WGR-2301

AC750 Dualb Bandb Wireless Gigabit, Dual WAN, VPN

User Manual

V1.0

Digital Data Communications Asia Co., Ltd.
http://www.level1.com

Table of Contents

0.1 Factory settings

1. The factory settings of interfaces are shown in Table 1-1.

Parameters	Factory Defaults	Note
User name	admin	User name and password are case sensitive.
Password	admin	
Address of LAN port	192.168.1.1/255.255.255.0	Intranet users can maintain the device through the address.
Address of WAN port	Dynamic IP access	
SSID 2.4G	LevelOne	For the device's SSID, the wireless clients must use the same SSID before connecting to wireless devices. Here, ABCDEF is the hexadecimal numbers converted from the device's serial number.
SSID 5G	LevelOne-5G	

Table 1-2 Factory settings

2. The factory user name of the system administrator is admin, and the factory password is admin (case-sensitive).

0.2 Contact Us

If you have any questions during installation or use, please contact us in the following manners.

- Customer service: 0800-011-110
- LEVELONE discussions: http://www.level1.com
- E-mail support: support@level1.com

Chapter 1. Product Overview

1.1 Key characteristics

- Supports fixed IP, dynamic IP, PPPoE, AP Client, 3G client access
- Supports traffic load balancing and line backup
- Supports policy routing
- Supports the Internet behavior management function
- Supports the DHCP server function
- Supports the PPPoE server functions, and provide a fixed IP allocation, account billing and other functions
- Supports daily affair notification, due account notification functions
- Supports WEB authentication function
- Supports virtual server and DMZ
- Supports various wireless modes
- Supports various wireless security mechanisms
- Supports SSID hiding
- Supports the WMM (Wi-Fi Multimedia) function
- Supports URL, MAC address, keyword filtering and other firewall policies
- Supports Internet behavior management for users, and provide a wealth of control strategies
- Supports hotel PnP (Plug and Play)
- Supports SYSLOG
- Supports the Internet behavior audit function
- Supports QQ, MSN white list
- Supports internal/external network attack and defense
- Supports user groups, time management

- Supports VPN function
- Supports UPnP
- Supports dynamic domain names
- Supports HTTP remote management
- Supports the WEB upgrading mode
- Supports backup and import of WEB configuration files
- The machine meets the 6KV lightning-proof feature

1.2 Specifications

- Compatible with IEEE802.3, IEEE802.3u, IEEE 802.11n, IEEE 802.11b and IEEE 802.11g.
- Supports TCP/IP, DHCP, ICMP, NAT, PPPoE, static routes and other protocols.
- The physical ports support auto negotiation function, and support the MDI/MDI-X adapter function.
- Provide status indicators.
- Operating environment: Temperature: 0~40°C

  Height: 0~4000m

  Relative humidity: 10%~-90%, no condensation

Chapter 2. Hardware Installation

2.1 Panel description

This section introduces the appearance of Progressive ™ 510W, and its front panel, back panel is shown in Figure 2-1, Figure 2-2.

Figure 2-1 Diagram of front panel - Progressive WGR-2301

Figure 2-2 Diagram of rear panel - Progressive WGR-2301

1. LED description

LED	Description	Function
PWR	Power LED	It is constantly on when the power supply is working properly.
SYS	System status indicator	Flashes in the frequency of 2 times per second, and the flashing frequency declines when the system burden is heavy; normally on or off in failure.
USB	Status LED for 3G Internet access card	LED is on after 3G card is inserted.
WLAN	Wireless Status LED	On when enabling the wireless feature, and flashes when sending/receiving wireless data.
WAN	Port status indicator	When a device is connected to the WAN port, the LED that corresponds to the port stays lit, and it will flash if there is flow.
LAN	Port status indicator	When a device is connected to the LAN port, the

		LED that corresponds to the port stays lit, and it will flash if there is flow.
Note	The WPS feature is temporarily not supported by this software version, so the corresponding status LED is not used.	

Table 2-1 LED description

2. Description of interfaces

Interface	Notes
LAN	Integrated with multiple Ethernet (100M) ports, LAN port is an RJ-45, and supports adaptive positive and negative lines.
WAN	WAN port is an RJ-45 and supports adaptive positive and negative lines.
USB	3G Internet card interfaces.
Antenna	For transmitting and receiving wireless data.

Table 2-2 Description of interfaces

3. Reset button

Reset button can be used to recover the device's factory settings when you forget the administrator password. Method: In the process of charged operation, hold down the Reset button for more than 5 seconds, and then release the button. The device will be returned to its factory settings after operation, and automatically restart.

Note: The above operations will delete all the original device configurations; please use it with care!

2.2 Precaution for installation

1. Make sure to install the workbench stably.
2. Do not place any heavy objects upon the device.
3. Make sure that the device is stored in a dry and ventilated area with proper heat dissipation, and do not put it in a dirty and damp place.
4. Avoid exposing the device directly to the sunlight and keep it far away from heating elements.
5. Mount the device away from the places where high power radio transmitters, radar transmitters reside as far as possible.

6. Please use the original power cord.

2.3 Preparing for installation

1. We have applied to local operators (ISP, such as China Telecom, China Unicom, etc.) for broadband services.
2. Preparation of related devices:
    1) Modem (This item is not required when connected directly to Ethernet).
    2) Hub or switch or wireless devices.
    3) The PC with Ethernet card and Internet Protocol (TCP/IP) installed.
    4) Power socket.
3. Preparation of tools and cables: Network cables.

2.4 Hardware Installation

Before installing the device, make sure the broadband service is normal. If you cannot access, please contact operators (ISP) to resolve the problem. After successfully accessing to the network, follow these steps to install the device. The power plug must be removed during installation.

Place the device on a stable work bench:

1. Place the device on a sufficiently large, stable and properly-grounded work bench with its bottom up.
2. Remove the adhesive protective paper from the foot pad, and stick the 4 pads in the 4 round slots at the bottom of the casing respectively.
3. Flip over the device, and place it on the workbench stably.

2.5 Hardware connection

1. Establish a LAN connection

Connect the LAN port of the router and a PC or a hub or a switch in LAN with a network cable. Or after the device's wireless feature is enabled, connect wireless clients or other wireless devices to the router over a wireless connection.

2. Establish a WAN connection

Connect the WAN port of the router to the Internet with a network cable, as shown in the figure below.

3. Connect power source

Before connecting the power supply, make sure that both power supply and grounding are normal.

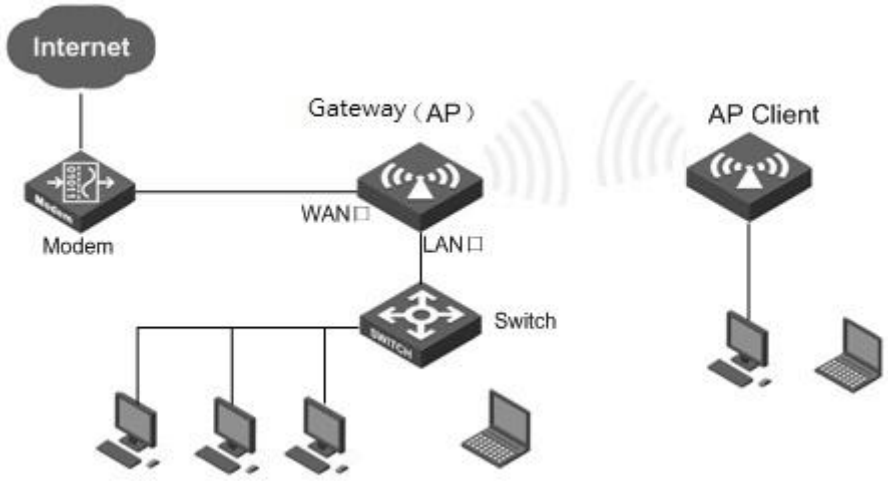


Figure 2-3 Establish a LAN connection and a WAN connection

Tip: The above network connection diagram is for reference only. Please configure the network architecture according to the actual situation and needs.

Chapter 3. Logging to the device

This chapter describes how to configure the correct network settings for the network computers, how to log on to the appliances and how to use shortcut icons to quickly link to the HiPER website for product information and services.

3.1 Configuring the correct network settings

Before logging to the device through the WEB interface, you must correctly configure the network computers in network settings.

First, connect your computer to the LAN port of the device, and then set the computer's IP address.

The first step is to set the computer's TCP/IP. If it has been set correctly, skip this step.

The second step is to set the computer's IP address. You can use either of the following methods:

1. Set the computer's IP address as one of the addresses from 192.168.1.2 - 192.168.1.254, the subnet mask is 255.255.255.0, and the default gateway is 192.168.1.1 (the LAN IP address of the device), and the DNS server is the address provided by the local operator.
2. Set the computer's TCP/IP as "Obtain an IP address automatically". After setting, the built-in DHCP server of the device will automatically assign IP addresses to computers.

The third step is to use the Ping command on your computer to check whether it is connected to the device. In **Start ->Operation**, type in **cmd**, and click <OK> to open the command window. Type in **ping 192.168.1.1**.

The following lists two kinds of results of executing the Ping command in the Windows XP environment:

If the screen is shown as follows, it indicates that the computer has been successfully and a connection is established on the device.

```
Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1:    bytes=32 time<1ms TTL=255

Reply from 192.168.1.1:    bytes=32 time<1ms TTL=255

Reply from 192.168.1.1:    bytes=32 time<1ms TTL=255

Reply from 192.168.1.1:    bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.1:

    Packets:    Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:
```

If the screen is shown as follows, it indicates that the connection between the computer and the device fails.

```
Pinging 192.168.1.1 with 32 bytes of data:

Request timed out.

Request timed out.

Request timed out.

Request timed out.

Ping statistics for 192.168.1.1:

Packets:    Sent = 4, Received = 0, Lost = 4 (100% loss),
```

When connection fails, please check the following items:

1. Hardware connections: The LEDs that correspond to the LAN port on the device panel and the PC network card LED must be on.
2. Configuring TCP/IP properties of the computer: If the LAN IP address of the device is 192.168.1.1, then the calculated IP address must be any one of the free addresses from 192.168.1.2 - 192.168.1.254.

3.2 Logging to the device

When MS Windows, Macintosh, Unix or Linux operating systems are used on the PC, the device can be configured through browsers (such as Internet Explorer or Firefox).

Open the browser, and type in the IP address of the device's LAN port in the address bar,

such as http://192.168.1.1. After the connection is established, you will see a login interface as shown in Figure 3-1. In the first use, you should log in as a system administrator, that is, enter your administrator username and password (the factory defaults of username, password are admin and admin respectively, which are case sensitive) on the login interface, and then click <OK>.

Figure 3-1 WEB login interface

If user name and password are correct, the browser will display the homepage of the WEB management interface, as shown in Figure 3-2. The top-right corner of the page displays device model, hardware version, software version and other information.

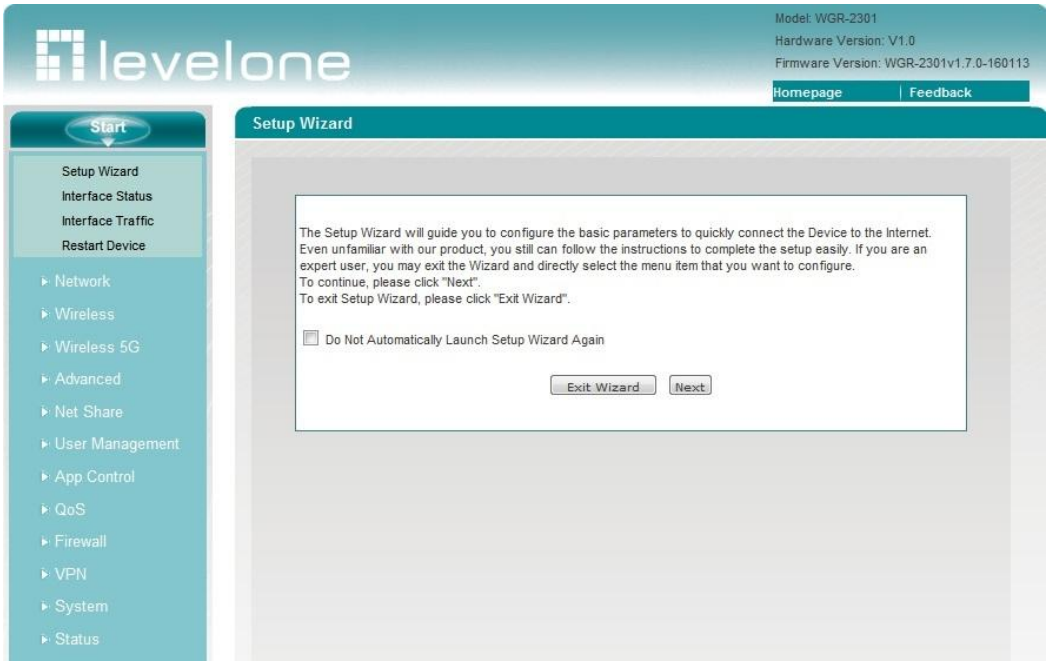


Figure 3-2 Homepage of the WEB interface

Homepage description:

1. The top-right corner of the page displays device model, hardware version, software version and three fast link icons. These 3 shortcut icons have the following functions:

    1) **Product Discussion–** Link to the discussion forums of the HiPER official website to participate in discussions about the product.

    2) **Knowledge Base**– Link to the knowledge base of HiPER official website for searching related technical information.

    3) **Booking Service**– Link to the booking service page of HiPER official website, for advance reservation of the customer service in a certain working period.

2. This page displays the main menu bar on the left.

3. The main operating page is located on the right of the page, in which you can configure various functions of the device, view the related configuration information and status information, etc.

4. If this is the first time for you to log in the device, the main operation page will be linked directly to the configuration wizard page. The next chapter describes how to configure the basic parameters required for the normal running of the device in the ***Start -> Configuration wizard*** page.

Chapter 4. Configuration Wizard

By reading this chapter, you can understand the basic network parameters required for the device to access to the Internet, and these parameters are configured to connect the device to the Internet. Before configuring "Internet Line" in the Configuration Wizard, you should properly configure the network settings of the network computer. For specific methods, see Chapter 3 Logging in the Device.

If this is the first time for you to log in the device, a configuration wizard homepage appears directly in the main operating page. As shown in Figure 4-1:

Figure 4-1 Homepage of configuration wizard

- In logging next time, the wizard will no longer automatically pop up: When checking it, you can go directly to the ***System Status*** page in logging next time.
- Exit the wizard: Exits the Configuration Wizard and returns to the ***System Status*** page.
- Next step: Enter the ***Selection of device access mode*** page.

4.1 Configuration of WAN1 port

Access modes provided by WAN1 port include: dynamic IP access, fixed IP access, PPPoE access.

4.1.1 Dynamic IP access

The default WAN1 access is dynamic IP access, as shown in Figure 4-3. If your Internet access mode is dynamic IP access, please click <Next>, to complete the configuration of the WAN1 port.

Figure 4-2 Configuration Wizard - Dynamic IP access

4.1.2 Static IP access

If your Internet access mode is Static IP access, please select "Fixed IP access" in the drop-down list box of Figure 4-4, and fill in the related parameters, and enter into the next page, to complete the configuration of WAN1.

Figure 4-3 Configuration Wizard - Static IP access

- IP address, subnet mask, gateway address, primary DNS server, secondary DNS server: Fill in the WAN IP address, subnet mask, gateway address and DNS server address that ISP (Such as China Telecom) offers you.

4.1.3 PPPoE access

If your Internet access mode is PPPoE access, please select "PPPoE access" in the drop-down list box of Figure 4-5 , and fill in the corresponding user name and password, and then click <Next> to enter into the next page to complete the configuration of WAN1.

Figure 4-4 Configuration wizard - PPPoE access

- User name, password: Type in the user name, password provided by the ISP. If you have any questions, please ask your ISP.

Chapter 5. Start menu

Start menu is located on the top of the Level 1 menu bar of the WEB interface, providing the interface for 4 common pages, including: configuration wizard, running status, port flow, device reboot. In the ***Start*** menu, you can quickly configure the basic parameters required by the device in working properly, view the information about the interfaces, and view the statistics data of the devices' real-time traffics.

5.1 Setup Wizard

The ***Start-> Setup wizard*** pages can help you to quickly configure the basic parameters required by some devices in working normally. For details, see Chapter 4 Configuration Wizard.

5.2 Interface status

This section describes the ***Start-> Interface status*** page, in which you can view the information about the device's interfaces. As shown in the interface in Figure 5-1, the connection type, connection status, IP address and other information about the interfaces can be viewed.

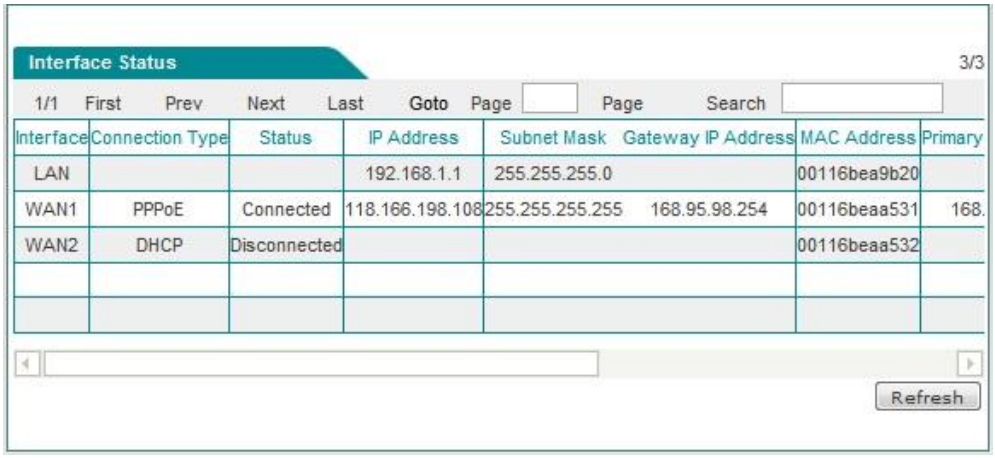


Figure 5-1 Interface status

5.3 Interface Traffic

This section describes the ***Start-> Interface Traffic*** page, as shown in Figure 5-2. You can view the average, maximum, sum and the current real-time rate for the relevant ports to receive and send data, and provide different units (Kbit/s and KB/s) for them.

Tip:

If this page fails to display properly, please click the hyperlink "If it cannot display properly, please install a svgviewer" to have the svgviewer plug-in installed.

Figure 5-2 Interface Traffic

- WAN1: WAN port of the device, click on the tab to view the dynamic figure of receiving, sending traffic.
- APClient: The wireless client of the device, click on the tab to view the dynamic figure of receiving, sending traffic.
- LAN: LAN port of the device, click on the tab to view the dynamic figure of receiving, sending traffic.
- Timeline: The x-coordinate in the flow chart. You can click on the timeline options (1x, 2x, 4x, 6x in the figure) in the figure to determine the display effect.
- Flowline: The y-coordinate in the flow chart. You can choose the display effects as needed (standardization, maximization as shown in the figure).

- Display: Provides two display effect options, solid effect and hollow effect.
- Color: It can be selected for display according to needs and preferences, such as red, blue, orange, etc.
- Flip: Click the Flip button, and the colors can swap to receive and send data.

5.4 Restart device

If you need to restart the device, just enter into the ***Start-> Restart device*** page to click <Restart>.

Figure 5-3 Restart device

Tip: Upon restarting, all users will be disconnected from the device.

Chapter 6. Network parameters

In the network parameter menu, you can configure the basic network parameters for the device, including WAN/LAN configuration, line combination, DHCP server, DDNS configuration and UPnP.

6.1 Configuration of WAN port

This section describes the ***Network parameters ->WAN configuration*** page. In this page, you can configure not only the line information, modify or delete the configured lines according to the actual needs, but also view the connection status of lines.

After completing the configuration of Internet line in ***Configuration Wizard***, you can view the connection and configuration of the line in this page, or modify the configuration as needed.

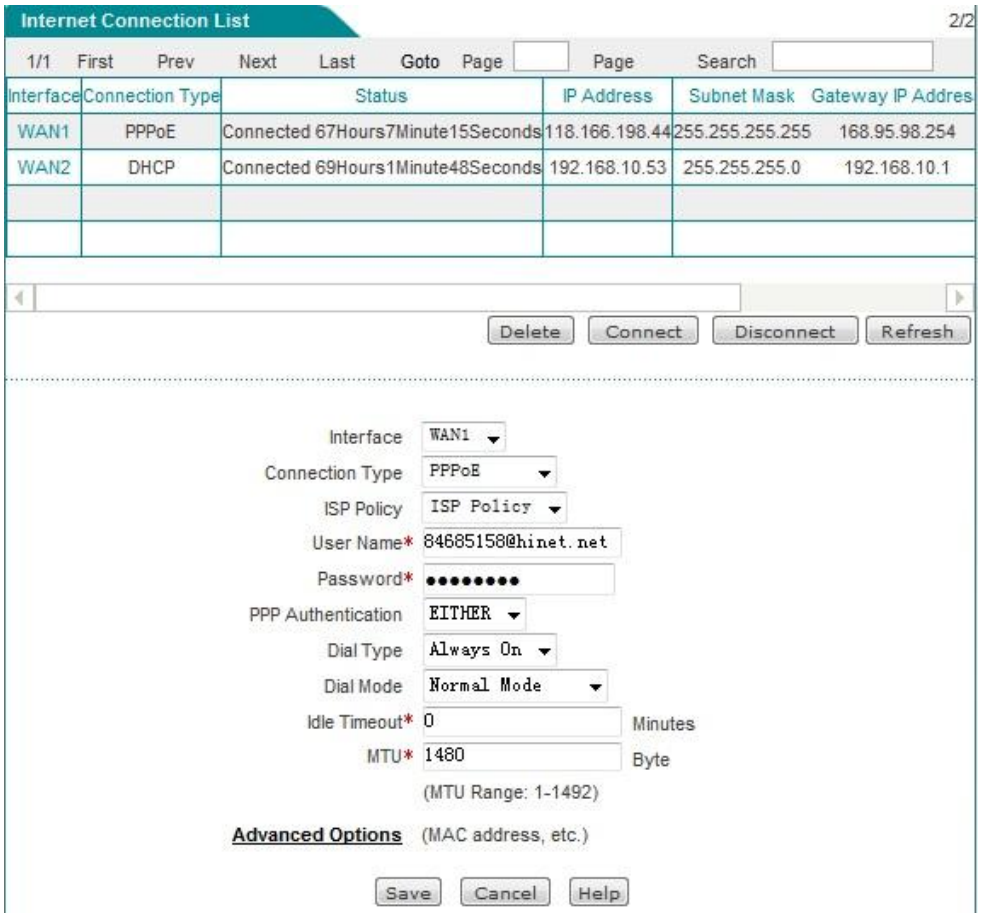


Figure 6-1 Configuration of WAN port

6.1.1 WAN1 access

1. Dynamic IP access

Figure 6-2 Dynamic IP access

- Access mode: Selects the corresponding access mode, and "Dynamic IP access" is selected here.
- Operator policy: Selects the operator of the interface, with the options as follows: Operator policy, China Telecom, China Unicom and China Mobile respectively.
- Working mode: Options include NAT and routing mode.
  - NAT mode: Network address translation. The router working in this mode can convert the IP address of the Intranet (LAN side) to that of the external network (WAN side). The router works in this mode by default.
  - Routing mode: The router working in this mode will not NAT-convert the IP address for the Intranet (LAN side) to access to the external network (WAN side), and directly looks up the routing table for forwarding.
- MAC address: The MAC address of the corresponding interfaces.
- Interface mode: Sets the duplex mode and rate for interfaces. Options are: Auto (adaptive), 10M-FD (10M full duplex), 10M-HD (10M half duplex), 100M-FD full duplex (100M), 100M-HD (100M half duplex). The default is Auto, which is usually not required to be modified, and if there is any compatibility issue, or the device used does not support auto negotiation function, then the type of Ethernet negotiation can be set up here.

Tip:

1. When configuring the line, users can select the appropriate operator through "Operator policy", and the system will generate a corresponding route based on the user's choice, you can easily achieve the goal that Telecom traffic flows on the

Telecom routes while Unicom traffic flows on the Unicom routes.

2. Generally, it is not recommended to modify the MAC address of interfaces. However, in some cases, the operator binds the MAC of the device, which results in the failure of the new network device to dial up successfully, and at this time, the MAC address of the device needs to be modified as that of the original network device.

2. PPPoE access

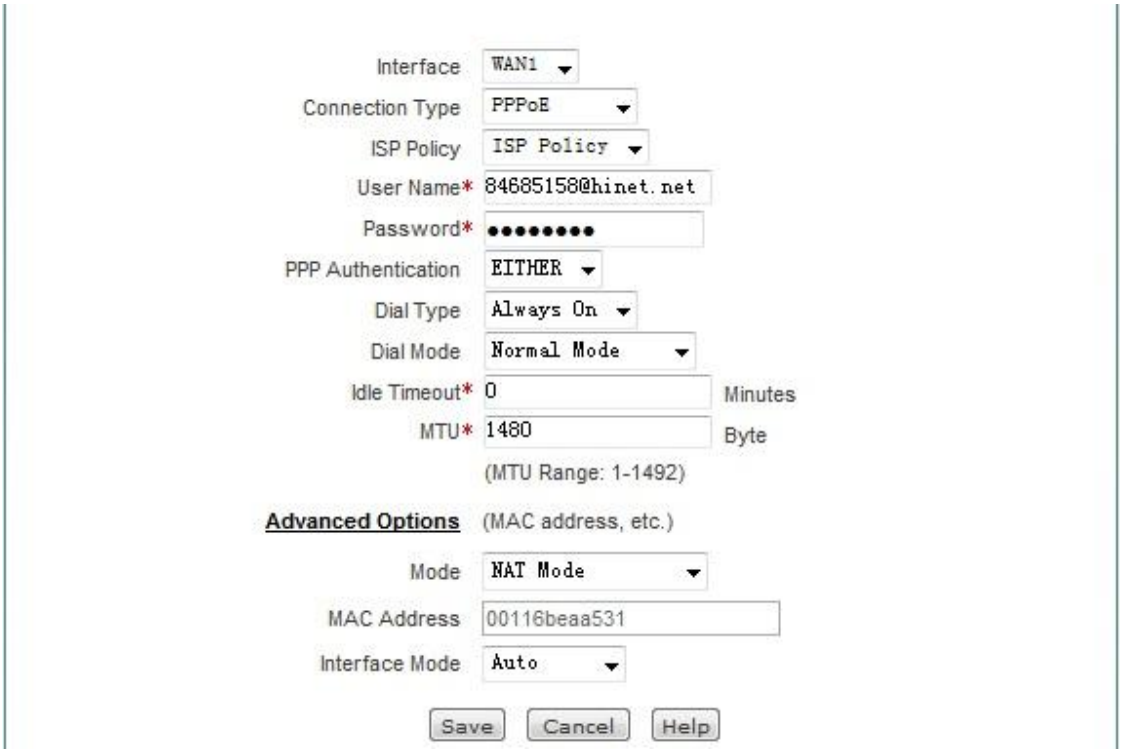


Figure 6-3 PPPoE access

- Password authentication mode: The mode that operators verify user names, passwords. Options include: NONE (not to be verified), PAP, CHAP, and EITHER (automatically negotiate with the peer device on the mode of password authentication).
- Dialing type: The options include auto dialing, dialing on demand, manual dialing.
  - Auto dialing: The device automatically dials up when it is powered on or the previous dial-up disconnection occurs.
  - Dialing on demand: The device will dial up automatically when there is Internet traffic in the intranet.
  - Manual dialing: Manual dialing and hanging up. Click <Dial>, and <Hang up> on the bottom right of the list to implement manual dialing.
- Dialing mode: If the dial-up is not successful, try using other modes on the premise of using the correct user name and password.

- Idle time: The time length after there is no Internet traffic of access and before automatic disconnection. 0 means no automatic disconnection.
- MTU: Maximum transmission unit, 1480 bytes by default. The device will automatically negotiate with the peer device in PPPoE dialup. Do not modify it unless in special applications.
- For the working mode in the advanced options, MAC address, interface mode, please refer to the configuration of dynamic access.

3. Static IP access

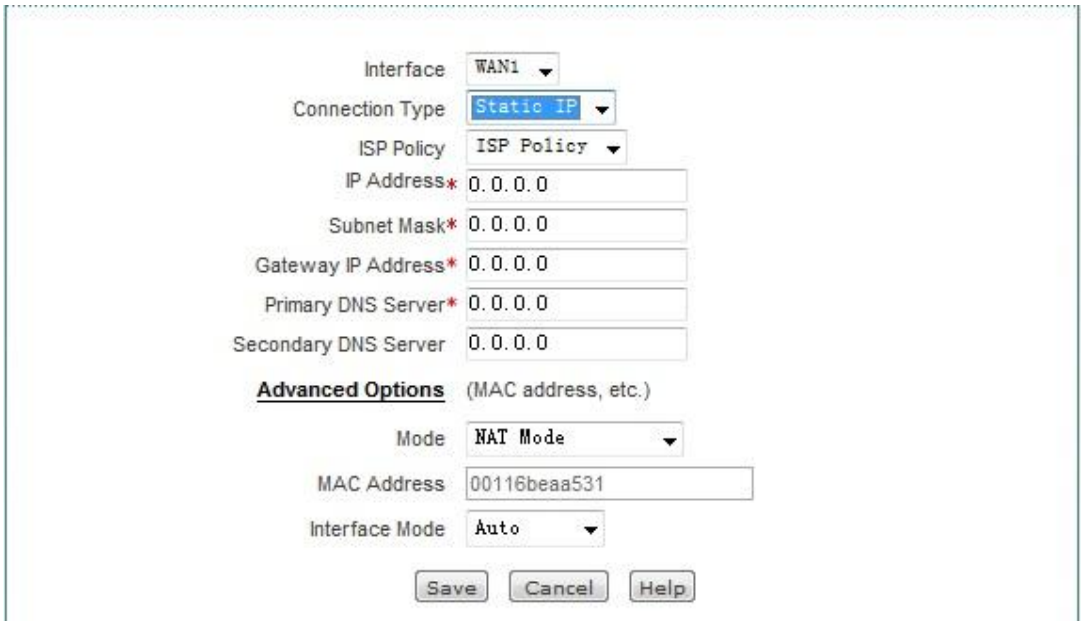


Figure 6-4 Static IP access

- IP address, subnet mask, gateway address: Static IP address, subnet mask and gateway address provided by the operator.
- Primary, secondary DNS server: The DNS server address the operator provides to you.
- For the working mode in the advanced options, MAC address, interface mode, please refer to the configuration of dynamic access.

6.1.2 List of line connection information

The following describes the list of line connection information when the connection types are dynamic IP access, Static IP access, PPPoE access,

1. Dynamic IP access

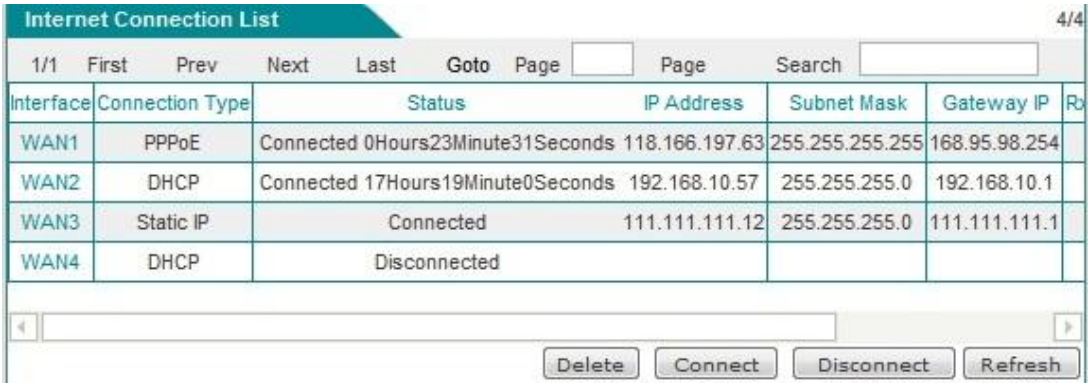


Figure 6-5 List of line connection information - Dynamic IP access

As shown in the above figure, APClient port is a dynamic IP access.

- Connection type: In the case of "Connected", it shows the time length of the connection.
- Downstream rate, upstream rate: The downlink/uplink average rate of the current line at the time interval of two times of list refreshing. The unit is KB/s.
- Delete: Deletes the appropriate line.
- Update: Click <Refresh>, and the system automatically completes the process of releasing the IP address, and then obtaining an IP address again.
- Release: Click <Release>, to release the currently obtained dynamic IP address.
- Refresh: Click <Refresh>, to display the up-to-date information of line connection information list.

2. Static IP access

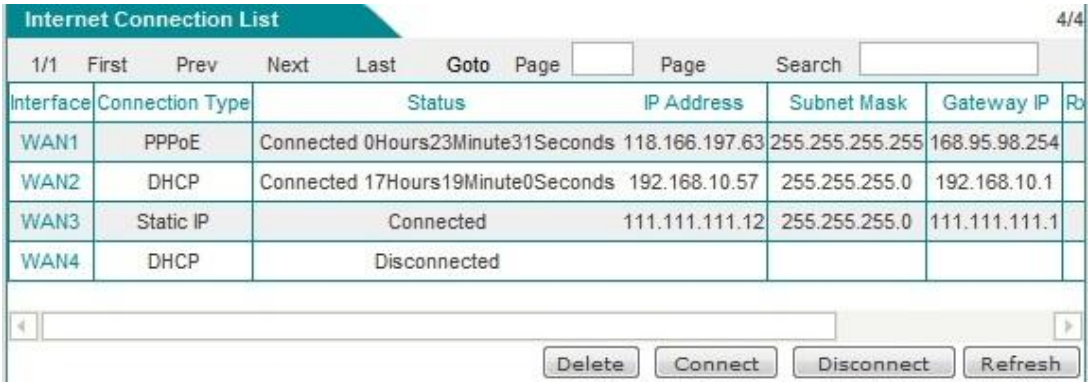


Figure 6-6 List of line connection information - Static IP access

As shown in the above figure, WAN3 is Static IP access. Its IP address, subnet mask, gateway address are the parameters for configuring the WAN port.

3. PPPoE access

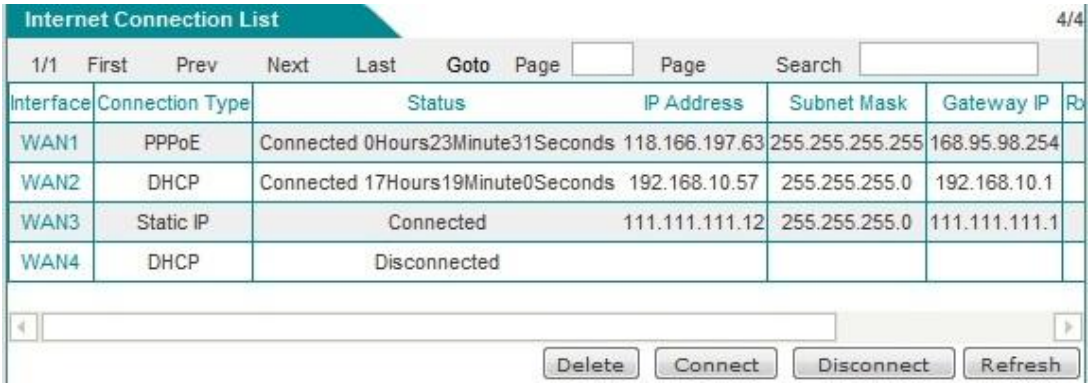


Figure 6-7 List of line connection information - PPPoE access

If a line is a PPPoE dialup one, then click on the interface, the "Dial-up" and "Hang-up" will appear below the "Line connection information list", as shown in the figure above, the WAN1 port is PPPoE access, click on "WAN1", and four buttons are displayed on the lower right part of the line connection information list.

- Connection status: As being in "Connected", the time that the line remains the connection will be displayed.
- IP address, subnet mask, gateway address: IP address, subnet mask, and gateway address assigned by the connected device to the interface.
- Delete: Deletes the appropriate line.
- Dial-up: Click <Dial>, to establish the PPPoE access, 3G access line unestablished or disconnected (When the PPPoE connection dial-up type is set to "Manual dial-up", and the PPPoE dial-up is to be completed here).
- Hang up: Click <Hang-up>, to hang up the PPPoE dial-up line or 3G access line that has been established.
- Refresh: Click <Refresh>, to display the up-to-date information of line connection information list.

6.2 Line combination

This section describes the ***Network parameter -> Line combination*** page.

In the line combination configuration, you can quickly configure line combination modes, and other related parameters, and specify the detection interval, detection number, detection target IP address and bandwidth of the lines.

6.2.1 Description of line combination function

1. Line detection mechanism

Regardless of line combination modes, make sure that the network is not interrupted when the line fails, which require that the device must be able to monitor line status in real time. To this end, we designed a flexible automatic detection mechanism, and provide a variety of line detection methods for users to choose, in order to meet the practical application needs.

To facilitate understanding, several related parameters are introduced first.

Detection interval: The time interval of sending inspection packets. One inspection packet is sent per time, and the default value is 0 seconds. In particular, when the value is 0, it means not to make line detection.

Detection times: The number of inspection packets sent within each detection cycle.

Destination IP address: The object of detection. The device will send inspection packets to the pre-designated target to detect if the line is normal.

The following is an introduction of the device's line detection mechanism in two cases: line normal and line failure.

When a line fails, the detection mechanism is described as follows: The device will send an inspection packet to the detection target of the line at the specified detection interval. If all the inspection packets sent have no response within a detection cycle, this line will be deemed to be failed, and it will be shielded immediately. For example, if the 3 inspection packets that are sent have no response within a detection cycle, the line is deemed to be failed by default.

When a line is normal, the detection mechanism is described as follows: Similarly, the device will send an inspection packet to the detection target of the line at the specified detection interval. If half of the inspection packets or above sent have response within a detection cycle, this line will be deemed to be normal, and it will be restored. For example, if there are 2 inspection packets that have responded within a detection cycle by default, the line is deemed to be restored by default.

The device allows users to specify Internet lines for some hosts in the Intranet in advance, which is realized by setting the "Internal starting IP address" and "Internal end IP address" of the line, and the hosts whose IP addresses are within two address ranges will give priority to the use of the specified line. For the hosts with the specified Internet line, they can only access to the Internet through that line when the specified line is normal. However, when the specified line fails, they will use other normal lines for Internet access.

Tip: Line detection is not enabled, then the "Detection interval" should be set to "0" second.

2. Line combination mode

The device provides 2 line groups: "Main line" group and "Backup line" group. For convenience's sake, the lines in the "main line" group are collectively known as main line, and the lines in the "backup line" group are collectively known as backup line. All lines are main lines by default. Users can divide some lines into the "Backup line" group as needed.

The device provides two line combination modes, "All line load balancing" and "Partial line load balancing while the other backed up".

In the "All line load balancing" mode, all lines are used as main lines. Working principles are as follows:

1. When all lines are normal, the Intranet hosts can use all lines for Internet access simultaneously.
2. If a line fails, it should be shielded immediately, and the flow originally passing through the line will be allocated to the other lines.
3. Once the fault line is restored to normal, the device will enable this line automatically, and the flow is automatically redistributed.

In the "Partial line load balancing while the others backed up" mode, part of the lines are used as main lines, the other part of the lines is used as backup lines. Working principles are as follows:

1. As long as the main line is normal, the Intranet hosts use main lines for Internet access.
2. If the main line fails, it will automatically switch to using the backup line for Internet access.
3. Once the fault lines are restored to normal once, they will be immediately switched back to the main line.

Tip: When a line is interrupted for line switching, some user applications (such as part of network games) may be unexpectedly interrupted. This is determined by the TCP session property.

6.2.2 Global configuration of line combination

In these two line combination modes, "All line load balancing" and "Partial line load balancing while the others backed up", the interface of global setting is different; therefore, their universal setting parameters are described below respectively.

1. Full Load Balancing

Figure 6-8 Full Load Balancing

- Line load balancing mode: "All line load balancing" is selected here.
- Save: The line combination configuration parameters take effect.
- Refill: Restores to the configuration parameters before modification.

Tip: Line combination mode is "All line load balancing" by default.

2. Partial Load Balancing

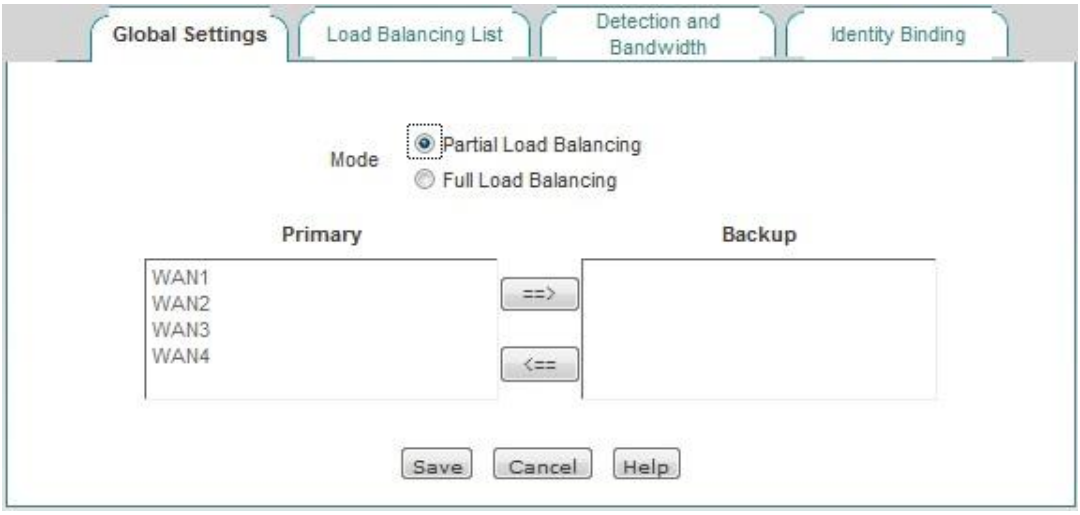


Figure 6-9 Partial Load Balancing

- Line combination mode: "Partial line load balancing while the others backed up" is selected here.
- Main line: The list box represents the "Main line" group, and all the lines in the list box are used as the main lines.
- Main line: The list box represents the "Backup line" group, and all the lines in the list box are used as the backup lines.
- ==> (Right arrow), <== (Left arrow): Select one (or more) line in the "Main line" list box first, and then click on "==>", and the selected lines are immediately moved to the "Backup line" list box. Similarly, select one (or more) line in the "Backup line" list box first, and then click on "<==", and the selected lines are immediately moved to the

"Main line" list box.

- Save: The line combination configuration parameters take effect.
- Refill: Restores to the configuration parameters before modification.

6.2.3 Load Balancing List

In the ***Network parameter -> Line combination -> Line combination status information*** page, you can view, configure the information of configuration line.

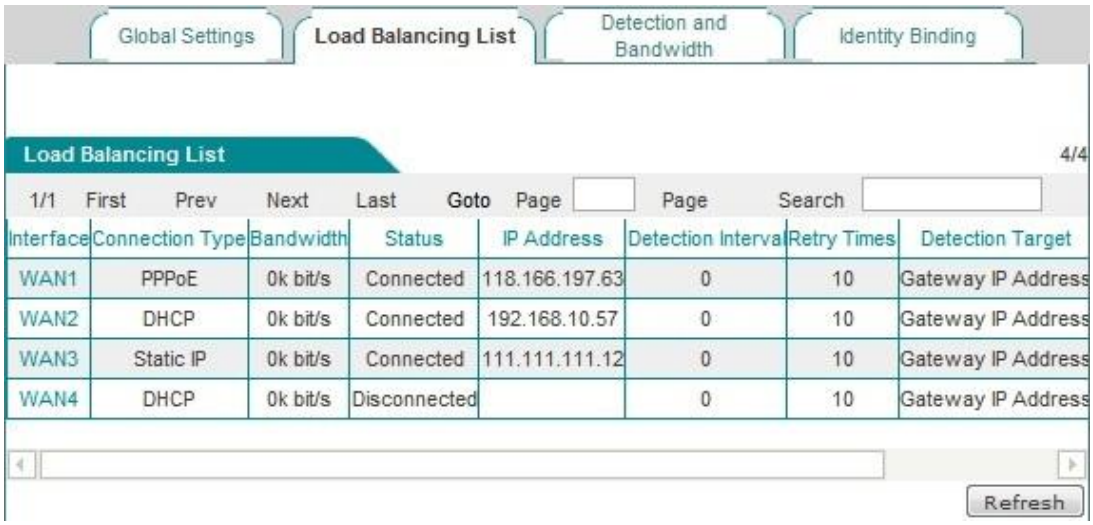


Figure 6-10 Load Balancing List

- Edit the line combination status information: Click on the interface of the line or the "Edit" hyperlink corresponding to the line, to skip to the relevant page for change, as shown in Figure 6-11.

- Refresh: Click <Refresh>, to get the latest status information of line combination.

6.2.4 Detection and bandwidth configuration

After configuring the line combination function, you also need to configure the detection mechanism of the lines, and the configuration methods are as follows.

Enter the ***Network parameters -> Line combination -> Detection and bandwidth configuration*** page, or enter the ***Line combination status information list*** and click a line interface or edit the icon, and enter the ***Detection and bandwidth distribution*** page.

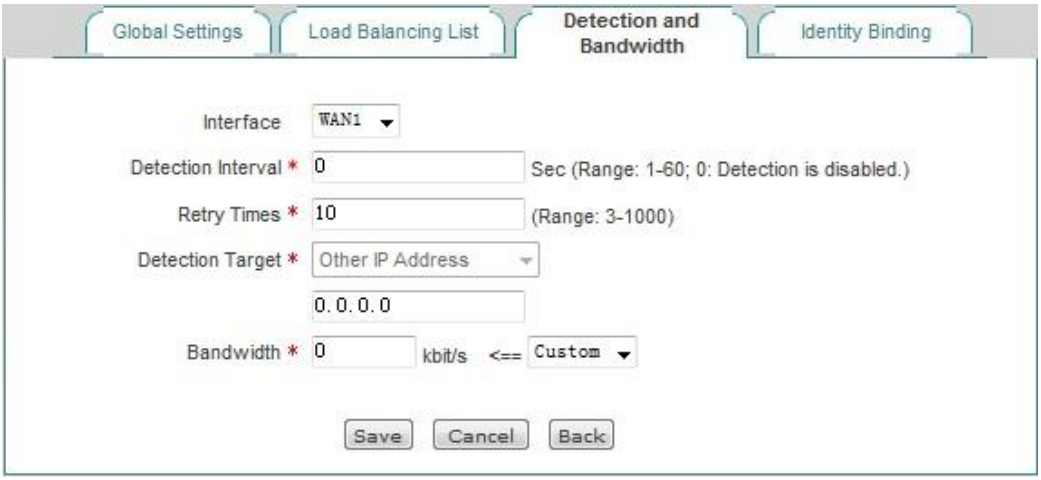


Figure 6-11 Line combination configuration

- Interface: Selects access modes (WLAN, 3G, APClient)
  - WAN1 configuration: Configure WAN1 to provide access to intranet users.
  - 3G client configuration: The device provides access to intranet users as a 3G client.
  - Wireless client configuration: The device provides access to intranet users as a wireless client.
- Detection interval: The time interval for sending inspection packets, Unit: seconds, when you enable line detection, the value range is 1~60 (the value is 0, which means not to enable the line detection).
- Detection times: The number of inspection packets sent within the detection cycle (one detection packet is sent per time), which is 10 times by default.
- Detection target: The destination address to be detected, which is the gateway IP address by default; if the gateway disallows PING, select a different IP address as the destination IP address of the PING detection.
- Bandwidth: Sets the bandwidth that ISP provides to the current line.
- Save: The above configuration parameters take effect.
- Refill: Restores to the configuration parameters before modification.
- Return: Returns to the line combination state information page.

6.2.5 Identity binding

When the device has multiple WAN ports, you can enter the ***Network parameters -> Line***

configuration -> Identity binding page to enable the identity binding function.

In the case of multi-line session load balancing, NAT sessions in the same application may be distributed in different lines, which will cause such applications as online bank, QQ, etc. not to work properly due to change of identity. The identity binding function can address this issue by binding the sessions in the same application from the same user on a line. For example, when a user in the Intranet logs in the online bank, if the first session is assigned to WAN2 port connection line, all the online banking sessions of this user will go out from the WAN2 port until the user logs out.

Figure 6-12 Enabling identity binding

- Enable identity binding: Enables/disables the identity binding function. If multiple lines are configured, please enable the device's identity binding function to make normal use of such apps as QQ, online bank.

6.3 Configuration of LAN port

The device's LAN ports can be configured with 4 IP addresses, and the first default IP address of the LAN port is 192.168.1.1. If you need to change the LAN IP address in order to adapt to the existing network, enter the ***Network parameters > LAN port configuration*** page for configuration.

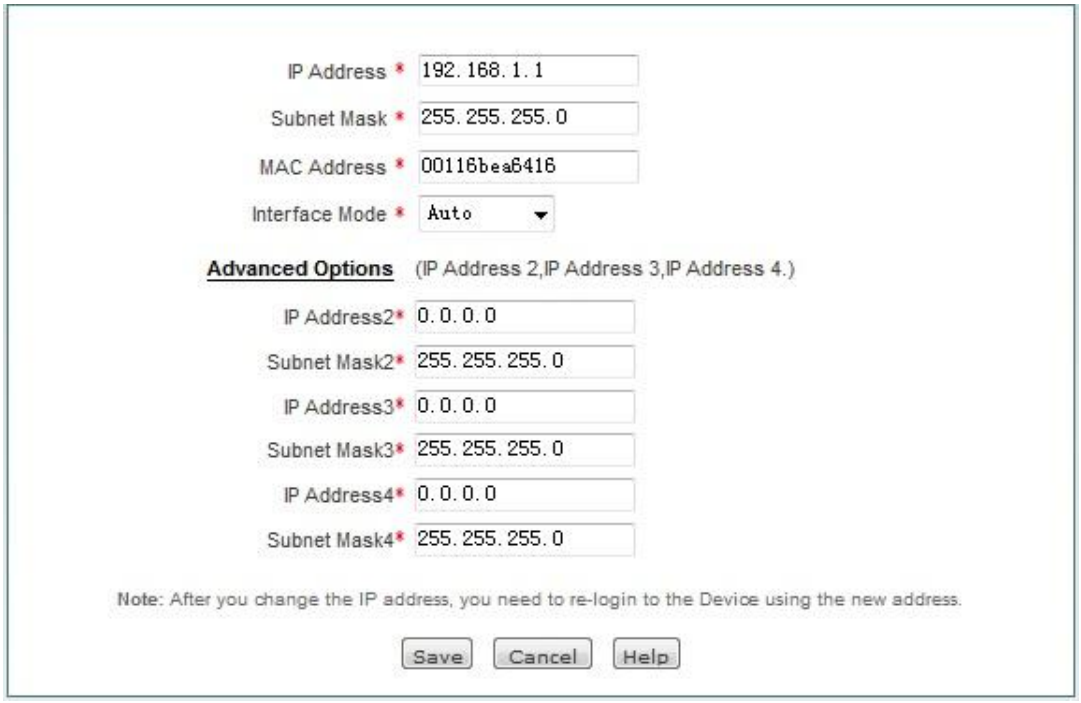


Figure 6-13 Configuration of LAN port

- IP address: Sets the LAN IP addresses, and the first IP address is 192.168.1.1 by default, while the other three IP addresses are 0.0.0.0 by default.
- Subnet mask: Sets the subnet mask of the corresponding IP address, which is 255.255.255.0 by default.
- MAC address: The MAC address of the LAN port. It is suggested not to modify the MAC address of the LAN port freely.
- Interface mode: Sets the duplex mode and rate for interfaces. Options are: Auto (adaptive), 10M-FD (10M full duplex), 10M-HD (10M half duplex), 100M-FD full duplex (100M), 100M-HD (100M half duplex). The default is Auto, which is usually not required to be modified, and if there is any compatibility issue, or the device used does not support auto negotiation function, then the type of Ethernet negotiation can be set up here.

Tip:

After modifying the LAN IP address, you must use a new IP address to log into the device, and the IP for logging into the host must be on the same network segment.

6.4 DHCP server

This section mainly introduces the ***Network parameters -> DHCP server*** page, including

DHCP server settings, static DHCP and DHCP automatic binding and DHCP client list.

6.4.1 DHCP server configuration

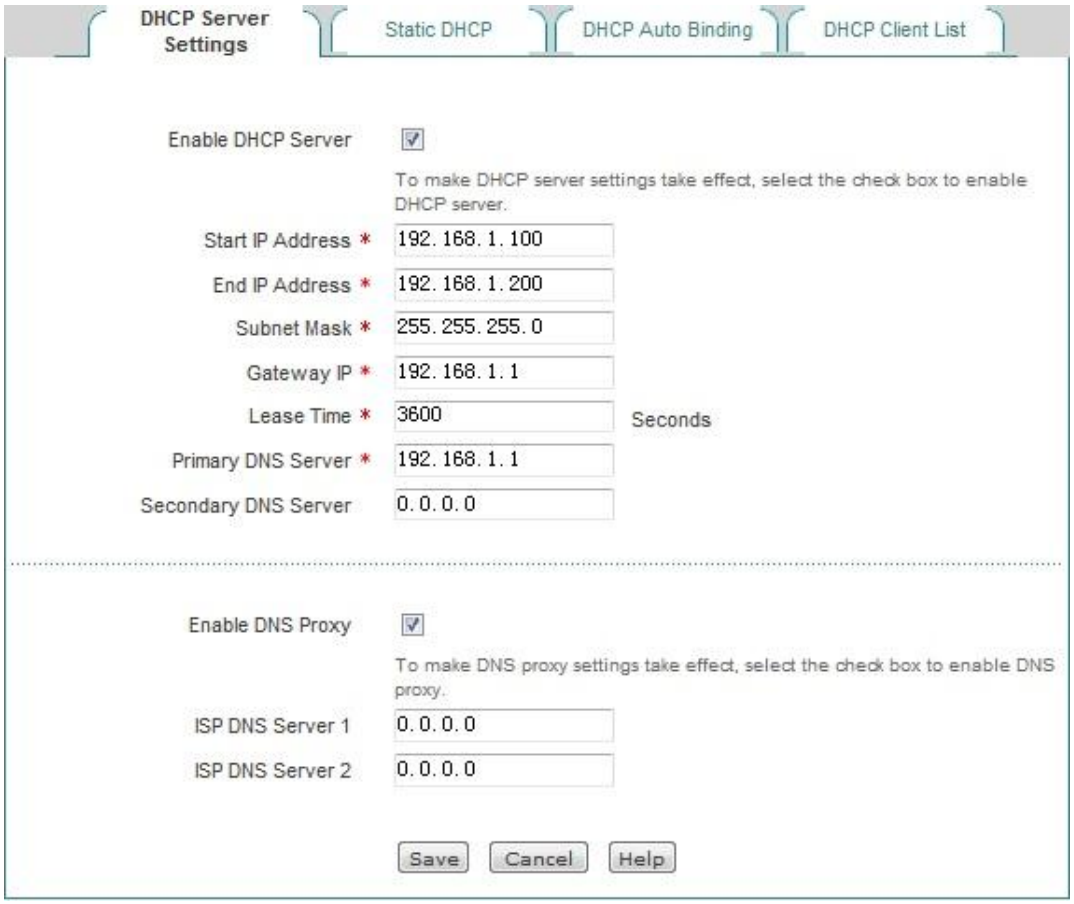


Figure 6-14 Configuring the DHCP service

- Enable DHCP server: Used to disable or enable the device's DHCP server function. Selecting it means allow.
- Start and end IP address: The IP address fields the DHCP server assigns to the network computer automatically (which should be on the same network segment as the IP address of the device LAN port).
- Subnet mask: The subnet mask automatically assigned by the DHCP server to the network computer (which should be consistent with that of the LAN port of the device).
- Gateway address: The gateway IP address the DHCP server automatically assigns to the network computer (which should be consistent with the LAN IP address of the device).
- Leasing time: The leasing time for the network computers to obtain the IP address assigned by the device (Unit: Seconds).

- Primary DNS server: The IP address of the primary DNS server automatically assigned by the DHCP server to the network computers.
- Secondary DNS server: The IP address of the secondary DNS server assigned by the DHCP server to the network computers automatically.
- Enable DNS proxy: Selecting it means enabled. The DNS proxy function of the device will not take effect unless enabled. After enabling this function, the gateway address is assigned to a client as primary, secondary DNS servers.
- Operator DNS servers 1, 2: The IP address of operator DNS server.

Tip:

1. If the device's DHCP server function is to be used, network computer's TCP/IP protocol can be set to "obtain an IP address automatically".
2. If what's originally used by the user is a proxy server software (such as Wingate), and the PC's DNS server is set as the IP address of the proxy server, then the LAN IP address of the device only needs to be set to the same IP address, so that the user can switch to using the device's DNS proxy function without having to change the PC setting after the device enables the DNS proxy function.

6.4.2 Static DHCP

This section describes the static DHCP list and the way to configure a static DHCP.

Using the DHCP service to automatically configure TCP/IP properties for the network computers is very convenient, but it can cause a computer to be assigned with different IP address at different times. And some Intranet computers may need a fixed IP address, in this case, the static DHCP function is required, to bind the computer's MAC address with an IP address, as shown in Figure 6-15. When a computer having this MAC address requests the address from the DHCP server (device) , the device will find a corresponding fixed IP address based on its MAC address and assign it to the computer.

1. Static DHCP list

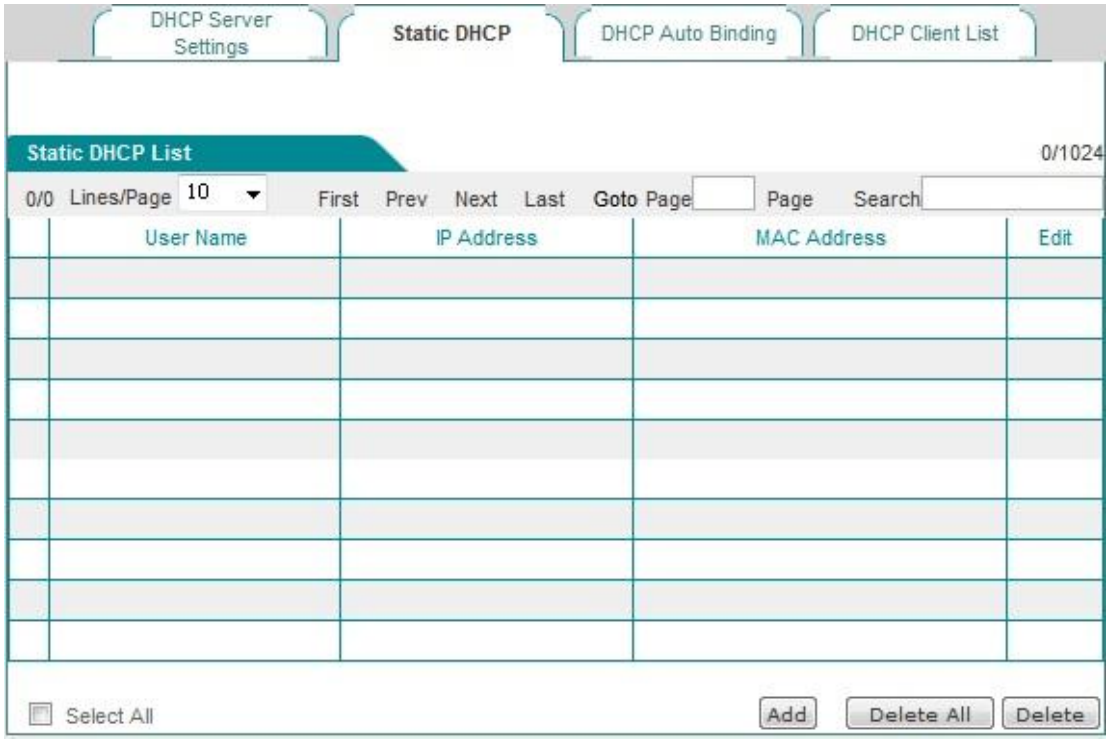


Figure 6-15 Static DHCP list

2. Static DHCP configuration

Click <Add new entry> in the page as shown in Figure 6-15, to enter into the ***Static DHCP configuration*** page as shown in the figure below. Below is a description of the meaning of the parameters for configuring static DHCP.

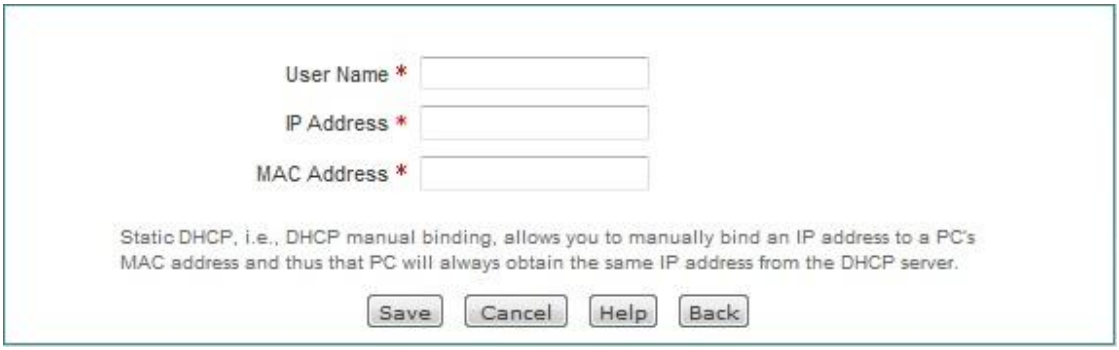


Figure 6-16 Static DHCP configuration

- User name: Configures the user name of the computer bound by this DHCP (custom, no repeat is allowed).
- IP address: The reserved IP address, which must be the valid IP address within the address range specified by the DHCP server.
- MAC address: The MAC address of the computer to use this reserved IP address in a fixed way.

Tip:

1. After the setting is successful, the device will assign the preset IP address for the specified computer in a fixed way.
2. The assigned IP addresses must be within the range provided by the DHCP server.

6.4.3 DHCP auto binding

Below is the description of DHCP automatic binding function.

Figure 6-17 DHCP auto binding

- Enable DHCP automatic binding: When DHCP automatic binding is enabled, the device will scan the Intranet, and bind IP/MAC of intranet users who obtain an IP address dynamically, and the device will bind any one IP address it assigns subsequently with the MAC address of the client. Enabling this function can protect against network ARP spoofing. If it is not enabled, no automatic binding operation is to be done.
- Enable DHCP automatic deletion: When DHCP automatic deletion is enabled, it means that the device will automatically delete the IP/MAC previously bound automatically after the lease expires or the user releases the address actively. If it is not enabled, it means that no automatic deleting operation is to be done.

6.4.4 DHCP client list

For the IP address already assigned to the network computer, its information can be viewed in the DHCP client list. Information as shown in the figure below: The DHCP server assigns the IP address of 192.168.1.100 in the address pool to the network computers whose MAC address is 6C:62:6D:E9:6D:13, and the rest of the time for the computer to lease this IP address is 86333 seconds.

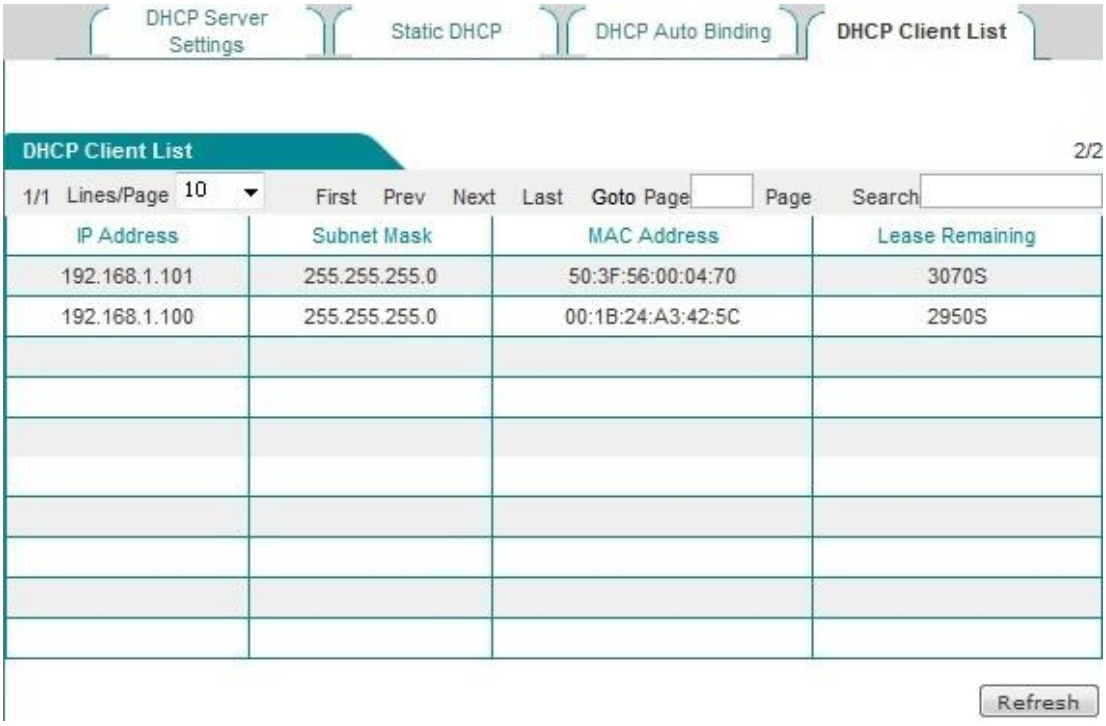


Figure 6-18 DHCP client list

6.4.5 Case of DHCP configuration

Application requirements

In this example, the device must have the DHCP function enabled, and the starting address is 192.168.1.10, with a total number of 100 allocable addresses. The host with the MAC address of 00:21:85:9B:45:46 assigns the fixed IP address of 192.168.1.15, while the host with the MAC address of 00:1f:3c:0f:07:f4 assigns the fixed IP address of 192.168.1.10.

Configuration steps

The first step is to enter into the ***Network parameters -> DHCP server -> DHCPservice settings*** page.

The second step is to enable the DHCP function, and configure the related DHCP service parameters (as shown in Figure 6-20), and click <Save> after the end of configuration.

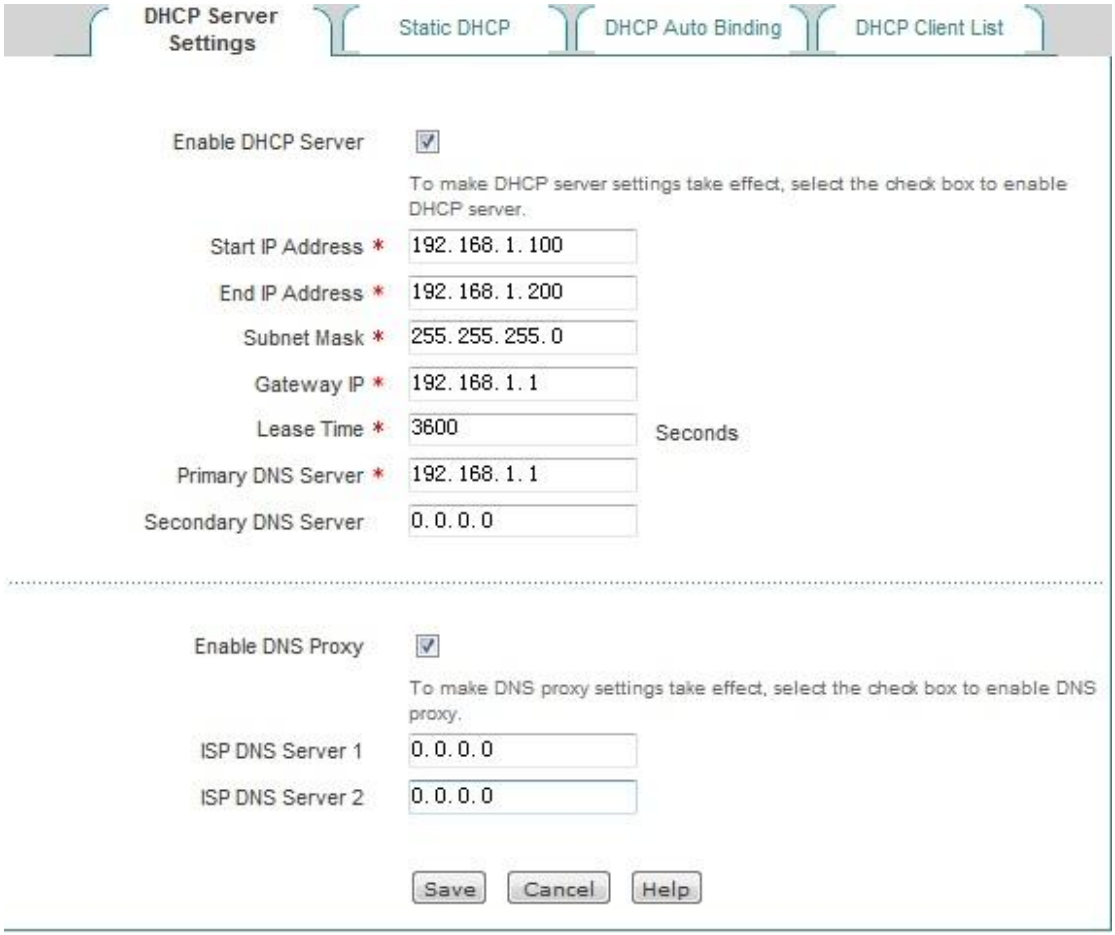


Figure 6-19 DHCP service settings - Instance

The third step is to enter the ***Network parameters -> DHCP server-> Static DHCP*** page, and click <Add new entry>, to configure the two static DHCP instances in the request (such as Figure 6-21, Figure 6-22).

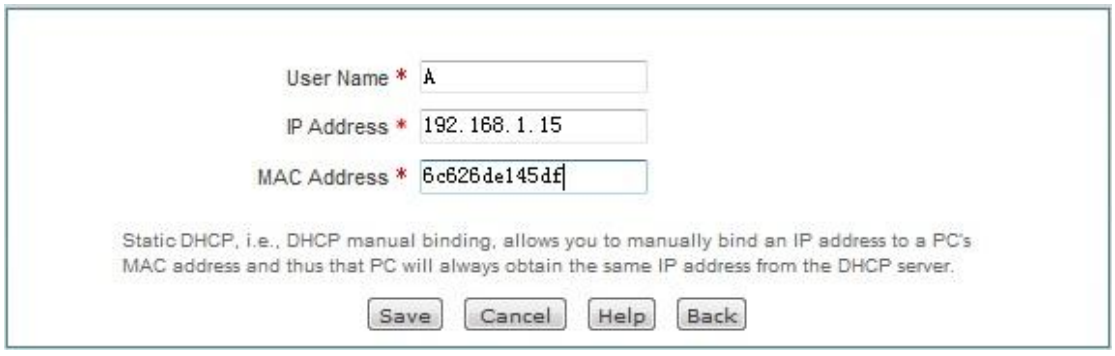


Figure 6-20 Static DHCP configuration - Instance A

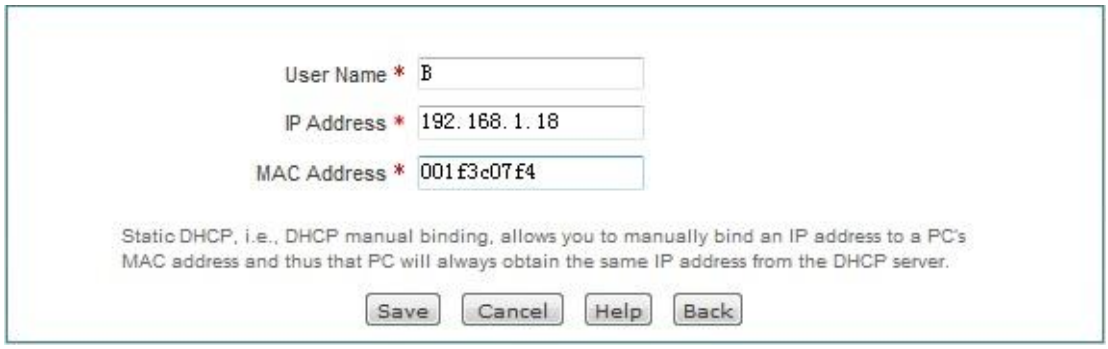


Figure 6-21 Static DHCP configuration - Instance B

At this point, the configuration is complete, and you can view the information about 2 static DHCP entries in the "Static DHCP information list", as shown in Figure 6-23. If configuration errors are found, you can click the corresponding item's icon directly and enter into the ***Static DHCP configuration*** page for modification and saving.

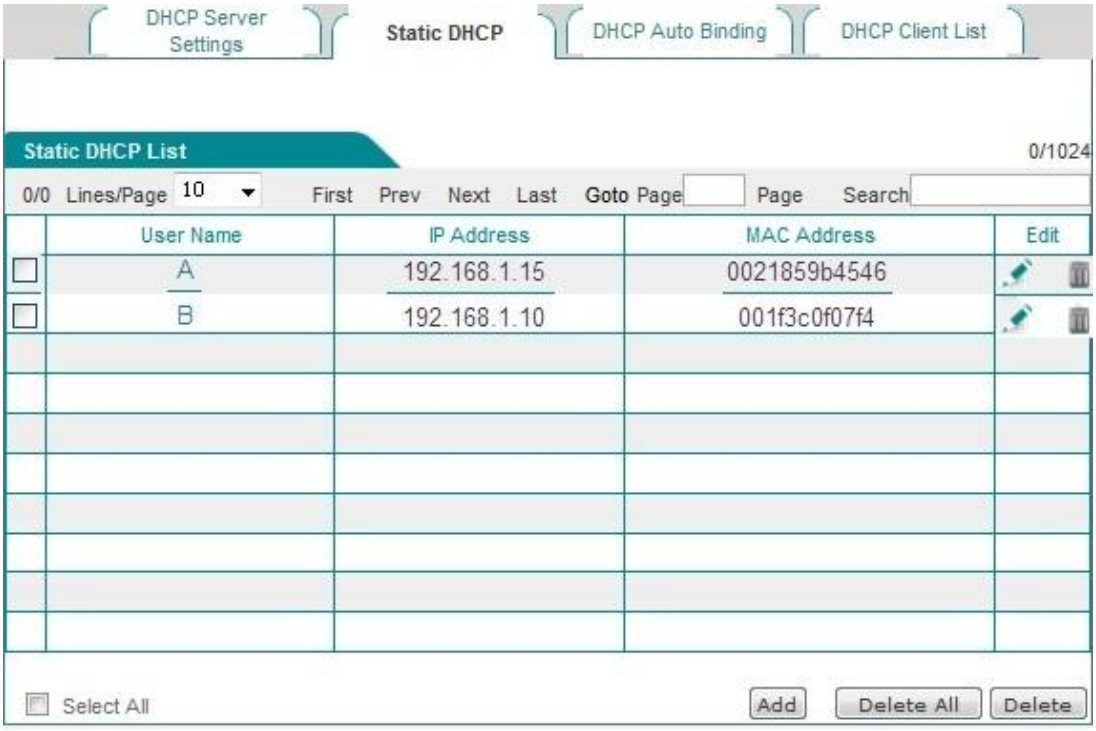


Figure 6-22 Static DHCP information list - Instance

6.5 DDNS configuration

This section describes the ***Network parameters ->DDNS configuration*** page and configuration methods. Includes: application for DDNS account, configuration of DDNS service, DDNS authentication.

Dynamic DNS (DDNS) is a service to resolve a fixed domain name to a dynamic IP address (such as ADSL dial-up Internet access) services. You need to apply to the DDNS service provider for this service, and various service providers provide the specific service of DDNS according to the actual situation. The DDNS service provider reserves the rights to change, interrupt or terminate part or all of the network services. At present, the DDNS service is free of charge, when the DDNS service provider may charge some fee for using DDNS services in providing network services. In this case, HiPER Technology will give a notice as soon as possible. If you refuse to pay such expenses, you cannot use the related services. At the free stage, HiPER Technology does not guarantee the DDNS service must be able to meet the requirements, nor guarantee the service will be uninterrupted, nor guarantee the timeliness, safety, and accuracy of network services.

6.5.1 DDNS authentication

You can use the Ping command (for example: ping avery12345.3322.org) in the DOS status of intranet computers, to check if the DDNS update is successful. Upon seeing the correctly parsed-out IP address (for example: 58.246.187.126), it indicates that domain name resolution is correct. Note: Under normal circumstances, the device's IP address will not be pinged from the Internet after NAT is used on the device but only the IP address for that domain name can be parsed out.

```
Pinging avery12345.3322.org [58.246.187.126] with 32 bytes of data:

Reply from 58.246.187.126: bytes=32 time=1ms TTL=63
Reply from 58.246.187.126: bytes=32 time=1ms TTL=63
Reply from 58.246.187.126: bytes=32 time=1ms TTL=63
Reply from 58.246.187.126: bytes=32 time=1ms TTL=63

Ping statistics for 58.246.187.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

1. Only when the IP address assigned by ISP (Such as China Telecom) to the WAN port connection line can the domain name be sure to be accessed by Internet users.
2. The DDNS function can help the Dynamic IP use VPN and server mapping.

6.6 UPnP

Universal Plug and Play (UPnP) is an architecture for common peer network connections

used for PCs and intelligent devices (or instruments). Using UPnP means simpler, more choices and more innovative experiences. The network products supporting Universal Plug and Play need only be physically connected to the network to begin to work.

This section describes the ***Network parameters ->UPnP*** page and configuration. When configuring UPnP in this page, you need to simply enable or disable this feature.

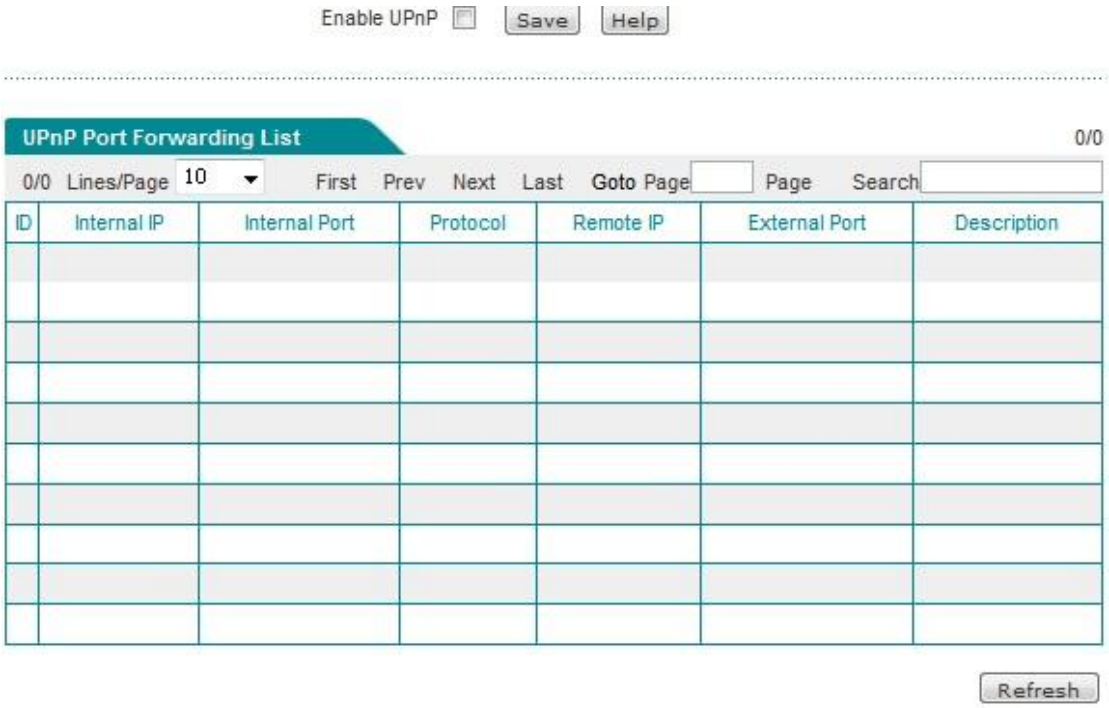


Figure 6-23 UPnP configuration

- Enable UPnP: Ticking the check box for enabling the UPnP feature.
- Internal address: The host IP address when port translation is needed in the intranet.
- Internal port: The port number provided by the host when port translation is required in the intranet.
- Protocol: The protocol used by the UPnP port in translation (TCP/UDP).
- Peer address: The IP address of the peer host.
- External ports: The port number of the device used for port translation. This port is the service port the device provides to the Internet.
- Description: The description information given when an application requests port translation to the device through UPnP.

Tip: It is recommended not to enable the UPnP feature when this feature is not in use.

Chapter 7. Wireless configuration

In the wireless configuration, the relevant wireless functions and parameters are mainly set in the device, including: basic settings, wireless security settings, wireless MAC address filtering, and wireless advanced configuration. In addition, you can also view the status information about the wireless host.

7.1 Basic settings

This section describes the ***Wireless Configuration -> Basic settings*** page and the configuration methods. In this page, you can configure the AP working mode, SSID, wireless mode, channel, channel bandwidth, enabling or disabling the SSID broadcast and other functions of the device. In this section, the AP working mode is used: The wireless basic configuration is introduced in the order of AP Mode, APClient Mode and WDS.

7.1.1 AP Mode

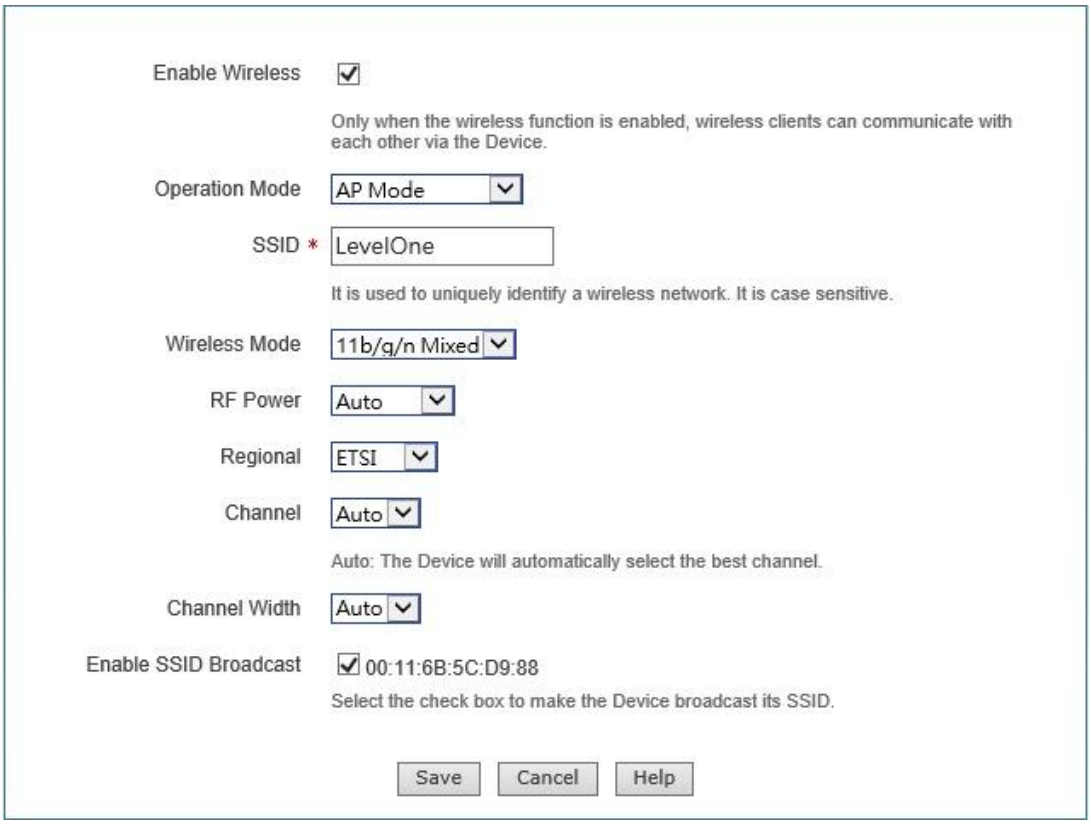


Figure 7-1 AP Mode

- Enable wireless function: Only after the wireless function is enabled can the wireless clients be connected to the device, to have wireless communications through the device, connect and access the cable network to which the device is connected.
- AP working mode: The AP Mode is selected here, namely the pure AP mode, in which the peer device can be an AP Client mode and single client.
- SSID: SSID (Service Set Identification) is used to uniquely identify a string of wireless network, and is case sensitive.
- Wireless mode: This parameter is used to set the modes of a wireless device, providing three options: only 11g, only 11n, and 11b/g/n hybrid.
  - Only 11g: pure 802.11g mode, in which the maximum rate is up to 54M bps. The wireless sites compatible with the IEEE 802.11g standard can be connected to the device.
  - Only 11n: Pure 802.11n mode, in which the maximum rate is up to 150M bps. The wireless sites compatible with the IEEE 802.11n standard can be connected to the device.
  - 11b/g/n hybrid: The wireless sites in compliance with IEEE 802.11b, 802.11g or 802.11n standard will be connected according to their modes, with the maximum rates of 11M bps, 54M bps and 150M bps respectively.

- Channel: This parameter is used to select the frequency bands in which the wireless network works, with the available range from 1 to 11, and it provides automatic options, which means that the device can automatically select the optimal frequency band. If there is more than one wireless device, the settings of frequency band of the devices cannot affect each other.
- Channel bandwidth: The channel bandwidth occupied by setting the wireless data transmission, with the options: Auto, 20M and 40M. Note that this parameter works only with the wireless site accessed using the 802.11n standard. For those wireless sites using the 802.11b or 802.11g standard, only the channel bandwidth of 20M can be used.
  - Auto: When Auto is selected, it means the wireless sites accessed using the 802.11n standard will use the channel bandwidths of 20M or 40M according to the results of the negotiation with the accessed peer ends.
  - 20M: When 20M is selected, it means the wireless sites accessed by using the 802.11n standard will use the channel bandwidth of 20M.
  - 40M: When 20M is selected, it means the wireless sites accessed by using the 802.11n standard will use the channel bandwidth of 20M.
- SSID broadcast: Enables or disables the SSID broadcast function. If this function is enabled, the device will broadcast its own SSID to all the wireless sites so that the wireless sites without SSID (null) will get the correct SSID, to be able to connect to the device, and join into the wireless network with this SSID identifier. This function is enabled at risk (illegal sites are very easy to get the SSID information), so it is generally recommended to disable this function.

Tip:

1. The device enables the wireless function by default and its work mode is AP Mode.
2. After the wireless parameters are modified, the device's wireless module will reboot, and rebooting of the wireless module will disconnect all wireless connections.
3. The AP work modes function differently, and should be selected according to the specific occasions, uses in configuration.

7.1.2 Repeater Mode

The device can exchange data with the network devices and single clients in Bridge Mode, Repeater Mode, Lazy Mode when its work mode is set to Repeater Mode, to realize network connectivity.

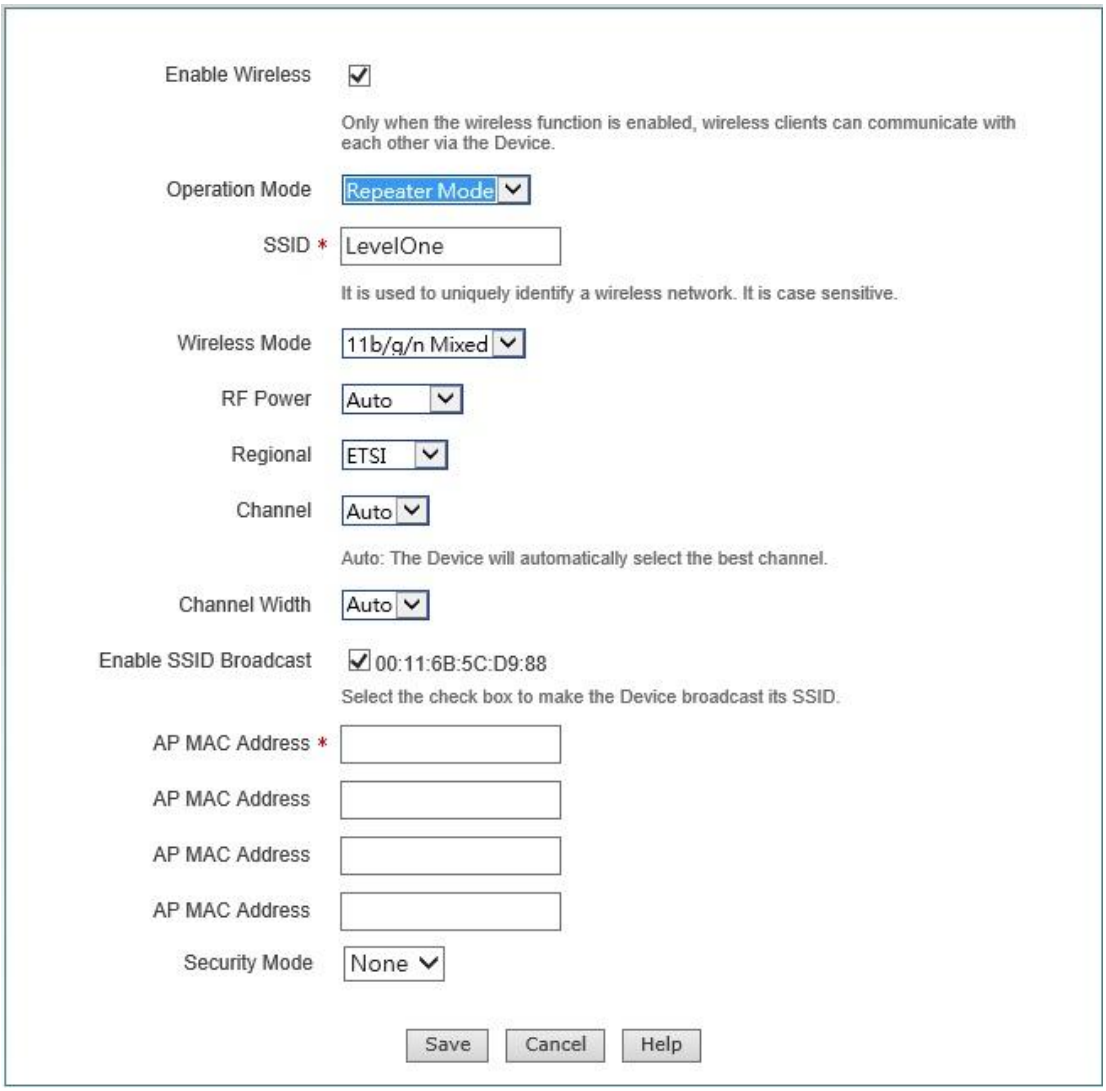


Figure 7-2 Repeater Mode

For the meaning of enabling wireless function, AP working mode, SSID, wireless mode, channel, channel bandwidth, enabling SSID broadcast, see Section 7.1.1 AP Mode for relevant explanations, and these terms will no longer be detailed if any in the subsequent configuration.

- MAC address of AP: MAC address of the peer device.
- Security mode: The encryption mode used in the establishment of connection through the WDS function, including four options, "No security mechanism", "WEP", "TKIP" and "AES".
  - No security mechanism: It means that no encryption algorithms will not be used to protect communication data in the data exchange process.
  - WEP: It means that the WEP encryption algorithm is used to protect communication data during the data exchange process. For details, please refer to the section 7.2.2 WEP.

- TKIP: It means that the TKIP encryption algorithm is used to protect communication data during the data exchange process. For details, please refer to the section 7.2.4 WPA-PSK/WPA2-PSK.
- AES: It means that the AES encryption algorithm is used to protect communication data during the data exchange process. For details, please refer to the section 7.2.4 WPA-PSK/WPA2-PSK.

7.1.3 Bridge Mode

Bridge Mode, in which the device is connected to two or more wired networks, and the device will no longer send wireless signals to other clients, to exchange data with the network devices in Bridge Mode, Repeater Mode, Lazy Mode.

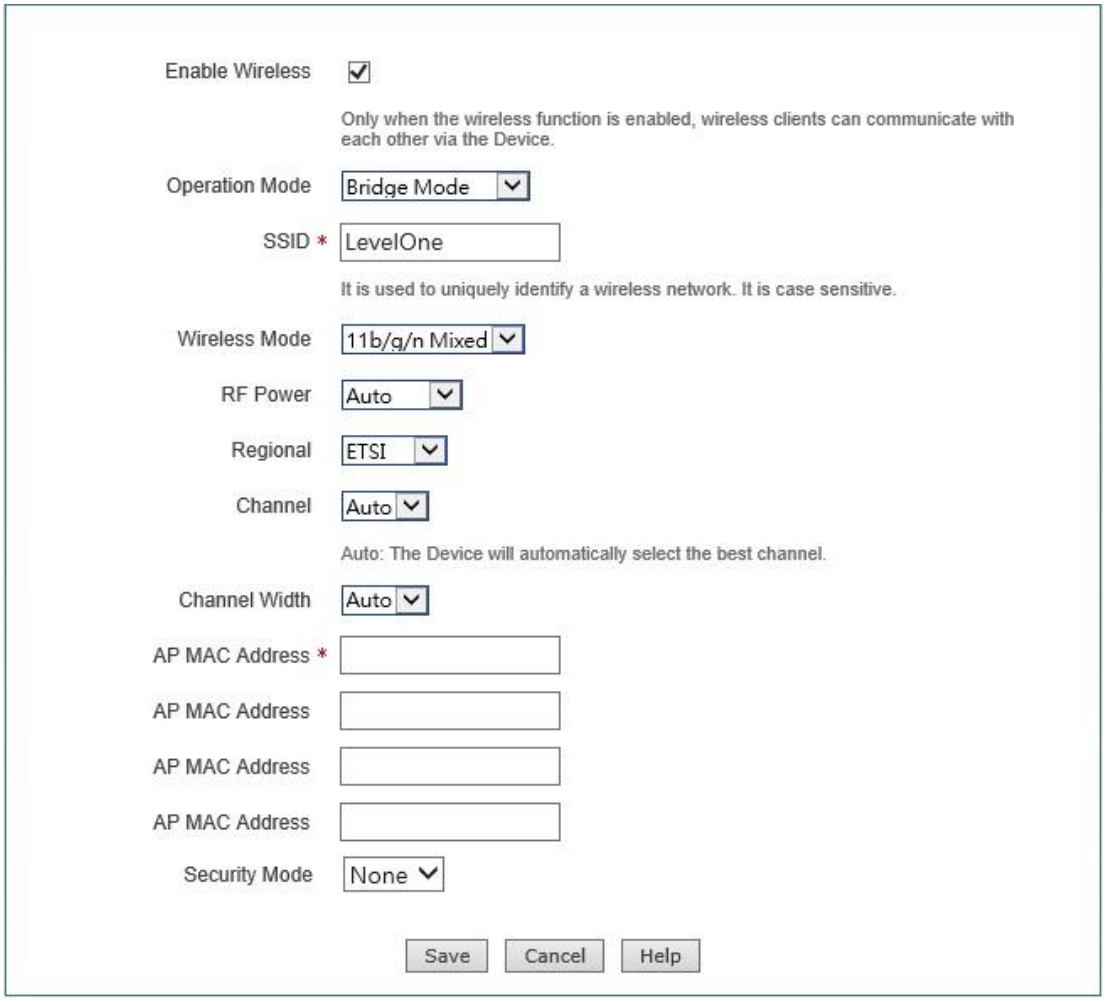


Figure 7-3 Bridge Mode

The meaning of related configuration parameters is the same as Repeater Mode. For details, refer to the related description in Section 7.1.2 Repeater Mode.

7.1.4 Lazy Mode

The device can exchange data with network devices and single clients in the Repeater Mode, Bridge Mode when its work mode is Lazy Mode, to realize network connectivity.

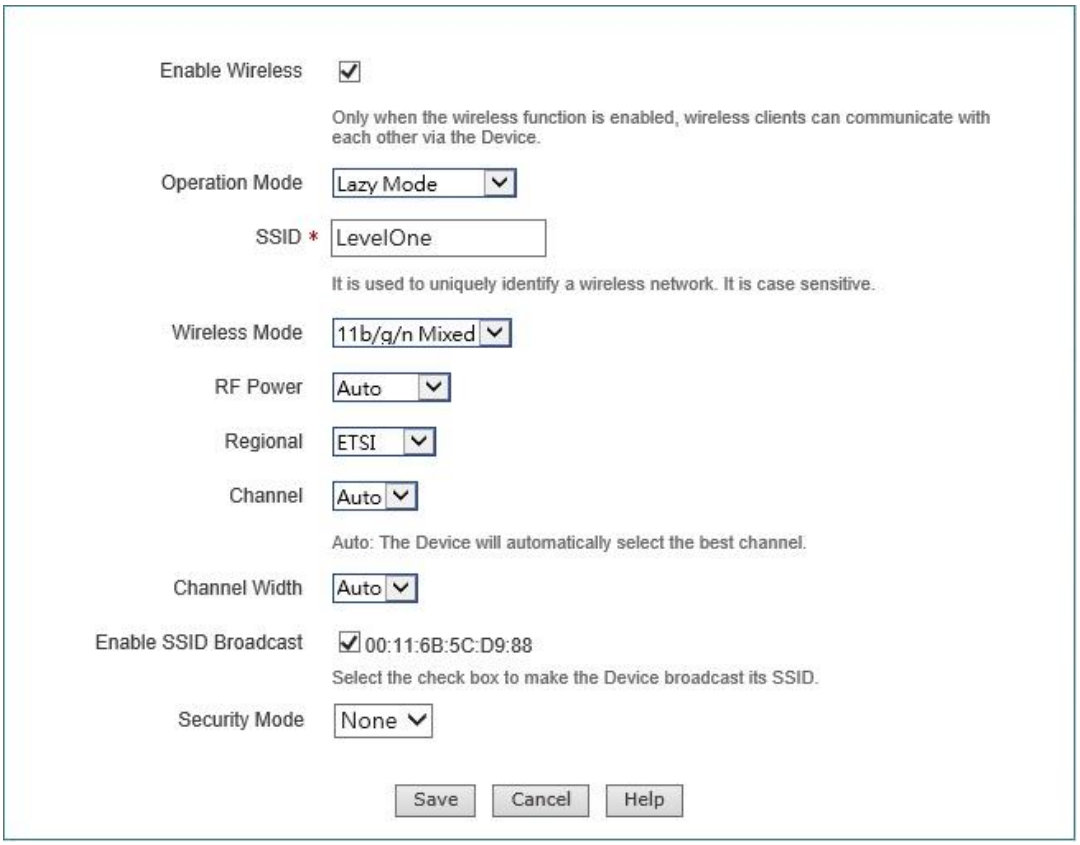


Figure 7-4 Lazy Mode

The meaning of related configuration parameters is the same as AP Mode and Repeater Mode. For details, refer to the related description in Section 7.1.1 AP Mode and 7.1.2 Repeater Mode.

7.1.5 Wireless configuration instance

This section lists configuration instances where the device works in the AP Mode, AP Client Mode and other AP working modes according to the five AP work modes of the device.

(1) **AP Mode configuration instance**

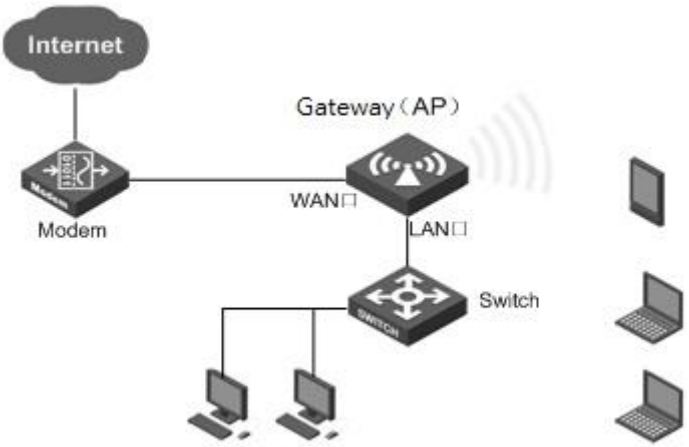


Figure 7-5 AP Mode networking environment

1. **Requirements:** Some home users want to put desktop computer, laptop, Tablet PC, smart phones on the Internet via wireless devices, and prevent users other than their home from accessing to wireless devices.

2. **Analysis:** Desktop computers are connected via a network cable to the LAN port of a wireless device. Laptops, Tablet PCs, etc. are wirelessly connected to a wireless device and need to be authenticated.

3. **Configuration steps:**

1) Configure the TCP/IP properties for network computer.

2) Log on to the device, and configure the WAN1 according to the types of business applied for by operators.

3) Enter into the ***Wireless Configuration -> Basic configuration*** page, to configure the device's wireless basic parameters, as shown in the figure below, and set the AP work mode as AP Mode.

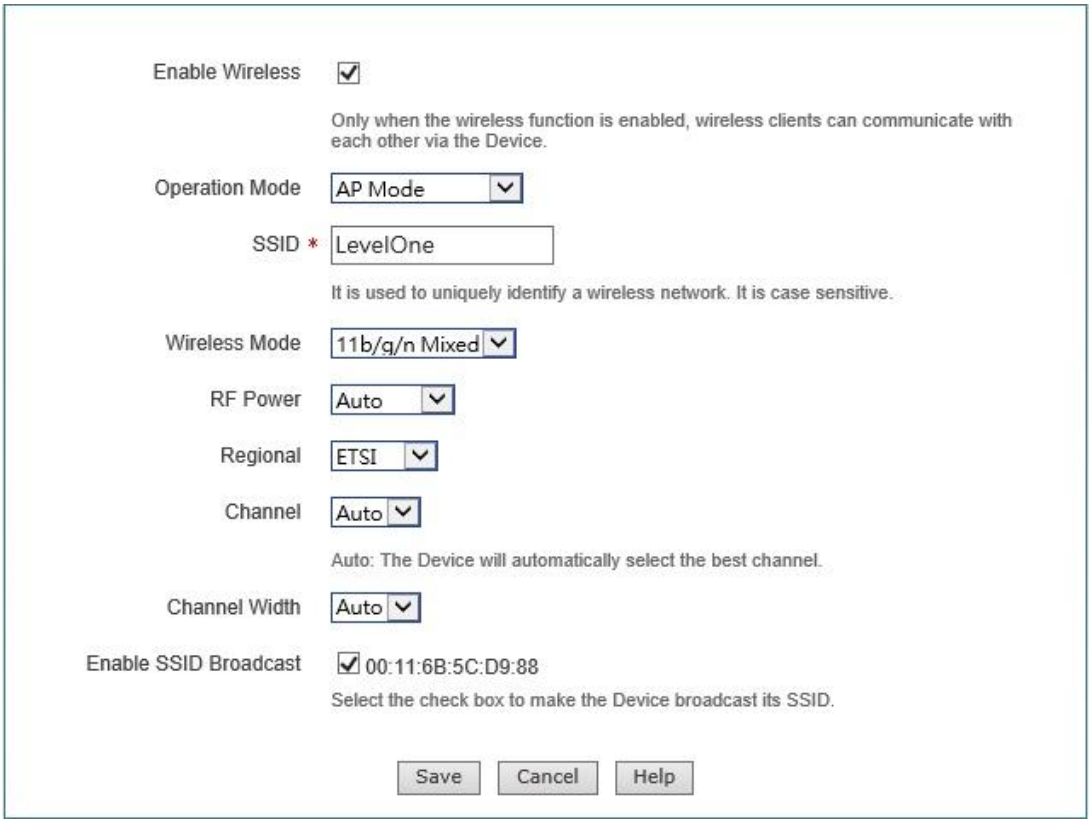


Figure 7-6 AP Mode configuration

4) Enter into the ***Wireless configuration -> Wireless security settings*** page, to configure the authentication modes and key for wireless communication.

Through the above configuration, wireless users can connect to the wireless devices so long as they pass the authentication, and access to the Internet through it. For the way to connect the network computer to the device, please refer to 0.

(2) **WDS configuration instance**

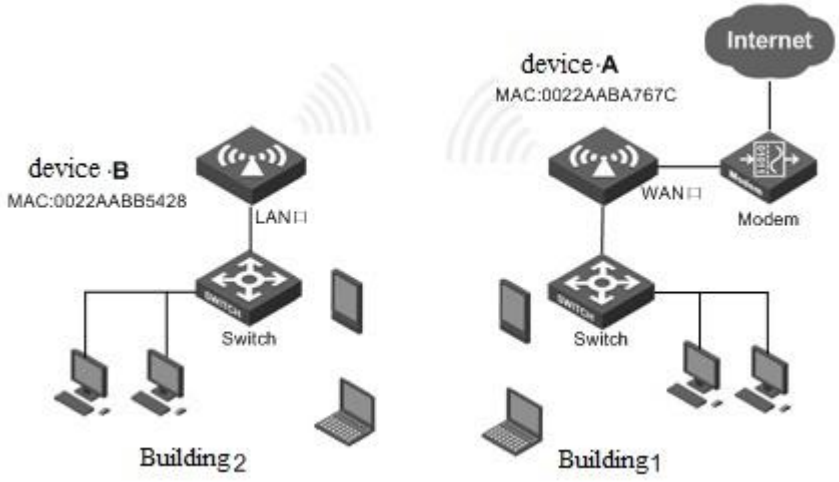


Figure 7-7 Repeater Mode networking environment

1. Requirements: The office personnel in Building 2 need to be wirelessly connected to

Device A, and access to the Internet through Device A.

2. Analysis: Achieved by the following solutions

Solution I: Devices A and B are set to Repeater Mode.

Solution II: Devices A and B are set to Bridge Mode.

Solution III: Devices A and B are set to Repeater Mode, Bridge Mode respectively.

Solution IV: Devices A and B are set to Repeater Mode, Lazy Mode respectively.

Solution V: Devices A and B are set to Bridge Mode, Lazy Mode respectively.

Solution VI: Device A is set to AP Mode while Device B is set to AP Client Mode.

3. Configuration steps:

Solution I: Both are Repeater Mode

1) Configure the AP working mode of Device A as Repeater Mode, and the configuration content is shown in the figure below:

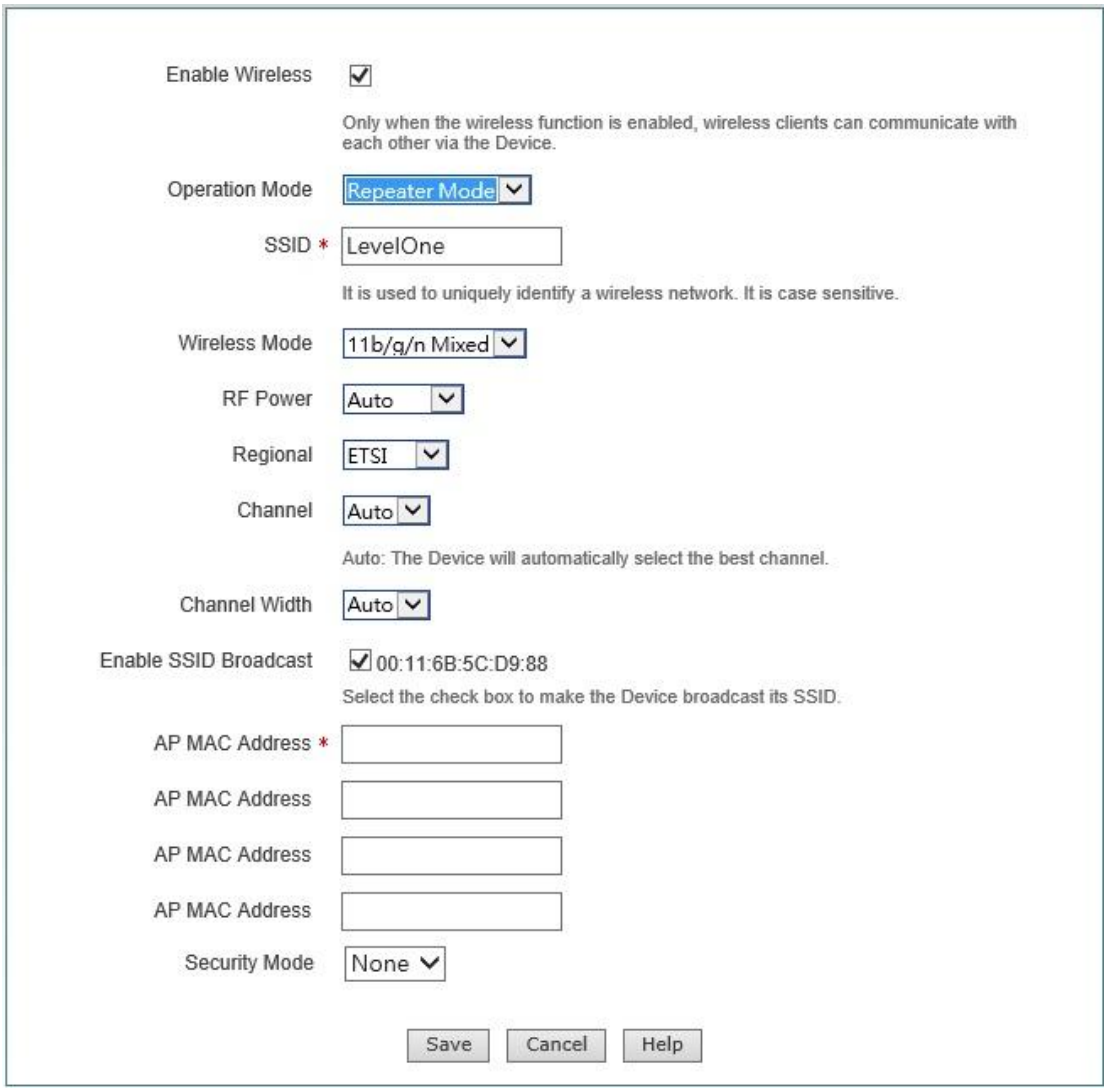


Figure 7-8 Repeater Mode instance

2) Configure the AP mode of Device B as Repeater Mode, and the SSID, wireless mode, channel, channel bandwidth, security mode, pre-shared key are configured in the same way as Device A, and the AP MAC address is: 0022AABB5428 (the MAC address of Device A).

Through the above configurations, the office personnel in Building 1 can access to the Internet through Device 2.

Tip:

1. The gateway of the computer in Building 2 is directed to the LAN port of Device A.
2. The IP address of LAN port of Device B is in the same network segment as the LAN port address of Device A.

4. Connectivity verification:

Ping the LAN IP address of Device A on a computer in Building 2. If it can be pinged successfully, then it means that the connection between the two wireless devices has been established.

Solutions II, III, IV, V can follow Solution I.

Tip:

1. The device in Bridge Mode cannot be connected to the wireless single clients, such as laptops, smart phones, etc.
2. The devices in Lazy Mode can be connected to the wireless single clients.
3. In configuration, the SSID and key of Devices A, B must be kept consistent, and the MAC address of AP is that of the peer device (It is not required to configure the MAC address of the peer device when the AP mode is Lazy Mode).
4. Both Devices A and B must be on the same network segment, and the network gateway addresses for all the computers in the intranet is directed to Device B.

7.2 Wireless security settings

This section describes the interfaces and configuration methods of ***Wireless configuration -> Wireless security configuration***. This device provides three wireless security mechanisms, WEP, WPA/WPA2, WPA-PSK/WPA2-PSK, while users are allowed not to use the security mechanism. In the following sections, the meaning of their configuration parameters are described separately.

7.2.1 No security mechanism

Figure 7-9 None

- Security mechanism: "No security mechanism" is selected here, which means that this device does not allow any security mechanism to authenticate the other wireless devices or wireless clients of the access device.

7.2.2 WEP

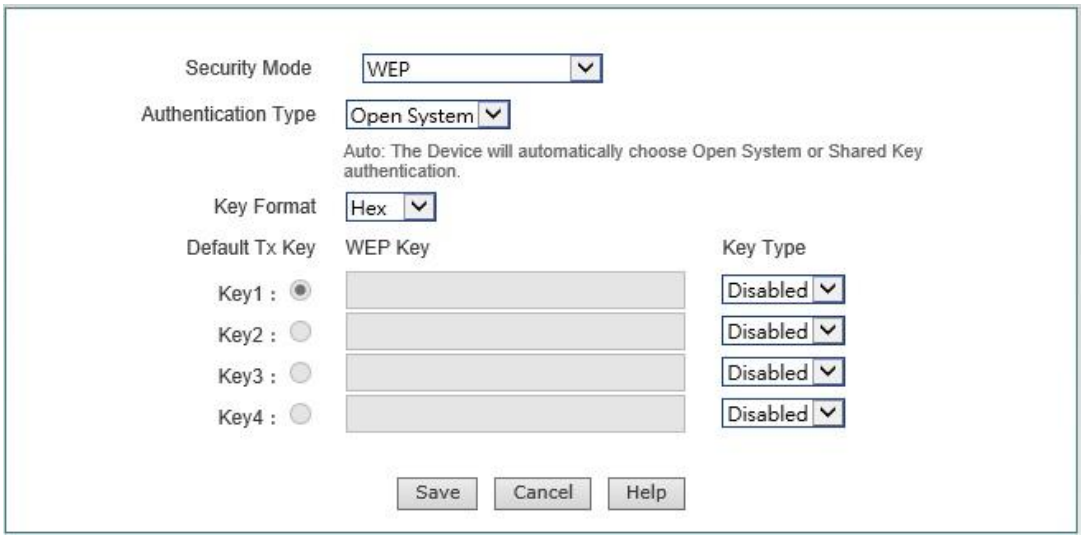


Figure 7-10 WEP

- Security mechanism: Selecting "WEP" here means that the device will use the most basic WEP security mechanism provided by the 802.11 Protocol.
- Authentication type: When using the WEP encryption mechanism, three options, automatic, open systems, Shared keys are available:
  - Auto: Means that the device can automatically choose Open System or Pre-shared key mode according to the requests of wireless clients.
  - Open system: Here, the wireless clients can pass the authentication and associate with the wireless devices under the premise of providing no

authentication key. To perform data transmission, you must provide the correct key.

- Shared key: Here, the wireless client host must provide a correct key to pass the authentication; otherwise, it cannot be associated with the wireless devices, and cannot perform data transmission.

- Key format: Two formats, hexadecimal code and ASCII code are provided:
  - When the hexadecimal code is used, the key characters can be 0 ~ 9, A, B, C, D, E, F.
  - When the ASCII code is used, the key characters can be all ASCII codes.
- Key selection: Users can enter 1 ~ 4 keys according to needs and these 4 keys can take different types of keys.
- WEP key: Sets the key value, and the length of the key is affected by key types:
  - When choosing a 64 - bit key, you can input 10 hexadecimal characters or 5 ASCII characters.
  - When choosing a 128 - bit key, you can input 26 hexadecimal characters or 13 ASCII characters.
- Key types: Selects key types, and provides three options, Disable, 64 bits, 128 bits. Among them, Disable means not to use the current key, but 64 bits, 128 bits, and used to specify the length of the WEP key.

7.2.3 WPA/WPA2

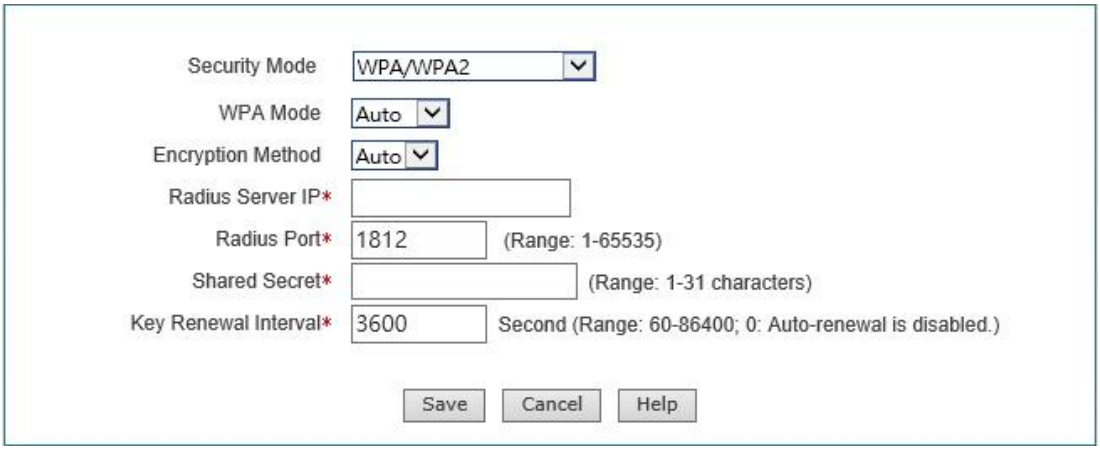


Figure 7-11 WPA/WPA2

- Security mechanism: Selecting "WPA/WPA2" here means that the device will use WPA or WPA2 security mechanism. Under the security mechanism, the device will

use the Radius server for authentication and obtaining the key.

- WPA version: Sets the security mode this device will use:
  - Auto: Means that the device can automatically choose WPA or WPA2 safe mode according to the requests of wireless client.
  - WPA: Means that this device will use the safe mode of WPA.
  - WPA2: Means that the device will use the safe mode of WPA2.
- Encryption algorithm: It is used to encrypt wireless data, with the options like Auto, TKIP and AES.
  - Auto: Means that the device will automatically choose encryption algorithms according to needs.
  - TKIP: Means that all wireless data will use TKIP as the encryption algorithm.
  - AES: Means that all wireless data will use AES as the encryption algorithm.
- Radius Server IP: It is used to the identity the authentication of the wireless hosts.
- Radius port: The Port number of service used by the Radius server for identifying the authentication of the wireless hosts.
- Radius password: Sets the password for accessing to the Radius service.
- Key update cycle: It is the timed update cycle used to specify the key. Value range is 60 ~ 86400, in the unit of seconds. The default value is 3600, which means no update when the value is 0.

7.2.4 WPA-PSK/WPA2-PSK

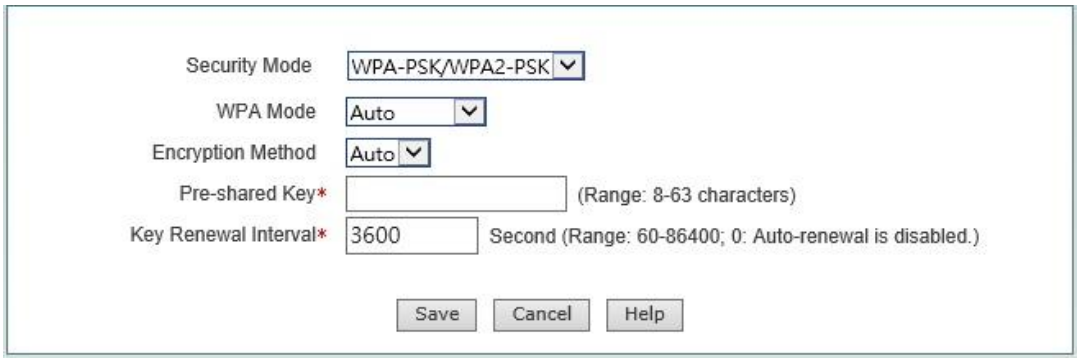


Figure 7-12 WPA-PSK/WPA2-PSK

- Security mechanism: Here, you can select "WPA-PSK /WPA2-PSK", which means that the device will use WPA-PSK/WPA2-PSK security mechanism. Under this

security mechanism, this device will use the WPA mode based on the Pre-Shared key.

- WPA version: Sets the security mode this device will use:
  - Auto: Means that the device can automatically choose WPA-PSK or WPA2-PSK safe mode according to the requests of wireless clients.
  - WPA: Means that the device will use the safe mode of WPA-PSK.
  - WPA2: Means that the device will use the safe mode of WPA2-PSK.
- Encryption algorithm: It is used to encrypt wireless data, with the options like Auto, TKIP and AES.
  - Auto: Means that the device will automatically choose encryption algorithms according to needs.
  - TKIP: Means that all wireless data will use TKIP as the encryption algorithm.
  - AES: Means that all wireless data will use AES as the encryption algorithm.
- Pre-shared key: The preset initialization key, with the value of 8 ~ 63 characters.
- Key update cycle: It is the timed update cycle used to specify the key. Value range is 60 ~ 86400, in the unit of seconds. The default value is 3600, which means no update when the value is 0.

7.3 Wireless MAC Address Filtering

This section describes the ***Wireless configuration->MAC filtering*** page and the configuration of wireless MAC address filtering. By setting the MAC address filtering function, you can enable or disable wireless hosts to or from access to the device and the wireless network.

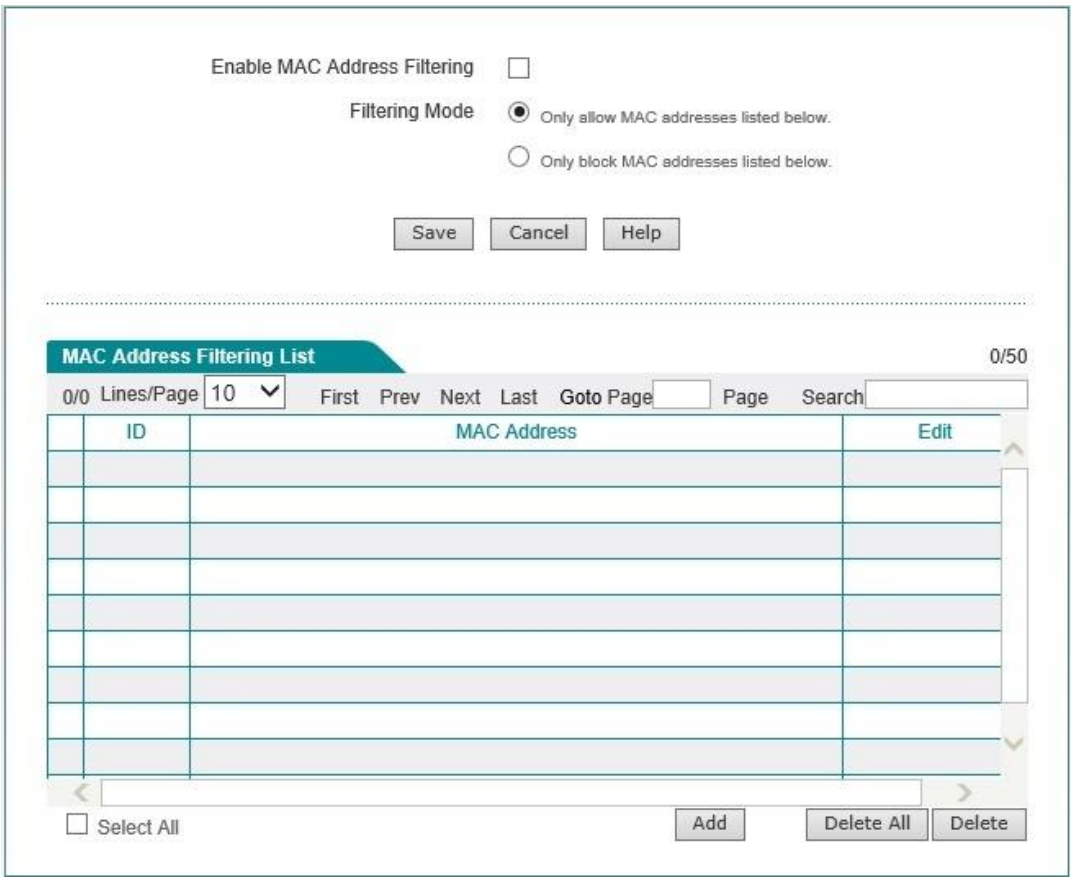


Figure 7-13 Wireless MAC Address Filtering

- Enable MAC address filtering: Enable or disable the MAC address filtering function, checking it means to enable it.
- Filtering rules: Sets the rules for MAC address filtering.
  - Permission: Only allows the MAC addresses in the list to access the wireless network: It indicates that only the wireless clients that correspond to the MAC addresses in the MAC address filtering information list are allowed to access to the device but disallow the wireless clients out of the filtering table to access.
  - Permission: Only disallows the MAC addresses in the list to access the wireless network: It indicates that only the wireless clients that correspond to the MAC addresses in the MAC address filtering information list are disallowed to access to the device but allow the wireless clients out of the filtering table to access.
- Add new entry: Click this button to enter into ***MAC address filtering configuration*** page to configure the MAC addresses to be filtered, as shown in the figure below.

Figure 7-14 Configuration of MAC address filtering

7.4 Wireless Advanced Configuration

This section describes the meaning of the wireless advanced parameters in the ***Wireless Configuration-> Advanced***.

In this page, you can set wireless advanced parameters, and under normal circumstances, keep the default values of these parameters. If you have special needs, you can configure in this page.

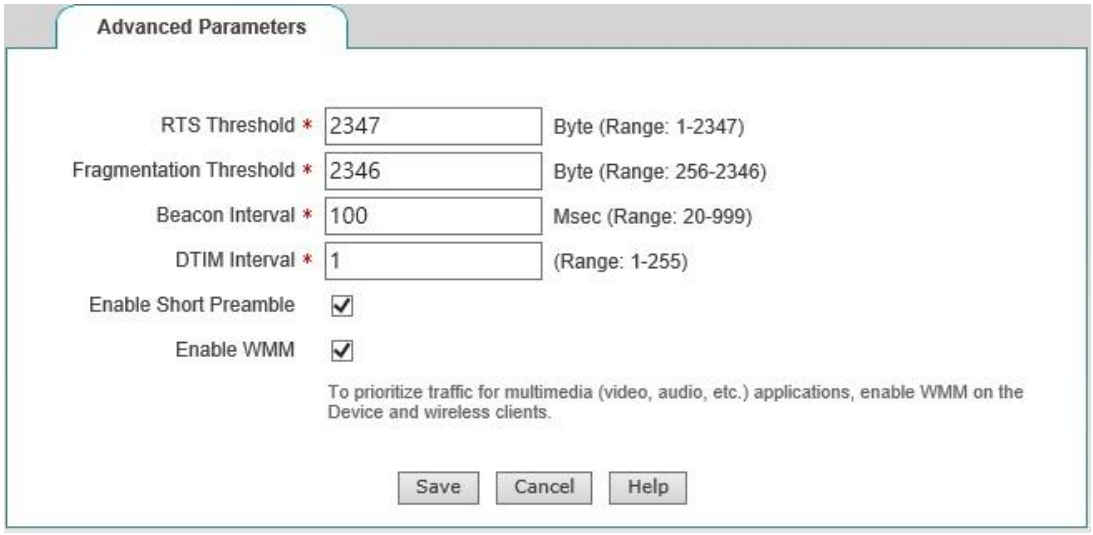


Figure 7-15 Advanced Wireless Settings

- RTS threshold: When a packet exceeds this threshold, it will activate the RTS mechanism. The device will send RTS (Request to Send) packet to the destination site for negotiation before sending data frames. After receiving an RTS frame, the wireless site will respond to the device by sending a CTS (Clear to Send) frame, which means wireless communication can be made between both of them. The value range is generally 1-2347 bytes, and the default is 2347 bytes.

  The RTS mechanism is used to avoid data transmission conflicts in the wireless LAN. The transmission frequency of the RTS packet needs to be set reasonably, and setting of the RTS threshold requires weighing. If this parameter is set to low, the transmission rate of RTS packets is increased, consuming more bandwidths, which may significantly affect the throughput of other network packets. But the more frequently the RTS packet is sent, the more quickly the system can be recovered from disruption or conflict.

- Segmentation threshold: It is used to define the maximum transmission length of the wireless data packets allowed by the wireless MAC layer to be transmitted, when the length of Data frames exceeds this value, they will automatically be segmented into multipledata frames, and then transmitted again. If the segmented transmission is interrupted, only the parts that are not sent successfully need to be sent, and the throughput of segmented packets is generally low. The value range is generally

256-2346 bytes, and the default is 2346 bytes.

The transmission efficiency for large segments is high, but if there is a clear conflict in the wireless network, or if the network is used at a high frequency, the reduction of segments can improve the reliability of data transfer. In most cases, keep the default value as 2346.

- Beacon interval: The device synchronizes the wireless network connection through regular Radio Beacon frames. This parameter is used to define the transmission interval of beacon frames, which are transmitted periodically at the specified time interval. The value range is generally 20-999 ms, and the default is 100 ms.
- DTIM interval: This parameter is used to specify the transmission interval for the Delivery Traffic Indication Message (DTIM). DTIM interval is used to decide the frequency of beacon frames containing Traffic Indication Map (TIM) to be transmitted. TIM will issue a warning to the sites entering into the sleep status, by indicating that the data is to be received. DTIM is usually the multiple of beacon interval. Its use range is 1-255, and its default value is 1.
- Enable Short Preamble: Enables or disables Short Preamble.
  - When enabled, the short preamble type will be used. The short preamble type can provide better performance. Because the use of short preamble can minimize the costs, thus maximizing the network data throughput.
  - When disabled, the long preamble type (Long Preamble) will be used, and able to provide more viable connections and a large range of connections.
- Enable WMM: Allows you to enable or disable the WMM support. WMM (Wi-Fi Multimedia) is a subset of the 802.11e standard. WMM allows wireless traffic to have a priority range based on the data type. Time-sensitive information, such as video or audio, will have a higher priority than the normal traffic. To use the WMM function properly, wireless clients must also support WMM.

7.5 Client List

This section describes the ***Wireless Configuration -> Client List*** page.

Through the "List of the wireless host status information", you can view the status information of the wireless hosts currently connected to the device. In addition, through the "List of the wireless host status information", you can also easily set the MAC address filtering function.

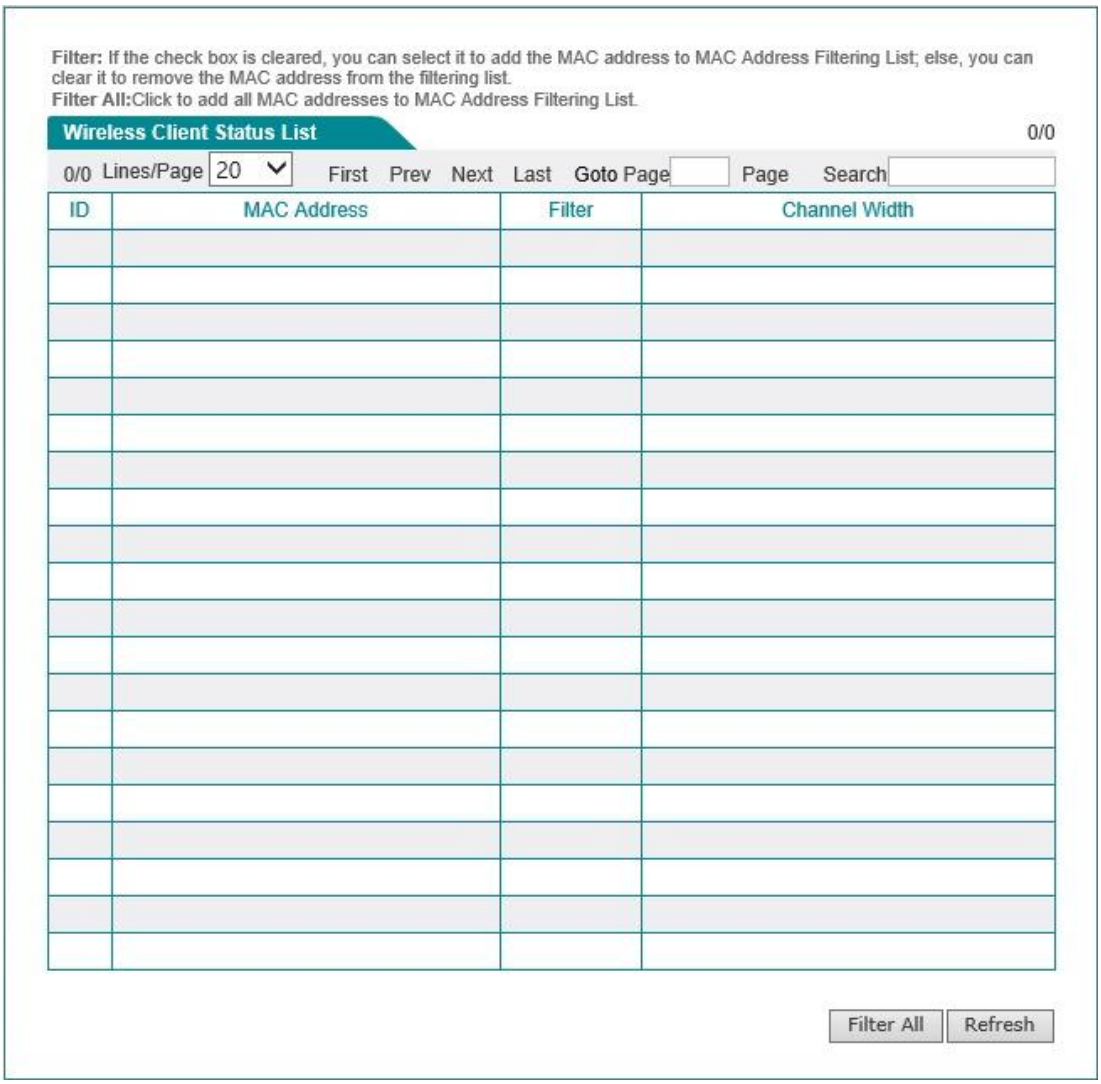


Figure 7-16 Client List

- ID: Serial number.
- MAC address: The MAC address of the wireless host.
- Filter: Selecting it to indicate that the current MAC address has been added into the "List of MAC address filter information" (which can be viewed in the ***Wireless configuration --> Wireless MAC address filtering*** page), while not selecting it means that the current MAC address filtering is not set.
- Channel bandwidth: The theoretical data transfer rate of the data channel.
- All filter: Click <All filter>, to conduct the MAC address filtering for all wireless hosts whose filtering is not enabled in the current list, and to add all the MAC addresses to the "MAC address filtering list".
- Refresh: Click <Refresh>, to view the latest wireless host status and statistical information.

Chapter 8. Advanced Configuration

The features described in this chapter include: NAT and DMZ, route configuration, network vanguard defense, port mirroring, port VLAN and SYSLOG configuration.

8.1 NAT and DMZ configuration

This section describes the features and configuration methods of the ***Advanced Configuration->NAT and DMZ configuration*** page.

8.1.1 Description of NAT functions

NAT (network address translation) is a technology to map an IP address field (such as Intranet) to another IP address field (such as the Internet). NAT was designed to solve the problem of increasing shortage of IP addresses, NAT allows a private network to use the IP address in any range internally, and for the public Internet, it is reflected as limited range of public network IP addresses. Since the internal network can be effectively isolated from the outside world, so NAT can also provide some assurance for network security.

LEVELONE routing products provide flexible NAT function. The following will detail its characteristics.

1. NAT address space

In order to correctly conduct the NAT operation, any NAT device must maintain two address spaces: one is the private IP addresses used internally by Intranet hosts, which is represented by "Internal IP address" in the device. Another is the public network IP address for external use, which is represented by "External IP address" in the device.

2. NAT Static mapping and virtual server (DMZ host)

After the NAT feature is enabled, the device blocks the access requests that originate outside. However, in certain application environments, a computer in the external network hopes to access

to the Intranet server through the device, at this point, the static NAT mapping or virtual server (DMZ host) needs to be set up on the device in order to achieve this objective.

With the static NAT mapping function, a one-to-one mapping relationship can be established between**<External IP address + External port>**and**<Internal IP address + Internal port>**, so that all the service requests for a specified port of the device will be forwarded to the matching intranet server, and the computer in the external network can access to the services provided by this server.

In some cases, a network computer needs to be fully exposed to the Internet, in order to achieve two-way communications, and at this time, you will need to set up this computer to a virtual server (DMZ host). When an external user accesses to the public network address that is mapped to the virtual server, the device will forward the packets directly to the virtual server.

Tip: The computer that is set to a virtual server will lose the firewall protection of the device.

The priority of NAT static mappings is higher than the virtual server. When the device receives a request from an external network, it will first check to see if there is a matching NAT static mapping based on the IP address and port number of the external access requests, and send the request messages matching the static NAT mapping to the Intranet computers if any. If there are no matching static mappings, it will check to see if there is a matching virtual server.

3. Two types of NAT rules

The device provides two NAT types: "Easy IP" and "One2One".

Easy IP: The translation of network port addresses. Multiple internal IP addresses are mapped to the same external IP address. It can dynamically assign a port associated with a single external address for each internal connection, and maintain the mapping of these internal connections to an external port, thus enabling multiple users to use a public network address to communicate with the external Internet.

One2One: The translation of static addresses. The internal IP and the external IP address are subject to one-to-one mapping. In this mode, the port number will not change. It is typically used to configure the extranet-access-to-intranet server: The network servers still use private addresses, and provide the public IP address assigned to it to the external network users.

We refer to each specific NAT configuration as "NAT rules". The exit IP address and lines must be specified when configuring the NAT rules. When there are multiple valid public network addresses, each type of NAT rules can be configured with more than one. In practical application, a mixture of different types of NAT rules often needs to be used.

8.1.2 Port Forwarding

This section describes the static NAT mapping functions of the device. Below is the description of

the meaning of the parameters for the static NAT mapping list and the static NAT mapping configuration.

1. Port Forwarding list

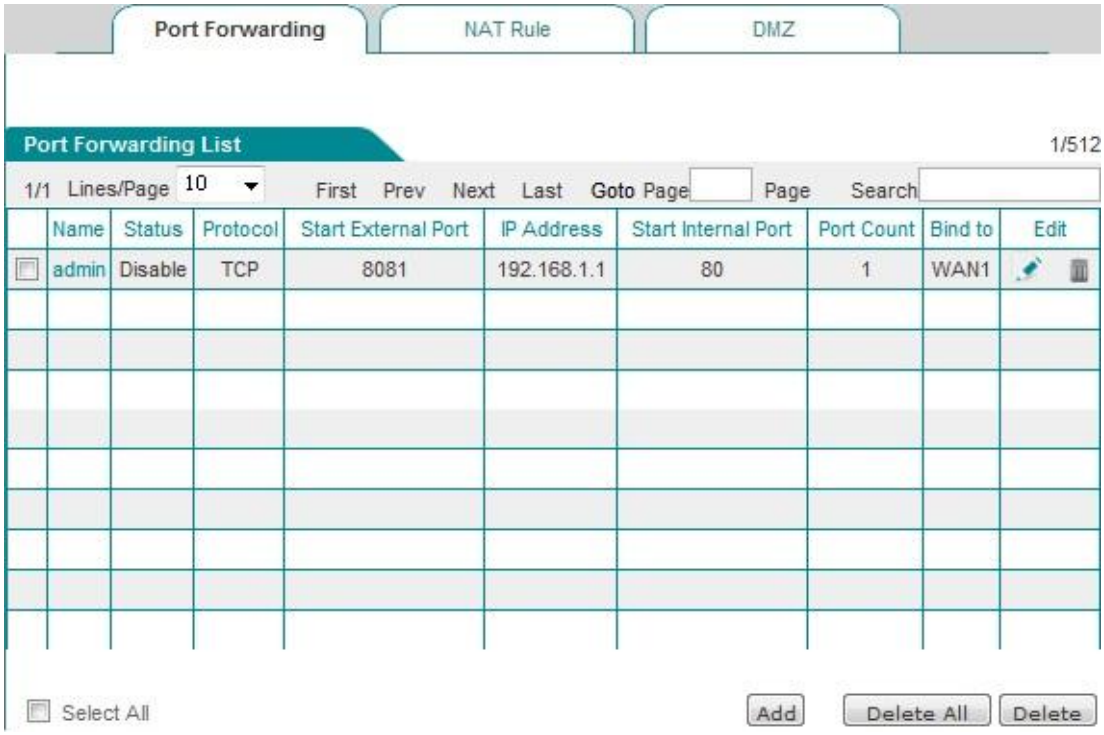


Figure 8_1 Port Forwarding list

Tip:

After enabling certain functions of the system, the list displays some NAT static mapping entries (A static mapping entry named as "admin" is added in the list after remote management is enabled in ***Systems management -> Remote management*** page, they cannot be edited or deleted in this page.

2. Static NAT mapping configuration

Click <Add new entry> in the page of Figure 8_1 to enter the ***Static NAT mapping configuration*** page, as shown in Figure 8_2. Here, the meaning of the parameters of the static NAT mapping configuration is described.

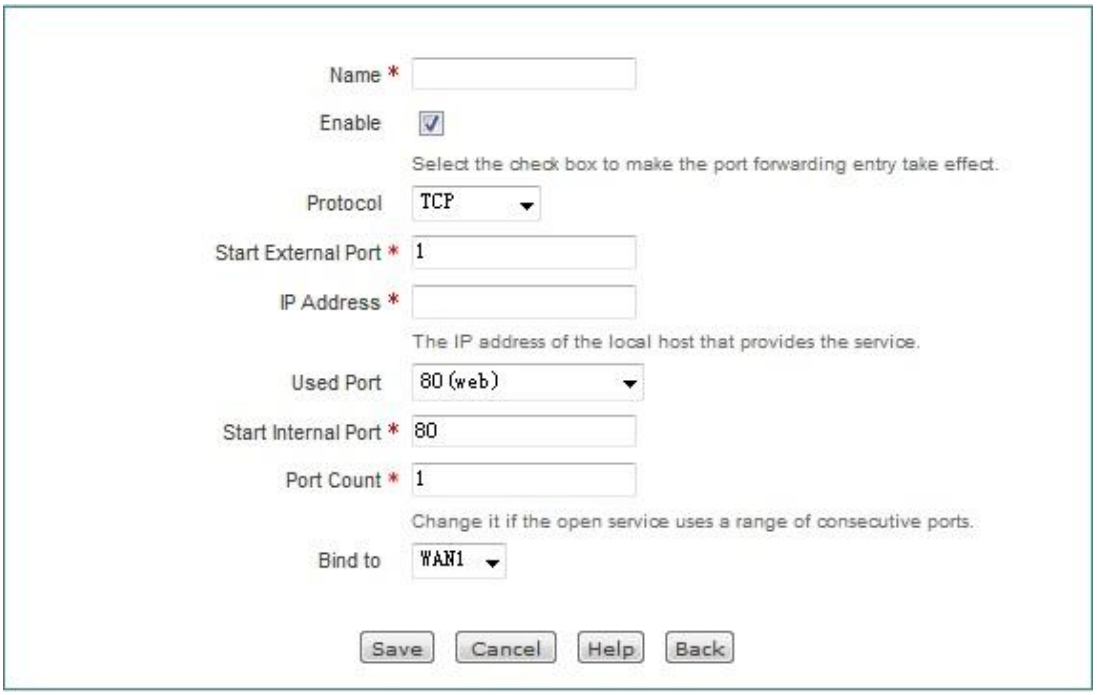


Figure 8_2 Port Forwarding Settings

- Static mapping name: The name of static NAT mapping, which is custom and cannot be repeated.
- Enable this configuration: Selecting it indicates that the static NAT mapping takes effect, and not selecting it means that the static NAT mapping does not take effect, but retains its configuration.
- Protocol: The protocol type of packets, the available options are: TCP, UDP and TCP/UDP. When you are unable to confirm that the protocol used by the application is TCP or UDP, select TCP/UDP.
- External starting port: The starting service port the device provides to the Internet.
- IP address: The IP address of the computer as a server in the Intranet.
- Common port: The port number that corresponds to the common protocol type for users' choice. When you are unable to confirm the protocol, select TCP/UDP.
- Internal starting port: The starting port of the services enabled by the network server.
- Number of ports: A segment of ports starting from the internal starting port, whose maximum value is set to 500.
- NAT binding: Selects the interface bound by the static NAT mapping.

8.1.3 NAT rules

The NAT rules features of the device are described below, including: NAT rule info lists, meaning of Easy IP NAT rules configuration parameters, meaning of One2One NAT rules configuration parameters.

1. List of NAT rules information

In NAT rules information list, you can see the configured NAT rules. As shown in Figure 8_3, it has two NAT rules instances configured. The NAT type of an instance: EasyIP converts the address with the intranet IP address of 192.168.1.20-192.168.1.25 to 200.200.202.20, and binds to the WAN1 port to achieve Internet access. The NAT type of an instance: One2One converts the address with the intranet IP address of 192.168.1.50-192.168.1-52 to 200.200.202.50, 200.200.202.51, 200.200.202.52, and binds to the WAN1 port to achieve Internet access.

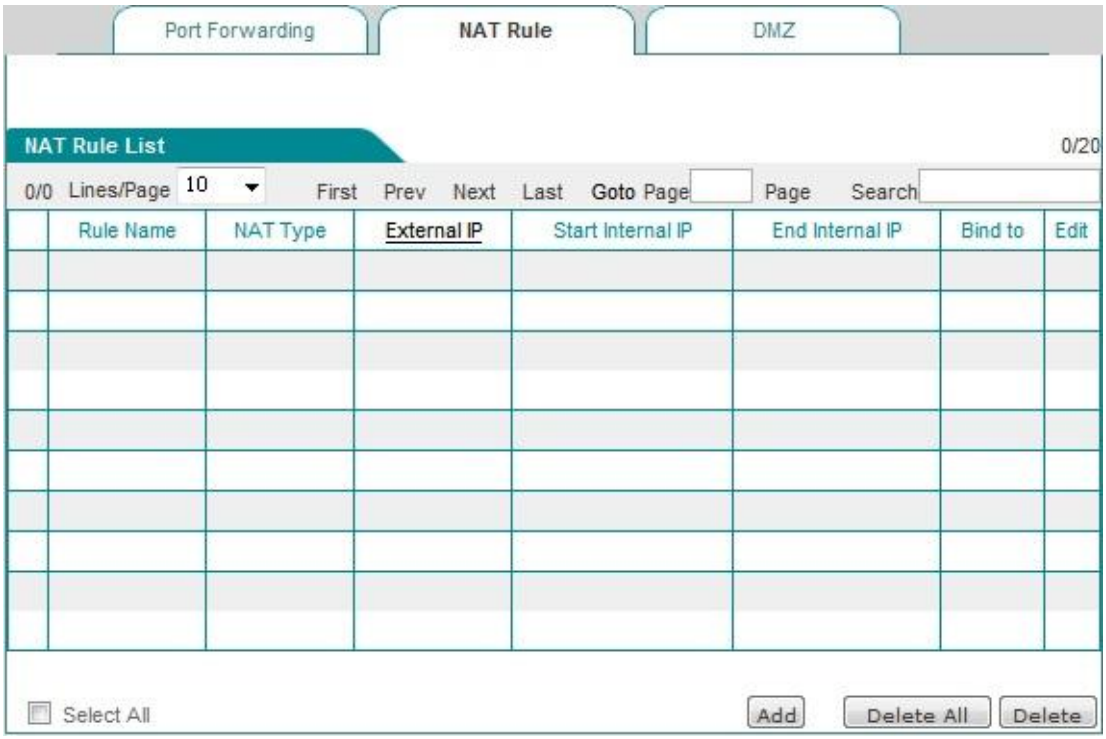


Figure 8_3 List of NAT rules information

Tip: Multiple NAT rules are configured for the same object, and the rules configured last will take effect first.

2. Easy IP

Click <Add new entry> in Figure 8_3 to enter the NAT rules configuration page. The following describes the meaning of the parameters for configuring the NAT rules with the type of EasyIP.

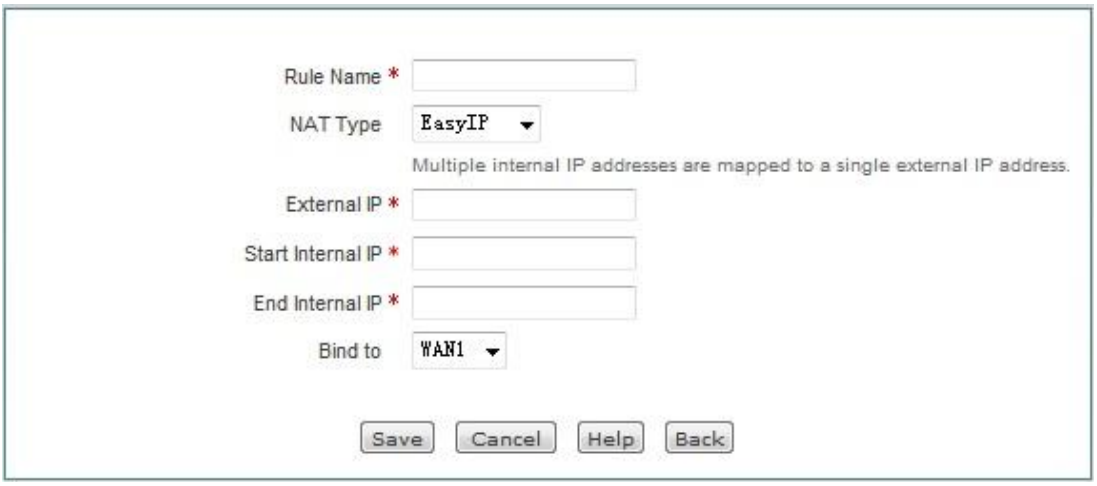


Figure 8_4 Easy IP

- Rule name: Customizes the name of the NAT rule.
- NAT type: Selects EasyIP here, which means the internal IP address are mapped to the same external IP address.
- External IP address: In the NAT rule, the external IP address mapped to the internal IP address.
- Internal starting IP address, internal ending IP address: The IP address range for the computers in the intranet that have the priority to use the NAT rules for Internet access.
- Binding: Selects the interface bound by the static NAT mapping.

3. One2One

Select the NAT type as One2One in Figure 8_5. The meaning of the parameters for configuring the NAT rules as One2One type is described here, and those parameters same as EasyIP are repeated no longer here.

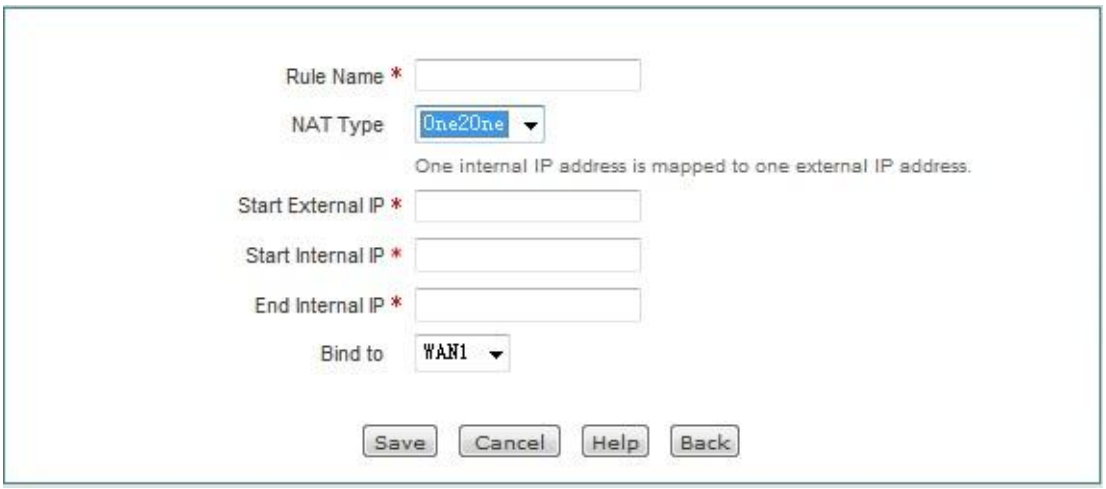


Figure 8_5 One2One

- NAT type: Here, One2One is selected. The internal IP address and the external IP address are

subject to one-to-one mapping.

- External starting IP address: In the NAT rule, the external starting IP address mapped to the internal starting IP address.

Tip:

1. Each One2One rule can only bind 20 external addresses at maximum.
2. "External starting IP address" must be set, and the actually mapped external IP address is gradually increased from the set value. For example, if "Internal starting IP address" is set to 192.168.1.50; "Internal ending IP address" is set to 192.168.1.52; "external starting address" is set to 200.200.202.50, then 192.168.1.50, 192.168.1.51, 192.168.1.52 are in turn mapped to 200.200.202.50, 200.200.202.51, 200.200.202.52.

8.1.4 DMZ

The DMZ functions of the device are described below.

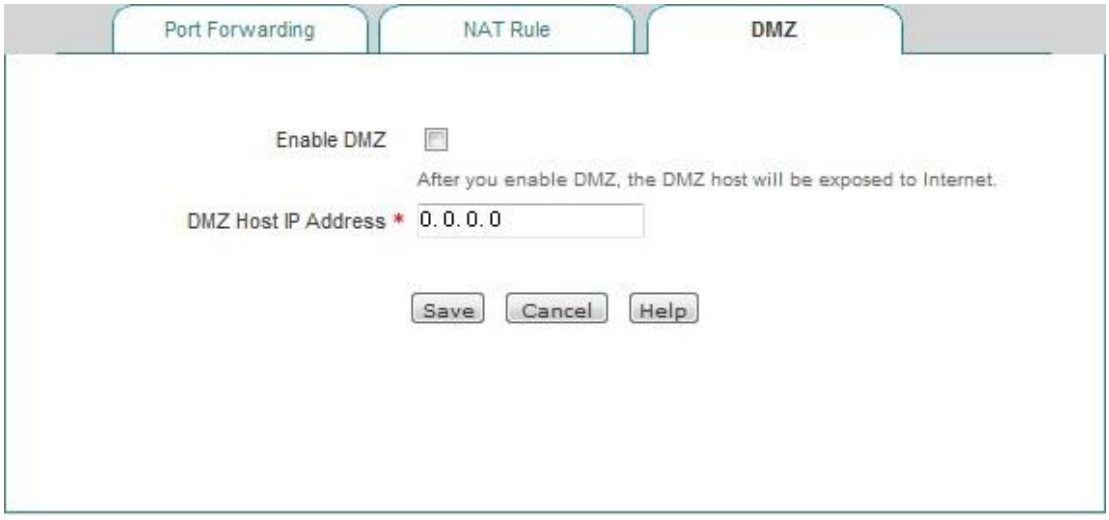


Figure 8_6 DMZ configuration

- Enable DMZ function: Enables or disable the DMZ function.
- DMZ host IP address: The IP address of the network computer used as a virtual server (DMZ host).

Tip:

The computer that is set to a DMZ host will lose the firewall protection of the device, which takes effect to all WAN ports.

8.1.5 NAT and DMZ configuration instances

This section describes the specific instances of NAT and DMZ configuration. Includes: Static NAT mapping instances, instances with the type of NAT rules as EasyIP, One2One.

一、Instances of Static NAT mapping configuration

Intranet computer 192.168.1.99 starts the TCP80 port services, and wants to access this service through WAN1 port 80. It's configuration is as shown in Figure 8_7.

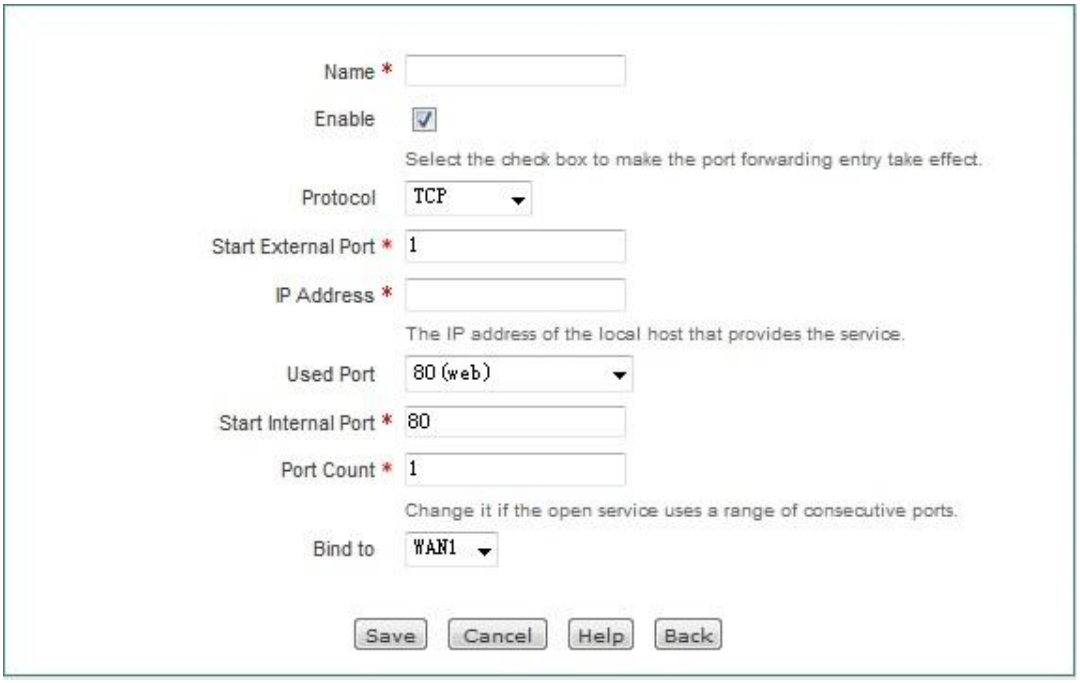


Figure 8_7 Port Forwarding Settings

二、EasyIP configuration instances

An Internet café uses a single line for Internet access, and the ISP has assigned 8 addresses for this line: 218.1.21.0/29 -218.1.21.7/29, where 218.1.21.1/29 is the gateway address of the line, and 218.1.21.2/29 is the IP address of WAN1 port of the device. Note that 218.1.21.0/29 and 218.1.21.7/29 are respectively the related subnet number and broadcast address, which cannot be used.

Now, Game B Zone (IP address range: 192.168.1.10/24-192.168.1.100/24) wishes to use 218.1.21.3/29 as a NAT mapping address for accessing to the Internet through the WAN port.

Configuration steps are follows:

The first step is to enter the ***Advanced configuration -> NAT and DMZ configurations ->NAT rules*** page, and click <Add new entry>.

The second step is to enter the ***NAT rules configuration*** page, and fill in "Game Zone" in the

"Rule name".

The third step is to select "NAT type" as "EasyIP".

The fourth step is to fill in 218.1.21.3 in the "External IP address". Fill in 192.168.1.10 and 192.168.1.100 in "Internal starting IP address" and "Internal ending IP address" respectively.

The fifth step is to select the rule-bound interface as WAN1 port.

The sixth step is to click <Save>, and the NAT rule is configured successfully.

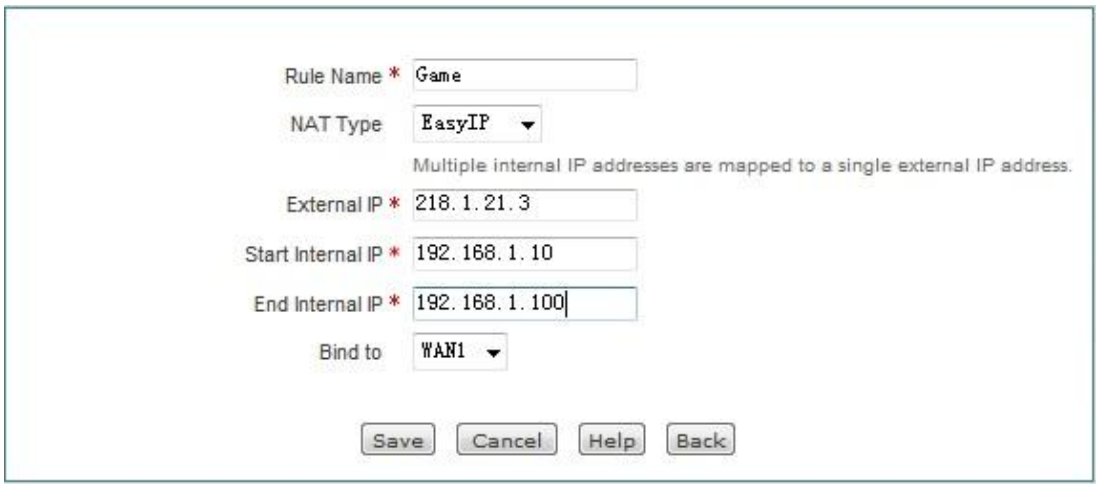


Figure 8_8 NAT rules Settings——EasyIP

Tip:

When configuring Easy IP, if the "External IP address" is not on the same network segment as the IP address of the bound interface, a route must be configured on the upper router to the network segment on which the "External IP address" resides or a 32-bit host route to the "external IP address", and the next hop is set to the IP address of the bound interface.

三、One2One configuration instance

Demands

An enterprise applies for a line of Telecom, which adopts the fixed IP access method, and the bandwidth is 6M. Telecom assigned 8 addresses to it: 202.1.1.128/29-202.1.1.1.135/29. Here, 202.1.1.129/29 is the gateway address of the line, and 202.1.1.130/29 is the IP address of the device's WAN1. Note: 218.1.21.0/29 and 218.1.21.7/29 are respectively the related subnet number and broadcast address, which cannot be used.

The company wants its people to access to the Internet via NAT by using 202.1.1.130/29 sharing. Additionally, there are four servers that are in one-to-one NAT (One2One) and use 202.1.1.131/29-202.1.1.1.134/29 for providing services externally. The internal network address is 192.168.1.0/24, and the address for 4 servers is 192.168.1.200/24-192.168.1.203/24.

Analysis

Since the fixed IP access mode is used for Internet access on this line, it is necessary to configure

the fixed IP access to the default Internet line in ***Network parameters —> WAN port configuration*** page, or directly enter the ***Start--> Configuration wizard > Network parameter s***page to configure the line. After the default Internet access line is configured correctly, the system-reserved NAT rules corresponding to the default line will be automatically generated, and the NAT function is automatically enabled.

And this enterprise provides four internal servers for external access, so it is also necessary to set an NAT rule with the type of "One2One".

Configuration steps are follows:

The first step is to enter the ***Advanced configuration -> NAT and DMZ configurations ->NAT rules*** page, and click <Add new entry>.

The second step is to enter the NAT rules configuration page, and fill in "Server" in the "Rule name".

The third step is to select "NAT type" as "One2One".

The fourth step is to fill in202.1.1.131in the "External starting IP address". Fill in192.168.1.200and 192.168.1.203 in "Internal starting IP address" and "Internal ending IP address" respectively.

The fifth step is to select the rule-bound interface as WAN1 port.

The sixth step is to click <Save>, and the NAT rule is configured successfully.

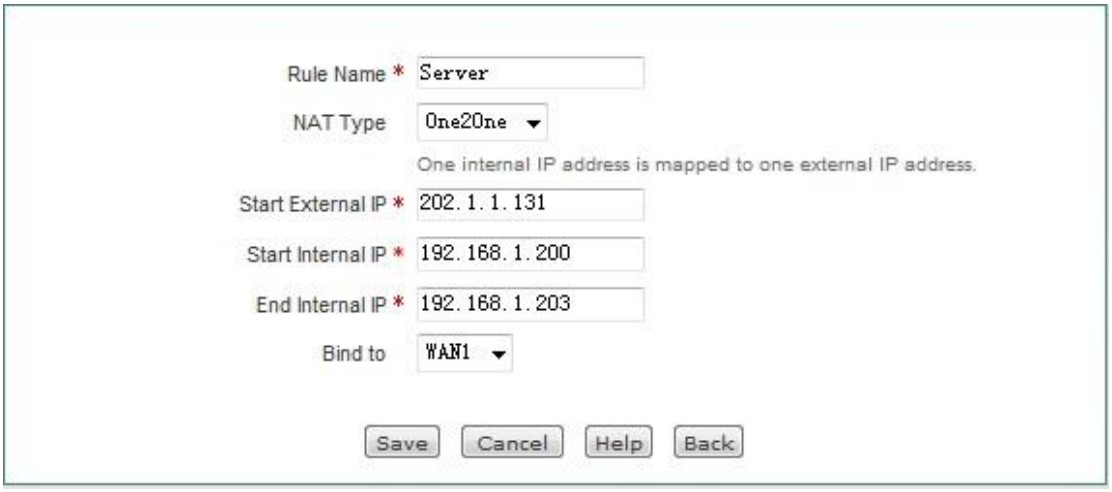


Figure 8_9 NAT rule Settings —One2One

8.2 Static Route Settings

This section describes the ***Advanced Configuration-> Routing configuration*** page and configuration methods.

Static route is manually configured by a network administrator, making the transmission of packets to the specified destination network be realized according to the predetermined path. Static routing does not change with changes in the structure of the network, therefore, when network structure changes or there is a network failure, you need to manually modify the static routing information in the routing table. Setting and using static routes correctly can improve network performance and meet special requirements, such as implementing traffic control, guaranteeing bandwidth for important applications and so on.

The following describes the list of routing configuration information and the meaning of the parameters in the routing configuration.

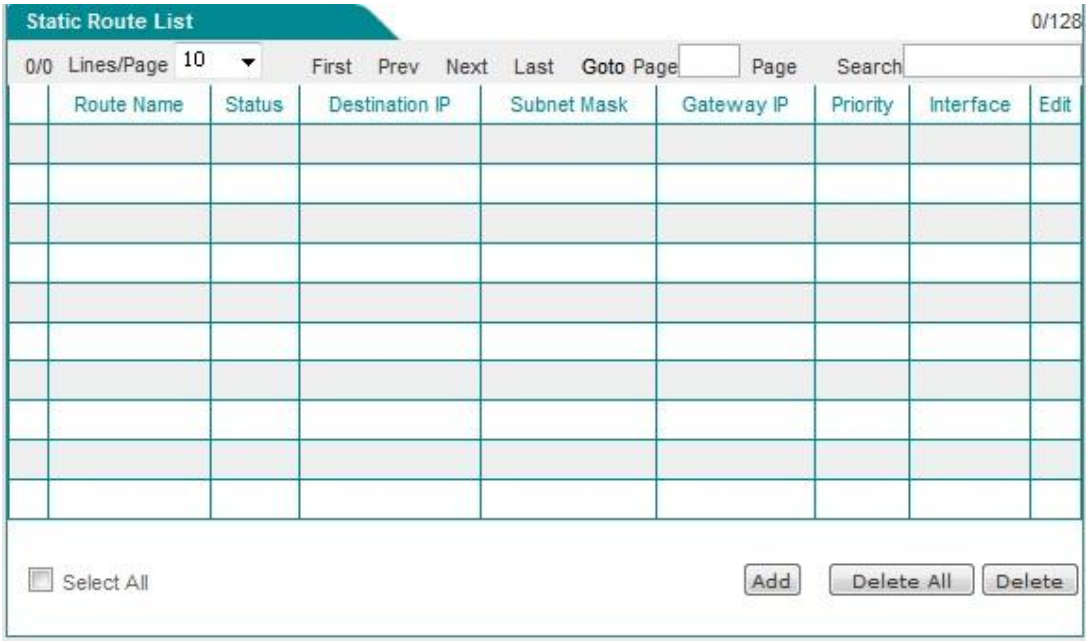


Figure 8_10 Static Route List

Click <Add new entry> in the above figure, and enter the ***Route configuration*** page.

Figure 8_11 Static Route Settings

- Routing name: The name of static routes (custom, no repetition).
- Enable this configuration: Enables this static route. Selecting it means enabled, while deselecting it means the route is disabled.
- Destination network: The destination network number for this static route.
- Subnet mask: The mask of the destination network for this static route.
- Gateway address: The IP address of the next-hop router ingress. The device defines a line for hopping to the next router through interface and gateway. Typically, the interface address and the gateway must be on the same network segment.
- Priority: Sets the priority of a static route. When the destination network, subnet mask are the same, select the high priority routing for forwarding data, and the smaller the value is, the higher the priority is.
- Interface: The forwarding interface for the specified packets. The packets matching the static route will be forwarded from the specified interface.

Tip:

When the destination network and priority of multiple routes are the same, the device will match them in the principle of first matching for last establishment.

8.3 Policy routing

This section mainly describes ***Advanced Configuration—>Policy routing*** page and configuration methods. In this page, you can define policy routing, and the packet are routed according to the source IP addresses, protocols, destination addresses and destination ports.

8.3.1 Enable policy routing

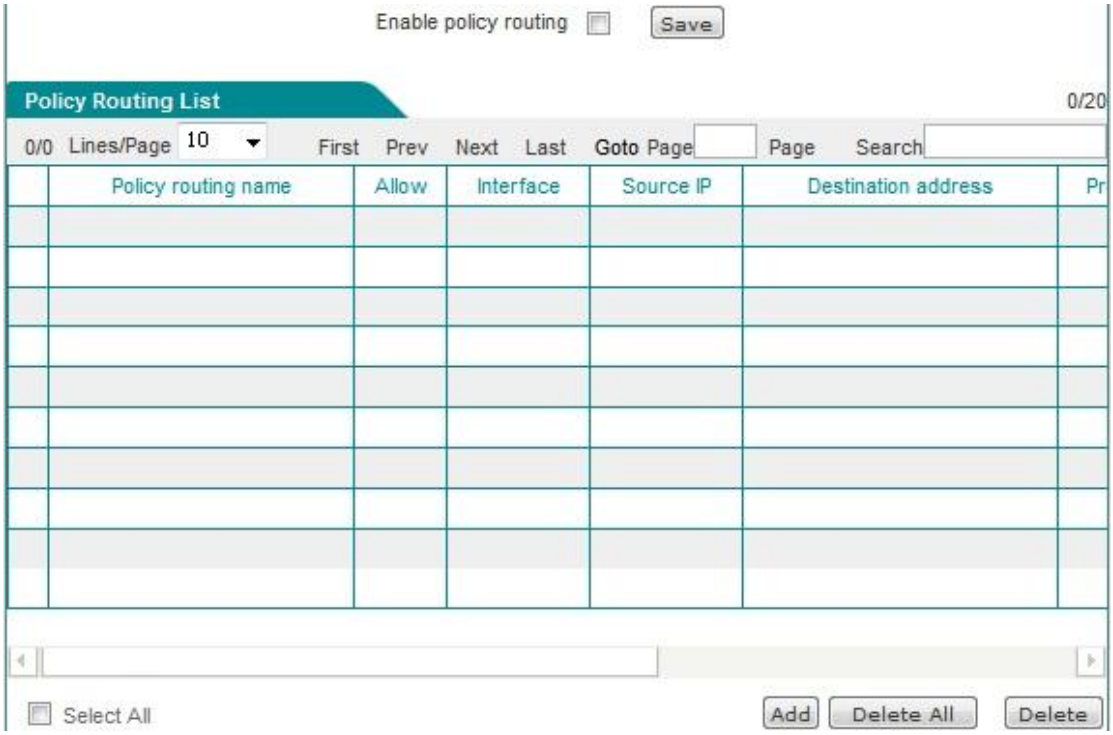


Figure 8_12 Policy routing list

- Enable policy routing: This is a global switch of policy routing. Only after it is enabled can the configured policy routing can take effect.
- Move to: Users can appropriately sort the policies using this bLeveloneon.

8.3.2 Policy routing configuration

Click <Add new entry> in the above figure, and enter the ***Policy routing configuration*** page.

Figure 8_13 Policy routing configuration

- Interface: Sets the physical interface bound by the policy routing, and the packets that meet the conditions of policy routing will be forwarded from the bound interface.
- Policy route name: Customizes the name of the policy.
- Source address: The source IP address of the packets following this policy route, which can be configured in two ways.
  - Network segment: The starting IP address and the ending IP address following this policy route.
  - User group: The user group following this policy route, click on "User group" to refer to the source address for policy reference for the user group. Enter User management -> User group configuration-> Add new entry to set up the source address field for the policy routing to take effect.
- Destination address: The destination address in the packet following this policy route, which is configured in the same way as the source address.
- Services: The services in the packets following this policy route, which can be configured in the following manner.
  - Ports: Range 1-65535, the corresponding protocols are TCP and UDP; when the selected

protocol is ICMP, the port range needs not be configured.

- Effective time setting: Selects the time period for the policy routing takes effect, and the default date is "Every day". The time is "All day". You can go to Advanced settings —> Configure policy route page to edit the time for the policy route to take effect.

Tip:

1. When all the packets match the defined source IP address, protocol and destination port, they will be forwarded to the specified interface, but the packets that cannot find a matching policy routes will go the normal route.
2. The execution order of policy routing: Static route to the LAN port > Policy routing > Static route to the WAN port.

8.4 Anti-NetSniper

This section describes the ***Advanced Configuration -> Anti-NetSniper*** page and configuration methods. Network vanguard defense is used to crack the shared detection set by the network operator. Verify that the intranet is experiencing a sharing problem, or don't enable that function.

Figure 8_14 Anti-NetSniper

8.5 Port mirroring

This section describes the port mirroring function of the ***Advanced configuration -> Port mirroring*** page. With the port mirroring function, you can copy the flow of the monitoring port to the monitoring port, to provide the detailed information on the transmitting status of the monitored ports, allowing network managers to make traffic monitoring, performance analysis and troubleshooting.

Except HiPER^{TM} 840G, the devices of HiPER series that support the port mirroring function have the default LAN1 port of monitoring port, and other LAN ports are monitored ports. The

configuration interface is shown in the figure below.

Figure 8_15 Port mirroring

- Enable mirroring: Checking it to enable this feature.

When the HiPER^{TM} 840G device supports two or more LAN ports, the port mirroring function can work.

- Monitoring port: The port for monitoring the traffic of the monitored ports, which can be only one.
- Monitored port: Only one monitored port can be selected.

Tip: The monitored port cannot be the same port as the monitoring port.

8.6 Port VLAN

This section describes the port VLAN function of the ***Advanced configuration -> Port VLAN*** page.

VLAN (virtual LAN) can split the network into several different broadcast domains logically. A logical constitutes a logical broadcast domain. The members of the same VLAN share broadcast and can communicate with each other. To achieve physical isolation between different VLANs, the unicast, broadcast and multicast packets within a VLAN will not be forwarded to any other VLAN, thereby helping to control traffic, simplify network management and enhance network security.

3. Port VLAN list

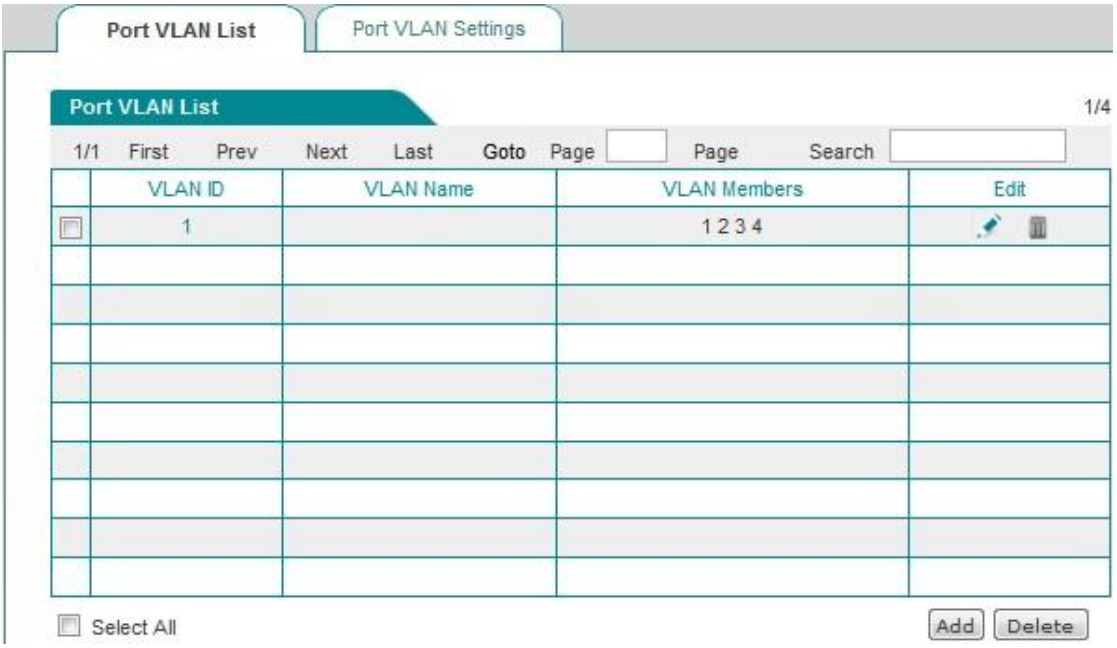


Figure 8_16 Port VLAN list

- VLAN group number: Displays the VLAN group number of the VLAN.
- VLAN group name: Displays the VLAN group name of the VLAN.
- VLAN members: Displays the members to the VLAN.

4. Port VLAN

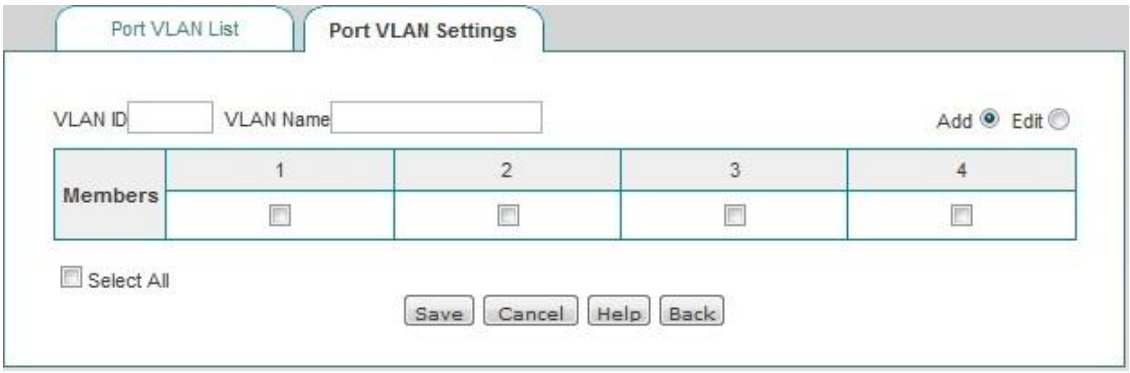


Figure 8_17 Port VLAN settings

- VLAN group number: Sets the VLAN group number.
- VLAN group name: Sets the name of the VLAN group.
- VLAN members: Selects the members to the VLAN group.

Tip:

1. The system has a default VLAN (VLAN 1), and it contains all physical ports by default, and cannot be deleted.

2. A VLAN can contain more than one port, and one port can belong to more than one VLAN.

5. Instances of Port VLAN

Requirements: The host under the LAN1 port can communicate with the hosts under the LAN2, LAN3 ports, but those under the LAN2 and LAN3 ports cannot access to each other.

Configuration steps:

1. Modify VLAN 1, whose member ports only include: 1, 2.
2. Create VLAN 2, whose member ports are: 1, 3.

Analysis: Both LAN1 port and LAN2 port belong to VLAN1, both LAN1 and LAN3 belong to VLAN2; the hosts under the fixed LAN1 port can communicate with the hosts under LAN2, LAN3 ports. Additionally, both LAN2 port and LAN3 port are not in the same VLAN, and the hosts under LAN2 and LAN3 cannot access to each other.

8.7 SYSLOG configuration

This section describes the ***Advanced Configuration -> SYSLOG configuration*** page.

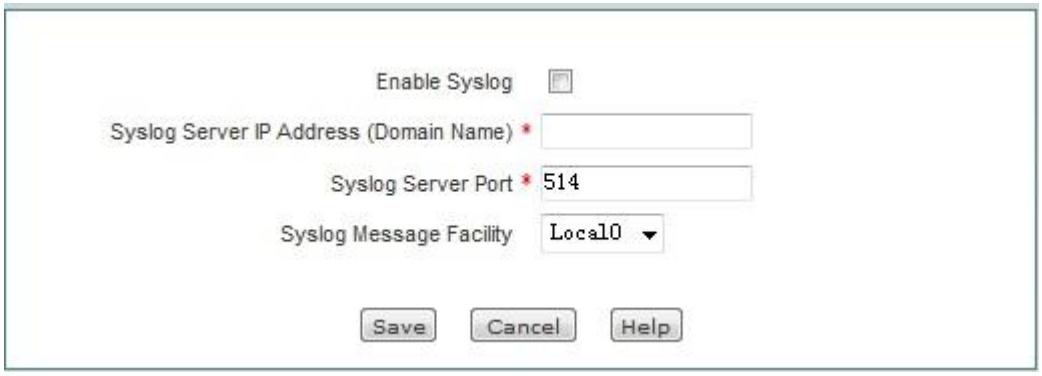


Figure 8_18 SYSLOG configuration

- Enable Syslog service: After the syslog service feature is enabled, this feature will send a large amount of information of device operation to a syslog server, which makes it easy for administrators to analyze system conditions, and monitoring system activity.
- Address of syslog server (domain name): Sets the address of the syslog server, which can be an IP address or a domain name.
- Port of Syslog server: Sets the service ports that are opened by the syslog server, whose default value is 514.
- Syslog message type: Sets the type of syslog message to be sent, whose default value is Local0.

Chapter 9. User management

This chapter describes the secondary menu under the primary menu of user management, including: User state, IP/MAC binding, PPPoE server, WEB authentication, user group configuration.

9.1 User status

This section describes the ***User management-> User status*** page. Administrators can understand all intranet users' net behaviors, the traffic occupied by the net behaviors and the status of each user, and so on by viewing, analyzing the pie charts and lists in this page.

Figure 9_1 User Status

- Analysis of the current network traffic usage: analyzes the current percentage of network traffic used by Intranet applications.
- Analysis of current net behaviors: Analyzes the net behavior of all currently online users.
- Clear data: The system counts the traffic and net behaviors from 00:00 every day. Clicking this bLeveloneon will clear the historical data of the day and immediately begin to recount.
- Disable identification statistics: Click this bLeveloneon to disable the identification function for net behavior management. After doing this, the net behavior management function will be disabled.

The following describes the list of user status information, through checking of which, administrators can learn about each online user's online time, real-time upload/download rate, total uplink/downlink traffic, net behaviors, etc.

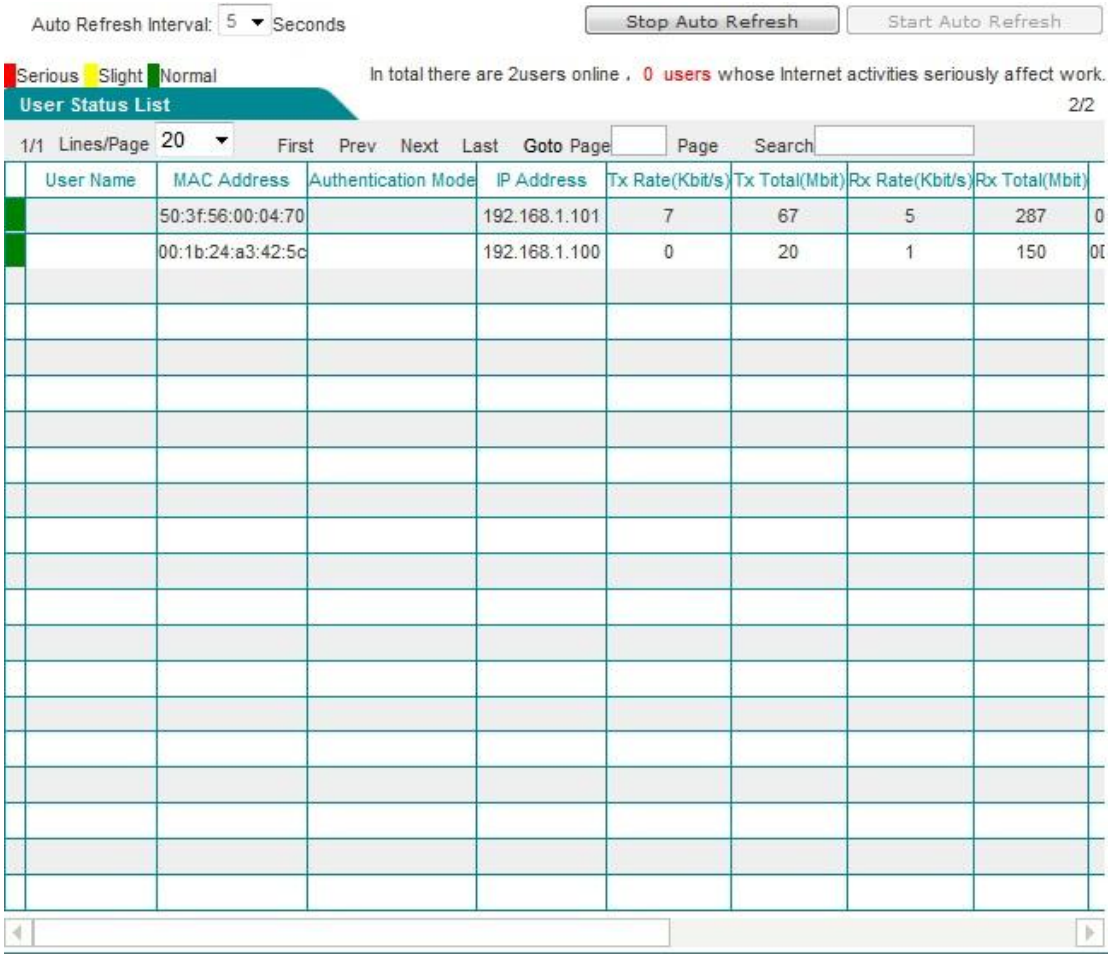


Figure 9_2 User status information list

The first column of user status information displays if each user's net behaviors are affecting work, whose status includes: Severe (red), minor (yellow), normal (green). When an intranet user's behavior of accessing shopping websites, social networking sites, using stock software and playing online/web game accounts for a range of [100%, 70%] of all of its personal net behaviors, this means seriously affecting work. When the range is (70%, 50%), it means minor. When the range is (50%, 0%), it means normal.

- User name: Displays the user name for Intranet users.
- MAC address: Displays the MAC address of Intranet users.
- Ways of authentication: Displays authentication of Intranet users (WEB and PPPoE)
- IP address: Displays the IP address of Intranet users.
- Upload, download rate: Displays the upload and download rate of Intranet users.
- Total uplink, downlink traffic: Displays the total uplink and downlink traffic of Intranet users.
- Online time: Displays the user's online time.

- Group: Displays the group to which the user belongs.
- Net behavior: Displays the user's net behaviors.
- Settings: Click the icon. If you want to clear the user's net behavior statistics, please click "Clear data".
- Note: Click on the icon to modify the description information of PPPoE dial-up user, WEB authenticated user.
- Automatic refreshing interval: This list supports automatic refreshing, with the interval of 1-5 seconds.
- Stop automatic refreshing: Click this bLeveloneon and the list will stop automatic refreshing. If you need to view the information of the entire list or modify the notes, etc., it is proposed to stop automatic refreshing.
- Start automatic refreshing: Click this bLeveloneon and the list will refresh the list at the automatic refreshing interval.

9.2 IP/MAC binding

This section describes the ***User management->IP/MAC binding*** page and configuration method.

To implement network security management, you must first solve the identity problems of users before you can carry out the necessary service authorization work. In ***Firewall -> Access control policy***, we will introduce how to implement the control of Intranet users' net behaviors. In this section, we will describe how to solve the problem of user identification.

In the device, user's identification can be completed through the IP/MAC binding function. The use of the bound IP/MAC address pair as the user's unique identity ID can protect the device and network against IP spoofing attacks. IP spoofing attack means that a host attempts to use another trusted host's IP address to connect to the device or pass through the device. This host's IP address can be easily changed as a trusted IP address, but the MAC address is added by the manufacturer to the Ethernet card, so it cannot be easily changed.

9.2.1 IP/MAC binding list

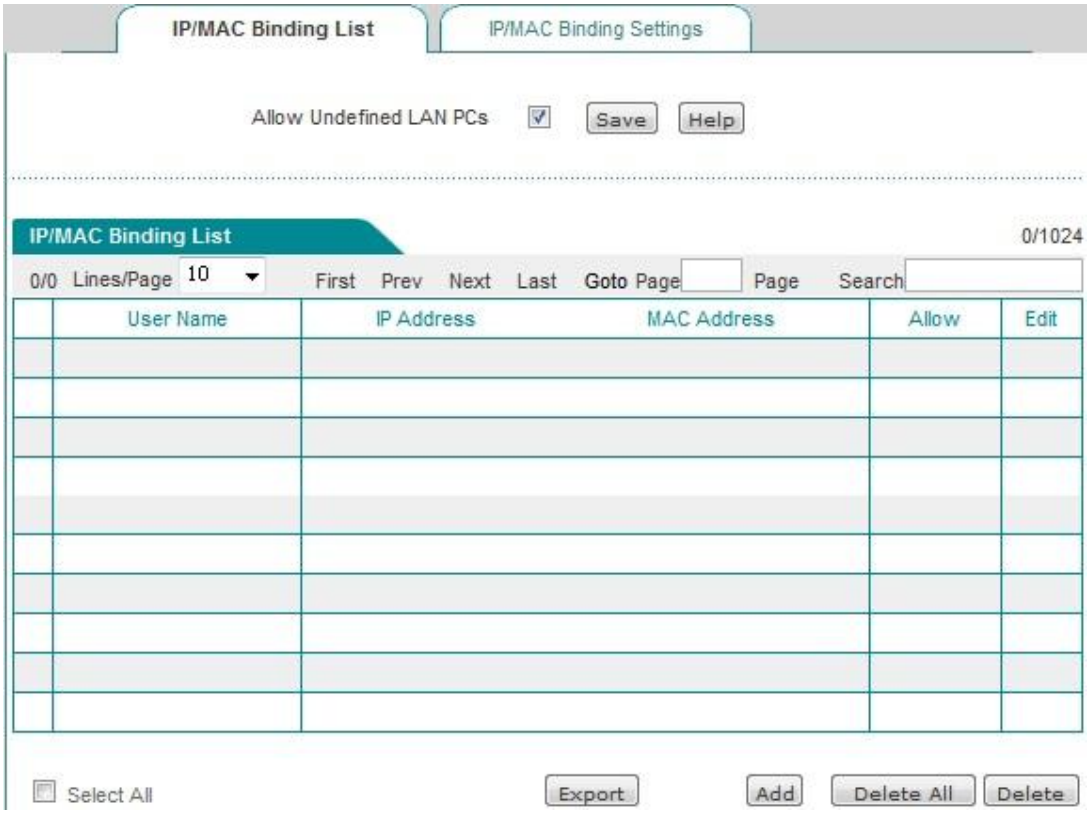


Figure 9_3 IP/MAC binding global configuration

- Allow non-IP/MAC bound user to connect to the device: Allows or disallows the non-IP/MAC bound users to connect to the device, and access to other networks through the device.
- Allow: Ticking this check box means to allow the bound user to connect to the device, but unchecking it means to disallow the bound user to connect to the device.
- Modify the IP/MAC binding entries, click the Edit icon, to enter the ***IP/MAC binding configuration*** page as shown in the figure below, and after change, click <Save>.
- Export: This bLeveloneon is used to export the IP address, MAC address, user name in the list of IP/MAC binding information.

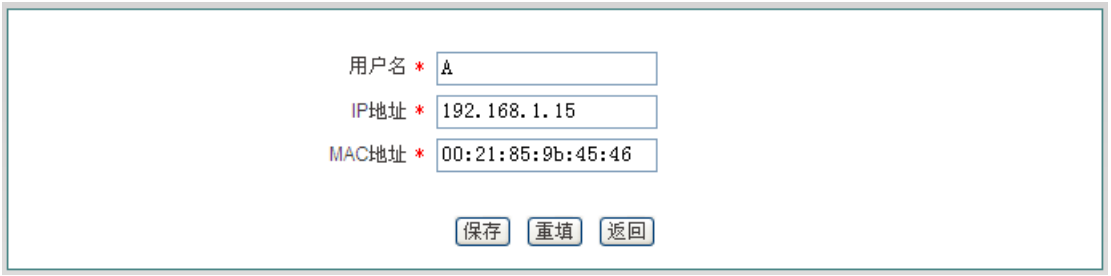


Figure 9_4 Modification of IP/MAC instances

Tip:

Before deciding to cancel the "Allow non-IP/MAC bound user to connect to the device" function, you must make sure that the management computer has been added to the "IP/MAC binding information list", otherwise it will cause the management computer to be unable to connect to the device.

9.2.2 IP/MAC binding configuration

Figure 9_5 IP/MAC binding configuration

- Network segment: The management IP address/subnet mask of the device by default.
- Text box: Displays the scanned IP/MAC information, or the configured IP/MAC binding information, whose input format is "IP+MAC+ username".
  - IP address, MAC address: The user's IP address, MAC address (which can be obtained using the ipconfig /all command under DOS environment on Windows platforms).
  - User name: It can be ignored, because the system will automatically assign a name for it.
- Scan: Click <Scan> to display the ARP information dynamically learned by the device.

- Binding: Binds all the IP/MAC entries in the text box.

Tip:

1. In the above input format, there may be one or more spaces between the IP and MAC, MAC and username.
2. For the invalid entries, the system will skip the invalid configuration entries in binding.

9.2.3 IP/MAC binding instances

Flexibly using the IP/MAC binding feature can configure "white list" and "black list" for Internet access for Intranet users.

By configuring the "white list" for Internet access, only the users in "white list" are allowed to access the Internet through the device, while prohibiting all other users from doing it. Therefore, if only a few users in the intranet are allowed for accessing the Internet, a "white list" is to be configured to achieve this goal.

By configuring the "black list" for Internet access, only the users in "black list" are prohibited from accessing the Internet through the device, while allowing all other users to do it. Therefore, if only a few users in the intranet are prohibited from accessing the Internet, a "black list" is to be configured to achieve this goal.

In the device, the users in the "white list" are legal users - their IP and MAC address exactly matches an entry in the "IP/MAC binding information list", and the entry selects "Allow".

The users in the "black list" are illegal users - their IP and MAC address exactly matches an entry in the "IP/MAC binding information list", and the entry does not select "Allow". Or, there is only one entry in their IP and MAC address matches the corresponding information of a bound entry.

1. Configure "white list" of Internet access for Intranet users, following these steps:

First, Specify legal users by configuring the IP/MAC binding entries, and use the IP address and MAC address of the host with the permission to access the Internet as the IP/MAC address binding pair, and add it to the "IP/MAC-binding information list", and "Allow" needs also be selected, that is, allow the users exactly matching the IP/MAC address to access the Internet.

Next, deselect the "Allow non-IP/MAC binding user to connect to the device", so that all other hosts not included in the "IP/MAC binding information list" will not be able to access the Internet.

For example, if you want to allow a host with the IP address of 192.168.1.2, and the MAC address of0021859b4544to connect to and pass the device, you can add an IP/MAC address binding entry, enter the host's IP address and MAC address, and select "Allow", as shown in Figure 9_ 6 .

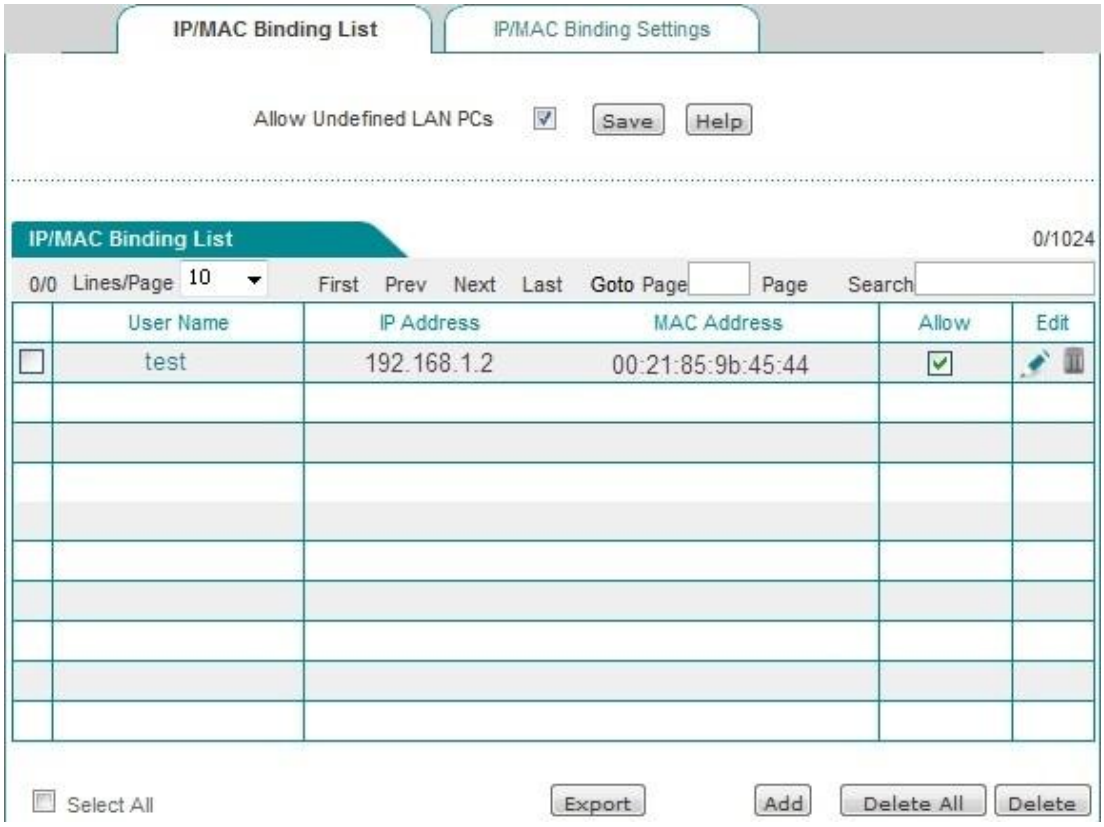


Figure 9_6 IP/MAC binding information list – Instance I

2. Configure "Black list" of Internet access for intranet users, following these steps:

First, specify the illegal user by configuring the IP/MAC binding entries, and there are two methods:

1. Use the IP address of the host that is prohibited from Internet access and the MAC address of any of the non-intranet adapter as the IP/MAC address binding pair, and add it into the "IP/MAC-binding information list".

2. You can use the IP and MAC addresses of the host that is prohibited from Internet access as the IP/MAC address binding pair, and deselect "Allow" (no "√" in the box), namely, to prohibit the users that exactly match the IP/MAC address from accessing to the Internet.

Next, select the "Allow non-IP/MAC binding user to connect to the device", so that all other hosts whose IP addresses and MAC addresses are not included in the "IP/MAC binding information list" will be able to access the Internet.

For example, if you want to prohibit a host with the IP address (for example, 192.168.1.3) from accessing and connecting to the device, you can add a IP/MAC address binding pair, enter the IP address, and the MAC address is set to the MAC address of any non- intranet adapter, as shown in the table below.

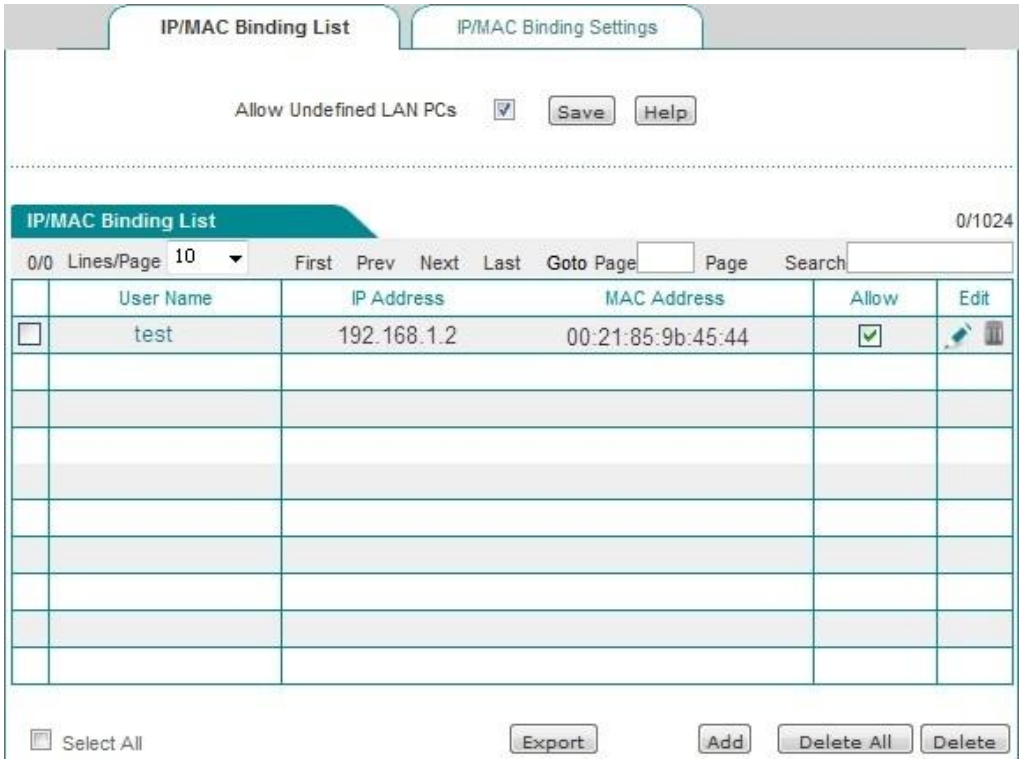


Figure 9_7 IP/MAC binding information list – Instance II

For example, if you want to prohibit a host with the IP address of 192.168.1.30 and the MAC address of 0021859b2564 from connecting and passing the device, you can add an IP/MAC address binding pair, enter the host's IP address and MAC address, and deselect "Allow" (no "√" in the box), as shown in Figure 9_ 8 .

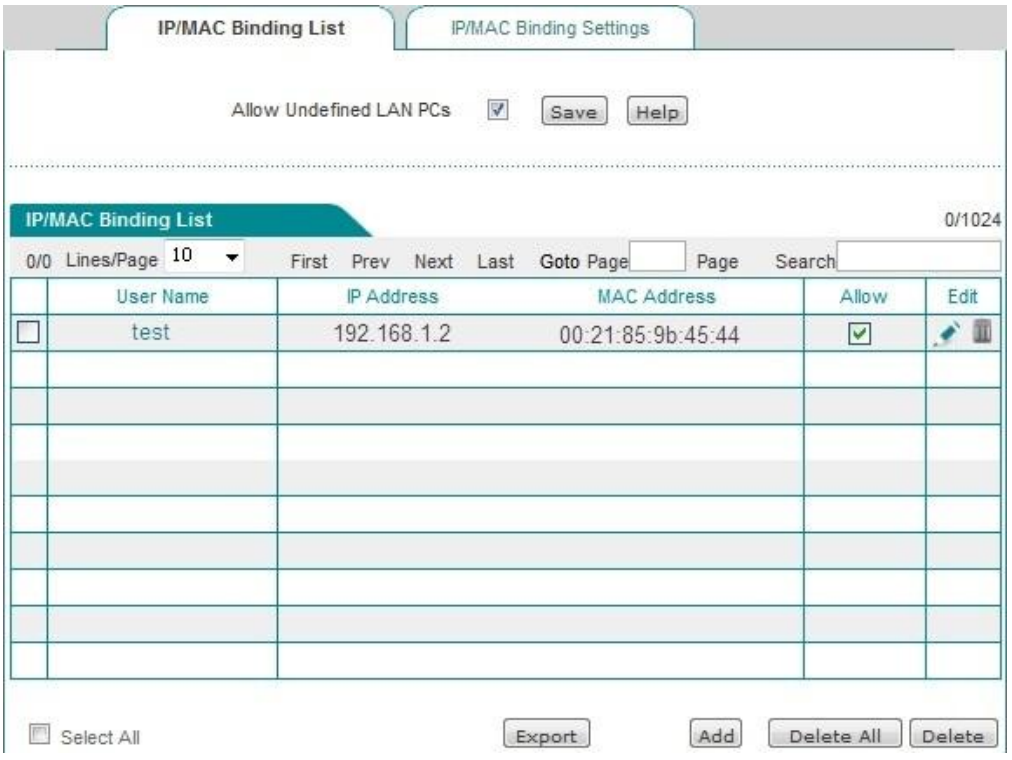


Figure 9_8 IP/MAC binding information list – Instance III

9.3 PPPoE Server

This section describes the device's PPPoE function, including: PPPoE introduction, PPPoE global configuration of device, configuration of PPPoE accounts and viewing of PPPoE connection status.

9.3.1 PPPoE introduction

PPPoE (Point-to-Point Protocol over Ethernet). It allows a host on the Ethernet to connect to the Internet through a simple access device. PPPoE protocol uses Client/Server, which encapsulates PPP packets in an Ethernet frame, and provides the point-to-point connection over Ethernet. PPPoE dial-up connections include two stages, Discovery (discovery) and Session (PPP session). The following will introduce these two stages.

1. Discovery stage

This stage is used to establish a connection. When a user host wants to start a PPPoE session, it must first implement the discovery stage to identify the Ethernet MAC address of PPPoE Server, and establish a PPPoE session ID (Session ID).

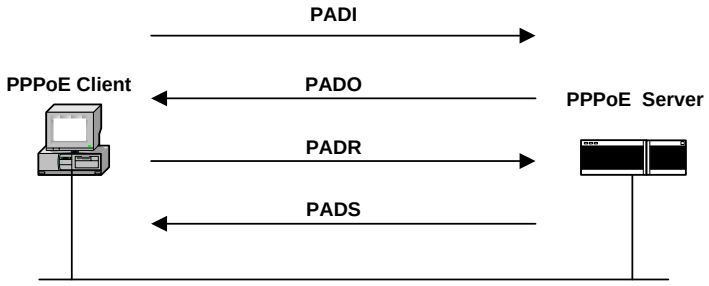


Figure 9_9 Basic workflow of Discovery stage

As shown in the figure above, Discovery stage consists of four steps. The following describes the basic workflow.

- PADI: If you want to set up a PPPoE connection, PPPoE client should first send a PADI (PPPoE Active Discovery Initiation) packet as a broadcast. The PADI packet includes the services the client requests.
- PADO: When the PPPoE server receives a PADI packet, it will determine if it is able to provide services, and if so, it will send to the client a PADO (PPPoE Active Discovery Offer) packet to respond. PADO packets include the PPPoE server name and the service name

same as that in the PADI packet. If the PPPoE server cannot provide services to PADI, it is not allowed to use the PADO packet to respond.

- PADR: Since PADI is sent as a broadcast, the PPPoE client may receive more than one PADO packet, and it will review all the PADO packets received and choose a PPPoE server based on the server name in it or the services provided, and then send a PADR (PPPoE Active Discovery Request) packet to the selected server. PADR packet includes the services requested by the client.
- PADS: When PPPoE server receives the PADR packet sent by the client, it is ready to start a PPPoE session, and creates a unique PPPoE session ID for PPPoE session, and sends to the client a PADS (PPPoE Active Discovery Session-confirmation) package as a response.

When the discovery stage ends normally, both ends of the communication obtain the session ID and their MAC addresses, and they define a PPPoE session together uniquely.

2. PPP session stage

When PPPoE enters the PPP session stage, the client and the server will conduct a standard PPP negotiation, and after this, the data is sent over PPP encapsulation. The PPP packets are encapsulated as the payload of PPPoE frame in an Ethernet frame, and sent to the peer end of the PPPoE link. Session ID must be the ID determined in the Discovery stage, and remains unchanged during the session. The MAC address must be that of the peer end.

At any time during the session stage, both PPPoE server and client can send PADT (PPPoE Active Discovery Terminate) to each other, notifying the other side of ending the session. When receiving PADT, it is not allowed to use the session to send the PPP traffic. After sending or receiving a PADT packet, even the conventional PPP end packet is not allowed to be sent. Normally, both parties of PPP communication end the PPPoE session using the PPP itself, but can end the session using PADT if PPP cannot be used.

9.3.2 PPPoE global Settings

Enter ***User management->PPPoE server*** page to configure the PPPoE server function. The configuration parameters are described as follows.

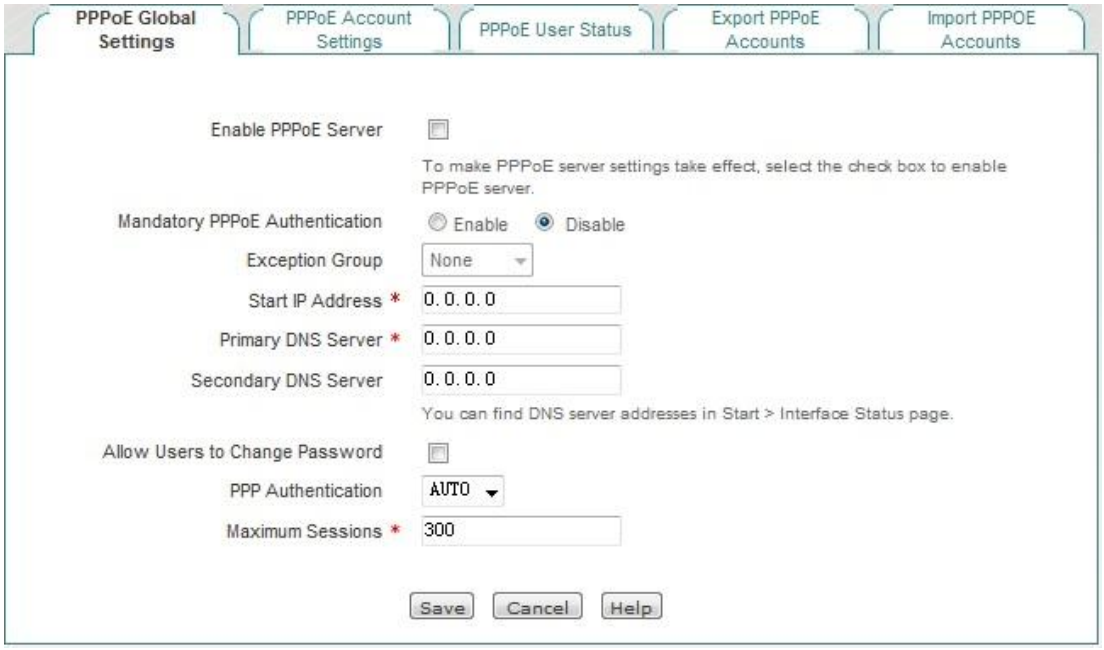


Figure 9_10 PPPoE Global Settings

- Enable PPPoE server: Enables/disables the PPPoE server function of the device. Select it to enable.
- Forcing PPPoE authentication: Enabling it means to only allow the users who pass the intranet PPPoE authentication to access the Internet.
- Exception address group: After the device enables the forcing PPPoE authentication, the users of the address group can communicate with external network without dial-up authentication, and the address group needs to be configured in the ***User management -> User group configuration*** page.
- Starting IP address: The starting IP address the PPPoE server automatically assigns to the network computers.
- Primary DNS server: The IP address of the primary DNS server automatically assigned by the PPPoE server to the network computers.
- Secondary DNS server: The IP address of the secondary DNS server automatically assigned by the PPPoE server to the network computers.
- Allow users to modify the dial-up password: Checking it means to allow intranet PPPoE dial-up users to modify dial-up password on their own.
- Password authentication mode: The way PPPoE authenticates username and password. The device provides three authentication modes, PAP, CHAP and AUTO, and the default value is AUTO, which means that the system automatically selects one of PAP and CHAP to authenticate the dial-in users, and generally does not need to be set.
- Maximum number of sessions: The maximum number of PPPoE sessions supported by the

system to be established.

Tip:

1. The steps that PPPoE users change the dial-up password:
   1) Users open the dial-up client, and dial up using the user name, password.
   2) After a successful dial-up, log into the self-service page, whose address is: http://192.168.1.1/poeUsers.asp (the address is the LAN IP address for the device).
   3) In the change password page, enter your user name, old password, new password, and confirming password.
   4) Click "Submit" to display "Operation is successful", and the password is successfully changed.
2. Users can modify their password 5 times a day on their own.
3. The administrator can use the ***Behavior management -> Electronic notification*** page to configure the **Routine business notification** for informing users of how to modify the PPPoE dial-up password.

9.3.3 PPPoE account configuration

Enter the ***User management ->PPPoE account ->PPPoE server configuration*** page (as shown in Figure 9_11) to view the PPPoE account info list. Click <Add new entry> in the page to enter into the page as shown in Figure 9_ 1 2 :

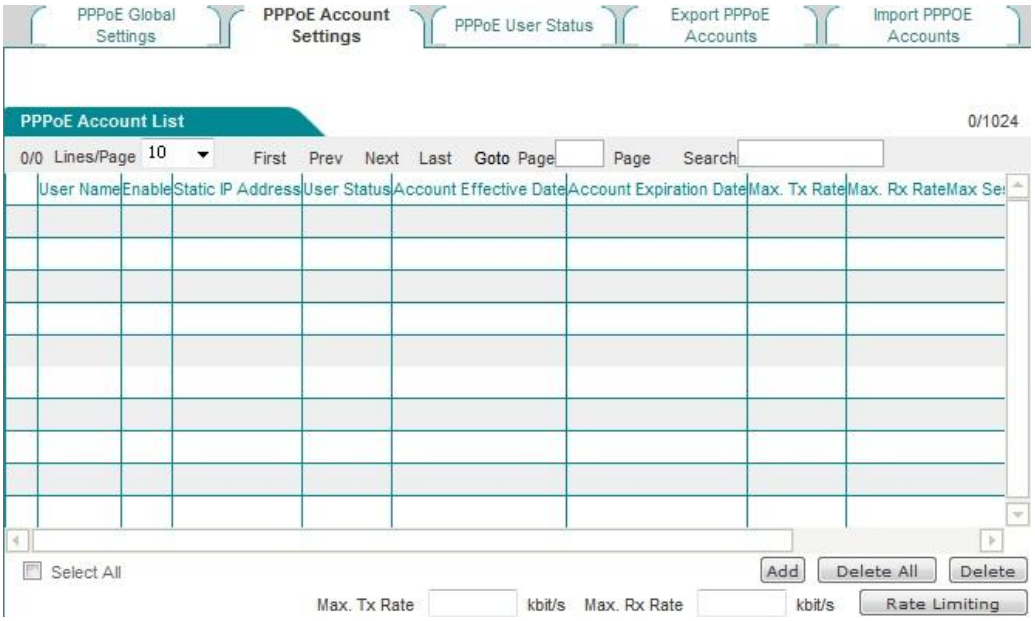


Figure 9_11 PPPoE account info list

- User name: The user name of PPPoE dial-up users.
- Enable: If the user is allowed to access the Internet. Checking it means allow.
- Fixed IP address: Displays the IP address bound to that user name.
- Charging mode: When the charging feature is enabled, the "by date" will be displayed (which currently supports charged by date).
- User status: The using status of the user will be displayed after the charging feature is enabled, including: normal, to be expired, expired.
  - To be expired: This parameter is controlled through "Account Days Remaining" in the account expiration notification feature (Here, the account expiration notification feature, please go to ***Behavior management -> Electronic notification*** page for configuration).
  - Expired: Means that the account is not in the effective date of account.
- Date of account opening, date of account disabling: When the charging feature is enabled, the effective date of the account will be displayed.
- Upload rate limit, download rate limit: The maximum upload and download rates of PPPOE (0 means unlimited rate).
- Maximum number of sessions for account: Displays the number of users who can simultaneously use the account for PPPoE connection.
- MAC address: Displays the MAC address bound by the account.
- Upload rate limit, download rate limit: Sets rate limit in batch for the accounts checked in the PPPoE account info list (0 means unlimited rate).
- Rate limit: Click on this bLeveloneon, to bring the upload speed, download rate limit in force.

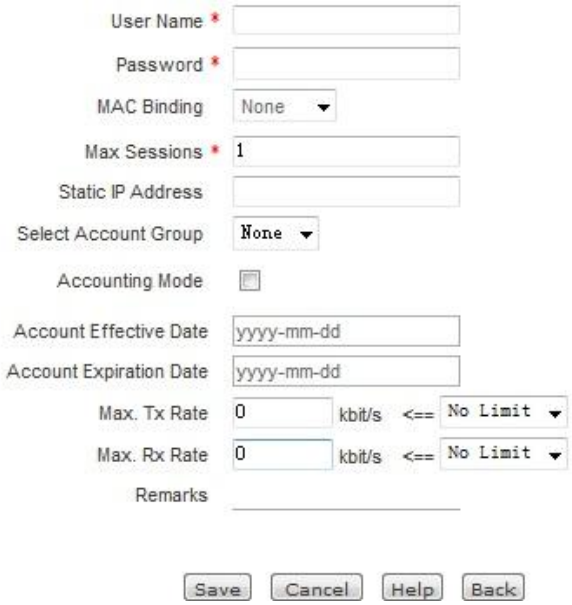


Figure 9_12 PPPoE account settings

- User name: The account (custom, not repeatable) used by users in initiating PPPoE connections for the PPPoE server to authenticate, the value range is: 1-31 characters.
- Password: The password used by users in initiating PPPoE connections for the PPPoE server to authenticate.
- MAC binding: Chooses to bind the user name with the corresponding MAC address. If binding, only the hosts with the corresponding MAC address can use the account for accessing to the Internet.
  - No binding: Means no user name/MAC binding is to be done.
  - Automatic binding: After the user dials up successfully for the first time, the device will automatically bind the user name with the dial-up user's MAC address.
  - Manual binding: Manually enters the MAC address in the MAC address bar for user name/MAC binding.
- Maximum number of sessions for account: Sets the number of users who can simultaneously use the account for PPPoE connection.
- Fixed IP address: The fixed IP address assigned for the PPPoE dial-up user, which must be within the scope of address pool.
- Added to the account groups: the user name will be added to the appropriate account group, which must be configured in the ***User management -> User group configuration*** page.
- Charging mode: Checking it means that the PPPoE charging feature is enabled. Here, the account expiration notification feature is configured in the ***Behavior management -> Electronic notification*** page.
- Date of account opening, date of account disabling: Sets the effective date for the dial-up user using the account.
- Upload rate limit, download rate limit: The maximum upload and download rates of the PPPOE account (0 means unlimited rate).
- Note: Fill in the information to be noted. When Note Information is long, the page displays only 5 characters, and when you position the mouse pointer over the content of the note, the page will automatically display all the contents of the note.

Tip:

If the PPPoE account is configured with the upload and download rate, then the account will no longer match the fine rate limit.

9.3.4 PPPoE user status

Enter the ***User management ->PPPoE server ->PPPoE user connection status*** page, on which

you can view the account information used; if users use the configured user name to connect to the PPPoE server, we can see such information of the IP addresses, the user's MAC address, online time of PPPoE connections, upload/download rates, etc. the PPPoE server assigns to the user in the list.

Figure 9_13 PPPoE User Status List

Tip:

When the account of the network dial-up user expires, dial-up can be made successfully, and the user can access to the device, but cannot access the Internet.

9.3.5 Export PPPoE Accounts

Figure 9_14 Export PPPoE Accounts

- Export account: Click this bLeveloneon to export all PPPoE accounts in the list, including the user name, password for the account, in the. txt format.

9.3.6 Import PPPOE Accounts

Figure 9_15 Import PPPOE Accounts

Tip:

1. When configuring PPPOE accounts to be imported and bound in batch, its input format is "Account + password", for example, test 123456, each row can have only one configuration item entered.
2. In the above input format, there may be one or more spaces between the account and the password.

9.3.7 Instance of PPPoE server configuration

1. Demand: Only the users authenticated by the Intranet can access the Internet.

Now, 3 accounts are configured for intranet users, and their user names are test1, test2, and test3 respectively. Initial passwords are: password1, password2, password3, in which test1, test2 are separately bound with 10.0.0.1, 10.0.0.2 and the charging feature is enabled (the using period of the account is from October 1, 2012 to December 31, 2013) and a notification is issued 15 days prior to account expiration; the maximum number of sessions of test3 is set to 5.

2. Configuration steps:

1) Configure the PPPoE server. Log on to the device, enter the ***User management ->PPPoE server*** page, configure the content as shown in the figure below, and enable the forced PPPoE authentication and allow users to modify the dial-up password (The password change message can be given to users by configuring the routine business notification feature).

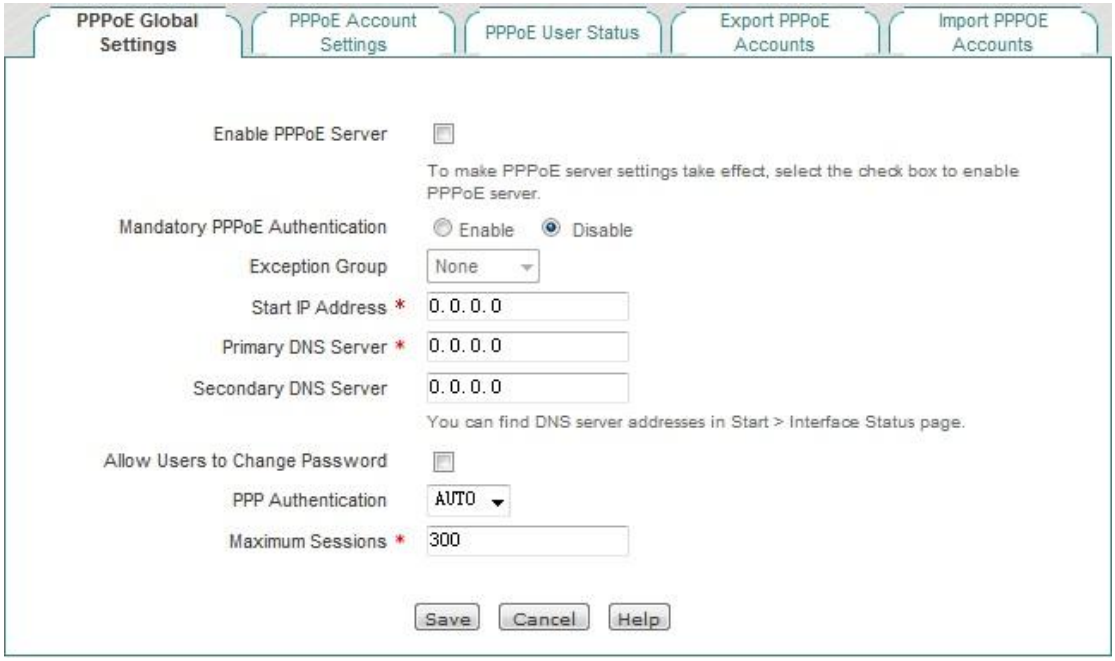


Figure 9_16 Instance - PPPoE Global Settings

2) Configuration of PPPoE account. Enter the ***PPPoE account Settings***. Click on the <Add new entry>, configure a PPPoE account, bind the account with the IP address, and enable the charging feature. The configured content with the user name of test1 is as shown in the figure below:

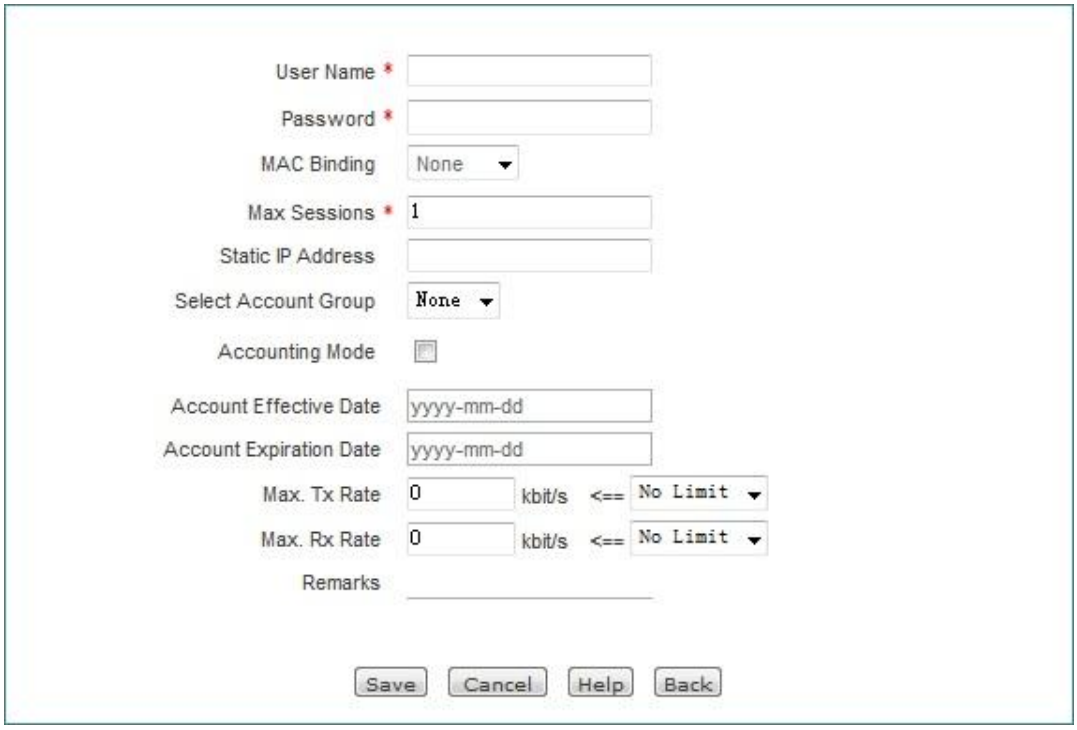


Figure 9_17 PPPoE account Settings

3) Repeat Step 2, and configure the account with the PPPoE user name as test2. Bind it with 10.0.0.2. Configure the account of test3, and set the maximum number of sessions for its account to 5.

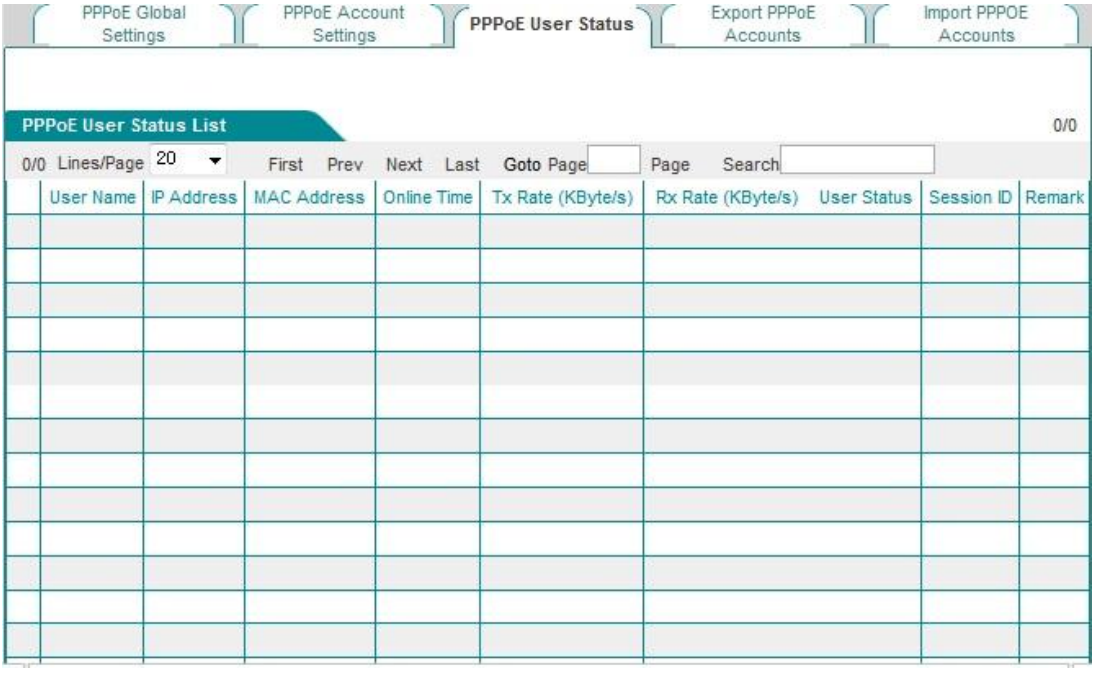


Figure 9_18 Instance - PPPoE User Status List

4) Configure the account expiration notification feature. Enter the ***Behavior management-> Electronic notification-> Account expiration notification*** page, to configure the account expiration notification feature, here, the "Send days of expiration notification in advance" is set to 15 days.

5) Create a client on the Intranet user's computer.

9.4 WEB authentication

9.4.1 WebAuth Global Settings

Enter the ***User management->WEB certification*** page to configure the WEB authentication feature of the device. WEB Authentication is used to authenticate Intranet users as to having permission to access the Internet, that is, after enabling this feature, the intranet users cannot access to the Internet unless passing the WEB authentication.

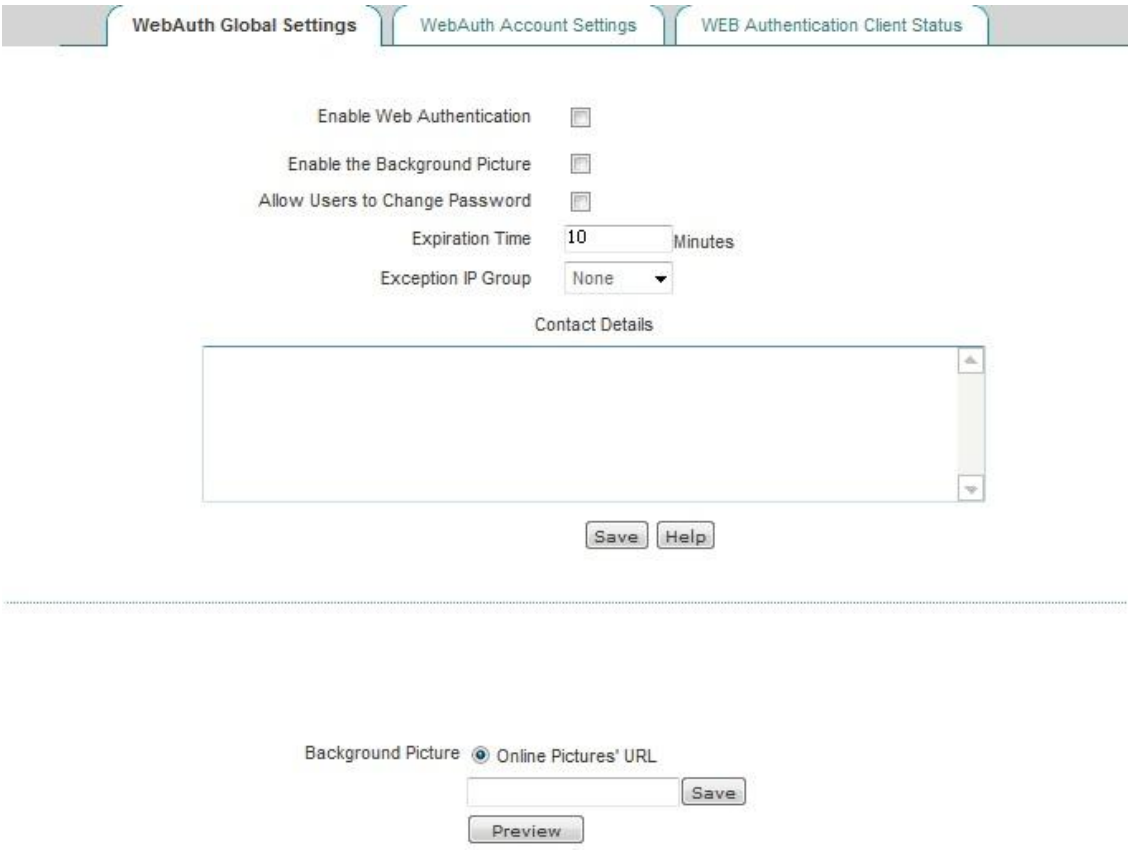


Figure 9_19 WebAuth Global Settings

- Enable WEB authentication: Checking it means that the intranet users cannot access the Internet unless passing the WEB authentication.
- Enable background image: Check it to enable this feature.
- Allow users to modify authentication password: Checking it means to allow the WEB authentication users to modify the authentication password on their own.
- Exception address group: After the device enables the forced PPPoE authentication, the users of the address group can communicate with external network without WEB authentication, and the address group needs to be configured in the ***User management -> User group Settings*** page.

- Window title: The title of the custom WEB authentication pop-up window.
- Window tip text: Tip texts for custom WEB authentication pop-up window.
- Network image link: Enters the network link to the picture, to make this picture as the background of the WEB authentication pop-up window.

9.4.2 Web Authentication Account List

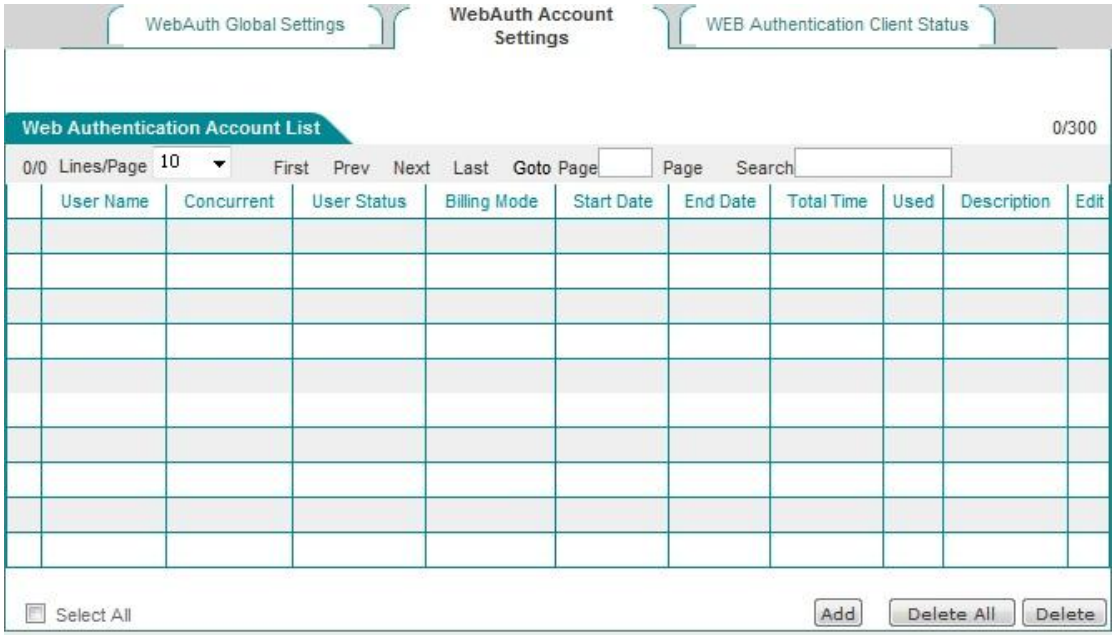


Figure 9_20 Web Authentication Account List

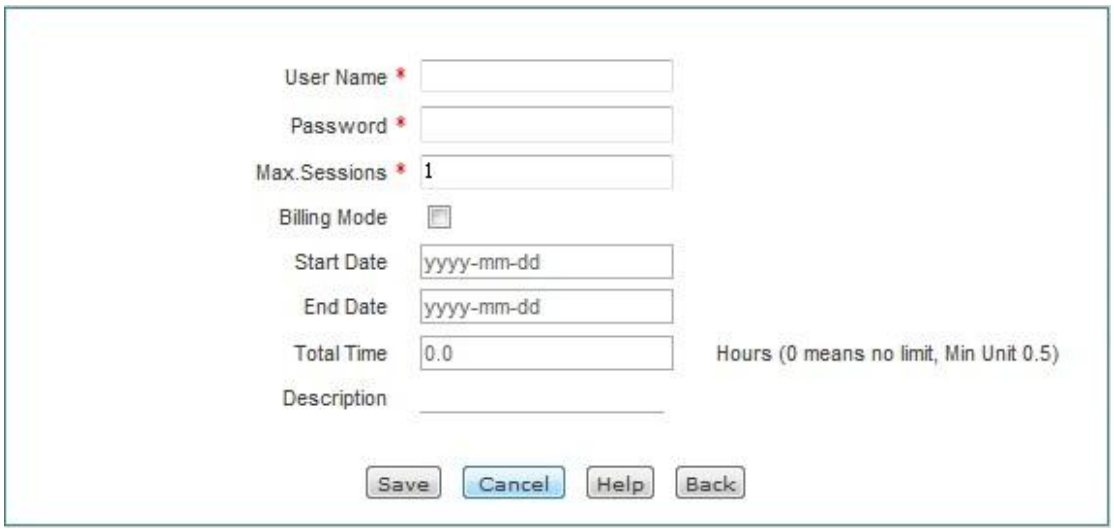


Figure 9_21 Web Authentication Account List - Add new entry

- User name: Displays/configures the user name of the WEB authentication user.
- Concurrent number: Displays the number of users using the same WEB authentication.
- User status: Displays the connection status of the WEB authentication users, including: not used, in use.
- Charging mode: Displaying/checking it means to enable the charging mode.
- Account opening/expiry date: Displays/configures the time period for the WEB authenticated user to use the account.
- Total time: Restricts the total time for the WEB authenticated user to use the account. 0 means no limit.
- Used time: Displays the time the currently authenticated account used accumulatively.
- Description: Displays/configures that described content.
- Password: Configures the password of the WEB authentication user.
- Maximum number of sessions for the account: Configures the maximum number of sessions for the account.
- Hang up: Clicks this bLeveloneon to hang up the connection to the user.
- Add new entry: Click this bLeveloneon to enter the Figure 9_ 2 1 page to configure the information WEB authentication account.
- Delete all entries: Click this bLeveloneon to delete all information configured on the page.

Tip:

1. Steps that the WEB authenticated users modify the authentication password:

   1) Users open the browser for authentication using the user name, password.

   2) After a successful authentication, click to change the password in the dialog box for successful authentication that opens.

   3) On the password change page, enter the user name, old password, new password and confirming password.

   4) Click "Submit" to display "Operation is successful", and the password is successfully changed.

   5) Users can modify their password 5 times a day on their own.

   6) The administrator can use the ***Behavior management -> Electronic notification*** page to configure the Routine business notification for informing users of how to modify the PPPoE dial-up password.

2. How the WEB authenticated users to go off line safely

1) Users open the browser for authentication using the user name, password.

2) After successful authentication, the dialog box for successful authentication that opens, click Go off line safely.

3) Click OK in the web page message dialog box that opens.

9.4.3 WEB Authentication Client Status

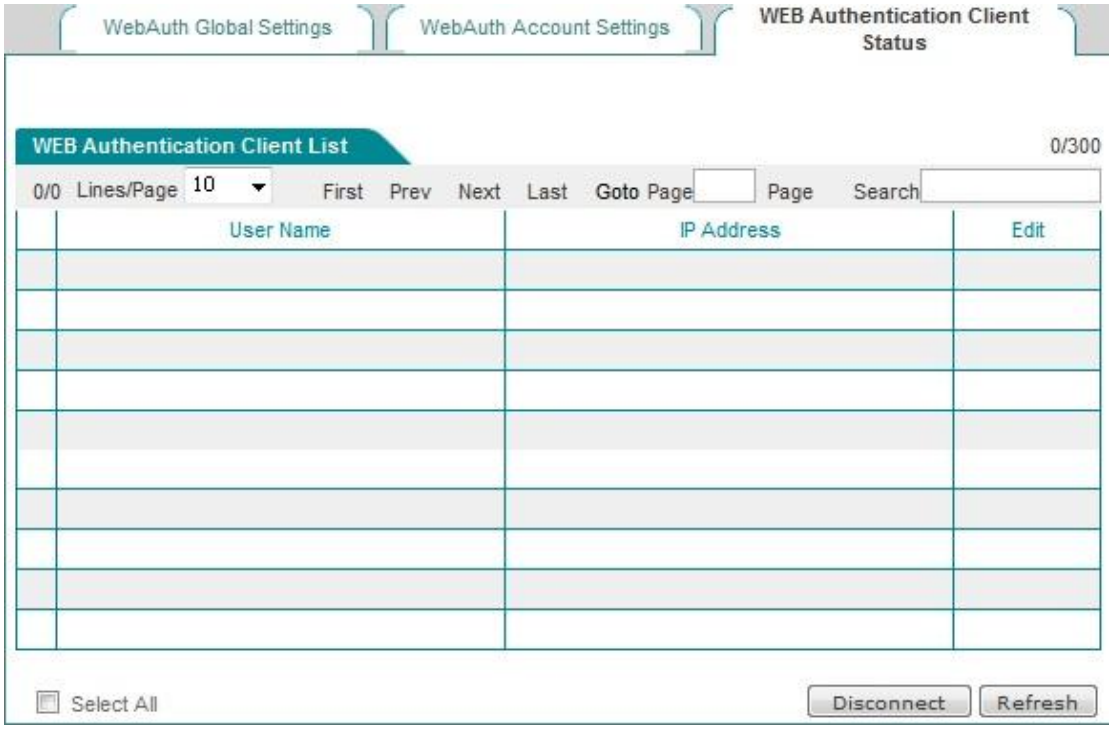


Figure 9_22 WEB Authentication Client Status

- User name: Displays the user name of the users who are using the WEB authentication.
- IP address: Displays the IP address of the users who are using the WEB authentication.

Tip:

The user names and IP addresses in the WEB authentication connection status list are those of the users who are using WEB authentication.

9.5 User Group Settings

In the ***User management -> User Group Settings*** page, and click <Add new entry> in the "User group configuration list", to enter the page as shown in Figure 9_ 2 4 .

Figure 9_23 User group list

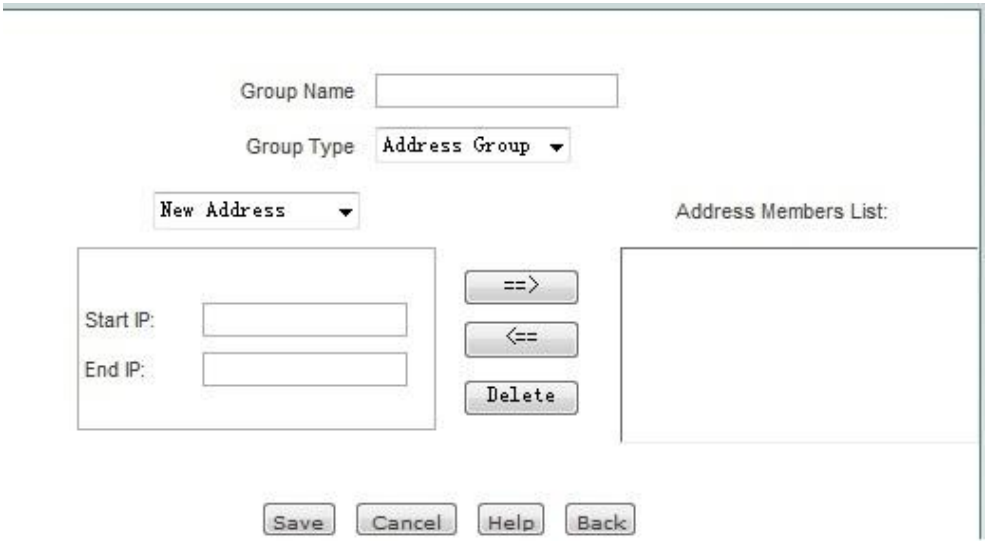


Figure 9_24 User group Settings

- Group name: Customizes the group name of the user group.
- Group type: It consists of address group and account group. Here, account group refers to the PPPoE authentication accounts, WEB authentication accounts.

Tip:

The depth of the user group cannot be greater than 2, for instance: Address A contains Address Group B, and now it is configured with Address Group C, it is not allowed to make it contain Address Group A.

Chapter 10. App Control

The features described in this chapter are include time period, net behavior management, QQ white list, MSN white list, electronic notifications.

10.1 Schedule Settings

Enter the ***App Control -> Schedule Settings*** page, and click "Add new entry" to enter into the configuration page as shown in Figure 10_ 2 . Time period defines the effective time for related features, one time period can define the three time units.

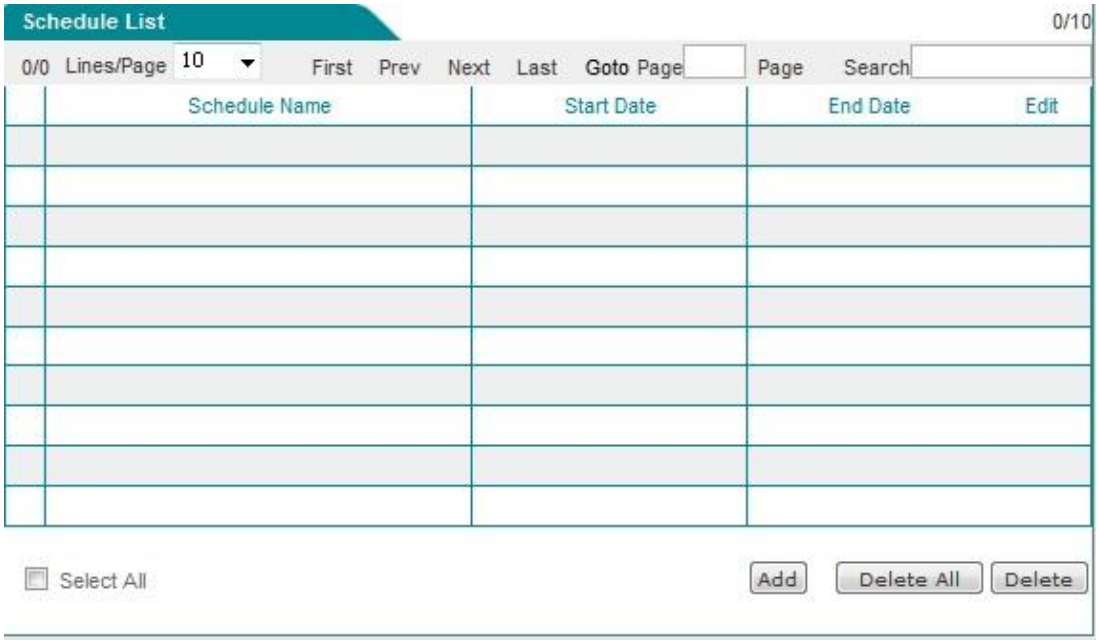


Figure 10_1 Schedule list

The meaning of time configuration parameters is described below.

- Time period name: Customizes the name of time period.
- Effective date of time period: Configures the effective date for this time period.
- Time unit: The effective date unit configured in the effective time.

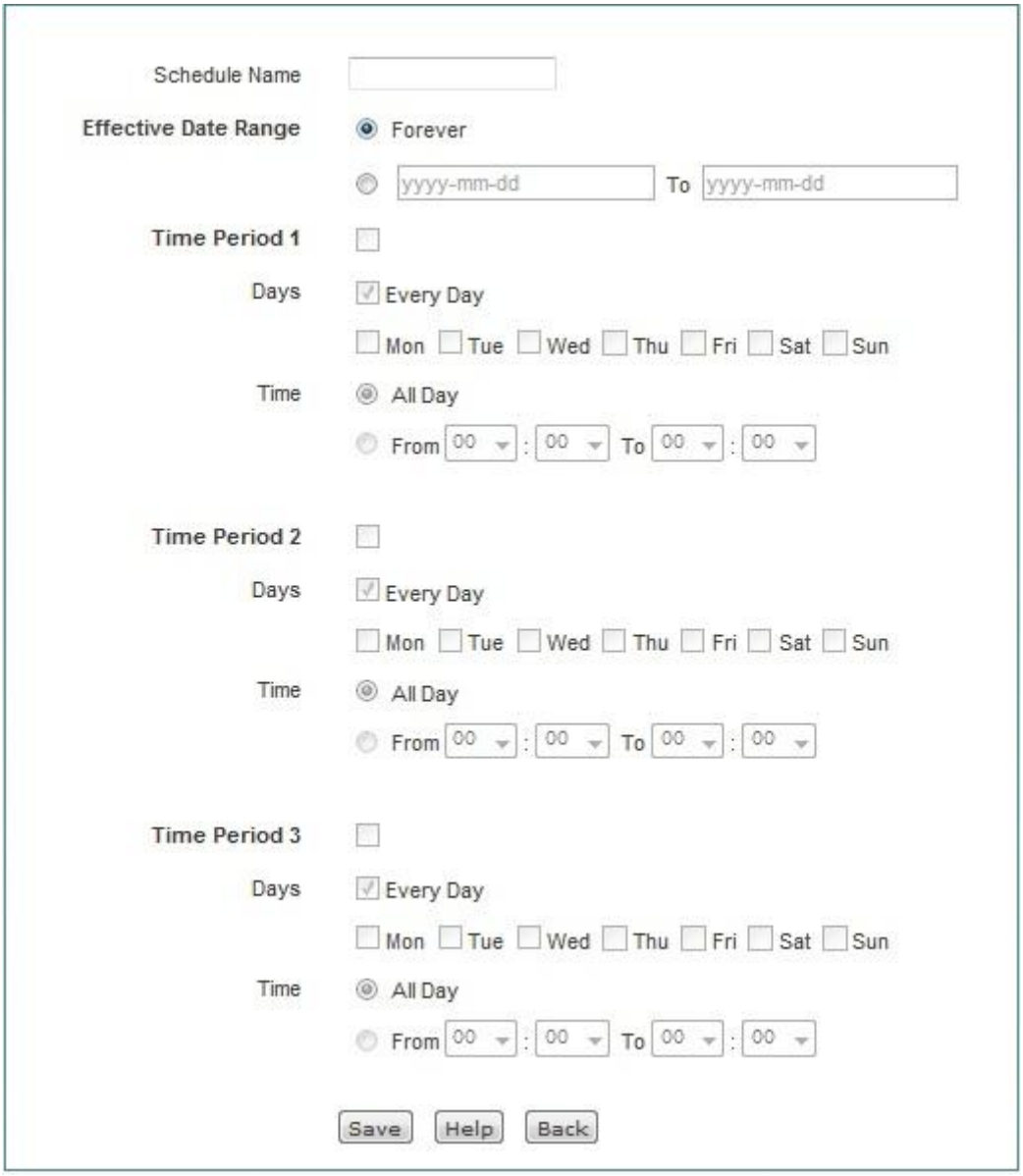


Figure 10_2 Schedule Settings

10.2 **Application Control**

This section describes the net behavior management list and net behavior management configuration in the ***App Control -> Application Control p***age.

10.2.1 Application Management List

Enter the ***Behavior management-> Net behavior management*** page, to enable the net behavior management feature in this page, and view the net behavior management information configured in the list of net behavior management information.

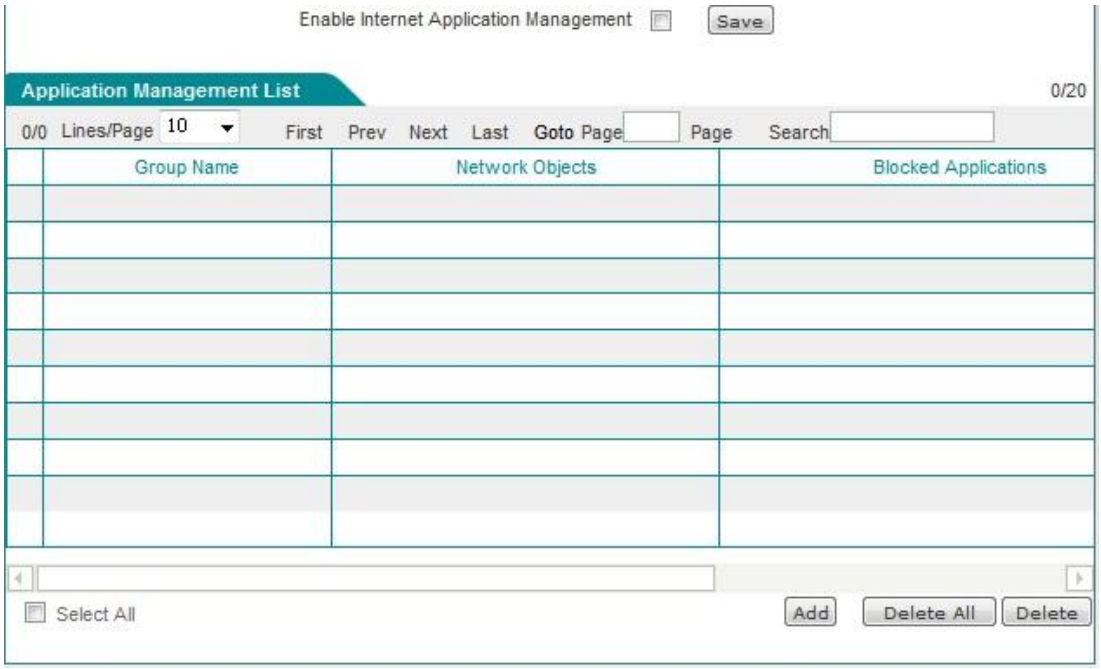


Figure 10_3 Application Management List

- Enable net behavior management: Checking it means to enable the net behavior management feature.

10.2.2 Internet Application Management Settings

Click <Add new entry> on the above image to enter the ***Net behavior management configuration*** page, to manage intranet users' net behavior.

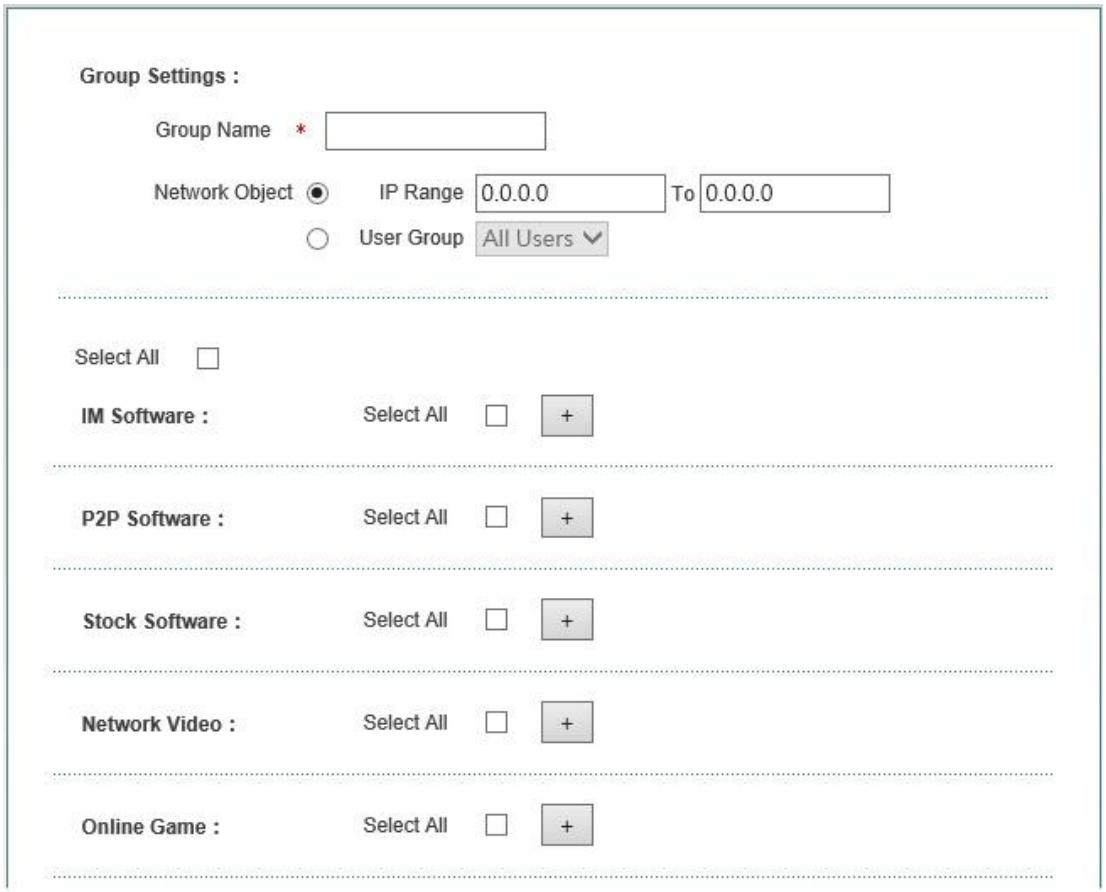
- Group name: Customizes the group name for the instances of the net behavior management, which must be unique.
- Select net behavior management object: Fills out the address field or user group on which the behavior management instance takes effect.
- The net behavior management supported by the device: Chat software, P2P software, stock software, web video, online game, shopping web sites, social networking sites, web games,

messages, forums, etc.

- Effective time setting: Sets the time when the net behavior management instance takes effect.

Tip:

When a net behavior management feature does not take effect, make sure that this policy library is up-to-date. In the ***Behavior management-→Policy library*** page, click <Update> hyperlink to update the corresponding policy library.



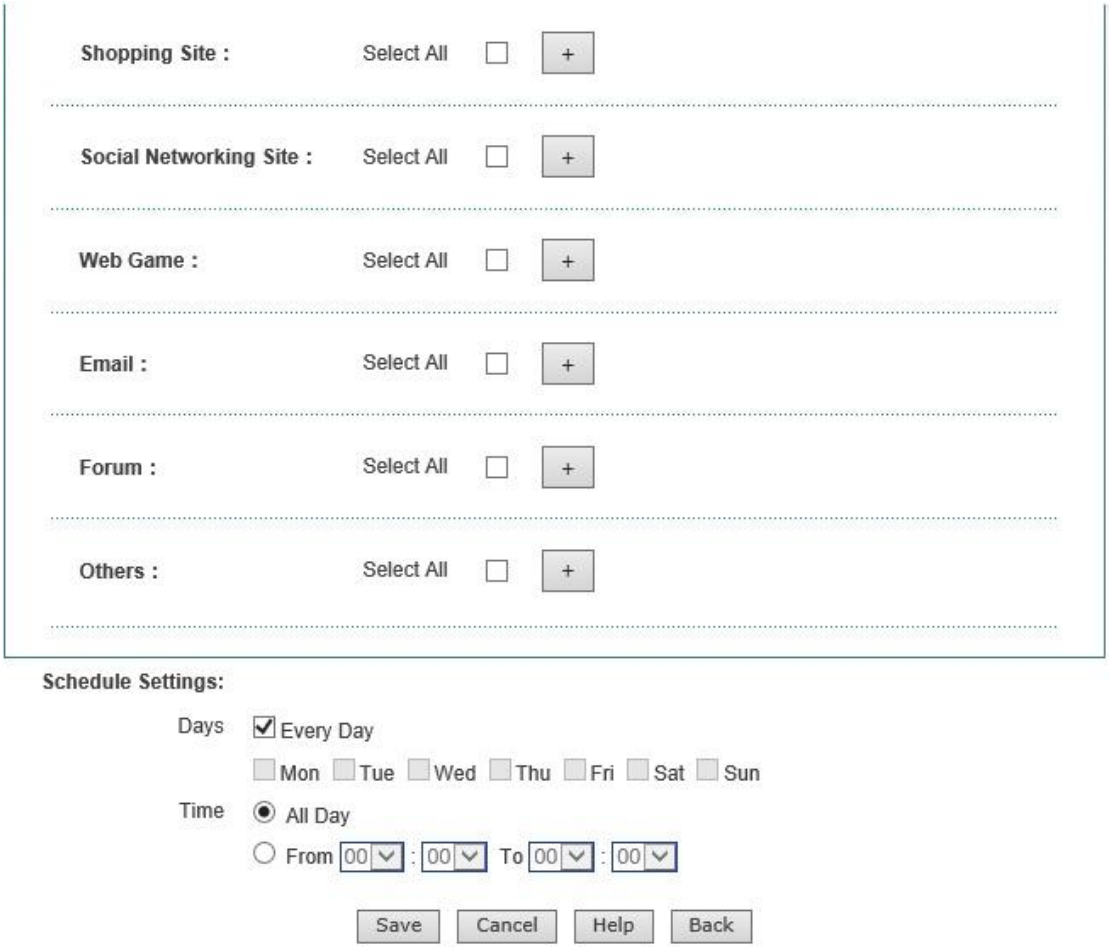


Figure 10_4 Internet Application Management Settings

10.2.3 Internet Application Management

1. Demands

In order to control its employees' net behavior, a company prescribes according to their actual needs, to prohibit QQ, MSN and other chat software, stocks and game software, checking stocks and game site information, and access to the shopping website during the working time. In the rest of the time, all operations are opened up.

Here, the users at the management level (address: 192.168.1.5 and 192.168.1.9) are not subject to any restrictions in net behavior.

Sales and customer service staff, whose addresses are 192.168.1.70-192.168.1.99 and 192.168.1.50 - 192.168.1.69 respectively, must use chat software to communicate with customers as required by their work.

The R & D Department (address: 192.168.1.100-192.168.1.129) prohibits the use of chat software.

The company's working hours are: Monday-Friday, 9 o'clock -18 o'clock.

2. Analysis

From above, 2 net behavior management policies are configured based on the requirements of the company's net behavior management.

1) Configure the net behavior management policies for sales and customer service staff to enable the chat software feature. However, other features are disabled.

2) Configure the net behavior management policies for R&D staff by only prohibiting the use of chat software.

3. Configuration steps

1) Enter the ***Behavior management-> Net behavior management*** page, to enter the ***Net behavior management configuration*** page.

2) Configure behavior management policies for sales department, customer service department:

   Group name: IM

   Starting IP address, ending IP address: 192.168.1.50, 192.168.1.99.

   Behavior management: Checks the "Select All" box of stock software, online video, online games, shopping sites, social networking sites, Web games, mails, forums and others.

   Effective time period: Monday to Friday, from 9:00-18:00. Click <Save>.

3) Configure the behavior management policies for the R&D Department:

   Group name: yanfa

   Starting IP address, ending IP address: 192.168.1.100, 192.168.1.129.

   Behavior management: Just checks the "Select All" box of the chat software.

   Effective time period: Monday to Friday, from 9:00-18:00. Click <Save>.

4. View the configuration list

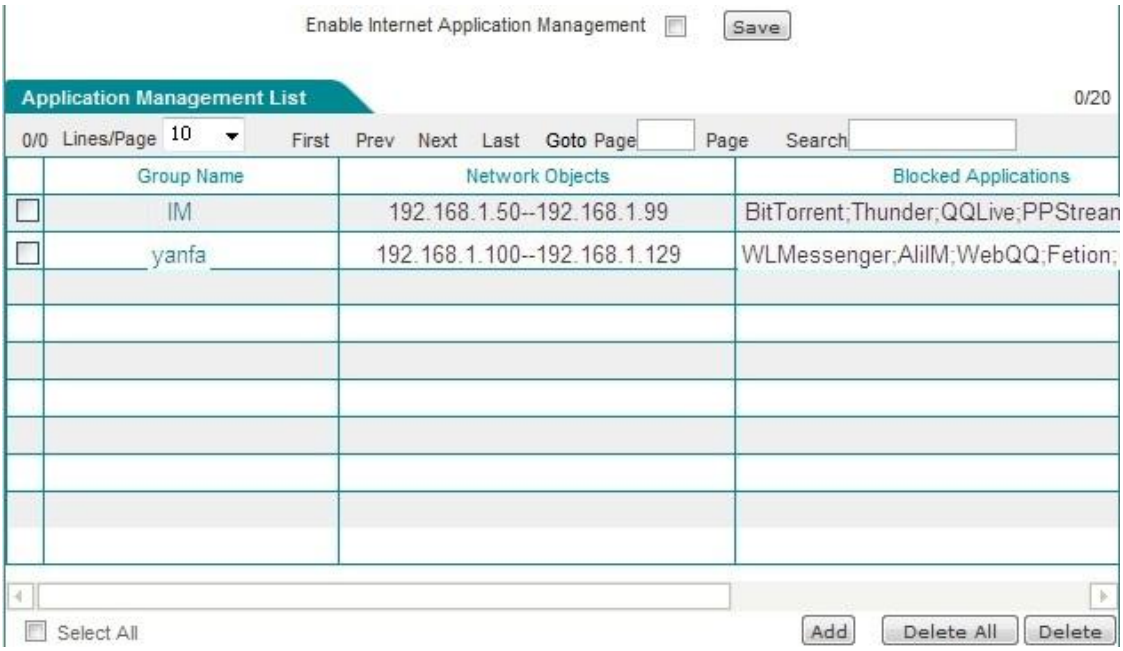


Figure 10_5 Internet Application Management

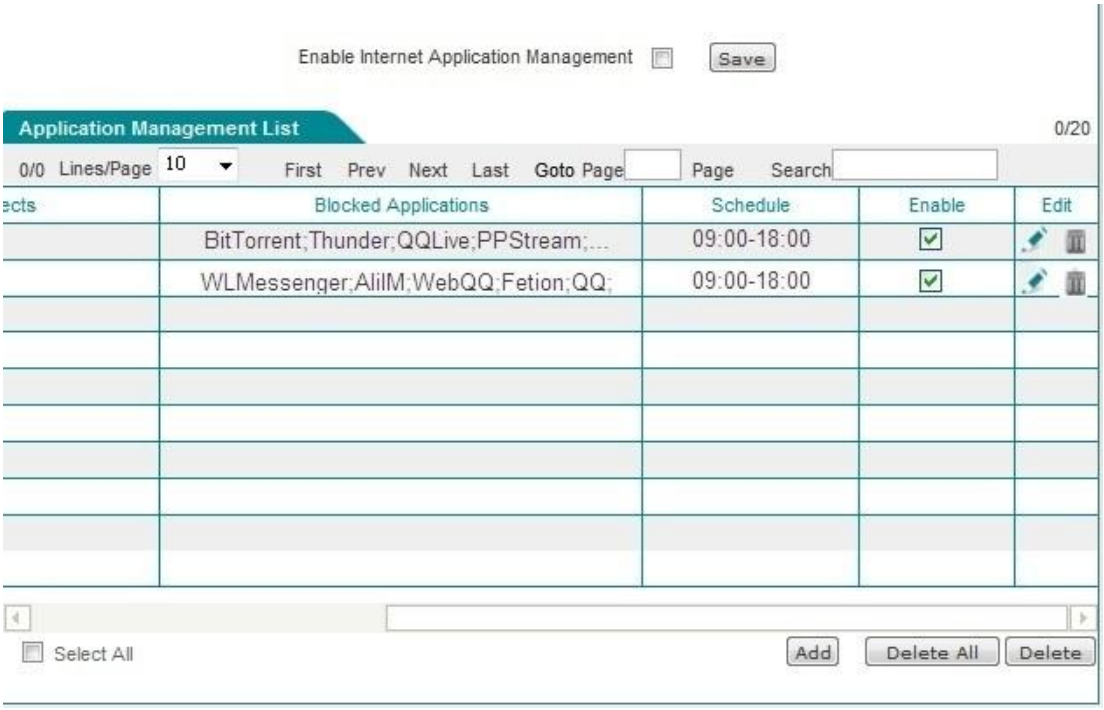


Figure 10_6 Internet Application Management (Continued Figure 10_5)

10.3 QQ white list

QQ white list refers to the QQ users who are defined to be allowed to log on after QQ is

prohibited in the ***Net behavior management*** page.

Enter the ***App Control-> QQ white list*** page, after the QQ white list feature is enabled, click "Add new entry" to add QQ white list users in the QQ white list configuration page.

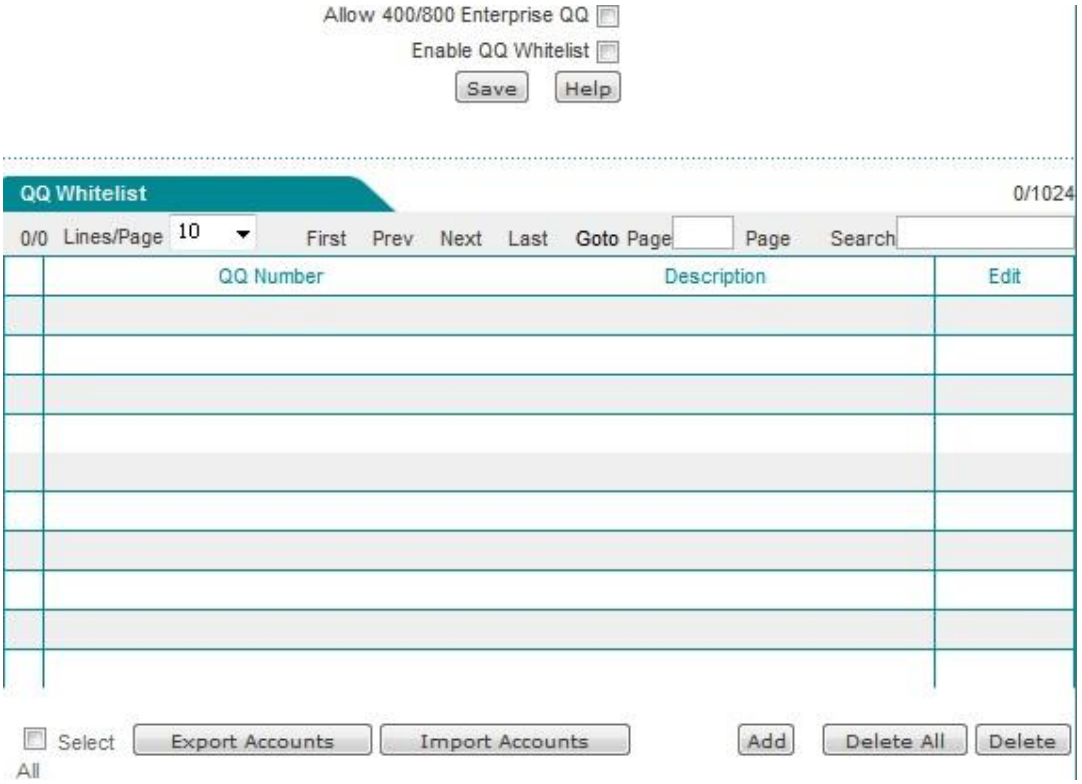


Figure 10_7 QQ white list

- Allow 400/800 Business QQ: Checks to allow 400/800 Business QQ.
- Enable QQ white list: Checks to enable the QQ white list feature.
- Export account: Click this bLeveloneon to export the QQ accounts in the QQ white list entry.
- Import account: Click this bLeveloneon to import QQ to the QQ white list entries.

Figure 10_8 Import QQ Accounts

Tip:
The maximum number of QQ numbers supported by this version is 4294967295

10.4 TM Whitelist

Aliwangwang White List refers to the Aliwangwang users allowed to log in after Aliwangwang is prohibited in the **Net behavior management**

Enter the ***App Control*** -> ***TM Whitelist*** page, and after the Aliwangwang white list feature is enabled, click "Add new entry" to enter into the Aliwangwang white list configuration page to add Aliwangwang white list users.

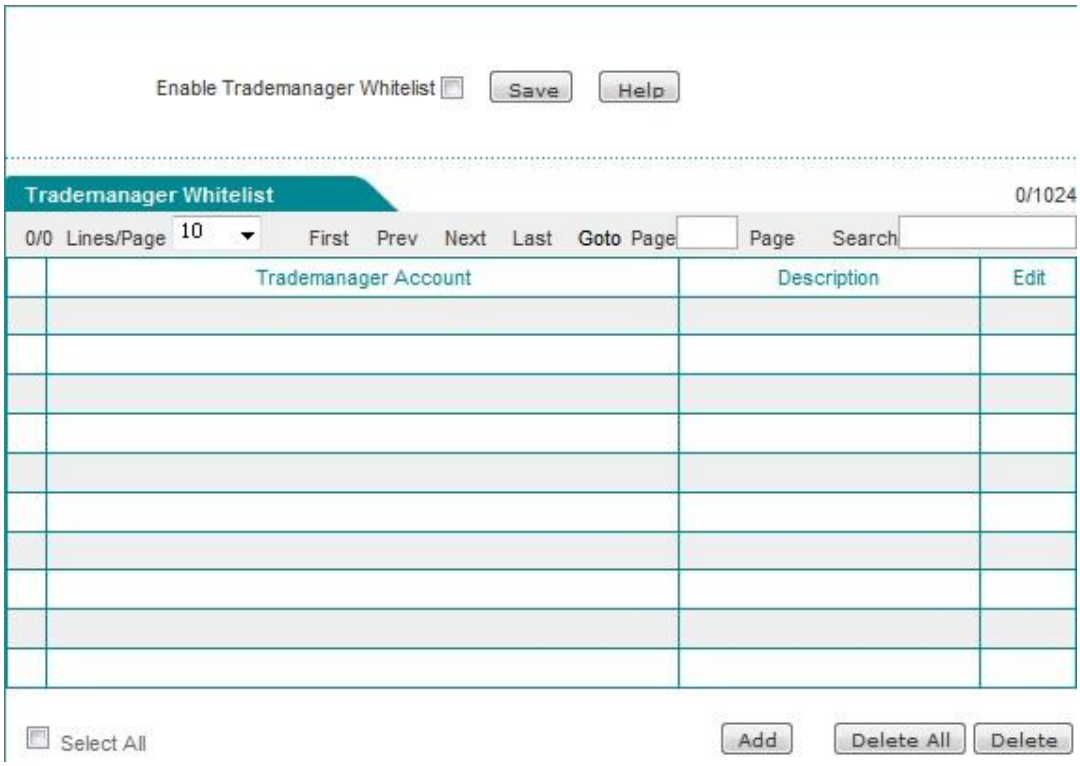


Figure 10_9 Trademanager Whitelist

- Enabled Aliwangwang white list: Checks to enable Aliwangwang white list feature.

10.5 Notification

Enter the ***App Control -> Notification*** page to configure routine business notification and account expiration notification.

Notification is a notice sent by the device to users in the form of Web pages when the Intranet users access to the website. Upon receipt of the notification, Intranet users can access the website normally by entering the corresponding address in the browser address bar again.

10.5.1 Daily Routine Notification

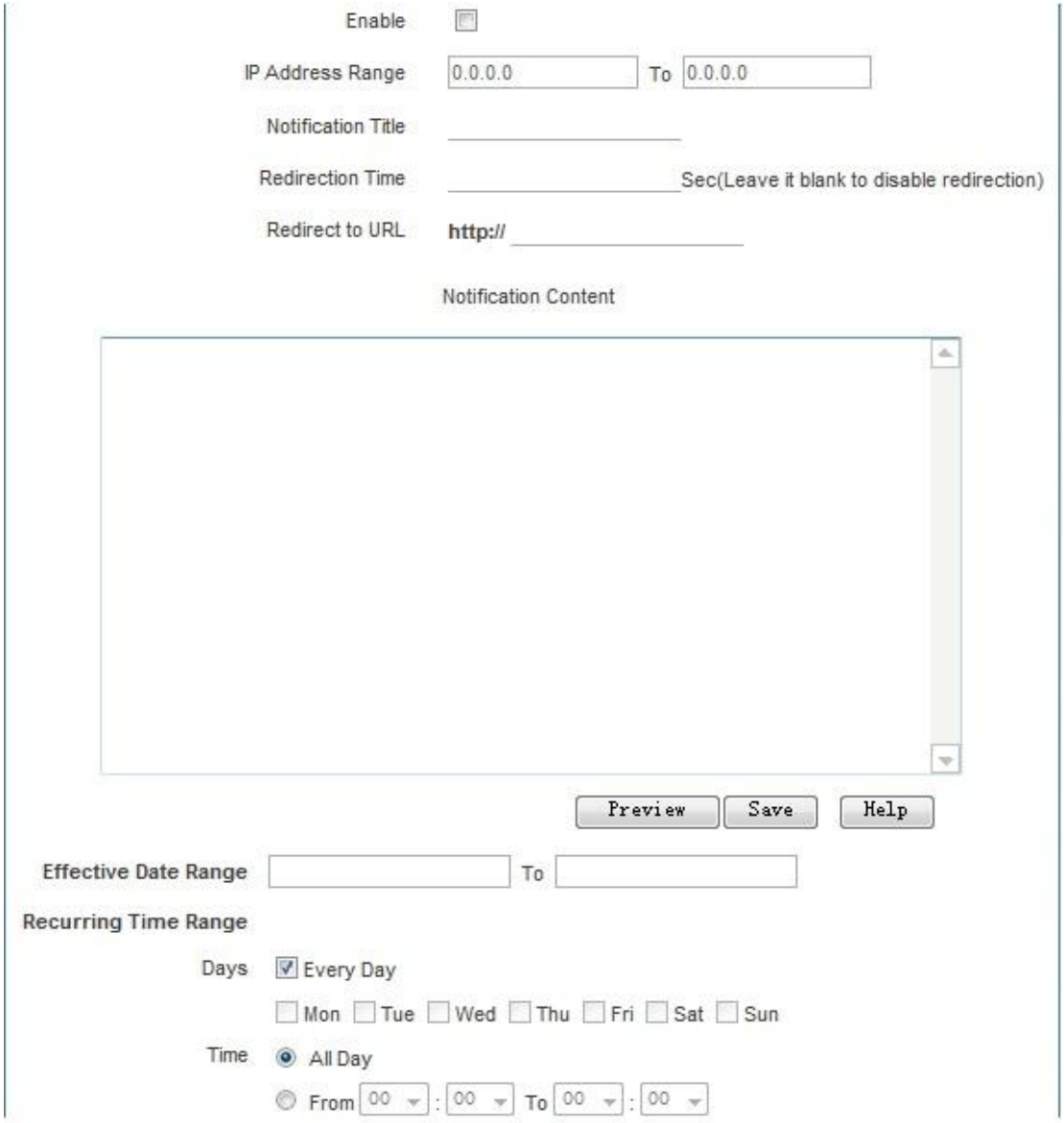


Figure 10_10 Daily Routine Notification

- Enable: Checks to enable the Routine business notification feature.
- Notification network segment: Sets the address range of routine business notification, which can only contain 65535 addresses at maximum.
- Notification title, content: Sets the title and content of the routine business notification.
- Redirecting time: Redirects to the specified page according to the specified time.
- Redirecting URL: Automatically redirects to the specified URL address.
- Setting of effective date: Sets the date when the routine business notification takes effect.

- Effective frequency: Sets the frequency of routine business notification.
- Preview page: Click this bLeveloneon to preview the configured notification contents.
- Save: After click <Save>, the specified users in the Intranet will receive a routine business notification sent by the device when it accesses to the web page for the first time with the effective time period.

Tip:

When the routine business notification only involves the change of "Notification title", "Notification content", click <Save> and the notification will not take effect.

10.5.2 Account expiration notification

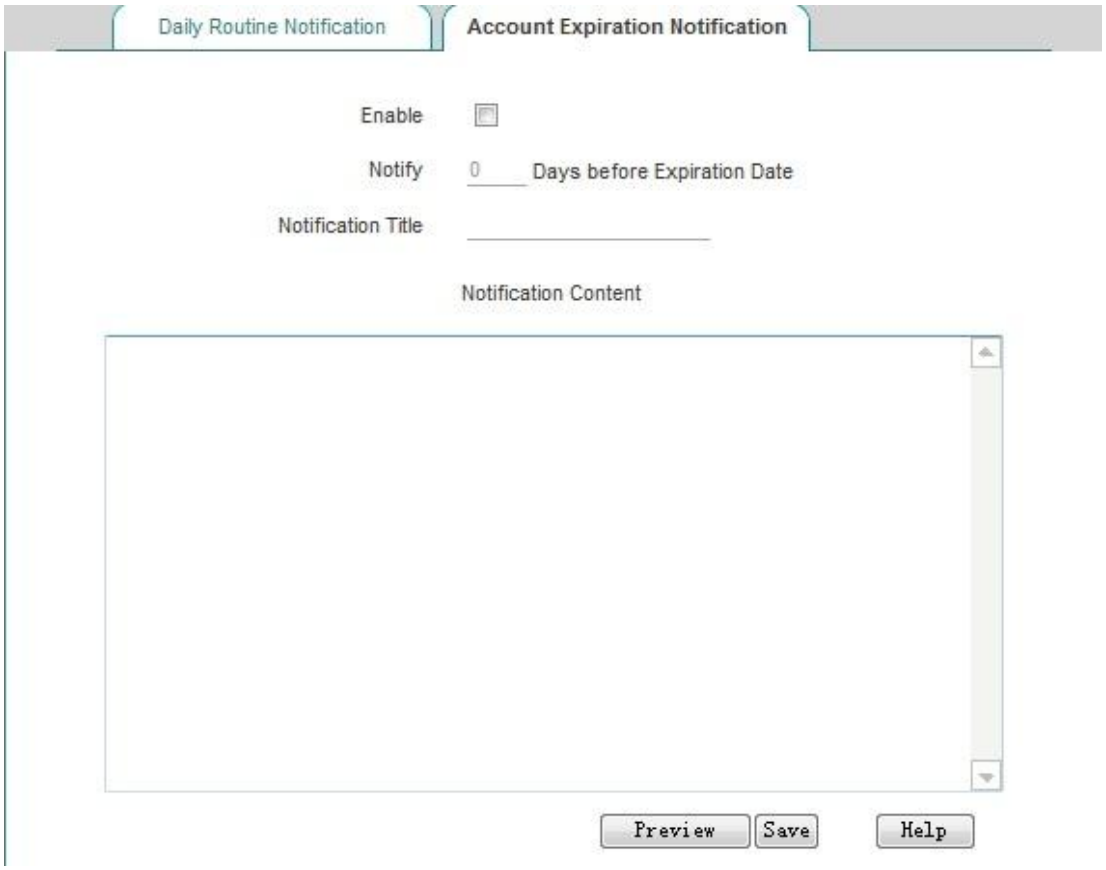


Figure 10_11 Account expiration notification

- Enable: Checks to enable the account expiration notification feature.
- Days for sending expiration notices in advance: Sets the effective number of days for sending expiration notification. When this parameter is set to 10, the user will receive the expiration

notification sent by the device when it dials up successfully and accesses to the website for the first time starting from 10 days before the expiration of the account.

- Notification title, content: Sets the title and content of the account expiration notification.
- Preview page: Click this bLeveloneon to preview the configured notification contents.

Tip:

When the account of the network dial-up user expires, dial-up can be made successfully, and the user can access to the device, but cannot access the Internet. Meanwhile, it will receive an expiration notification sent by the device in accessing the website.

10.6 Application Audit

The section describes the net behavior audit feature. Enter the ***App Control -> Application Audit -> Log Management*** page, as shown in the figure below.

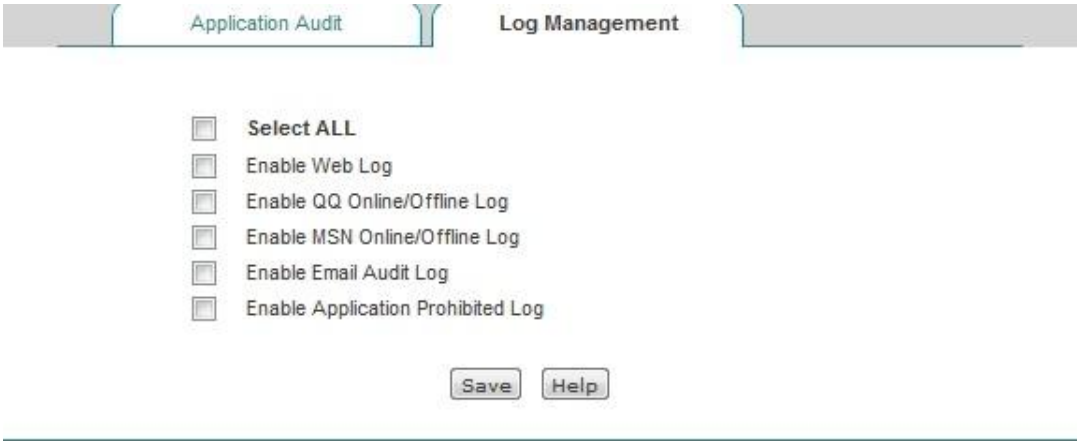


Figure 10_12 Log management

- Enable web logs: Enables the web log to view the records of Intranet users' access to webpages in the ***Behavior audit*** page. Such as "2012-12-03 15:07:47 srcip=10.0.0.10; url=www.Levelone.com.cn", which means that the users whose Intranet IP address is 10.0.0.10 at 15:07 on December 3, 2012 visited www.Levelone.com.cn.
- Enable QQ online/offline logs: Enable the QQ online/offline logs to view the online/offline logs of the Intranet user QQ in the ***Behavior audit***.
- Enable MSN online/offline logs: Enable the MSN online/offline logs to view the online/offline logs of the Intranet user MSN in the ***Behavior audit***.
- Enable mail audit logs: Enable the mail audit logs to view the records of Intranet user mails in the ***Behavior audit*** page.

- Enable behavior-blocking log: Enable the behavior-blocking log to view the user records filtered by the behavior management PDB.

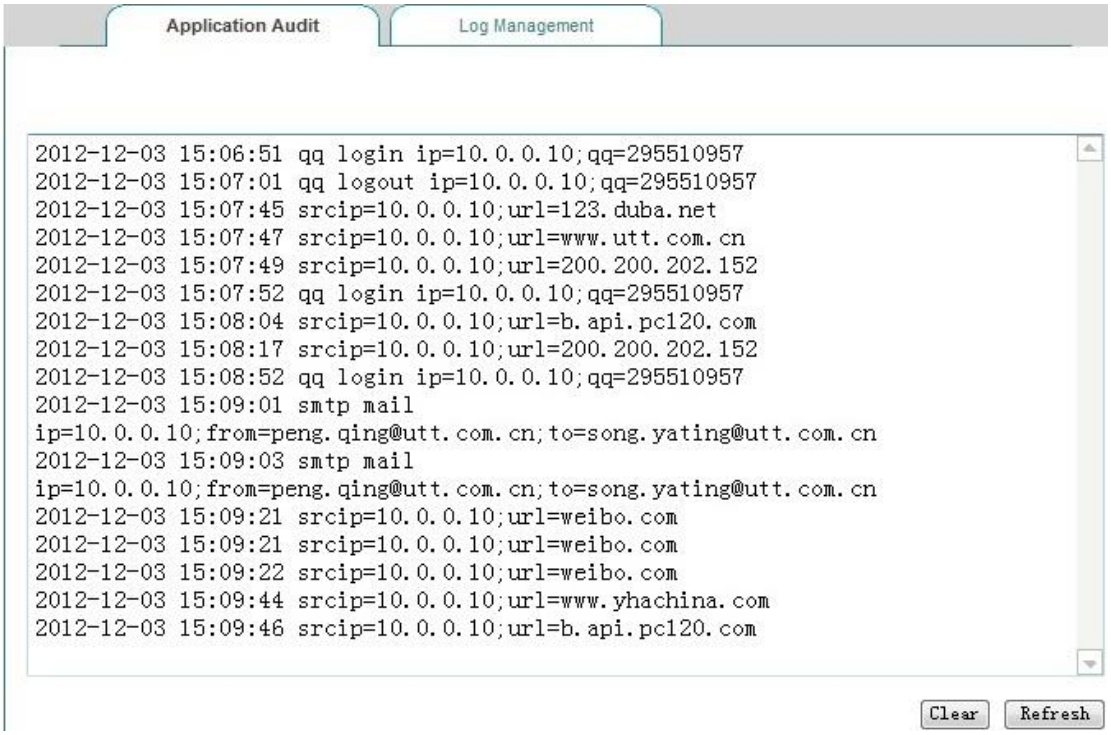


Figure 10_13 Internet Audit

Note: Net behavior audit can record the latest 400 log information.

10.7 Policy Database

This section describes the ***App Control - Policy Database*** page and operating procedures. The system provides 11 different types of policies at present, including: emails, IM, P2P, STOCK, online video, online games, shopping websites, social networking sites, web games, forums, etc. Users can bring the behavior management referencing these policies into force by updating one policy or all policies.

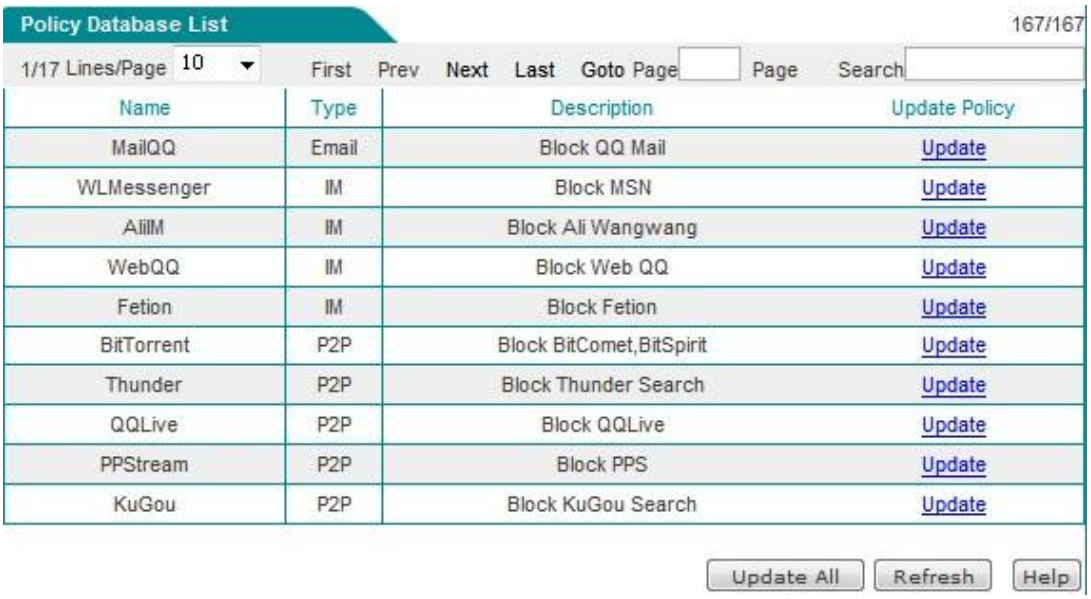


Figure 10_14 Policy Database list

The following describes the meaning of the parameters in the policy library info list.

- Name: The name of a policy.
- Type: The type of a policy, for example, QQ is of the IM type as shown in the above figure.
- Notes: A detailed description of a policy.
- Update policy: Click < Update > to update a policy online through the Internet.

Chapter 11. QoS

This chapter describes the fine rate limit, flexible bandwidth and connection limit features.

11.1 Fixed Rate Limiting

This section describes the ***QoS -> Fixed Rate Limiting*** page and the meaning of configuration parameters. Users can limit the uploading, downloading rates of the Intranet users in a segment of address through the fine rate limit feature, in order to achieve a rational distribution and utilization of bandwidth.

1. Fixed Rate Limiting list

Enter the ***Bandwidth management->Fine rate limit*** to view the information of the fine rate limit instances configured in the fine rate limit info list, and adjust the order of fine rate limit instances by the "Move to".

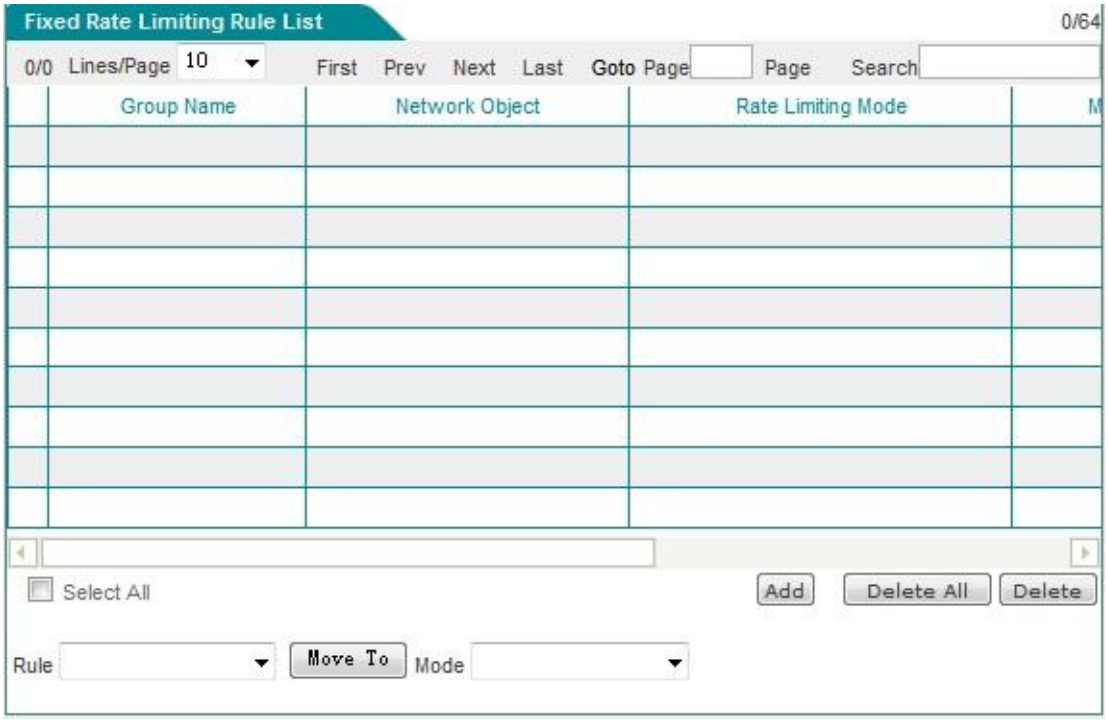


Figure 11_1 Fixed Rate Limiting list

2. Fixed Rate Limiting Rule Settings

Click <Add new entry> in the above figure to enter the **Fixed Rate Limiting Rule Settings** page. The following describes the meaning of the parameters for configuring fine rate limit.

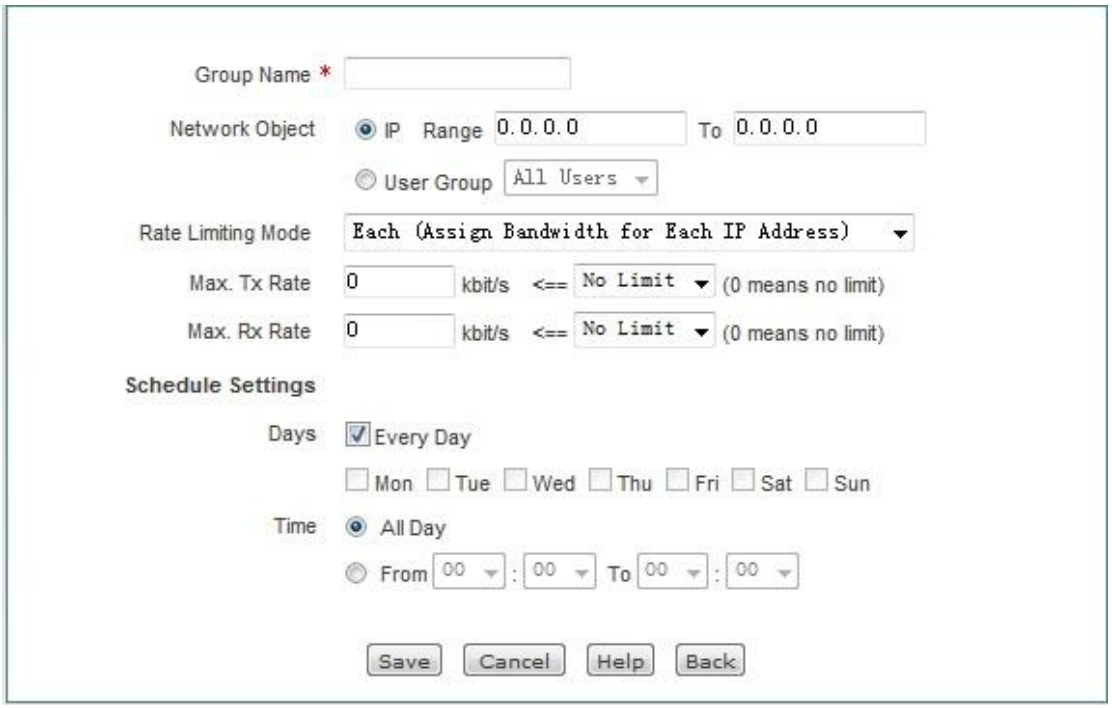


Figure 11_2 Fixed Rate Limiting Rule Settings

- Group name: Customizes the group name of the instance of the fine rate limit, which cannot be the same as another instance name.
- Select the object of rate limit: Fills in the starting IP address and ending IP address of the address field for the fine rate limit to take effect.
- Rate limit policy: The available options are exclusive and shared; Exclusive means each IP addresses in this range can use this bandwidth. Shared means the IP addresses in this range share this bandwidth.
- Uploading rate limit and downloading rate limit: Sets the maximum uploading, downloading rates of the IP addresses in this range here. 0 means no limitation.
- Effective time setting: Sets the time for the fine rate limit to take effect in the IP address range.

11.2 Flexible bandwidth

This section describes the ***QoS> Flexible bandwidth*** page and the meaning of the configuration parameters. When the network is busy, the flexible bandwidth feature guarantees that each intranet user can have a normal Internet access.

Tip: It is not recommended to enable the flexible bandwidth feature and fine rate limit feature.

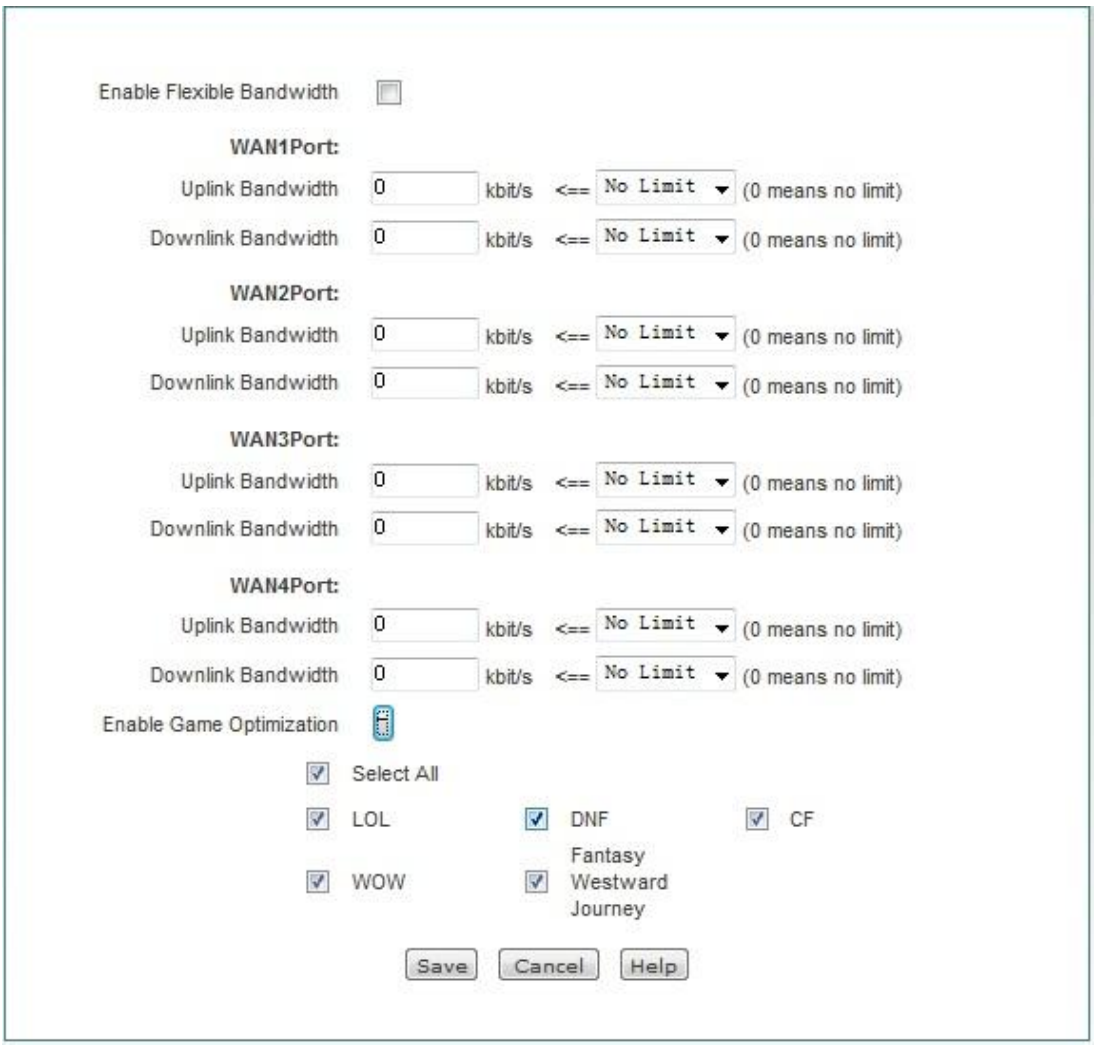


Figure 11_3 Flexible Bandwidth

- Enable flexible bandwidth: Checks to enable the flexible bandwidth feature.
- Uplink and downlink bandwidth of WAN1: Sets the uplink and downlink bandwidth of WAN1 applied for from ISP, and the custom maximum value of Gigabit devices can be set to 1000M.
- Uplink and downlink bandwidth of WAN2: Sets the uplink and downlink bandwidth of WAN1 applied for from ISP, and the custom maximum value of Gigabit devices can be set to 1000M.
- Enable game acceleration: Checks to enable the acceleration of games.

11.3 Session Limiting

This section describes the ***QoS-> Session Limiting*** page. You can define the maximum total number of connections, the maximum number of TCP connections, the maximum number of UDP connections, and the maximum number of ICMP connections established by each host in the Intranet allowed by the device by setting the numbers of connections.

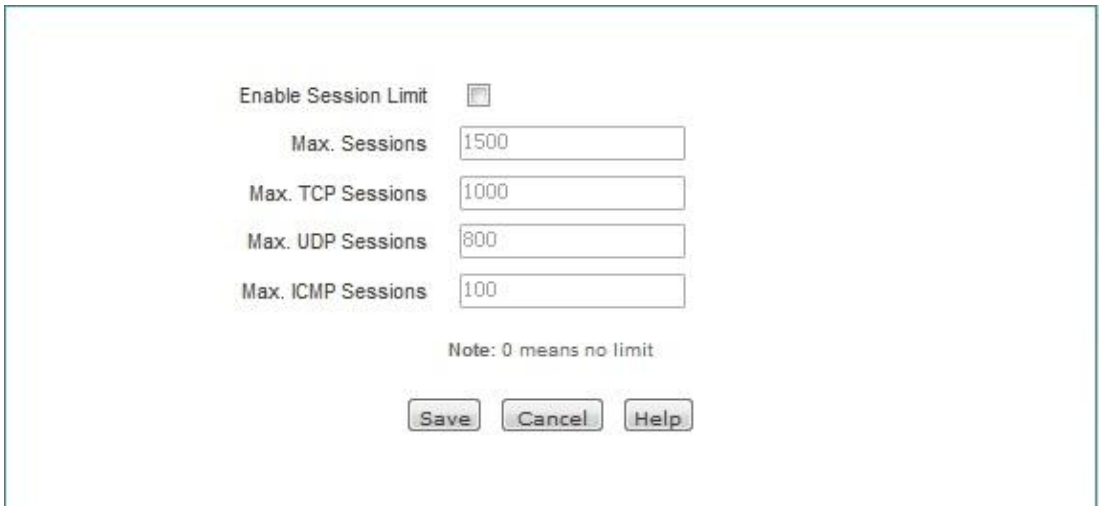


Figure 11_4 Session Limiting

- Enable connections limit: Checks to enable the connections limit.
- Total connections: The maximum total number of connections established per host in the Intranet, whose default is 1500.
- Total connections: The maximum number of TCP connections established per host in the Intranet, whose default is 1000.
- Total connections: The maximum number of UDP connections established per host in the Intranet, whose default is 800.
- Total connections: The maximum number of ICMP connections established per host in the Intranet, whose default is 100.

Tip:

1. When the number of connections is set at 0, the number of connections per Intranet host is not to be limited.
2. When the connection of Intranet applications (such as network game) becomes slow, you can increase the "Total number of connections" and "Number of UDP connections" (or "Number of TCP connection") appropriately. Note: The number of the above connections is set too high, which may cause the device's capability to lower or lose its capability against the DDoS attacks.

3. Under normal circumstances, the maximum number of sessions cannot be set too low, so it is recommended that: "The number of TCP connections" is not less than 100, "the number of UDP connections" is not less than 50, "the number of ICMP connections" is not less than 10. If their value is too small, it will cause the LAN users to be unable to access the Internet or access the Internet normally.

Chapter 12. Firewall

This chapter describes how to configure the device's firewall feature, including security configuration, access control policy, and domain name filtering.

12.1 Attack Prevention

This section describes the ***Firewall -> Attack Prevention*** interface and its configuration.

1. Internal Attack Prevention

Figure 12_1 Attack Prevention - Internal Attack Prevention

- Enable DDoS attack defense: When enabled, the device will effectively defend against the common Intranet DDOS attacks.
- Enable IP spoofing defense: When enabled, the device can effectively defend against Intranet IP spoofing.
- Enable UDP FLOOD defense: When enabled, the device can effectively defend against Intranet UDP FLOOD attacks.
- Enable ICMP FLOOD defense: When enabled, the device can effectively defend against Intranet ICMP FLOOD attacks.

- Enable SYN FLOOD defense: When enabled, the device can effectively defend against Intranet SYN FLOOD attacks.
- Enable ARP proofing defense: When enabled, the device's LAN port can send ARP broadcast packets at a certain time interval (the default is 100 milliseconds), which can effectively defend against ARP spoofing.
- Enable device access control: When enabled, only the hosts within the address field range to log on the device via the LAN port.
- Enable port scan defense: When enabled, the device can effectively defend against Intranet port scanning.

2. External Attack Prevention

Figure 12_2 Attack Prevention - External Attack Prevention

- Reject external Ping: When enabled, the WAN port of the device does not respond to the ping requests from the external network.

12.2 Access control

This section describes the functions and configuration methods of the ***Firewall -> Access control policy***.

Flexibility in the use of the access control feature not only can set Internet access for different users, but also can control the Internet access of users at different times. In practical applications, the device can be configured with related access control policies according to the management regulations of individual agencies. For example, for school users, access control policies can be configured to prohibit students from visiting the games websites. For family users, it can be configured to only allow children to access the Internet during the specified time. For enterprise users, it can be configured to prevent the machines of the finance department from being accessed by the Internet.

12.2.1 Access Control Rule

Configuring access control policies on the device can monitor each packet flowing through the device. By default, the device is not configured with access control policies, and it will forward all the legitimate packets received. If the access control policy is configured, when the device receives a packet, it will extract the source MAC address, source address, destination address, upper-layer protocol, port number or the packet content for analysis, and assign them according to the order of the policy table from top to bottom, view any matching policy, and implement the action defined by the first policy: forwarding or discarding. And it will no longer compare the rest of the policies.

You can specify the filter type for access control policy by setting the "Filter type". The device offers four filter types: IP filtering, URL filtering, keyword filtering and DNS filtering.

1. IP filtering

IP filtering refers to filtering of packet header information, such as source and destination IP addresses. If the protocol field encapsulation protocol in the IP header is TCP or UDP, then filter again according to the TCP header information (source port and destination port) or UDP header information (source port and destination port).

When filter type is IP filtering, the filtering conditions available for setting include: Source address, destination IP address, protocol, source port, destination port, action and effective time, etc.

2. URL filtering

URL filtering refers to filtering of URL websites. Filtering according to the keywords in the URL not only can control the Intranet users in access to a site, but also can control user access to the web pages.

When the filter type is URL filtering, the filtering conditions available for setting include: source address, filtering content (refer to URL address), actions, and effective time.

3. Keyword filtering

Keyword filtering refers to keyword filtering in the HTML pages (web pages), which means if you have made a comment (such as pornography, the Falun Gong, gambling, etc.), the comment will not be submitted successfully.

When the filter type is keyword filtering, the filtering conditions available for setting include: source address, filtering content (refers to the keywords on a web page) and the effective time.

4. DNS filtering

DNS filtering refers to filtering of domain names, which is made according to the keywords in the

domain name.

When the filter type is DNS filtering, the filtering conditions available for setting include: source address, filtering content (refers to the domain names to be filtered), action, effective time period.

Tip: DNS filtering is implemented through Port 53, while URL filtering is implemented through Port 80.

The actions of access control policy include forwarding and discarding, and the corresponding "actions" are "allow" or "disallow". When the packets to be processed match a defined access control policy, and if the "action" of the policy is "allow", then the device will forward the packet. If the "action" of the policy is "disallow", the device will discard the packet.

What needs to be aware of is that keyword filtering does not provide any "action" options, but "disallow" by default due to its special application.

12.2.2 Access control list

Drag the cross bar below the access control policy list, to view the detailed information of instances.

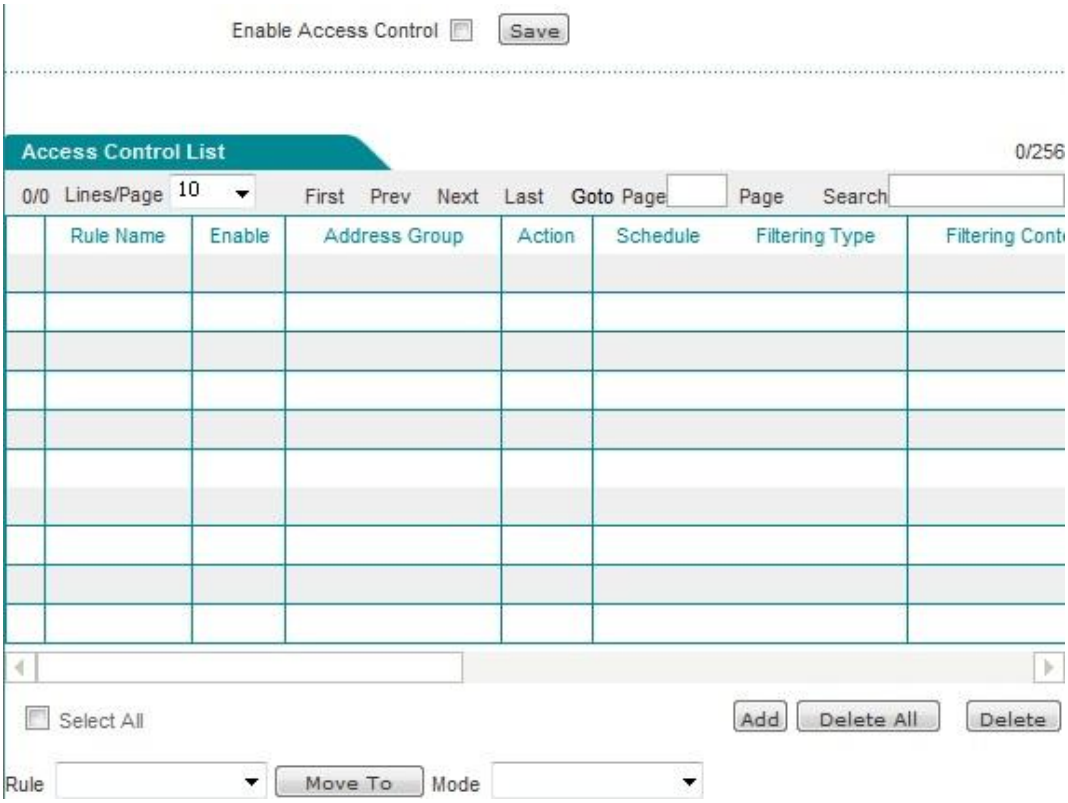


Figure 12_3 Access control list

- Move to: This bLeveloneon allows you to sort the instances accordingly.

Tip:

The user-defined access control policies are matched from top to bottom according to the order in the list.

12.2.3 Access Control Settings

Access control policy is to control the packets flowing through the device. Click <Add new entry> in the above figure, to enter the ***Access control policy configuration*** page, to configure the required firewall policy. The following will describe the meaning of the parameters in the access control policy configuration under four different filter types, IP filtering, URL filtering, keyword filtering and DNS filtering.

一、Access Control Settings - IP filtering

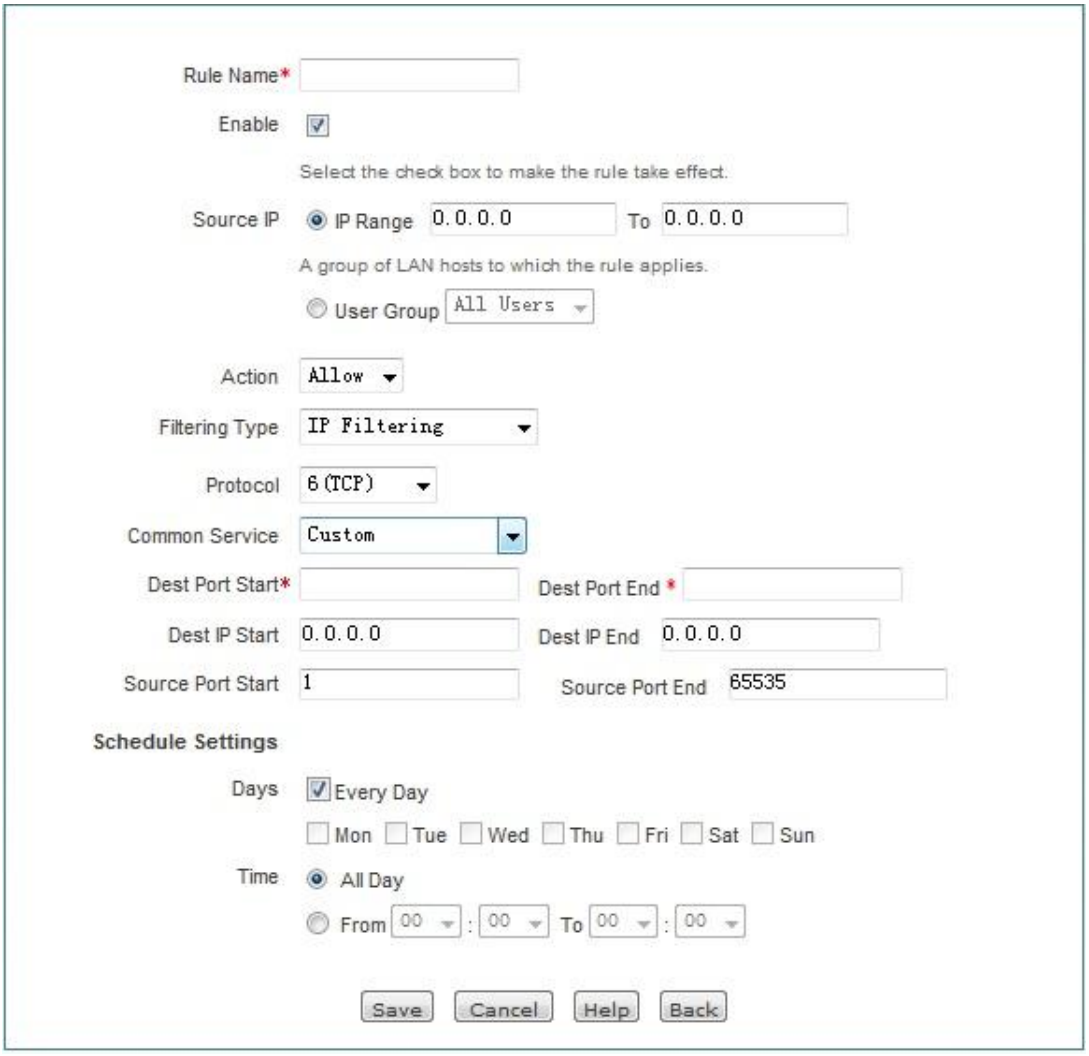


Figure 12_4 Access Control Settings - IP address filtering

- Policy name: The name of the custom access control policy.
- Enable this configuration: Enables this access control policy. Selecting it means to enable this policy, while deselecting it means to disable it.
- Source address: The Intranet users controlled by the access control policy.
- Action: The implementing action for the access control policy, the options are "allow" or "disallow".
  - Allow: Allows the packet that matches the access control policy to pass, that is, the device will forward the packet.
  - Disallow: Disallows the packet that matches the access control policy to pass, that is, the device will discard the packet.
- Filter type: Here, "IP filter" is selected.
- Protocol: The protocol type of the access control policy. The protocols available for choice are as follows: 1 (ICMP), 6 (TCP), 17 (UDP), 51 (AH), all (All). Among them, "all" indicates

all protocols. Appendix C provides a table of commonly used protocol numbers and protocol names.

- Common services: Provides the common service ports using UDP or TCP. Among them, the option "All" means all ports: Ports 1-65535.

  After a port number (service) is selected, the system will automatically fill the port number in "Destination starting port" and "Destination ending port". Specifically, if you select "All", then fill in "destination starting port" and "destination ending port" as 1 and 65535 respectively.

  Appendix D provides a table of common service ports and service names.

- Destination starting port, destination-ending port: the destination starting port and destination ending port for the access control policy, through which you can specify the destination ports within a segment. If only one destination port is defined, then set them to the same value, with the range of values as 1-65535.

- Destination starting address, destination-ending address: The destination starting IP address and destination ending address for the access control policy, through which you can specify the destination IP addresses within a segment. If only one destination IP address is defined, then they are set to the same value.

- Source starting port, source-ending port: the source starting port and source ending port for the access control policy, through which you can specify the source ports within a segment. If only one source port is defined, then set them to the same value. Value range is 1-65535.

- Effective time setting: The time when the access control policy takes effect. All times are not to be set.

Tip:

The IP address field being 0.0.0.0 to 0.0.0.0 by default means that it takes effect to all clients, that is, there is no limitation to the source address, including the clients in the LAN address field, the clients of the PPPoE Server address pool.

二、Access Control Settings -- URL filtering

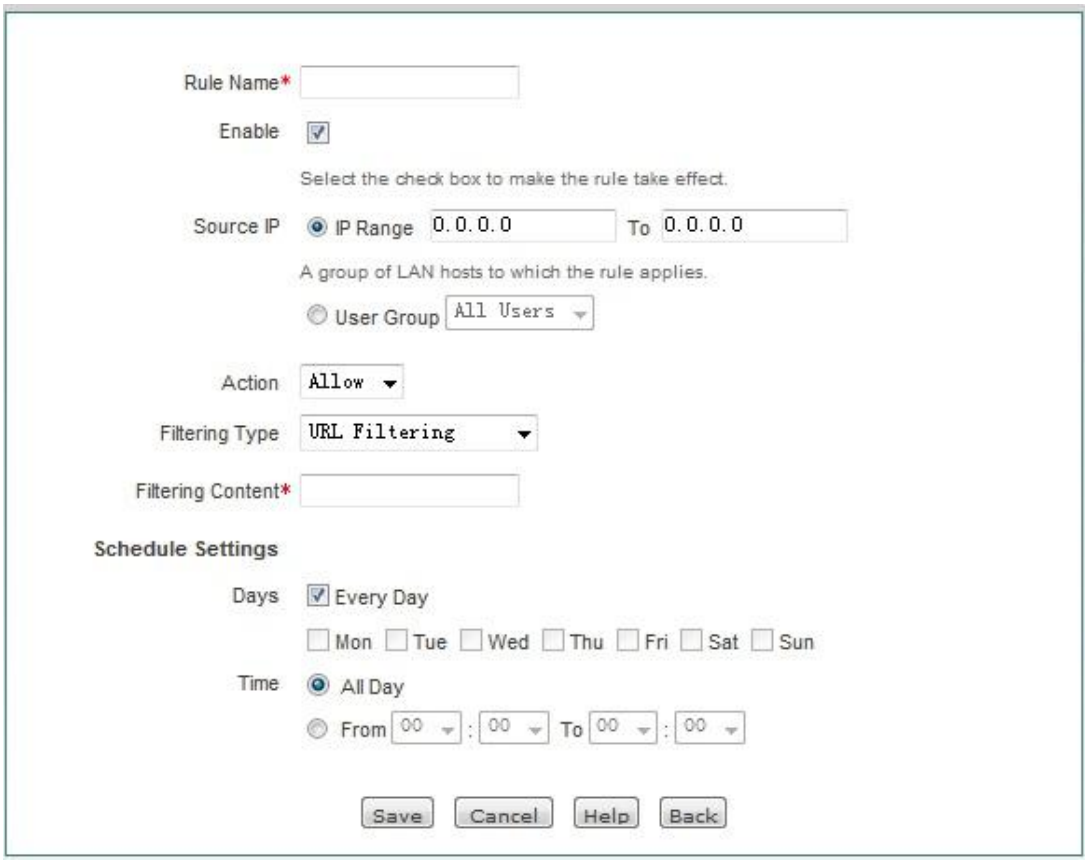


Figure 12_5 Access Control Settings -- URL filtering

"Policy name", "Source address", "Action" and other parameters have the same meaning as the related parameters in the "IP filter", which will not be repeated here. Please refer to the description.

- Filter type: Here, "URL filtering" is selected.
- Filter content: The URL address to be filtered for the access control policy.

URL filtering is based on the URL keyword filtering. When the URL of the page to be access contains the fields exactly matching "Filter content", it is considered to match the policy. Here, you can enter a complete domain name; at this time, all pages that start with the domain name are matched. Or you can enter the substring of the domain name, and then all pages that contain the substring in the URL are matched, thus filtering all web pages of a site. Next, let's give a few examples to illustrate:

Instance I: If you enter www.sina.com.cn, then all web pages beginning with www.sina.com.cn will match that policy, such as www.sina.com.cn/index.jsp, but the web pages beginning with book.sina.com.cn will not be matched.

Instance 2: If you enter www.Levelone.com.cn/bbs/, then all web pages beginning with www.Levelone.com.cn/bbs/ will match that policy, thus controlling the LEVELONE's access to BBS page in this site.

Instance 3: if you enter sina.com, then all web pages containing sina.com are matched, which means the whole sina site is matched. Of course, the pages beginning with book.sina.com.cn will

be matched.

Tip:

1. In the URL addresses, the English characters are not case-sensitive. When you enter a URL, please do not include http://.
2. URL filtering cannot control users in using a Web browser to access other services. For example, the URL filtering cannot control the access to ftp://ftp.Levelone.com.cn. In this case, you need to disallow or allow FTP connections by configuring the access control policy of IP filter type.

三、Access Control Settings - Keyword filtering

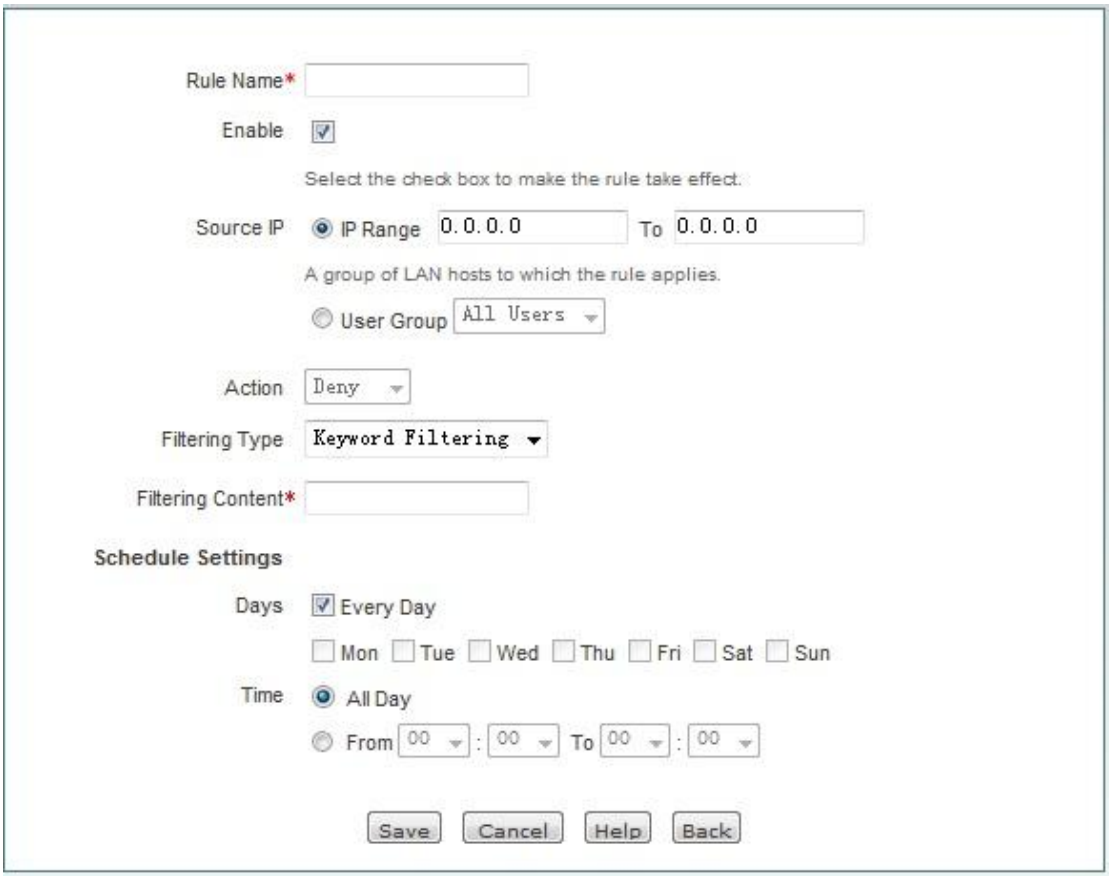


Figure 12_6 Access Control Settings - Keyword filtering

"Policy name", "Source address", "Action" and other parameters have the same meaning as that of the parameters in the "IP filter" type, which will not be repeated here. Please refer to the related description.

- Filter type: "Keyword filter" is selected.
- Filter content: The keywords to be filtered by the access control policy, which refers to the keywords on a web page.

Tip:

1. For the access control policy with the filter type of "Keyword" , "Action" has only the option, "Disallow".

2. The filtered content should exclude: < > , % ' \ " & ; and the characters except spaces.

四、Access Control Settings -- DNS filtering

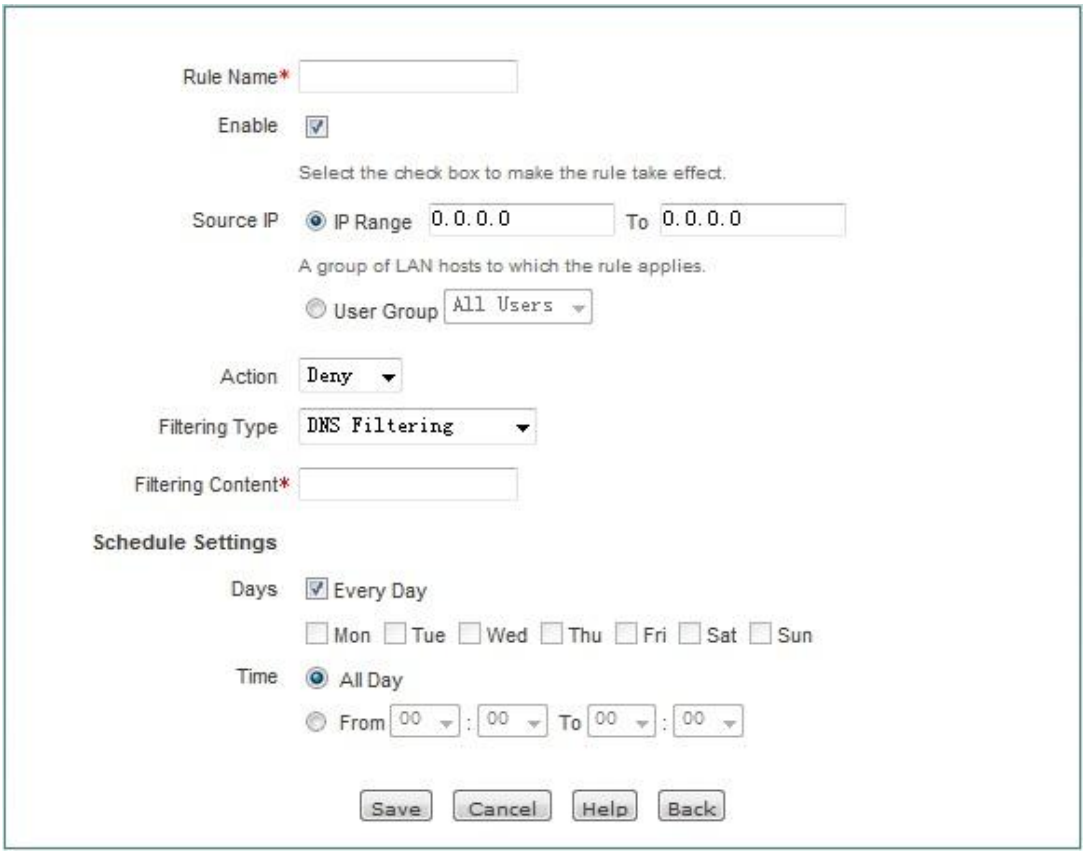


Figure 12_7 Access Control Settings - DNS filtering

"Policy name", "Source address", "Action" and other parameters have the same meaning as that of the parameters in the "IP filter" type, which will not be repeated here. Please refer to the related description.

- Filter type: Here, "DNS filtering" is selected.
- Filter content: Sets the domain name to be filtered.

Tip:

You can filter more than one domain names by entering the wildcard character, " * " in the filter content. For example, enter the domain name"*.163.*" in the filter content, and select "Disallow" in Action, and the intranet users will not be able to access all the web pages with the domain name containing ".163."

12.2.4 Access Control Settings instance

This section describes two instances of access control.

一、Instance I

Requirements: An enterprise Intranet requires allowing only the users with the IP addresses of 192.168.1.10 - 192.168.1.20 to use WEB services during working hours (Monday to Friday, 9:00-18:00).

Analysis:

Custom policy 1: Allows the DNS application in 192.168.1.10-192.168.1.20.

Custom policy 2: Allows the WEB application in 192.168.1.10-192.168.1.20.

Custom policy 3: Disallows all other applications in 192.168.1.10-192.168.1.20.

What calls for special attention is that (Policy 3) when all services are prohibited, the DNS service is also prohibited. In order to make the users in this address field access the network normally, Policy 3 should be configured to the last.

Access control policy list:

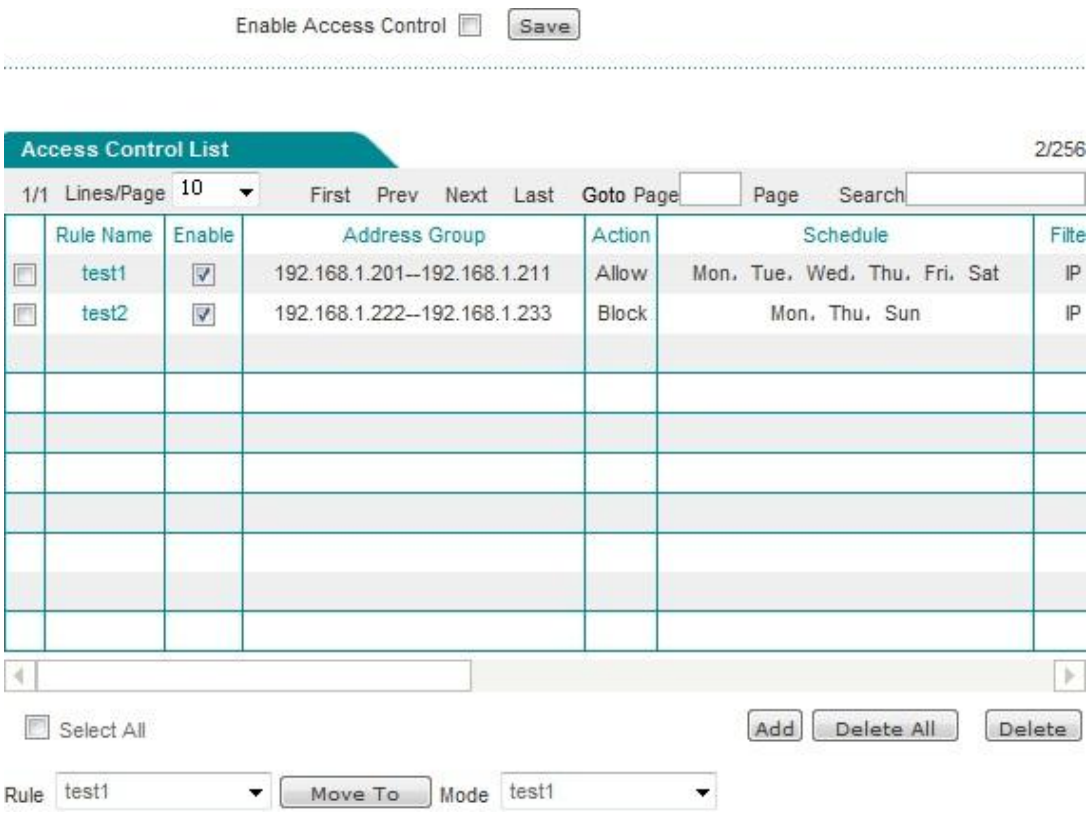


Figure 12_8 Access Control Settings - Instance I

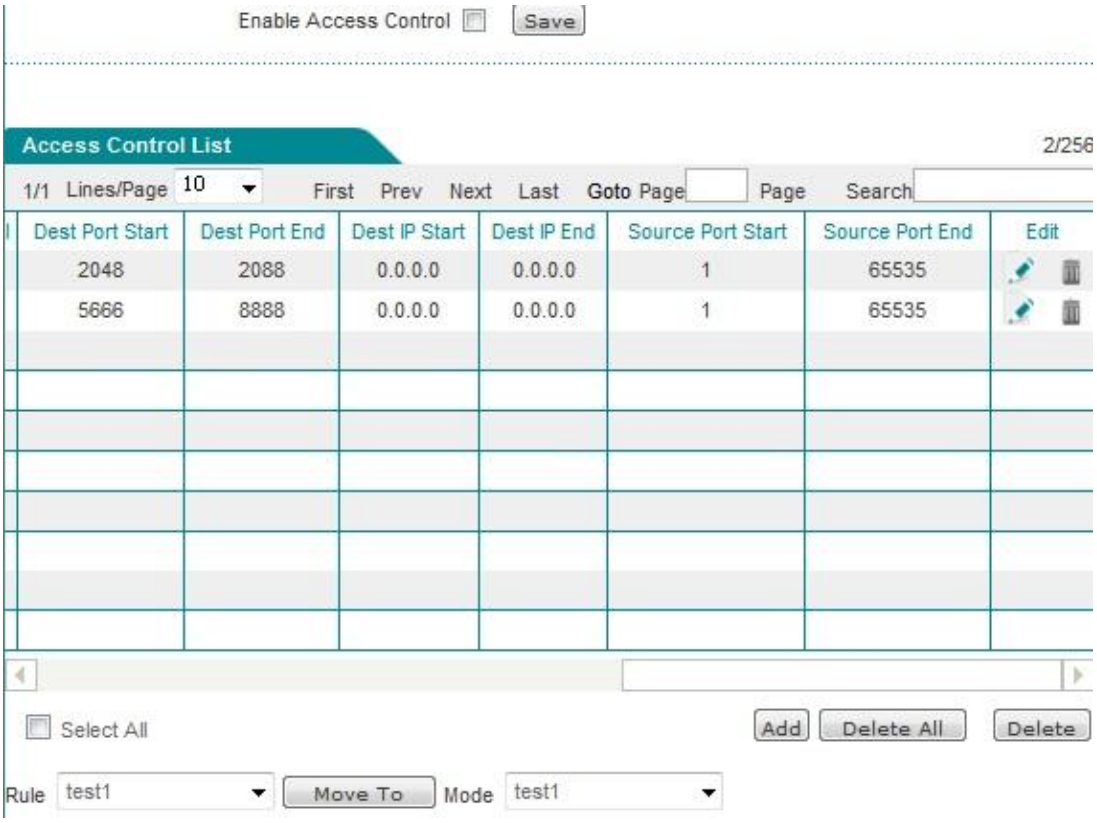


Figure 12_9 Access Control Settings - Instance I (Continued Figure 12_8)

二、Instance II

Requirements: An enterprise network wants to prohibit the users in 192.168.1.80-192.168.1.100 from visiting the website http://www.bbc.com (IP address is 212.58.246.93) and the website http://www.cnn.com (IP address is 157.166.255.18), but allow all other online services of the group.

Analysis:

Configure Policy 1, to disallow the users in the segment of 192.168.1.80-192.168.1.100 to accesshttp://www.bbc.com.

Configure Policy 2, to disallow the users in the segment of 192.168.1.80-192.168.1.100 to accesshttp://www.cnn.com.

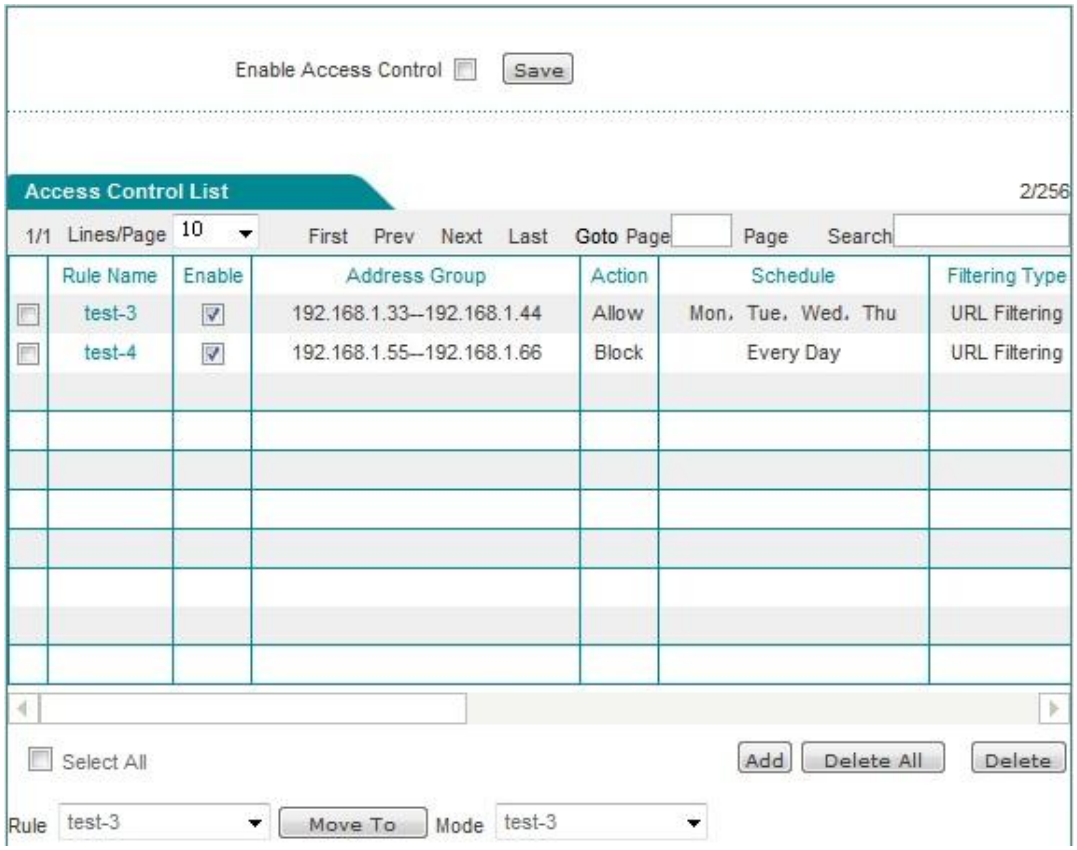


Figure 12_10 Access Control Settings –Instance II

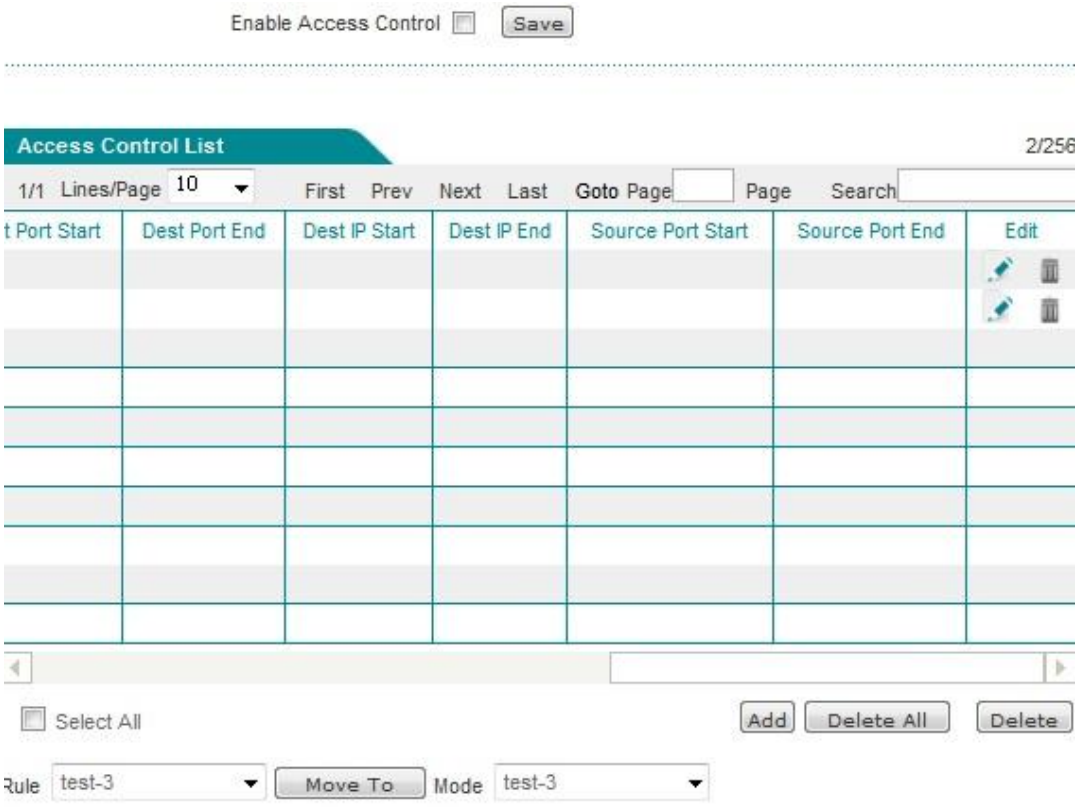


Figure 12_11 Access Control Settings – Instance I (Continued Figure 12_10)

12.3 Domain filtering

This section describes the domain name filtering feature of the ***Firewall -> Domain filtering*** page, including the matters needing attention in the domain name filtering operation steps, domain name filtering configuration process.

12.3.1 Domain filtering Settings

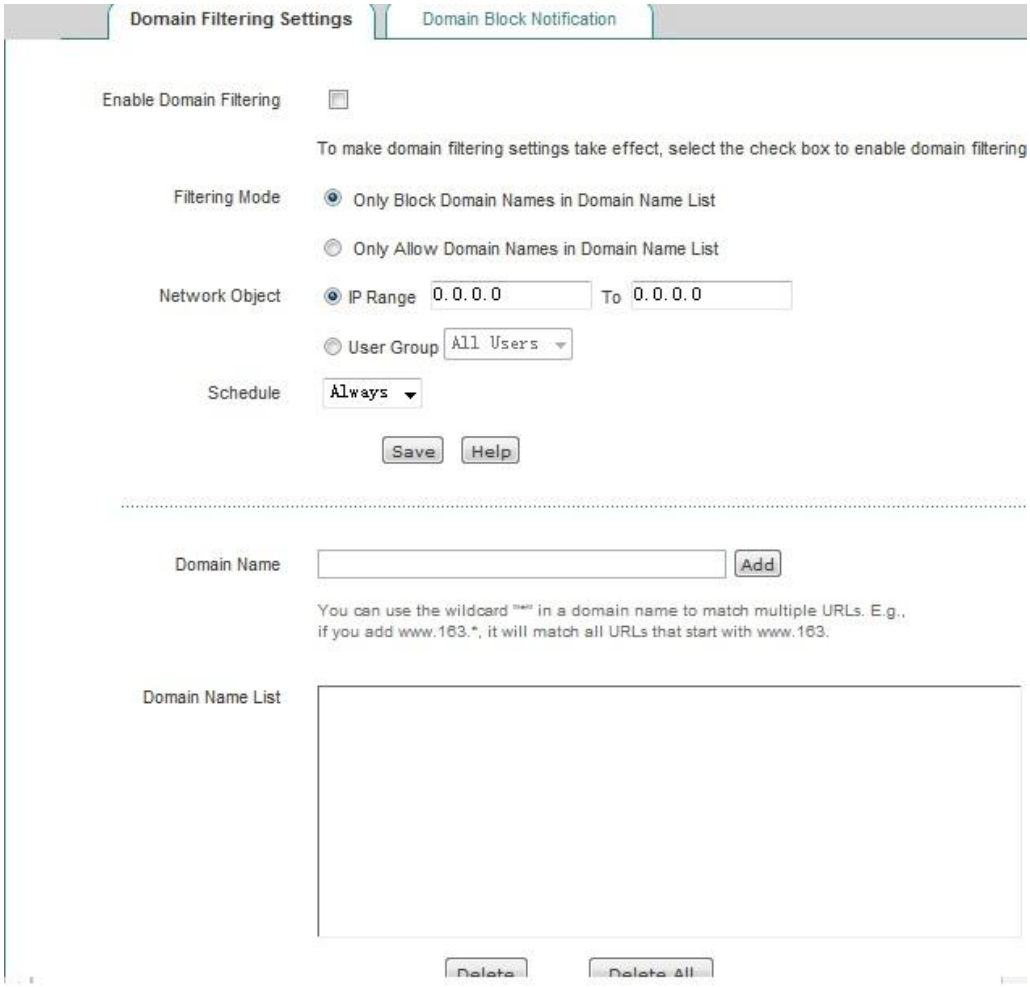


Figure 12_12 Domain filtering page

Steps of configuring domain name filtering:

1. Check the "Enable domain name filtering".
2. Select the way for the domain name filtering policy to take effect.
3. Select the intranet objects for the domain name filtering to take effect.

4. Select the time period for the domain name filtering to take effect.
5. In the text box corresponding to "Domain name", enter the appropriate domain name, and click < Add new entry > bLeveloneon. A corresponding domain name will appear in the "Domain name list".
6. Click <Save>.

Tip:

1. The device supports setting of the filtering of 100 domain names.
2. Domain name filtering is of matching whole word only. When the domain name entered by an intranet user in the browser matches the one as displayed in the "Domain list" in whole word, it will not be able to access the web page corresponding to that domain name.
3. You can filter multiple domain names by entering the wildcard character, "*", in the domain name, for example, enter the domain name, "www.163.*" in the domain name list, and intranet users will not be able to access all web pages beginning with "www.163".

12.3.2 Domain Block Notification

This section focuses on ***Firewall***->***Domain filtering***-> ***Domain Block Notification*** function. When a web site is prohibited from access, it hopes to give users a hint that this web site being prohibited is not a network problem. Click on the domain name filtering notification tab, to enter the page as shown in Figure 12-13.

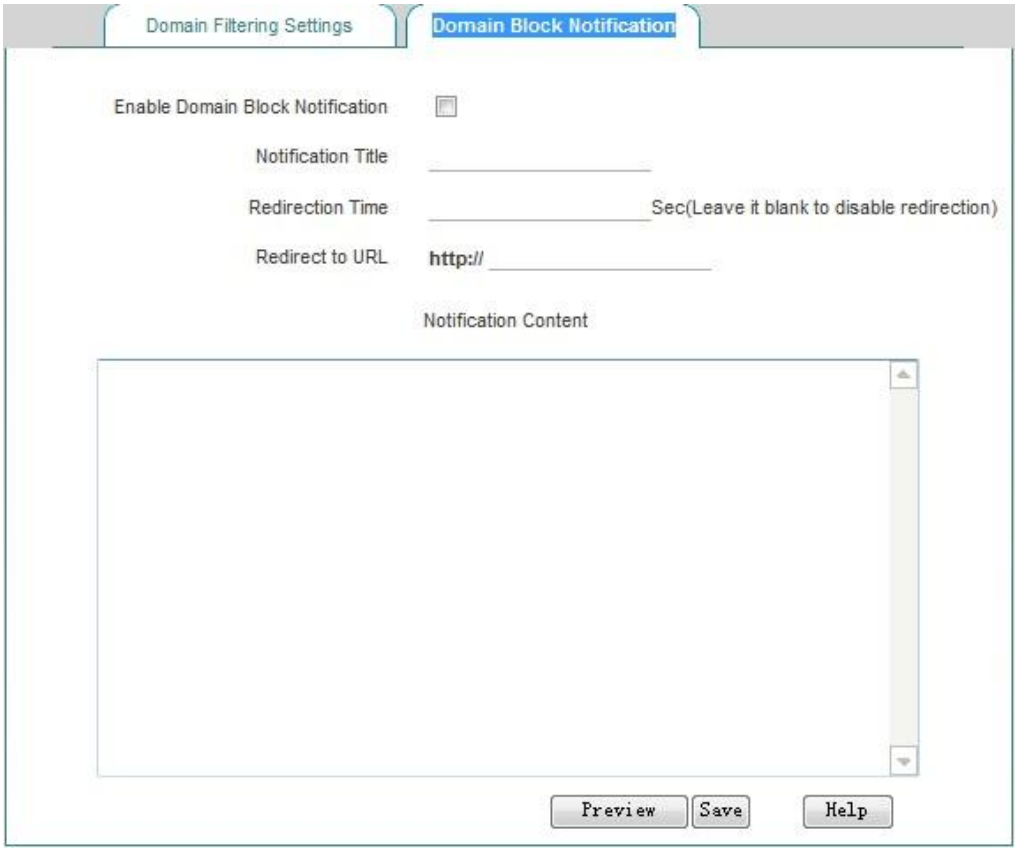


Figure 12_13 Domain Block Notification page

- Enable domain name filtering notification feature: Checking it means to enable this feature. After this feature is enabled, the device will send a notice to the user when the intranet users access the prohibited domain names, and after the set time, it will skip to a specific web site.
- Notice title: The title of the notification information pushed by the device.
- Redirecting time: Sets the redirecting time for accessing the domain name as listed in the domain name list. Blank means no redirecting while 0 means redirecting immediately
- Redirecting URL: Sets the domain name address redirected when accessing to the domain names as listed in the domain name list;
- Notice content: the content of the notification information pushed by the device.
- Save: The global configuration parameters domain name filtering take effect.
- Preview page: Previews the configured notification content, as shown in the figure below:

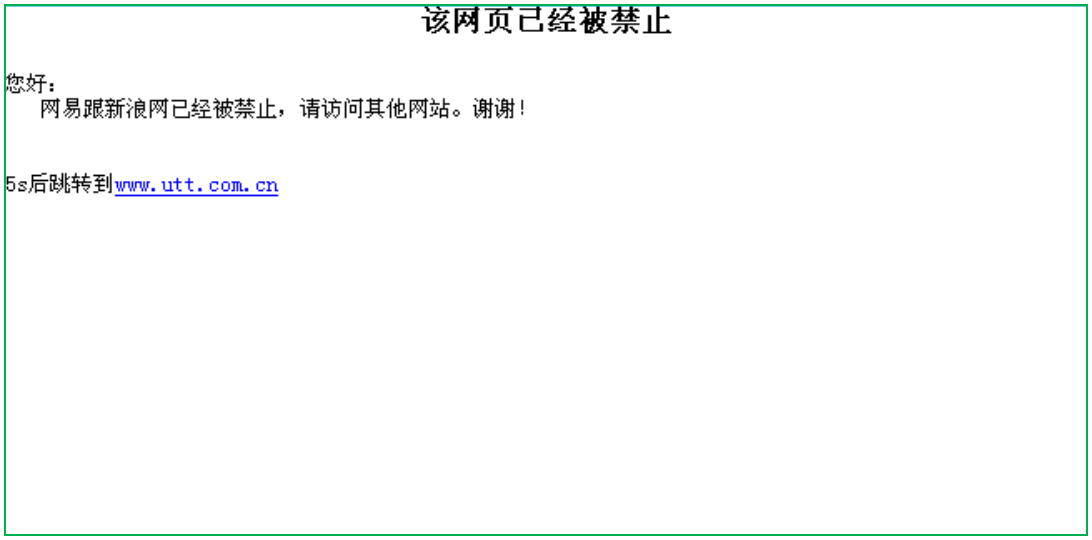


Figure 12_14 Domain Block Notification page

12.4 MAC Address Filtering

This section describes the MAC address filtering function of the ***Firewall -> MAC address filtering*** page, including: The steps of MAC address filtering and the points for attention to the process of MAC address filter configuration.

12.4.1 MAC Address Filtering

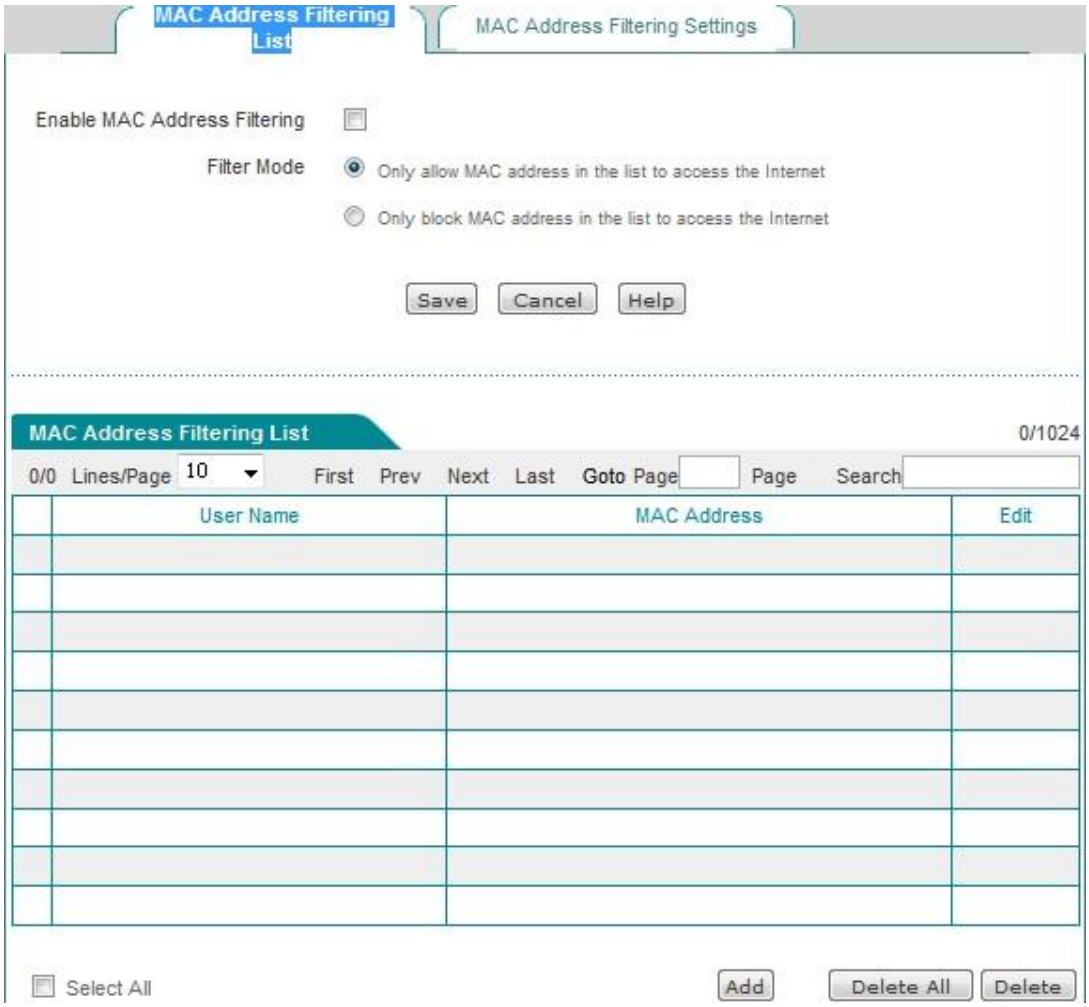


Figure 12_15 MAC Address Filtering List

- Enable MAC address filtering: Checks to enable the MAC address filtering function.
- Filtering rules: Users can choose "Allow Allow only the MAC addresses in the list to access to the network" or "Disallow Disallow only the MAC addresses in the list to access to the network".
- User name: Displays the user name of the configured MAC address filtering.
- MAC address: Displays the MAC address of the configured MAC address filtering.

12.4.2 MAC Address Filtering Settings

Enter the MAC address filtering information list, click "Add new entry", to enter the MAC address filtering configuration page, as shown in the figure below.

Figure 12_16 MAC Address Filtering Settings

- User name: Displays the user name of the configured MAC address filtering.
- MAC address: Configures the MAC address to be filtered.

Users can configure in batch in the ***Firewall -> MAC address filtering -> MAC Address Filtering Settings*** page.

Figure 12_17 MAC address filtering

- Text box: Sets the corresponding MAC address information in the text box.

  The input format is "MAC+ user name".

  - MAC address: The user's MAC address (which can be obtained using the ipconfig /all command under the DOS environment on Windows platforms).
  - User name: It can be ignored, because the system will automatically assign a name for it.

Tip:

1. In the above input format, there may be one or more spaces between the MAC address and the user name.

Chapter 13. For the invalid entries, the system will skip the invalid configuration entries in binding VPN

VPN (Virtual Private Network): VPN refers to the technology for establishing a dedicated data communication network in the public network (such as Internet) based on ISP (Internet Service Provider) and NSP (Network Service Provider).

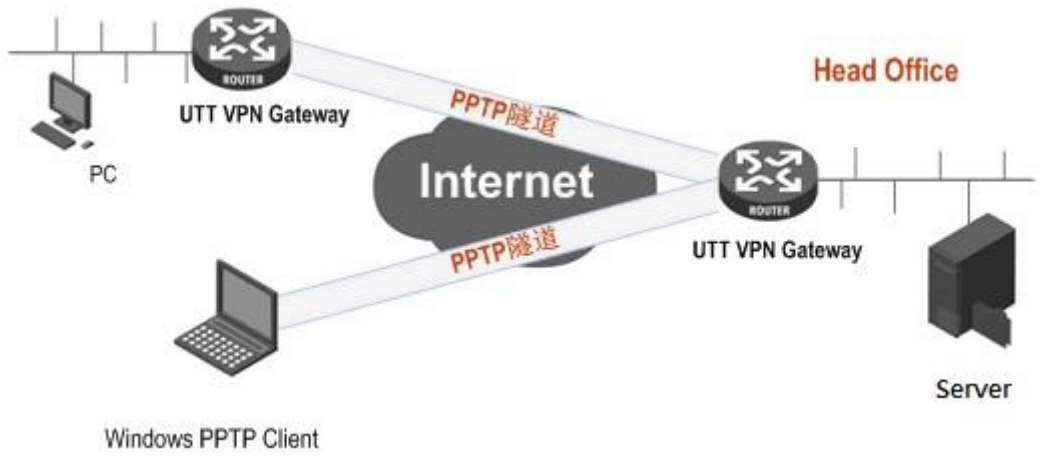
13.1 PPTP

13.1.1 PPTP overview

PPTP (Point-to-Point Tunneling Protocol): PPTP is a virtual private networking protocol, belonging to the second layer protocol. PPTP encapsulates the PPP (Point-to-Point Protocol) frames in the IP datagrams, and sends them by IP networks, such as Internet or corporate Intranet.

The basic function of the PPTP is to transmit user data packets encapsulated using PPP in the IP network. PPTP client is responsible for receiving the raw data from users, and encapsulates it to the PPP packet, and then establishes a PPTP tunnel between the PPTP client and the server for sending the PPP packet.

Typical application is to deploy the PPTP clients in the PC software of remote offices or mobile office users, and they are used to launch the PPTP tunnel. The PPTP server is deployed in Enterprise Center or office, used to receive a call from the PPTP client. When a PPTP tunnel connection is established, the PPTP server receives the PPP packets from the PPTP client and restores user's data packets, and then sends the restored packets to the end user's PC.



PPTP Tunnel Server Mobile user

Figure 13_1 PPTP typical application

13.1.2 PPTP list

Enter the ***VPN ->PPTP*** page to view the information related to the PPTP tunnel, such as user name, business type, remote Intranet IP address, session state, time of connection established.

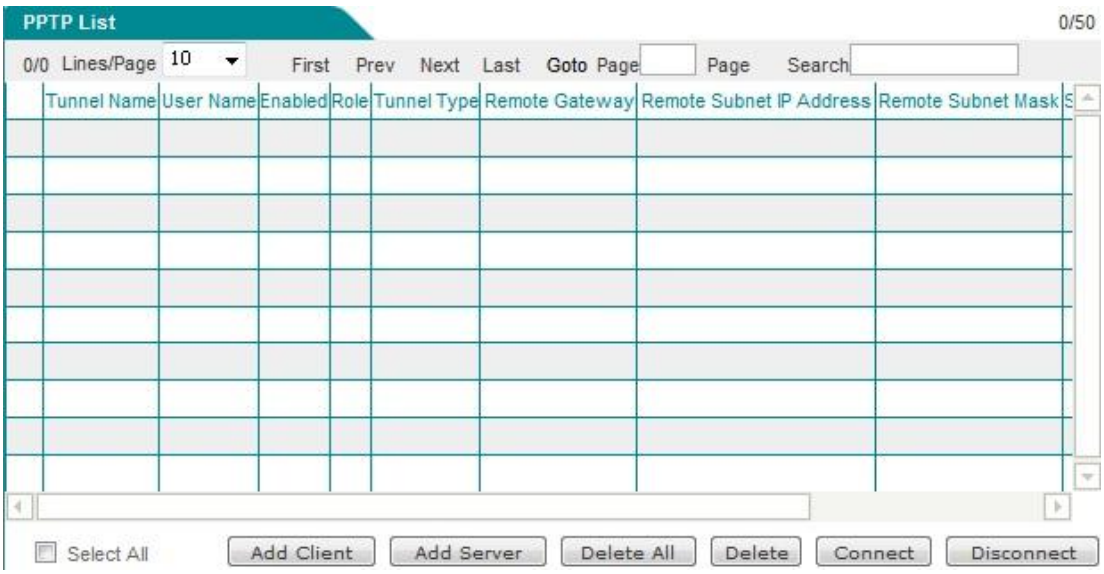


Figure 13_2 PPTP list

Tip:

1. The operation of the "Establish" and "Hang up" bLeveloneons only take effect for clients.
2. In order to ensure the PPTP tunnel can be connected normally after the VPN gateway enables

NAT, and after the PPTP configuration is complete, the system will automatically generate a static NAT mapping to TCP 1723 port (which can be viewed in the "Static mapping information list" of ***Advanced Configuration->NAT static mapping and DMZ***, named as "PPTP"). Please do not edit, delete them, or it may even cause the PPTP tunnel not to be connected and not to transmit data.

13.1.3 PPTP server configuration

Enter the ***VPN configuration ->PPTP*** page, click <Add a server>in the page as shown in Figure 13_2, and enter the ***PPTP server*** page.

13.1.3.1 Global Settings

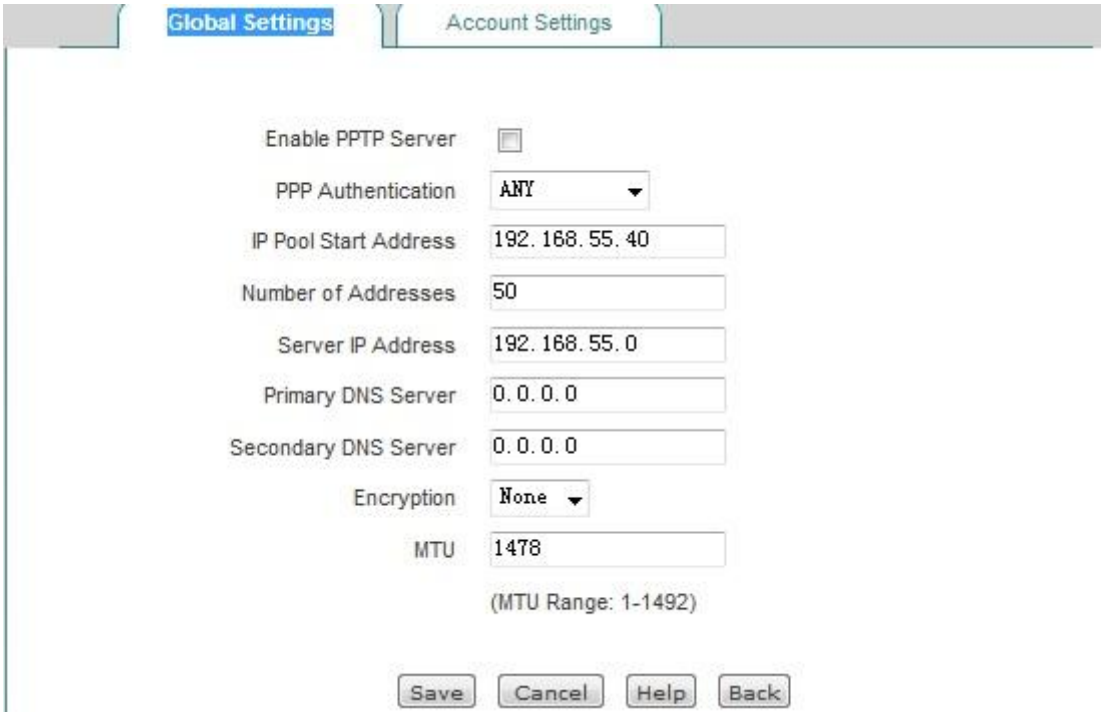


Figure 13_3 PPTP server - Global Settings

- Enable PPTP server: Check to enable the service.
- Password authentication mode: Sets the password authentication mode to establish PPTP VPN. The options include MS-CHAPV2, PAP, CHAP, ANY (automatically negotiate with the peer device on password authentication mode).
- Address pool starting address: Configures the starting IP address assigned by the PPTP server to the PPTP client, to ensure that the network segment to which the address belongs does not repeat with any of the network segments in LAN.

- Number of address pool addresses: Sets the total number of the addresses in the address pool.
- Server IP address: The virtual interface IP address of the tunnel server. This address is not included in the address pool. Please confirm that the address and the address pool that is configured are located on the same network segment.
- Master/standby DNS server: When the device is configured as the PPTP/L2TP server, it can assign the DNS address for the PPTP/L2TP clients, so that users can browse web pages through the DNS address assigned on the server line after connecting to the server, which can solve the problem that users can open the internal network of the server after dialing through the VPN but cannot open the web pages.
- Encryption mode: Sets the data encryption mode, with the options of MPPE encryption, no encryption. Note: In the use of MPPE encryption mode, MS-CHAPV2 password authentication method must be selected.

13.1.3.2 Account Settings

The following describes the meaning of the parameters for the PPTP server to configure accounts for the PPTP client.

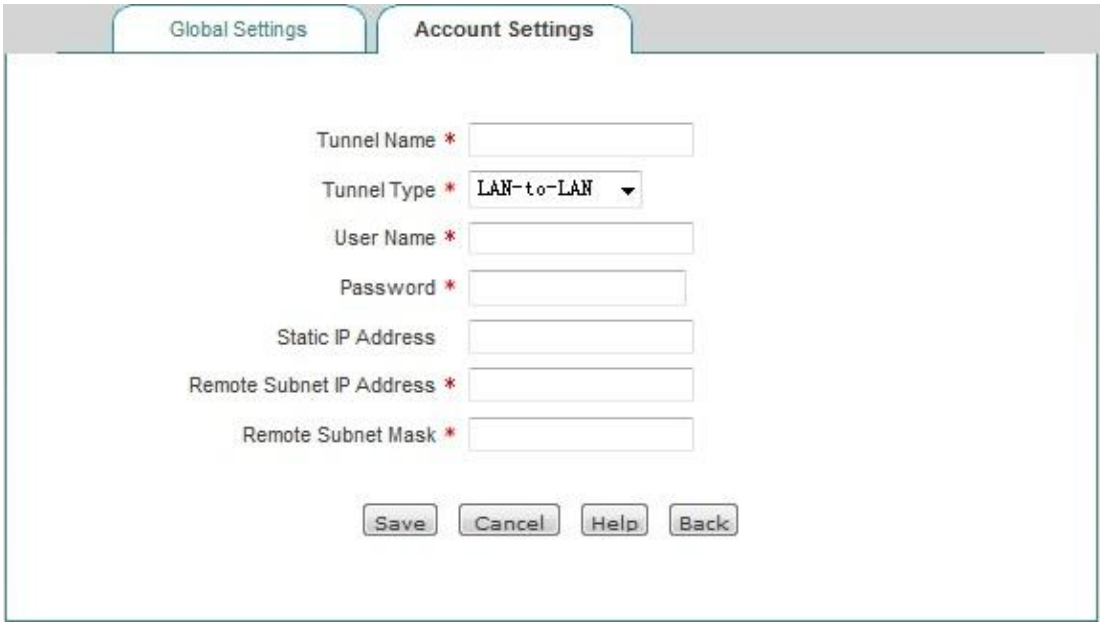


Figure 13_4 PPTP server - Account Settings

- Tunnel name: Custom tunnel name: Customizes the name of the tunnel, which must not repeat with the existing instance name in the device.
- User type: The options include LAN to LAN, mobile users.
  - LAN to LAN: An incoming PPTP user is the user of a network segment, which often is dialed through via a router, to implement communications in the LAN at both ends of the PPTP tunnel.
  - Mobile user: The dialed-in VPN user is an individual user, which is often dialed in by a

single PC, to implement the communications between the PPTP tunnel remote PC and the local LAN.

- User name: The user name used when the custom client is dialing.
- Password: The password used when the custom client is dialing.
- Fixed IP address: Sets up the IP address assigned by the PPTP server to the client, and the address must be in the PPTP server address pool.
- Remote Intranet network address: Fills in the IP addresses used by the LAN at the opposite end of the PPTP tunnel (which may be the LAN IP address of the device at the opposite end of the VPN tunnel).
- Remote Intranet subnet mask: Fills in the subnet mask used by the LAN at the opposite end of the PPTP tunnel.

13.1.4 PPTP client Settings

Enter the ***VPN configuration ->PPTP*** page, and click <Add a client> in the page as shown in Figure 13_2, to enter the ***PPTP client*** page. The following describes the meaning of the parameters for configuring the PPTP client.

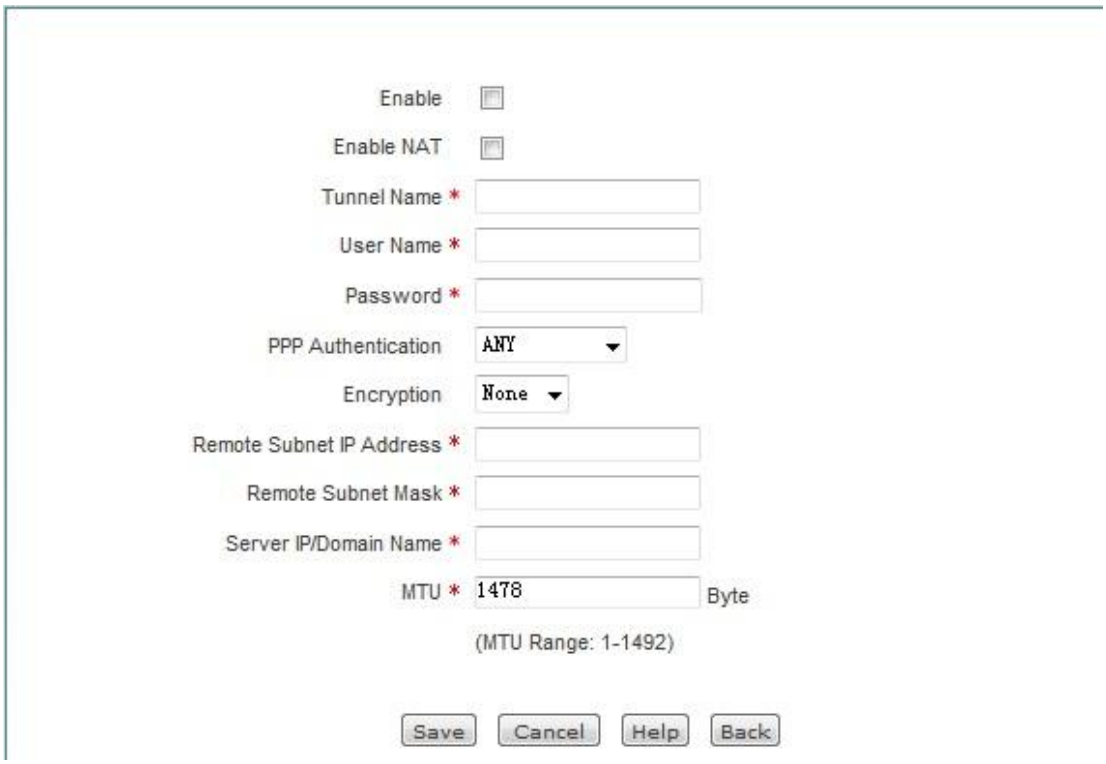


Figure 13_5 PPTP client

- Enable the configuration: Check it to enable this configuration.
- Enable NAT: After NAT is enabled, the PPTP client will do NAT to the PPTP tunnel, that is, translate the LAN IP address to the IP address assigned by the peer PPTP server, so that LAN users will be connected to the LAN at the opposite end of the tunnel with the IP address assigned by the PPTP server, and the device at the opposite end of the tunnel need not to set the local route.
- Tunnel name: The name of the tunnel, which cannot repeat with the instance name existing in the device.
- User name: The user name when dialing this tunnel.
- Password: The password used when dialing the tunnel.
- Password authentication mode: Sets the password authentication mode to establish PPTP VPN. The options include MS-CHAPV2, PAP, CHAP, ANY (automatically negotiate with the peer device on password authentication mode). Make sure that the password authentication mode is consistent with that of the server.
- Encryption mode: Sets the data encryption mode, with the options of MPPE encryption, no encryption. Note: In the use of MPPE encryption mode, MS-CHAPV2 password authentication mode must be selected.
- Remote Intranet network address: Fills in the IP address of the remote Intranet, which can be the LAN IP address of the remote VPN gateway.
- Remote Intranet subnet mask: The subnet mask of the remote Intranet.
- Tunnel server address (name): Fills in the IP address or domain name of the WAN port of the remote VPN gateway.

13.1.5 PPTP configuration instance

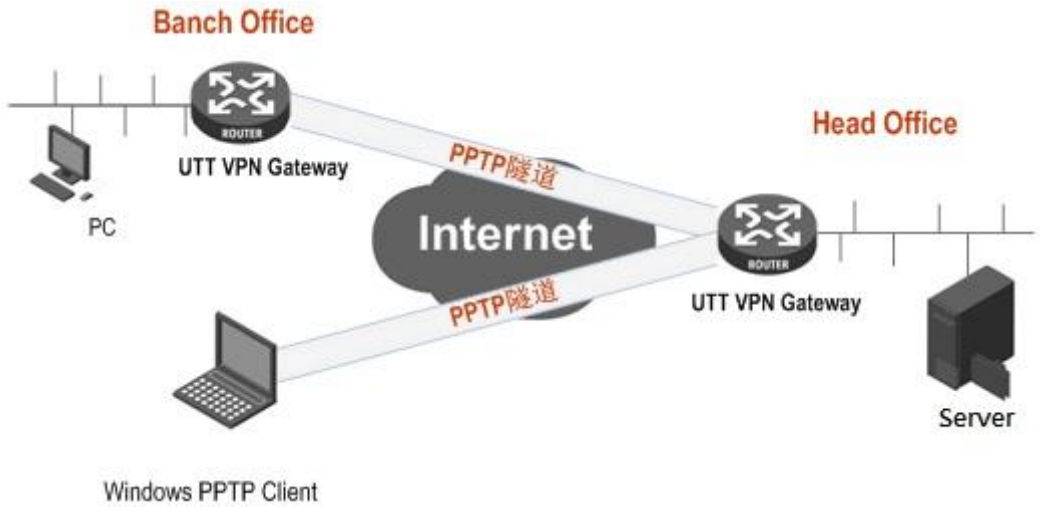


Figure 13_6 PPTP instance topology

In this scenario, a company is based in Shanghai. It has a branch office in Beijing, and hopes to achieve a mutual access to the internal resources of the LAN in two places. The company also has some mobile users in business trips and using remote office hoping to remotely access the company's internal resources of LAN.

The scenario uses the PPTP to establish VPN tunnels, and the VPN gateway in both places are using HiPER router, and the mobile users using the built-in PPTP client software of the Windows operating systems at the following addresses:

Shanghai gateway (PPTP server):

Intranet network segment: 192.168.1.0/24.

LAN IP address: 192.168.1.1/24.

WAN domain name: 200.200.202.126/24.

Beijing gateway (PPTP client):

Intranet network segment: 192.168.16.0/24.

LAN IP address: 192.168.16.1/24.

WAN IP address: 200.200.202.127/24.

Mobile client (PPTP client):

A PPTP tunnel connection is established using the Windows operating system through the PPTP dial-up.

The configuring steps are follows:

1. Configure Shanghai VPN gateway

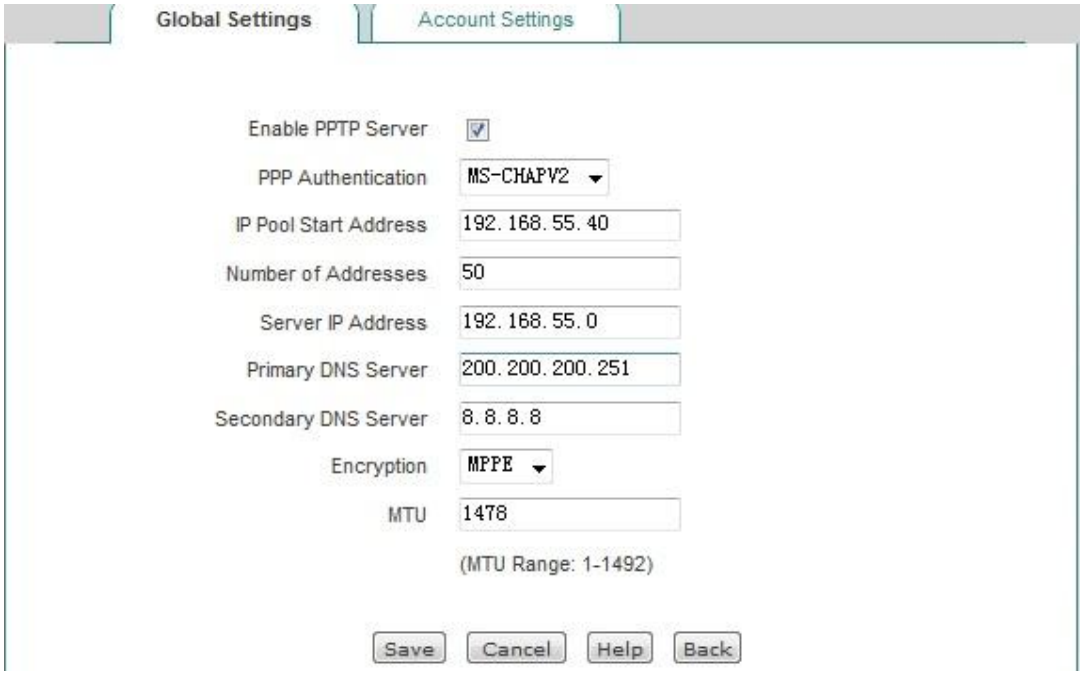


Figure 13_7 PPTP server Settings

Create an account for the Beijing Branch, user type: LAN to LAN. User name: Test2. Password: 123456. Password authentication mode: MS-CHAPV2. Remote Intranet network addresses: 192.168.16.1. Remote Intranet subnet mask: 255.255.255.0.

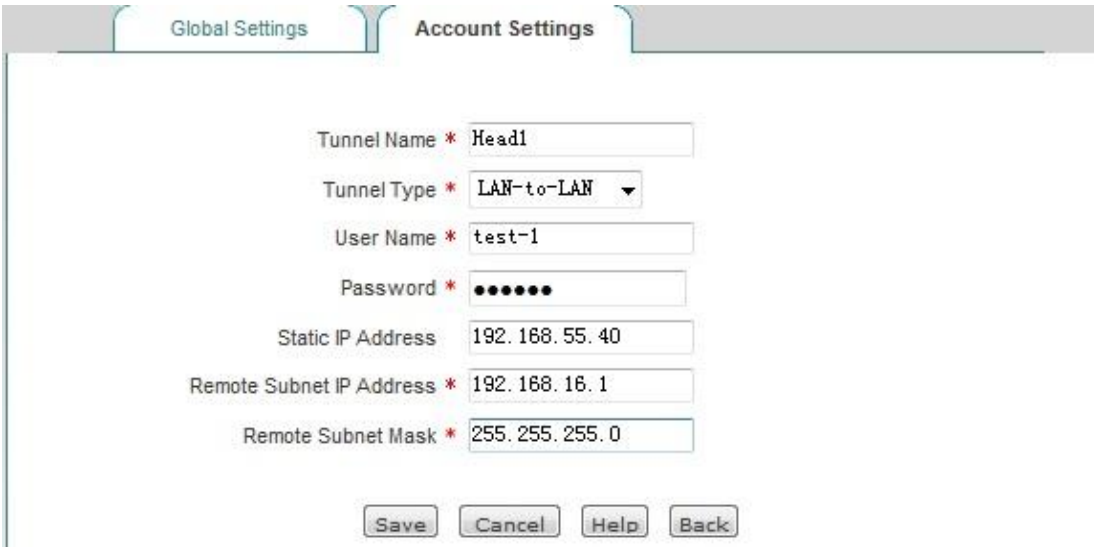


Figure 13_8 PPTP server Settings - LAN to LAN

Create an account for mobile users, user types: Mobile users. User name: Test1. Password: 123456. And assign a fixed IP address of 192.168.55.41 for the mobile user.

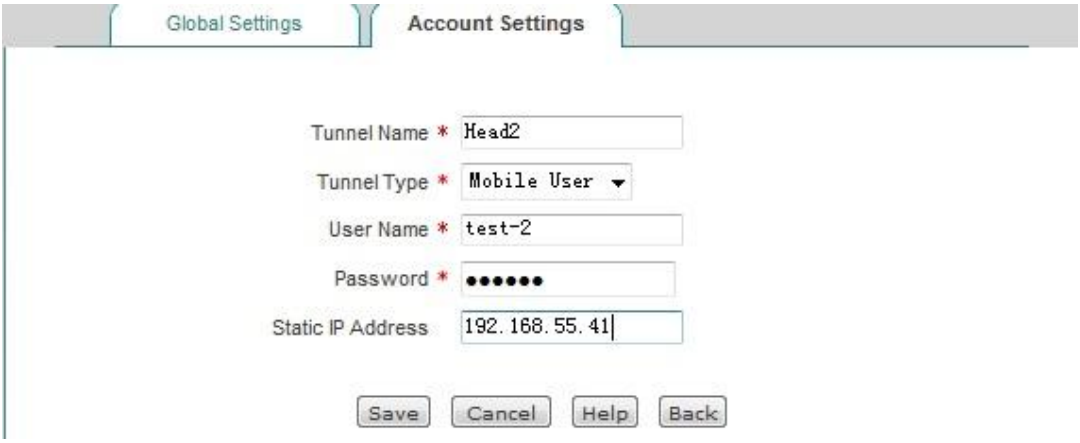


Figure 13_9 PPTP server Settings - Mobile users

2. Configure Beijing PPTP Client

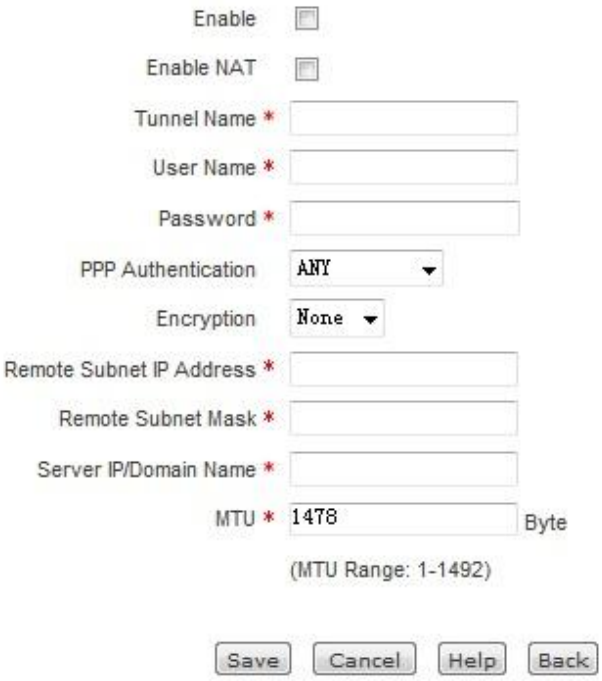


Figure 13_10 PPTP client Settings

PPTP clients are configured as shown in the above figure, user name: test1. Password: 123456. Password authentication mode: MS-CHAPV2. Remote Intranet network addresses: 192.168.1.1. Remote subnet mask: 255.255.255.0, tunnel server address: 200.200.202.126.

3. Mobile user configuration

Follow these steps to configure a Windows XP computer, allowing it to connect to the PPTP server.

The first step is to create a PPTP dial-up connection:

1) Enter the Windows XP ->"Start"→-> "Settings"→ -> "Control Panel", and select "Switch to category view".

2) Select "Network and Internet connections".

3) Select "Set up a network connection to your work location".

4) Select "Virtual private network connection (V)", and click "Next".

5) Enter a name for the connection, "Banch2", and click "Next".

6) Select "Do not dial this initial connection", and click "Next".

7) Enter the IP address "200.200.202.126" of the PPTP server ready to connect, and click "Next".

8) Click "Finish".

9) Double-click the "Banch2" connection, and in the Banch2 window, click "Properties".

10) Select the "Security" property page, select "Advanced (Custom settings)", and click "Settings".

11) In the "Data encryption", select "Optional encryption (which can connect without encryption)".

12) In "Allow these protocols", check "Unencrypted password (PAP)", "Challenge Handshake Authentication Protocol (CHAP)", "Microsoft CHAP (MS-CHAP)," "Microsoft CHAP (MS-CHAP v2) version", and click "OK".

13) Select the "Network" property page, and in "VPN Type", select "PPTP VPN".

14) Make sure that "Internet protocol (TCP/IP)" is selected.

15) Click "OK" and save your changes.

The second step is to connect to the PPTP server using the device PPTP tunnel:

1) Confirm that your PC is already connected to the Internet (probably a dial-up connection or a fixed IP access).

2) Start up the "Banch2" dial-up connection created in the first step.

3) Enter the PPTP user name "Test2" and the password "123456".

4) Click "Connect".

5) When the connection is successful, type "ipconfig" in MS-DOS mode, and you can see the addresses in the PPTP server address pool, which are the IP addresses assigned by the PPTP server to the local machine.

4. Viewing connection information

Enter the corresponding pages respectively, to view the PPTP instance connection information. As shown in the figure below, you can view the user name, service type, session status, using time, remote Intranet IP address/mask and other information of the PPTP instances.

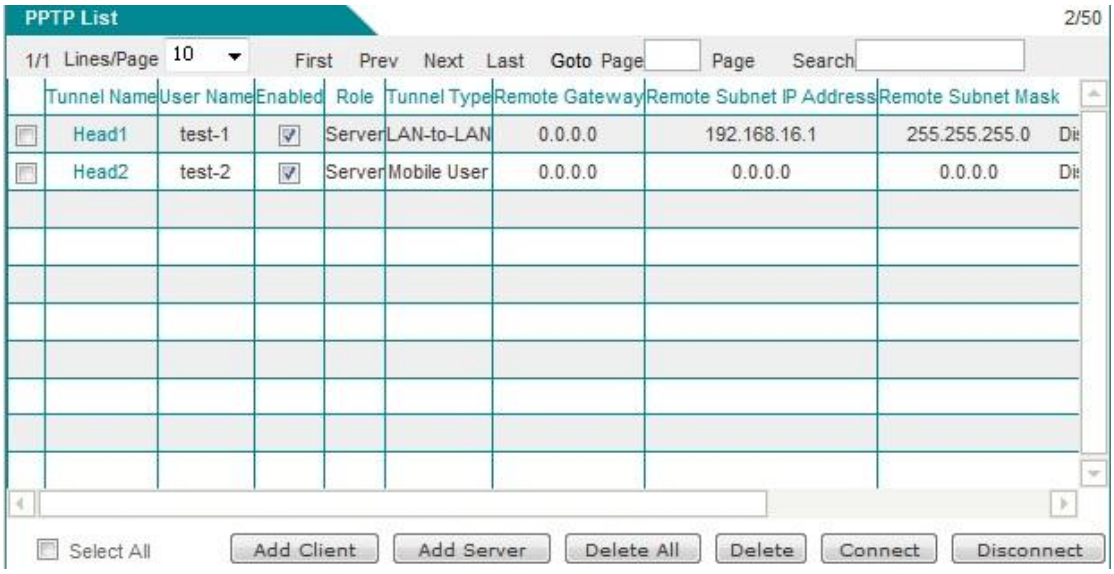


Figure 13_11 PPTP List 1

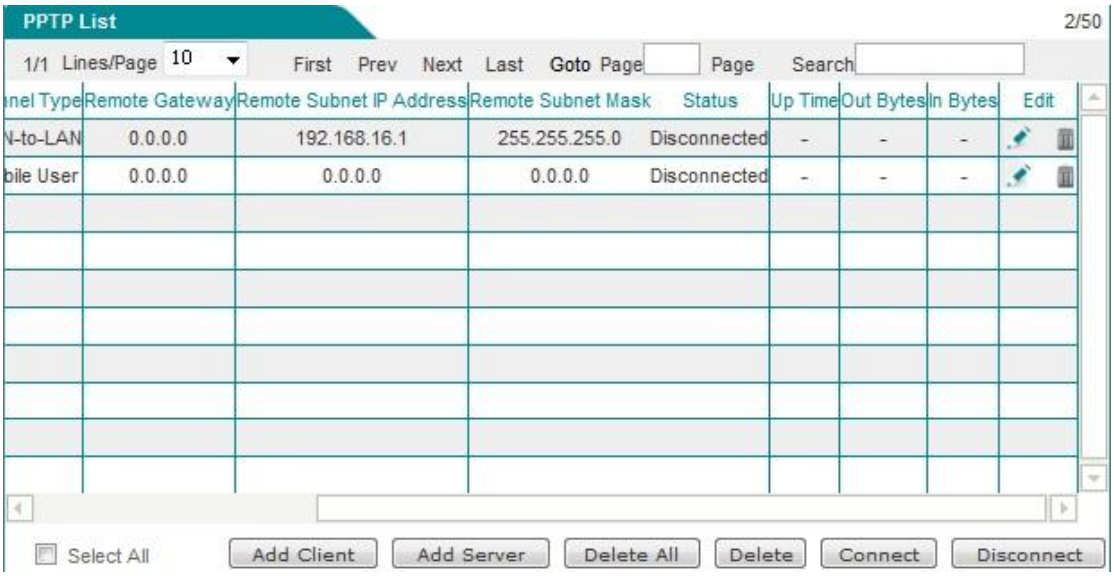


Figure 13_12 PPTP List 2

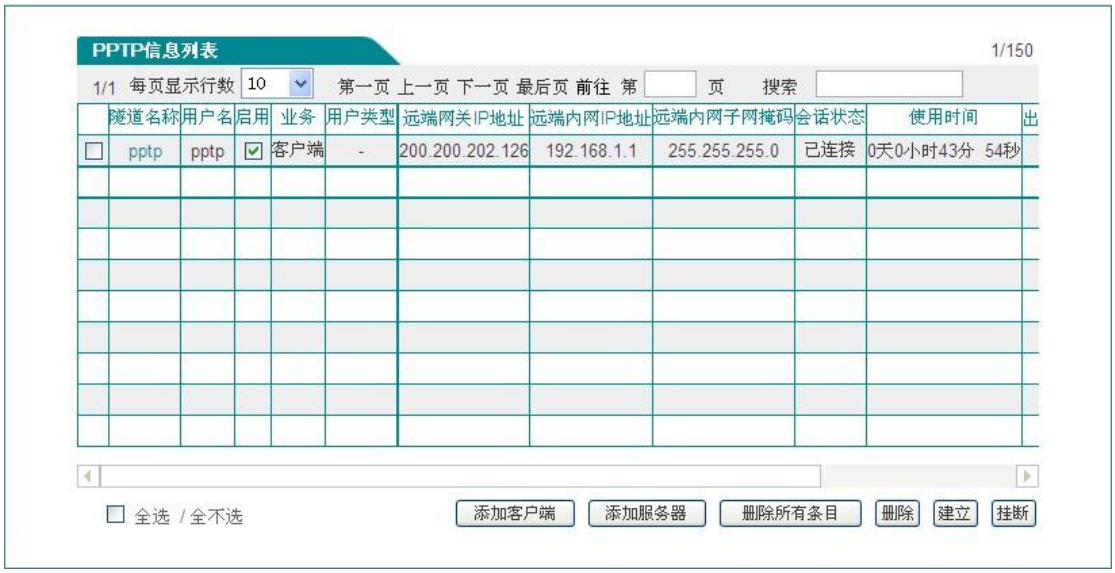


Figure 13_13 PPTP Client Info List 1

Figure 13_14 PPTP Client Info List 2

13.2 IPSec

13.2.1 IPSec Overview

With the development of security standards and network protocols, various VPN technologies

emerge, but IPSec VPN is currently one of the most widely used VPN security technologies. IPSec is a set of open standards, protocols to create and maintain IP network secure communication that provides two security mechanisms: encryption and authentication. Encryption mechanism ensures the confidentiality of data, while authentication mechanism ensures that data come from the original sender and are not destroyed and tampered with during transmission.

IPSec can provide the following services:

- Data confidentiality: The IPSec sender encrypts the packets before transmission across the network.
- Data integrity: The IPSec receiver authenticates the packets sent by the sender, to ensure that the data has not been tampered with during transmission.
- Data source authentication: IPSec can authenticate if the sending end for transmitting the IPSec packet is legitimate in order to ensure the authenticity of data.
- Anti-replay: The IPSec receiver can detect and reject to receive duplicate packets.

13.2.1.1 Abbreviations and terminology

IPSec (IP Security Protocol): IPSec is a series of protocols formulated by IETF, to ensure the security and confidentiality of the data sent across the Internet, and the communicating parties can guarantee the confidentiality, integrity and authenticity of packets sent across the Internet through encryption and data origin authentication at the IP layer.

IKE (Internet Key Exchange): IKE is used for both communicating parties to negotiate and establish security alliances, exchange keys. IKE defines the method for two parties to authenticate, negotiate encryption algorithm, and generate shared keys.

DES (Data Encryption Standard): DES is a data encryption algorithm used by IPSec to encrypt the packets.

3DES (Triple Data Encryption Standard): 3DES is a data encryption algorithm used by IPSec, to encrypt the packets with a higher strength than DES.

AES (Advanced Encryption Standard): AES is a data encryption algorithm used by IPSec. Compare with DES and 3DES, AES is more efficient and safer.

DH (Diffie-Hellman Group): Each party generates a pair of public and private keys, and only needs to exchange the public key with the other party, and after calculation, a set of private keys can be obtained for secure communications, which avoids the risk of direct transmission of keys in the communications, thus improving the security of the whole IPSec system. DH has an important property: group (components). There are 5 basic groups, and the commonly used groups are: MODP Group (Group2) with the modulus of 1024 bits and MODP Group (Group5) with the modulus of 1536 bits.

MD5 (Message Digest 5): The algorithm for generating a 128-bit hash (also known as a digital signature or information arrangement) from any length information and the 16-byte key. The

generated hash (as the input fingerprints) is used to validate the authenticity and integrity of the contents and sources.

SHA-1 (Secure Hash Alogrithm1): The algorithm for generating a 160-bit hash from any length information and the 20-byte key. It is generally considered more secure than MD5 because it generates a larger hash.

SA (Security Association): Before an IPSec VPN tunnel is established between the two devices, through which secure communications can be made, they must agree on the security parameters required during the communication, namely establish a security association SA. SA will specify the authentication and encryption algorithms to be used, the key used during the call and the time to be maintained by the Security Alliance itself, and SA is unidirectional.

SPI (Security Parameter Index): SPI is actually a data entity with the length of 32 bits, used to uniquely identify a SA on the receiver.

AH (Authentication Header): A protocol of IPSec. This protocol is used to provide data integrity, packet source address authentication service for the IP packets. Compared with the ESP, AH do not provide communication data encryption services.

ESP (Encapsulating Security Payload): A protocol of IPSec. It is used to ensure the confidentiality of IP packets (not visible to any third parties), data integrity, and data source authentication, as well as the anti-replay feature.

PSK (Pre-Shared Key): One of the IKE authentication methods, which requires that each IKE peer use a predefined and shared key to authenticate the IKE exchange.

Phase I and Phase II: Establish an IPSec Channel Security Alliance (SA) using the Internet Key Exchange Protocol (IKE), which requires two stages of negotiation. In the first phase, participants authenticate each other and negotiate the establishment of a secure channel used to negotiate on the later IPSec SA. In the second phase, participants negotiate and establish IPSec SA that is used to encrypt and authenticate user data.

Main Mode and Aggressive Mode: IKE automatically negotiates the first phase of the channel, which can be done in two modes, main mode and aggressive mode. In main mode, the initiator and the responder have three bi-directional information exchanges between them, with a total of six messages. In aggressive mode, the initiator and the responder acquire the same objects, but have only two exchanges, with a total of three messages.

DPD (Dead Peer Detect): Using the DPD, you can regularly check SA as to whether the other party is normal, and the network connection is normal.

IPSec NAT-T (NAT-Traversal): This technique implements IPSec protocol penetrating the NAT device.

13.2.1.2 Security Alliance

Before an IPSec VPN tunnel is established between the two devices, through which secure communications can be made, they must agree on the security parameters required during the

communication, namely establish a security association SA. SA consists of a pair of specified security parameter indexes (SPI), the destination IP address and the used security protocol.

Through SA, the IPSec tunnel provides the following security features:

- Confidentiality (through encryption)
- Content integrity (through data authentication)
- Sender authentication and accreditation (through authentication)

一、Establishment of Security Alliance

Security Association (SA) is a one-way protocol of related methods and parameters used by both parties of the IPSec tunnel to ensure tunnel security. For IPSec two-way communication, there must be at least two SAs, one is used to receive data from the peer end, and the other one is used to send data to the other party.

The establishment of SA requires two phases of negotiations:

- In the first phase, both communicating parties negotiate on how to protect the future communications and to establish an authentication and security protection channel (namely, IKE SA), this channel will be used to protect the negotiation process of IPSec SA later.
- In the second phase, both parties negotiate about encryption algorithms, keys, life cycle, as well as authentication of IPSec, and establish a channel for encryption and authentication of user data (IPSec SA).

1. Phase I

In the first phase, Aggressive Mode or Main Mode can be used, and both parties will exchange the security proposals acceptable to each other, for example:

- Encryption algorithm (DES, 3DES and AES128/192/256) and authentication algorithm (MD5 and SHA-1)
- Diffie-Hellman group (please refer to "Diffie-Hellman Exchange" in this section)
- Pre-shared key

When both ends of the tunnel agreed to accept at least a group of security parameters for the first phase, and process the related parameters, a successful first-phase negotiation will end. When the device is used as the initiator, currently up to 8 kinds of proposes for the first-stage negotiation are supported to allow user to define a series of security parameters. While acting as a responder, the device can accept proposals for the first phase negotiation in any combination forms.

➢ **Main Mode / Aggressive Mode**

First stage can take place under the main mode or aggressive mode, and these two modes are described as follows:

Main mode: Initiator and responder make three bi-directional information exchange (a total of six messages) between them, in order to complete the following functions:

- The first exchange, (Messages 1 and 2): Provides and accepts encryption and authentication algorithms.
- The second exchange, (Messages 3 and 4): Implements the Diffie-Hellman exchange, both the initiator and the responder provide a current number (which is randomly generated).
- The third exchange, (Messages 5 and 6): Sends and verifies their identity.

The information sent at the third exchange of information is protected by the encryption algorithm established in the first two exchanges. Therefore, there is no identity of participants in transmission, thereby providing the maximum extent of protection.

In aggressive mode, the initiator and the responder acquire the same objects, but have only two exchanges, with a total of three messages:

- The first message: The initiator recommends SA, to initiate Diffie-Hellman exchange, and send a current number and its IKE identity.
- The second message: The responder accepts SA, authenticates the initiator, sends a current number and its IKE identity, and sends the responder's certificate (if you are using a certificate).
- The third message: The initiator authenticates the responder, and confirms the exchange.

Since the participants ' identities are exchanged in the plain text (in the first two messages), the aggressive mode provides no identity protection.

Tip:

When the IPSec tunnel is connected by the other dynamically connecting to the local, dynamically connecting to the gateway, the aggressive mode must be used for negotiations.

➢ **Diffie-Hellman Exchange**

Diffie-Hellman exchange, also known as "DH exchange", allows both parties to generate a shared key. The advantage of this technology is that it allows both parties to create a key on the non-secure media, without having to transmit the pre-shared keys over the network. There are five basic DH groups (the device supports Groups 2 and Group 5), and the size of the main modulus used in the calculation of the groups vary, as described below:

- DH Group 2: 1024-bit modulus
- DH Group 5: 1536-bit modulus

The larger the modulus is, the more secure the generated key is. However, the larger the modulus is, the longer the key generation process takes.

Tip:

Since the modulus size of each DH group is different, therefore both communication parties of the IPSec tunnel must use the same group.

2. Phase II

When both communication parties establish an authenticated secure channel, the second phase will continue to be implemented, and in this phase, IPSec SA will be negotiated to protect user data to be transmitted through the IPSec tunnel.

Similar to the process of the first phase, both parties exchanged proposals to determine the security parameters used in the SA. The second-phase proposal also includes a security protocol (the device currently supports ESP) and the selected encryption and authentication algorithms.

Regardless of the mode used in the first stage, the second stage is always operated in the "fast" mode, and includes the exchange of three messages.

二、Maintenance of security alliances

Once the SA establishment is complete, both parties of IPSec SA must also maintain SA, to ensure that SA is secure and effective. IPSec SA test the effectiveness of SA with the following methods:

1. SA survival time

In the establishment of SA negotiation, the two parties will negotiate the SA's survival time, when such time reaches the pre-set value, the renegotiation is required to establish a new SA. Periodic renegotiation is equivalent to change of passwords on a regular basis.

In the WEB UI mode, you can configure the "Survival time" and "Maximum flow" in the "Advanced options" of ***VPN configuration -> IPSec***.

The efficiency of data transfer will be lowered due to the frequent rebuilding SA that needs to consume large amounts of system resources (mainly DH exchanges and generation of current numbers). So the survival time of SA is usually set to relatively long (1 hour to 1 day typically). Within the validity period, the two communicating parties can only "assume" that the other party works normally since they cannot detect each other (similar to the PING function), and in case a party has a foreseeable problem or the network connecting both of them has fault, the other party does not know that the connection line between them is interrupted, and will continue to send data to the other party that does not exist, thus causing a false connection (SA is normal and sends data normally, but is unable to complete the two-way communications), so there must be an effective way to detect that both parties participating in the IPSec SA are fully functional, and the network connection between them is completely normal. The overhead of this testing method is less than that for renegotiating the IPSec SA, so a higher density can be used for test. This technology is IPSec "DPD", which exists as a complement to SA negotiation.

2. DPD (Dead Peer Detect)

IPSec DPD regularly detects SA to find out whether the other party still exists. Within the survival time and maximum flow range of SA, it regularly detects if the other's network is reachable, and the program is normal, so as to find out communications faults caused by network changes or avoid to keep SA with a "Mars people" host that already does not exist. This detection cycle is usually 20 seconds or 1 minutes around, and both parties can detect the other party by sending a "heartbeat" packet. After continuously losing multiple heartbeat packets, IPSec DPD will forcibly initiate a SA negotiation again.

In the WEB UI mode, you can enable the DPD function by selecting the "DPD" option, and determine the test cycle by configuring "heartbeat" in the "Advanced options" of ***VPN configuration—>IPSec***.

13.2.1.3 IPSec NAT traversal

Due to historical reasons, one of the problems in deploying an IPSec VPN network in the NAT mode lies in the impossibility to locate the IPSec peers after network address translation (NAT). Internet service providers and Small Office/Home Office (SOHO) networks typically use NAT to share a single public IP address. Although NAT helps to save the remaining IP address space, but they also bring troubles to the end-to-end protocols such as IPSec.

One of the main reasons for IPSec disruption caused by NAT is that, for "Encapsulating Security Protocol (ESP)", the NAT devices cannot identify the location (because it has been encrypted) of the Layer 4 header for port translation (the 4th layer). For the "Authentication header (AH)" protocol, the NAT devices can modify the port number, but cannot modify the authentication check, so the authentication check of the entire IPSec packet will fail.

A new technology known as IPSec NAT Traversal (NAT-T) is under standardization by the IPSec network of the Internet Engineering Task Force.

In the IPSec negotiation process, the two peers can be determined automatically according to the following two conditions to support IPSec NAT-T:

- One party (usually a client computer) to initiate the IPSec session and one party to respond to the IPSec session (usually a server) can perform IPSec NAT-T or not.
- Any NAT exists in the path between them.

If both of these conditions are true, then both parties will use IPSec NAT-T to send the IPSec-protected traffic through NAT. If one party does not support IPSec NAT-T, then the IPSec negotiation and IPSec protection are to be performed (after the first two messages). If both parties support IPSec NAT-T, but there is no NAT between them, then the normal IPSec protection is to be performed.

Tip: IPSec NAT-T is only defined for ESP traffic, but AH traffic cannot pass through NAT devices.

The device can use the NAT traversal (NAT-T) function. In the first-phase exchange, NAT-T will add a layer of UDP encapsulation (UDP4500 port is usually used) when it discovers by detecting along the data path that there is one or more NAT devices, and passes through the NAT device.

In the WEB UI mode, the NAT traversal feature can be enabled by selecting "NAT traversal" option in the "Advanced options" of ***VPN configuration ->IPSec***.

13.2.2 IPSec list

Enter the ***VPN configuration->IPSec*** page to view the information about associated IPSec tunnels, such as SA status, remote gateway address, remote Intranet address, locally bound interfaces, etc.

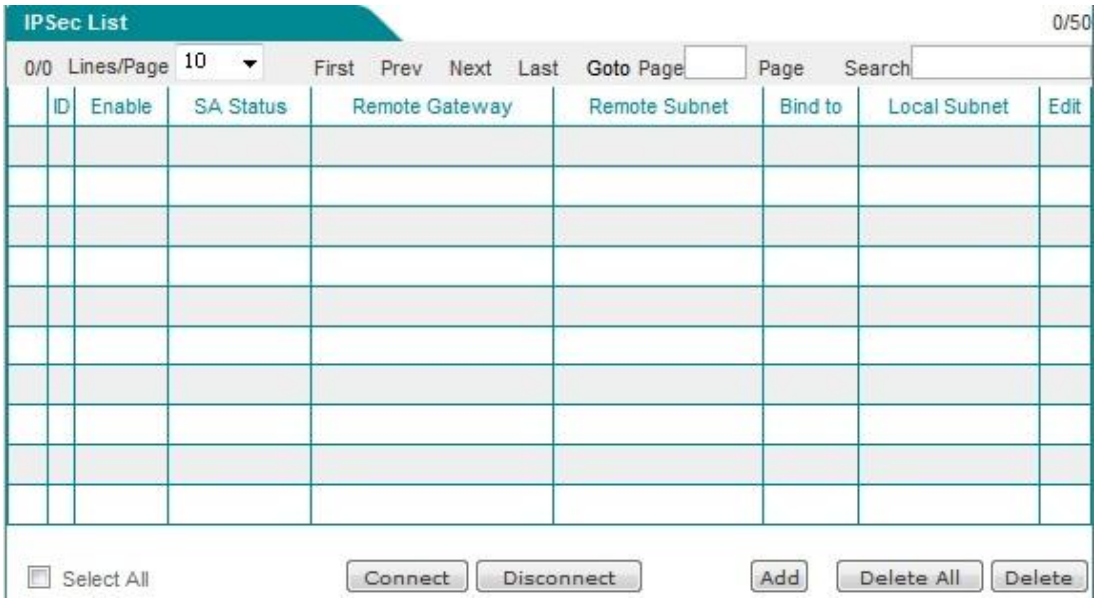


Figure 13_15 IPSec list

Tip: If the IPSec connection mode is "The other party dynamically connects to the local", the "Establish" bLeveloneon is invalid.

13.2.3 IPSec Settings

IPSec supports three ways of connection, namely: gateway to gateway, dynamic connection to the gateway, the other party dynamically connects to the local. The following describes the meaning of the configuration parameters for three types of connection.

When one end of the IPSec tunnel is dynamic IP access (when no DDNS is applied for), "Dynamic connection to the gateway", "The other party dynamically connects to the local" are used at both ends of the tunnel. Here, one end of the dynamic IP access adopts "Dynamic connection to the gateway" and is used as the initiator, and then the other end adopts "The other party dynamically connects to the local" and is used as the responder.

13.2.3.1 Gateway to gateway

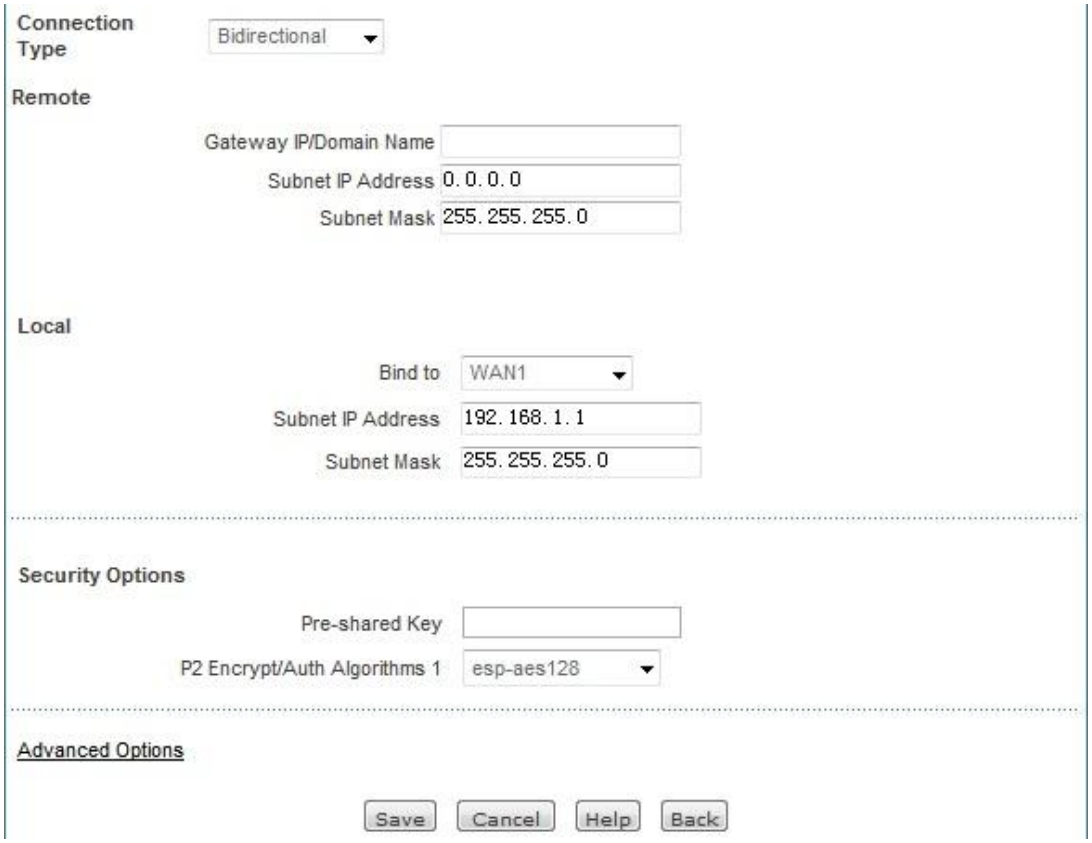


Figure 13_16 Gateway to gateway

- Connection mode: Here, gateway to gateway is selected.

Remote end

- Gateway address (domain name): The address of the remote gateway address (or domain name) of the IPSec tunnel. When set to a domain name, a DNS server needs to be configured on the device, and then the device will periodically resolves the domain name. If the IP address is changed, the device will renegotiate the IPSec tunnel again.
- Intranet address: Any IP address of the Intranet protected at the remote end of the IPSec tunnel, if the remote end is a mobile single user, then fill in the IP address of the device.
- Network mask: The subnet mask of the Intranet protected at the remote end of the IPSec tunnel, if the remote end is a mobile single user, then fill in 255.255.255.255.

Local

- Local binding: Select the type of local interfaces, which can be an Ethernet interface or PPTP dial-up interface. If the IPSec tunnel is configured to be bound to the interface, then all packets passing through the interface will be checked by IPSec to determine whether the packet is subject to encryption and decryption operations.
- Intranet address: Any IP address of Intranet locally protected.

- Intranet mask: Subnet mask of locally protected Intranet.

Security options:

- Pre-shared key: Pre-shared key used by negotiation, with the maximum of 128 characters.
- Encryption and authentication algorithm 1: The preferred encryption and authentication algorithm that can be used for negotiation in the second phase.

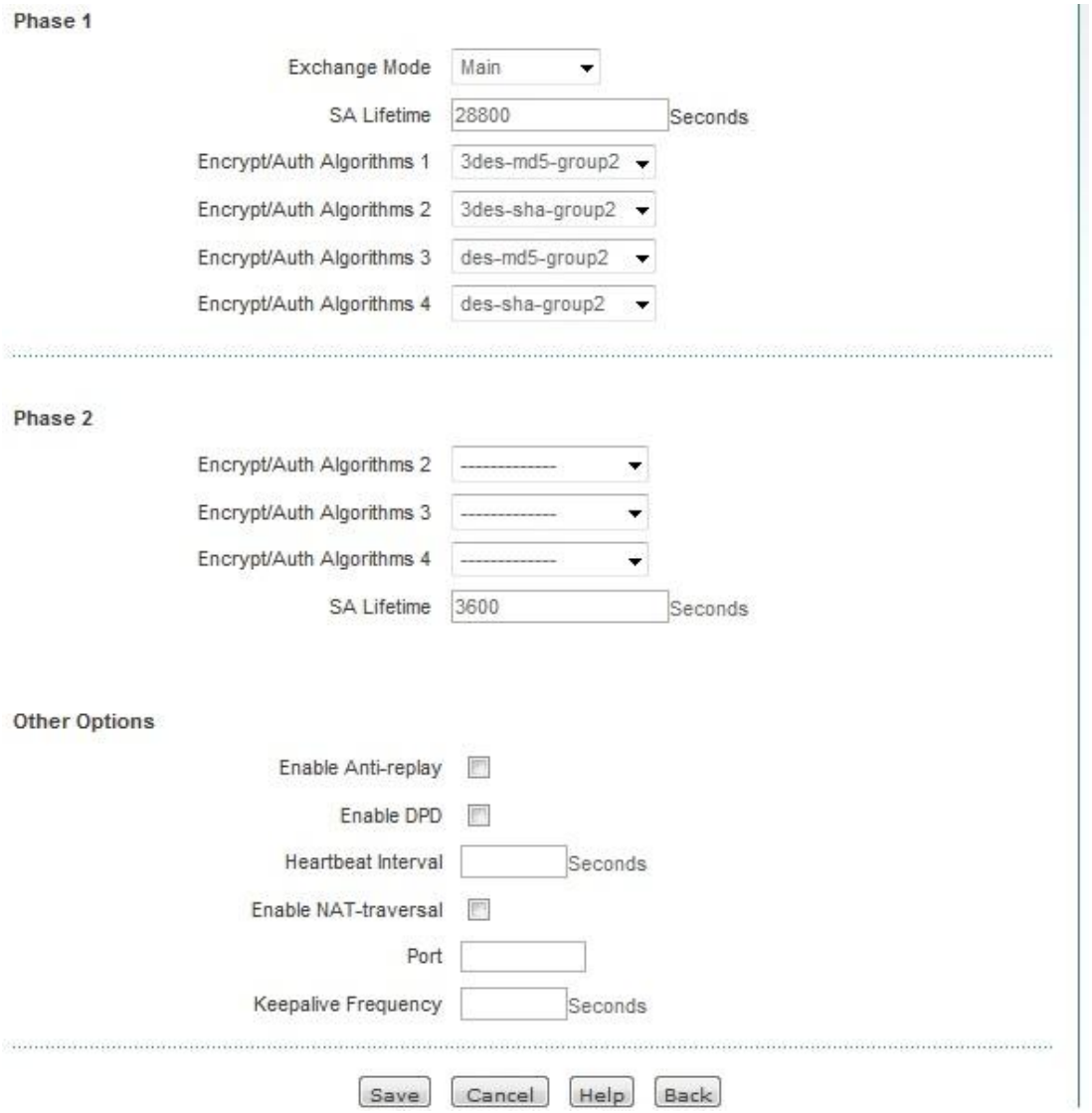


Figure 13_17 IPSec Advanced options -- Main mode

First phase

- Negotiation mode: Sets the negotiation mode in the first phase, with the options: main mode and aggressive mode. When selecting gateway-to-gateway connection, select the main mode. When the connection mode is dynamic connection to the gateway, other party dynamically connecting to the local machine, select the aggressive mode.
- Survival time: Sets the survival time of IKE SA, which is at least 600 seconds. When the remaining time is 540 seconds, the IKE SA will be negotiated again.

- Encryption and authentication algorithm (1-4): Sets the encryption and authentication algorithm used for negotiation in the first phase. You can select four groups, each of which the combination of different encryption algorithms and authentication algorithms and DH groups.

Phase II

- Encryption and authentication algorithm (2-4): Sets the encryption and authentication algorithm used for negotiation the second phase, and three groups can be selected, together with a group that has been configured in the basic parameter configuration, so there is a total of four groups.
- Survival time: Sets the survival time of IPSec SA, which is at least 600 seconds. When the remaining time is 540 seconds, the SA will expire and the IPSec SA will be negotiated again.

Others

- Anti-replay: Sets whether or not anti-replay is enabled. When enabled, the gateway will support the anti-replay feature, to reject the received packets or copies of packets in order to protect themselves from attacks.
- DPD: Sets whether to enable DPD. After enabled, the device sends a heartbeat packet on a regular basis to detect whether each other's network is reachable, and whether the program is normal. If multiple heartbeat packets are lost continuously, then IPSec DPD will launch SA negotiation again forcibly.
- Heartbeat: Sets the time interval for sending heartbeat packets, whose default value is 20 seconds. After configuring this value, the gateway will send detection messages to the peer end at an interval of unit time ("heartbeat"), to determine whether the peer end still survives.
- NAT traversal: Enables or disables the feature of NAT traversal.
- Port: Sets the port number of UDP encapsulation packets in NAT traversal, whose default value is 4500.
- Maintain: After NAT traversal feature is enabled, the device will send a packet to the NAT device to maintain NAT mapping at an interval of unit time ("keep"), so that the NAT mapping needs no change until SA in the first phase and second phase expires. Its default value is 20 seconds.

13.2.3.2 Dynamic connection to the gateway

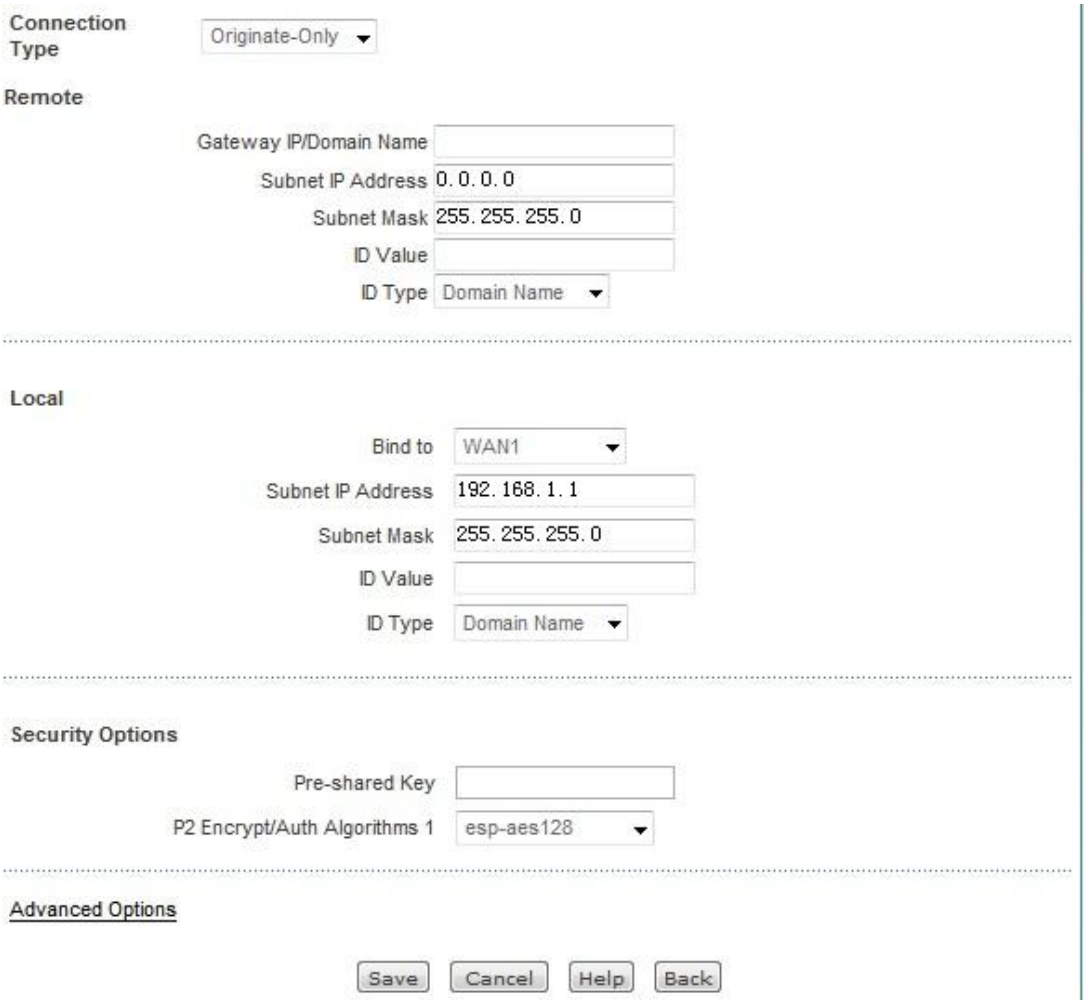


Figure 13_18 Dynamic connection to the gateway

The parameters described in the "gateway to gateway" connections are no longer to be described again one by one.

- Connection mode: Here, dynamic connection to the gateway is selected. In this case, this device can only be used as the initiator when establishing an IPSec tunnel, and the IPSec tunnel should have the aggressive mode selected at both ends for the IKE negotiation in the first phase.

Remote end

- Identity ID: Sets the identity ID used to authenticate remote ends.
- Identity type: The type of remote identity ID, including three options: "Email address", "Domain name" and "IP address".

Local

- Identity ID: Identity ID sent locally to the remote end for authentication.
- Identity type: The type of local identity ID, including three options: "Email address",

"Domain name" and "IP address".

13.2.3.3 Other party dynamically connects to local machine

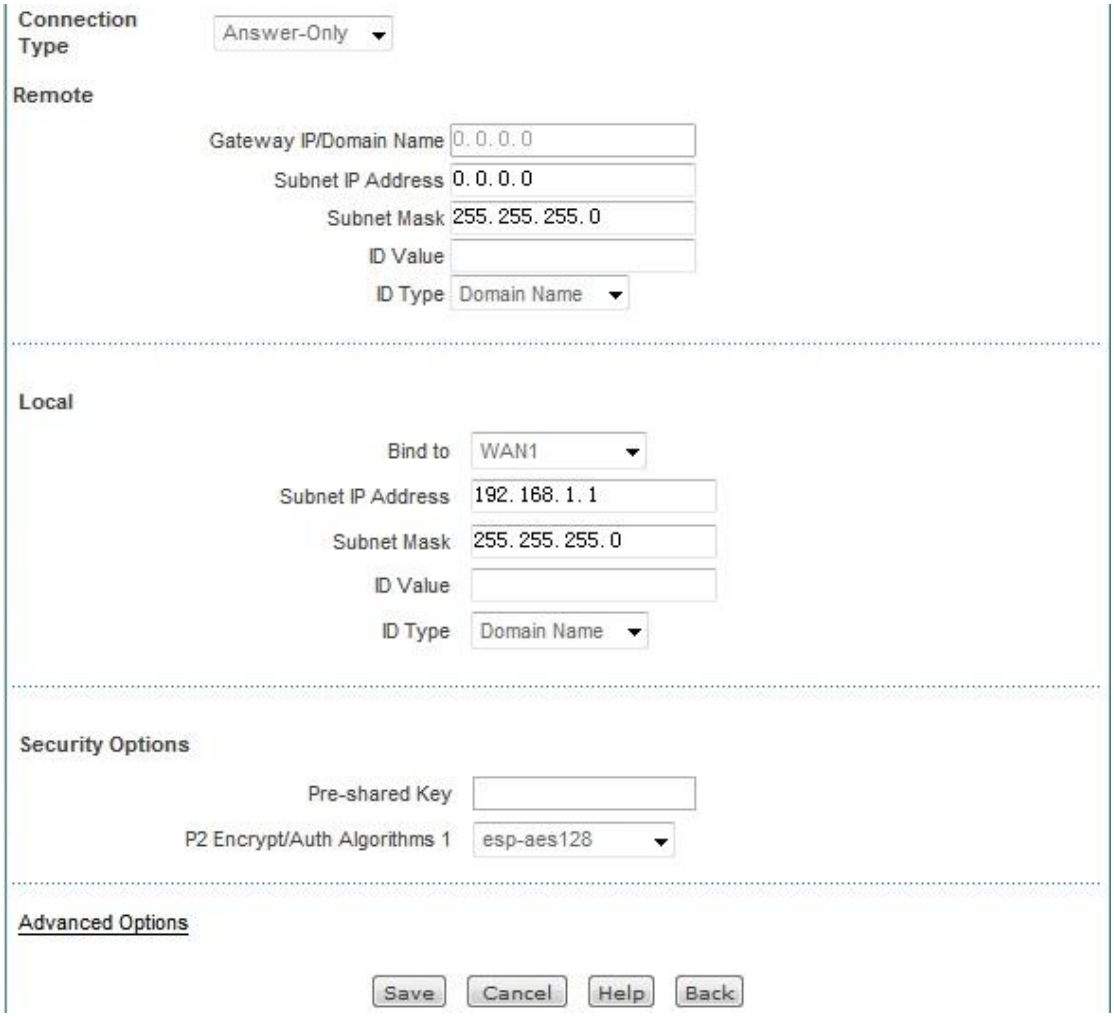


Figure 13_19 Other party dynamically connects to local machine

The parameters for the other party to dynamically connect to local machine has been described in the previous two sections, so there is no need to repeat any more. When selecting "Other party dynamically connects to the local", the remote gateway address (domain name) needs not be configured. In this case, this device can only be used as the responder in establishing an IPSec tunnel, and the IPSec tunnel should have the aggressive mode selected at both ends for the IKE negotiation in the first phase.

13.2.4 IPSec configuration instance

13.2.4.1 Gateway to gateway

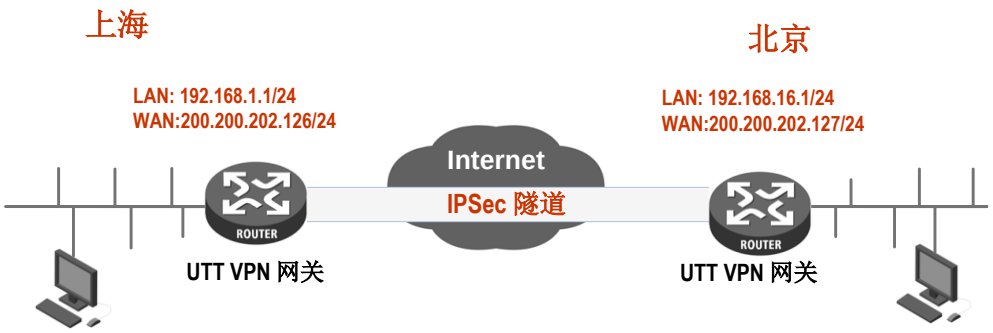


Figure 13_20 Gateway to gateway topology

Requirements:

In this scenario, a company is based in Shanghai. It has a branch office in Beijing, and hopes to achieve a mutual access to the internal resources of the LAN in two places. This scenario uses the IPSec protocol to establish VPN tunnels, and the HiPER router is used by the VPN gateway in two places at the following addresses:

Shanghai gateway:

Intranet network segment: 192.168.1.0/24.

LAN IP address: 192.168.1.1/24.

WAN1 domain name: 200.200.202.126/24.

Beijing gateway:

Intranet network segment: 192.168.16.0/24.

LAN IP address: 192.168.16.1/24.

WAN1 IP address: 200.200.202.127/24.

The configuring steps are follows:

1. Configure Shanghai gateway

Figure 13_21 Gateway to gateway configuration 1

Remote gateway address is set as the WAN IP address of Beijing gateway, 200.200.202.127, and remote Intranet address is the LAN IP address of Beijing gateway, 192.168.1.1, which is locally bound at WAN1 port. Set the preshared key for the first phase to testing, and the encryption and authentication algorithms for the second phase is esp-ase-128.

2. Configure Beijing gateway

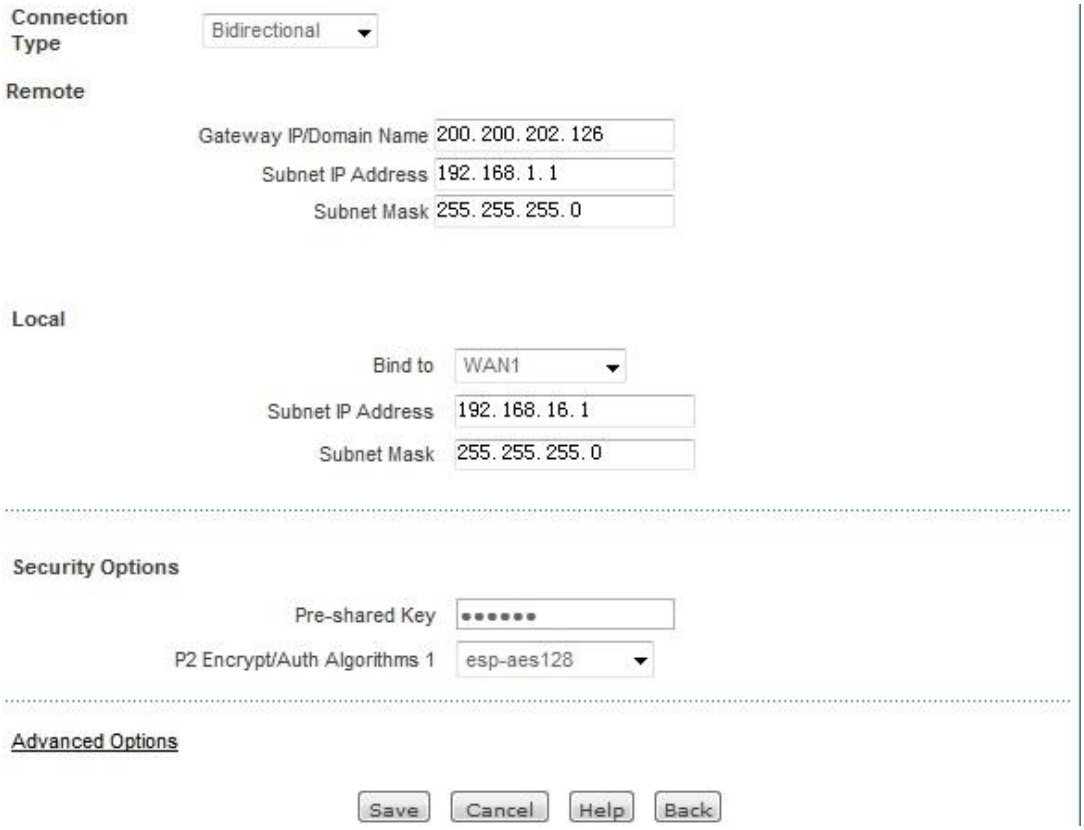


Figure 13_22 Gateway to gateway configuration 2

Remote gateway address is set as the WAN IP address of Shanghai gateway, 200.200.202.126, and remote Intranet address is the LAN IP address of Shanghai gateway, 192.168.1.1, which is locally bound at WAN1 port. Set the preshared key for the first phase to testing, and the encryption and authentication algorithms for the second phase is esp-ase-128.

View connection status:

Enter the corresponding pages respectively, to view the IPSec instance connection information. As shown in the figure below, you can view the SA status, remote gateways, remote Intranet, local binding interfaces, and other information of the IPSec instances.

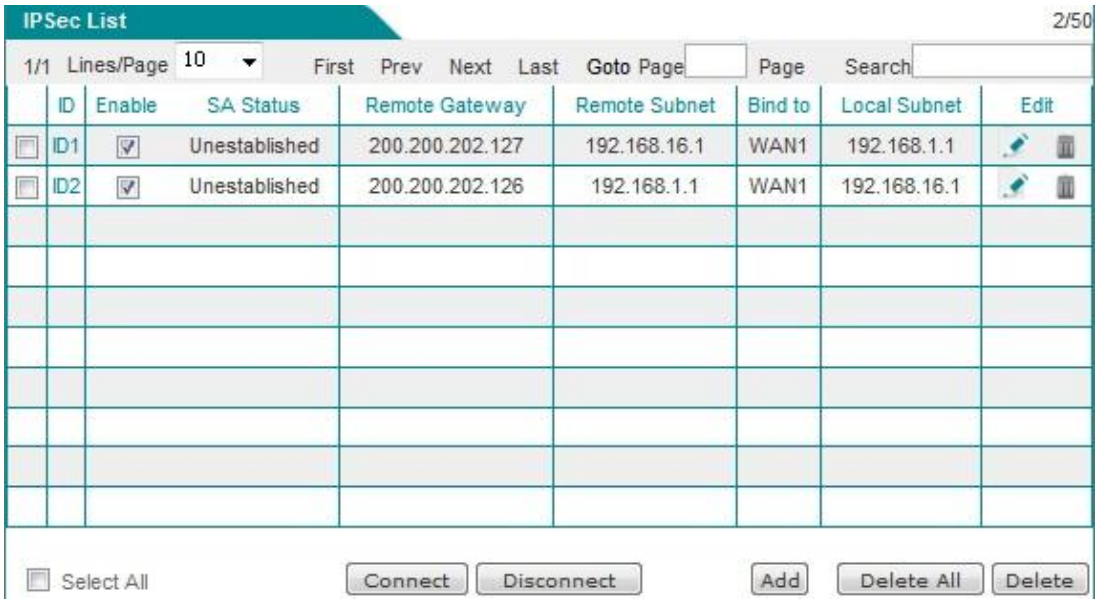


Figure 13_23 IPSec connection status - Shanghai gateway

Figure 13_24 IPSec connection status - Beijing gateway

13.2.4.2 Dynamic on one party

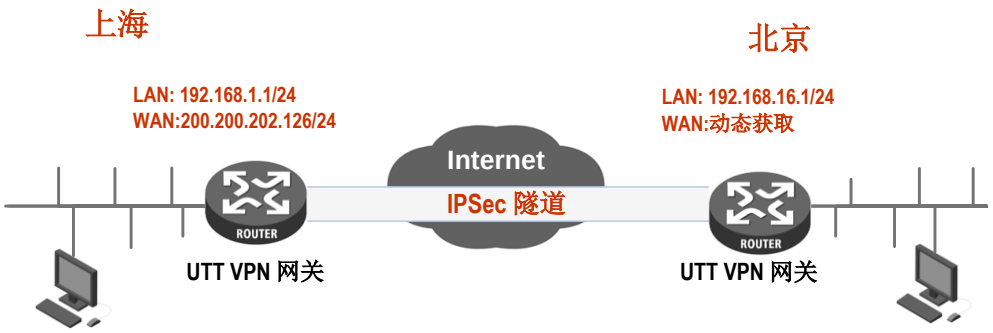


Figure 13_25 "Dynamic on one party" topology

Requirements:

In this scenario, a company is based in Shanghai. It has a branch office in Beijing, and hopes to achieve a mutual access to the internal resources of the LAN in two places. This scenario uses the IPSec protocol to establish VPN tunnels, and the HiPER router is used by the VPN gateway in two places at the following addresses:

Shanghai gateway:

Intranet network segment: 192.168.1.0/24.

LAN IP address: 192.168.1.1/24.

WAN domain name: 200.200.202.126/24.

Beijing gateway:

Intranet network segment: 192.168.16.0/24.

LAN IP address: 192.168.16.1/24.

IP address of WAN1 port: Acquired dynamically.

The configuring steps are follows:

1. Configure Shanghai gateway

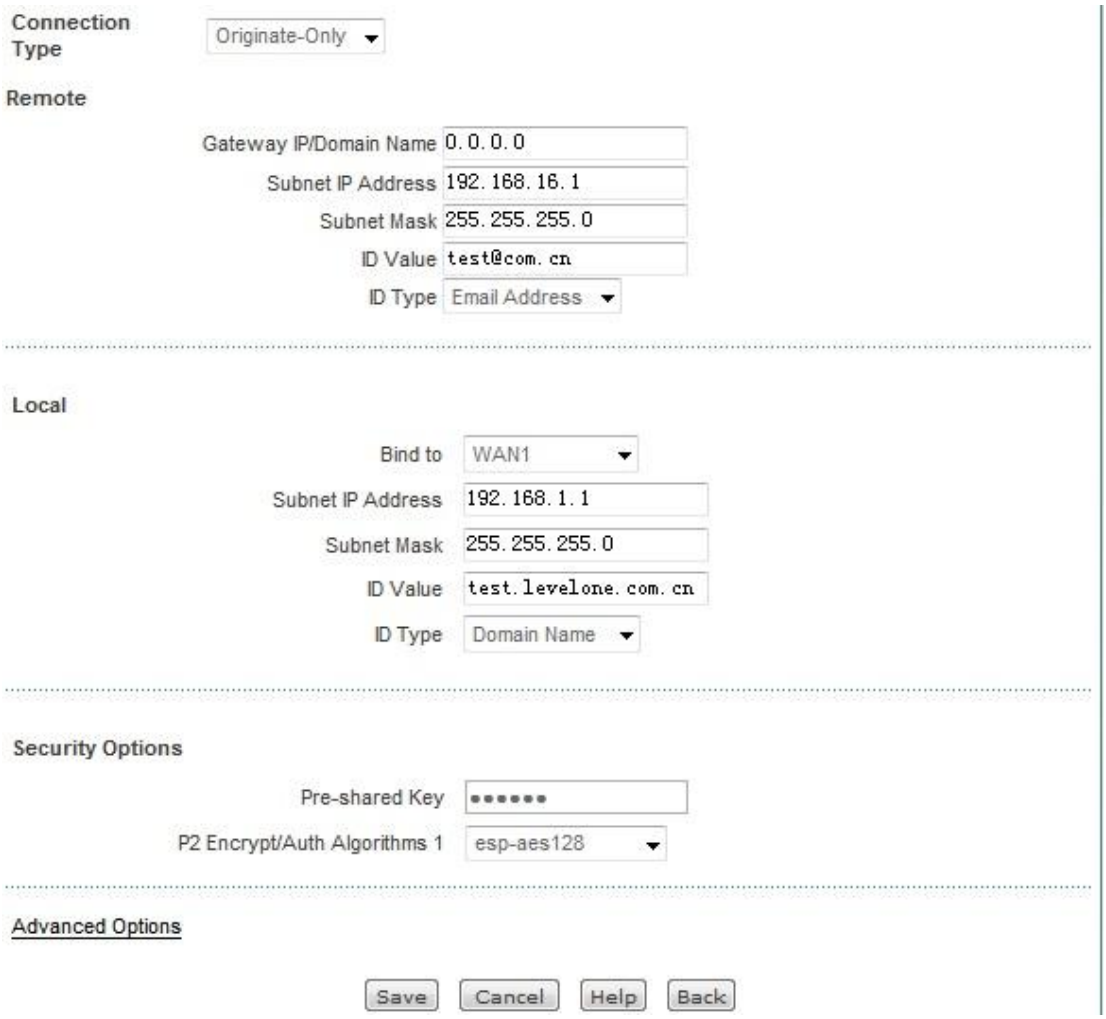


Figure 13_26 Dynamic on one party - The other party dynamically connects to local machine

Set the connection mode to the other party dynamically connecting to the local machine, and Beijing gateway dynamically connecting to Shanghai gateway. Meanwhile, set the Beijing gateway information, such as Intranet addresses, identity ID. Locally bound at WAN1 port, set the preshared key for the first phase to testing, and the encryption and authentication algorithm for the second phase is esp-ase-128.

2. Configure Beijing gateway

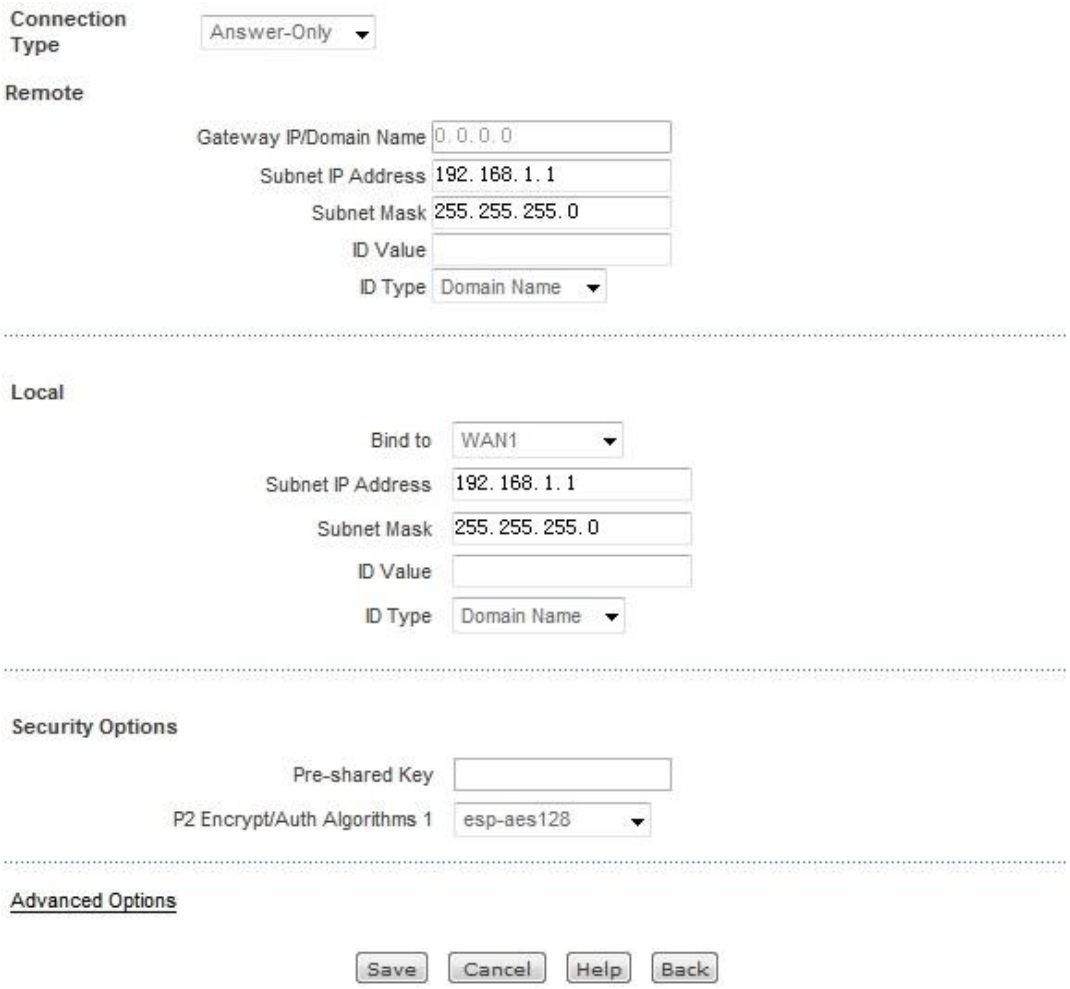


Figure 13_27 Dynamic on one party - Dynamically connects to the gateway

Sets the connection mode of Beijing gateway to a dynamic connection to the gateway. Meanwhile, sets up Shanghai gateway - related information, such as gateway address, Intranet address, identity ID. Locally bound at the WAN1 port, set the preshared key for the first phase to testing, and the encryption and authentication algorithm for the second phase is esp-ase-128.

View the connection status:

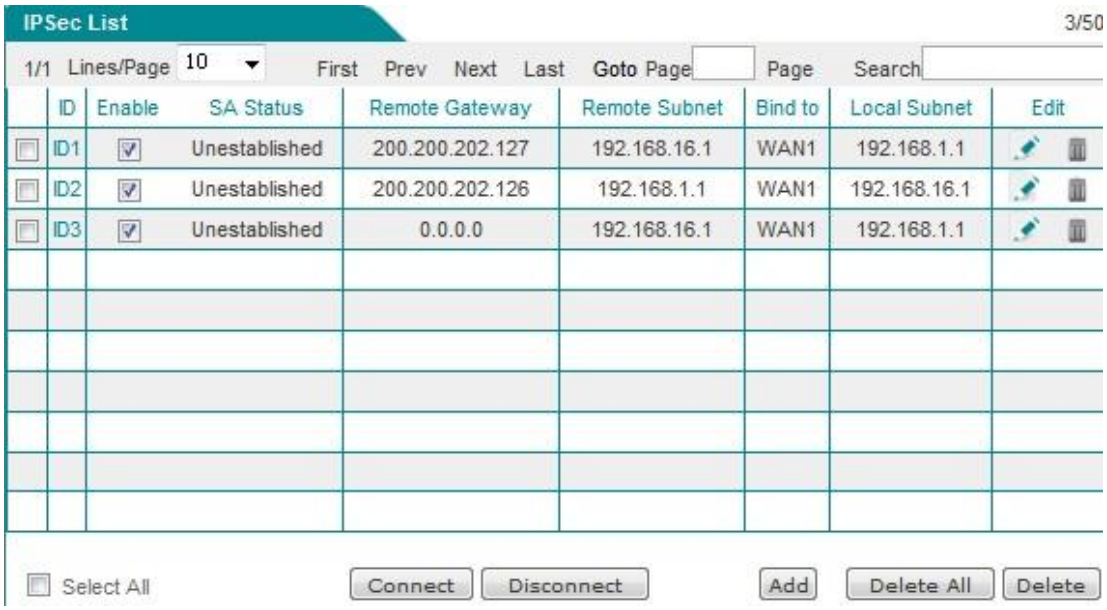


Figure 13_28 IPSec connection status -- Other party connects to local host dynamically

Figure 13_29 IPSec connection status -- Connect to local host dynamically

Chapter 14. System

In the ***System Management*** main menu, you can enter the ***Administrator configuration, Language selection, clock management, configuration management, software upgrade, remote management, scheduled task*** page. This chapter mainly describes how to change administrator user name and password. How to set the device clock. How to back up and import configuration files. How to upgrade the device. How to enable remote management, etc.

14.1 Administrator

1. Administrator list

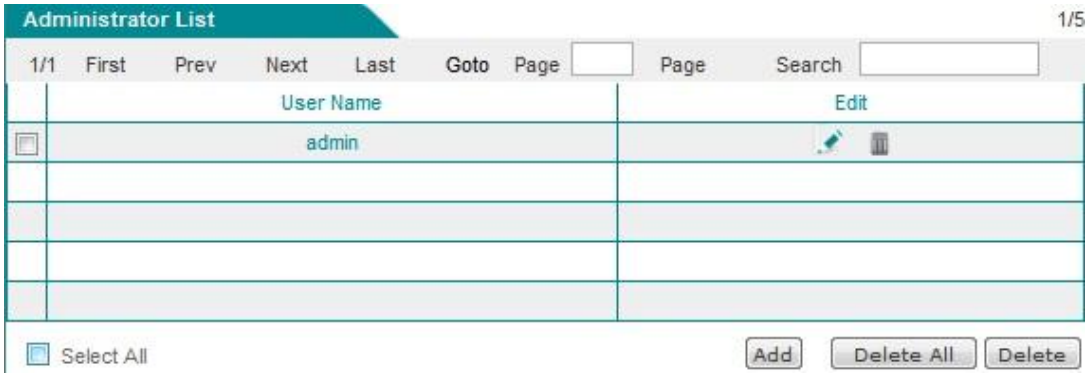


Figure 14-1 Administrator list

2. Administrator Settings

Figure 14-2 Administrator Settings

- User name: Customizes the user name of the administrator who logs in the WEB interface.

- Password, confirming password: Customizes the password of the administrator who logs in the WEB interface.

3. Modification of administrators' factory user name, password

For security reasons, we strongly recommend to modify the initial administrator user name and password, and to keep them with care.

Enter into the ***System Management-> Administrator configuration*** page, click on the edit icon with the user name of "admin", and enter into the configuration page to modify the factory user name and password for login. After modification, you must use the new user name and password to log into the device.

14.2 Language

This section describes the ***System management-> Language selection*** page. Select the device's WEB interface language through the configuration in this page.

Figure 14_3 Language

14.3 Time

This section describes the ***System > Time*** page.

In order to guarantee that the functions of the device relating to time work normally, the clock of the device needs to be accurately set, to make it synchronize with the local standard time.

The device provides two ways of setting system time, "Manual setup time" and "Network time synchronization". It is recommended to use the "Network time synchronization" function to obtain the standard time from the Internet, and the device will automatically get the standard time from the Internet after it connects to the Internet in startup.

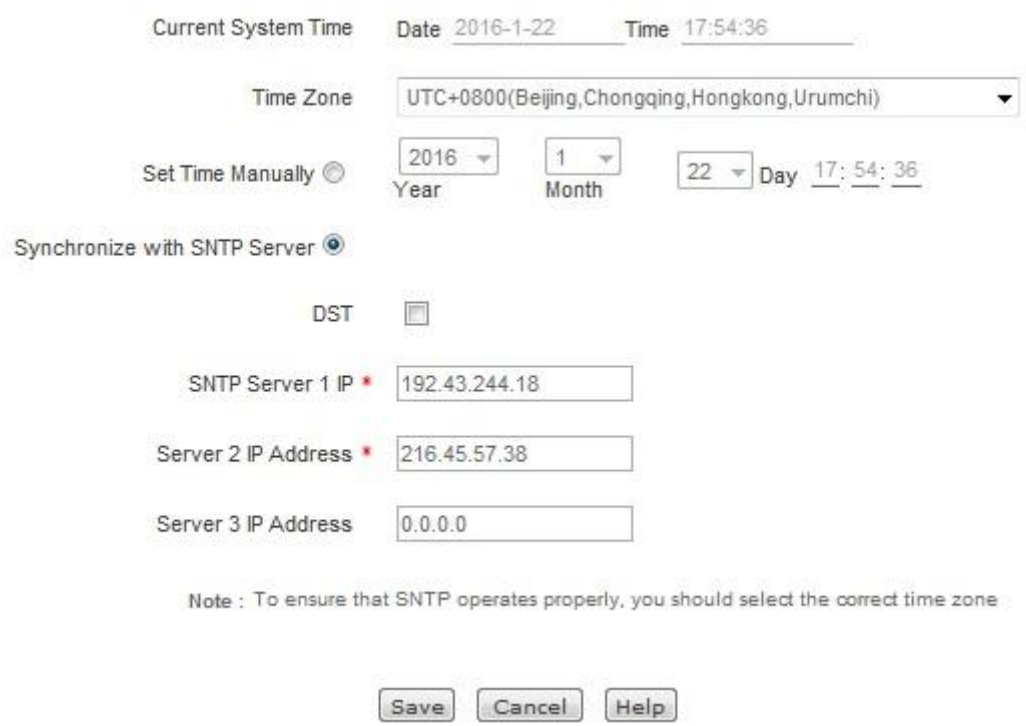


Figure 14-4 Time

- Current system time: Displays the current date and time information of the device (unit: Y-M-D, H:M:S).
- Time zone selection: Selects the international time zone in which the device resides. Only choosing a correct time zone can the network time synchronization function work properly.
- Manual time setting: Manually enters the current date and time (unit: Y-M-D, H:M:S).
- Network time synchronization: After using the network time synchronization function to set up a right NTP server, and when the device is connected to the Internet, it will automatically synchronize the time with the set NTP server. The addresses of two NTP servers preset by the system by default are 192.43.244.18, 216.45.57.38, which generally requires no change. If you need to know more about the NTP knowledge and the server, just visit http://www.ntp.org.

Tip:

It is recommended to set the device clock to synchronize with network time. Only when the system time is properly configured can the settings related to time, such as firewall, etc. work normally!

14.4 Configuration

This section describes the configuration methods of ***System -> Configuration***. In this page, you can back up the current configuration files to a local PC, import the new configuration file to the device and restore the factory settings of the device.

Figure 14-5 Configuration management

1. Back up configuration files

Click the <Save> bLeveloneon in the above figure, to back up the configuration files to the local PC, and the format of the configuration file is .xml.

2. Import configuration files

In the above figure, click < Browse ... >, and select the configuration files stored on the local PC. Then click <Import> again. If you have checked the check box "Restore factory settings before import", click the <Import> bLeveloneon, and the device will be restored to the factory settings.

Tip: Do not cut off the device's power supply in loading configuration, to avoid unexpected errors.

3. Restore to factory settings of the device

If users need to restore the device to its factory settings, enter into the ***Systems management -> Configuration management*** page, and click <Restore>.

Tip:

1. It is strongly recommended that before restoring the factory settings, first back up its configuration files.
2. After clicking <Restore>, the device continues to run in the current configuration, and it needs to be restarted manually to restore it to its factory settings.
3. The user name and password of the device's factory administrator are as follows: admin, and the default LAN IP address/subnet mask is: 192.168.1.1/ 255.255.255.0.

14.5 Firmware Upgrade

This section describes the ***System*** > ***Firmware Upgrade*** page and the software upgrading procedure. In this page, you can view the information of the currently running version, and download the latest version of software from the LEVELONE official website.

Figure 14_6 Firmware Upgrade

- Version information: Displays the information of the current hardware version, software version used by the device.
- Download the latest version: Links to the official website of LEVELONE to download the latest version of the software.

Upgrading steps:

Step 1: Download the latest version of software

Click on the hyperlink "Download the latest version" and go to the official site of LEVELONE to download the latest version of the software to your local PC.

Tip:

1. Please select the most appropriate type of the latest software. The applicable hardware version for the downloaded software must be consistent with the hard versions of the current products.
2. It is recommended that before upgrading, enter into ***Systems management -> Configuration management*** to back up the current configuration of the system.

Step 2: Select the path where the upgraded software resides

In the "Select the upgrade file" text box, enter the path for upgrading the software on the local PC,

or select the new software on the local PC by clicking < Browse ... >.

Step 3: Update device software

After selecting the software, click on the <Upgrade> bLeveloneon, to update the device software.

Tip:

1. It is strongly recommended to upgrade when the device load is low (less users).
2. Upgrading device software on a regular basis enables the device to get more functions or to have a better working performance. The right software upgrading will not change the current device settings.
3. During the upgrading process, the device's power supply cannot be cut off; otherwise, it will cause unpredictable errors and even irreversible damages to the hardware.
4. After the completion of upgrading, the software will be automatically restarted to take effect, without the need of human intervention.

14.6 Remote Management

This section describes the ***System -> Remote management*** page. To facilitate the network maintenance by remote administrators on this page, you can configure the remote management function of the device in the ***Systems management -> Remote administration*** page.

Figure 14_7 Remote Management

- Enable HTTP: Allow or disallow to manage the device from the Internet through the WEB interface, and the default WEB management external port of the device is 8081. To manage the device from the Internet through the WEB interface, you must use the mode of "IP address: Port" (For instance http://218.21.31.3:8081) to log on to the device.
- External port: Changes the default external port (default is 8081) of the device. Note that after the port is changed to 80, a TCP80 port mapping will be added in the "Static NAT mapping list" of ***Advanced Configuration->NAT and DMZ configuration***, at this point, it will cause a conflict if the mapping to the Intranet WEB server is to be added.

Tip:

1. The device's Internet address can be obtain from the "Line connection information list" of ***Network configuration -> WAN port configuration***.
2. If “WAN1” adopts PPPoE dial-up, its IP address is dynamic, and you can configure the DDNS function in the ***Network parameters -> DDNS configuration***.
3. For security purposes, unless absolutely necessary, do not enable the remote management function. In looking for LEVELONE's customer service engineer's service, please enable the remote management function.

14.7 Scheduled task

This section describes the ***System management-> Scheduled task*** page. By configuring scheduled tasks, administrators can predefine the actions completed by the device at a specified time.

1. List of scheduled tasks

The scheduled task list is an editable list. You can operate the instances in the list.

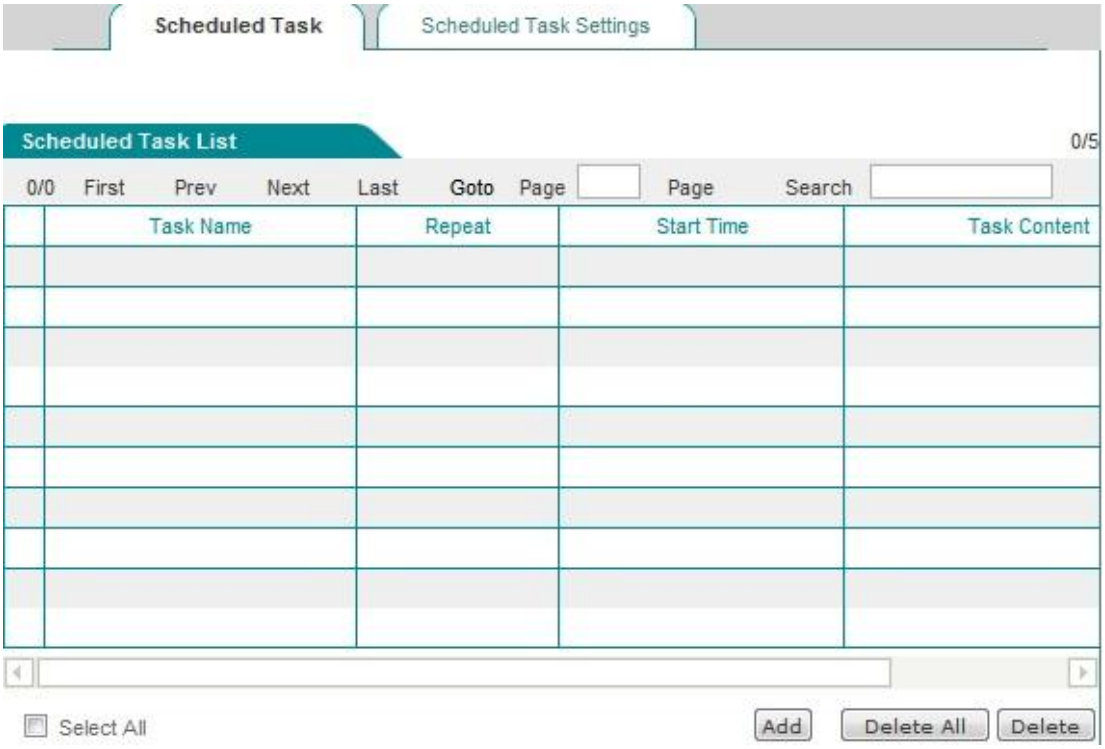


Figure 14_8 Scheduled task list 1

Figure 14_9 Scheduled task list 2

2. Description of scheduled task parameters

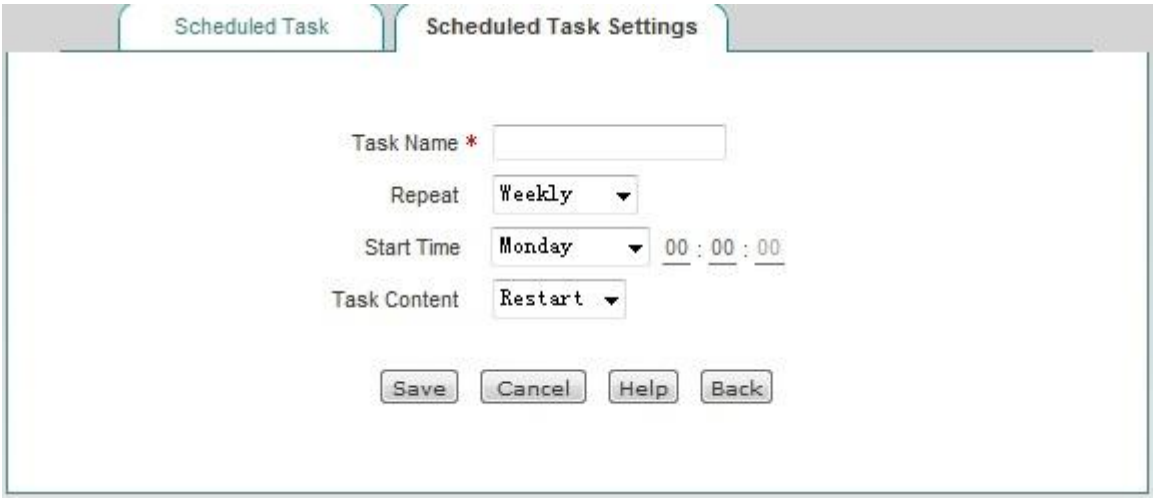


Figure 14-10 Scheduled Task Settings

- Task name: Name of the custom tasks.
- Startup type: Indicates time cycle, and the options are: per week, per day, per hour, per minute.
- Running time: Means the specific time for implementing these tasks and its settings vary based on different startup types.
- Task content: Selects the appropriate task content.

Chapter 15. System

In System status, you can easily view the running state of the device, and the system information and history of the device.

15.1 Interface Status

The running status page described in this section is the same as 5-1 錯誤! 找不到參照來源。, so it is not to be detailed again here.

15.2 System information

In the ***System status*** -> ***System information*** page, network administrators can understand the system-related information and view the system history. Through system information, network administrators can understand the problems occurring to the network or the potential ones, which helps improve the network performance and enhance network security.

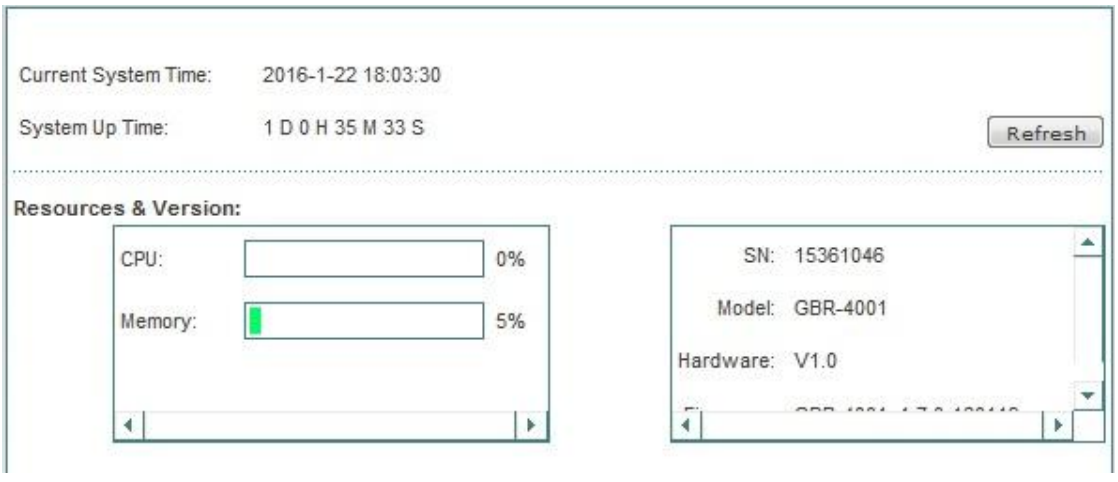


Figure 15_1 System information

- Current system time: Displays the current date and time information of the device (Unit:

Y-M-D, H:M:S).

- System running time: Displays the time from starting of the device at this time to viewing the time.
- CPU utilization: Shows the percentage of the current CPU utilization.
- Memory usage: Shows the percentage of the current memory usage.
- Serial number: Shows the internal serial number of product (which may be different from the surface serial number).
- Device model: Displays the product model of the device.
- Hardware version: Displays the hardware version number of the device.
- Software version: Displays the software version number of the device.
- Refresh: Click <Refresh>, to view the latest system information.

Tip:

Figure 15_1 The usage of CPU, memory is different and the displayed colors are different:

- Green when the usage is (0, 50%).
- Orange when the usage is (50%, 70%).
- Red when the usage is (70%, 100).

15.3 System log

In the ***System status*** -> ***System log*** page, network administrators can view the system-related log information and configure the log management.

15.3.1 System log information

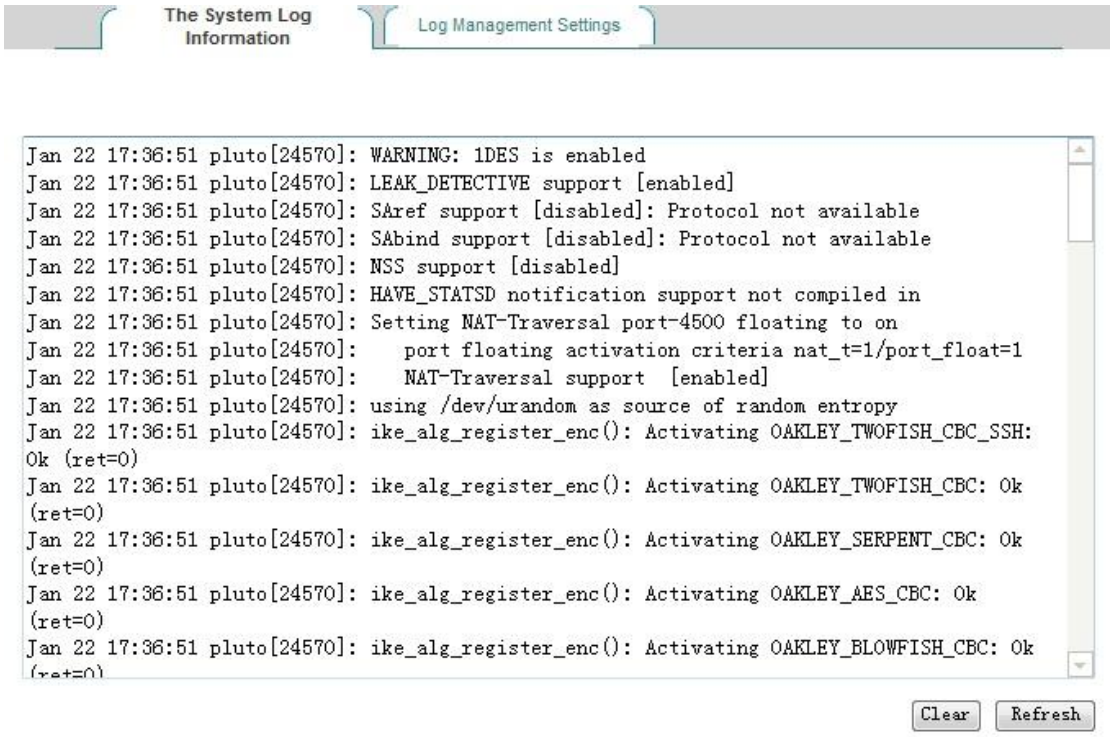


Figure 15_2 System information

The common log information displayed in the device is as follows:

Content of logs	Details	Meaning of information
DHCP:IP conflicted	arp:[IP address]	Means DHCP address conflicts: The device discovers the IP address already existing in the Intranet when its DHCP Server is ready to assign it to a user, at this point, the system will assign another IP address to the user.
ARP	Spoof mac [MAC address] New IP [IP address] mac [MAC address] Old IP [IP address] mac [MAC address]	Means the spoofing of gateway addresses. The MAC address table learns a new MAC address again. MAC address times out and ages.
PPPoE	Local IP address [IP address] Primary DNS address [primary DNS address] Secondary DNS address[backup DNS address]	IP address issued under the PPPoE dial-up. Primary DNS address issued by PPPoE dial-up. Backup DNS address issued by PPPoE dial-up.

notice	Give notice to user: [IP address]	Push notification messages to the IP address.

Figure 14- 1 Log information

15.3.2 Log Management Settings

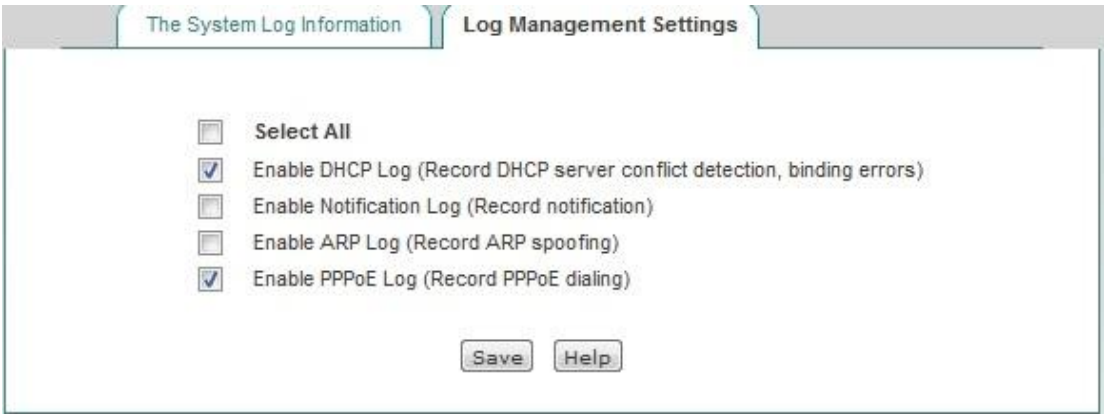


Figure 15_3 Log Management Settings

◆ Enable DHCP logging: Check to enable DHCP logging, for recording the conflicts of the DHCP server and DHCP Distribute the address conflicts, and other messages.

◆ Enable notification logging: Check to enable notification logging, recording the notification log information.

◆ Enable ARP logs: Check to enable the ARP logging, and record the information of ARP cheat.

◆ Enable PPPoE logging: Check to enable PPPoE logging, recording the PPPoE dial-up log information.

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Appendix A FAQ

A-1 How is an intranet computer with Windows 7 system connected to a wireless access device?

Step one: Configure the TCP/IP for a computer properly

1. Enter the "Start > Control Panel > Network and Internet > Network and Sharing Center > Change adapter settings" page.
2. Right click on "Wireless network connection" and select "Properties".
3. Double-click "Internet Protocol Version 4 (TCP/IPv4)", to enter into the "Internet Protocol Version 4 (TCP/IPv4) properties" page.
4. Set the IP address of PC. The IP address is 192.168.1.X (X is any one between 2 and 254), the subnet mask is 255.255.255.0, and the default gateway is 192.168.1.1 (the LAN IP address of the device), and the DNS server address is provided by operators. If confirming that the wireless device has enabled the DHCP server function, select "Obtain the IP address automatically".
5. Select the "Use the following DNS server addresses" option. Type in the IP address (which can be provided by the ISP) of the DNS server provided by the ISP in the "Preferred DNS server", and the "Standby DNS server" is optional. When the preferred DNS cannot be connected, the device automatically uses the standby DNS server. If the wireless device enables the DHCP server function, "Obtain DNS server address automatically" can be selected.
6. Click <OK>, and the TCP/IP properties are configured successfully.

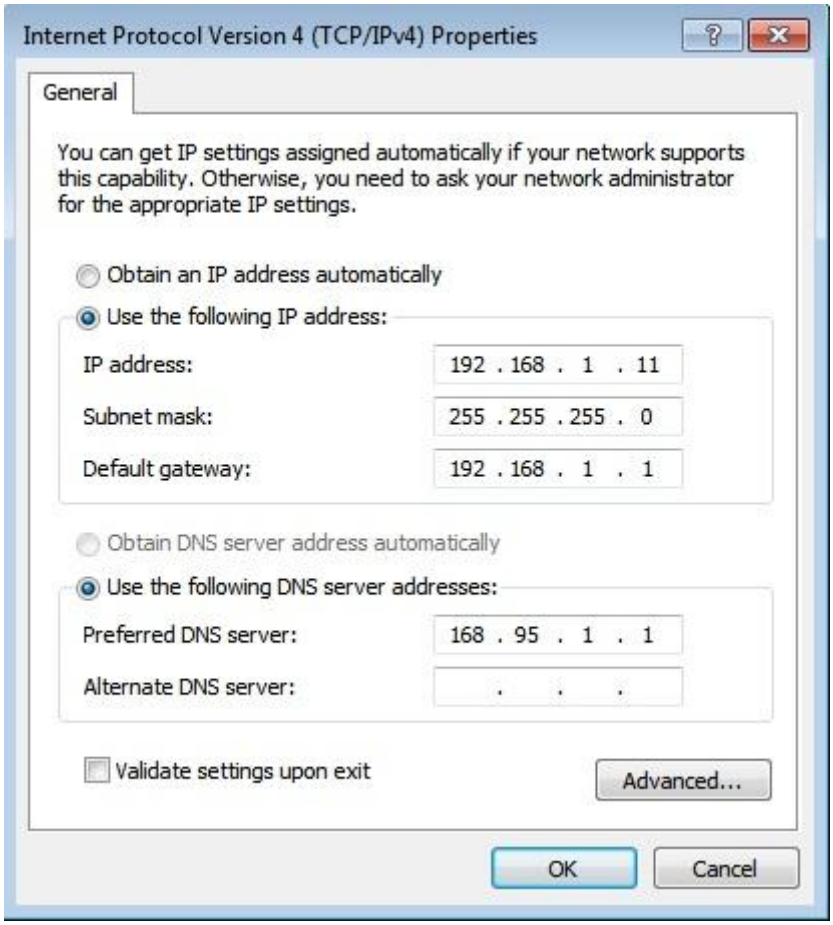

Figure 0-1 Configuring the TCP/IP properties of a computer (Win 7)

Step two: Connect to a wireless network

1. After the installation of the wireless network card is complete, click the icon on the bottom right of the desktop.
2. From the pop-up list of network connections, select the wireless network to be connected, and click <Connect>.

Figure 0-2 Establishing a wireless connection (Win 7)

3. When the right corner of the entry displays "Connected", it means that the computer is already connected to a wireless network.

Figure 0-3 Wireless connection established successfully (Win 7)

A-2 The device is used as wireless client, why can a wireless connection not be established?

After confirming that the device is powered normally and connected normally, please check the following configurations of the wireless devices in the network:

1. The "AP SSID" values set by the wireless client are consistent with the SSID of the associated wireless device or not.
2. The "AP MAC" values set by the wireless client are consistent with the MAC address of the associated wireless device or not.
3. The safe mode and key set by the wireless client are consistent with those of the associated wireless device or not.
4. The associated device has already enabled the wireless feature, and has been the AP mode or not.

A-3 How can I restore the device to its factory settings?

Tip: The following method is used to delete all original settings of the device, so please use it with care.

Case I: Knowing the administrator password

Under normal circumstances, you can directly enter the ***System management- > Configuration management*** page, and then click <Restore> to manually restart the device, and the device can be restored to its factory configuration.

Case II: Forget the administrator password

If you forget the administrator password, you will not be able to enter the WEB interface, and now you can only use the Reset button to restore the factory configuration. Method: In the process of charged operation, hold down the Reset button for more than 5 seconds, then release the button, and the device will be returned to the factory settings, and automatically restart.

Appendix B Figure Index

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