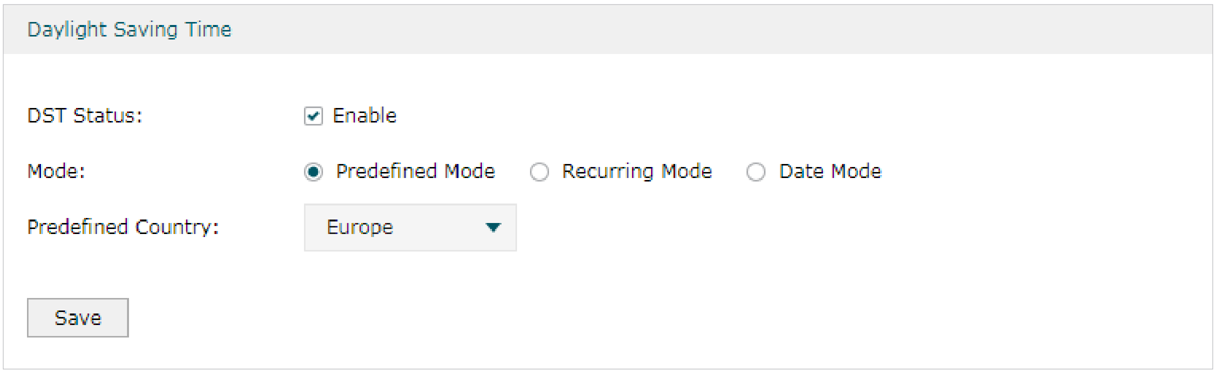
7.2 Setting the Daylight Saving Time

Choose one method to set the daylight saving time.

7.2.1 Predefined Mode

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 7-3 Predefined Mode Page



Daylight Saving Time

DST Status: ☑ Enable

Mode: ● Predefined Mode ○ Recurring Mode ○ Date Mode

Predefined Country: Europe

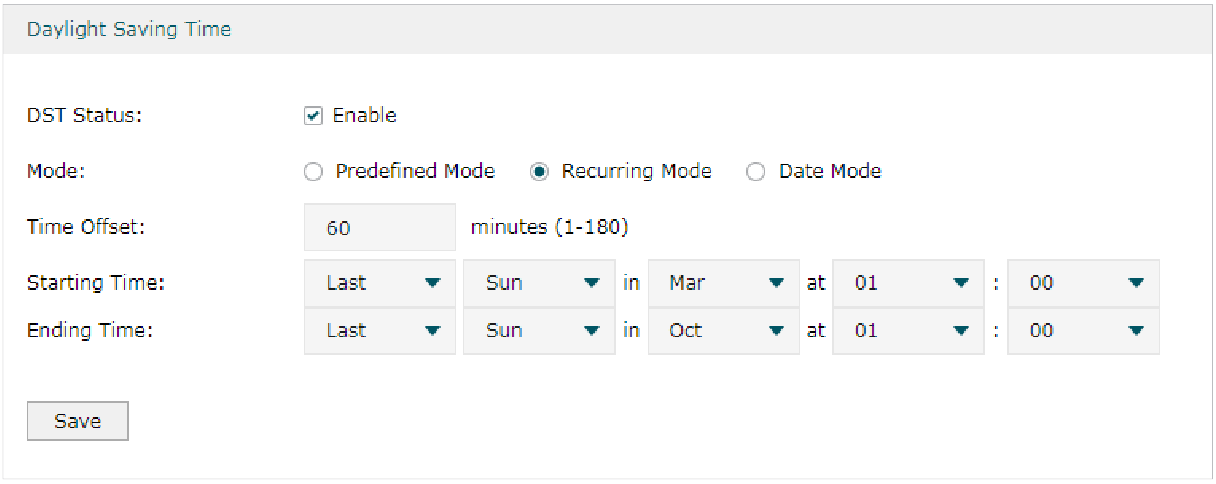
In the **Daylight Saving Time** section, select one predefined DST schedule and click **Save**.

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.

7.2.2 Recurring Mode

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 7-4 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

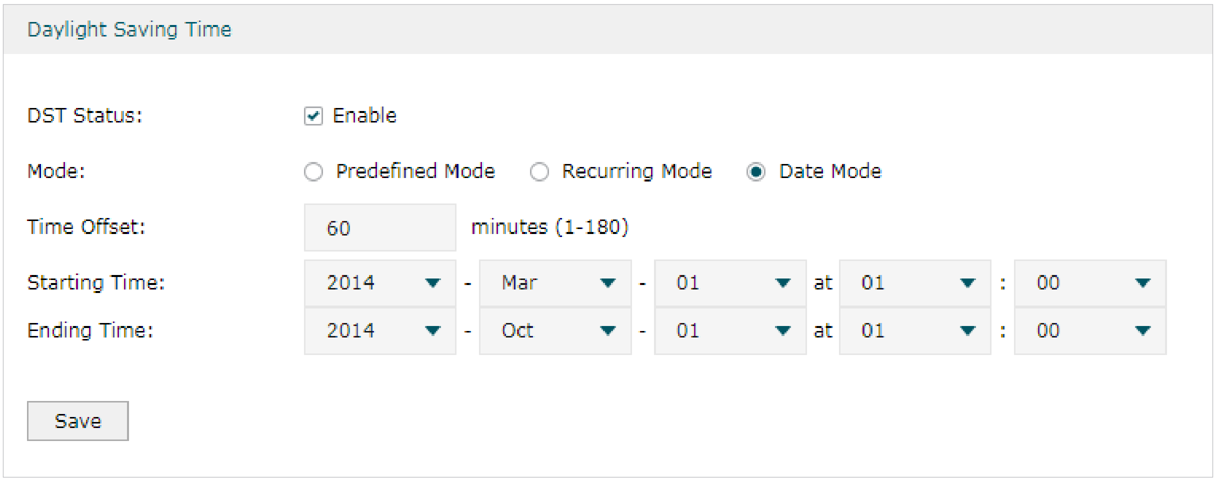
In the **Daylight Saving Time** section, configure the following parameters and click **Save**.

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.

7.2.3 Date Mode

Choose the menu **System Tools** > **Time Settings** > **Time Settings** to load the following page.

Figure 7-5 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

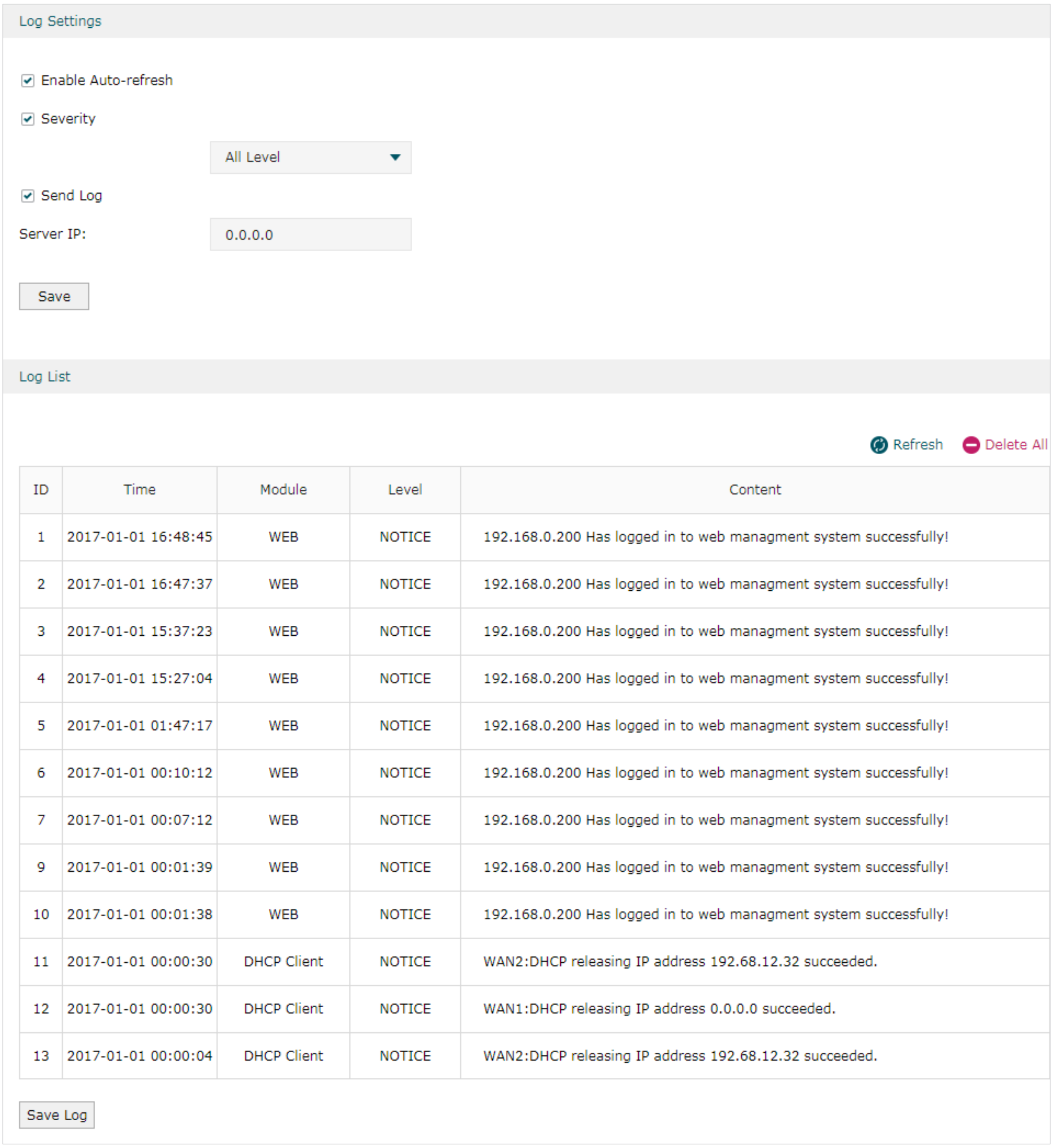
In the **Daylight Saving Time** section, select one predefined DST schedule and click **Save**.

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.

8 System Log

Choose the menu **System Tools** > **System Log** > **System Log** to load the following page.

Figure 8-1 System Log Page



Log Settings

☑ Enable Auto-refresh

☑ Severity

All Level ▾

☑ Send Log

Server IP: 0.0.0.0

Save

Log List

Refresh Delete All

ID	Time	Module	Level	Content
1	2017-01-01 16:48:45	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
2	2017-01-01 16:47:37	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
3	2017-01-01 15:37:23	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
4	2017-01-01 15:27:04	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
5	2017-01-01 01:47:17	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
6	2017-01-01 00:10:12	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
7	2017-01-01 00:07:12	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
9	2017-01-01 00:01:39	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
10	2017-01-01 00:01:38	WEB	NOTICE	192.168.0.200 Has logged in to web managment system successfully!
11	2017-01-01 00:00:30	DHCP Client	NOTICE	WAN2:DHCP releasing IP address 192.68.12.32 succeeded.
12	2017-01-01 00:00:30	DHCP Client	NOTICE	WAN1:DHCP releasing IP address 0.0.0.0 succeeded.
13	2017-01-01 00:00:04	DHCP Client	NOTICE	WAN2:DHCP releasing IP address 192.68.12.32 succeeded.

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 router 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 router 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.

2) (Optional) Click **Save Log** to save the current logs to the host.