User Manual

Version 1.0.1 May 2017

IOP760AM

(Ethernet/UART to Wi-Fi Converter)

Written by Alex Chen
Edited by Kalia Huang

Table of Contents

Chapter 1 Introduction

1.1 Introduction

Congratulations on your purchase of this outstanding product: IOP760AM Modbus AP Router. For wireless M2M (Machine-to-Machine) applications, Modbus AP Router is absolutely the right choice. With built-in 802.11ac/n compliant single band or dual band WiFi module, you just need to find out an available wireless network (or Access Point), and the Modbus AP Router can simply connect to the wireless network and connect your field devices to the local management center.

Main Features:

- Built-in 802.11ac/n dual band selectable WiFi uplink for wireless M2M application.
- Provide one Ethernet port for comprehensive LAN connection.
- Provide one RS232/RS485 serial port for controlling legacy serial device, or Modbus devices.
- Digital I/O ports for integrating sensors or alarm devices.
- Equips 802.11b/g/n/ac dualband selectable Wi-Fi access point especially suitable for local wireless data transmission or device configuration.
- Work with external portal and RADIUS server for wireless client authentication.

Before you install and use this product, please read this manual in detail for fully exploiting the functions of this product.

1.2 Contents List

1.2.1 Package Contents

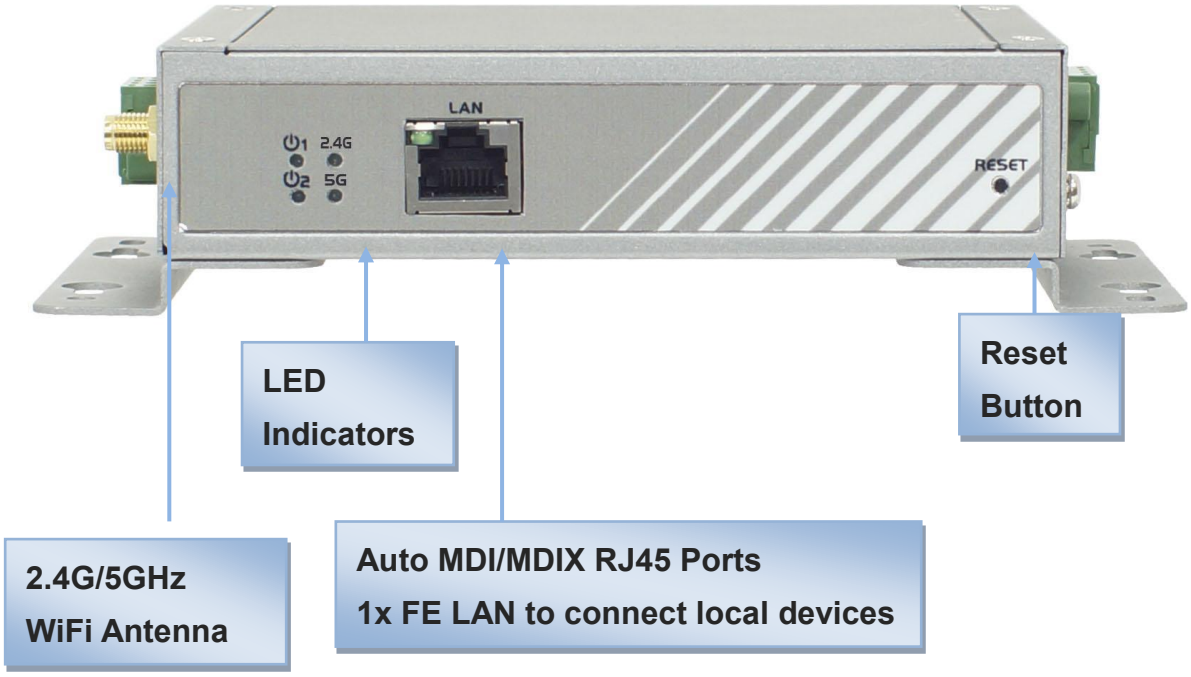
#Standard Package

Items	Description	Contents	Quantity
1	**IOP760AM Modbus AP Router**		1pcs
2	**2.4G/5GHz WiFi Antenna**		2pcs
3	**Power Adapter (DC 12V/1A)** (*[1])		1pcs
4	**RJ45 Cable**		1pcs
5	**Console Cable**		1pcs
6	**CD (Manual)**		1pcs
7	**4 Pin Terminal Block**		1pcs
8	**Mounting Bracket**		2pcs
9	**DIN-Rail Bracket**		1pcs

1 The maximum power consumption of IOP760AM is 7W.

1.3 Hardware Configuration

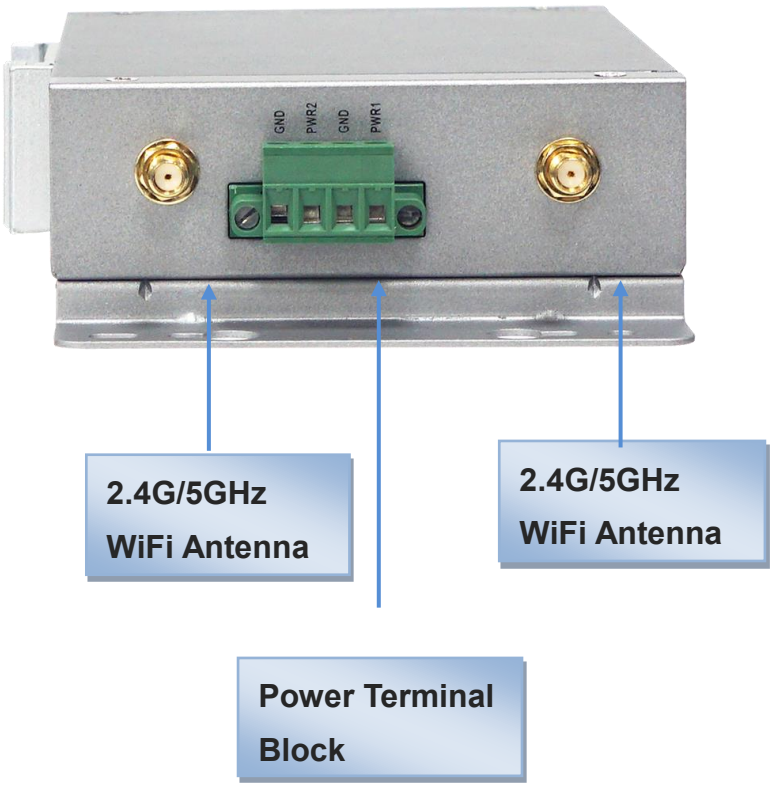
➢ Front View



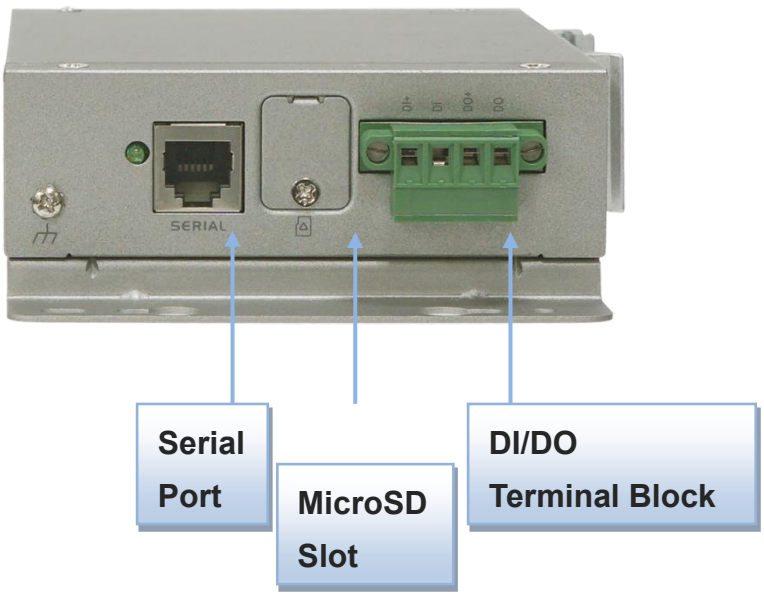
※Reset Button

The RESET button provides user with a quick and easy way to resort the default setting. Press the RESET button continuously for 6 seconds, and then release it. The device will restore to factory default settings.

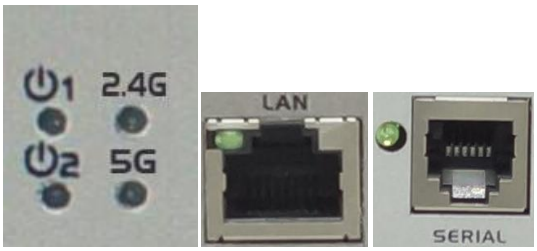
➢ Left View



➢ Right View



1.4 LED Indication



LED Icon	Indication	LED Color	Description
	Power Source 1	Green	**Steady ON:** Device is powered on by power source 1
	Power Source 2 (*2)	Green	**Steady ON:** Device is powered on by power source 2
	2.4GHz	Green	**Flash:** Data packet transferred. **Dark:** Wireless Radio is disable
	5GHz	Green	**Flash:** Data packet transferred. **Dark:** Wireless Radio is disable
	LAN	Green	**Steady ON:** Ethernet connection of LAN WAN is established **Flash:** Data packets are transferred
	Serial Port	Green	**Steady ON:** If serial device is attached

2 If both of power source 1 and power source 2 are connected, the device will choose power source 1 first. The LED of power source 2 will remain OFF at this condition.

1.5 Installation & Maintenance Notice

1.5.1 SYSTEM REQUIREMENTS

Network Requirements	• A fast Ethernet RJ45 cable or DSL modem • IEEE 802.11a/b/g/n/ac wireless network • IEEE 802.11n/ac or 802.11b/ g wireless clients • 10/100 Ethernet adapter on PC
Web-based Configuration Utility Requirements	**Computer with the following:** • Windows®, Macintosh, or Linux-based operating system • An installed Ethernet adapter **Browser Requirements:** • Internet Explorer 6.0 or higher • Chrome 2.0 or higher • Firefox 3.0 or higher • Safari 3.0 or higher

1.5.2 WARNING

Attention

- Only use the power adapter that comes with the package. Using a different voltage rating power adaptor is dangerous and may damage the product.
- Do not open or repair the case yourself. If the

1.5.3 HOT SURFACE CAUTION

CAUTION: The surface temperature for the metallic enclosure can be very high! Especially after operating for a long time, installed at a close cabinet without air conditioning support, or in a high ambient temperature space.
DO NOT touch the hot surface with your fingers while servicing!!

1.6 Hardware Installation

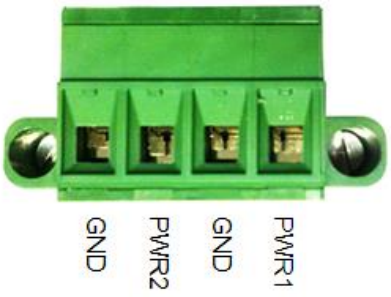
This chapter describes how to install and configure the hardware

1.6.1 Mount the Unit

The IOP760 series products can be placed on a desktop, or mounted on the DIN Rail, and wall. The DIN-rail bracket is not screwed on the product when out of factory. Please screw the DIN-rail bracket on the product first if necessary.

1.6.2 Connecting Power

The IOP760 series products can be powered by connecting a power source to the terminal block. **It supports dual 9 to 48VDC power inputs**. Following picture is the power terminal block pin assignments. Please check carefully and connect to the right power requirements and polarity.



There is a DC12V/1A power adapter[3] in the package for you to easily connect DC power adapter to this terminal block.

WARNNING: This commercial-grade power adapter is mainly for ease of powering up the purchased device while initial configuration. It's not for operating at wide temperature

3 The maximum power consumption of IOP760AM is 7W.

range environment. PLEASE PREPARE OR PURCHASE OTHER INDUSTRIAL-GRADE POWER SUPPLY FOR POWERING UP THE DEVICE.

For the dual power supply design on PWR1 and PWR2, the primary/backup power mode is implemented. If there is only one power source, no matter it is connected to PWR1 or PWR2, the device can be powered up with the power source.

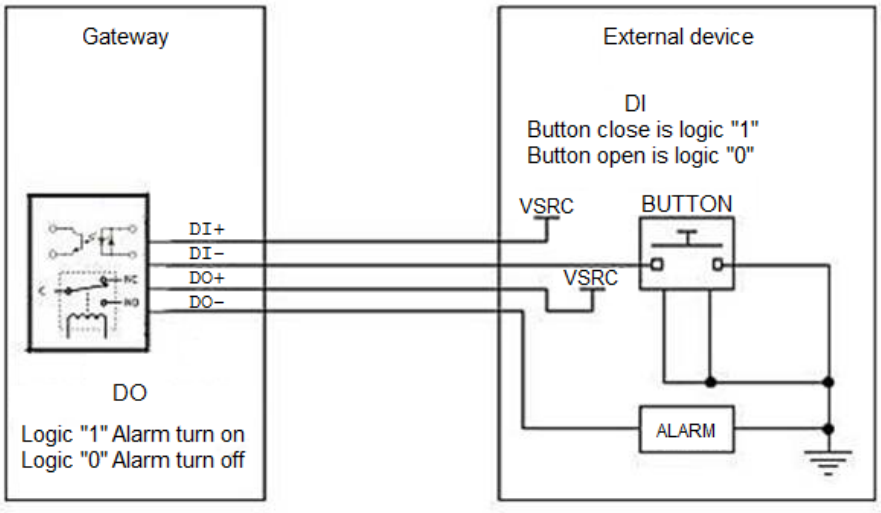
However, if there are two power sources available and connected to both PWR1 and PWR2 simutaneously, the device will choose PWR1 as the primary power, and supply required power to the entire system. The PWR2 is treated as a backup power source, and the device will seamlessly switch to use the PWR2 as the power source for the device when there is a power failure on PWR1. Whenever PWR1 is recovered, it will continute to supply the required power to the system since PWR1 is the treated as the primary power source.

1.6.3 Connecting DI/DO Devices

There are a DI and a DO ports together with power terminal block. Please refer to following specification to connect DI and DO devices.

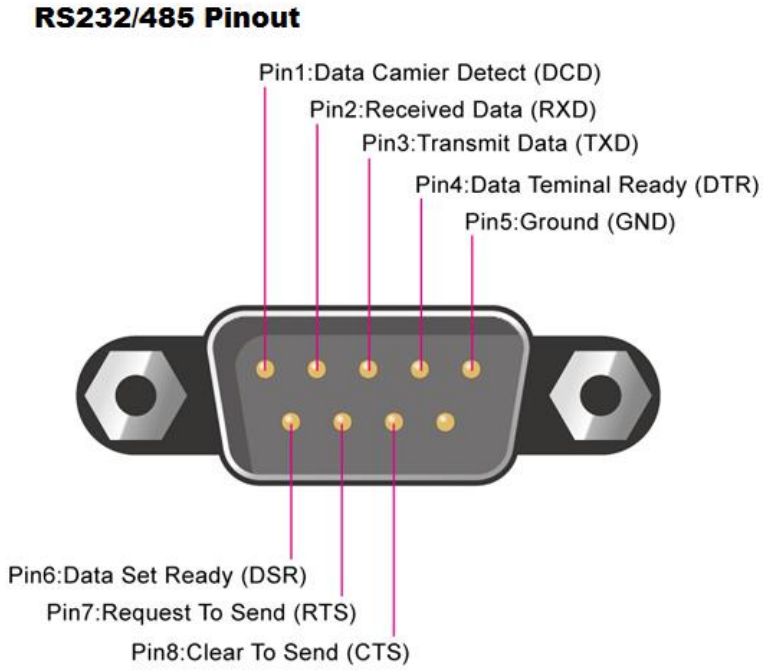
Mode	Specification	
Digital Input	Trigger Voltage (high)	Logic level 1: 5V~30V
	Normal Voltage (low)	Logic level 0: 0V~2.0V
Digital Output	Voltage (Relay Mode)	Depends on external device maximum voltage is 30V
	Maximum Current	1A

Example of Connection Diagram



1.6.4 Connecting Serial Devices

The IOG700 series products provide one standard serial port RJ12 female connector and one RJ11 to DB9 conversion cable. Connect the serial device to the unit DB9 male port with the right pin assignments of RS-232/485 are shown as below.



	Pin1	Pin2	Pin3	Pin4	Pin5	Pin6	Pin7	Pin8
RS-232	DCD	RXD	TXD	DTR	GND	DSR	RTS	CTS
RS-485			DATA+	DATA-	GND			

1.6.5 Connecting to the Network or a Host

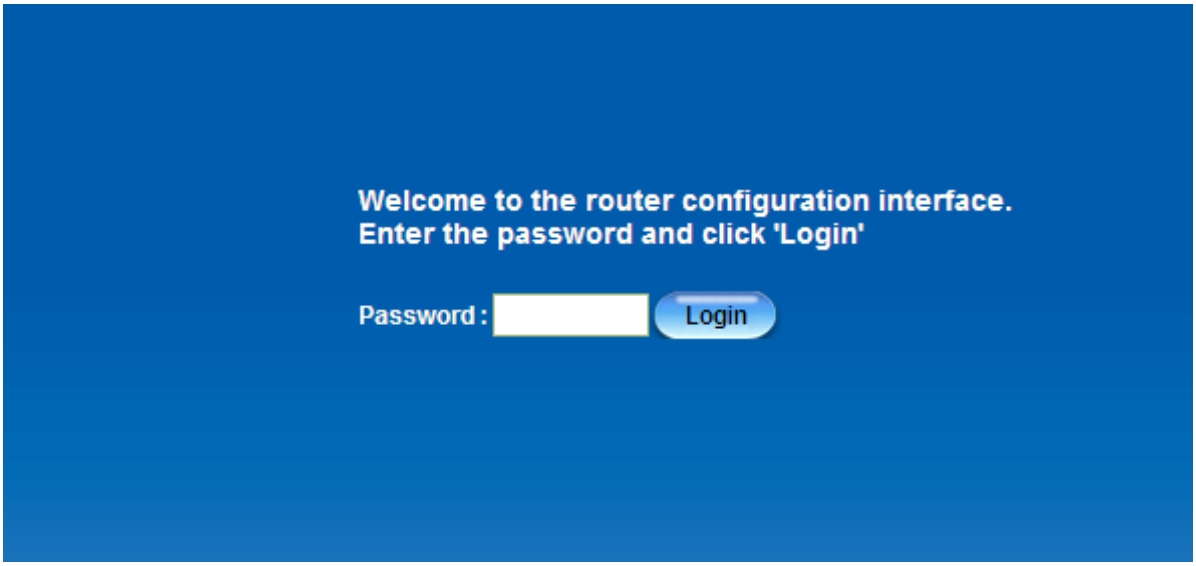
The IOP760 series products provide one RJ45 port to connect 10/100Mbps Ethernet. It can auto detect the transmission speed on the network and configure itself automatically. Connect one Ethernet cable to the RJ45 port (LAN) of the device and plug another end of the Ethernet cable into your computer's network port. In this way, you can use the RJ45 Ethernet cable to connect the gateway to the host PC's Ethernet port.

1.6.6 Setup by Configuring WEB UI

You can browse web UI to configure the device.

Type in the IP Address (**http://192.168.123.254**)[4]

When you see the login page, enter the password **'admin'** [5] and then click **'Login'** button.

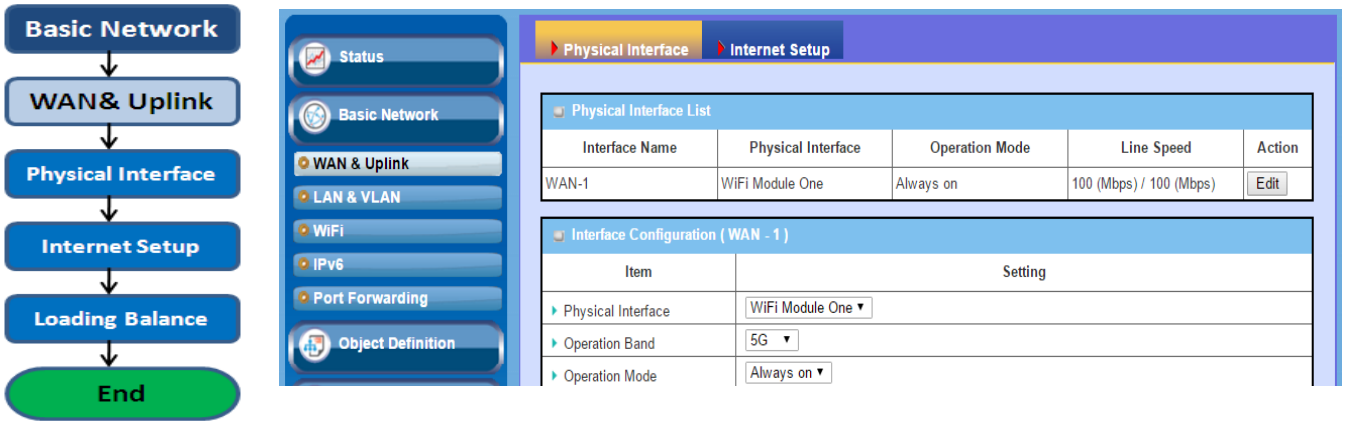


4 The default LAN IP address of this gateway is 192.168.123.254. If you change it, you need to login by using the new IP address.

5 It's strongly recommending you to change this login password from default value.

Chapter 2 Basic Network

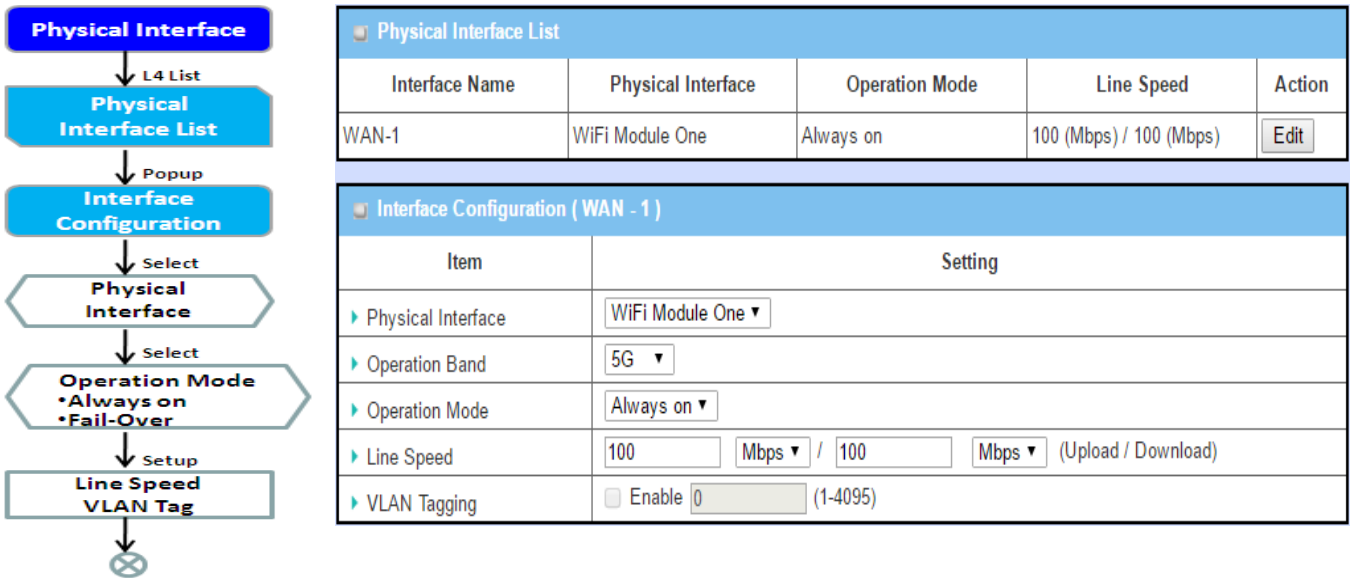
2.1 WAN & Uplink



The gateway provides one WAN interface to let all client hosts in Intranet of the gateway access the the uplink network or Internet. But ISPs in the world apply various connection protocols to let gateways or user's devices dial in ISPs and then link to the Internet via different kinds of transmit media.

So, the WAN Connection lets you specify the WAN Physical Interface, and WAN Internet Setup for Intranet to access Internet. For each WAN interface, you must specify its physical interface first and then its Internet setup to connect to uplink network or Internet.

2.1.1 Physical Interface



M2M gateways are usually equipped with various WAN interfacess to support different WAN connection scenario for requirement. You can configure the WAN interface one by one to get proper internet connection setup. **Refer to the product specification for the available WAN interfaces in the product you purchased.**

The first step to configure one WAN interface is to specify which kind of connection media to be used for the WAN connection, as shown in "Physical Interface" page.

In "Physical Interface" page, there are two configuration windows, "Physical Interface List" and "Interface Configuration". "Physical Interface List" window shows all the available physical interfaces. After clicking on the "Edit" button for the interface in "Physical Interface List" window the "Interface Configuration" window will appear to let you configure a WAN interface.

Physical Interface:

- **Ethernet WAN:** The gateway has one RJ45 WAN port that can be configured to be WAN connections. You can directly connect to external DSL modem or setup behind a firewall device.
- **WiFi Uplink WAN:** For the product with WiFi Uplink function, one WiFi module can be configured to be WAN connections. For the WiFi module with Uplink function activated, you can further create some uplink profiles for ease of connecting to an uplink network.

Operation Mode:

There are three option items “Always on”, “Failover”, and “Disable” for the operation mode setting. For the product with single WAN & Uplink interface, only “Always on” option is available.

Always on:

Set this WAN interface to be active all the time. When two or more WAN are established at "Always on" mode, outgoing data will through these WAN connections base on load balance policies.

Physical Interface Setting

Go to Basic Network > WAN > Physical Interface tab.

The Physical Interface allows user to setup the physical WAN interface and to adjust WAN’s behavior.

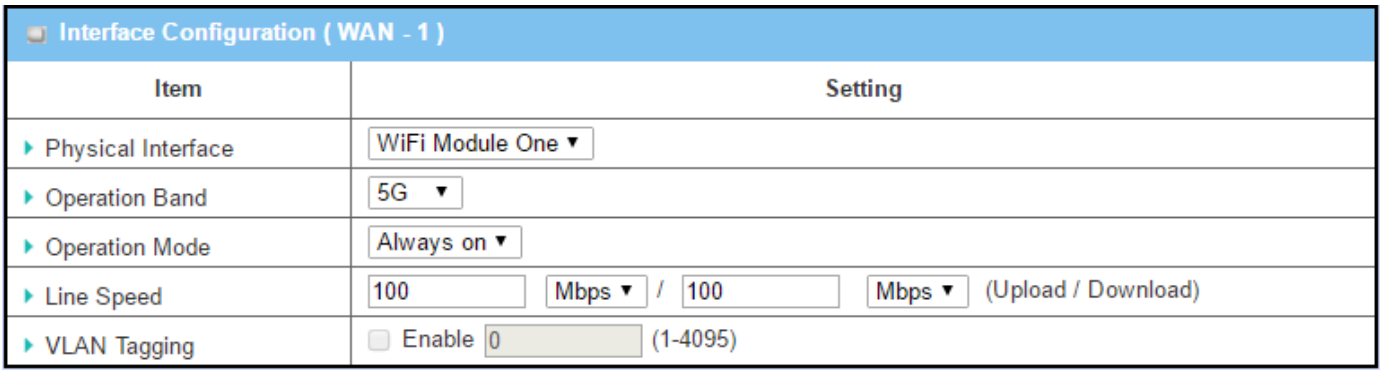
Note: Numbers of available WAN Interfaces can be different for the purchased gateway.

Physical Interface List

Interface Name	Physical Interface	Operation Mode	Line Speed	Action
WAN-1	WiFi Module One	Always on	100 (Mbps) / 100 (Mbps)	Edit

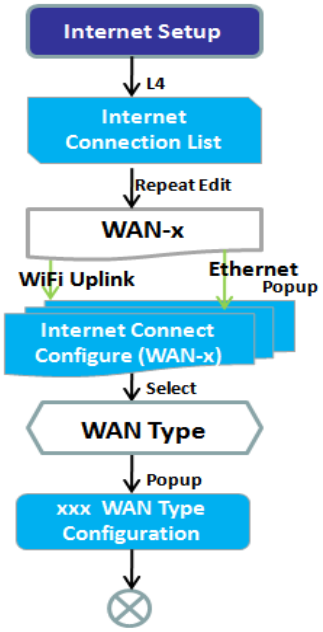
When **Edit** button is applied, an **Interface Configuration** screen will appear. WAN-1 interface is used in this example.

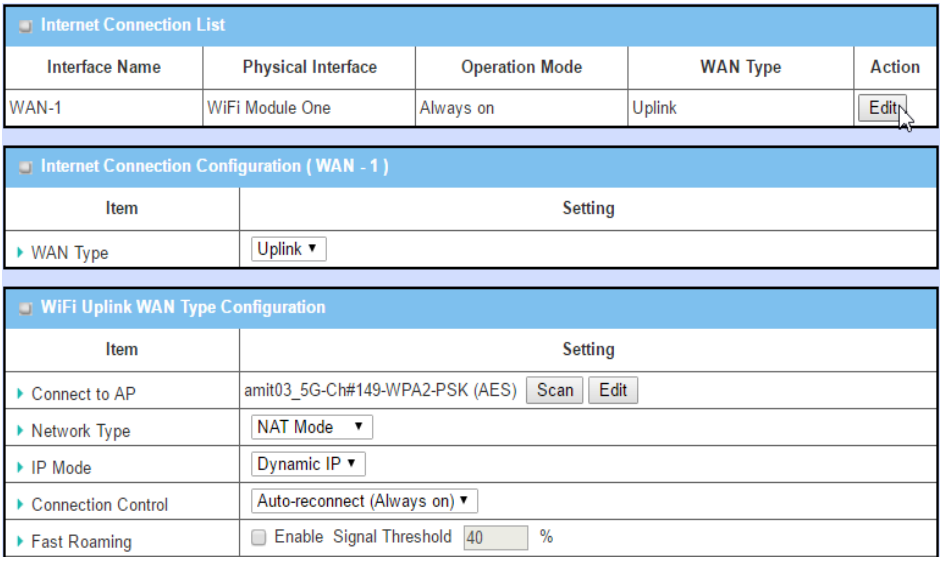
Interface Configuration:



Interface Configuration		
Item	**Value setting**	**Description**
Physical Interface	1. A Must fill setting 2. WAN-1 is the primary interface and is factory set to Always on.	Select one expected interface from the available interface dropdown list. It can be **Etherent** or **WiFi Module**. Depending on the gateway model, **Disable** and **Failover** options will be available only to multiple WAN gateways.
Operation Band	1. A Must fill setting 2. **5G** is selected by default.	If WiFi Module is specified as the physical interface, the Operation Band item will be displayed for radio band selection. Specify the radio band for WiFI uplink connection. If the WiFi module in use is a 2.4G/5GHz selectable module, please select one band for uplink connection.
Operation Mode	A Must fill setting	Define the operation mode of the interface. Select **Always on** to make this WAN always active. Select **Disable** to disable this WAN interface. (Note: for WAN-1, only **Always on** option is available.)
VLAN Tagging	Optional setting	Check **Enable** box to enter tag value provided by your ISP. Otherwise uncheck the box. ***Value Range*****:** 1 ~ 4096. Note: This feature is NOT available for 3G/4G WAN connection.

2.1.2 Internet Setup





After specifying the physical interface for each WAN connection, administrator must configure their connection profile to meet the dial in process of ISP, so that all client hosts in the Intranet of the gateway can access the Internet.

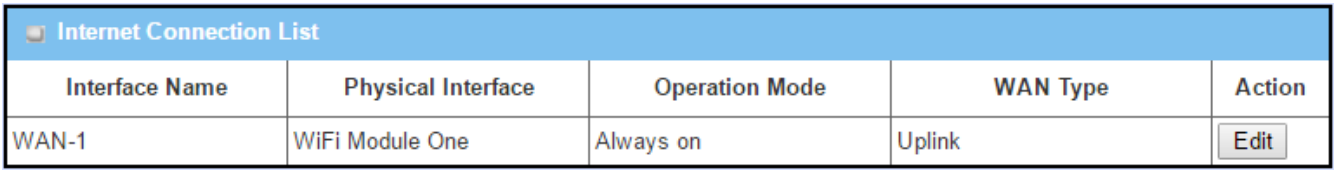
In "Internet Setup" page, there are some configuration windows: "Internet Connection List", "Internet Connection Configuration", "WAN Type Configuration" and related configuration windows for each WAN type. For the Internet setup of each WAN interface, you must specify its WAN type of physical interface first and then its related parameter configuration for that WAN type. After clicking on the "Edit" button of a physical interface in "Internet Setup List" window, the "Internet Connection Configuration" window will appear to let you specify which kind of WAN type that you will use for that physical interface to make an Internet connection. Based on your chosen WAN type, you can configure necessary parameters in each corresponding configuration window.

Internet Connection – WFi Uplink WAN

If the device connects to Internet through WiFi Uplink, this section will help you to complete WiFi Uplink connection setup.

Go to **Basic Network > WAN & Uplink > Internet Setup** tab.

WiFi Uplink interface: The Uplink network is a wireless network, and the gateway can connect to the Uplink network through WiFi connection.
If you have the access permission to a certain wireless network, you can setup a WiFi Uplink connection by using the gateway device. This gateway can support 802.11ac/n/g/b data connection, and it can connect to a wireless network (access point) under the regular infrastrature mode.

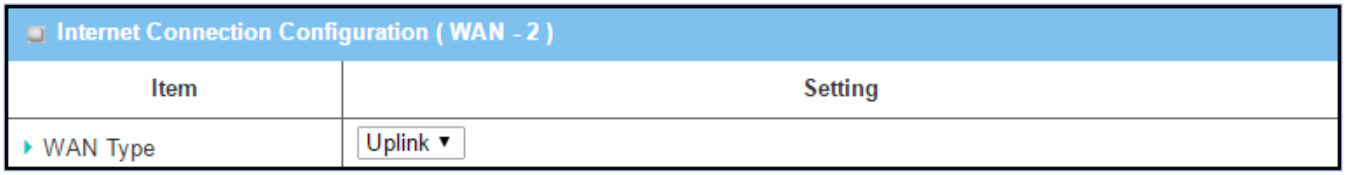


Internet Connection List

Interface Name	Physical Interface	Operation Mode	WAN Type	Action
WAN-1	WiFi Module One	Always on	Uplink	Edit

Configure Ethernet WAN Setting

When **Edit** button is applied, **Internet Connection Configuration** screen will appear. WAN-2 interface is used in this example.

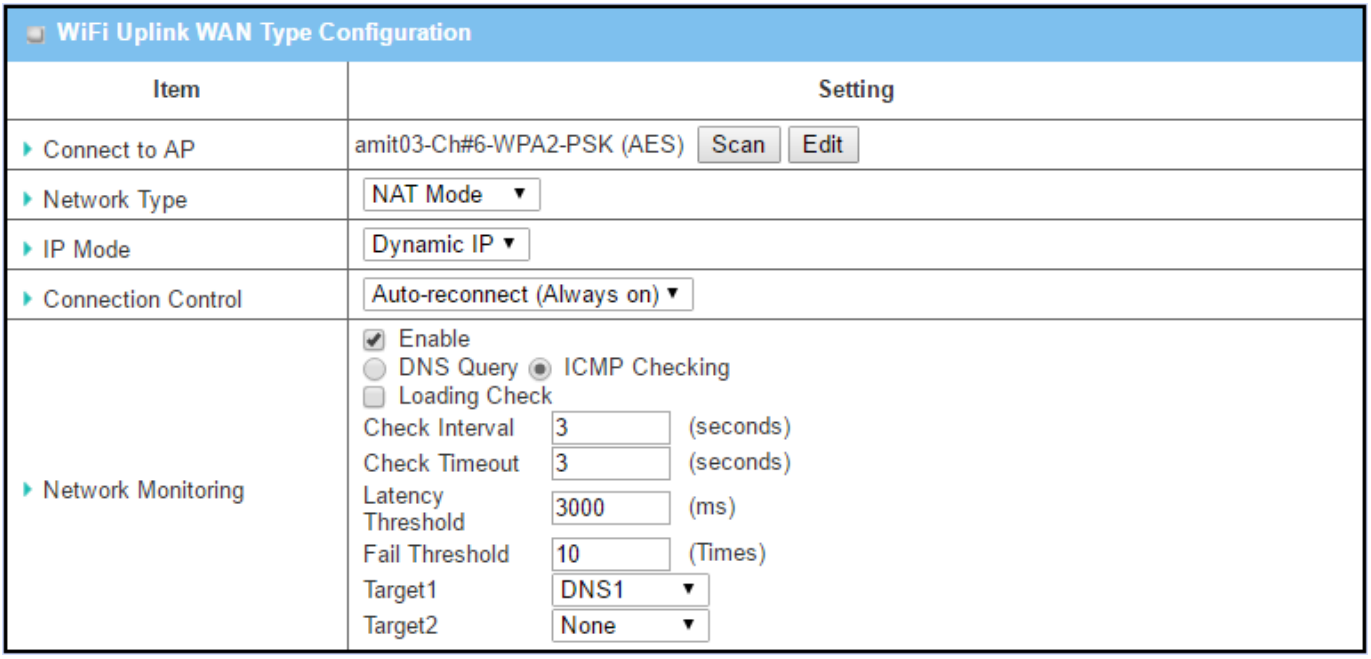


Internet Connection Configuration (WAN - 2)

Item	Setting
WAN Type	Uplink ▼

Internet Connection Configuration		
Item	**Value setting**	**Description**
WAN Type	1. A Must filled setting. 2. **Uplink** is selected by default.	From the dropdown box, select Internet connection method for WiFi Uplink Connection. Only **Uplink** is available.

WiFi Uplink

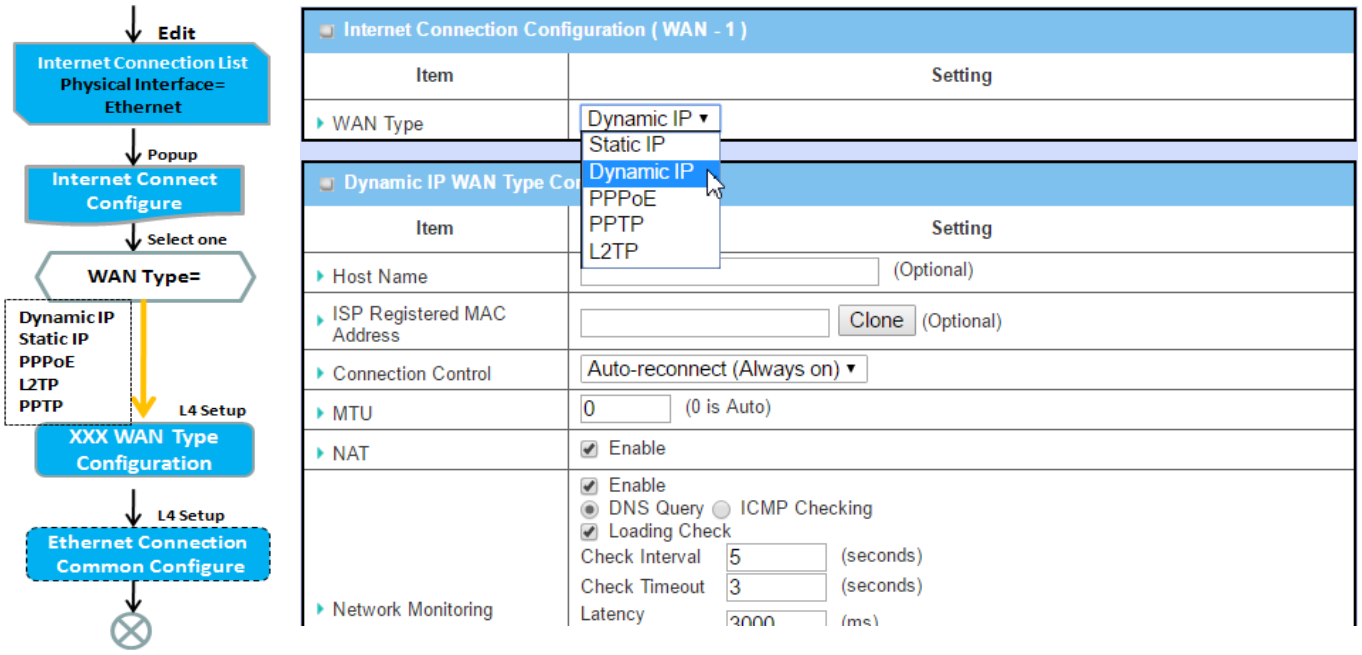


WiFi Uplink WAN Type Configuration		
Item	**Value setting**	**Description**
Connect to AP	N/A	Display the information of AP for connecting. You can Click the **Scan** button and select a AP for the uplink network. Besides, you can also create uplink profile(s) for ease of connecting to an available Uplink network. Refer to **Basic Network > WiFi > Uplink Profile** tab.
Network Type	1. A Must filled setting **2. NAT Mode** is selected by default.	Select the expected network type for the WiFi Uplink connection. It can be **NAT Mode**, **Bridge Mode**, or **NAT Disable**. When **NAT Mode** is selected, the NAT function is activated on the Wireless Uplink connection; When **Bridge Mode** is selected, the bridge function is activated on the Wireless Uplink connection; The supporting of bridge mode depends on the product specification, if the purchased device doesn't support the bridge mode, it will be greyed out from selection. When **NAT Disable** is selected, the NAT function is deactivated on the Wireless Uplink connection, and it can function as a router with manually configured routing setting.
IP Mode	1. A Must filled setting **2. Dynamic IP** is selected by default.	Specify the IP mode for the wireless uplink Interface. It can be **Dynamic IP** or **Static IP**. When **Dynamic IP** is selected, the device will request a IP from the Uplink Network as the IP for the uplink interface ; When **Static IP** is selected, you have to manually configure the IP address settings for the uplink interface. The settings include IP address, subnet mask, gateway, and

		primary/secondary DNS.
Connection Control	A Must filled setting	There are three connection modes. ● **Auto-reconnect (Always on)** enables the router to always keep the Internet connection on. ● **Connect-on-demand** enables the router to automatically re-establish Internet connection as soon as user attempts to access the Internet. Internet connection will be disconnected when it has been inactive for a specified idle time. ● **Connect Manually** allows user to connect to Internet manually**.** Internet connection will be inactive after it has been inactive for specified idle time.
Network Monitoring	1. An optional setting 2. Enabled by default.	When the Network Monitoring feature is enabled, the gateway will use DNS Query or ICMP to periodically check Internet connection –connected or disconnected. • Choose either **DNS Query** or **ICMP Checking** to detect WAN link. With **DNS Query,** the system checks the connection by sending DNS Query packets to the destination specified in Target 1 and Target 2. With **ICMP Checking,** the system will check connection by sending ICMP request packets to the destination specified in Target 1 and Target 2. ● **Loading Check** Enable Loading Check allows the router to ignore unreturned DNS Queries or ICMP requests when WAN bandwidth is fully occupied. This is to prevent false link-down status. ● **Check Interval** defines the transmitting interval between two DNS Query or ICMP checking packets. ● **Check Timeout** defines the timeout of each DNS query/ICMP. ● **Latency Threshold** defines the tolerance threshold of responding time. ● **Fail Threshold** specifies the detected disconnection before the router recognize the WAN link down status. Enter a number of detecting disconnection times to be the threshold before disconnection is acknowledged. ● **Target1** (**DNS1** set by default**)** specifies the first target of sending DNS query/ICMP request. ➢ **DNS1**: set the primary DNS to be the target. ➢ **DNS2**: set the secondary DNS to be the target. ➢ **Gateway**: set the Current gateway to be the target. ➢ **Other Host**: enter an IP address to be the target. ● **Target2** (**None** set by default**)** specifies the second target of sending DNS query/ICMP request. ➢ **None**: to disable **Target2.** ➢ **DNS1**: set the primary DNS to be the target.

		➢ **DNS2**: set the secondary DNS to be the target. ➢ **Gateway**: set the Current gateway to be the target. ➢ **Other Host**: enter an IP address to be the target.
Save	*N/A*	Click **Save** to save the settings.
Undo	*N/A*	Click **Undo** to cancel the settings.

Internet Connection List - Ethernet WAN



WAN Type for Ethernet Interface:

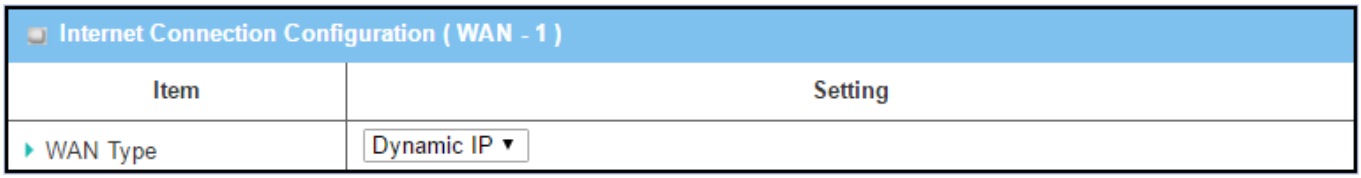
Ethernet is the most common WAN and uplink interface for M2M gateways. Usually it is connected with xDSL or cable modem for you to setup the WAN connection. There are various WAN types to connect with ISP.

- **Static IP:** Select this option if ISP provides a fixed IP to you when you subsribe the service. Usually is more expensive but very importat for cooperate requirement.
- **Dynamic IP:** The assigned IP address for the WAN by a DHCP server is different every time. It is cheaper and usually for consumer use.
- **PPP over Ethernet:** As known as PPPoE. This WAN type is widely used for ADSL connection. IP is usually different for every dial up.
- **PPTP:** This WAN type is popular in some countries, like Russia.
- **L2TP :** This WAN type is popular in some countries, like Israel.

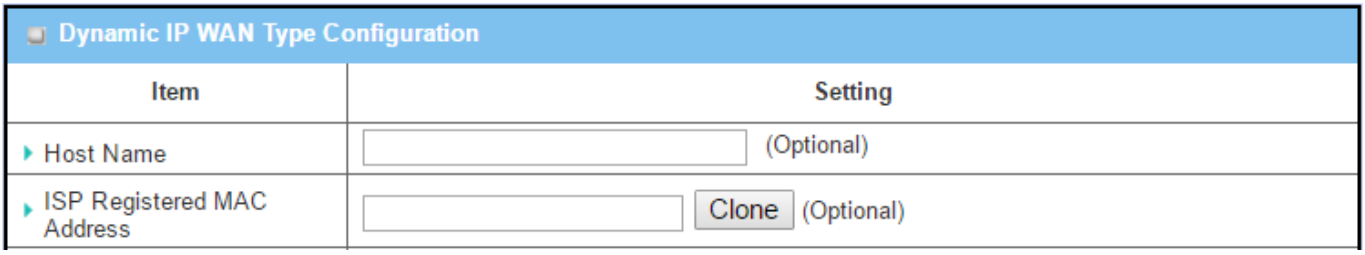
Configure Ethernet WAN Setting

When **Edit** button is applied, **Internet Connection Configuration** screen will appear. WAN-1 interface is used in this example.

WAN Type = Dynamic IP

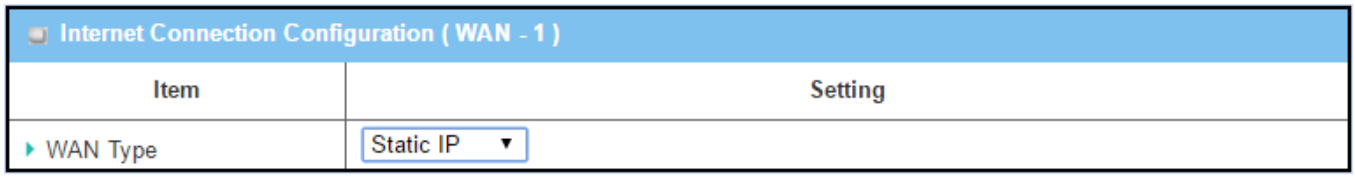


When you select it, "Dynamic IP WAN Type Configuration" will appear. Items and setting is explained below

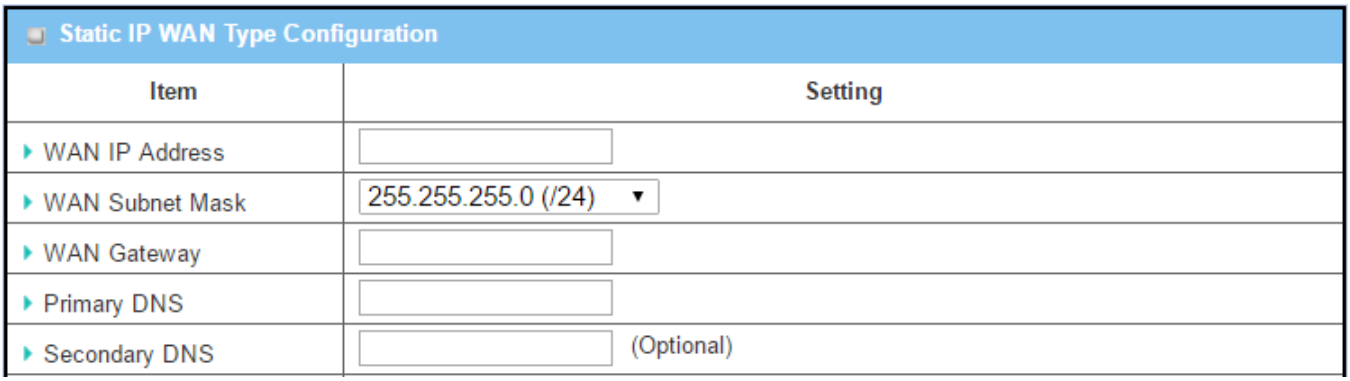


Dynamic IP WAN Type Configuration		
Item	**Value setting**	**Description**
Host Name	An optional setting	Enter the host name provided by your Service Provider.
ISP Registered MAC Address	An optional setting	Enter the MAC address that you have registered with your service provider. Or Click the **Clone** button to clone your PC's MAC to this field. Usually this is the PC's MAC address assigned to allow you to connect to Internet.

WAN Type= Static IP

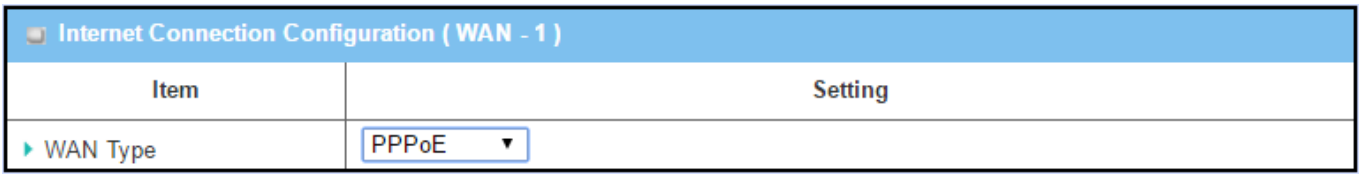


When you select it, "Static IP WAN Type Configuration" will appear. Items and setting is explained below

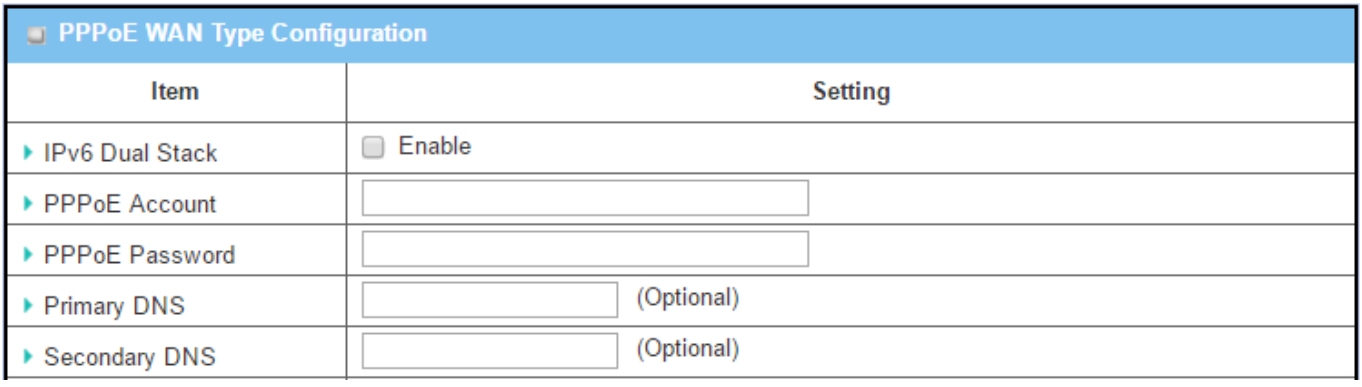


Static IP WAN Type Configuration		
Item	**Value setting**	**Description**
WAN IP Address	A Must filled setting	Enter the WAN IP address given by your Service Provider
WAN Subnet Mask	A Must filled setting	Enter the WAN subnet mask given by your Service Provider
WAN Gateway	A Must filled setting	Enter the WAN gateway IP address given by your Service Provider
Primary DNS	A Must filled setting	Enter the primary WAN DNS IP address given by your Service Provider
Secondary DNS	An optional setting	Enter the secondary WAN DNS IP address given by your Service Provider

WAN Type= PPPoE



When you select it, "PPPoE WAN Type Configuration" will appear. Items and setting is explained below



Service Name	(Optional)
Assigned IP Address	(Optional)

PPPoE WAN Type Configuration		
Item	**Value setting**	**Description**
PPPoE Account	A Must filled setting	Enter the PPPoE User Name provided by your Service Provider.
PPPoE Password	A Must filled setting	Enter the PPPoE password provided by your Service Provider.
Primary DNS	An optional setting	Enter the IP address of Primary DNS server.
Secondary DNS	An optional setting	Enter the IP address of Secondary DNS server.
Service Name	An optional setting	Enter the service name if your ISP requires it
Assigned IP Address	An optional setting	Enter the IP address assigned by your Service Provider.

WAN Type= PPTP

Internet Connection Configuration (WAN - 1)	
Item	**Setting**
WAN Type	PPTP

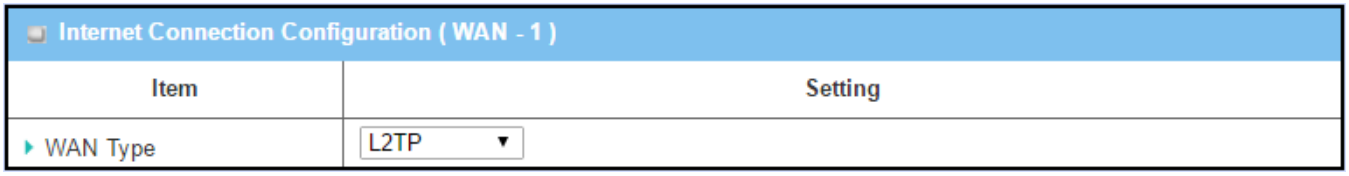
When you select it, "PPTP WAN Type Configuration" will appear. Items and setting is explained below

PPTP WAN Type Configuration	
Item	**Setting**
IP Mode	Dynamic IP Address
Server IP Address / Name	
PPTP Account	
PPTP Password	
Connection ID	(Optional)

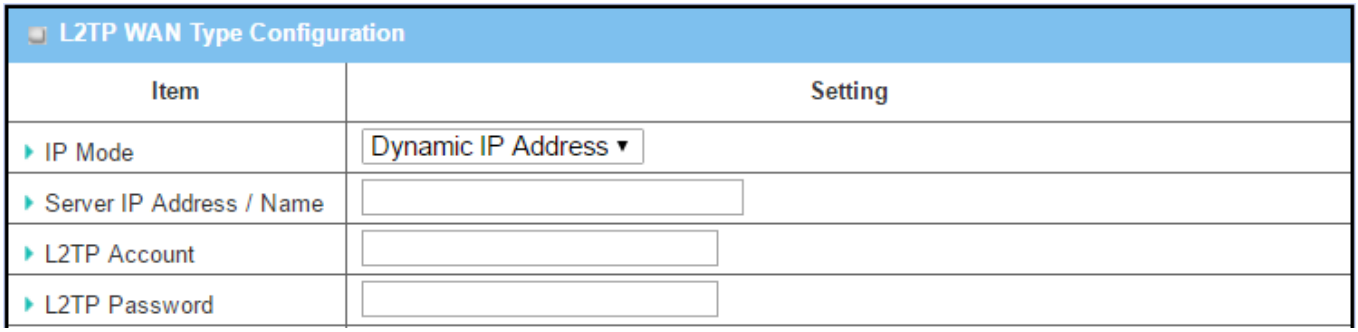
MPPE	Enable

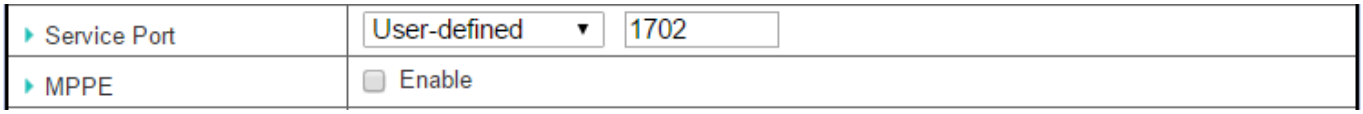
PPTP WAN Type Configuration		
Item	**Value setting**	**Description**
IP Mode	A Must filled setting	Select either Static or Dynamic IP address for PPTP Internet connection. ● When **Static IP Address** is selected, you will need to enter the **WAN IP Address**, **WAN Subnet Mask,** and **WAN Gateway**. ■ **WAN IP Address** (A Must filled setting)**:** Enter the WAN IP address given by your Service Provider. ■ **WAN Subnet Mask** (A Must filled setting)**:** Enter the WAN subnet mask given by your Service Provider. ■ **WAN Gateway** (A Must filled setting)**:** Enter the WAN gateway IP address given by your Service Provider. ● When **Dynamic IP** is selected, there are no above settings required.
Server IP Address/Name	A Must filled setting	Enter the PPTP server name or IP Address.
PPTP Account	A Must filled setting	Enter the PPTP username provided by your Service Provider.
PPTP Password	A Must filled setting	Enter the PPTP connection password provided by your Service Provider.
Connection ID	An optional setting	Enter a name to identify the PPTP connection.
MPPE	An optional setting	Select **Enable** to enable MPPE **(**Microsoft Point-to-Point Encryption) security for PPTP connection.

WAN Type= L2TP



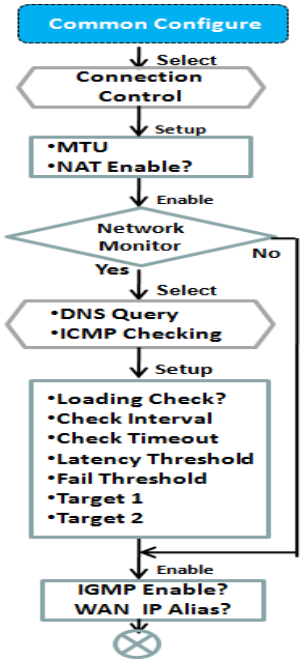
When you select it, "L2TP WAN Type Configuration" will appear. Items and setting is explained below





L2TP WAN Type Configuration		
Item	**Value setting**	**Description**
IP Mode	A Must filled setting	Select either Static or Dynamic IP address for L2TP Internet connection. ● When **Static IP Address** is selected, you will need to enter the **WAN IP Address**, **WAN Subnet Mask,** and **WAN Gateway**. ■ **WAN IP Address** (A Must filled setting)**:** Enter the WAN IP address given by your Service Provider. ■ **WAN Subnet Mask** (A Must filled setting)**:** Enter the WAN subnet mask given by your Service Provider. ■ **WAN Gateway** (A Must filled setting)**:** Enter the WAN gateway IP address given by your Service Provider. ● When **Dynamic IP** is selected, there are no above settings required.
Server IP Address/Name	A Must filled setting	Enter the L2TP server name or IP Address.
L2TP Account	A Must filled setting	Enter the L2TP username provided by your Service Provider.
L2TP Password	A Must filled setting	Enter the L2TP connection password provided by your Service Provider.
Service Port	A Must filled setting	Enter the service port that the Internet service. There are three options can be selected : ● **Auto:** Port will be automatically assigned. ● **1701 (For Cisco)**: Set service port to port 1701 to connect to CISCO server. ● **User-defined**: enter a service port provided by your Service Provider.
MPPE	An optional setting	Select **Enable** to enable MPPE **(**Microsoft Point-to-Point Encryption) security for PPTP connection.

Ethernet Connection Common Configuration

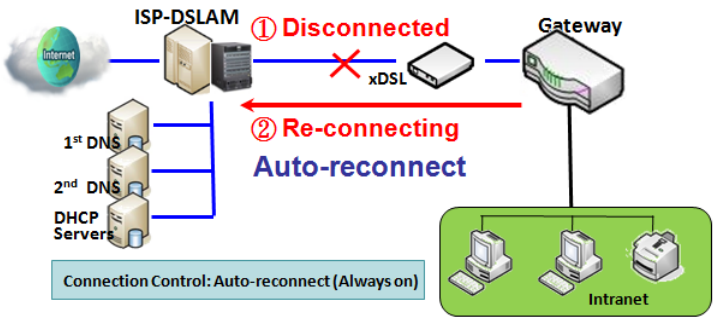


Ethernet Connection Common Configuration

Item	Setting
Connection Control	Auto-reconnect (Always on)
MTU	0 (0 is Auto)
NAT	Enable
Network Monitoring	Enable DNS Query ICMP Checking Loading Check Check Interval 5 (seconds) Check Timeout 3 (seconds) Latency Threshold 3000 (ms) Fail Threshold 5 (Times) Target1 DNS1 Target2 None
IGMP	Disable
WAN IP Alias	Enable 10.0.0.1

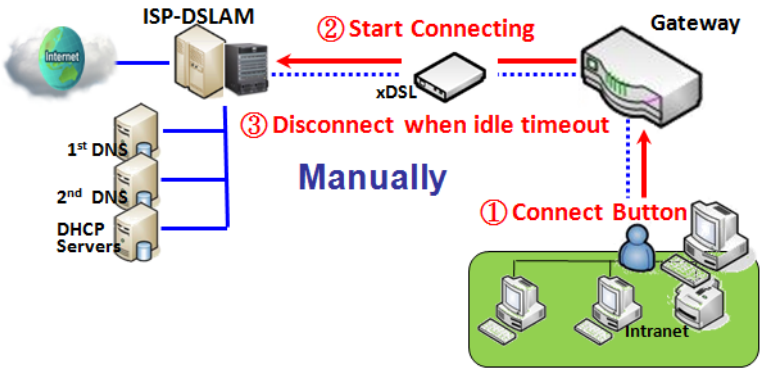
There are some important parameters to be setup no matter which WAN type is selected. You should follow up the rule to configure.

Connection Control.



Auto-reconnect: This gateway will establish Internet connection automatically once it has been booted up, and try to reconnect once the connection is down. It's recommended to choose this scheme if for mission critical applications to ensure full-time Internet connection.

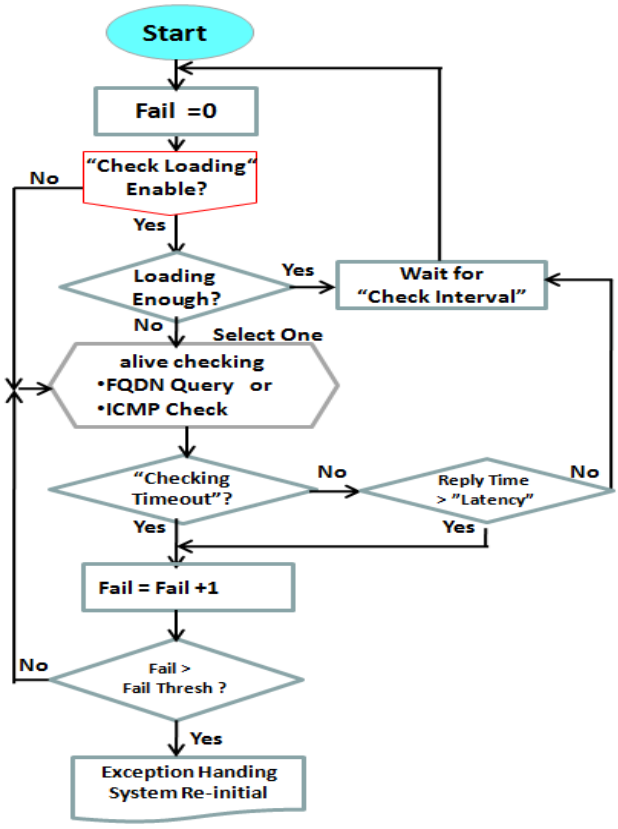
Connect-on-demand: This gateway won't start to establish Internet connection until local data is going to be sent to WAN side. After normal data transferring between LAN and WAN sides, this gateway will disconnect WAN connection if idle time reaches value of Maximum Idle Time.



Manually: This gateway won't start to establish WAN connection until you press "Connect" button on web UI. After normal data transferring between LAN and WAN sides, this gateway will disconnect WAN connection if idle time reaches value of Maximum Idle Time.

Please be noted, if the WAN interface serves as the primary one for another WAN interface in Failover role, the Connection Control parameter will not be available to you to configure as the system must set it to "Auto-reconnect (Always on)".

Network Monitoring



It is necessary to monitor connection status continuous. To do it, "ICMP Check" and "FQDN Query" are used to check. When there is trafiic of connection, checking packet will waste bandwidth. Response time of replied packets may also increase. To avoid "Network Monitoring" work abnormally, enabling "Checking Loading" option will stop connection check when there is traffic. It will wait for another "Check Interval" and then check loading again.

When you do "Network Monitoring", if reply time longer than "Latency" or even no response longer than "Checking Timeout", "Fail" count will be increased. If it is continuous and "Fail" count is more than "Fail Threshold", gateway will do exception handing process and re-initial this connection again . Otherwise, network monitoring process will be start again.

Set up “Ethernet Common Configuration”

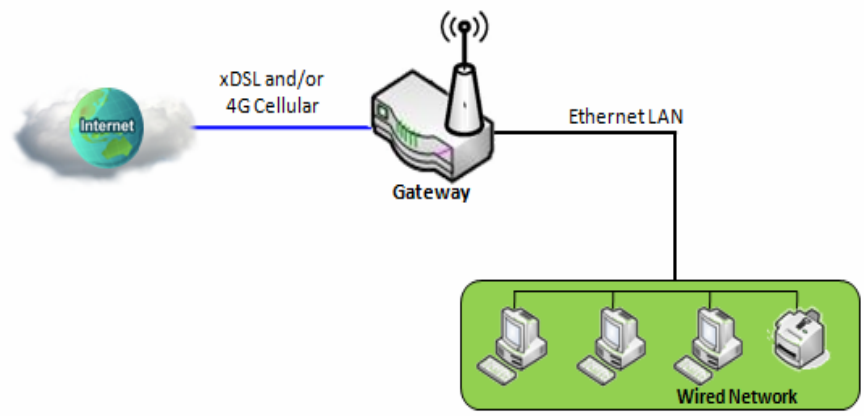
Ethernet WAN Common Configuration		
Item	**Value setting**	**Description**
Connection Control	A Must filled setting	There are three connection modes. ● **Auto-reconnect (Always on)** enables the router to always keep the Internet connection on. ● **Connect-on-demand** enables the router to automatically re-establish Internet connection as soon as user attempts to access the Internet. Internet connection will be disconnected when it has been inactive for a specified idle time. ● **Connect Manually** allows user to connect to Internet manually**.** Internet connection will be inactive after it has been inactive for specified idle time.
MTU	1. A Must filled setting 2. **Auto** (value zero) is set by default 3. Manual set range 1200~1500	**MTU** refers to Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission. When set to **Auto** (value ‘0’), the router selects the best MTU for best Internet connection performance.
NAT	1. An optional setting 2. NAT is enabled by default	Enable NAT to apply NAT on the WAN connection. Uncheck the box to disable NAT function.
Network Monitoring	1. An optional setting 2. Enabled by default	When the Network Monitoring feature is enabled, the gateway will use DNS Query or ICMP to periodically check Internet connection –connected or disconnected. ● Choose either **DNS Query** or **ICMP Checking** to detect WAN link. With **DNS Query,** the system checks the connection by sending DNS Query packets to the destination specified in Target 1 and Target 2. With **ICMP Checking,** the system will check connection by sending ICMP request packets to the destination specified in Target 1 and Target 2. ● **Loading Check** Enable Loading Check allows the router to ignore unreturned DNS Queries or ICMP requests when WAN bandwidth is fully occupied. This is to prevent false link-down status. ● **Check Interval** defines the transmitting interval between two DNS Query or ICMP checking packets. ● **Check Timeout** defines the timeout of each DNS query/ICMP. ● **Latency Threshold** defines the tolerance threshold of responding time. ● **Fail Threshold** specifies the detected disconnection before the router recognize the

		WAN link down status. Enter a number of detecting disconnection times to be the threshold before disconnection is acknowledged. ● **Target1** (**DNS1** set by default**)** specifies the first target of sending DNS query/ICMP request. ➢ **DNS1**: set the primary DNS to be the target. ➢ **DNS2**: set the secondary DNS to be the target. ➢ **Gateway**: set the Current gateway to be the target. ➢ **Other Host**: enter an IP address to be the target. ● **Target2** (**None** set by default**)** specifies the second target of sending DNS query/ICMP request. ➢ **None**: to disable **Target2.** ➢ **DNS1**: set the primary DNS to be the target. ➢ **DNS2**: set the secondary DNS to be the target. ➢ **Gateway**: set the Current gateway to be the target. ➢ **Other Host**: enter an IP address to be the target.
IGMP	1. A Must filled setting 2. Disable is set by default	Enable IGMP (Internet Group Management Protocol) would enable the router to listen to IGMP packets to discover which interfaces are connected to which device. The router uses the interface information generated by IGMP to reduce bandwidth consumption in a multi-access network environment to avoid flooding the entire network.
WAN IP Alias	1. An optional setting 2. Box is unchecked by default	Enable **WAN IP Alias** then enter the IP address provided by your service provider. **WAN IP Alias** is used by the device router and is treated as a second set of WAN IP to provide dual WAN IP address to your LAN network.
Save	*N/A*	Click **Save** to save the settings.
Undo	*N/A*	Click **Undo** to cancel the settings.

2.2 LAN & VLAN

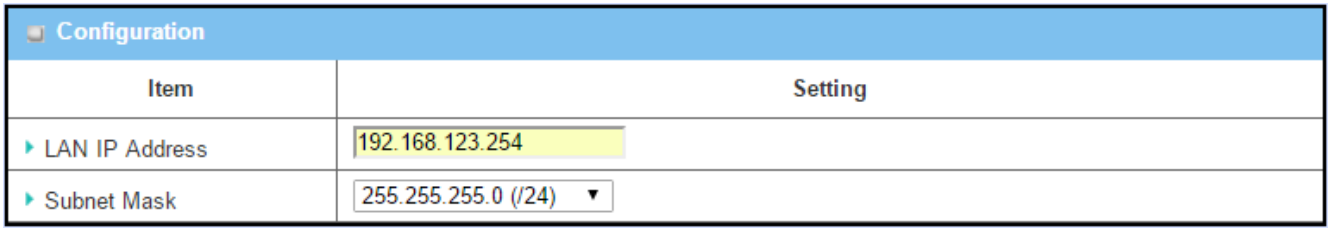
This section provides the configuration of LAN and VLAN. VLAN is an optional feature, and it depends on the product specification of the purchased gateway.

2.2.1 Ethernet LAN



The Local Area Network (LAN) can be used to share data or files among computers attached to a network. Following diagram illustrates the network that wired and interconnects computers.

Please follow the following instructions to do IPv4 Ethernet LAN Setup.



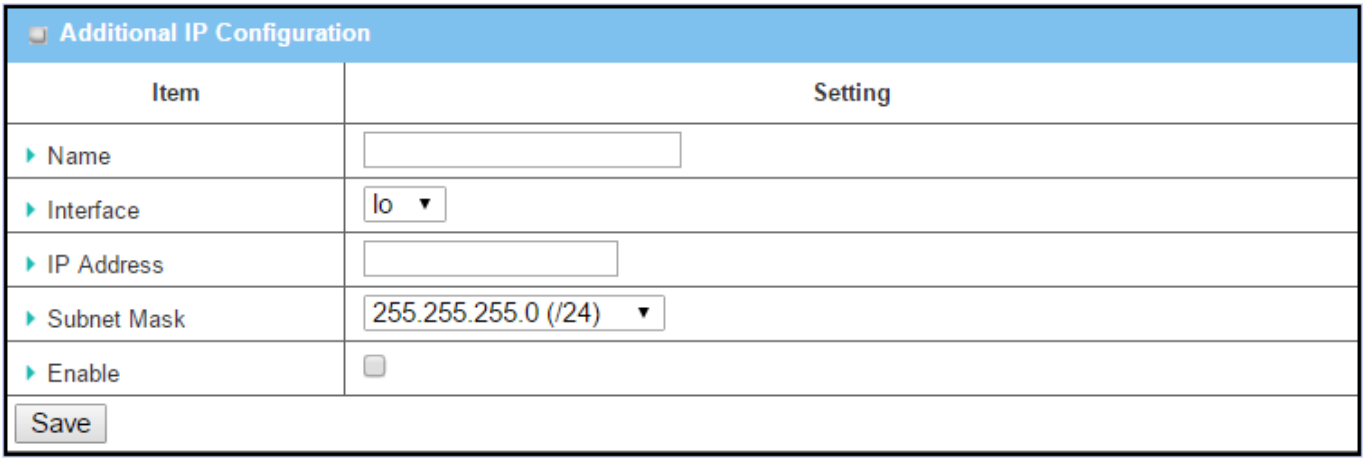
Configuration		
Item	**Value setting**	**Description**
LAN IP Address	1. A Must filled setting **2. 192.168.123.254 is set by default**	Enter the local IP address of this device. The network device(s) on your network must use the LAN IP address of this device as their Default Gateway. You can change it if necessary. **Note**: *It's also the IP address of web UI. If you change it, you need to type new IP address in the browser to see web UI*.
Subnet Mask	1. A Must filled setting 2. **255.255.255.0 (/24)**	Select the subnet mask for this gateway from the dropdown list.

	is set by default	Subnet mask defines how many clients are allowed in one network or subnet. The default subnet mask is 255.255.255.0 (/24), and it means maximum 254 IP addresses are allowed in this subnet. However, one of them is occupied by LAN IP address of this gateway, so there are maximum 253 clients allowed in LAN network. ***Value Range***: 255.0.0.0 (/8) ~ 255.255.255.252 (/30).
Save	N/A	Click the **Save** button to save the configuration
Undo	N/A	Click the **Undo** button to restore what you just configured back to the previous setting.

Create / Edit Additional IP

This gateway provides the LAN IP alias function for some special management consideration. You can add additional LAN IP for this gateway, and access to this gateway with the additional IP.

When **Add** button is applied, **Additional IP Configuration** screen will appear.



Configuration		
Item	**Value setting**	**Description**
Name	.1 An Optional Setting	Enter the name for the alias IP address.
Interface	1. A Must filled setting 2. **Lo** is set by default	Specify the Interface type. It can be **Lo** or **Br0**.
IP Address	1. An Optional setting **2. 192.168.123.254 is set by default**	Enter the addition IP address for this device.
Subnet Mask	1. A Must filled setting 2. **255.255.255.0 (/24)**	Select the subnet mask for this gateway from the dropdown list.

	is set by default	Subnet mask defines how many clients are allowed in one network or subnet. The default subnet mask is 255.255.255.0 (/24), and it means maximum 254 IP addresses are allowed in this subnet. However, one of them is occupied by LAN IP address of this gateway, so there are maximum 253 clients allowed in LAN network. ***Value Range***: 255.0.0.0 (/8) ~ 255.255.255.255 (/32).
Save	NA	Click the **Save** button to save the configuration

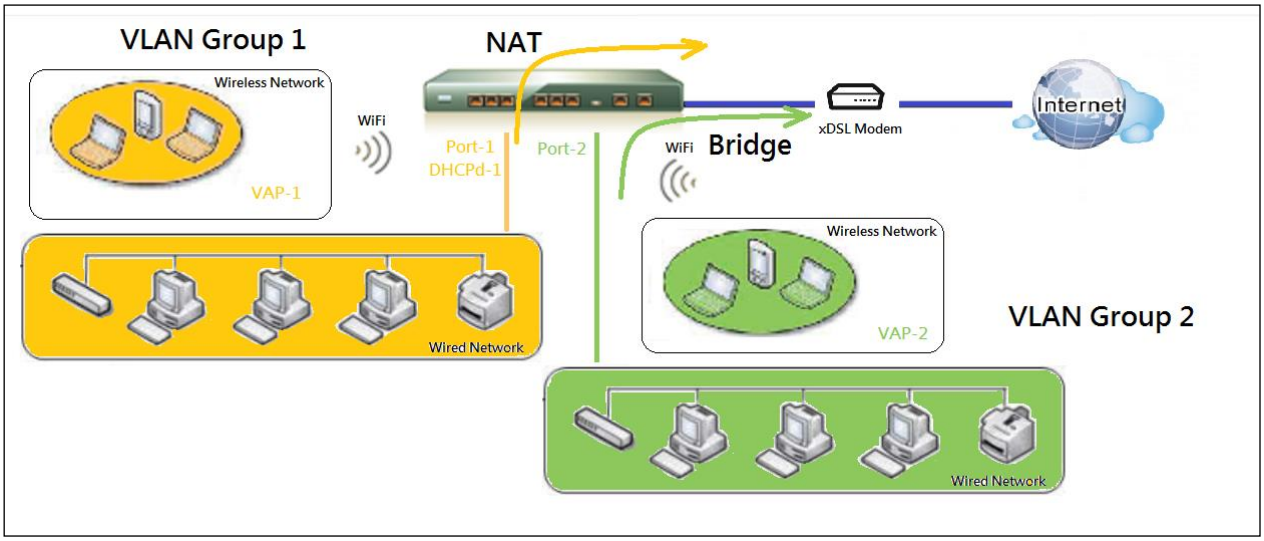
2.2.2 VLAN

VLAN (Virtual LAN) is a logical network under a certain switch or router device to group client hosts with a specific VLAN ID. This gateway supports both Port-based VLAN and Tag-based VLAN. These functions allow you to divide local network into different “virtual LANs”. It is common requirement for some application scenario. For example, there are various departments within SMB. All client hosts in the same department should own common access privilege and QoS property. You can assign departments either by port-based VLAN or tag-based VLAN as a group, and then configure it by your plan. In some cases, ISP may need router to support “VLAN tag” for certain kinds of services (e.g. IPTV). You can group all devices required this service as one tag-based VLAN.

If the gateway has only one physical Ethernet LAN port, only very limited configuration is available if you enable the Port-based VLAN.

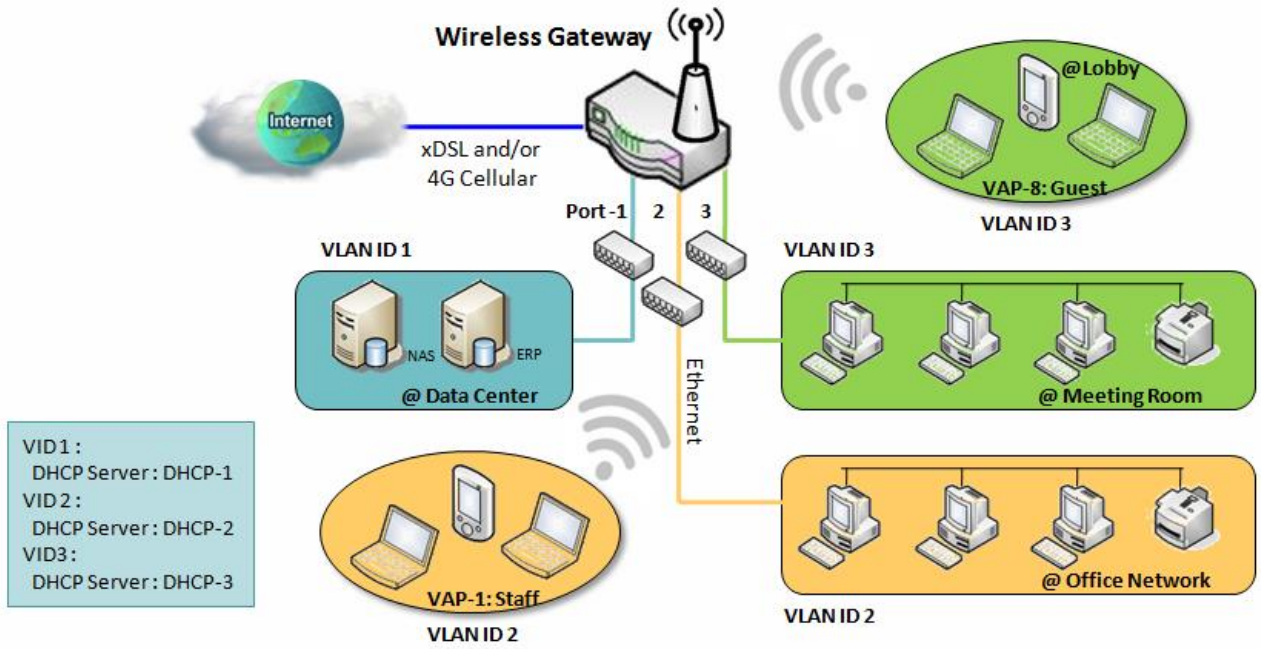
➢ Port-based VLAN

Port-based VLAN function can group Ethernet ports, Port-1 ~ Port-4, and WiFi Virtual Access Points, VAP-1 ~ VAP-8, together for differentiated services like Internet surfing, multimedia enjoyment, VoIP talking, and so on. Two operation modes, NAT and Bridge, can be applied to each VLAN group. One DHCP server can be allocated for a NAT VLAN group to let group host member get its IP address. Thus, each host can surf Internet via the NAT mechanism of business access gateway. In bridge mode, Intranet packet flow is delivered out WAN trunk port with VLAN tag to upper link for different services.



A port-based VLAN is a group of ports on an Ethernet or Virtual APs of Wired or Wireless Gateway that form a logical LAN segment. Following is an example.

For example, in a company, administrator schemes out 3 network segments, Lobby/Meeting Room, Office, and Data Center. In a Wireless Gateway, administrator can configure Lobby/Meeting Room segment with VLAN ID 3. The VLAN group includes Port-3 and VAP-8 (SSID: Guest) with NAT mode and DHCP-3 server equipped. He also configure Office segment with VLAN ID 2. The VLAN group includes Port-2 and VAP-1 (SSID: Staff) with NAT mode and DHCP-2 server equipped. At last, administrator also configure Data Center segment with VLAN ID 1. The VLAN group includes Port-1 with NAT mode to WAN interface as shown in following diagram.



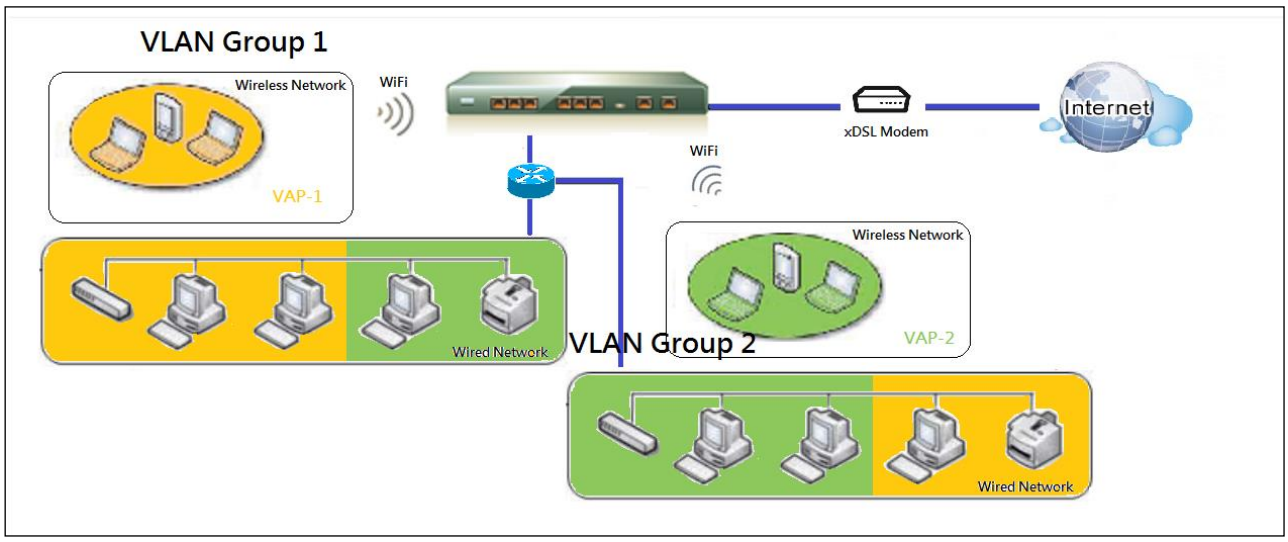
Above is the general case for 3 Ethernet LAN ports in the gateway. But if the device just has one Ethernet LAN port, there will be only one VLAN group for the device. Under such situation, it still supports both the NAT and Bridge mode for the Port-based VLAN configuration.

➢ Tag-based VLAN

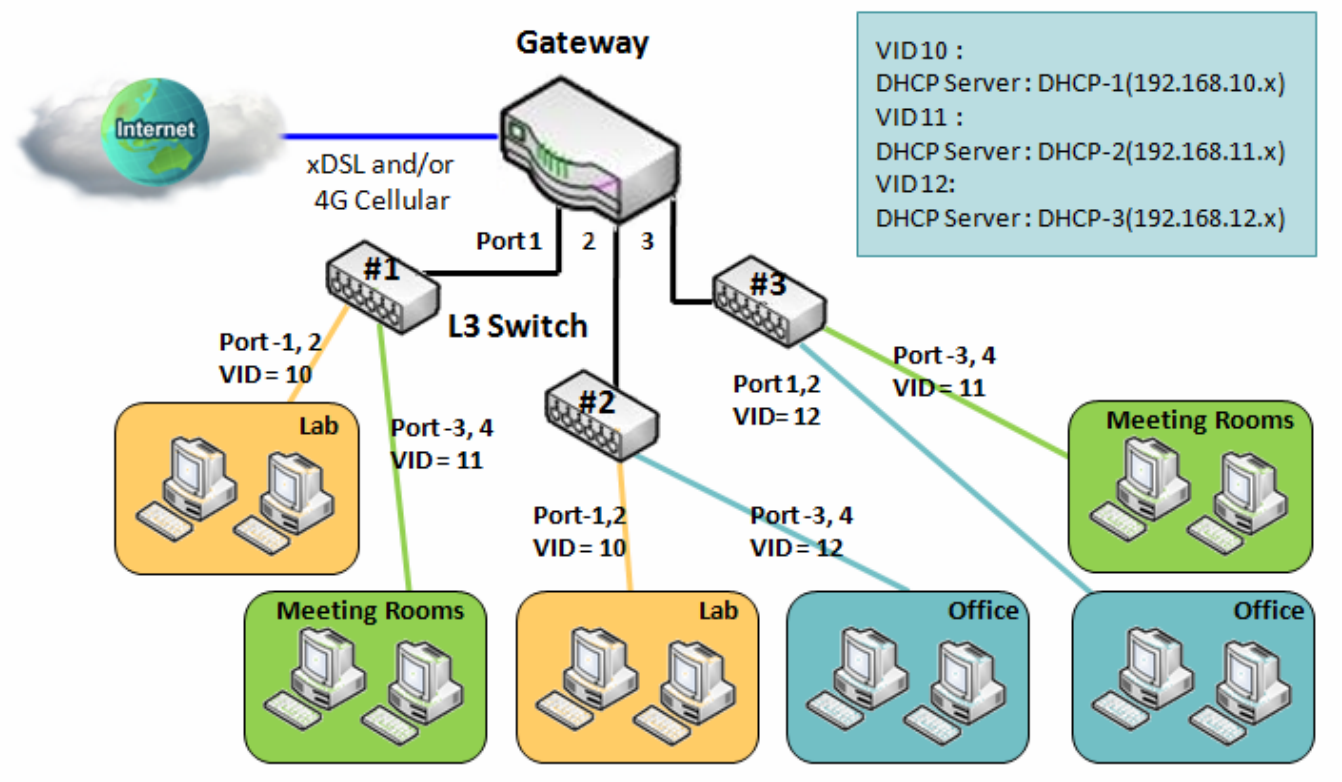
Tag-based VLAN function can group Ethernet ports, Port-1 ~ Port-4, and WiFi Virtual Access Points, VAP-1 ~ VAP-8, together with different VLAN tags for deploying subnets in Intranet. All packet flows can carry with different VLAN tags even at the same physical Ethernet port for Intranet. These flows can be directed to different destination because they have differentiated tags. The approach is very useful to group some hosts at different geographic location to be in

the same workgroup.

Tag-based VLAN is also called a VLAN Trunk. The VLAN Trunk collects all packet flows with different VLAN IDs from Router device and delivers them in the Intranet. VLAN membership in a tagged VLAN is determined by VLAN ID information within the packet frames that are received on a port. Administrator can further use a VLAN switch to separate the VLAN trunk to different groups based on VLAN ID. Following is an example.



For example, in a company, administrator schemes out 3 network segments, Lab, Meeting Rooms, and Office. In a Security VPN Gateway, administrator can configure Office segment with VLAN ID 12. The VLAN group is equipped with DHCP-3 server to construct a 192.168.12.x subnet. He also configure Meeting Rooms segment with VLAN ID 11. The VLAN group is equipped with DHCP-2 server to construct a 192.168.11.x subnet for Intranet only. That is, any client host in VLAN 11 group can't access the Internet. At last, he configures Lab segment with VLAN ID 10. The VLAN group is equipped with DHCP-1 server to construct a 192.168.10.x subnet.

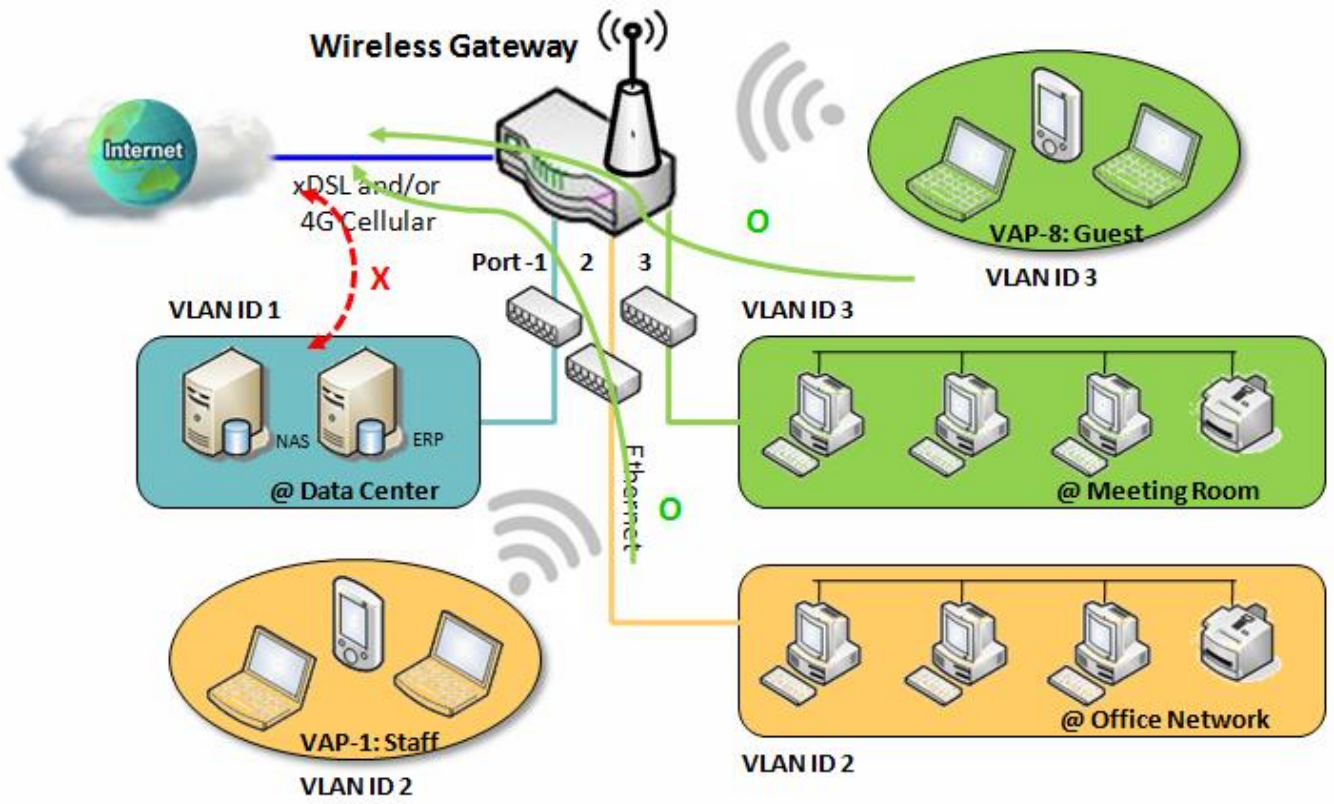


➢ VLAN Groups Access Control

Administrator can specify the Internet access permission for all VLAN groups. He can also configure which VLAN groups are allowed to communicate with each other.

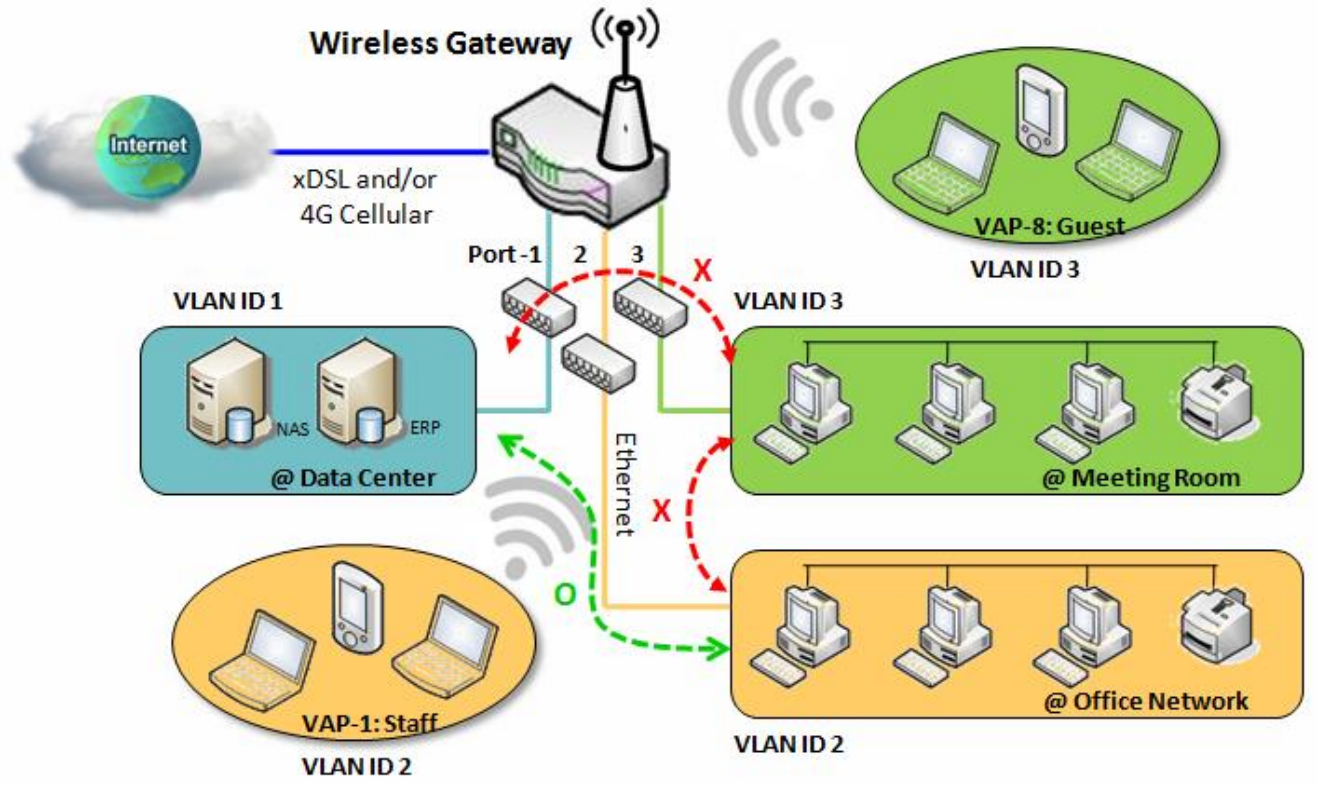
VLAN Group Internet Access

Administrator can specify members of one VLAN group to be able to access Internet or not. Following is an example that VLAN groups of VID is 2 and 3 can access Internet but the one with VID is 1 cannot access Internet. That is, visitors in meeting room and staffs in office network can access Internet. But the computers/servers in data center cannot access Internet since security consideration. Servers in data center only for trusted staffs or are accessed in secure tunnels.



Inter VLAN Group Routing:

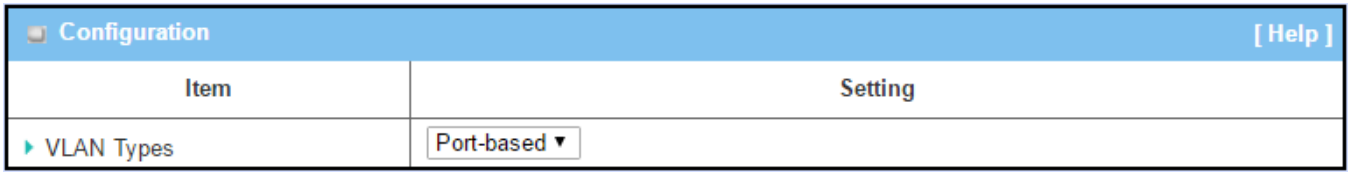
In Port-based tagging, administrator can specify member hosts of one VLAN group to be able to communicate with the ones of another VLAN group or not. This is a communication pair, and one VLAN group can join many communication pairs. But communication pair doesn't have the transitive property. That is, A can communicate with B, and B can communicate with C, it doesn't imply that A can communicate with C. An example is shown at following diagram. VLAN groups of VID is 1 and 2 can access each other but the ones between VID 1 and VID 3 and between VID 2 and VID 3 can't.



VLAN Setting

Go to Basic Network > LAN & VLAN > VLAN Tab.

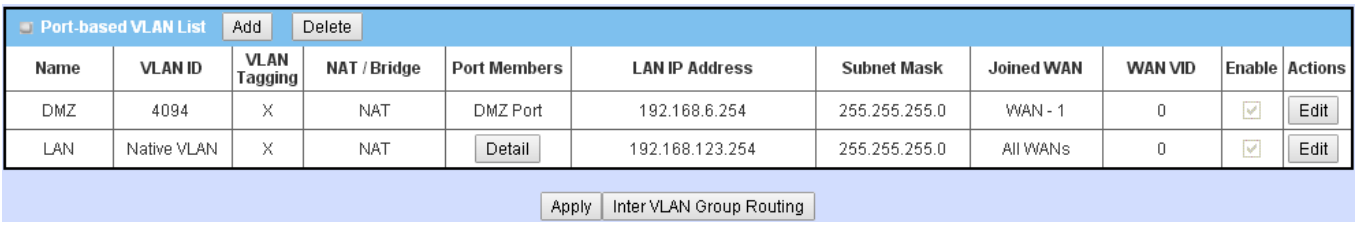
The VLAN function allows you to divide local network into different virtual LANs. There are Port-based and Tag-based VLAN types. Select one that applies.



Configuration		
Item	**Value setting**	**Description**
VLAN Type	**Port-based** is selected by default	Select the VLAN type that you want to adopt for organizing you local subnets. **Port-based**: Port-based VLAN allows you to add rule for each LAN port, and you can do advanced control with its VLAN ID. **Tag-based**: Tag-based VLAN allows you to add VLAN ID, and select member and DHCP Server for this VLAN ID. Go to **Tag-based VLAN List** table.
Save	NA	Click the **Save** button to save the configuration

Port-based VLAN – Create/Edit VLAN Rules

The port-based VLAN allows you to custom each LAN port. There is a default rule shows the configuration of all LAN ports. Also, if your device has a DMZ port, you will see DMZ configuration, too. The maxima rule numbers is based on LAN port numbers.



When **Add** button is applied, Port-based VLAN Configuration screen will appear, which is including 3 sections: **Port-based VLAN Configuration**, **IP Fixed Mapping Rule List,** and **Inter VLAN Group Routing** (enter through a button)

Port-based VLAN – Configuration

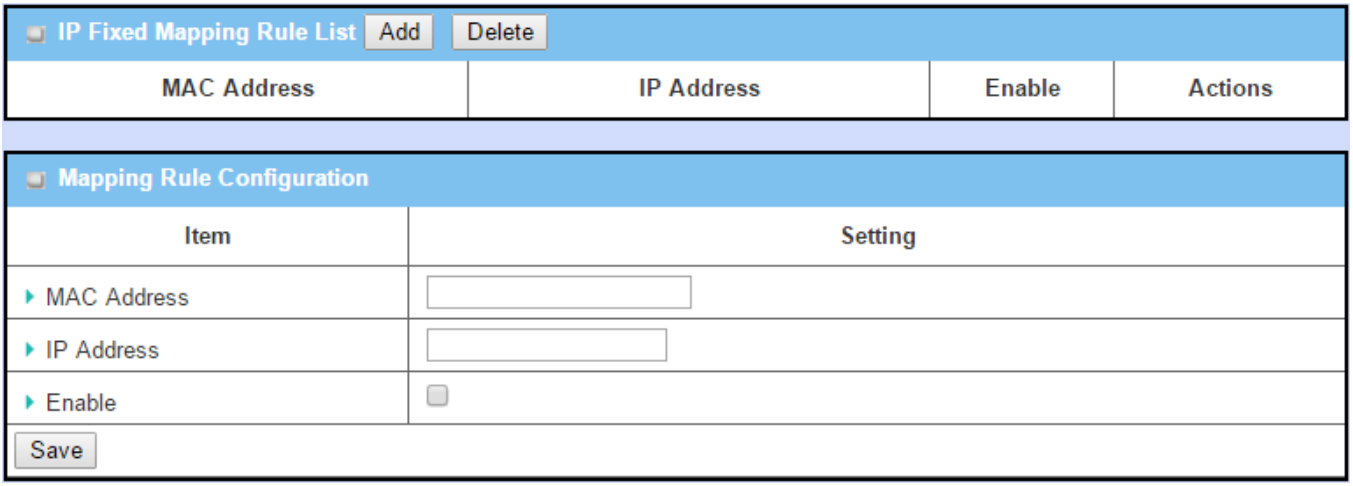
Port-based VLAN Configuration	
Item	**Setting**
Name	VLAN-1
VLAN ID	
VLAN Tagging	Disable
NAT / Bridge	NAT
Port Members	PORT2 PORT3 PORT4 VAP1 VAP2 VAP3 VAP4 VAP5 VAP6 VAP7 VAP8
WAN & WAN VID to Join	All WANs None
LAN IP Address	192.168.2.254
Subnet Mask	255.255.255.0 (/24)

DHCP Server/Relay	Server
DHCP Server Name	
IP Pool	Starting Address: 192.168.2.100 Ending Address: 192.168.2.200
Lease Time	86400 seconds
Domain Name	(Optional)
Primary DNS	(Optional)
Secondary DNS	(Optional)
Primary WINS	(Optional)
Secondary WINS	(Optional)
Gateway	(Optional)
Enable	

Port-based VLAN Configuration		
Item	**Value setting**	**Description**
Name	1. A Must filled setting 2. String format: already have default texts	Define the **Name** of this rule. It has a default text and cannot be modified.
VLAN ID	A Must filled setting	Define the VLAN ID number, range is 1~4094.
VLAN Tagging	**Disable** is selected by default.	The rule is activated according to **VLAN ID** and **Port Members** configuration when **Enable** is selected. The rule is activated according **Port Members** configuration when **Disable** is selected.
NAT / Bridge	**NAT** is selected by default.	Select **NAT** mode or **Bridge** mode for the rule.
Port Members	These box is unchecked by default.	Select which LAN port(s) and VAP(s) that you want to add to the rule. Note: The available member list can be different for the purchased product.
WAN & WAN VID to Join	**All WANs** is selected by default.	Select which **WAN** or **All WANs** that allow accessing Internet. Note: If Bridge mode is selected, you need to select a WAN and enter a VID.
LAN IP Address	A Must filled setting	Assign an **IP Address** for the DHCP Server that the rule used, this IP address is a gateway IP.
Subnet Mask	**255.255.255.0(/24)** is selected by default.	Select a **Subnet Mask** for the DHCP Server.
DHCP Server /Relay	**Server** is selected by default.	Define the **DHCP Server** type. There are three types you can select: **Server**, **Relay**, and **Disable**. **Relay**: Select **Relay** to enable DHCP Relay function for the VLAN group, and you only need to fill the **DHCP Server IP Address** field. **Server**: Select **Server** to enable DHCP Server function for the VLAN group, and you need to specify the DHCP Server settings. **Disable**: Select **Disable** to disable the DHCP Server function for the VLAN group.
DHCP Server IP Address (for DHCP **Relay** only)	A Must filled setting	If you select **Relay** type of DHCP Server, assign a **DHCP Server IP Address** that the gateway will relay the DHCP requests to the assigned DHCP server.
DHCP Server Name	A Must filled setting	Define name of the DHCP Server.
IP Pool	A Must filled setting	Define the IP Pool range. There are **Starting Address** and **Ending Address** fields. If a client requests an IP address from this DHCP Server, it will assign an IP address in the range of **IP pool**.
Lease Time	A Must filled setting	Define a period of time for an IP Address that the DHCP Server leases to a new device. By default, the **lease time** is 86400 seconds.
Domain	String format can be	The Domain Name of this DHCP Server.

Name	any text	***Value Range***: 0 ~ 31 characters.
Primary DNS	IPv4 format	The Primary DNS of this DHCP Server.
Secondary DNS	IPv4 format	The Secondary DNS of this DHCP Server.
Primary WINS	IPv4 format	The Primary WINS of this DHCP Server.
Secondary WINS	IPv4 format	The Secondary WINS of this DHCP Server.
Gateway	IPv4 format	The Gateway of this DHCP Server.
Enable	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	NA	Click the **Save** button to save the configuration
Undo	NA	Click the **Undo** button to restore what you just configured back to the previous setting.

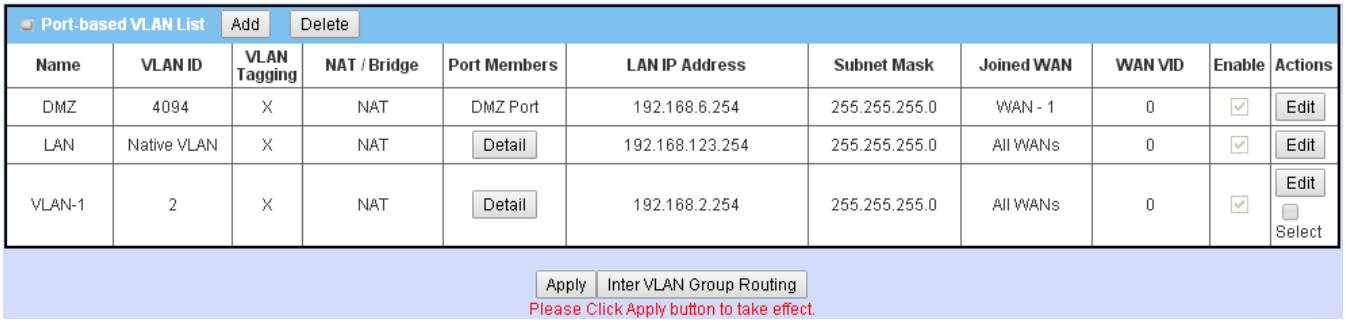
Besides, you can add some IP rules in the **IP Fixed Mapping Rule List** if DHCP Server for the VLAN groups is required.



When **Add** button is applied, **Mapping Rule Configuration** screen will appear.

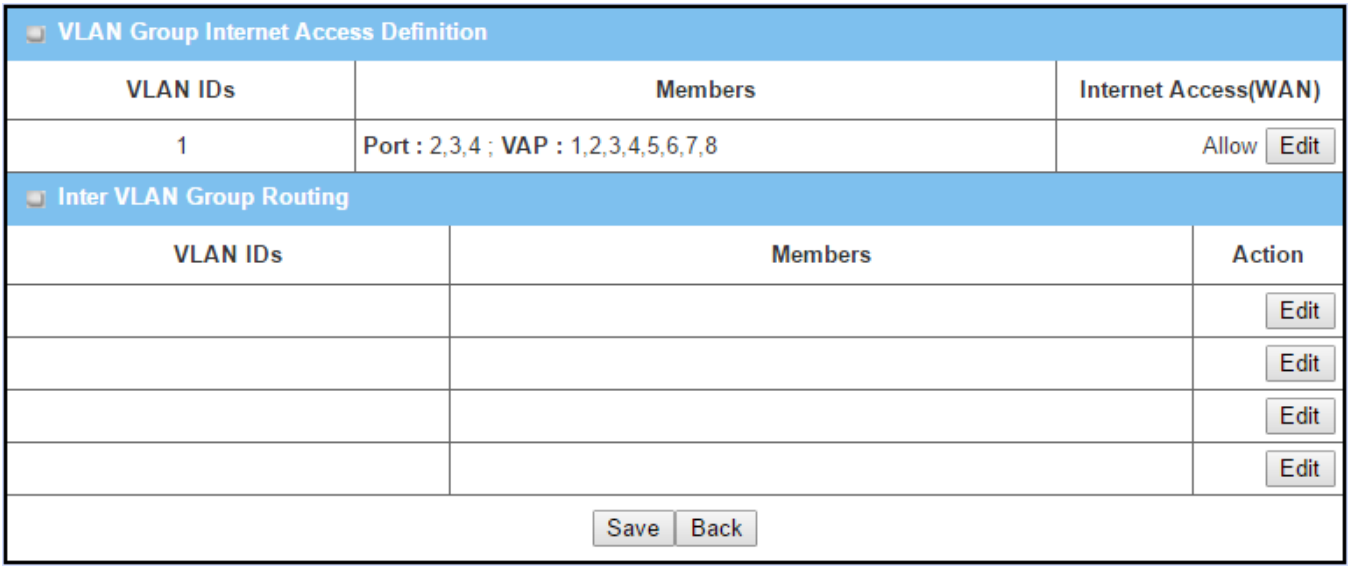
Mapping Rule Configuration		
Item	**Value setting**	**Description**
MAC Address	A Must filled setting	Define the **MAC Address** target that the DHCP Server wants to match.
IP Address	A Must filled setting	Define the **IP Address** that the DHCP Server will assign. If there is a request from the MAC Address filled in the above field, the DHCP Server will assign this **IP Address** to the client whose **MAC Address** matched the rule.
Enable	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	NA	Click the **Save** button to save the configuration

Note: ensure to always click on **Apply** button to apply the changes after the web browser refreshed taken you back to the VLAN page.

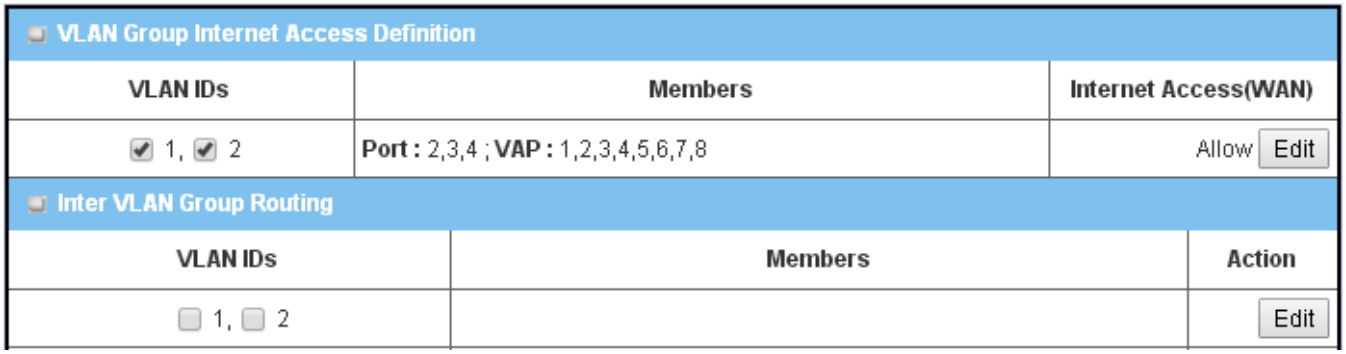


Port-based VLAN – Inter VLAN Group Routing

Click VLAN Group Routing button, the VLAN Group Internet Access Definition and Inter VLAN Group Routing screen will appear.



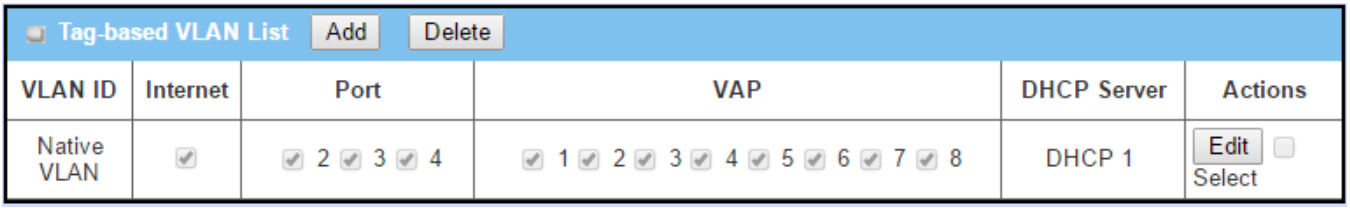
When **Edit** button is applied, a screen similar to this will appear.



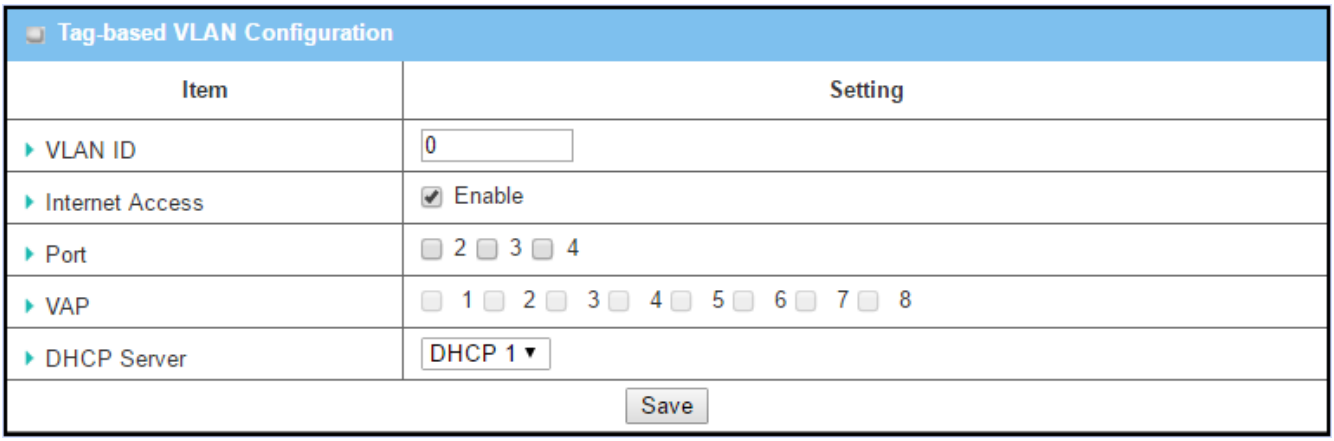
Inter VLAN Group Routing		
Item	**Value setting**	**Description**
VALN Group Internet Access Definition	All boxes are checked by default.	By default, all boxes are checked means all VLAN ID members are allow to access WAN interface. If uncheck a certain VLAN ID box, it means the VLAN ID member can't access Internet anymore. Note: VLAN ID 1 is available always; it is the default VLAN ID of LAN rule. The other VLAN IDs are available only when they are enabled.
Inter VLAN Group Routing	The box is unchecked by default.	Click the expected VLAN IDs box to enable the Inter VLAN access function. By default, members in different VLAN IDs can't access each other. The gateway supports up to 4 rules for Inter VLAN Group Routing. For example, if ID_1 and ID_2 are checked, it means members in VLAN ID_1 can access members of VLAN ID_2, and vice versa.
Save	N/A	Click the Save button to save the configuration

Tag-based VLAN – Create/Edit VLAN Rules

The **Tag-based VLAN** allows you to customize each LAN port according to VLAN ID. There is a default rule shows the configuration of all LAN ports and all VAPs. Also, if your device has a DMZ port, you will see DMZ configuration, too. The router supports up to a maximum of 128 tag-based VLAN rule sets.



When **Add** button is applied, **Tag-based VLAN Configuration** screen will appear.

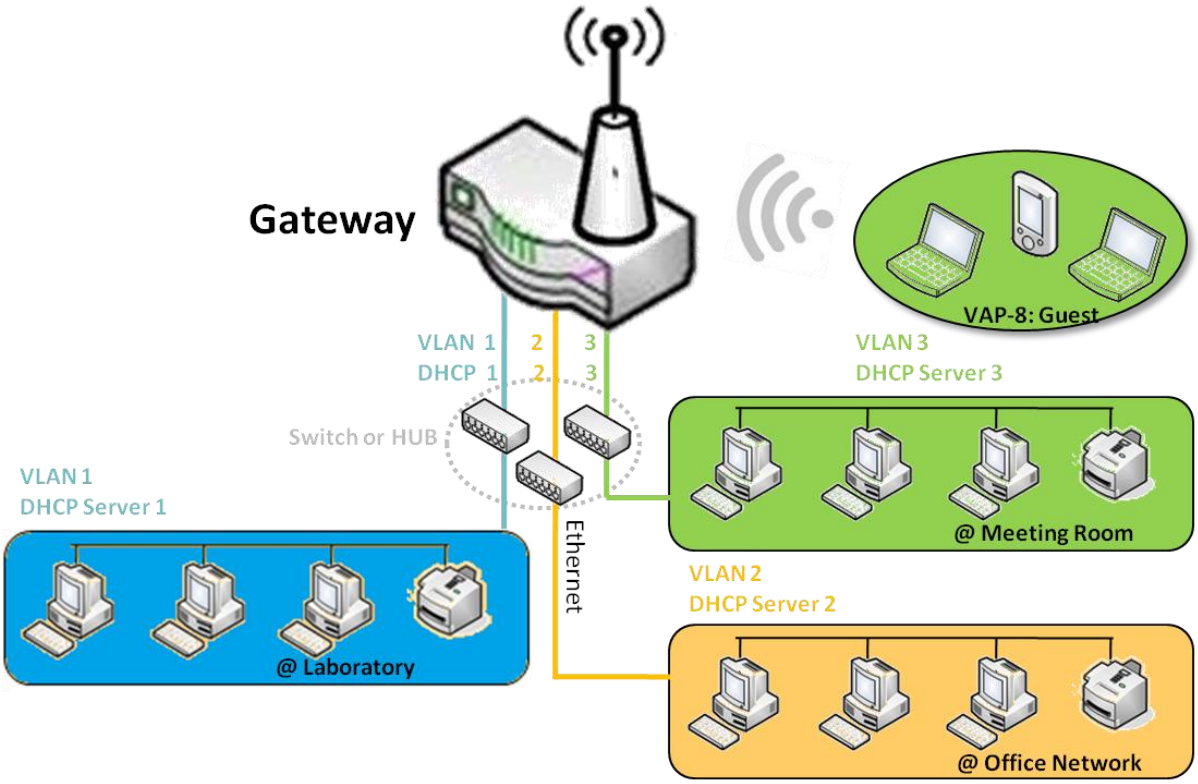


Tag-based VLAN Configuration		
Item	**Value setting**	**Description**
VALN ID	A Must filled setting	Define the **VLAN ID** number, range is 6~4094.
Internet Access	The box is checked by default.	Click **Enable** box to allow the members in the VLAN group access to internet.
Port	The box is unchecked by default.	Check the LAN port box(es) to join the VLAN group.
VAP	The box is unchecked by default.	Check the VAP box(es) to join the VLAN group. Note: Only the wireless gateway has the VAP list.
DHCP Server	**DHCP 1** is selected by default.	Select a **DHCP Server** to these members of this VLAN group. To create or edit DHCP server for VLAN, refer **to Basic Network > LAN & VLAN > DHCP Server**.
Save	N/A	Click **Save** button to save the configuration Note: After clicking **Save** button, always click **Apply** button to apply the settings.

2.2.3 DHCP Server

➢ DHCP Server

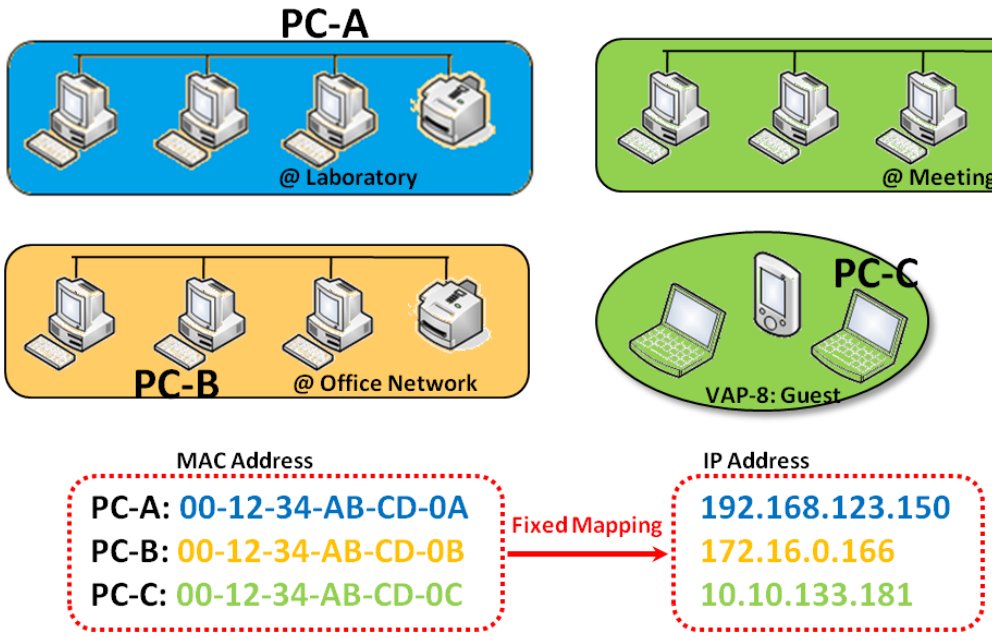
The gateway supports up to 4 DHCP servers to fulfill the DHCP requests from different VLAN groups (please refer to VLAN section for getting more usage details). And there is one default setting for whose LAN IP Address is the same one of gateway LAN interface, with its default Subnet Mask setting as “255.255.255.0”, and its default IP Pool ranges is from “.100” to “.200” as shown at the DHCP Server List page on gateway’s WEB UI.



User can add more DHCP server configurations by clicking on the “Add” button behind “DHCP Server List”, or clicking on the “Edit” button at the end of each DHCP Server on list to edit its current settings. Besides, user can select a DHCP Server and delete it by clicking on the “Select” check-box and the “Delete” button.

➢ Fixed Mapping

User can assign fixed IP address to map the specific client MAC address by select them then copy, when targets were already existed in the DHCP Client List, or to add some other Mapping



Rules by manually in advance, once the target's MAC address was not ready to connect.

DHCP Server Setting

Go to **Basic Network > LAN & VLAN > DHCP Server** Tab.

The DHCP Server setting allows user to create and customize DHCP Server policies to assign IP Addresses to the devices on the local area network (LAN).

Create / Edit DHCP Server Policy

The gateway allows you to custom your DHCP Server Policy. If multiple LAN ports are available, you can define one policy for each LAN (or VLAN group), and it supports up to a maximum of 4 policy sets.

DHCP Server List | Add | Delete | DHCP Client List | [Help]

DHCP Server Name	LAN IP Address	Subnet Mask	IP Pool	Lease Time	Domain Name	Primary DNS	Secondary DNS	Primary WINS	Secondary WINS	Gateway	Enable	Actions
DHCP 1	192.168.123.254	255.255.255.0	192.168.123.100-192.168.123.200	3600		0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	☑	Edit / Fixed Mapping

When **Add** button is applied, **DHCP Server Configuration** screen will appear.

DHCP Server Configuration

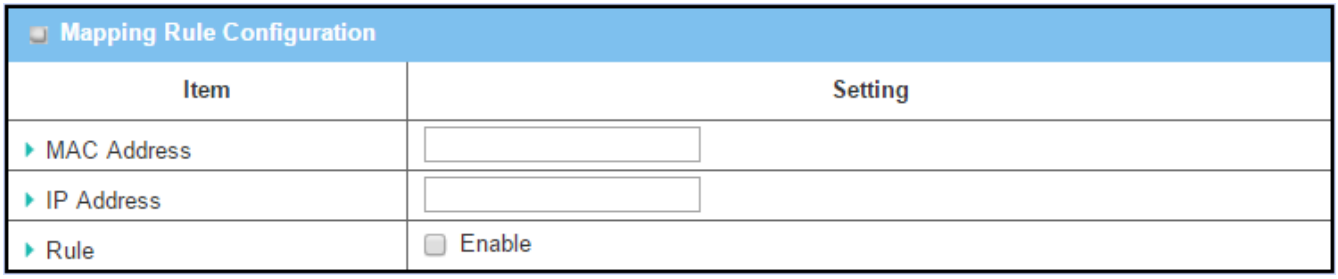
Item	Setting
DHCP Server Name	DHCP 2
LAN IP Address	192.168.2.254
Subnet Mask	255.0.0.0 (/8)
IP Pool	Starting Address: Ending Address:
Lease Time	86400 seconds
Domain Name	(Optional)
Primary DNS	(Optional)
Secondary DNS	(Optional)
Primary WINS	(Optional)
Secondary WINS	(Optional)
Gateway	(Optional)
Server	Enable

DHCP Server Configuration		
Item	**Value setting**	**Description**
DHCP Server Name	1. String format can be any text 2. A Must filled setting	Enter a DHCP Server name. Enter a name that is easy for you to understand.
LAN IP Address	1. IPv4 format. 2. A Must filled setting	The LAN IP Address of this DHCP Server.
Subnet Mask	255.0.0.0 (/8) is set by default	The Subnet Mask of this DHCP Server.
IP Pool	1. IPv4 format. 2. A Must filled setting	The IP Pool of this DHCP Server. It composed of Starting Address entered in this field and Ending Address entered in this field.
Lease Time	1. Numberic string format. 2. A Must filled setting	The Lease Time of this DHCP Server. ***Value Range*: 300 ~ 604800 seconds.**
Domain Name	String format can be any text	The Domain Name of this DHCP Server.
Primary DNS	IPv4 format	The Primary DNS of this DHCP Server.
Secondary DNS	IPv4 format	The Secondary DNS of this DHCP Server.
Primary WINS	IPv4 format	The Primary WINS of this DHCP Server.
Secondary WINS	IPv4 format	The Secondary WINS of this DHCP Server.
Gateway	IPv4 format	The Gateway of this DHCP Server.
Server	The box is unchecked by default.	Click **Enable** box to activate this DHCP Server.
Save	N/A	Click the **Save** button to save the configuration
Undo	N/A	Click the **Undo** button to restore what you just configured back to the previous setting.
Back	N/A	When the **Back** button is clicked the screen will return to the DHCP Server Configuration page.

Create / Edit Mapping Rule List on DHCP Server

The router allows you to custom your Mapping Rule List on DHCP Server. It supports up to a maximum of 64 rule sets. When **Fix Mapping** button is applied, the **Mapping Rule List** screen will appear.

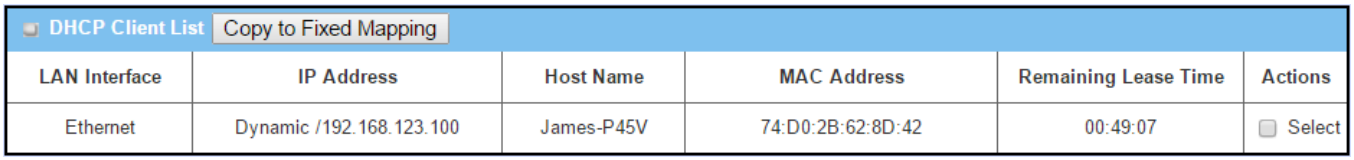
When **Add** button is applied, **Mapping Rule Configuration** screen will appear.



Mapping Rule Configuration		
Item	**Value setting**	**Description**
MAC Address	1. MAC Address string format 2. A Must filled setting	The MAC Address of this mapping rule.
IP Address	1. IPv4 format. 2. A Must filled setting	The IP Address of this mapping rule.
Rule	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	N/A	Click the **Save** button to save the configuration
Undo	N/A	Click the **Undo** button to restore what you just configured back to the previous setting.
Back	N/A	When the **Back** button is clicked the screen will return to the **DHCP Server Configuration** page.

View / Copy DHCP Client List

When **DHCP Client List** button is applied, **DHCP Client List** screen will appear.



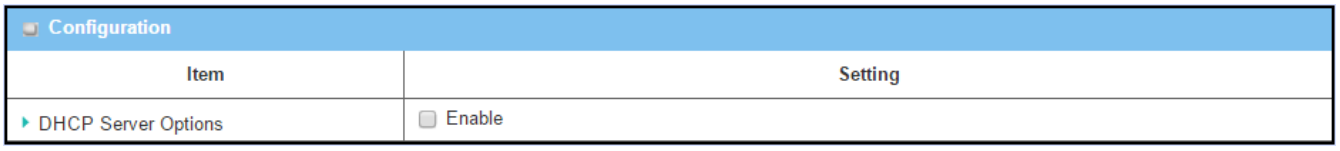
When the DHCP Client is selected and **Copy to Fixed Mapping** button is applied. The IP and MAC address of DHCP Client will apply to the Mapping Rule List on specific DHCP Server automatically.

Enable / Disable DHCP Server Options

The DHCP Server Options setting allows user to set DHCP OPTIONS 66, 72, or 114. Click the

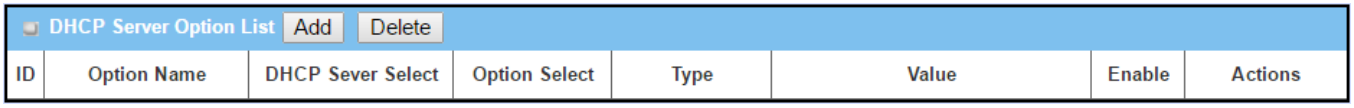
Enable button to activate the DHCP option function, and the DHCP Server will add the expected options in its sending out DHCPOFFER DHCPACK packages.

Option	Meaning	RFC
66	TFTP server name	[RFC 2132]
72	Default World Wide Web Server	[RFC 2132]
114	URL	[RFC 3679]

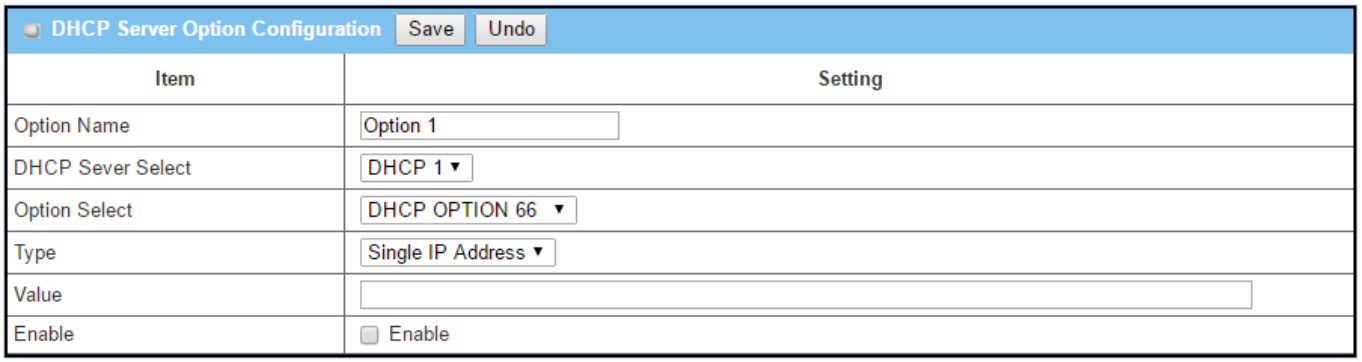


Create / Edit DHCP Server Options

The router supports up to a maximum of 99 option settings.

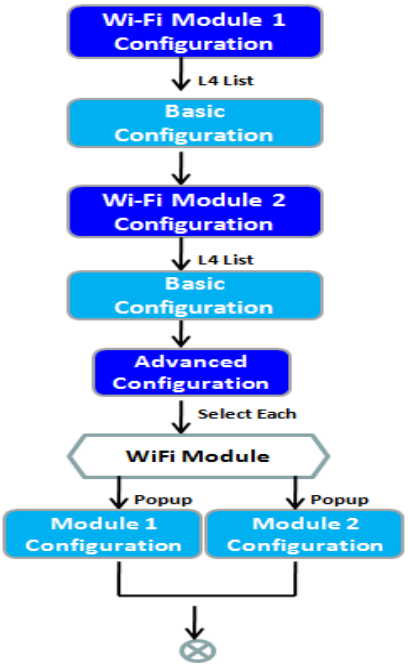


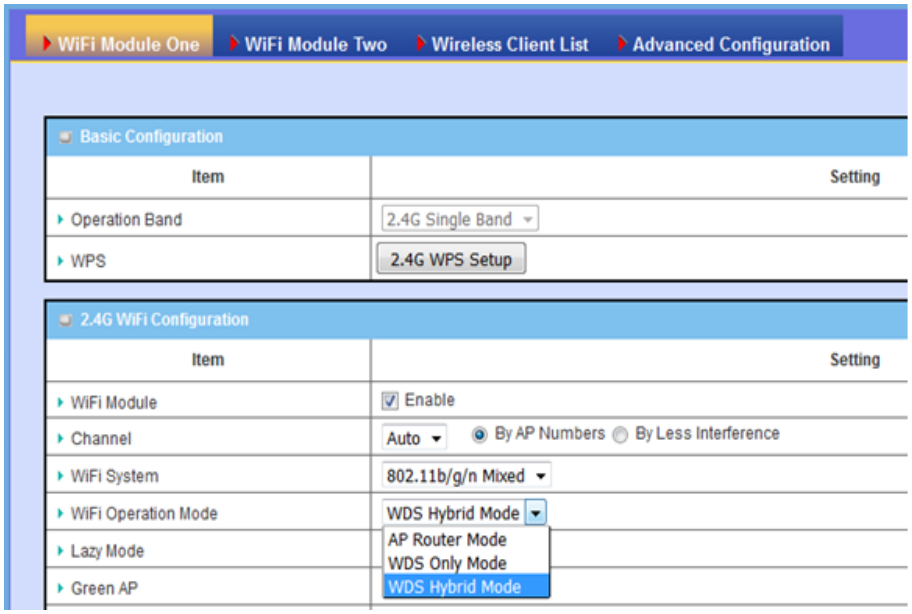
When **Add**/**Edit** button is applied, **DHCP Server Option Configuration** screen will appear.



<table>
<tr><th colspan="5">DHCP Server Option Configuration</th></tr>
<tr><th>Item</th><th>Value setting</th><th colspan="3">Description</th></tr>
<tr><td>Option Name</td><td>1. String format can be any text
2. A Must filled setting.</td><td colspan="3">Enter a DHCP Server Option name. Enter a name that is easy for you to understand.</td></tr>
<tr><td>DHCP Server Select</td><td>Dropdown list of all available DHCP servers.</td><td colspan="3">Choose the DHCP server this option should apply to.</td></tr>
<tr><td>Option Select</td><td>1. A Must filled setting.
2. Option 66 is selected by default.</td><td colspan="3">Choose the specific option from the dropdown list. It can be Option 66, Option 72, or Option 144.
Option 66 for tftp;
Option 72 for www;
Option 144 for url.</td></tr>
<tr><td rowspan="5">Type</td><td rowspan="5">Dropdown list of DHCP server option value’s type</td><td colspan="3">Each different options has different value types.</td></tr>
<tr><td rowspan="2">66</td><td colspan="2">Single IP Address</td></tr>
<tr><td colspan="2">Single FQDN</td></tr>
<tr><td>72</td><td colspan="2">IP Addresses List, separated by “,”</td></tr>
<tr><td>114</td><td colspan="2">Single URL</td></tr>
<tr><td rowspan="6">Value</td><td rowspan="6">1. IPv4 format
2. FQDN format
3. IP list
4. URL format
5. A Must filled setting</td><td colspan="3">Should conform to Type :</td></tr>
<tr><td></td><td>Type</td><td>Value</td></tr>
<tr><td rowspan="2">66</td><td>Single IP Address</td><td>IPv4 format</td></tr>
<tr><td>Single FQDN</td><td>FQDN format</td></tr>
<tr><td>72</td><td>IP Addresses List, separated by “,”</td><td>IPv4 format, separated by “,”</td></tr>
<tr><td>114</td><td>Single URL</td><td>URL format</td></tr>
<tr><td>Enable</td><td>The box is unchecked by default.</td><td colspan="3">Click Enable box to activate this setting.</td></tr>
<tr><td>Save</td><td>NA</td><td colspan="3">Click the Save button to save the setting.</td></tr>
<tr><td>Undo</td><td>NA</td><td colspan="3">When the Undo button is clicked the screen will return back with nothing changed.</td></tr>
</table>

2.3 WiFi

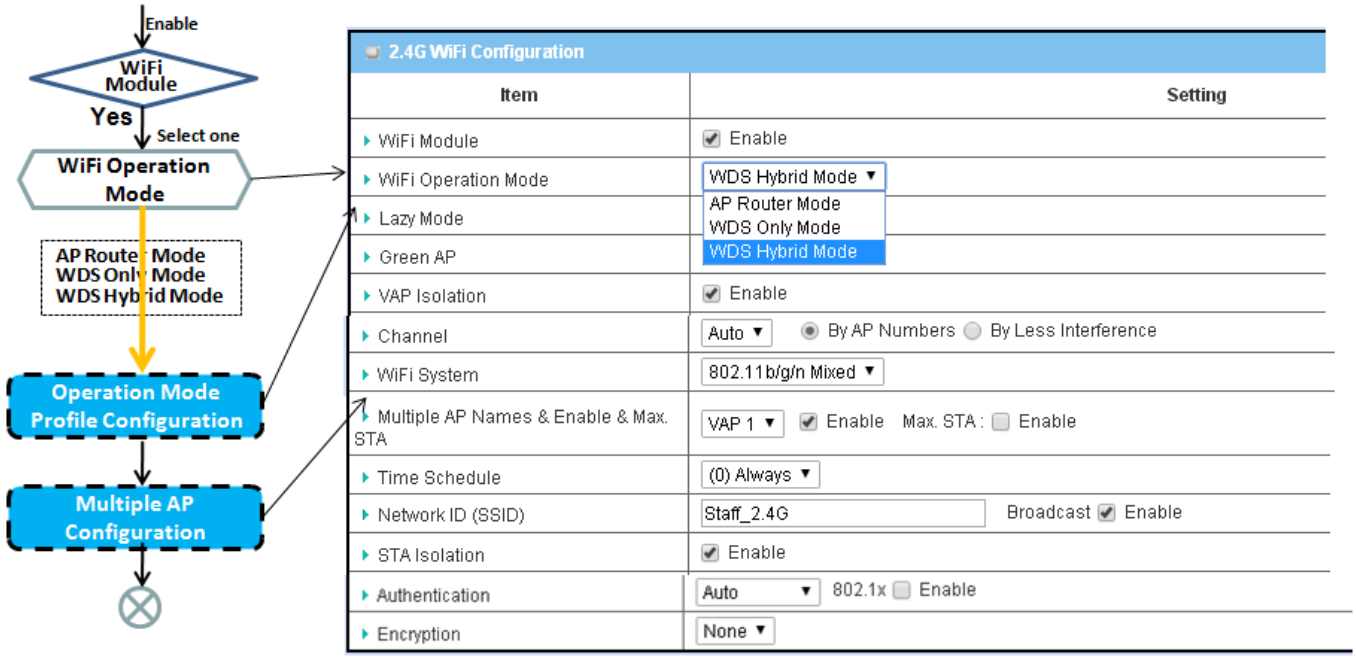




The gateway provides WiFi interface for mobile devices or BYOD devices to connect for Internet/Intranet accessing. Wi-Fi function is usually modulized design in a gateway, and there can be single or dual modules within a gateway. The WiFi system in the gateway complies with IEEE 802.11ac/11n/11g/11b standard in 2.4GHz or 5GHz single band or 2.4G/5GHz concurrent dual bands of operation. There are several wireless operation modes provided by this device. They are: "**AP Router Mode**", "**WDS Only Mode**", and "**WDS Hybrid Mode**". You can choose the expected mode from the wireless operation mode list.

There are some sub-sections for you to configure the WiFi function, including "Basic Configuration" and "Advanced Configuration". In Basic Configuration section, you have to finish almost all the settings for using the WiFi function. And the Advanced Configuration section provides more parameters for advanced user to fine tune the connectivity performance for the WiFi function.

2.3.1 WiFi Configuration

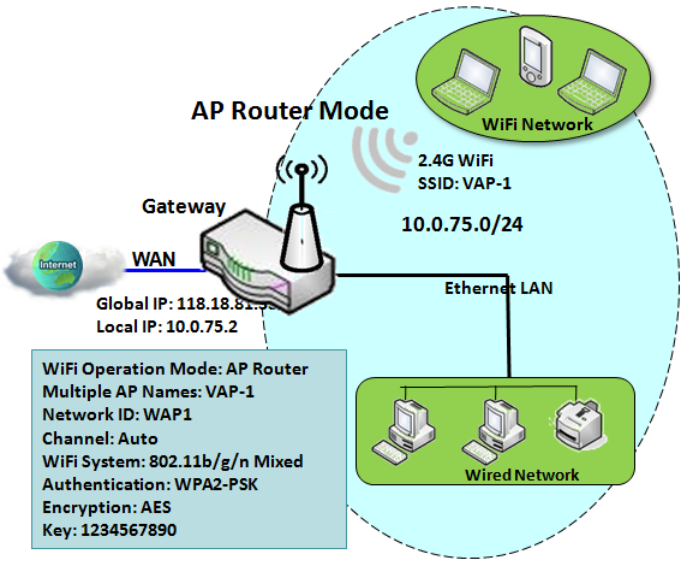


Due to optional module(s) and frequency band, you need to setup module one by one. For each module, you need to specify the operation mode, and then setup the virtual APs for wireless access.

In addition, if you configured the WiFi Uplink function in the **Basic Network > WAN & Uplink > Physical Interface** tab, the WiFi uplink function is activated. However, for the wireless LAN function of the module worked under WiFi uplink operation, it also provide AP Router function for local wireless clients to connect to wireless uplink network via the gateway.

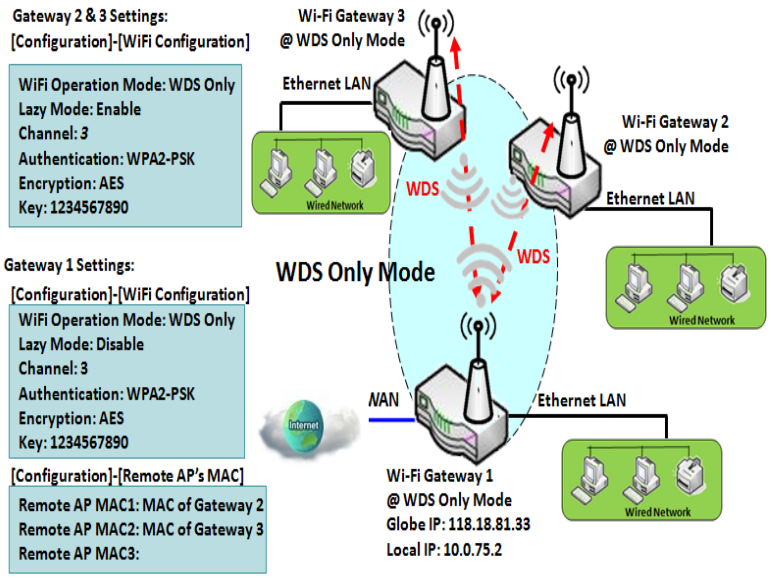
Hereunder are the scenarios for each wireless operation mode, you can get how it works, and what is the difference among them. To connect your wireless devices with the wireless gateway, make sure your application scenario for WiFi network and choose the most adequate operation mode.

AP Router Mode



This mode allows you to get your wired and wireless devices connected to form the Intranet of the wireless gateway, and the Intranet will link to the Internet with NAT mechanism of the gateway. So, this gateway is working as a WiFi AP, but also a WiFi hotspot for Internet accessing service. It means local WiFi clients can associate to it, and go to Internet. With its NAT mechanism, all of wireless clients don't need to get public IP addresses from ISP.

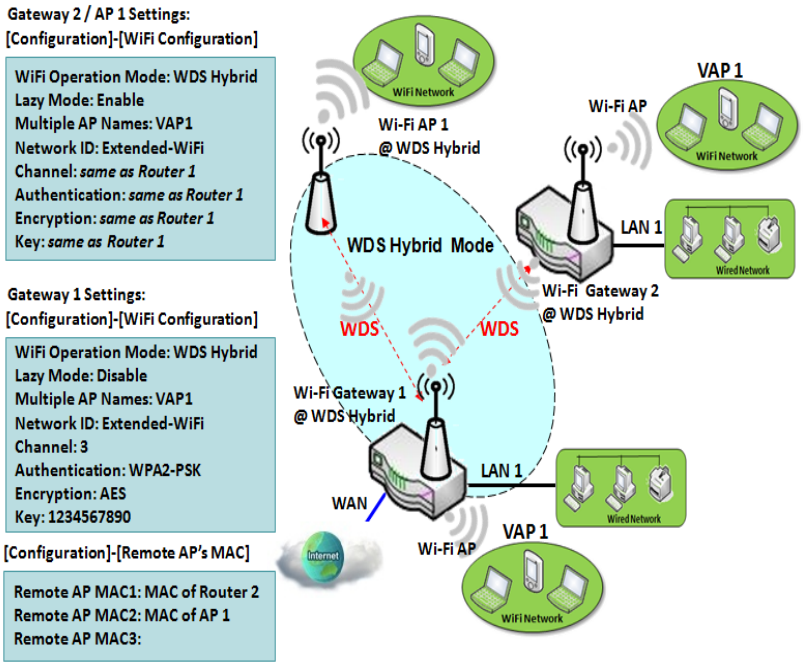
WDS Only Mode



WDS (Wireless Distributed System) Only mode drives a WiFi gateway to be a bridge for its wired Intranet and a repeater to extend distance. You can use multiple WiFi gateways as a WiFi repeater chain with all gateways setup as "WDS Only" mode. All gateways can communicate with each other through WiFi. All wired client hosts within each gateway can also communicate each other in the scenario. Only one gateway within repeater chain can be DHCP server to provide IP for all wired client hosts of every gateway which being disabled DHCP server. This gateway can be NAT router to provide internet access

The diagram illustrates that there are two wireless gateways 2, 3 running at "WDS Only" mode. They both use channel 3 to link to local Gateway 1 through WDS. Both gateways connected by WDS need to setup the remote AP MAC for each other. All client hosts under gateway 2, 3 can request IP address from the DHCP server at gateway 1. Besides, wireless Gateway 1 also execute the NAT mechanism for all client hosts Internet accessing.

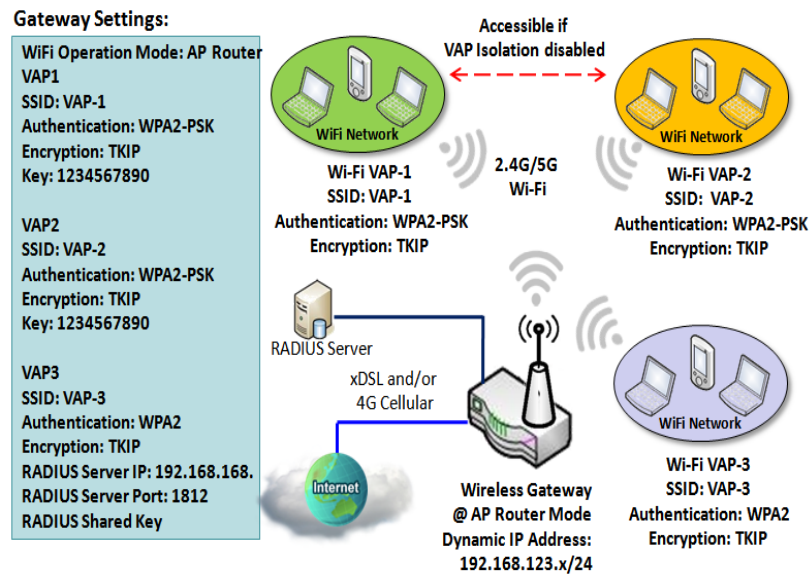
WDS Hybrid Mode



WDS hybrid mode includes both WDS and AP Router mode. WDS Hybrid mode can act as an access point for its WiFi Intranet and a WiFi bridge for its wired and WiFi Intranets at the same time. Users can thus use the features to build up a large wireless network in a large space like airports, hotels or campus.

The diagram illustrates Gateway 1, Gateway 2 and AP 1 connected by WDS. Each gateway has access point function for WiFi client access. Gateway 1 has DHCP server to assign IP to each client hosts. All gateways and AP are under WDS hybrid mode. To setup WDS hybrid mode, it need to fill all configuration items similar to that of AP-router and WDS modes.

Multiple VAPs

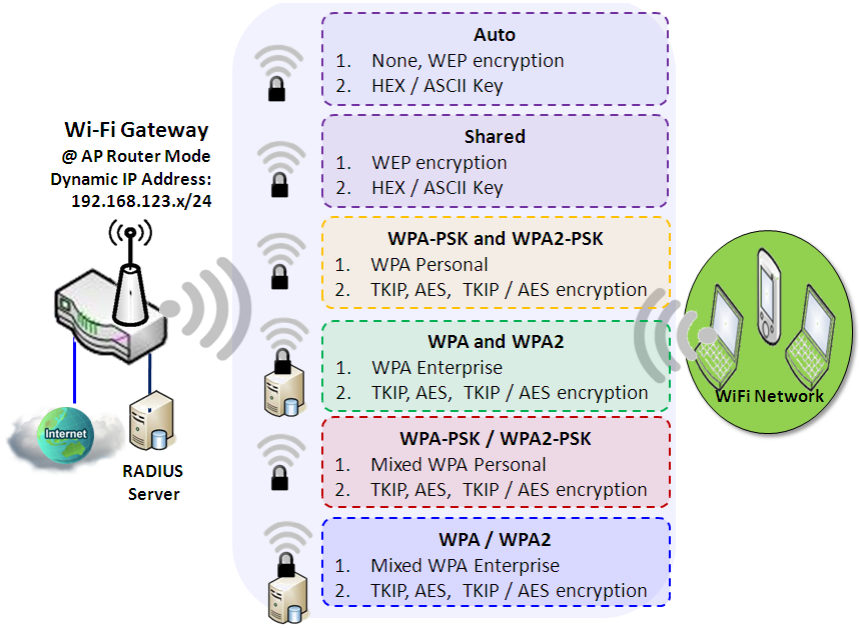


VAP (Virtual Access Point) is function to partition wireless network into multiple broadcast domains. It can simulate multiple APs in one physical AP. This wireless gateway supports up to 8 VAPs. For each VAP, you need to setup SSID, authentication and encryption to control Wi-Fi client access.

Besides, there is a VAP isolation option to manage the access among VAPs. You can allow or blocks communication for the wireless clients connected to different VAPs. As shown in the diagram, the

clients in VAP-1 and VAP-2 can communicate to each other when VAP Isolation is disabled.

Wi-Fi Security - Authentication & Encryption



Wi-Fi security provides complete authentication and encryption mechanisms to enhance the data security while your data is transferred wirelessly over the air. The wireless gateway supports Shared, WPA-PSK / WPA2-PSK and WPA / WPA2 authentication. You can select one authentication scheme to validate the wireless clients while they are connecting to the AP. As to the data encryption, the gateway supports WEP, TKIP and AES. The selected encryption algorithm will be applied to the data while the wireless connection is established.

WiFi Configuration Setting

The Wi-Fi configuration allows user to configure 2.4GHz or 5GHz WiFi settings.

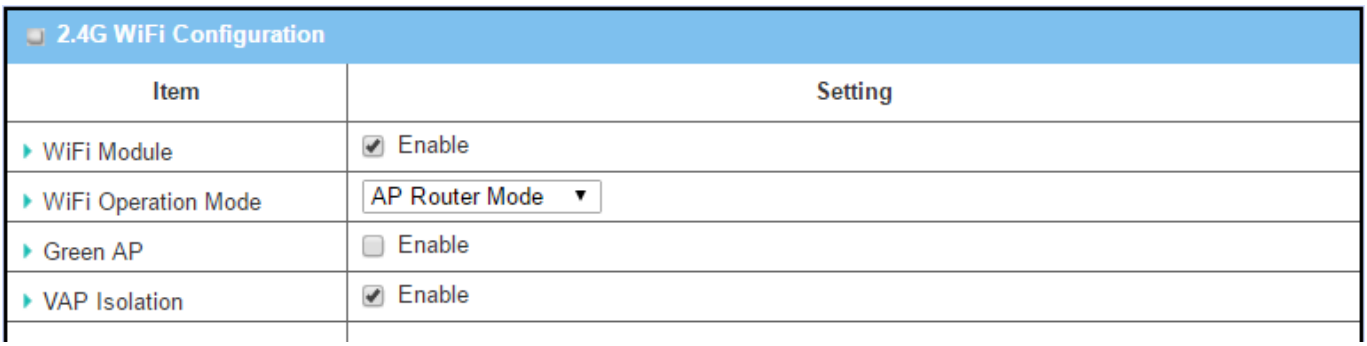
Go to **Basic Network > WiFi > WiFi Module One** Tab. If the gateway is equipped with two WiFi modules, there will be another **WiFi Module Two**. You can do the similar configurations on both WiFi modules.

Basic Configuration

Basic Configuration	[Help]
Item	Setting
Operation Band	2.4G Single Band
WPS	2.4G WPS Setup

Basic Configuration		
Item	**Value setting**	**Description**
Operation Band	A Must filled setting	Specify the intended operation band for the WiFi module. Basically, this setting is fixed and cannot be changed once the module is integrated into the product. However, there is some module with selectable band for user to choose according to his network environment. Under such situation, you can specify which operation band is suitable for the application.
WPS	N/A	Press 2.4G or 5G button will lead user to **WiFi Protected Setup** page.

Configure WiFi Setting

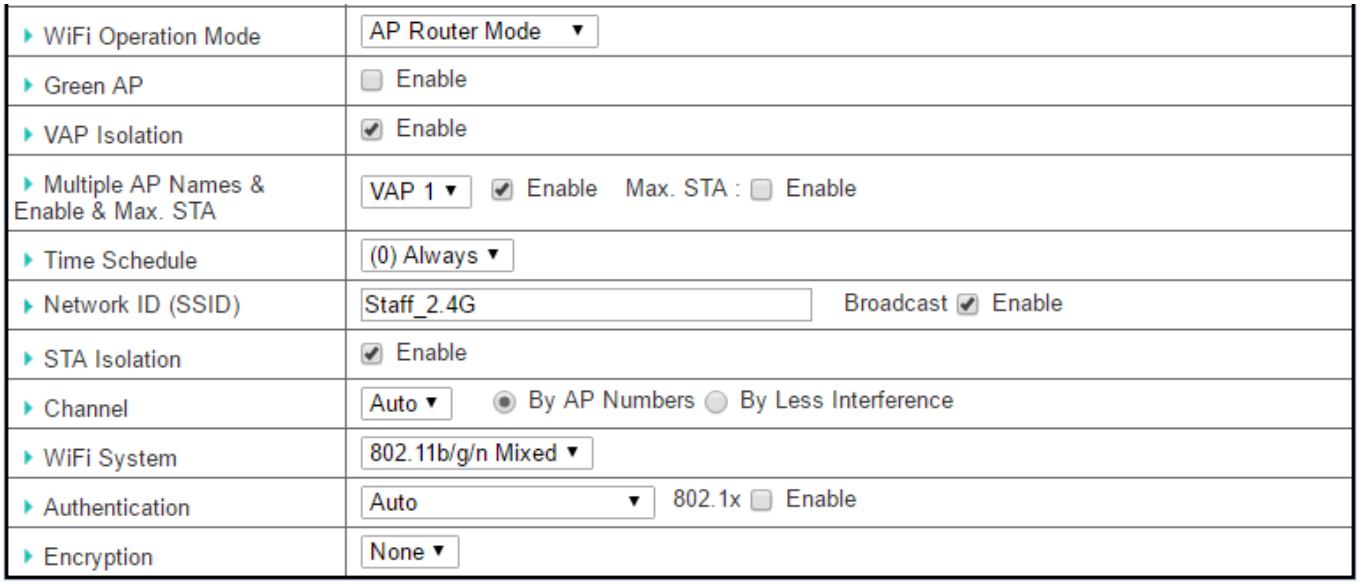


Configuring Wi-Fi Settings		
Item	**Value setting**	**Description**
WiFi Module	The box is checked by default	Check the **Enable** box to activate Wi-Fi function.
WiFi Operation Mode		Specify the **WiFi Operation Mode** according to your application. Go to the following table for **AP Router Mode**, **WDS Only Mode**, **WDS Hybrid Mode**, **Universal Repeater Mode**, **AP Only Mode**, and **Client Mode** settings. The available operation modes depend on the product specification.

In the following, the specific configuration description for each WiFi operation mode is given.

AP Router Mode

For the AP Router mode, the device not only supports **stations connection** but also the **router function**. The **WAN** port and the **NAT** function are **enabled**.



AP Router Mode		
Item	**Value setting**	**Description**
Green AP	The box is unchecked by default.	Check the **Enable** box to activate **Green AP** function.
VAP Isolation	The box is checked by default.	Check the **Enable** box to activate this function. By default, the box is checked; it means that stations which associated to different VAPs cannot communicate with each other.
Multiple AP Names	1. A Must filled setting 2. VAP1 and VAP8 are activated by default.	● **Multiple AP Names (VAP)** It means **multiple SSID** feature and the device support up to 8 **virtual SSIDs.** Select one of VAP to configure its setting at a time. ● **Enable** Check the **enable** box to activate the selected VAP. ● **Max. STA** Limit the maximum number of client station. Check this box and enter a limitation. The box is unchecked (unlimited) by default.
Time Schedule	A Must filled setting	Apply a specific **Time Schedule** to this rule; otherwise leave it as **(0) Always**. If the dropdown list is empty ensure **Time Schedule** is pre-configured. Refer to **Object Definition** > **Scheduling > Configuration** tab.
Network ID (SSID)	1. String format : Any text 2. The box is checked by default.	Enter the SSID for the VAP, and decide whether to broadcast the SSID or not. The **SSID** is used for identifying from another AP, and client stations will associate with AP according to SSID. If the broadcast SSID option is enabled, it means the SSID will be broadcasted, and the stations can associate with this device by scanning SSID.
STA Isolation	The box is checked by default.	Check the **Enable** box to activate this function. By default, the box is checked; it means that stations which associated to the same VAP cannot communicate with each

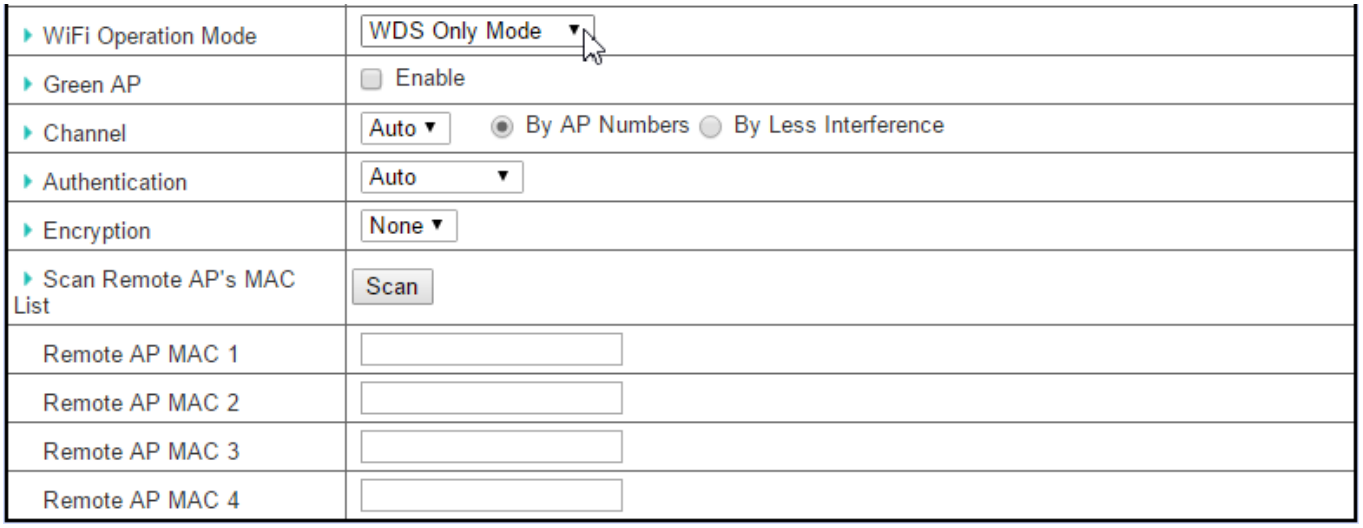
		other.
Channel	1. A Must filled setting. 2. **Auto** is selected be default.	Select a radio channel for the VAP. Each channel is corresponding to different radio band. The permissible channels depend on the **Regulatory Domain**. There are two available options when **Auto** is selected: ● **By AP Numbers** The channel will be selected according to AP numbers (The less, the better). ● **By Less Interference** The channel will be selected according to interference. (The lower, the better).
WiFi System	A Must filled setting	Specify the preferred WiFi System. The dropdown list of **WiFi system** is based on **IEEE 802.11** standard. ● **2.4G Wi-Fi** can select b, g and n only or mixed with each other. ● **5G Wi-Fi** can select a, n and ac only or mixed with each other.
Authentication	1. A Must filled setting 2. **Auto** is selected be default.	For security, there are several authentication methods supported. Client stations should provide the key when associate with this device.
		When **Open** is selected The check box named **802.1x** shows up next to the dropdown list. ● **802.1x** (The box is unchecked by default) When **802.1x** is enabled, it means the client stations will be authenticated by RADIUS server. **RADIUS Server IP** (The default IP is 0.0.0.0) **RADIUS Server Port** (The default value is 1812) **RADIUS Shared Key**
		When **Shared** is selected The pre-shared WEP key should be set for authenticating.
		When **Auto** is selected The device will select **Open** or **Shared** by requesting of client automatically. The check box named **802.1x** shows up next to the dropdown list. ● **802.1x** (The box is unchecked by default) When **802.1x** is enabled, it means the client stations will be authenticated by RADIUS server. **RADIUS Server IP** (The default IP is 0.0.0.0) **RADIUS Server Port** (The default value is 1812) **RADIUS Shared Key**
		When **WPA** or **WPA2** is selected They are implementation of IEEE 802.11i. **WPA** only had implemented part of IEEE 802.11i, but owns the better **compatibility**. **WPA2** had fully implemented 802.11i standard, and owns the highest **security**. ● **RADIUS Server** The client stations will be authenticated by RADIUS server. **RADIUS Server IP** (The default IP is 0.0.0.0) **RADIUS Server Port** (The default value is 1812)

		RADIUS Shared Key
		When **WPA** / **WPA2** is selected It owns the same setting as **WPA** or **WPA2**. The client stations can associate with this device via **WPA** or **WPA2**.
		When **WPA-PSK** or **WPA2-PSK** is selected It owns the same encryption system as WPA or WPA2. The authentication uses pre-shared key instead of RADIUS server.
		When **WPA-PSK** / **WPA2-PSK** is selected It owns the same setting as **WPA-PSK** or **WPA2-PSK**. The client stations can associate with this device via **WPA-PSK** or **WPA2-PSK**.
Encryption	1. A Must filled setting. 2. **None** is selected be default.	Select a suitable encryption method and enter the required key(s). The available method in the dropdown list depends on the Authentication you selected. **None** It means that the device is open system without encrypting. **WEP** Up to 4 WEP keys can be set, and you have to select one as current key. The key type can set to **HEX** or **ASCII**. If **HEX** is selected, the key should consist of (0 to 9) and (A to F). If **ASCII** is selected, the key should consist of ASCII table. **TKIP** TKIP was proposed instead of WEP without upgrading hardware. Enter a Pre-shared Key for it. The length of key is from 8 to 63 characters. **AES** The newest encryption system in WiFi, it also designed for the fast 802.11n high bitrates schemes. Enter a Pre-shared Key for it. The length of key is from 8 to 63 characters. You are recommended to use **AES** encryption instead of any others for security. **TKIP / AES** **TKIP / AES** mixed mode. It means that the client stations can associate with this device via **TKIP** or **AES**. Enter a Pre-shared Key for it. The length of key is from 8 to 63 characters.
Save	N/A	Click the **Save** button to save the current configuration.
Undo	N/A	Click the **Undo** button to restore configuration to previous setting before saving.
Apply	N/A	Click the **Apply** button to apply the saved configuration.

WDS Only Mode

For the WDS Only mode, the device only bridges the connected wired clients to another WDS-enabled Wi-Fi device which the device associated with. That is, it also means the no wireless

clients stat can connect to this device while WDS Only Mode is selected.

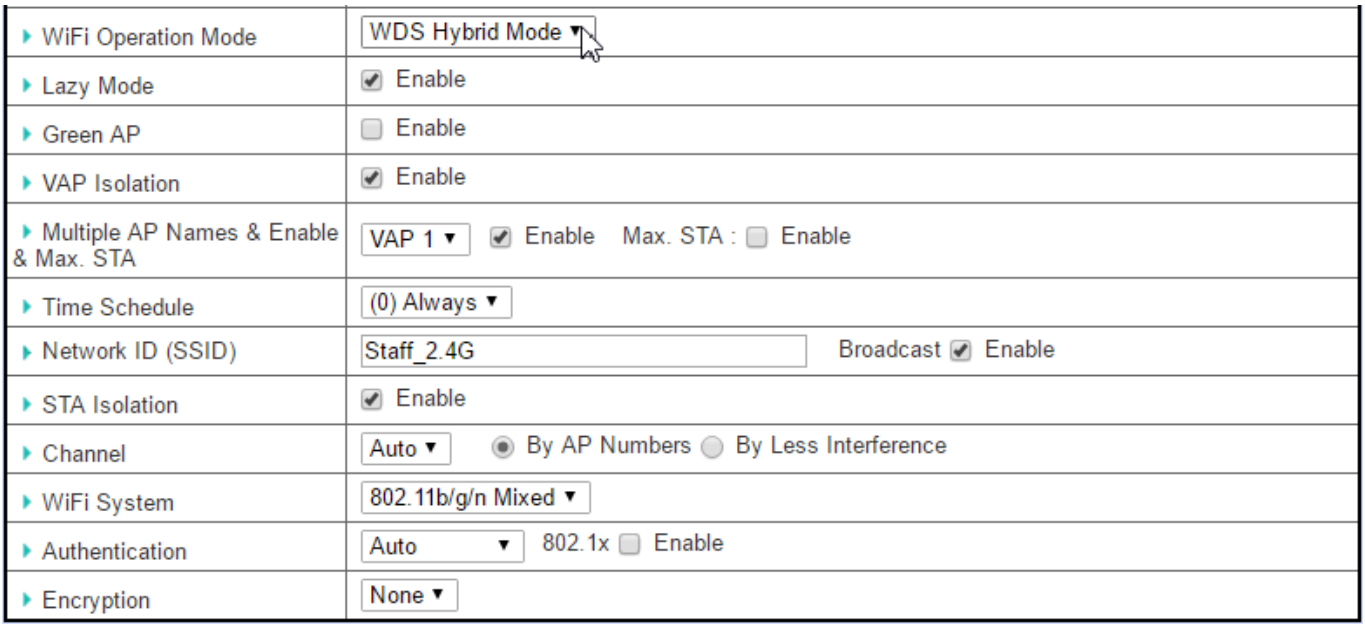


WDS Only Mode		
Item	**Value setting**	**Description**
Green AP	The box is unchecked by default.	Check the **Enable** box to activate **Green AP** function.
Channel	1. A Must filled setting. 2. **Auto** is selected be default.	Select a radio channel for the VAP. Each channel is corresponding to different radio band. The permissible channels depend on the **Regulatory Domain**. There are two available options when **Auto** is selected: ● **By AP Numbers** The channel will be selected according to AP numbers (The less, the better). ● **By Less Interference** The channel will be selected according to interference. (The lower, the better).
Authentication	1. A Must filled setting 2. **Auto** is selected be default.	For security, there are several authentication methods supported. Client stations should provide the key when associate with this device.
		When **Open** is selected The check box named **802.1x** shows up next to the dropdown list. ● **802.1x** (The box is unchecked by default) When **802.1x** is enabled, it means the client stations will be authenticated by RADIUS server. **RADIUS Server IP** (The default IP is 0.0.0.0) **RADIUS Server Port** (The default value is 1812) **RADIUS Shared Key**
		When **Shared** is selected The pre-shared WEP key should be set for authenticating.
		When **Auto** is selected The device will select **Open** or **Shared** by requesting of client automatically. The check box named **802.1x** shows up next to the dropdown list.

		● **802.1x** (The box is unchecked by default) When **802.1x** is enabled, it means the client stations will be authenticated by RADIUS server. **RADIUS Server IP** (The default IP is 0.0.0.0) **RADIUS Server Port** (The default value is 1812) **RADIUS Shared Key**
		When **WPA-PSK** is selected It owns the same encryption system as WPA. The authentication uses pre-shared key instead of RADIUS server.
		When **WPA2-PSK** is selected It owns the same encryption system as WPA2. The authentication uses pre-shared key instead of RADIUS server.
Encryption	1. A Must filled setting. 2. **None** is selected be default.	Select a suitable encryption method and enter the required key(s). The available method in the dropdown list depends on the Authentication you selected. **None** It means that the device is open system without encrypting. **WEP** Up to 4 WEP keys can be set, and you have to select one as current key. The key type can set to **HEX** or **ASCII**. If **HEX** is selected, the key should consist of (0 to 9) and (A to F). If **ASCII** is selected, the key should consist of ASCII table. **TKIP** TKIP was proposed instead of WEP without upgrading hardware. Enter a Pre-shared Key for it. The length of key is from 8 to 63 characters. **AES** The newest encryption system in WiFi, it also designed for the fast 802.11n high bitrates schemes. Enter a Pre-shared Key for it. The length of key is from 8 to 63 characters. You are recommended to use **AES** encryption instead of any others for security.
Scan Remote AP's MAC List	N/A	Press the **Scan** button to scan the spatial AP information, and then select one from the AP list, the MAC of selected AP will be auto filled in the following Remote AP MAC table.
Remote AP MAC 1~4	A Must filled setting	Enter the remote AP's MAC manually, or via auto-scan approach, The device will bridge the traffic to the remote AP when associated successfully.
Save	N/A	Click the **Save** button to save the current configuration.
Undo	N/A	Click the **Undo** button to restore configuration to previous setting before saving.
Apply	N/A	Click the **Apply** button to apply the saved configuration.

WDS Hybrid Mode

For the WDS Hybrid mode, the device bridges all the wired **LAN** and **WLAN** clients to another WDS or WDS hybrid enabled Wi-Fi devices which the device associated with.



WDS Hybrid Mode		
Item	**Value setting**	**Description**
Lazy Mode	The box is checked by default.	Check the **Enable** box to activate this function. With the function been enabled, the device can auto-learn WDS peers without manually entering other AP's MAC address. But at least one of the APs has to fill remote AP MAC addresses.
Green AP	The box is unchecked by default.	Check the **Enable** box to activate **Green AP** function.
VAP Isolation	The box is checked by default.	Check the **Enable** box to activate this function. By default, the box is checked; it means that stations which associated to different VAPs cannot communicate with each other.
Multiple AP Names	1. A Must filled setting 2. VAP1 and VAP8 are activated by default.	● **Multiple AP Names (VAP)** It means **multiple SSID** feature and the device support up to 8 **virtual SSIDs.** Select one of VAP to configure its setting at a time. ● **Enable** Check the **enable** box to activate the selected VAP. ● **Max. STA** Limit the maximum number of client station. Check this box and enter a limitation. The box is unchecked (unlimited) by default.
Time Schedule	A Must filled setting	Apply a specific **Time Schedule** to this rule; otherwise leave it as **(0) Always**. If the dropdown list is empty ensure **Time Schedule** is pre-configured. Refer to **Object Definition** > **Scheduling > Configuration** tab.
Network ID (SSID)	1. String format : Any text 2. The box is	Enter the SSID for the VAP, and decide whether to broadcast the SSID or not. The **SSID** is used for identifying from another AP, and client

	checked by default.	stations will associate with AP according to SSID. If the broadcast SSID option is enabled, it means the SSID will be broadcasted, and the stations can associate with this device by scanning SSID.
STA Isolation	The box is checked by default.	Check the **Enable** box to activate this function. By default, the box is checked; it means that stations which associated to the same VAP cannot communicate with each other.
Channel	1. A Must filled setting. 2. **Auto** is selected be default.	Select a radio channel for the VAP. Each channel is corresponding to different radio band. The permissible channels depend on the **Regulatory Domain**. There are two available options when **Auto** is selected: ● **By AP Numbers** The channel will be selected according to AP numbers (The less, the better). ● **By Less Interference** The channel will be selected according to interference. (The lower, the better).
WiFi System	A Must filled setting	Specify the preferred WiFi System. The dropdown list of **Wi-Fi system** is based on **IEEE 802.11** standard. ● **2.4G Wi-Fi** can select b, g and n only or mixed with each other. ● **5G Wi-Fi** can select a, n and ac only or mixed with each other.
Authentication	1. A Must filled setting 2. **Auto** is selected be default.	For security, there are several authentication methods supported. Client stations should provide the key when associate with this device.
		When **Open** is selected The check box named **802.1x** shows up next to the dropdown list. ● **802.1x** (The box is unchecked by default) When **802.1x** is enabled, it means the client stations will be authenticated by RADIUS server. **RADIUS Server IP** (The default IP is 0.0.0.0) **RADIUS Server Port** (The default value is 1812) **RADIUS Shared Key**
		When **Shared** is selected The pre-shared WEP key should be set for authenticating.
		When **Auto** is selected The device will select **Open** or **Shared** by requesting of client automatically. The check box named **802.1x** shows up next to the dropdown list. ● **802.1x** (The box is unchecked by default) When **802.1x** is enabled, it means the client stations will be authenticated by RADIUS server. **RADIUS Server IP** (The default IP is 0.0.0.0) **RADIUS Server Port** (The default value is 1812) **RADIUS Shared Key**
		When **WPA-PSK** is selected It owns the same encryption system as WPA. The authentication uses pre-shared key instead of RADIUS server.

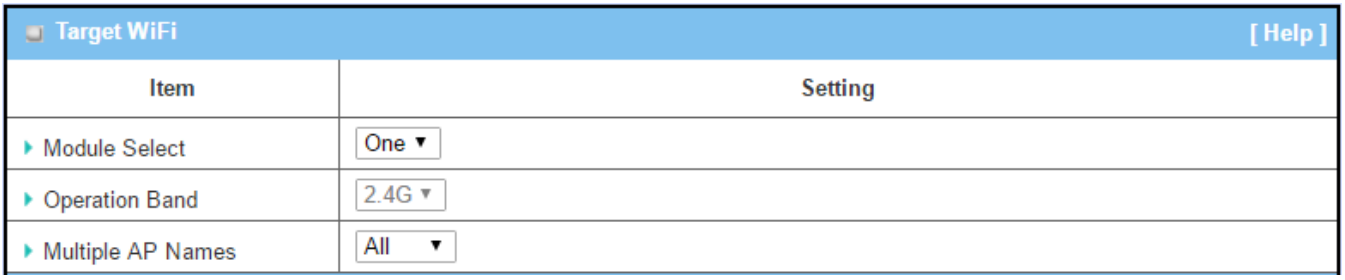
		When **WPA2-PSK** is selected It owns the same encryption system as WPA2. The authentication uses pre-shared key instead of RADIUS server.
Encryption	1. A Must filled setting. 2. **None** is selected be default.	Select a suitable encryption method and enter the required key(s). The available method in the dropdown list depends on the Authentication you selected. **None** It means that the device is open system without encrypting. **WEP** Up to 4 WEP keys can be set, and you have to select one as current key. The key type can set to **HEX** or **ASCII**. If **HEX** is selected, the key should consist of (0 to 9) and (A to F). If **ASCII** is selected, the key should consist of ASCII table. **TKIP** TKIP was proposed instead of WEP without upgrading hardware. Enter a Pre-shared Key for it. The length of key is from 8 to 63 characters. **AES** The newest encryption system in WiFi, it also designed for the fast 802.11n high bitrates schemes. Enter a Pre-shared Key for it. The length of key is from 8 to 63 characters. You are recommended to use **AES** encryption instead of any others for security.
Save	N/A	Click the **Save** button to save the current configuration.
Undo	N/A	Click the **Undo** button to restore configuration to previous setting before saving.
Apply	N/A	Click the **Apply** button to apply the saved configuration.

2.3.2 Wireless Client List

The **Wireless Client List** page shows the information of wireless clients which are associated with this device.

Go to **Basic Network > WiFi > Wireless Client List** Tab.

Select Target WiFi



Target Configuration		
Item	**Value setting**	**Description**
Module Select	A Must filled setting.	Select the WiFi module to check the information of connected clients. For those single WiFi module products, this option is hidden.
Operation Band	A Must filled setting.	Specify the intended operation band for the WiFi module. Basically, this setting is fixed and cannot be changed once the module is integrated into the product. However, there is some module with selectable band for user to choose according to his network environment. Under such situation, you can specify which operation band is suitable for the application.
Multiple AP Names	1. A Must filled setting. 2. **All** is selected by default.	Specify the VAP to show the associated clients information in the following Client List. By default, All VAP is selected.

Show Client List

The following Client List shows the information for wireless clients that is associated with the selected VAP(s).

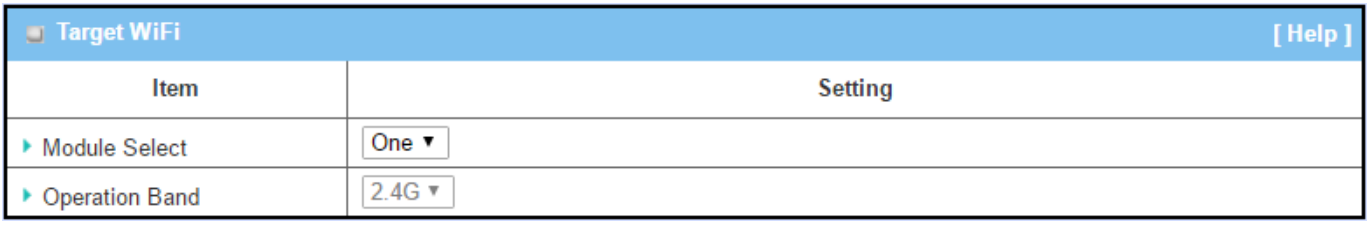
Target Configuration		
Item	**Value setting**	**Description**
IP Address Configuration & Address	N/A	It shows the Client's IP address and the deriving method. **Dynamic** means the IP address is derived from a DHCP server. **Static** means the IP address is a fixed one that is self-filled by client.
Host Name	N/A	It shows the host name of client.
MAC Address	N/A	It shows the MAC address of client.
Mode	N/A	It shows what kind of **Wi-Fi system** the client used to associate with this device.
Rate	N/A	It shows the **data rate** between client and this device.
RSSI0, RSSI1	N/A	It shows the RX sensitivity (RSSI) value for each radio path.
Signal	N/A	The **signal strength** between client and this device.
Interface	N/A	It shows the VAP ID that the client associated with.
Refresh	N/A	Click the **Refresh** button to update the Client List immediately.

2.3.3 Advanced Configuration

This device provides advanced wireless configuration for professional user to optimize the wireless performance under the specific installation environment. Please note that if you are not familiar with the WiFi technology, just leave the advanced configuration with its default values, or the connectivity and performance may get worse with improper settings.

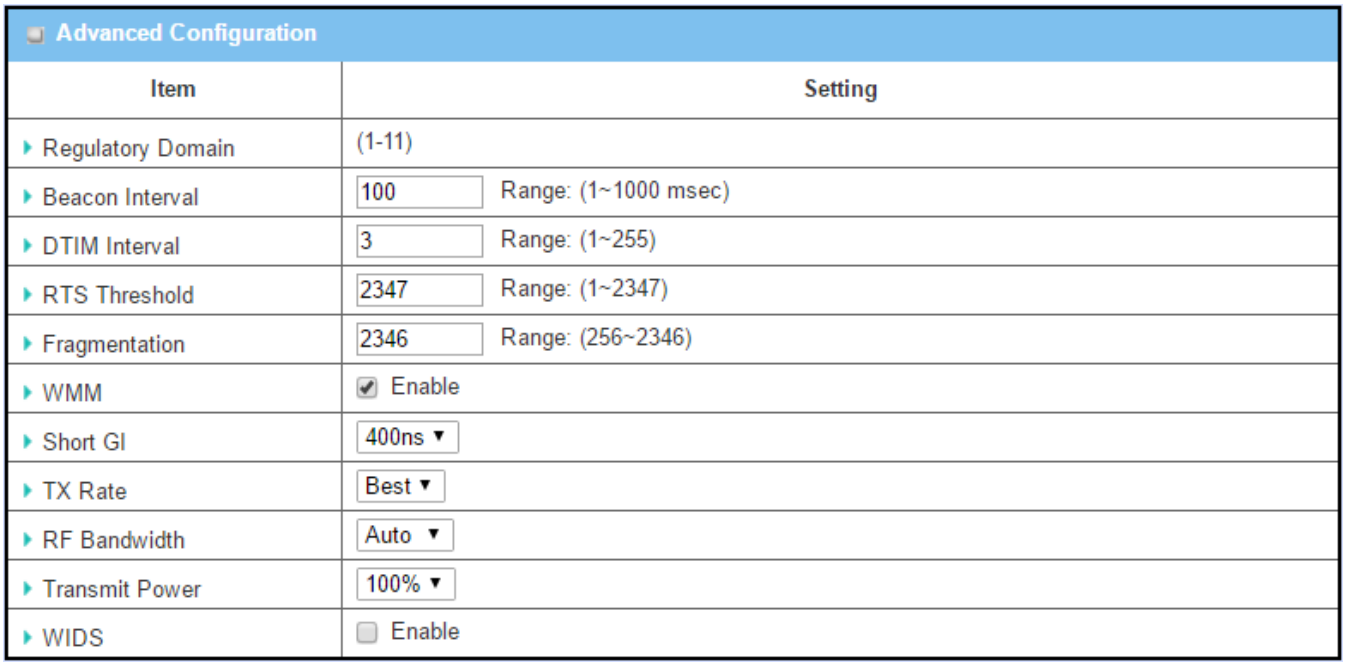
Go to **Basic Network > WiFi > Advanced Configuration** Tab.

Select Target WiFi



Target Configuration		
Item	**Value setting**	**Description**
Module Select	A Must filled setting.	Select the WiFi module to check the information of connected clients. For those single WiFi module products, this option is hidden.
Operation Band	A Must filled setting.	Specify the intended operation band for the WiFi module. Basically, this setting is fixed and cannot be changed once the module is integrated into the product. However, there is some module with selectable band for user to choose according to his network environment.

Setup Advanced Configuration



Advanced Configuration		
Item	**Value setting**	**Description**
Regulatory Domain	The default setting is according to where the product sale to	It limits the available radio channel of this device. The permissible channels depend on the **Regulatory Domain**.
Beacon Interval	100	It shows the time interval between each beacon packet broadcasted. The beacon packet contains **SSID**, **Channel ID** and **Security setting**.
DTIM Interval	3	A **DTIM (Delivery Traffic Indication Message)** is a countdown informing clients of the next window for listening to broadcast message. When the device has buffered broadcast message for associated client, it sends the next DTIM with a DTIM value.

RTS Threshold	2347	**RTS (Request to send) Threshold** means when the packet size is over the setting value, then active **RTS** technique. RTS/CTS is a **collision avoidance** technique. It means RTS **never** activated when the threshold is set to **2347**.
Fragmentation	2346	Wireless frames can be divided into smaller units (fragments) to **improve performance** in the presence of RF interference at the limits of RF coverage.
WMM	The box is checked by default	**WMM (Wi-Fi Multimedia)** can help control **latency** and **jitter** when transmitting **multimedia content** over a wireless connection.
Short GI	By default **400ns** is selected	**Short GI (Guard Interval)** is defined to set the sending interval between each packet. Note that lower **Short GI** could **increase** not only the **transition rate** but also **error rate**.
TX Rate	By default **Best** is selected	It means the **data transition rate**. When **Best** is selected, the device will choose a proper **data rat**e according to **signal strength**.
RF Bandwidth	By default **Auto** is selected	The setting of RF bandwidth limits the maximum data rate.
Transmit Power	By default **100%** is selected	Normally the wireless transmitter operates at 100% power. By setting the **transmit power** to control the Wi-Fi **coverage**.
5G Band Steering	The box is unchecked by default	When the client station associate with 2.4G Wi-Fi, the device will send the client to 5G Wi-Fi automatically if the client is available on accessing this 5G Wi-Fi band. This option is only available on the module that supports 5GHz band.
WIDS	The box is unchecked by default	The WIDS (Wireless Intrusion Detection System) will analyze all packets and make a statistic table in WiFi status. Go to **Status** > **Basic Network** > **WiFi** tab for detailed WIDS status.
Save	N/A	Click the **Save** button to save the current configuration.
Undo	N/A	Click the **Undo** button to restore configuration to previous setting before saving.

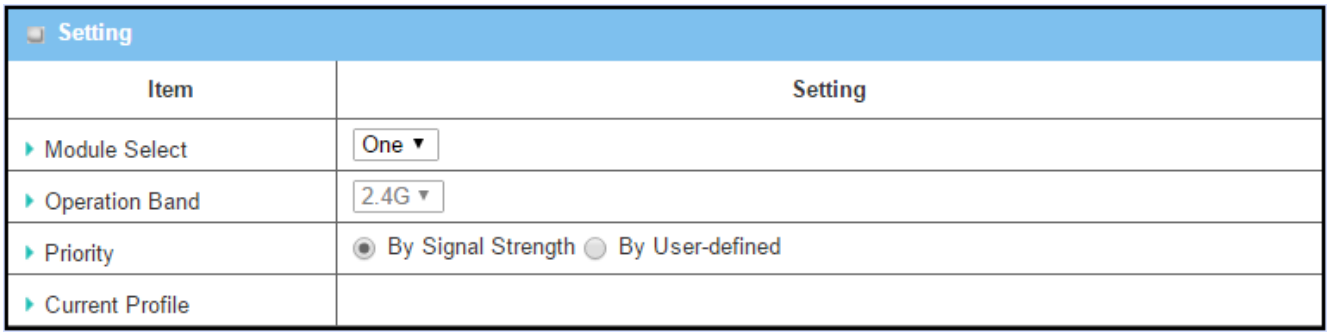
2.3.4 Uplink Profile

This device provides WiFi Uplink function for connecting to a wireless access point just like connected to a wired WAN or cellular WAN connection. It can operate as a NAT gateway and link the devices wirelessly to the uplink network or hosts.

To connect to the wireless access point, user has to enable the wireless Uplink function for a certain WiFi Module (refer to **Basic Network > WAN & Uplink > Physical Interface**, **Internet Setup** tabs) first, and then configure the Uplink profile(s) for the access point to be connected to in the **Uplink Profile** page.

Go to **Basic Network > WiFi > Uplink Profile** tab for configuring the Uplink Profile page.

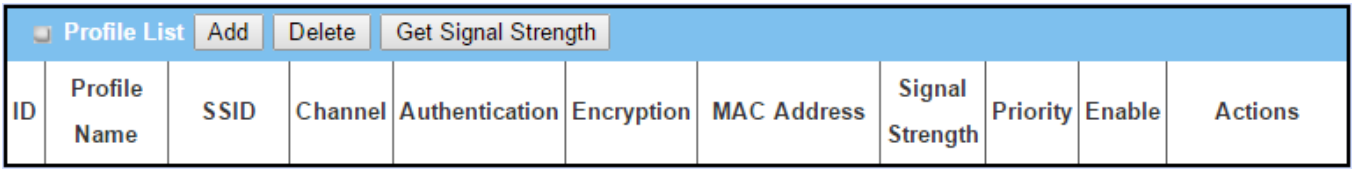
Uplink Profile Setting



Setting		
Item	**Value setting**	**Description**
Module Select	A Must filled setting.	Select the WiFi module to check or configure the expected uplink profile(s). For those single WiFi module products, this option is hidden.
Operation Band	A Must filled setting.	Specify the intended operation band for the WiFi module. Basically, this setting is fixed and cannot be changed once the module is integrated into the gaye product. However, there are some module with selectable band for user to choose according to his network environment. Under such situation, you can specify which operation band is suitable for the application.
Priority	1. A Must filled setting. 2. **By Signal Strength** is selected by default.	Specify the network selection methodology for connectin to an available wireless uplink network. It can be **By Signal Strength** or **By User-defined** priority. When **By Signal Strength** is selected, the gateway will try to connect to the available uplink network whose wireless signal strength is the strongest. When **By User-defined** is selected, the gateway will try to connect to the available uplink network whose priority is the highest (1 is the highest priority, and 16 is the lowest priority).

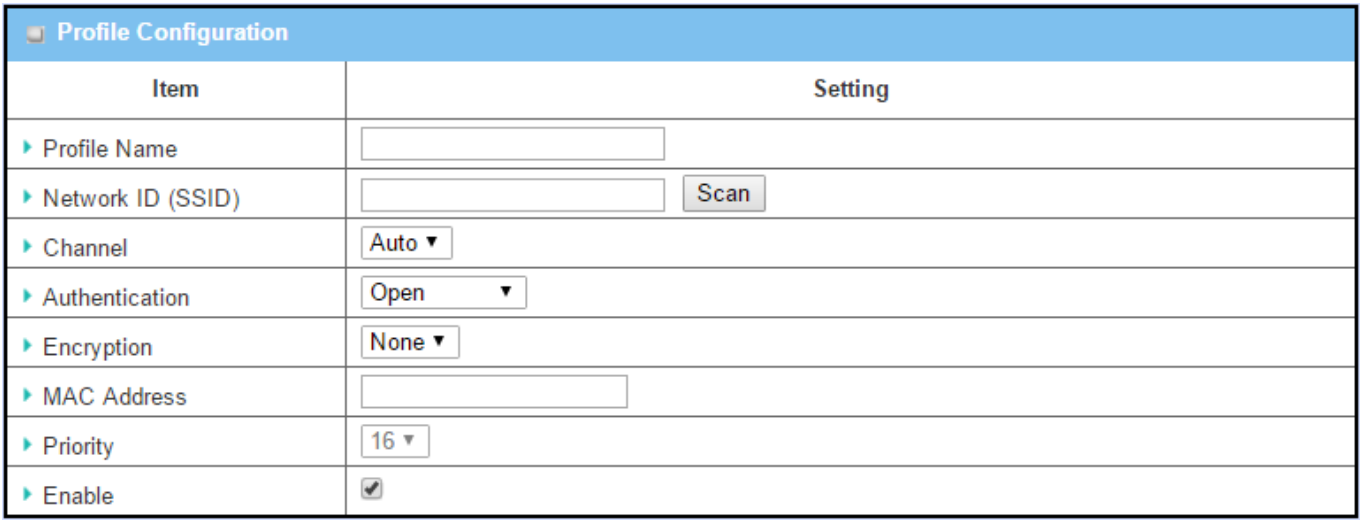
Note: to apply the defined Uplink profile(s) for the gateway to find a best fit profile for connecting to a certain uplink network, user has to **Enable** the Profile auto-connect function (Refer to **Basic Network > WiFi > (Module 1/ Module 2) WiFi Configuration** tab.

Create/Edit Uplink Profile



The Profile List shows the settings for the created uplink profiles. The information includes Profile Name, SSID, Channel, Authentication, Encryption, MAC Address, Signal Strength, Priority, and Enable.

When **Add** button is applied, **Profile Configuration** screen will appear.



Profile Configuration		
Item	**Value setting**	**Description**
Profile Name	1. String format can be any text 2. A Must filled setting	Enter a profile name for the uplink network specified below. It is a name that is easy for you to understand. ***Value Range***: 1 ~ 64 characters.
Network ID (SSID)	1. String format : Any text	Enter the SSID for the VAP, and decide whether to broadcast the SSID or not.

	2. The box is checked by default.	The **SSID** is used for identifying from another AP, and client stations will associate with AP according to SSID. If the broadcast SSID option is enabled, it means the SSID will be broadcasted, and the stations can associate with this device by scanning SSID.
Channel	1. A Must filled setting. 2. **Auto** is selected by default.	Select a radio channel for the VAP. Each channel is corresponding to different radio band. The permissible channels depend on the **Regulatory Domain**. There are two available options when **Auto** is selected: ● **By AP Numbers** The channel will be selected according to AP numbers (The less, the better). ● **By Less Interference** The channel will be selected according to interference. (The lower, the better).
Authentication	1. A Must filled setting 2. **Open** is selected by default.	Specify the authentication method for connecting with the uplink network. It can be **Open**, **Shared**, **WPA-SPK**, or **WPA2-PSK**. When **Open** is selected, the preshared WEP key could be set for authentication; When **Shared** is selected, the preshared WEP key should be set for authentication; When **WPA-PSK** or **WPA2-PSK** is selected, The the TKIP or AES preshared key should be set for authentication;
Encryption	1. A Must filled setting. 2. **None** is selected by default.	Select a suitable encryption method and enter the required key(s). The available method in the dropdown list depends on the Authentication you selected. **None** It means that the device is open system without encrypting. **WEP** Up to 4 WEP keys can be set, and you have to select one as current key. The key type can set to **HEX** or **ASCII**. If **HEX** is selected, the key should consist of (0 to 9) and (A to F). If **ASCII** is selected, the key should consist of ASCII table. **TKIP** TKIP was proposed instead of WEP without upgrading hardware. Enter a Preshared Key for it. The length of key is from 8 to 63 characters. **AES** The newest encryption system in WiFi, it also designed for the fast 802.11n high bitrates schemes. Enter a Preshared Key for it. The length of key is from 8 to 63 characters. You are recommended to use **AES** encryption instead of any others for security.
MAC Address	1. MAC Address string Format 2. A Must fill setting	Specify the **MAC Address** of the access point (with the Network ID) to be connected to.
Priority	1. An Optional filled setting. 2. **16** is set by	Specify a priority setting for the uplink profile when the **By User-defined** methodology is selected. The priority value can be 1 ~ 16. 1 is the highest priority, and 16 is the lowest

	default.	priority).
Enable	The box is checked by default.	Click the **Enable** box to activate this profile.
Save	N/A	Click the **Save** button to save the configuration.
Undo	N/A	Click the **Undo** button to restore what you just configured back to the previous setting.
Back	N/A	When the **Back** button is clicked, the screen will return to the Profile List page.

Instead of manually enter the information for the uplink network, you can alslo click the **Scan** button to get the available wireless networks around the device, and select one as the uplink network.

When the **Scan** button is applied, **Wireless AP List** will appear after few seconds.

Wireless AP List

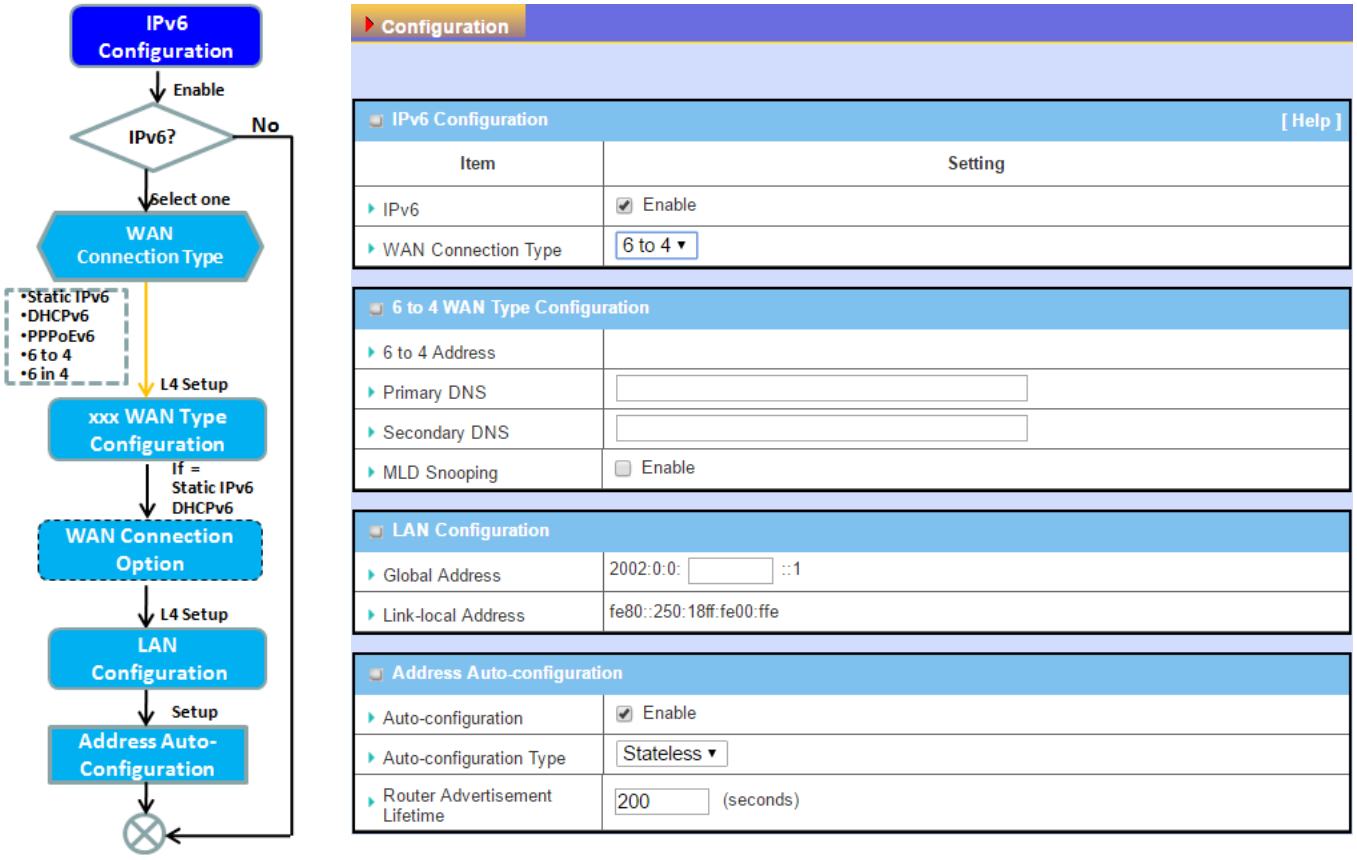
SSID	Channel	Quality	Authentication	Encryption	MAC Address	Select
Guest_2.4G	1	86%		None	02:50:78:56:79:15	
WIN	1	100%	WPA2-PSK	AES	00:60:64:cb:f5:f6	
amit02	1	63%	WPA2-PSK	AES	00:50:18:21:e2:17	
Guest_2.4G	1	5%		None	1a:50:18:33:55:66	
lan test_24_1	1	86%	WPA2-PSK	AES	00:50:18:56:79:15	
lan test_24_3	1	89%	WPA2-PSK	AES	02:50:28:56:79:15	
lan test_24_5	1	86%	WPA2-PSK	AES	02:50:48:56:79:15	
lan test_24_7	1	86%	WPA2-PSK	AES	02:50:68:56:79:15	

Once you selected an AP from the AP list, the channel, SSID, Authentication, Encryption, and MAC address will be automatically filled into the profile, you just have to enter a key for the uplink connection, if required.

2.4 IPv6

The growth of the Internet has created a need for more addresses than are possible with IPv4. IPv6 (Internet Protocol version 6) is a version of the Internet Protocol (IP) intended to succeed IPv4, which is the protocol currently used to direct almost all Internet traffic. IPv6 also implements additional features not present in IPv4. It simplifies aspects of address assignment (stateless address auto-configuration), network renumbering and router announcements when changing Internet connectivity providers.

2.4.1 IPv6 Configuration



The **IPv6 Configuration** setting allows user to set the IPv6 connection type to access the IPv6 network. This gateway supports various types of IPv6 connection, including **Static IPv6**, **DHCPv6**, **PPPoEv6**, **6to4**, and **6in4**

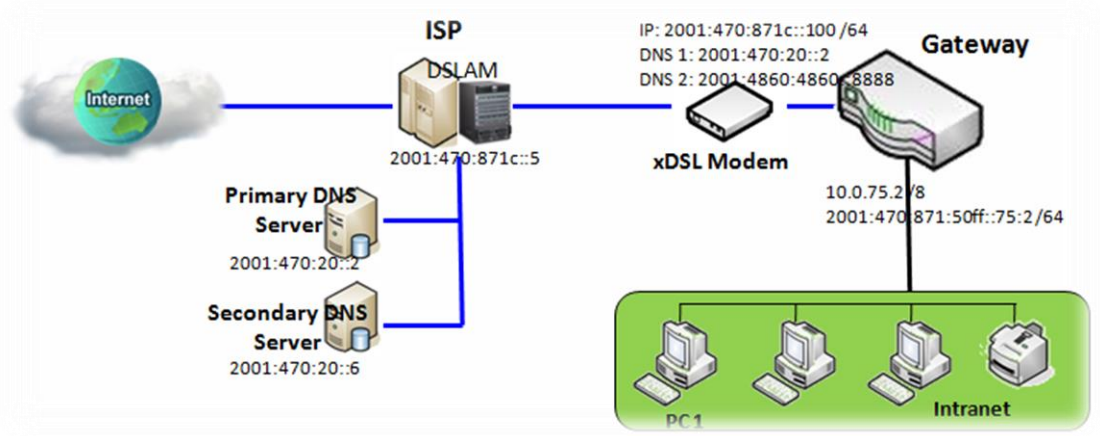
Note: For the products just having 3G/4G WAN interface, only **6to4** and **6in4** are supported.

Please contact your ISP for the IPv6 supports before you proceed with IPv6 setup.

IPv6 WAN Connection Type

Static IPv6

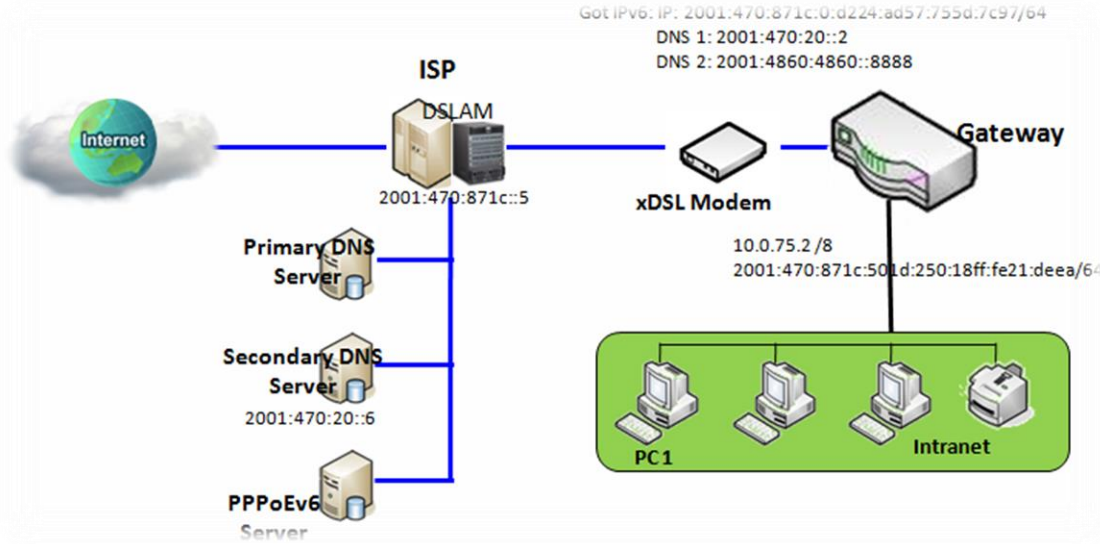
Static IPv6 does the same function as static IPv4. The static IPv6 provides manual setting of IPv6 address, IPv6 default gateway address, and IPv6 DNS.



Above diagram depicts the IPv6 IP addressing, type in the information provided by your ISP to setup the IPv6 network.

DHCPv6

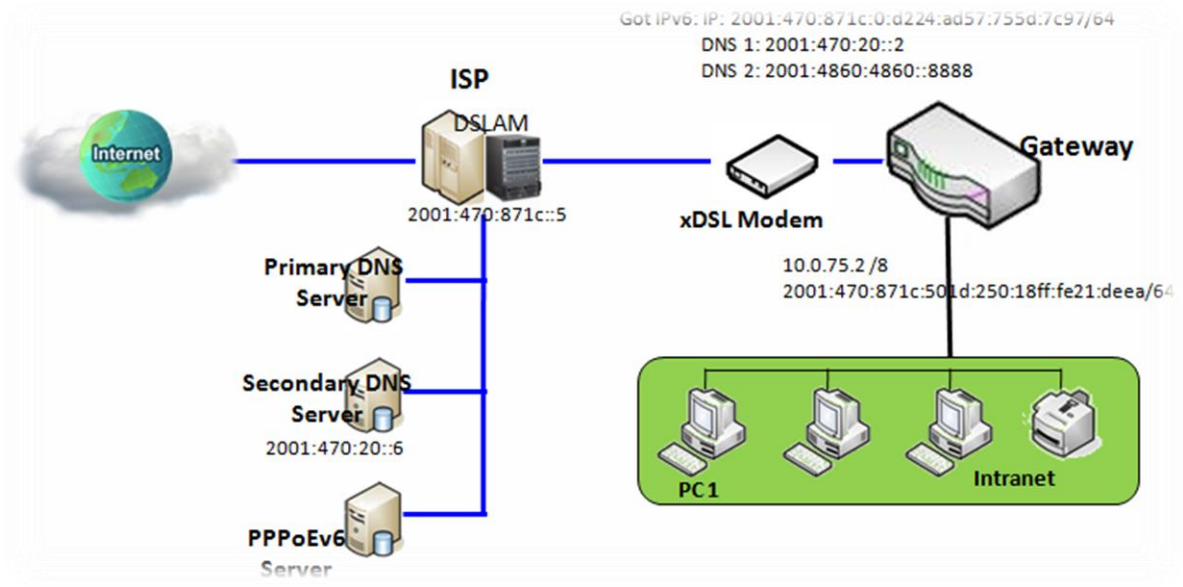
DHCP in IPv6 does the same function as DHCP in IPv4. The DHCP server sends IP address, DNS server addresses and other possible data to the DHCP client to configure automatically. The server also sends a lease time of the address and time to re-contact the server for IPv6 address renewal. The client has then to resend a request to renew the IPv6 address.



Above diagram depicts DHCP IPv6 IP addressing, the DHCPv6 server on the ISP side assigns IPv6 address, IPv6 default gateway address, and IPv6 DNS to client host's automatically.

PPPoEv6

PPPoEv6 in IPv6 does the same function as PPPoE in IPv4. The PPPoEv6 server provides configuration parameters based on PPPoEv6 client request. When PPPoEv6 server gets client request and successfully authenticates it, the server sends IP address, DNS server addresses and other required parameters to automatically configure the client.

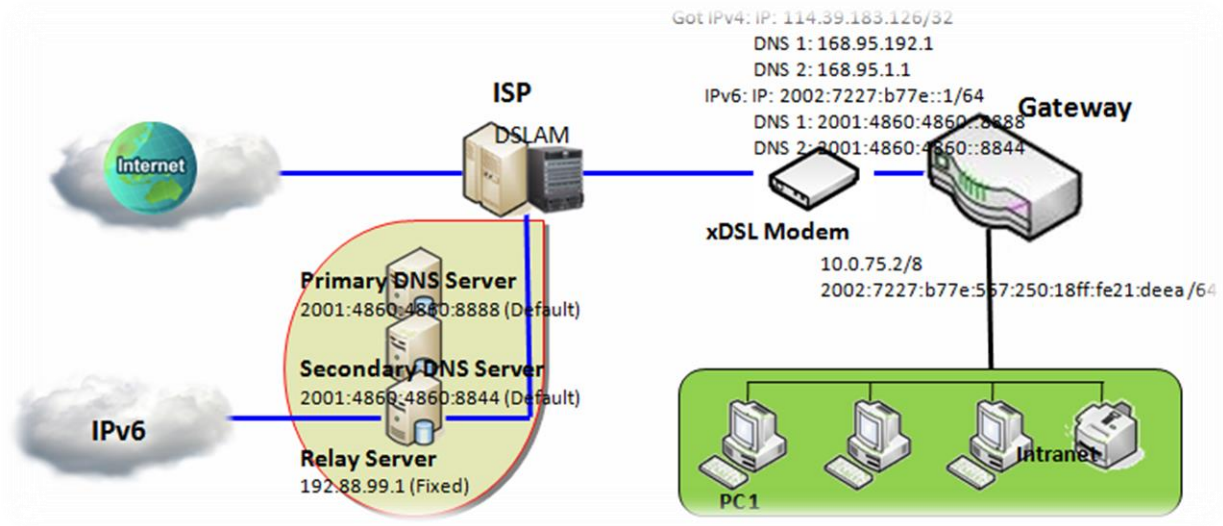


The diagram above depicts the IPv6 addressing through PPPoE, PPPoEv6 server (DSLAM) on the ISP side provides IPv6 configuration upon receiving PPPoEv6 client request. When PPPoEv6 server gets client request and successfully authenticates it, the server sends IP address, DNS server addresses and other required parameters to automatically configure the client.

6to4

6to4 is one mechanism to establish automatic IPv6 in IPv4 tunnels and to enable complete IPv6 sites communication. The only thing a 6to4 user needs is a global IPv4 address.

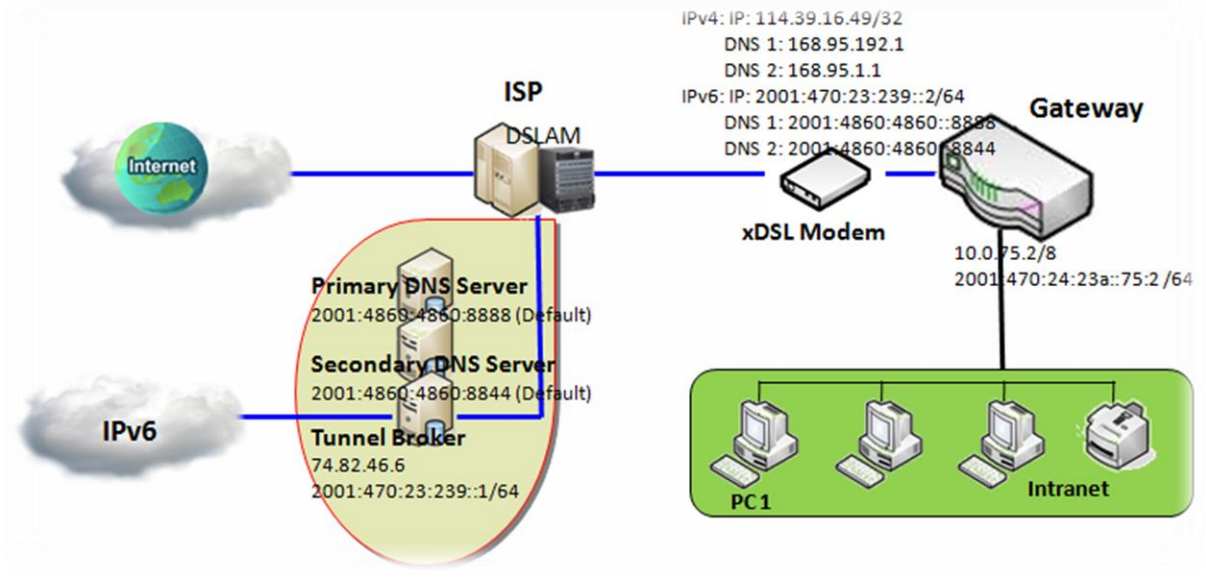
6to4 may be used by an individual host, or by a local IPv6 network. When used by a host, it must have a global IPv4 address connected, and the host is responsible for encapsulation of outgoing IPv6 packets and decapsulation of incoming 6to4 packets. If the host is configured to forward packets for other clients, often a local network, it is then a router.



In above diagram, the 6to4 means no need to set gateway address "automatic" tunneling solution. The automatic mean have relay server, as defined in RFC 3068 has included segments draw 192.88.99.0/24 used as 6to4 relay of any-cast address to complete 6in4 setting.

6in4

6in4 is an Internet transition mechanism for Internet IPv4 to IPv6 migration. 6in4 uses tunneling to encapsulate IPv6 traffic over explicitly-configured IPv4 links. As defined in RFC 4213, the 6in4 traffic is sent over the IPv4 Internet inside IPv4 packets whose IP headers have the IP protocol number set to 41. This protocol number is specifically designated for IPv6 encapsulation.

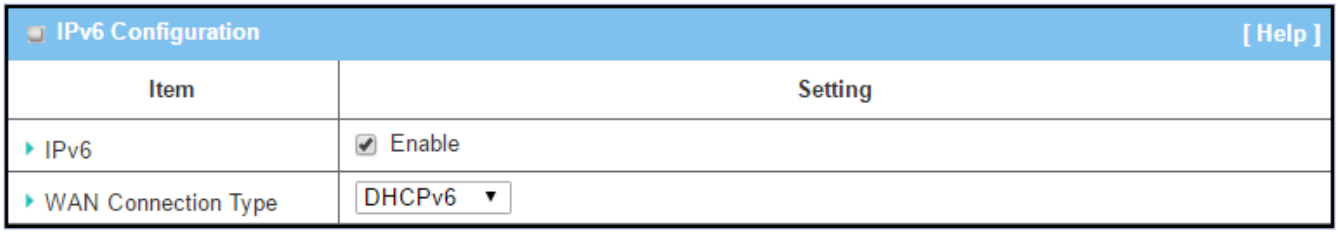


In above diagram, the 6in4 usually needs to register to a 6in4 tunnel service, known as Tunnel Broker, in order to use. It also need end point global IPv4 address as 114.39.16.49 to complete 6in4 setting.

IPv6 Configuration Setting

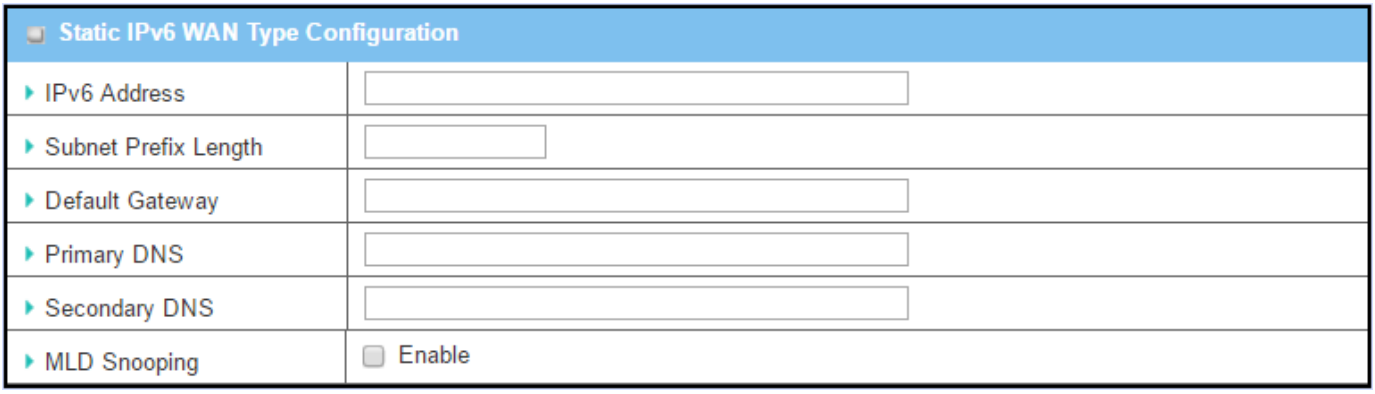
Go to Basic Network > IPv6 > Configuration Tab.

The **IPv6 Configuration** setting allows user to set the IPv6 connection type to access the IPv6 network.



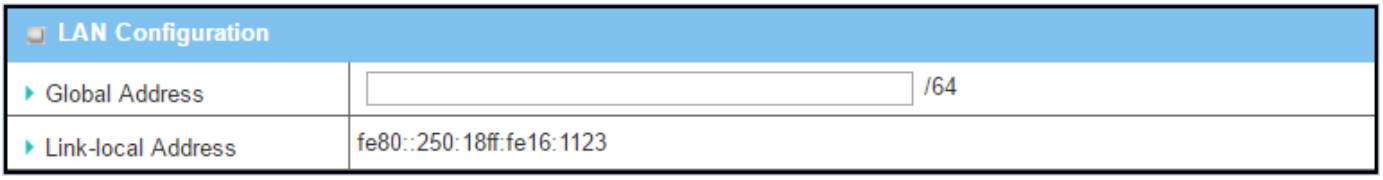
IPv6 Configuration		
Item	**Value setting**	**Description**
IPv6	The box is unchecked by default,	Check the **Enable** box to activate the IPv6 function.
WAN Connection Type	1. Only can be selected when IPv6 Enable 2. A Must filled setting	Define the selected IPv6 WAN Connection Type to establish the IPv6 connectivity. Select **Static IPv6** when your ISP provides you with a set IPv6 addresses. Then go to **Static IPv6 WAN Type Configuration**. Select **DHCPv6** when your ISP provides you with DHCPv6 services. Select **PPPoEv6** when your ISP provides you with PPPoEv6 account settings. Select **6to4** when you want to user IPv6 connection over IPv4. Select **6in4** when you want to user IPv6 connection over IPv4. **Note**: For the products just having 3G/4G WAN interface, only **6to4** and **6in4** are supported.

Static IPv6 WAN Type Configuration



Static IPv6 WAN Type Configuration		
Item	**Value setting**	**Description**
IPv6 Address	A Must filled setting	Enter the WAN **IPv6 Address** for the router.
Subnet Prefix Length	A Must filled setting	Enter the WAN **Subnet Prefix Length** for the router.
Default Gateway	A Must filled setting	Enter the WAN **Default Gateway** IPv6 address.
Primary DNS	An optional setting	Enter the WAN **primary DNS Server**.
Secondary DNS	An optional setting	Enter the WAN **secondary DNS Server**.
MLD Snooping	The box is unchecked by default	Enable/Disable the MLD Snooping function

LAN Configuration

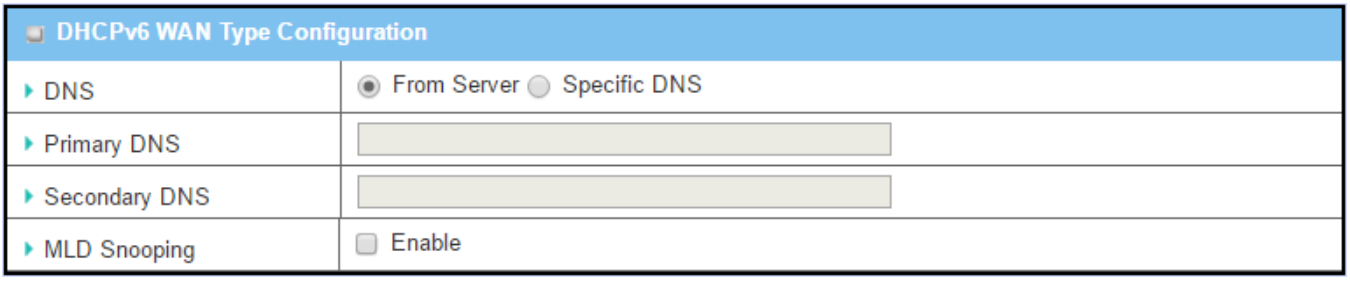


LAN Configuration		
Item	**Value setting**	**Description**
Global Address	A Must filled setting	Enter the LAN **IPv6 Address** for the router.
Link-local Address	Value auto-created	Show the link-local address for LAN interface of router.

Then go to **Address Auto-configuration (summary)** for setting LAN environment.

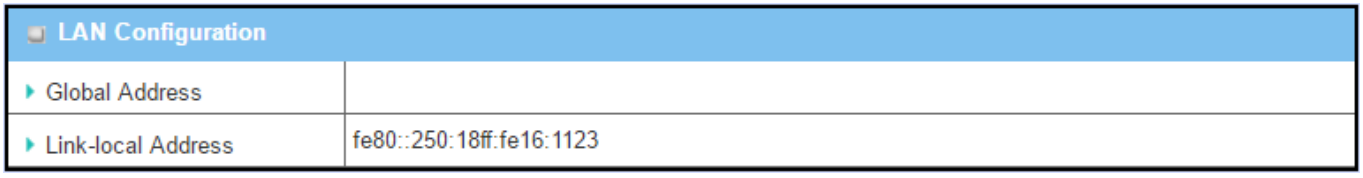
If above setting is configured, click the **Save** button to save the configuration, and click the **Reboot** button to reboot the router.

DHCPv6 WAN Type Configuration



DHCPv6 WAN Type Configuration		
Item	**Value setting**	**Description**
DNS	The option [From Server] is selected by default	Select the [Specific DNS] option to active Primary DNS and Secondary DNS. Then fill the DNS information.
Primary DNS	Can not modified by default	Enter the WAN **primary DNS Server**.
Secondary DNS	Can not modified by default	Enter the WAN **secondary DNS Server**.
MLD	The box is unchecked by default	Enable/Disable the MLD Snooping function

LAN Configuration

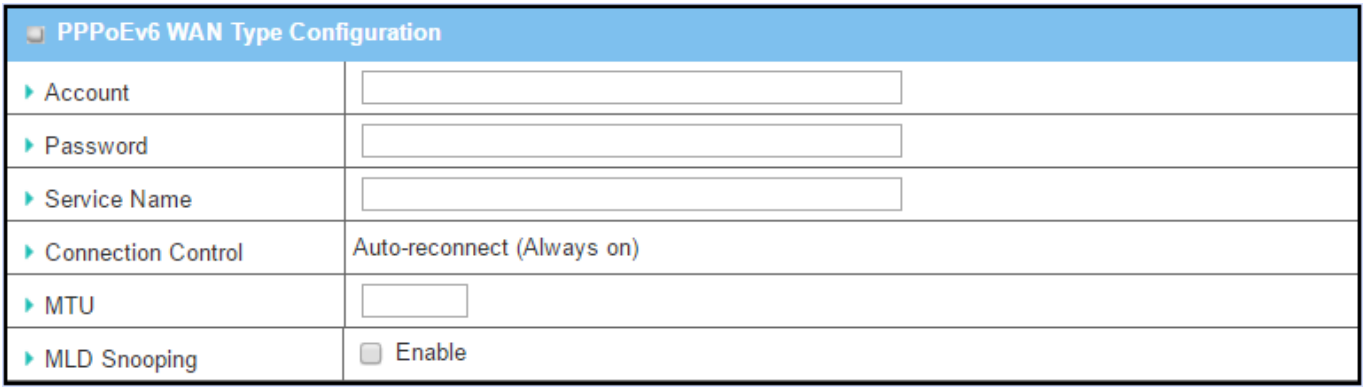


LAN Configuration		
Item	**Value setting**	**Description**
Global Address	Value auto-created	Enter the LAN **IPv6 Address** for the router.
Link-local Address	Value auto-created	Show the link-local address for LAN interface of router.

Then go to **Address Auto-configuration (summary)** for setting LAN environment.

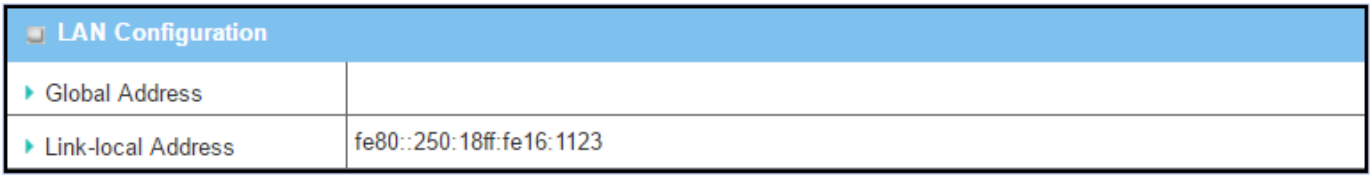
If above setting is configured, click the **Save** button to save the configuration, and click **Reboot** button to reboot the router.

PPPoEv6 WAN Type Configuration



PPPoEv6 WAN Type Configuration		
Item	**Value setting**	**Description**
Account	A Must filled setting	Enter the Account for setting up PPPoEv6 connection. If you want more information, please contact your ISP. ***Value Range*:** 0 ~ 45 characters.
Password	A Must filled setting	Enter the Password for setting up PPPoEv6 connection. If you want more information, please contact your ISP.
Service Name	A Must filled setting/Option	Enter the Service Name for setting up PPPoEv6 connection. If you want more information, please contact your ISP. ***Value Range*:** 0 ~ 45 characters.
Connection Control	Fixed value	The value is **Auto-reconnect(Always on)**.
MTU	A Must filled setting	Enter the MTU for setting up PPPoEv6 connection. If you want more information, please contact your ISP. ***Value Range*:** 1280 ~ 1492.
MLD Snooping	The box is unchecked by default	Enable/Disable the MLD Snooping function

LAN Configuration

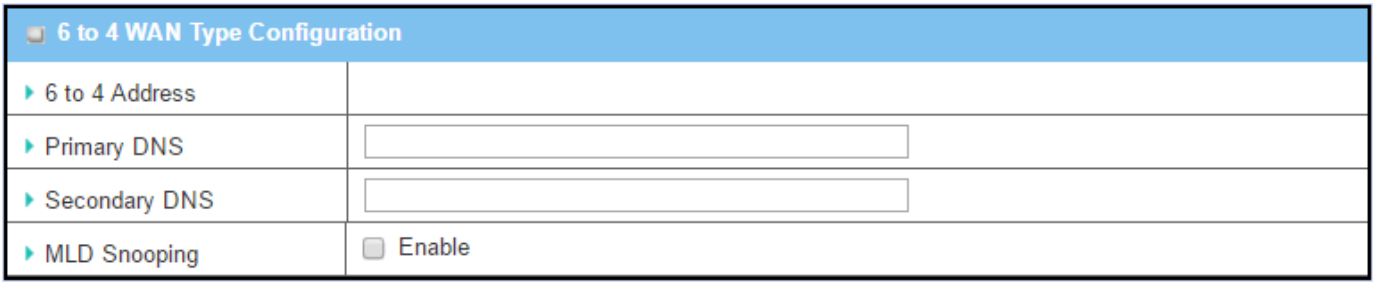


LAN Configuration		
Item	**Value setting**	**Description**
Global Address	Value auto-created	The LAN **IPv6 Address** for the router.
Link-local Address	Value auto-created	Show the link-local address for LAN interface of router.

Then go to **Address Auto-configuration (summary)** for setting LAN environment.

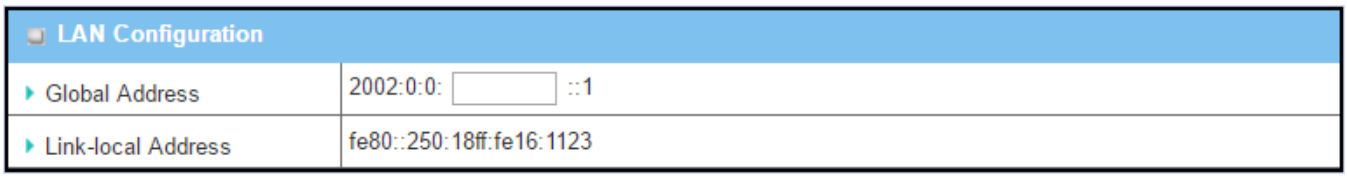
If above setting is configured, click the **save button** to save the configuration and click **reboot button** to reboot the router.

6to4 WAN Type Configuration



6to4 WAN Type Configuration		
Item	**Value setting**	**Description**
6to4 Address	Value auto-created	IPv6 address for access the IPv6 network.
Primary DNS	An optional setting	Enter the WAN primary DNS Server.
Secondary DNS	An optional setting	Enter the WAN secondary DNS Server.
MLD	The box is unchecked by default	Enable/Disable the MLD Snooping function

LAN Configuration



LAN Configuration		
Item	**Value setting**	**Description**
Global Address	An optional setting	Enter the LAN **IPv6 Address** for the router. *Value Range*: 0 ~ FFFF.
Link-local Address	Value auto-created	Show the link-local address for LAN interface of router.

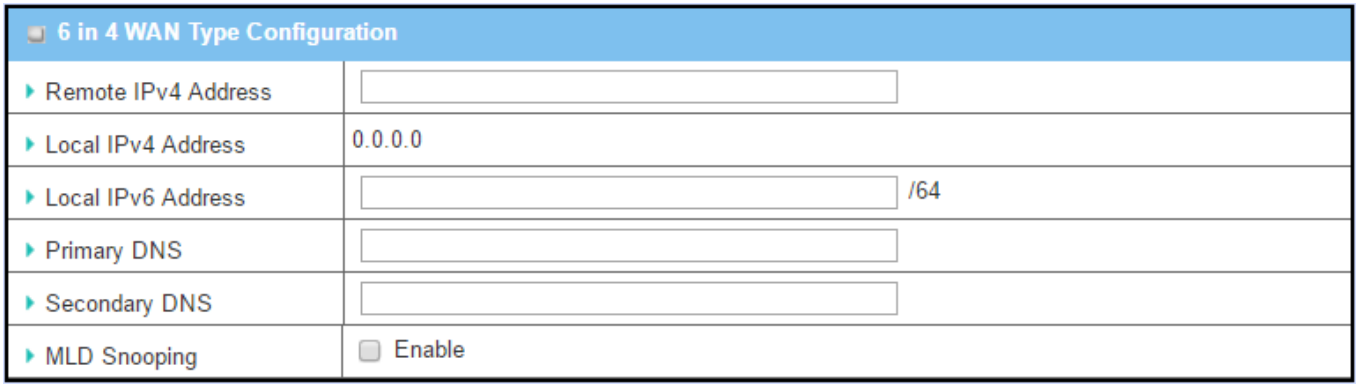
Then go to **Address Auto-configuration (summary)** for setting LAN environment.

If above setting is configured, click the **save button** to save the configuration and click **reboot button** to reboot the router.

6in4 WAN Type Configuration

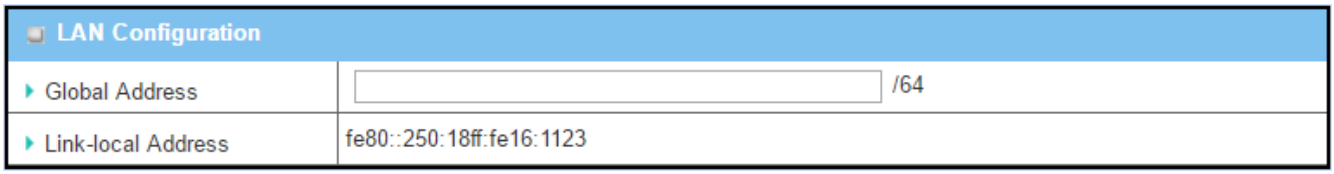
Please go to find IPv6 tunnel brokers to establish 6in4 tunnel. (You can find List of IPv6 tunnel brokers that support 6in4 service from wiki.)

Then enter the Local IPv4 address of router into Client IPv4 Address field in IPv6 tunnel broker setting page.



6in4 WAN Type Configuration		
Item	**Value setting**	**Description**
Remote IPv4 Address	A Must filled setting	Filled **Server IPv4 Address** gotten from tunnel broker in this field.
Local IPv4 Address	Value auto-created	IPv4 address of this router.
Local IPv6 Address	A Must filled setting	Filled **Client IPv6 Address** gotten from tunnel broker in this field.
Primary DNS	An optional setting	Enter the WAN primary DNS Server.
Secondary DNS	An optional setting	Enter the WAN secondary DNS Server.
MLD	The box is unchecked by default	Enable/Disable the MLD Snooping function

LAN Configuration

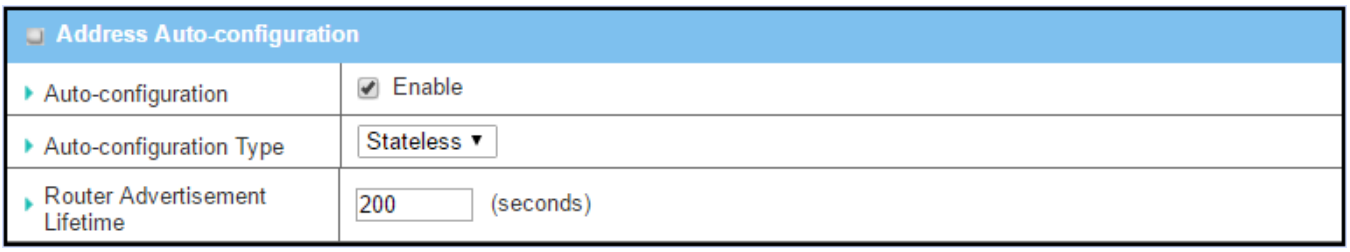


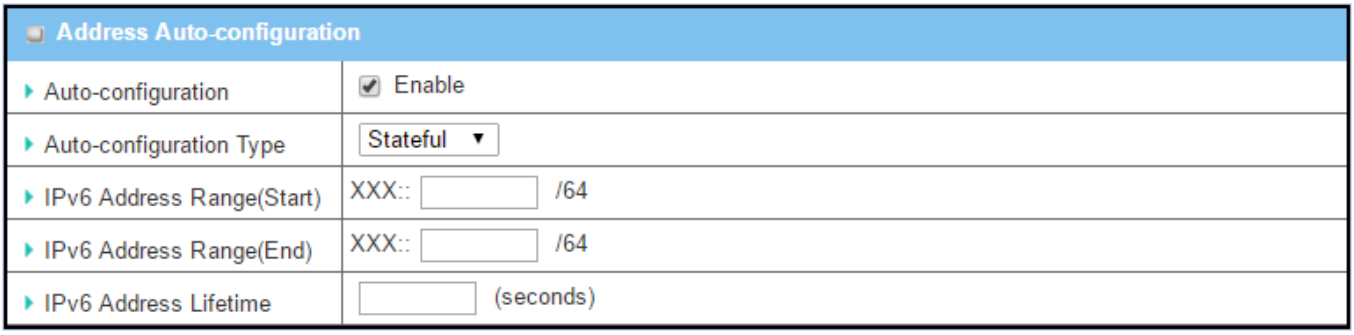
LAN Configuration		
Item	**Value setting**	**Description**
Global Address	A Must filled setting	Filled **Routed /64** gotten from tunnel broker in this field.
Link-local Address	Value auto-created	Show the link-local address for LAN interface of router.

Then go to **Address Auto-configuration (summary)** for setting LAN environment.

If above setting is configured, click the **save button** to save the configuration and click **reboot button** to reboot the router.

Address Auto-configuration

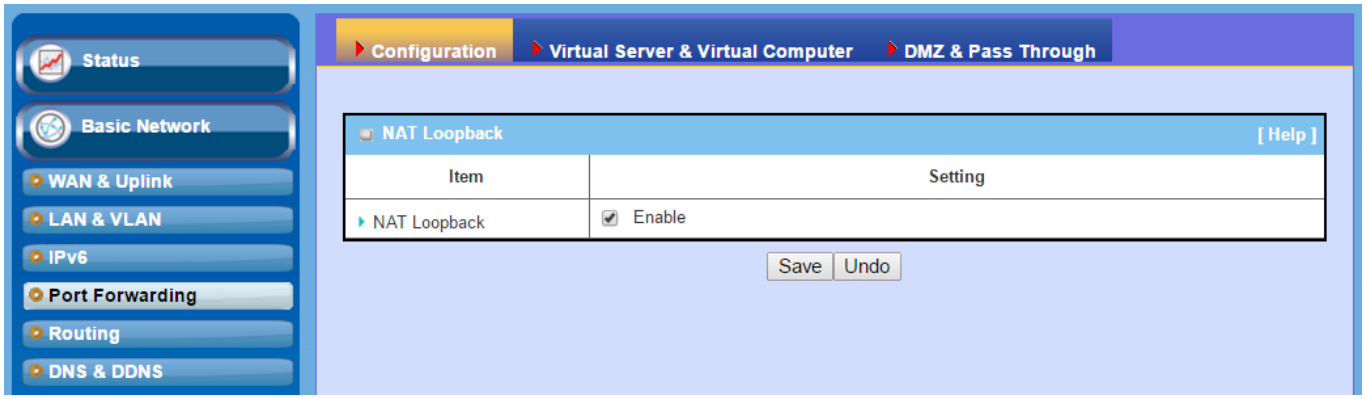




Address Auto-configuration		
Item	**Value setting**	**Description**
Auto-configuration	The box is unchecked by default	Check to enable the Auto configuration feature.
Auto-configuration Type	1. Only can be selected when **Auto-configuration** enabled 2. Stateless is selected by default	Define the selected IPv6 WAN Connection Type to establish the IPv6 connectivity. Select **Stateless** to manage the Local Area Network to be SLAAC + RDNSS **Router Advertisement Lifetime** (A Must filled setting): Enter the Router Advertisement Lifetime (in seconds). 200 is set by default. *Value Range*: 0 ~ 65535. Select **Stateful** to manage the Local Area Network to be **Stateful (DHCPv6)**. **IPv6 Address Range (Start)** (A Must filled setting): Enter the start IPv6 Address for the DHCPv6 range for your local computers. 0100 is set by default. ***Value Range*:** 0001 ~ FFFF. **IPv6 Address Range (End)** (A Must filled setting): Enter the end IPv6 Address for the DHCPv6 range for your local computers. 0200 is set by default. ***Value Range*:** 0001 ~ FFFF. **IPv6 Address Lifetime** (A Must filled setting): Enter the DHCPv6 lifetime for your local computers. 36000 is set by default. *Value Range*: 0 ~ 65535.

2.5 Port Forwarding

Network address translation (NAT) is a methodology of remapping one IP address space into another by modifying network address information in Internet Protocol (IP) datagram packet headers while they are in transit across a traffic routing device. The technique was originally used for ease of rerouting traffic in IP networks without renumbering every host. It has become a popular and essential tool in conserving global address space allocations in face of IPv4 address exhaustion. The product you purchased embeds and activates the NAT function. You also can disable the NAT function in **[Basic Network]-[WAN & Uplink]-[Internet Setup]-[WAN Type Configuration]** page.



Usually all local hosts or servers behind corporate gateway are protected by NAT firewall. NAT firewall will filter out unrecognized packets to protect your Intranet. So, all local hosts are invisible to the outside world. Port forwarding or port mapping is function that redirects a communication request from one address and port number combination to assigned one. This technique is most commonly used to make services on a host residing on a protected or masqueraded (internal) network available to hosts on the opposite side of the gateway (external network), by remapping the destination IP address and port number

There are several optional Port Forwarding related functions in this gateway. They are Virtual Server, Virtual Computer, IP Translation, Special AP & ALG, DMZ and Pass Through, etc. The available functions might be different for the purchased model.

2.5.1 Configuration

NAT Loopback

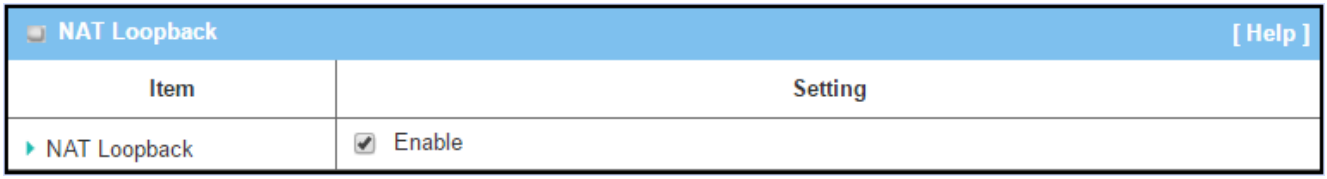
This feature allows you to access the WAN global IP address from your inside NAT local network. It is useful when you run a server inside your network. For example, if you set a mail server at LAN side, your local devices can access this mail server through gateway's global IP address when enable NAT loopback feature. On either side are you in accessing the email server, at the LAN side or at the WAN side, you don't need to change the IP address of the mail server.

Configuration Setting

Go to Basic Network > Port Forwarding > Configuration tab.

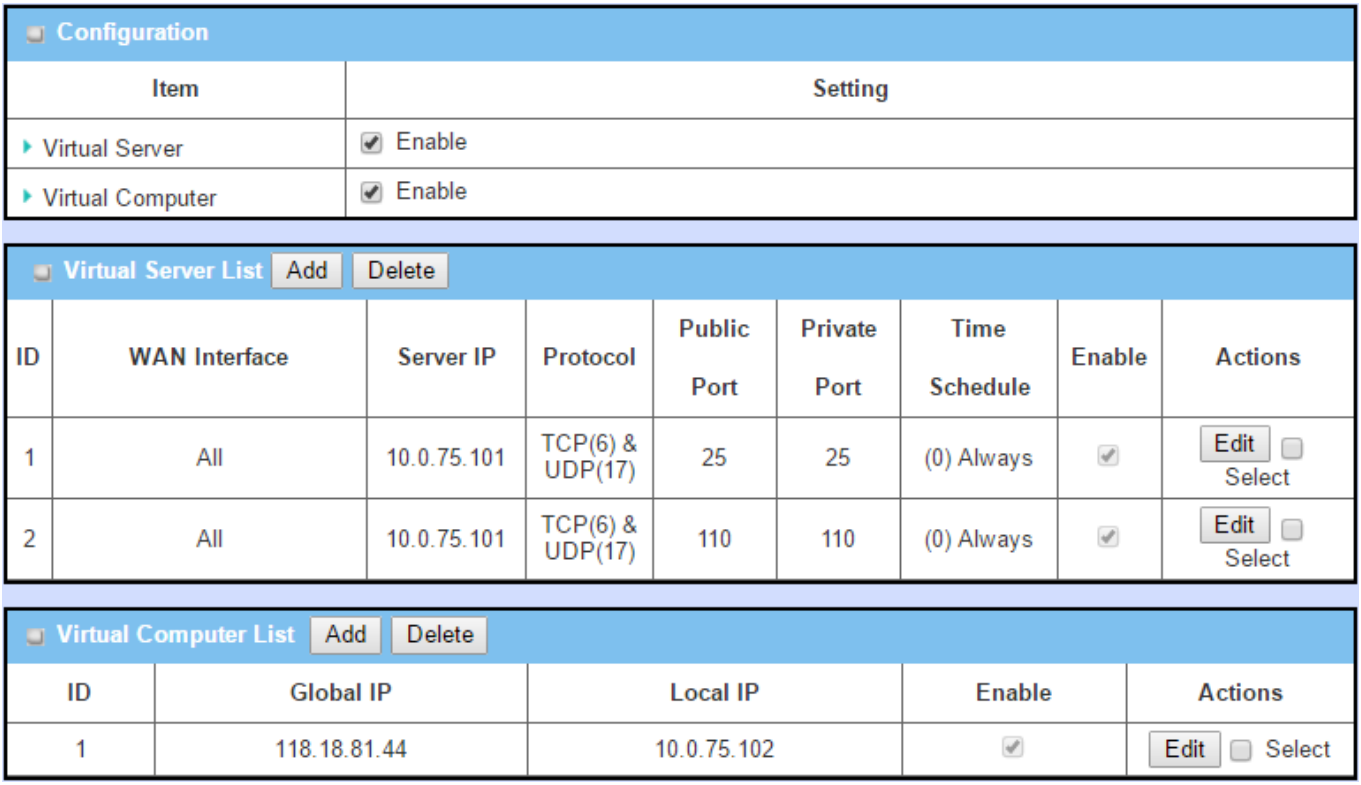
The NAT Loopback allows user to access the WAN IP address from inside your local network.

Enable NAT Loopback



Configuration		
Item	**Value setting**	**Description**
NAT Loopback	The box is checked by default	Check the **Enable** box to activate this NAT function
Save	N/A	Click the **Save** button to save the settings.
Undo	N/A	Click the **Undo** button to cancel the settings

2.5.2 Virtual Server & Virtual Computer



Configuration

Item	Setting
Virtual Server	Enable
Virtual Computer	Enable

Virtual Server List Add Delete

ID	WAN Interface	Server IP	Protocol	Public Port	Private Port	Time Schedule	Enable	Actions
1	All	10.0.75.101	TCP(6) & UDP(17)	25	25	(0) Always		Edit Select
2	All	10.0.75.101	TCP(6) & UDP(17)	110	110	(0) Always		Edit Select

Virtual Computer List Add Delete

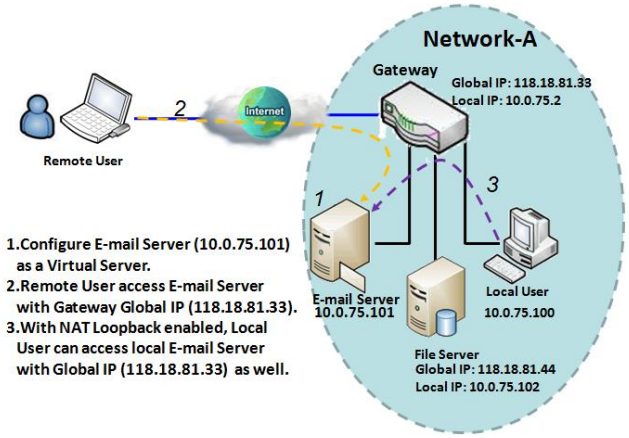
ID	Global IP	Local IP	Enable	Actions
1	118.18.81.44	10.0.75.102		Edit Select

There are some important Pot Forwarding functions implemented within the gateway, including "Virtual Server", "NAT loopback" and "Virtual Computer".

It is necessary for cooperate staffs who travel outside and want to access various servers behind office gateway. You can set up those servers by using "Virtual Server" feature. After trip, if want to access those servers from LAN side by global IP, without change original setting, NAT Loopback can achieve it.

"Virtual computer" is a host behind NAT gateway whose IP address is a global one and is visible to the outside world. Since it is behind NAT, it is protected by gateway firewall. To configure Virtual Computer, you just have to map the local IP of the virtual computer to a global IP.

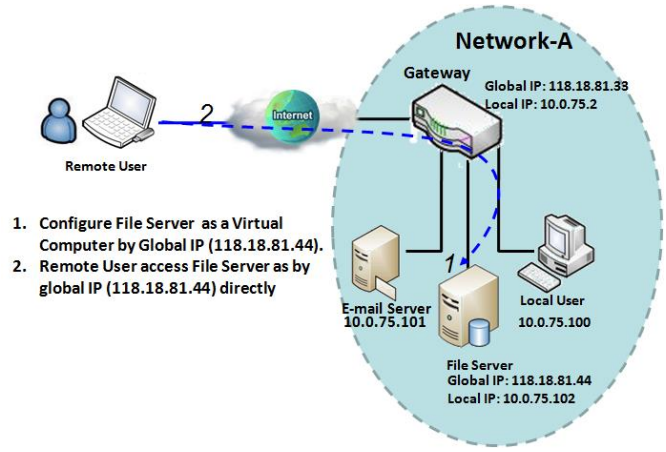
Virtual Server & NAT Loopback



"Virtual Server" allows you to access servers with the global IP address or FQDN of the gateway as if they are servers existed in the Internet. But in fact, these servers are located in the Intranet and are physically behind the gateway. The gateway serves the service requests by port forwarding the requests to the LAN servers and transfers the replies from LAN servers to the requester on the WAN side. As shown in example, an E-mail virtual server is defined to be located at a server with IP address 10.0.75.101 in the Intranet of Network-A, including SMTP service port 25 and POP3 service port 110. So, the remote user can access the E-mail server with the gateway's global IP 118.18.81.33 from its WAN side. But the real E-mail server is located at LAN side and the gateway is the port forwarder for E-mail service.

NAT Loopback allows you to access the WAN global IP address from your inside NAT local network. It is useful when you run a server inside your network. For example, if you set a mail server at LAN side, your local devices can access this mail server through gateway's global IP address when enable NAT loopback feature. On either side are you in accessing the email server, at the LAN side or at the WAN side, you don't need to change the IP address of the mail server.

Virtual Computer

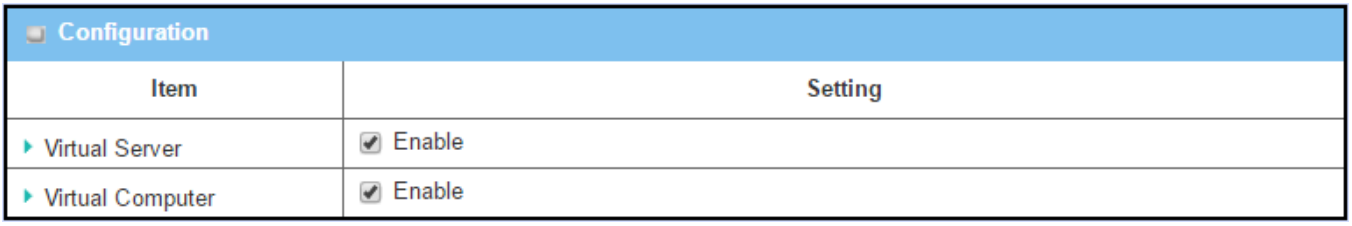


"Virtual Computer" allows you to assign LAN hosts to global IP addresses, so that they can be visible to outside world. While so, they are also protected by the gateway firewall as being client hosts in the Intranet. For example, if you set a FTP file server at LAN side with local IP address 10.0.75.102 and global IP address 118.18.82.44, a remote user can access the file server while it is hidden behind the NAT gateway. That is because the gateway takes care of all accessing to the IP address 118.18.82.44, including to forward the access requests to the file server and to send the replies from the server to outside world.

Virtual Server & Virtual Computer Setting

Go to Basic Network > Port Forwarding > Virtual Server & Virtual Computer **tab.**

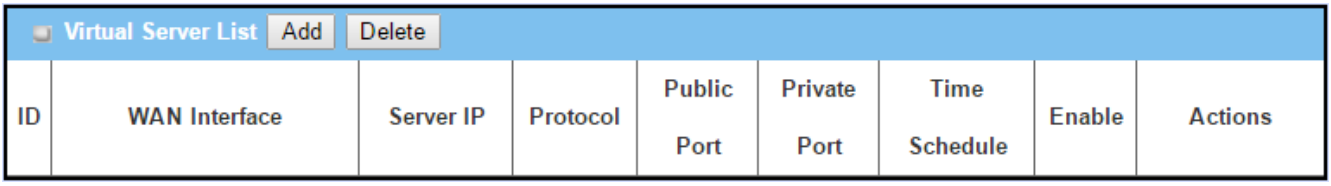
Enable Virtual Server and Virtual Computer



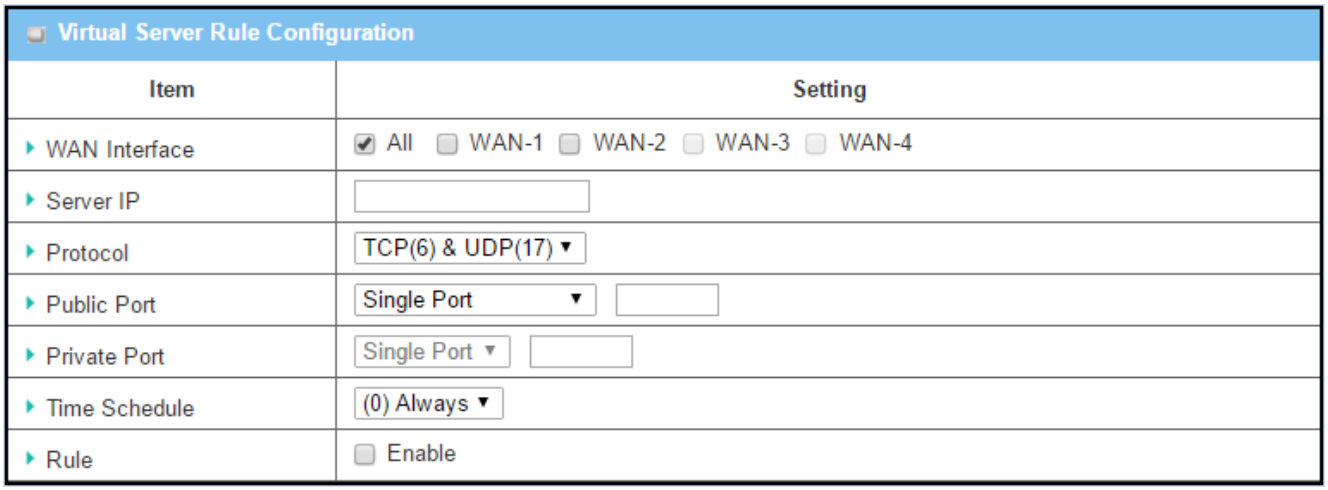
Configuration		
Item	**Value setting**	**Description**
Virtual Server	The box is unchecked by default	Check the **Enable** box to activate this port forwarding function
Virtual Computer	The box is checked by default	Check the **Enable** box to activate this port forwarding function
Save	N/A	Click the **Save** button to save the settings.
Undo	N/A	Click the **Undo** button to cancel the settings.

Create / Edit Virtual Server

The gateway allows you to custom your Virtual Server rules. It supports up to a maximum of 20 rule-based Virtual Server sets.



When **Add** button is applied, **Virtual Server Rule Configuration** screen will appear.



Virtual Server Rule Configuration		
Item	**Value setting**	**Description**
WAN Interface	1. A Must filled setting 2. Default is **ALL**.	Define the selected interface to be the packet-entering interface of the gateway. If the packets to be filtered are coming from **WAN-x** then select **WAN-x** for this field. Select **ALL** for packets coming into the gateway from any interface. It can be selected **WAN-x** box when **WAN-x** enabled. **Note**: The available check boxes (**WAN-1** ~ **WAN-4**) depend on the number of WAN interfaces for the product.
Server IP	A Must filled setting	This field is to specify the IP address of the interface selected in the WAN Interface setting above.
Protocol	A Must filled setting	When **"ICMPv4"** is selected It means the option "Protocol" of packet filter rule is ICMPv4. Apply **Time Schedule** to this rule, otherwise leave it as **Always**. **(**refer to **Scheduling setting** under **Object Definition)** Then check **Enable** box to enable this rule.
		When **"TCP"** is selected It means the option "Protocol" of packet filter rule is TCP. **Public Port** selected a predefined port from **Well-known Service**, and **Private Port** is the same with **Public Port** number. **Public Port** is selected **Single Port** and specify a port number, and **Private Port** can be set a **Single Port** number. **Public Port** is selected **Port Range** and specify a port range, and **Private Port** can be selected **Single Port** or **Port Range**. *Value Range*: 1 ~ 65535 for Public Port, Private Port.
		When **"UDP"** is selected It means the option "Protocol" of packet filter rule is UDP.

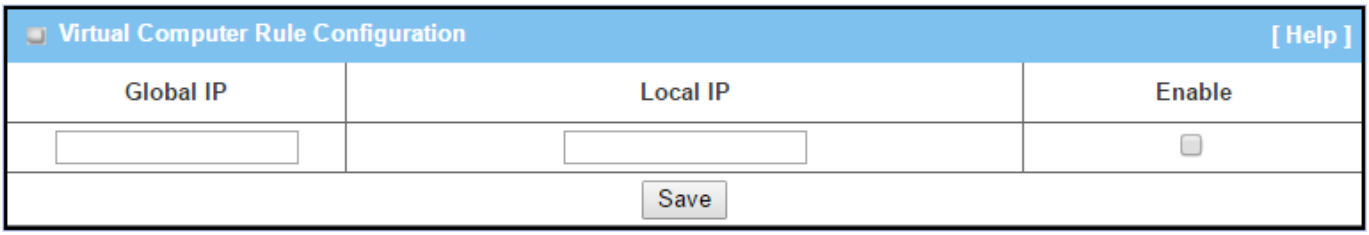
		Public Port selected a predefined port from **Well-known Service**, and **Private Port** is the same with **Public Port** number. **Public Port** is selected **Single Port** and specify a port number, and **Private Port** can be set a **Single Port** number. **Public Port** is selected **Port Range** and specify a port range, and **Private Port** can be selected **Single Port** or **Port Range**. *Value Range*: 1 ~ 65535 for Public Port, Private Port.
		When **"TCP & UDP"** is selected It means the option "Protocol" of packet filter rule is TCP and UDP. **Public Port** selected a predefined port from **Well-known Service**, and **Private Port** is the same with **Public Port** number. **Public Port** is selected **Single Port** and specify a port number, and **Private Port** can be set a **Single Port** number. **Public Port** is selected **Port Range** and specify a port range, and **Private Port** can be selected **Single Port** or **Port Range**. *Value Range*: 1 ~ 65535 for Public Port, Private Port.
		When **"GRE"** is selected It means the option "Protocol" of packet filter rule is GRE.
		When **"ESP"** is selected It means the option "Protocol" of packet filter rule is ESP.
		When **"SCTP"** is selected It means the option "Protocol" of packet filter rule is SCTP.
		When **"User-defined"** is selected It means the option "Protocol" of packet filter rule is User-defined. For **Protocol Number**, enter a port number.
Time Schedule	1. An optional filled setting 2. **(0)Always** Is selected by default.	Apply Time Schedule to this rule; otherwise leave it as (0)Always. (refer to Scheduling setting under Object Definition)
Rule	1. An optional filled setting 2.The box is unchecked by default.	Check the Enable box to activate the rule.
Save	N/A	Click the **Save** button to save the settings.
Undo	N/A	Click the **Undo** button to cancel the settings.

Back	N/A	When the **Back** button is clicked the screen will return to previous page.

Create / Edit Virtual Computer

The gateway allows you to custom your Virtual Computer rules. It supports up to a maximum of 20 rule-based Virtual Computer sets.

When **Add** button is applied, **Virtual Computer Rule Configuration** screen will appear.

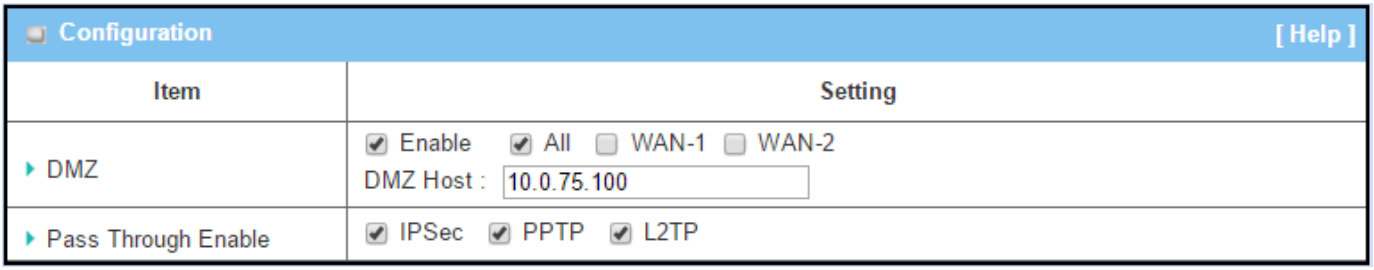


Virtual Computer Rule Configuration		
Item	**Value setting**	**Description**
Global IP	A Must filled setting	This field is to specify the IP address of the WAN IP.
Local IP	A Must filled setting	This field is to specify the IP address of the LAN IP.
Enable	N/A	Then check **Enable** box to enable this rule.
Save	N/A	Click the **Save** button to save the settings.

2.5.3 DMZ & Pass Through

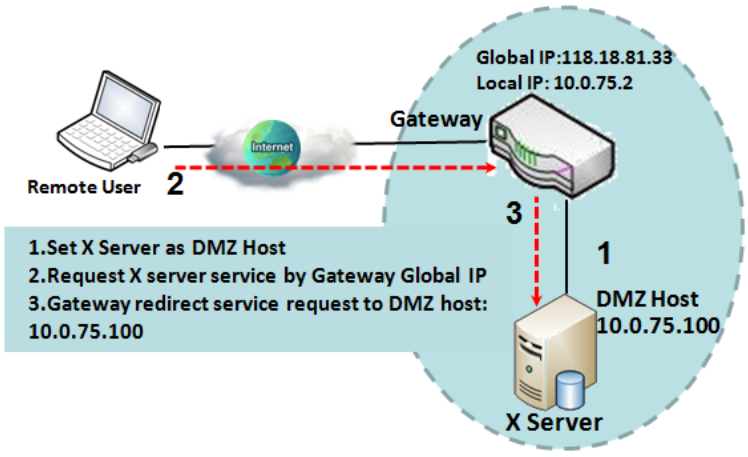
DMZ (De Militarized Zone) Host is a host that is exposed to the Internet cyberspace but still within the protection of firewall by gateway device. So, the function allows a computer to execute 2-way communication for Internet games, Video conferencing, Internet telephony and other special applications. In some cases when a specific application is blocked by NAT mechanism, you can indicate that LAN computer as a DMZ host to solve this problem.

The DMZ function allows you to ask the gateway pass through all normal packets to the DMZ host behind the NAT gateway only when these packets are not expected to receive by applications in the gateway or by other client hosts in the Intranet. Certainly, the DMZ host is also



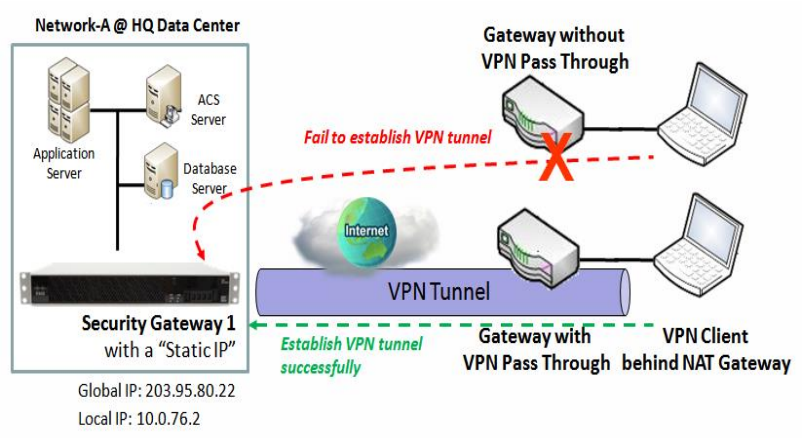
protected by the gateway firewall. Activate the feature and specify the DMZ host with a host in the Intranet when needed.

DMZ Scenario



When the network administrator wants to set up some service daemons in a host behind NAT gateway to allow remote users request for services from server actively, you just have to configure this host as DMZ Host. As shown in the diagram, there is an X server installed as DMZ host, whose IP address is 10.0.75.100. Then, remote user can request services from X server just as it is provided by the gateway whose global IP address is 118.18.81.33. The gateway will forward those packets, not belonging to any configured virtual server or applications, directly to the DMZ host.

VPN Pass through Scenario



Since VPN traffic is different from that of TCP or UDP connection, it will be blocked by NAT gateway. To support the pass through function for the VPN connections initiating from VPN clients behind NAT gateway, the gateway must implement some kind of VPN pass through function for such application. The gateway support the pass through function for IPSec, PPTP, and L2TP connections, you just have to check the corresponding checkbox to activate it.

DMZ & Pass Through Setting

Go to **Basic Network > Port Forwarding > DMZ & Pass Through** tab.

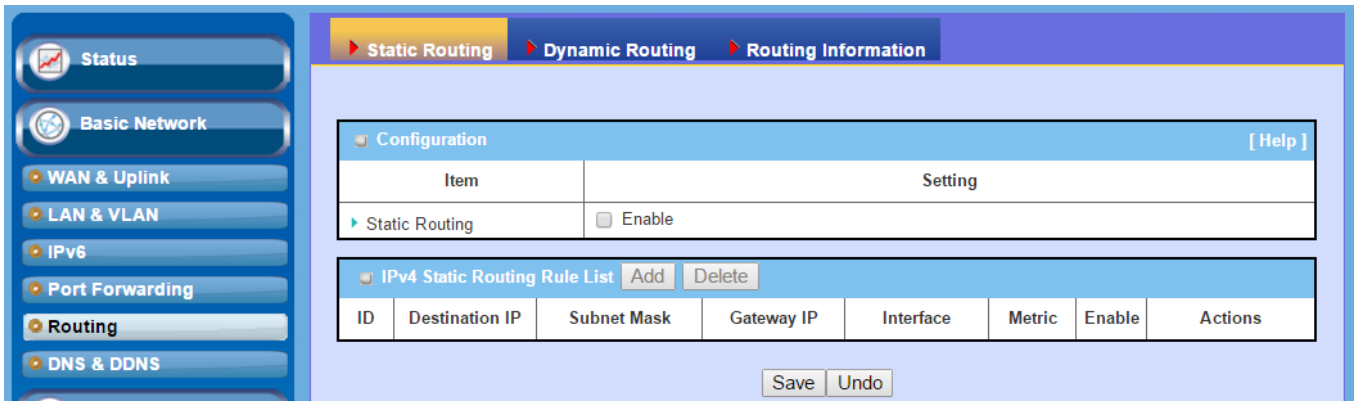
The DMZ host is a host that is exposed to the Internet cyberspace but still within the protection of firewall by gateway device.

Enable DMZ and Pass Through

Configuration	[Help]
Item	**Setting**
DMZ	☐ Enable ☑ All ☐ WAN-1 ☐ WAN-2 ☐ WAN-3 ☐ WAN-4 DMZ Host :
Pass Through Enable	☑ IPSec ☑ PPTP ☑ L2TP

Configuration		
Item	**Value setting**	**Description**
DMZ	1. A Must filled setting 2. Default is **ALL**.	Check the **Enable** box to activate the DMZ function Define the selected interface to be the packet-entering interface of the gateway, and fill in the IP address of Host LAN IP in **DMZ Host** field . If the packets to be filtered are coming from **WAN-x** then select **WAN-x** for this field. Select **ALL** for packets coming into the router from any interfaces. It can be selected **WAN-x** box when **WAN-x** enabled. **Note**: The available check boxes (**WAN-1** ~ **WAN-4**) depend on the number of WAN interfaces for the product.
Pass Through Enable	The boxes are checked by default	Check the box to enable the pass through function for the **IPSec**, **PPTP**, and **L2TP**. With the pass through function enabled, the VPN hosts behind the gateway still can connect to remote VPN servers.
Save	N/A	Click the **Save** button to save the settings.
Undo	N/A	Click the **Undo** button to cancel the settings

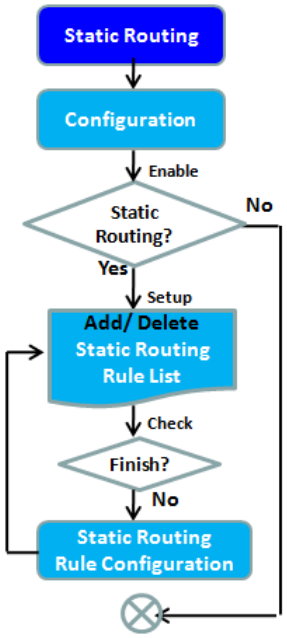
2.6 Routing

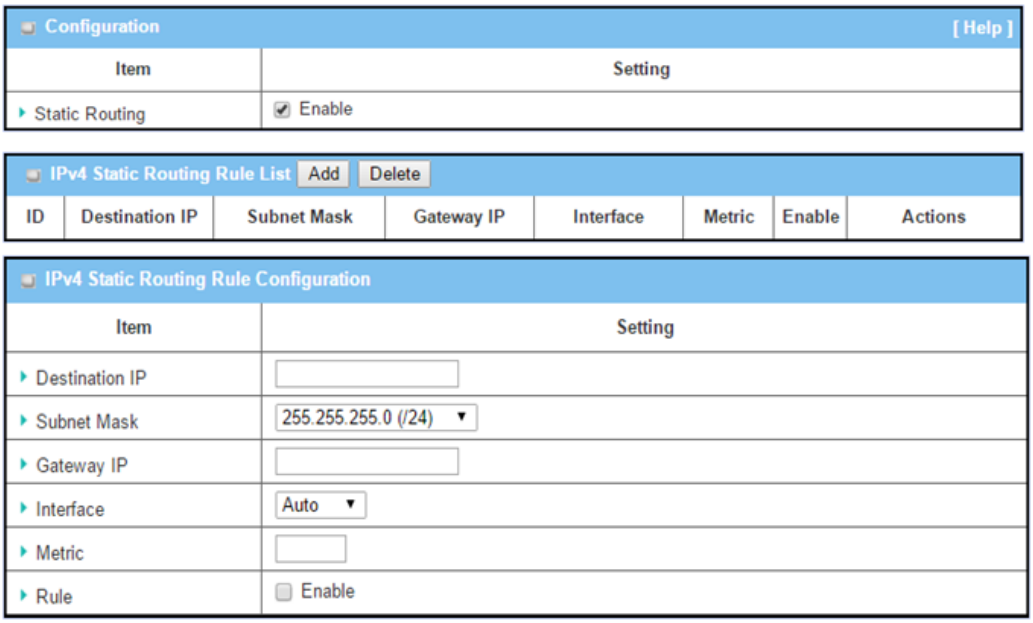


If you have more than one router and subnet, you will need to enable routing function to allow packets to find proper routing path and allow different subnets to communicate with each other. Routing is the process of selecting best paths in a network. It is performed for many kinds of networks, like electronic data networks (such as the Internet), by using packet switching technology. The routing process usually directs forwarding on the basis of routing tables which maintain a record of the routes to various network destinations. Thus, constructing routing tables, which are held in the router's memory, is very important for efficient routing. Most routing algorithms use only one network path at a time.

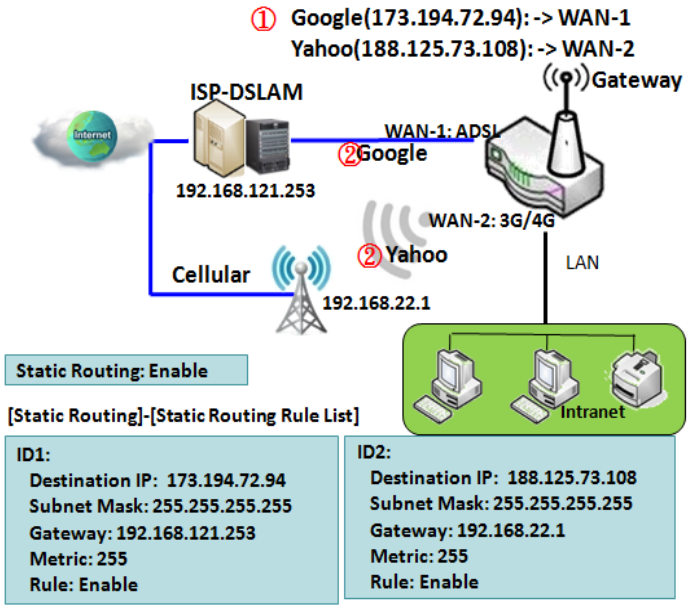
The routing tables record your pre-defined routing paths for some specific destination subnets. It is ***static routing***. However, if the contents of routing tables record the obtained routing paths from neighbor routers by using some protocols, such as RIP, OSPF and BGP. It is ***dynamic routing***. These both routing approaches will be illustrated one after one. In addition, the gateway also built in one advanced configurable routing software Quagga for more complex routing applications, you can configure it if required via Telnet CLI.

2.6.1 Static Routing





"Static Routing" function lets you define the routing paths for some dedicated hosts/servers or subnets to store in the routing table of the gateway. The gateway routes incoming packets to different peer gateways based on the routing table. You need to define the static routing information in gateway routing rule list.



When the administrator of the gateway wants to specify what kinds of packets to be transferred via which gateway interface and which peer gateway to their destination. It can be carried out by the "Static Routing" feature. Dedicated packet flows from the Intranet will be routed to their destination via the pre-defined peer gateway and corresponding gateway interface that are defined in the system routing table by manual.

As shown in the diagram, when the destination is Google access, rule 1 set interface as ADSL, routing gateway as IP-DSLAM gateway 192.168.121.253. All the packets to Google will go through WAN-1. And the same way applied to rule 2 of access Yahoo. Rule 2 sets 3G/4G as interface.

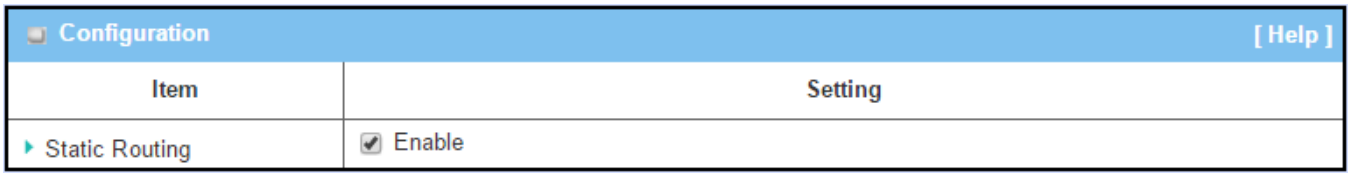
Static Routing Setting

Go to Basic Network > Routing > Static Routing Tab.

There are three configuration windows for static routing feature, including "Configuration", "Static Routing Rule List" and "Static Routing Rule Configuration" windows. "Configuration" window lets you activate the global static routing feature. Even there are already routing rules, if you want to disable routing temporarily, just uncheck the Enable box to disable it. "Static Routing Rule List" window lists all your defined static routing rule entries. Using "Add" or "Edit" button to add and create one new static routing rule or to modify an existed one.
When "Add" or "Edit" button is applied, the "Static Routing Rule Configuration" window will appear to let you define a static routing rule.

Enable Static Routing

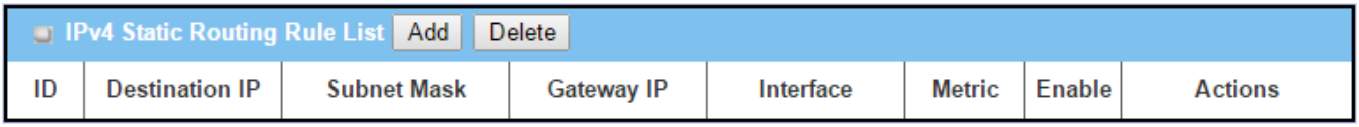
Just check the **Enable** box to activate the "Static Routing" feature.



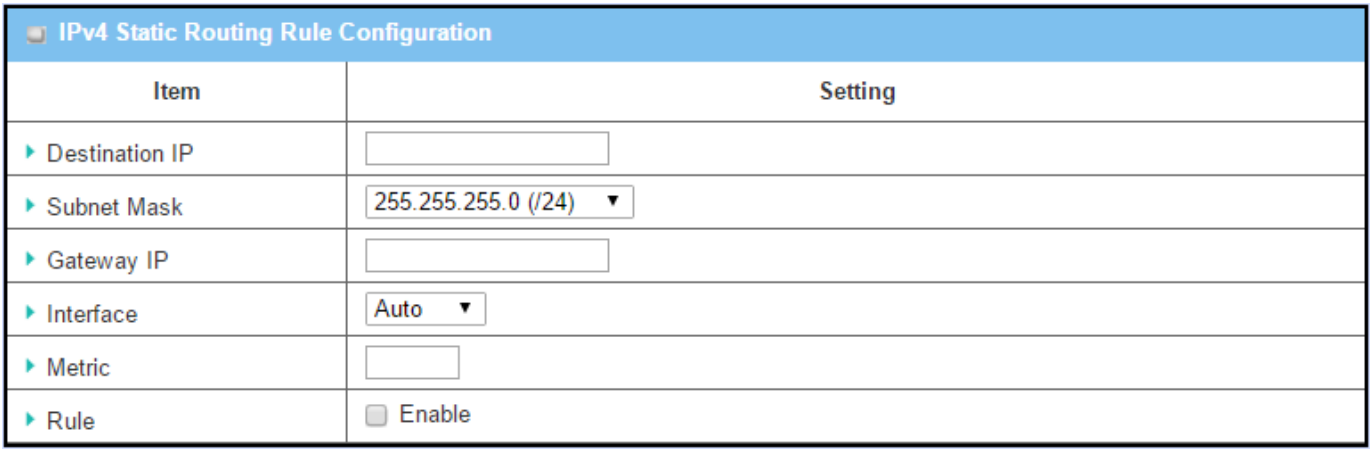
Static Routing		
Item	**Value setting**	**Description**
Static Routing	The box is unchecked by default	Check the **Enable** box to activate this function

Create / Edit Static Routing Rules

The Static Routing Rule List shows the setup parameters of all static routing rule entries. To configure a static routing rule, you must specify related parameters including the destination IP address and subnet mask of dedicated host/server or subnet, the IP address of peer gateway, the metric and the rule activation.

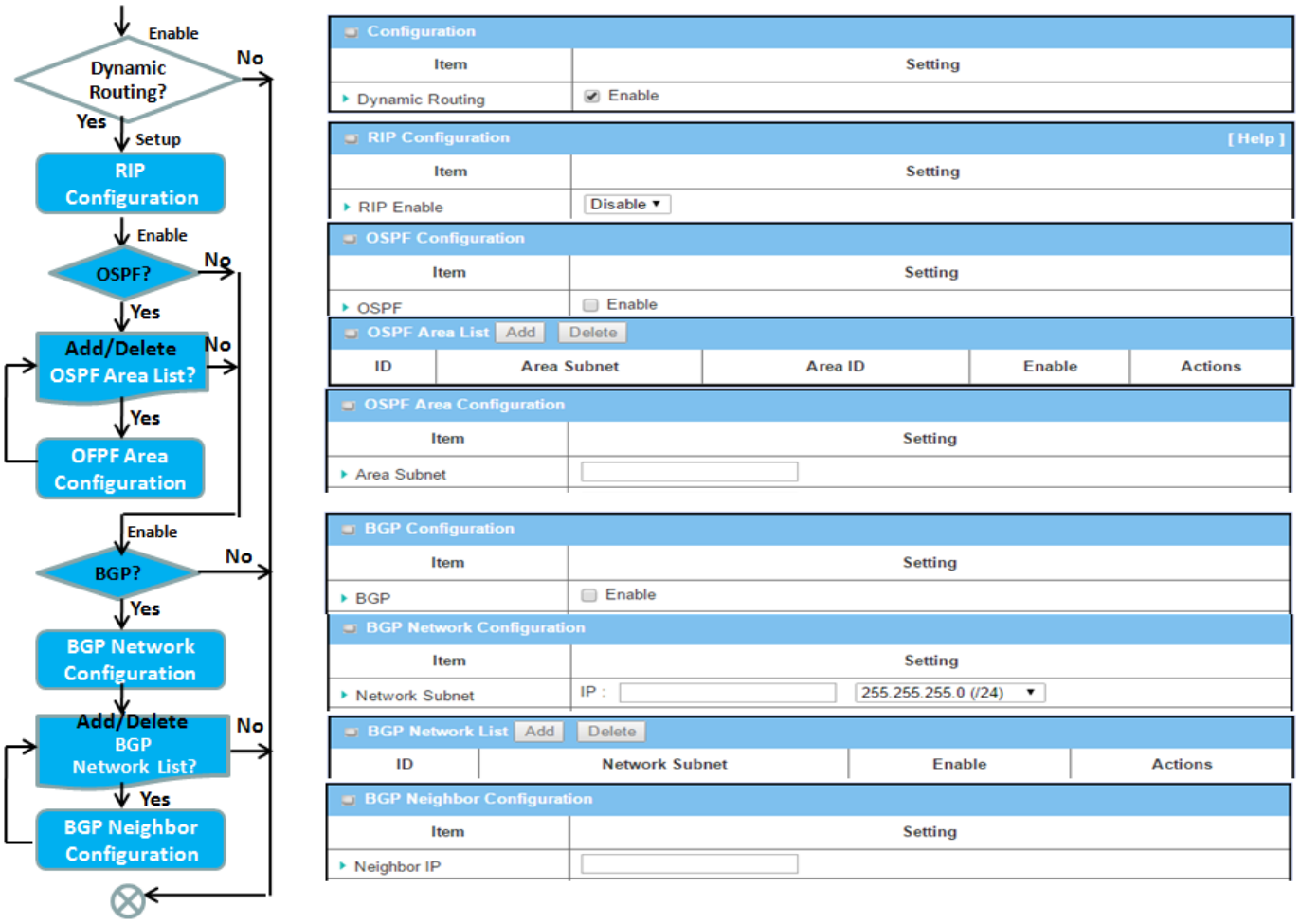


The gateway allows you to custom your static routing rules. It supports up to a maximum of 64 rule sets. When **Add** button is applied, **Static Routing Rule Configuration** screen will appear, while the **Edit** button at the end of each static routing rule can let you modify the rule.



IPv4 Static Routing		
Item	**Value setting**	**Description**
Destination IP	1. IPv4 Format 2. A Must filled setting	Specify the Destination IP of this static routing rule.
Subnet Mask	255.255.255.0 (/24) is set by default	Specify the Subnet Mask of this static routing rule.
Gateway IP	1. IPv4 Format 2. A Must filled setting	Specify the Gateway IP of this static routing rule.
Interface	Auto is set by default	Select the Interface of this static routing rule. It can be **Auto**, or the available WAN / LAN interfaces.
Metric	1. Numberic String Format 2. A Must filled setting	The Metric of this static routing rule. *Value Range*: 0 ~ 255.
Rule	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	NA	Click the **Save** button to save the configuration
Undo	NA	Click the **Undo** button to restore what you just configured back to the previous setting.
Back	NA	When the **Back** button is clicked the screen will return to the Static Routing Configuration page.

2.6.2 Dynamic Routing

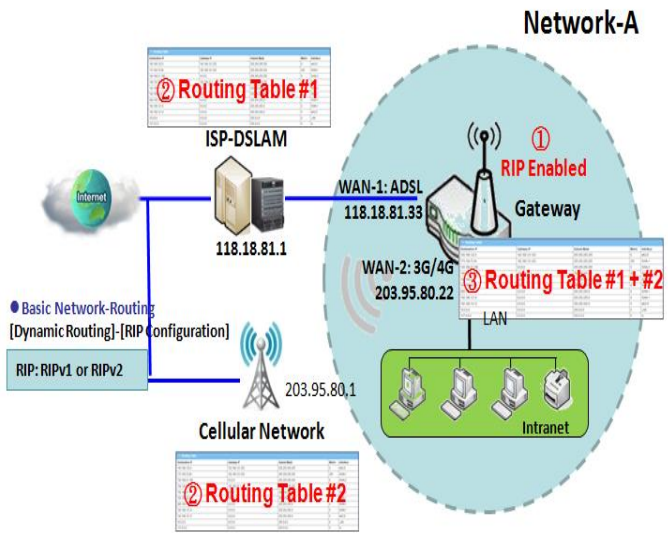


Dynamic Routing, also called adaptive routing, describes the capability of a system, through which routes are characterized by their destination, to alter the path that the route takes through the system in response to a change in network conditions.

This gateway supports dynamic routing protocols, including RIPv1/RIPv2 (Routing Information Protocol), OSPF (Open Shortest Path First), and BGP (Border Gateway Protocol), for you to establish routing table automatically. The feature of dynamic routing will be very useful when there are lots of subnets in your network. Generally speaking, RIP is suitable for small network. OSPF is more suitable for medium network. BGP is more used for big network infrastructure.

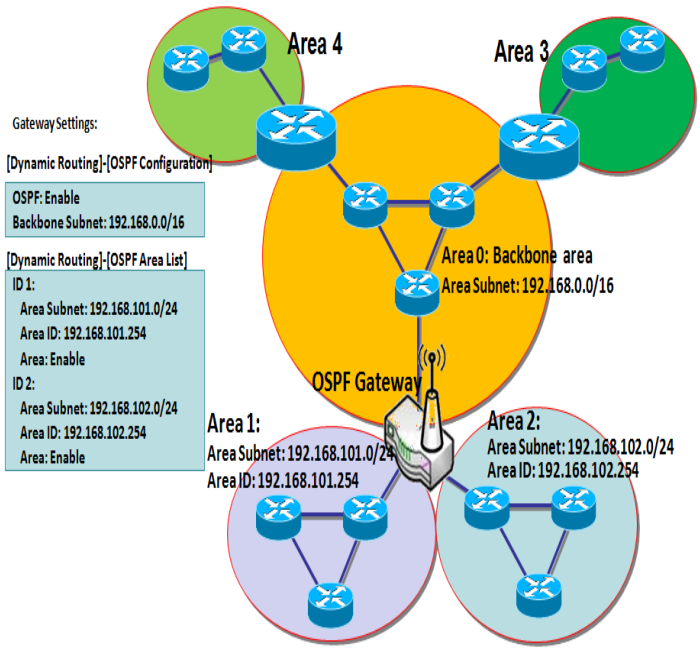
The supported dynamic routing protocols are described as follows.

RIP Scenario



The Routing Information Protocol (RIP) is one of the oldest distance-vector routing protocols, which employs the hop count as a routing metric. RIP prevents routing loops by implementing a limit on the number of hops allowed in a path from the source to a destination. The maximum number of hops allowed for RIP is 15. This hop limit, however, also limits the size of networks that RIP can support. A hop count of 16 is considered an infinite distance, in other words the route is considered unreachable. RIP implements the split horizon, route poisoning and hold-down mechanisms to prevent incorrect routing information from being propagated.

OSPF Scenario

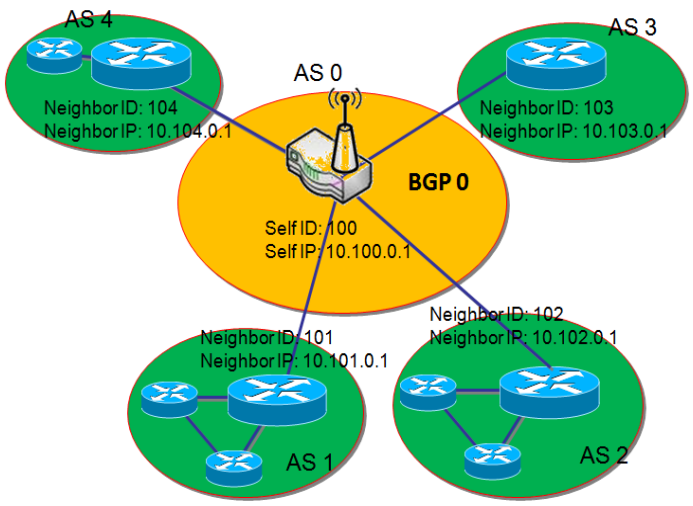


Open Shortest Path First (OSPF) is a routing protocol that uses link state routing algorithm. It is the most widely used interior gateway protocol (IGP) in large enterprise networks. It gathers link state information from available routers and constructs a topology map of the network. The topology is presented as a routing table which routes datagrams based solely on the destination IP address.

Network administrator can deploy OSPF gateway in large enterprise network to get its routing table from the enterprise backbone, and forward routing information to other routers, which are no linked to the enterprise backbone. Usually, an OSPF network is subdivided into routing areas to simplify administration and optimize traffic and resource utilization.

As shown in the diagram, OSPF gateway gathers routing information from the backbone gateways in area 0, and will forward its routing information to the routers in area 1 and area 2 which are not in the backbone.

BGP Scenario



Border Gateway Protocol (BGP) is a standard exterior gateway protocol designed to exchange routing and reachability information between autonomous systems (AS) on the Internet. It usually makes routing decisions based on paths, network policies, or rule-sets. Most ISPs use BGP to establish routing between one another (especially for multi-homed). Very large private IP networks also use BGP internally. The major BGP gateway within one AS will links with some other border gateways for exchanging routing information. It will distribute the collected data in AS to all routers in other AS.

As shown in the diagram, BGP 0 is gateway to dominate AS0 (self IP is 10.100.0.1 and self ID is 100). It links with other BGP gateways in the Internet. The scenario is like Subnet in one ISP to be linked with the ones in other ISPs. By operating with BGP protocol, BGP 0 can gather routing information from other BGP gateways in the Internet. And then it forwards the routing data to the routers in its dominated AS. Finally, the routers resided in AS 0 know how to route packets to other AS.

Advanced Configurable Routing

Within this gateway, there is built-in configurable routing software Quagga. It is a routing software package that provides TCP/IP based routing services with routing protocols support such as OSPF and BGP. Quagga is made from a collection of several daemons that work together to build the routing table, so it provides an interactive user interface for each routing protocol and supports common client commands.

Dynamic Routing Setting

Go to Basic Network > Routing > Dynamic Routing Tab.

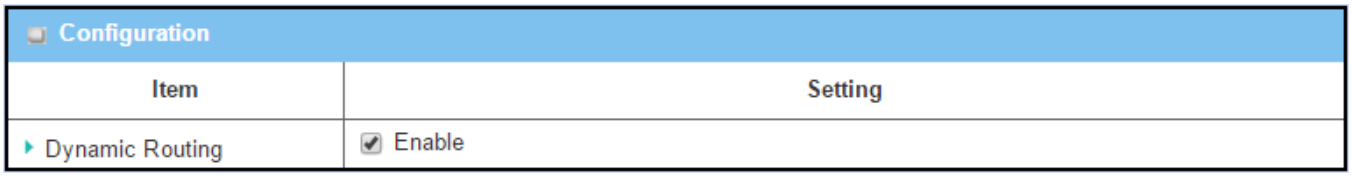
The dynamic routing setting allows user to customize RIP, OSPF, and BGP protocol through the router based on their office setting.

In the "Dynamic Routing" page, there are seven configuration windows for dynamic routing feature. They are the "RIP Configuration" window, "OSPF Configuration" window, "OSPF Area List", "OSPF Area Configuration", "BGP Configuration", "BGP Neighbor List" and "BGP Neighbor Configuration" window. RIP, OSPF and BGP protocols can be configured individually.

The "RIP Configuration" window lets you choose which version of RIP protocol to be activated or disable it. The "OSPF Configuration" window can let you activate the OSPF dynamic routing protocol and specify its backbone subnet. Moreover, the "OSPF Area List" window lists all defined areas in the OSPF network. However, the "BGP Configuration" window can let you activate the BGP dynamic routing protocol and specify its self ID. The "BGP Neighbor List" window lists all defined neighbors in the BGP network.

Enable Dynamic Routing

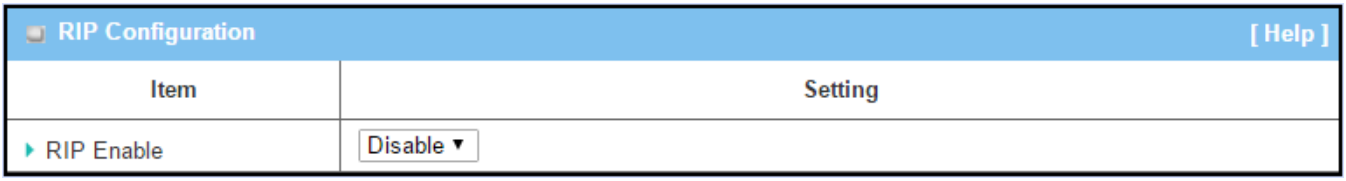
Just check the "**Enable**" box to activate the "Dynamic Routing" feature.



Configuration		
Item	**Value setting**	**Description**
Dynamic Routing	The box is unchecked by default	Check the **Enable** box to activate this function

RIP Configuration

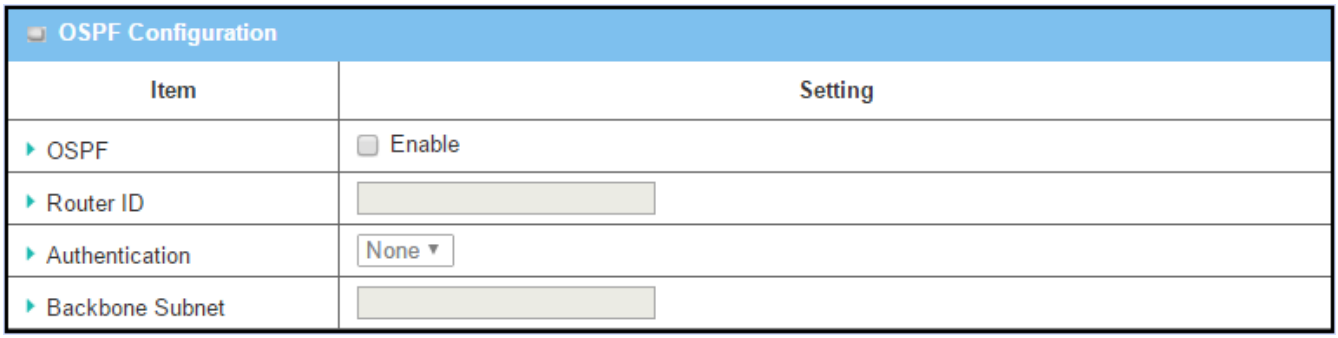
The RIP configuration setting allows user to customize RIP protocol through the router based on their office setting.



RIP Configuration		
Item	**Value setting**	**Description**
RIP Enable	Disable is set by default	Select **Disable** will disable RIP protocol. Select **RIP v1** will enable RIPv1 protocol. Select **RIP v2** will enable RIPv2 protocol.

OSPF Configuration

The OSPF configuration setting allows user to customize OSPF protocol through the router based on their office setting.



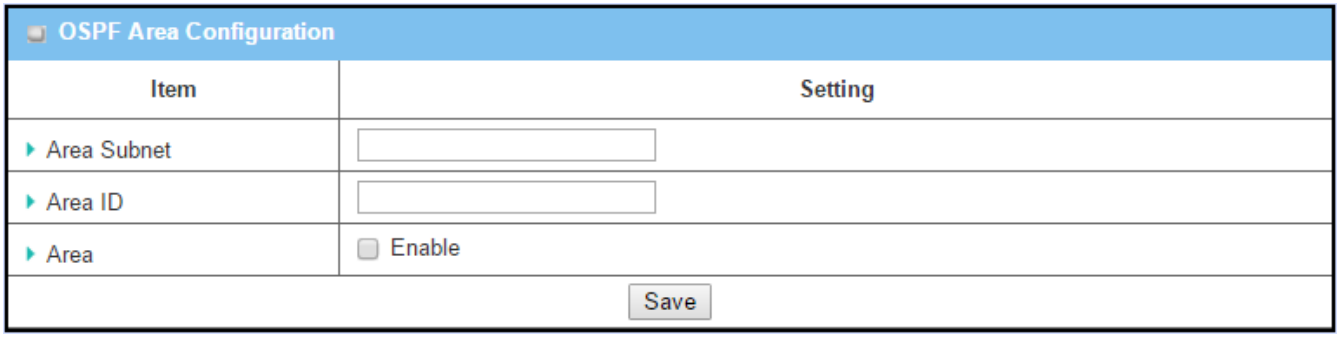
OSPF Configuration		
Item	**Value setting**	**Description**
OSPF	Disable is set by default	Click **Enable** box to activate the OSPF protocol.
Router ID	1. IPv4 Format 2. A Must filled setting	The Router ID of this router on OSPF protocol
Authentication	None is set by default	The Authentication method of this router on OSPF protocol. Select **None** will disable Authentication on OSPF protocol. Select **Text** will enable Text Authentication with entered the Key in this field on OSPF protocol. Select **MD5** will enable MD5 Authentication with entered the ID and Key in these fields on OSPF protocol.

Backbone Subnet	1. Classless Inter Domain Routing (CIDR) Subnet Mask Notation. (Ex: 192.168.1.0/24) 2. A Must filled setting	The Backbone Subnet of this router on OSPF protocol.

Create / Edit OSPF Area Rules

The router allows you to custom your OSPF Area List rules. It supports up to a maximum of 32 rule sets.

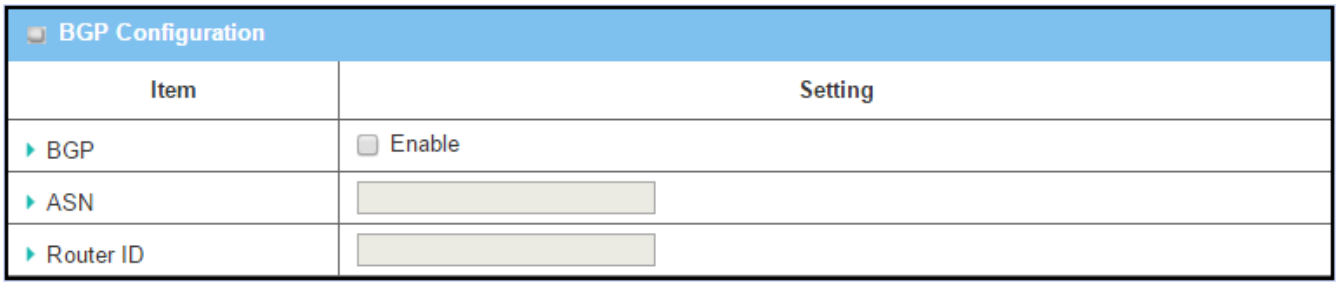
When **Add** button is applied, **OSPF Area Rule Configuration** screen will appear.



OSPF Area Configuration		
Item	**Value setting**	**Description**
Area Subnet	1. Classless Inter Domain Routing (CIDR) Subnet Mask Notation. (Ex: 192.168.1.0/24) 2. A Must filled setting	The Area Subnet of this router on OSPF Area List.
Area ID	1. IPv4 Format 2. A Must filled setting	The Area ID of this router on OSPF Area List.
Area	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	N/A	Click the **Save** button to save the configuration

BGP Configuration

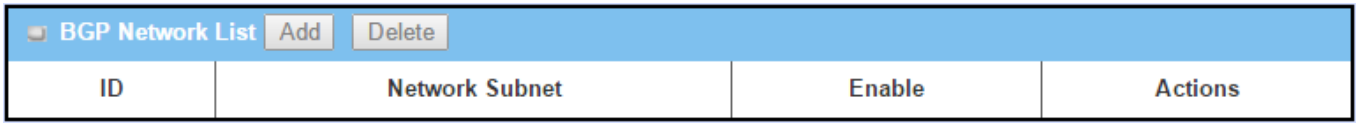
The BGP configuration setting allows user to customize BGP protocol through the router setting.



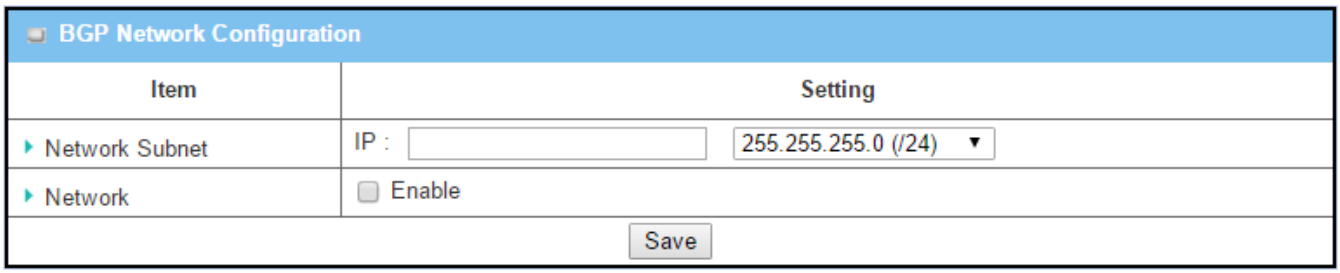
BGP Network Configuration		
Item	**Value setting**	**Description**
BGP	The box is unchecked by default	Check the **Enable** box to activate the BGP protocol.
ASN	1. Numberic String Format 2. A Must filled setting	The ASN Number of this router on BGP protocol. ***Value Range*****:** 1 ~ 4294967295.
Router ID	1. IPv4 Format 2. A Must filled setting	The Router ID of this router on BGP protocol.

Create / Edit BGP Network Rules

The router allows you to custom your BGP Network rules. It supports up to a maximum of 32 rule sets.



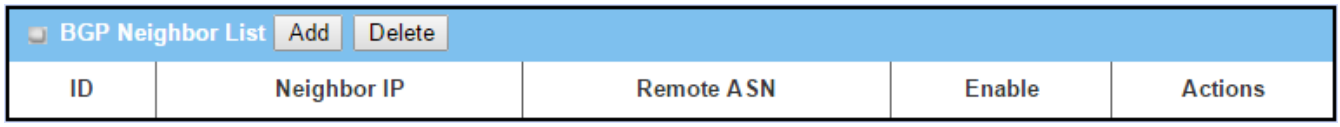
When **Add** button is applied, **BGP Network Rule Configuration** screen will appear.



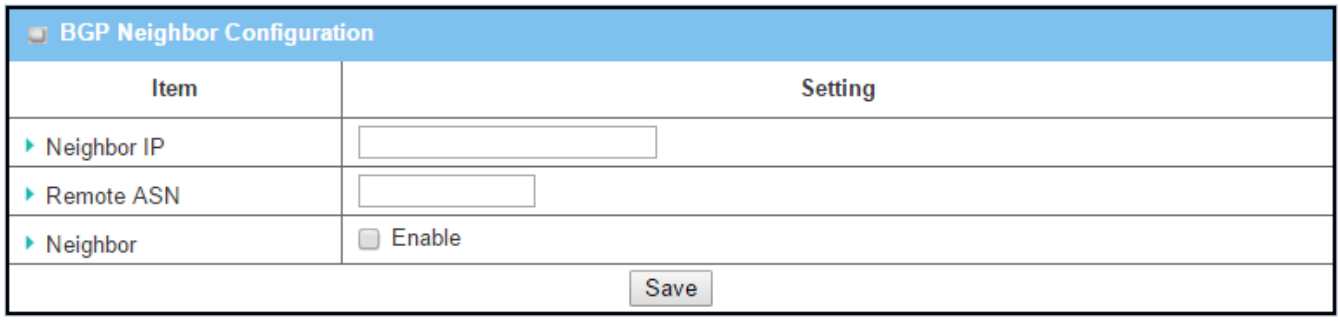
Item	Value setting	Description
Network Subnet	1. IPv4 Format 2. A Must filled setting	The Network Subnet of this router on BGP Network List. It composes of entered the IP address in this field and the selected subnet mask.
Network	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	N/A	Click the **Save** button to save the configuration

Create / Edit BGP Neighbor Rules

The router allows you to custom your BGP Neighbor rules. It supports up to a maximum of 32 rule sets.



When **Add** button is applied, **BGP Neighbor Rule Configuration** screen will appear.



BGP Neighbor Configuration		
Item	**Value setting**	**Description**
Neighbor IP	1. IPv4 Format 2. A Must filled setting	The Neighbor IP of this router on BGP Neighbor List.
Remote ASN	1. Numberic String Format 2. A Must filled setting	The Remote ASN of this router on BGP Neighbor List. ***Value Range*****:** 1 ~ 4294967295.
Neighbor	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	N/A	Click the **Save** button to save the configuration

2.6.3 Routing Information

The routing information allows user to view the routing table and policy routing information. Policy Routing Information is only available when the Load Balance function is enabled and the Load Balance Strategy is By User Policy.

Go to Basic Network > Routing > Routing Information **Tab.**

Routing Table

Destination IP	Subnet Mask	Gateway IP	Metric	Interface
192.168.1.0	255.255.255.0	0.0.0.0	0	LAN
169.254.0.0	255.255.0.0	0.0.0.0	0	LAN
239.0.0.0	255.0.0.0	0.0.0.0	0	LAN
127.0.0.0	255.0.0.0	0.0.0.0	0	lo

Routing Table		
Item	**Value setting**	**Description**
Destination IP	N/A	Routing record of Destination IP. IPv4 Format.
Subnet Mask	N/A	Routing record of Subnet Mask. IPv4 Format.
Gateway IP	N/A	Routing record of Gateway IP. IPv4 Format.
Metric	N/A	Routing record of Metric. Numeric String Format.
Interface	N/A	Routing record of Interface Type. String Format.

Policy Routing Information

Policy Routing Source	Source IP	Destination IP	Destination Port	WAN Interface
Load Balance	-	-	-	-

Policy Routing Information		
Item	**Value setting**	**Description**
Policy Routing Source	N/A	Policy Routing of Source. String Format.
Source IP	N/A	Policy Routing of Source IP. IPv4 Format.
Destination IP	N/A	Policy Routing of Destination IP. IPv4 Format.
Destination Port	N/A	Policy Routing of Destination Port. String Format.
WAN Interface	N/A	Policy Routing of WAN Interface. String Format.

2.7 QoS

The total amount of data traffic increases nowadays as the higher demand of mobile applications, like Game / Chat / VoIP / P2P / Video / Web access. In order to pose new requirements for data transport, e.g. low latency, low data loss, the entire network must ensure them via a connection service guarantee.

The main goal of QoS (Quality of Service) is prioritizing incoming data, and preventing data loss due to factors such as jitter, delay and dropping. Another important aspect of QoS is ensuring that prioritizing one data flow doesn't interfere with other data flows. So, QoS helps to prioritize data as it enters your router. By attaching special identification marks or headers to incoming packets, QoS determines which queue the packets enter, based on priority. This is useful when there are certain types of data you want to give higher priority to, such as voice packets given higher priority than Web data packets.

To utilize your network throughput completely, administrator must define bandwidth control rules carefully to balance the utilization of network bandwidth for all users to access. It is indeed required that an access gateway satisfies the requirements of latency-critical applications, minimum access right guarantee, fair bandwidth usage for same subscribed condition and flexible bandwidth management. Security Gateway provides a Rule-based QoS to carry out the requirements.

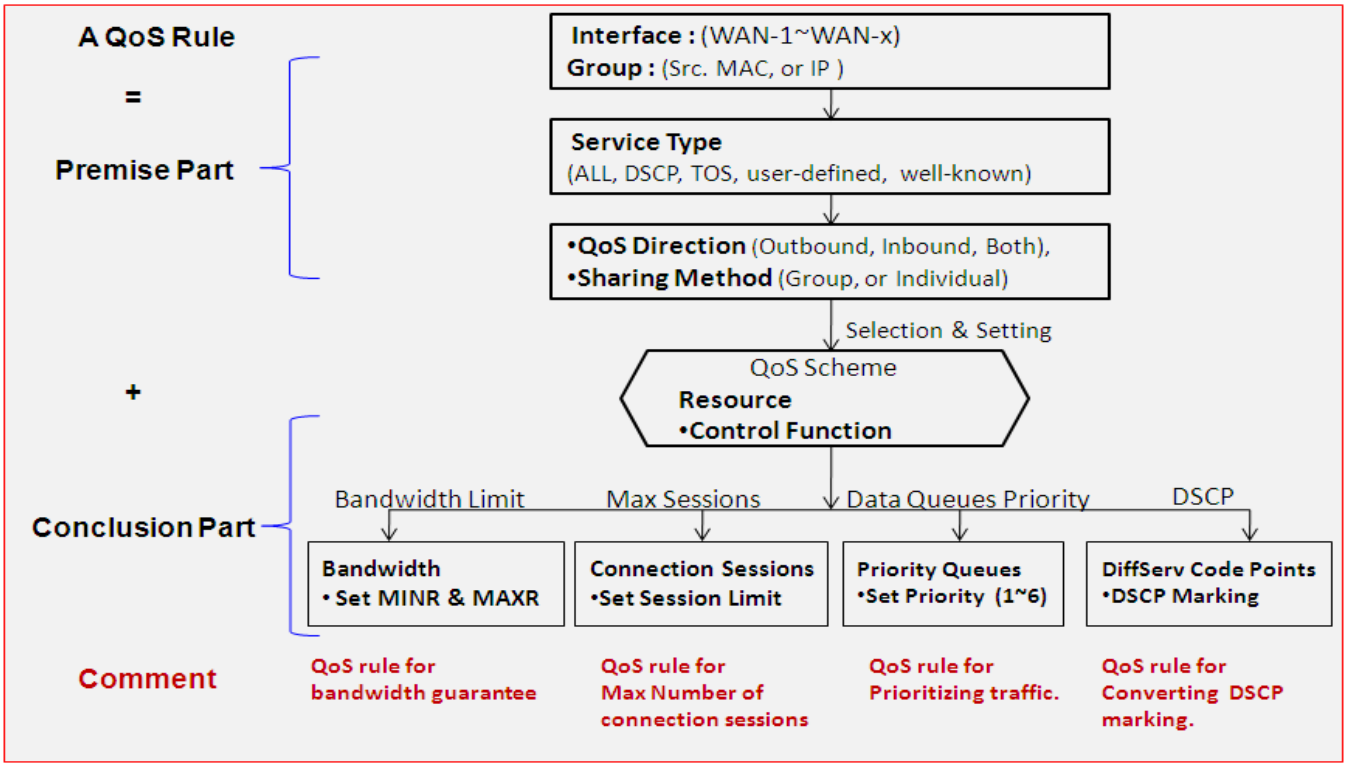
2.7.1 QoS Configuration

This gateway provides lots of flexible rules for you to set QoS policies. Basically, you need to know three parts of information before you create your own policies. First, "who" needs to be managed? Second, "what" kind of service needs to be managed? The last part is "how" you prioritize. Once you have this information, you can continue to learn functions in this section in more detail.

QoS Rule Configuration

When you want to add a new QoS rule or edit one already existed, the "QoS Rule Configuration" window shows up for you to configure. The parameters in a rule include the applied WAN interfaces, the dedicated host group based on MAC address or IP address, the dedicated kind of

service packets, the system resource to be distributed, the corresponding control function for your specified resource, the packet flow direction, the sharing method for the control function, the integrated time schedule rule and the rule activation. Following diagram illustrates how to organize a QoS rule.



In above diagram, a QoS rule is organized by the premise part and the conclusion part. In the premise part, you must specify the WAN interface, host group, service type in the packets, packet flow direction to be watched and the sharing method of group control or individual control. However, in the conclusion part, you must make sure which kind of system resource to distribute and the control function based on the chosen system resource for the rule.

The Rule-based QoS has following features.

Multiple Group Categories

Specify the group category in a QoS rule for the target objects to be applied on.

Group Category can be based on VLAN ID, MAC Address, IP Address, Host Name or Packet Length.

Differentiated Services

Specify the service type in a QoS rule for the target packets to be applied on.
Differentiated services can be based on 802.1p, DSCP, TOS, VLAN ID, User-defined Services and Well-known Services. Well-known services include FTP(21), SSH(TCP:22), Telnet(23), SMTP(25), DNS(53), TFTP(UDP:69), HTTP(TCP:80), POP3(110), Auth(113), SFTP(TCP:115), SNMP&Traps(UDP:161-162), LDAP(TCP:389), HTTPS(TCP:443), SMTPs(TCP:465), ISAKMP(500), RTSP(TCP:554), POP3s(TCP:995), NetMeeting(1720), L2TP(UDP:1701) and PPTP(TCP:1723).

Available Control Functions

There are 4 resources can be applied in a QoS rule: bandwidth, connection sessions, priority queues and DiffServ Code Point (DSCP). Control function that acts on target objects for specific services of packet flow is based on these resources.

For bandwidth resource, control functions include guaranteeing bandwidth and limiting bandwidth. For priority queue resource, control function is setting priority. For DSCP resource, control function is DSCP marking. The last resource is Connection Sessions; the related control function is limiting connection sessions.

Individual / Group Control

One QoS rule can be applied to individual member or whole group in the target group. This feature depends on model.

Outbound / Inbound Control

One QoS rule can be applied to the outbound or inbound direction of packet flow, even them both. This feature depends on model.

Two QoS rule examples are listed as below.

QoS Rule Example #1 - Connection Sessions

QoS Rule Configuration	
Item	**Setting**
Interface	WAN - 1
Group	IP 10.0.75.16 Subnet Mask : 255.255.255.240 (/28)
Service	All
Resource	Connection Sessions
Control Function	Set Session Limitation 20000
QoS Direction	Outbound
Sharing Method	Group Control
Time Schedule	(0) Always
Rule	Enable

When administrator wants to limit maximum connection sessions from some client hosts (IP 10.0.75.16~31) to 20000 to avoid resource unbalanced, he can setup this rule as above configuration.

This rule defines that all client hosts, whose IP address is in the range of 10.0.75.16~31, can access the Internet via "WAN-1" interface under the limitation of the maximum 20000 connection sessions totally at any time

QoS Rule Example #2 – DifferServ Code Points

QoS Rule Configuration	
Item	**Setting**
Interface	All WANs
Group	IP 10.0.75.196 Subnet Mask : 255.255.255.252 (/30)
Service	DSCP DiffServ CodePoint IP Precedence 4(CS4)
Resource	DiffServ Code Points
Control Function	DSCP Marking AF Class2(High Drop)
QoS Direction	Inbound
Sharing Method	Group Control
Time Schedule	(0) Always
Rule	Enable

When the administrator of the gateway wants to convert the code point value, "IP Precedence 4(CS4)", in the packets from some client hosts (IP 10.0.75.196~199) to the code value, "AF Class2(High Drop)", he can use the "Rule-based QoS" function to carry out this rule by defining an QoS rule as shown in above configuration. Under such configuration, all packets from WAN interfaces to LAN IP address 10.0.75.196 ~ 10.0.75.199 which have DiffServ code points with “IP Precedence 4(CS4)” value will be modified by “DSCP Marking” control function with “AF Class 2(High Drop)” value at any time.

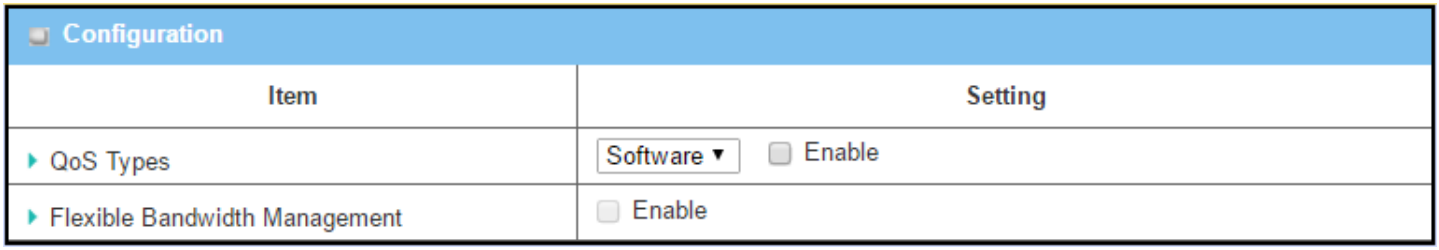
QoS Configuration Setting

Go to **Basic Network > QoS > Configuration** tab.

In "QoS Configuration" page, there are some configuration windows for QoS function. They are the "Configuration" window, “System Resource Configuration” window, "QoS Rule List" window, and "QoS Rule Configuration" window.

The "Configuration" window can let you activate the Rule-based QoS function. In addition, you can also enable the "Flexible Bandwidth Management" (FBM) feature for better utilization of system bandwidth by FBM algorithm. Second, the “System Configuration” window can let you configure the total bandwidth and session of each WAN. Third, the "QoS Rule List" window lists all your defined QoS rules. At last, the "QoS Rule Configuration" window can let you define one QoS rule.

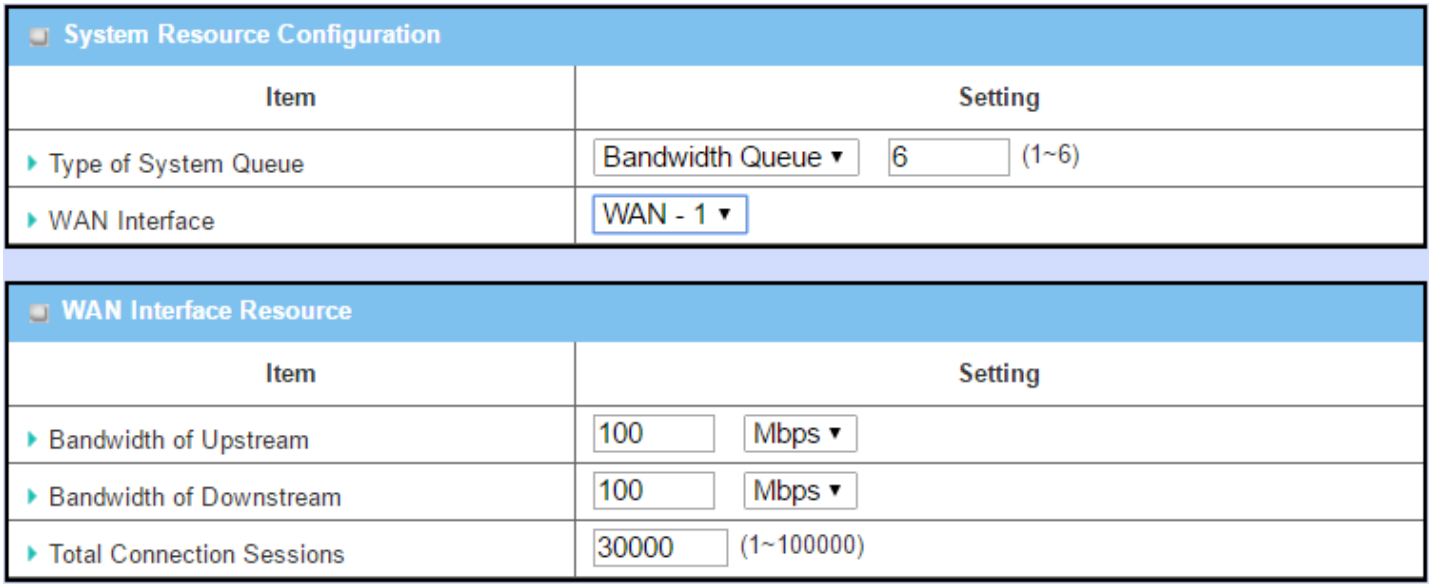
Enable QoS Function



Configuration Item	Value Setting	Description
QoS Type	1. **Software** is selected by default. 2. The box is unchecked by default.	Select the QoS Type from the dropdown list, and then click **Enable** box to activate the QoS function. The default QoS type is set to **Software** QoS. For some models, there is another option for **Hardware** QoS.
Flexible Bandwidth Management	The box is unchecked by default	Click **Enable** box to activate the Flexible Bandwidth Management function.
Save	N/A	Click the **Save** button to save the settings.

Check the "Enable" box to activate the "Rule-based QoS" function. Also enable the Flexible Bandwidth Management (FBM) feature when needed. When FBM is enabled, system adjusts the bandwidth distribution dynamically based on current bandwidth usage situation to reach maximum system network performance while transparent to all users. Certainly, the bandwidth subscription profiles of all current users are considered in system's automatic adjusting algorithm.

Setup System Resource

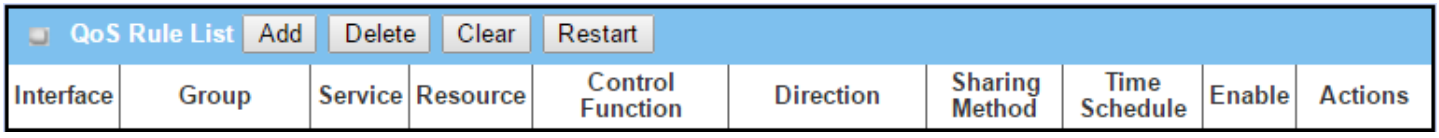


System Resource Configuration		
Item	**Value Setting**	**Description**
Type of System Queue	1. A Must filled setting. 2. **Bandwidth Queue**, and **6** are set by default.	Define the system queues that are available for the QoS settings. The supported type of system queues are **Bandwidth Queue** and **Priority Queues.** ***Value Range***: 1 ~ 6.
WAN Interface	**WAN-1** is selected by default.	Select the WAN interface and then the following **WAN Interface Resource** screen will show the related resources for configuration. ● **Bandwidth of Upstream / Downstream** Specify total upload / download bandwidth of the selected WAN. ***Value Range***: For Gigabit Ethernet:1~1024000Kbps, or 1~1000Mbps; For Fast Ethernet: 1~102400Kbps, or 1~100Mbps; For 3G/4G: 1~153600Kbps, or 1~150Mbps. ● **Total Connection Sessions** Specify total connection sessions of the selected WAN. ***Value Range***: 1 ~ 10000.
Save	N/A	Click the **Save** button to save the settings.

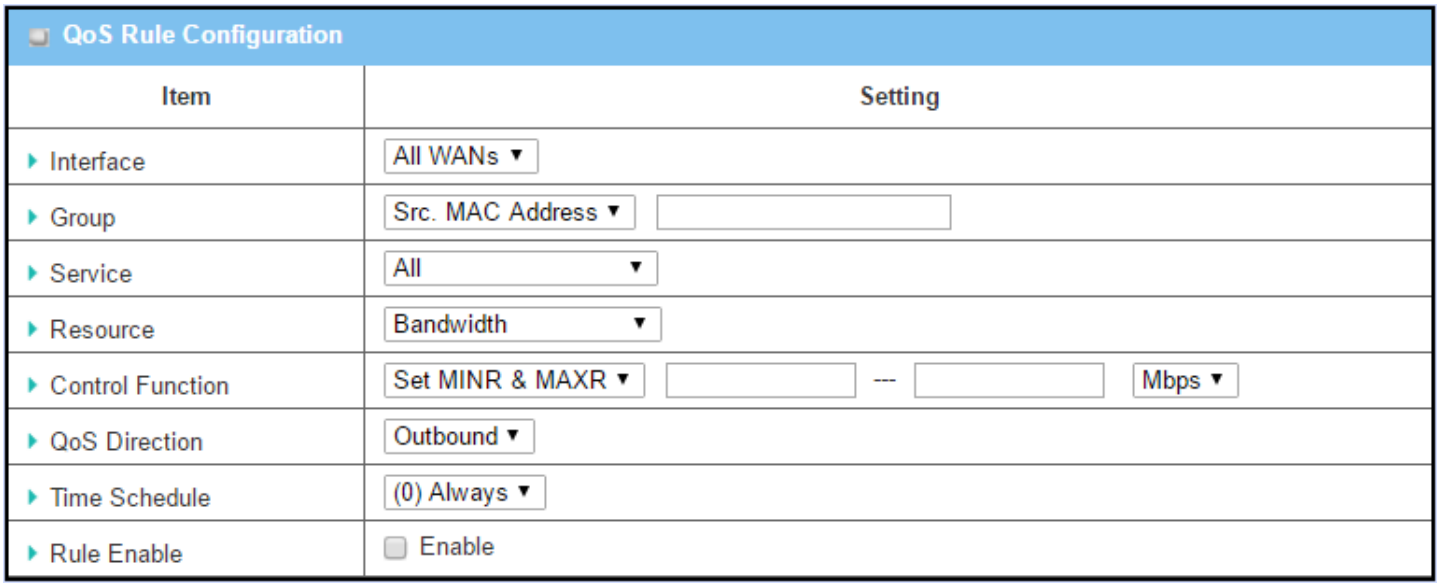
Each WAN interface should be configured carefully for its upstream bandwidth, downstream bandwidth and maximum number of connection sessions.

Create / Edit QoS Rules

After enabled the QoS function and configured the system resources, you have to further specify some QoS rules for provide better service on the interested traffics. The gateway supports up to a maximum of 128 rule-based QoS rule sets.



When **Add** button is applied, **QoS Rule Configuration** screen will appear.



QoS Rule Configuration		
Item	**Value setting**	**Description**
Interface	1. A Must filled setting. 2. **All WANs** is selected by default.	Specify the WAN interface to apply the QoS rule. Select **All WANs** or a certain **WAN-n** to filter the packets entering to or leaving from the interface(s).
Group	1. A Must filled setting. 2. **Src. MAC Address** is selected by default.	Specify the **Group** category for the QoS rule. It can be **Src. MAC Address**, **IP**, or **Host Name.** Select **Src. MAC Address** to prioritize packets based on MAC; Select **IP** to prioritize packets based on IP address and Subnet Mask; Select **Host Name** to prioritize packets based on a group of a pre-configured group of host from the dropdown list. If the dropdown list is empty, ensure if any group is pre-configured.

		Note: The required host groups must be created in advance and corresponding QoS checkbox in the **Multiple Bound Services** field is checked before the **Host Group** option become available. Refer to **Object Definition > Grouping > Host Grouping.**
Service	1. A Must filled setting. 2. **All** is selected by default.	Specify the service type of traffics that have to be applied with the QoS rule. It can be **All**, **DSCP**, **TOS**, **User-defined Service**, or **Well-known Service**. Select **All** for all packets. Select **DSCP** for DSCP type packets only. Select **TOS** for TOS type packets only. You have to select a service type (**Minimize-Cost**, **Maximize-Reliability**, **Maximize-Throughput**, or **Minimize-Delay**) from the dropdown list as well. Select **User-defined Service** for user-defined packets only. You have to define the port range and protocol as well. Select **Well-known Service** for specific application packets only. You have to select the required service from the dropdown list as well.
Resource, and **Control Function**	A Must filled setting	Specify the Resource Type and corresponding Control function for the QoS rule. The available Resource options are **Bandwidth**, **Connection Sessions**, **Priority Queues**, and **DiffServ Codepoints**. **Bandwidth**: Select **Bandwidth** as the resource type for the QoS Rule, and you have to assign the min rate, max rate and rate unit as the bandwidth settings in the **Control Function** / **Set MINR & MAXR** field. **Connection Sessions**: Select **Connection Sessions** as the resource type for the QoS Rule, and you have to assign supported session number in the **Control Function** / **Set Session Limitation** field. **Priority Queues**: Select **Priority Queues** as the resource type for the QoS Rule, and you have to specify a priority queue in the **Control Function** / **Set Priority** field. **DiffServ Code Points**: Select **DiffServ Code Points** as the resource type for the QoS Rule, and you have to select a DSCP marking from the **Control Function** / **DSCP Marking** dropdown list.
QoS Direction	1. A Must filled setting. 2. **Outbound** is selected by default.	Specify the traffic flow direction for the packets to apply the QoS rule. It can be **Outbound**, **Inbound**, or **Both**. **Outbound**: Select **Outbound** to prioritize the traffics going to the Internet via the specified interface. Under such situation, the hosts specified in the Group field is a source group. **Inbound**: Select **Inbound** to prioritize the traffics coming from the Internet via the specified interface. Under such situation, the hosts specified in the Group field is a destination group. **Both**: Select **both** to prioritize the traffics passing through the specified interface, both Inbound and Outbound are considered. Under such situation, the hosts specified in the Group field can be a source or destination group.
Sharing Method	1. A Must filled setting. 2. **Group Control**	Specify the preferred sharing method for how to apply the QoS rule on the selected group. It can be **Individual Control** or **Group Control**.

	is selected by default.	**Individual Control**: If **Individual Control** is selected, each host in the group will have his own QoS service resource as specified in the rule. **Group Control**: If **Group Control** is selected, all the group hosts share the same QoS service resource.
Time Schedule	1. A Must filled setting. 2. **(0) Always** is selected by default.	Apply **Time Schedule** to this rule; otherwise leave it as (0) **Always**. (refer to **Object Definition > Scheduling > Configuration** settings)
Rule Enable	The box is unchecked by default.	Click **Enable** box to activate this QoS rule.
Save	N/A	Click the **Save** button to save the settings.

Chapter 3 Object Definition

3.1 Scheduling

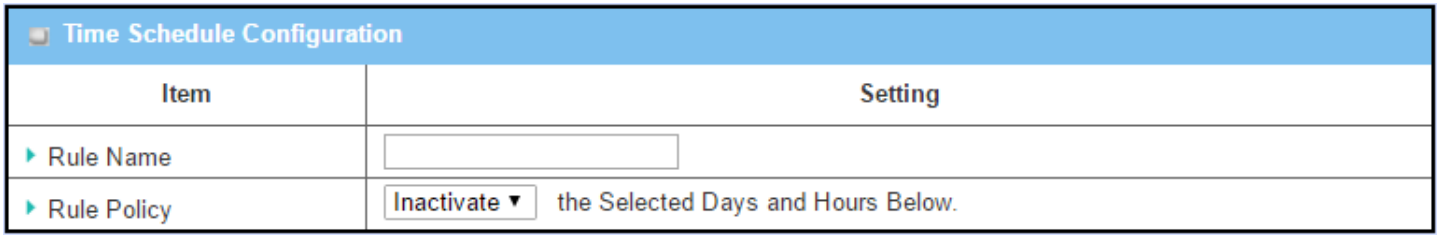
Scheduling provides ability of adding/deleting time schedule rules, which can be applied to other functionality.

3.1.1 Scheduling Configuration

Go to **Object Definition > Scheduling > Configuration** tab.

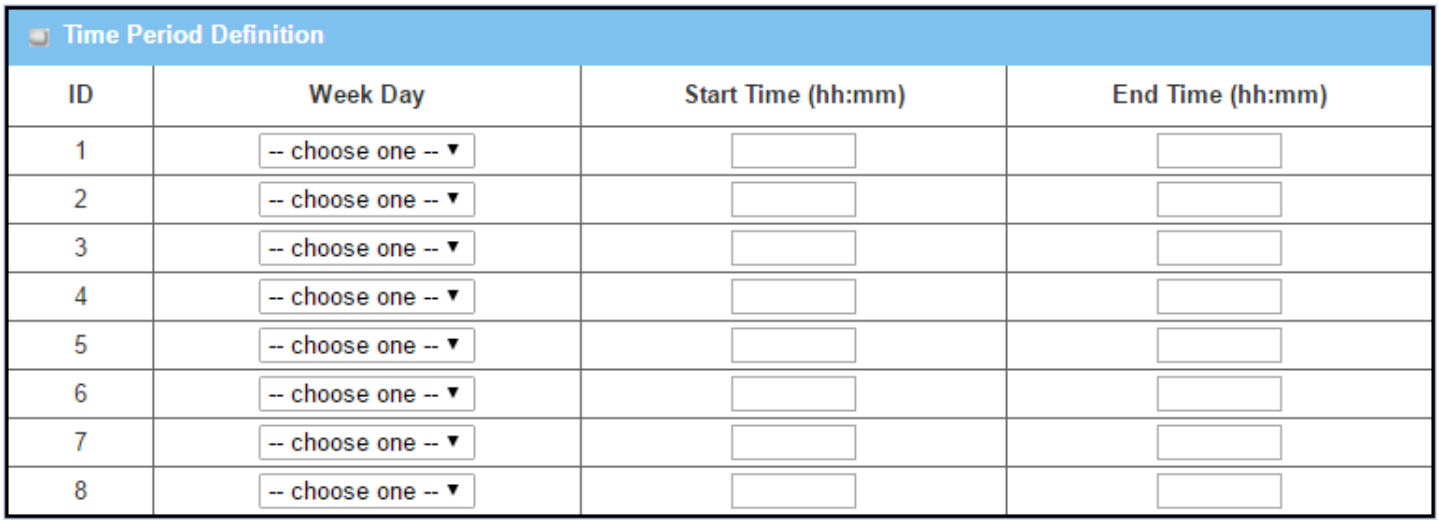
Button description		
Item	**Value setting**	**Description**
Add	N/A	Click the **Add** button to configure time schedule rule
Delete	N/A	Click the **Delete** button to delete selected rule(s)

When **Add** button is applied, Time Schedule Configuration and Time Period Definition screens will appear.



Time Schedule Configuration		
Item	**Value Setting**	**Description**
Rule Name	String: any text	Set rule name

Rule Policy	Default Inactivate	Inactivate/activate the function been applied to in the time period below



Time Period Definition		
Item	**Value Setting**	**Description**
Week Day	Select from menu	Select everyday or one of weekday
Start Time	Time format (hh :mm)	Start time in selected weekday
End Time	Time format (hh :mm)	End time in selected weekday
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings
Refresh	N/A	Click the **Refresh** button to refresh the time schedule list.

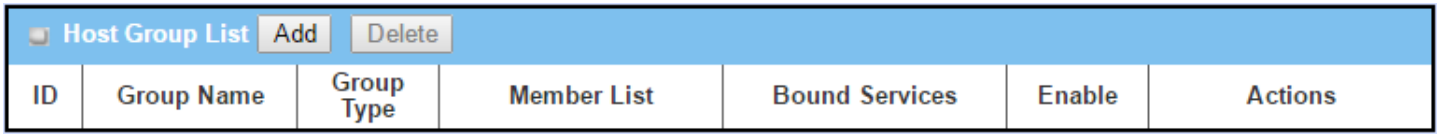
3.2 Grouping

The Grouping function allows user to make group for some services.

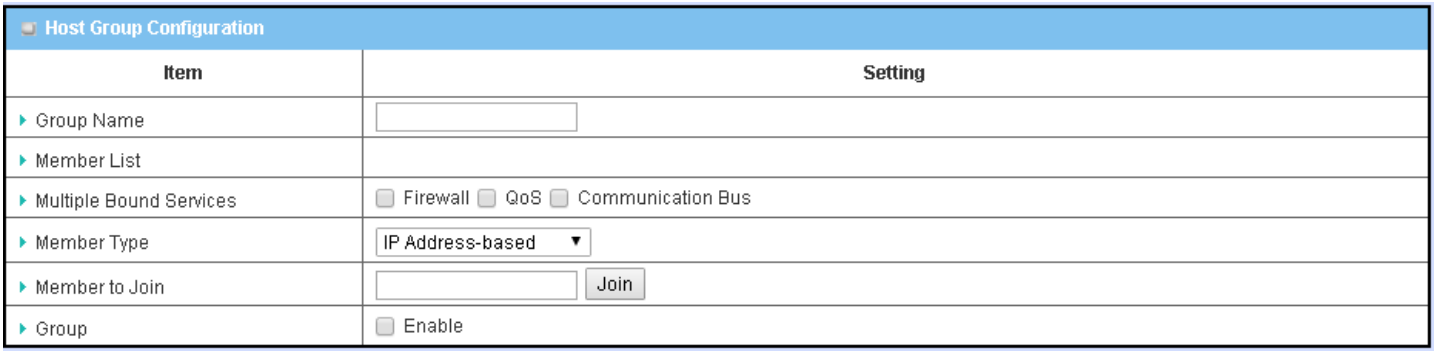
3.2.1 Host Grouping

Go to **Object Definition > Grouping > Host Grouping** tab.

The Host Grouping function allows user to make host group for some services, such as QoS, Firewall, and Communication Bus. The supported service types could be different for the purchased product.



When **Add** button is applied, **Host Group Configuration** screen will appear.



Host Group Configuration		
Item	**Value setting**	**Description**
Group Name	1. String format can be any text 2. A Must filled setting	Enter a group name for the rule. It is a name that is easy for you to understand.
Member List	NA	This field will indicate the hosts (members) contained in the group.

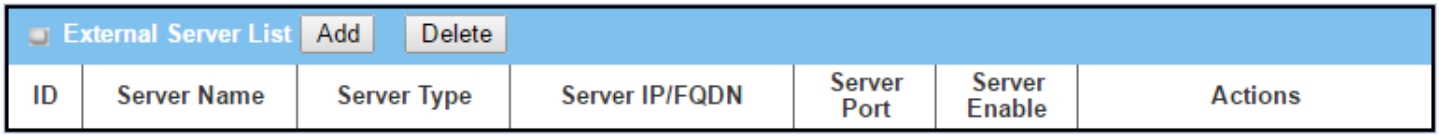
Multiple Bound Services	The boxes are unchecked by default	Binding the services that the host group can be applied. If you enable the **Firewall**, the produced group can be used in firewall service. Same as by enable **QoS** and **Communication Bus**. **Note**: The supported service type can be different for the purchased product.
Member Type	1. **IP Address-based** is selected by default. 2. A Must filled setting	Select the member type for the host group. It can be **IP Address-based**, **MAC Address-based**, or **Host Name-based**. When **IP Address-based** is selected, only IP address can be added in **Member to Join.** When **MAC Address-based** is selected, only MAC address can be added in **Member to Join.** When **Host Name-based** is selected, only host name can be added in **Member to Join.**
Member to Join	N/A	Add the members to the group in this field. You can enter the member information as specified in the Member Type above, and press the **Join** button to add. Only one member can be add at a time, so you have to add the members to the group one by one.
Group	The box is unchecked by default	Check the **Enable** checkbox to activate the host group rule. So that the group can be bound to selected service(s) for further configuration.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

3.3 External Server

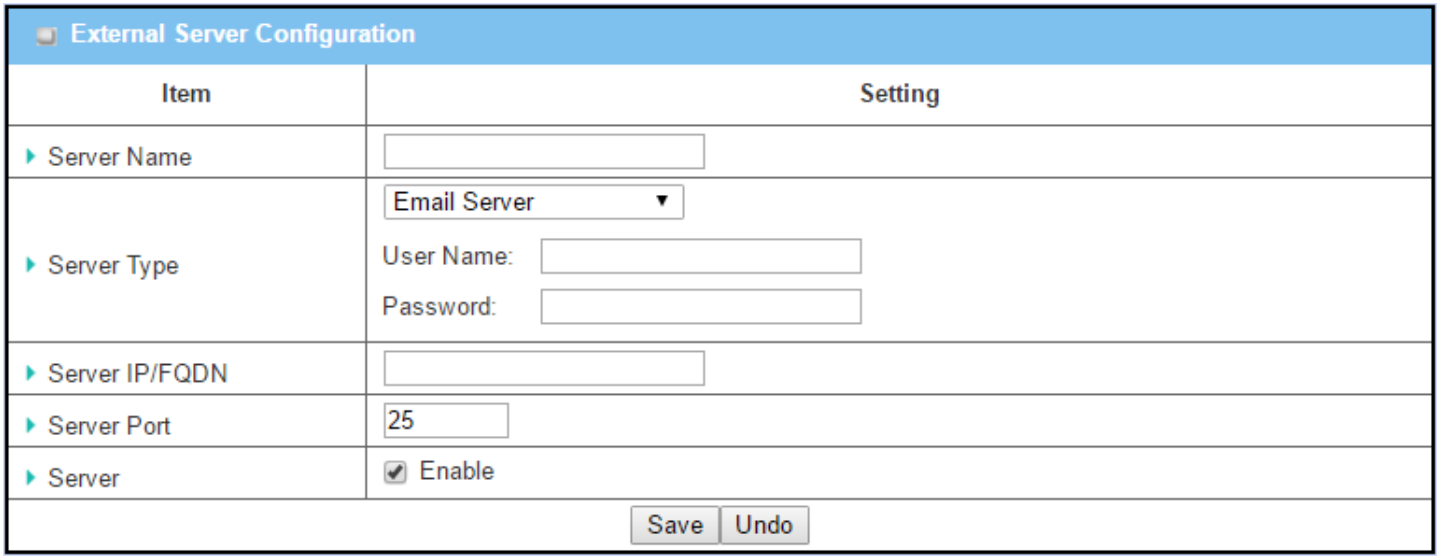
Go to **Object Definition > External Server > External Server** tab.

The External Server setting allows user to add external server.

Create External Server



When **Add** button is applied, **External Server Configuration** screen will appear.



External Server Configuration		
Item	**Value setting**	**Description**
Sever Name	1. String format can be any text 2. A Must filled setting	Enter a server name. Enter a name that is easy for you to understand.
Server Type	A Must filled setting	Specify the Server Type of the external server, and enter the required settings for the accessing the server.
		Email Server (A Must filled setting) : When **Email Server** is selected, **User Name**, and **Password** are also required. **User Name** (String format: any text) **Password** (String format: any text)
		RADIUS Server (A Must filled setting) : When **RADIUS Server** is selected, the following settings are also required. **Accounting Port** (A Must filled setting) Primary : **Shared Key** (String format: any text) Authentication Protocol (By default CHAP is selected) Session Timeout (By default **1**) The values must be between 1 and 60. Idle Timeout: (By default 1) The values must be between 1 and 26. Secondary : **Shared Key** (String format: any text) Authentication Protocol (By default CHAP is selected) Session Timeout (By default **1**) The values must be between 1 and 60. Idle Timeout: (By default 1) The values must be between 1 and 26.
		Active Directory Server (A Must filled setting) : When **Active Directory Server** is selected, **Domain** setting is also required. **Domain** (String format: any text)
		LDAP Server (A Must filled setting) : When **LDAP Server** is selected, the following settings are also required. **Base DN** (String format: any text) **Identity** (String format: any text) **Password** (String format: any text)
		UAM Server (A Must filled setting) : When **UAM Server** is selected, the following settings are also required. **Login URL** (String format: any text) **Shared Secret** (String format: any text) **N/AS/Gateway ID** (String format: any text)

		Location ID (String format: any text) **Location Name** (String format: any text)
		TACACS+ Server (A Must filled setting) : When **TACACS+ Server** is selected, the following settings are also required. **Shared Key** (String format: any text) **Session Timeout** (String format: any number) The values must be between 1 and 60.
		SCEP Server (A Must filled setting) : When **SCEP Server** is selected, the following settings are also required. **Path** (String format: any text, By default **cgi-bin** is filled) **Application** (String format: any text, By default **pkiclient.exe** is filled)
		FTP(SFTP) Server (A Must filled setting) : When **FTP(SFTP) Server** is selected, the following settings are also required. **User Name** (String format: any text) **Password** (String format: any text) **Protocol** (Select **FTP** or **SFTP**) **Encryprion** (Select **Plain, Explicit FTPS** or **Implicit FTPS**) **Transfer mode** (Select **Passive** or **Active**)
Server IP/FQDN	A Must filled setting	Specify the IP address or FQDN used for the external server.
Server Port	A Must filled setting	Specify the Port used for the external server. If you selected a certain server type, the default server port number will be set. For **Email Server** 25 will be set by default; For **Syslog Server**, port 514 will be set by default; For **RADIUS Server**, port 1812 will be set by default; For **Active Directory Server**, port 389 will be set by default; For **LDAP Server**, port 389 will be set by default; For **UAM Server**, port 80 will be set by default; For **TACACS+ Server**, port 49 will be set by default; For **SCEP Server**, port 80 will be set by default; For **FTP(SFTP) Server**, port 21 will be set by default;
Server	The box is checked by default	Click **Enable to** activate this External Server.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings
Refresh	N/A	Click the **Refresh** button to refresh the external server list.

3.4 Certificate

In cryptography, a public key certificate (also known as a digital certificate or identity certificate) is an electronic document used to prove ownership of a public key. The certificate includes information about the key, information about its owner's identity, and the digital signature of an entity that has verified the certificate's contents are genuine. If the signature is valid, and the person examining the certificate trusts the signer, then they know they can use that key to communicate with its owner[6].

In a typical public-key infrastructure (PKI) scheme, the signer is a certificate authority (CA), usually a company such as VeriSign which charges customers to issue certificates for them. In a web of trust scheme, the signer is either the key's owner (a self-signed certificate) or other users ("endorsements") whom the person examining the certificate might know and trust. The device also plays as a CA role.

Certificates are an important component of Transport Layer Security (TLS, sometimes called by its older name SSL), where they prevent an attacker from impersonating a secure website or other server. They are also used in other important applications, such as email encryption and code signing. Here, it can be used in IPSec tunneling for user authentication.

3.4.1 Configuration

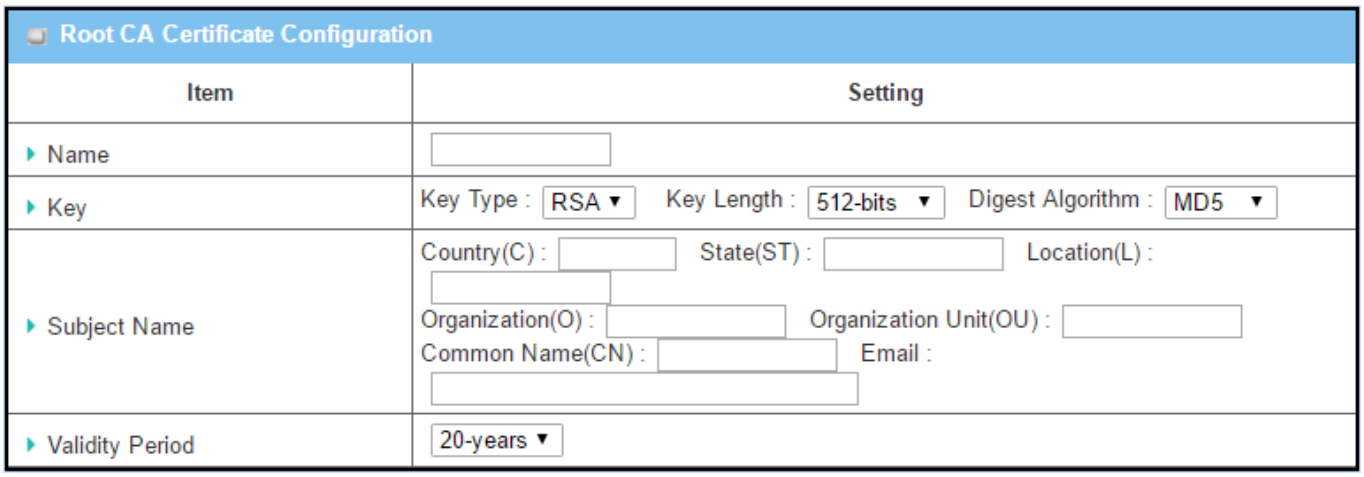
The configuration setting allows user to create Root Certificate Authority (CA) certificate and configure to set enable of SCEP. Root CA is the top-most certificate of the tree, the private key of which is used to "sign" other certificates.

Go to **Object Definition > Certificate > Configuration** tab.

Create Root CA

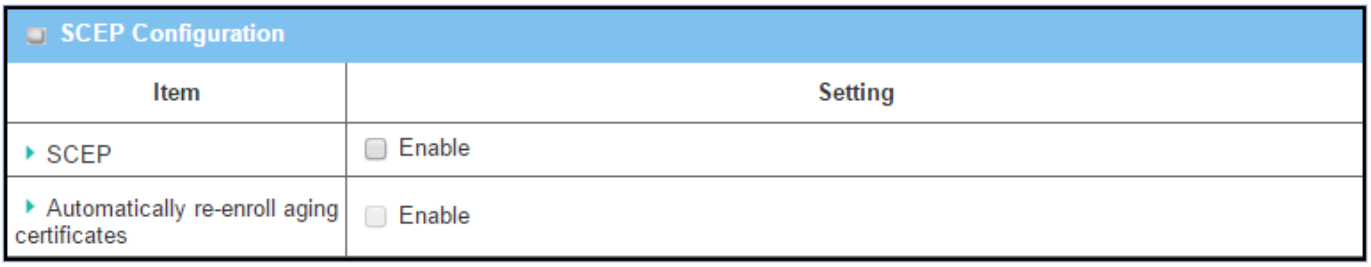
When **Generate** button is applied, **Root CA Certificate Configuration** screen will appear. The required information to be filled for the root CA includes the name, key, subject name and validity.

6 http://en.wikipedia.org/wiki/Public_key_certificate.



Root CA Certificate Configuration		
Item	**Value setting**	**Description**
Name	1. String format can be any text 2. A Must filled setting	Enter a Root CA Certificate name. It will be a certificate file name
Key	A Must filled setting	This field is to specify the key attribute of certificate. **Key Type** to set public-key cryptosystems. It only supports RSA now. **Key Length** to set s the size measured in bits of the key used in a cryptographic algorithm. **Digest Algorithm** to set identifier in the signature algorithm identifier of certificates
Subject Name	A Must filled setting	This field is to specify the information of certificate. **Country(C)** is the two-letter ISO code for the country where your organization is located. **State(ST)** is the state where your organization is located. **Location(L)** is the location where your organization is located. **Organization(O)** is the name of your organization. **Organization Unit(OU)** is the name of your organization unit. **Common Name(CN)** is the name of your organization. **Email** is the email of your organization. It has to be email address style.
Validity Period	A Must filled setting	This field is to specify the validity period of certificate.

Setup SCEP

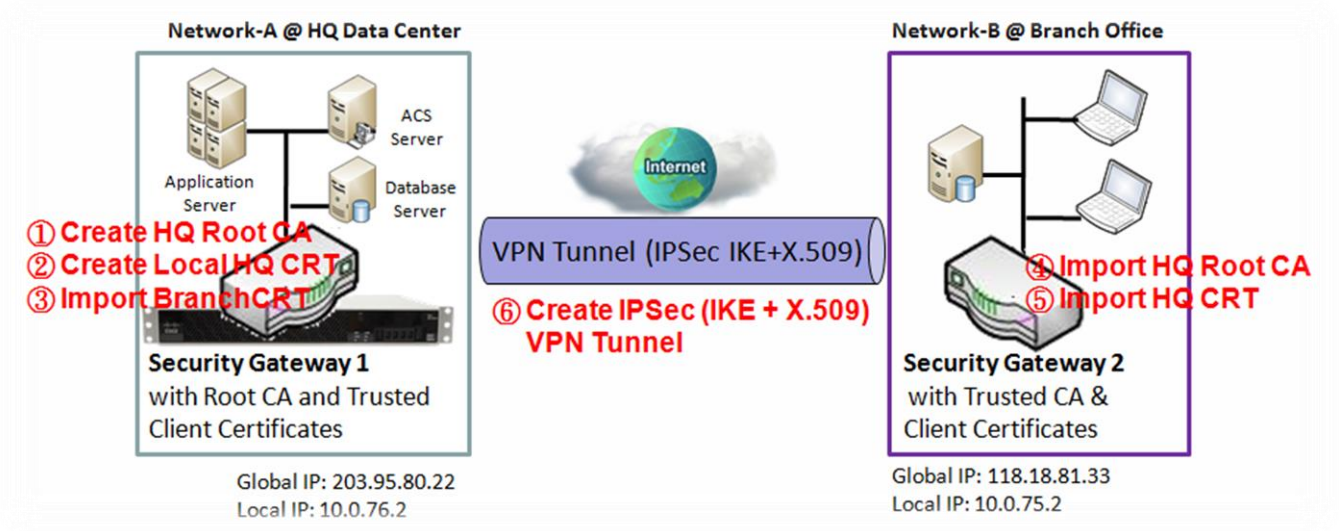


SCEP Configuration		
Item	**Value setting**	**Description**
SCEP	The box is unchecked by default	Check the **Enable** box to activate SCEP function.
Automatically re-enroll aging certificates	The box is unchecked by default	When **SCEP** is activated, check the **Enable** box to activate this function. It will be automatically check which certificate is aging. If certificate is aging, it will activate SCEP function to re-enroll automatically.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

3.4.2 My Certificate

My Certificate includes a Local Certificate List. Local Certificate List shows all generated certificates by the root CA for the gateway. And it also stores the generated Certificate Signing Requests (CSR) which will be signed by other external CAs. The signed certificates can be imported as the local ones of the gateway.

Self-signed Certificate Usage Scenario



Scenario Application Timing

When the enterprise gateway owns the root CA and VPN tunneling function, it can generate its own local certificates by being signed by itself or import any local certificates that are signed by other external CAs. Also import the trusted certificates for other CAs and Clients. In addition, since it has the root CA, it also can sign Certificate Signing Requests (CSR) to form corresponding certificates for others. These certificates can be used for two remote peers to make sure their identity during establishing a VPN tunnel.

Scenario Description

Gateway 1 generates the root CA and a local certificate (HQCRT) signed by itself. Import a trusted certificate (BranchCRT) –a BranchCSR certificate of Gateway 2 signed by root CA of Gateway 1.

Gateway 2 creates a CSR (BranchCSR) to let the root CA of the Gateway 1 sign it to be the BranchCRT certificate. Import the certificate into the Gateway 2 as a local certificate. In addition, also import the certificates of the root CA of the Gateway 1 into the Gateway 2

as the trusted ones. (Please also refer to following two sub-sections)

Establish an IPSec VPN tunnel with IKE and X.509 protocols by starting from either peer, so that all client hosts in these both subnets can communicate with each other.

Parameter Setup Example

For Network-A at HQ

Following tables list the parameter configuration as an example for the "My Certificate" function used in the user authentication of IPSec VPN tunnel establishing, as shown in above diagram. The configuration example must be combined with the ones in following two sections to complete the whole user scenario.

Use default value for those parameters that are not mentioned in the tables.

Configuration Path	[My Certificate]-[Root CA Certificate Configuration]
Name	***HQRootCA***
Key	Key Type: ***RSA*** Key Length: ***1024-bits***
Subject Name	Country(C): ***TW*** State(ST): ***Taiwan*** Location(L): ***Tainan*** Organization(O): ***AMITHQ*** Organization Unit(OU): ***HQRD*** Common Name(CN): ***HQRootCA*** E-mail: ***hqrootca@icpdas.com***

Configuration Path	[My Certificate]-[Local Certificate Configuration]
Name	***HQCRT*** Self-signed: ■
Key	Key Type: ***RSA*** Key Length: ***1024-bits***
Subject Name	Country(C): ***TW*** State(ST): ***Taiwan*** Location(L): ***Tainan*** Organization(O): ***AMITHQ*** Organization Unit(OU): ***HQRD*** Common Name(CN): ***HQCRT*** E-mail: ***hqcrt@icpdas.com***

Configuration Path	[IPSec]-[Configuration]
IPSec	■ ***Enable***

Configuration Path	[IPSec]-[Tunnel Configuration]
Tunnel	■ ***Enable***
Tunnel Name	***s2s-101***
Interface	***WAN 1***
Tunnel Scenario	***Site to Site***
Operation Mode	***Always on***

Configuration Path	[IPSec]-[Local & Remote Configuration]
Local Subnet	***10.0.76.0***
Local Netmask	***255.255.255.0***
Full Tunnel	***Disable***
Remote Subnet	***10.0.75.0***
Remote Netmask	***255.255.255.0***

Remote Gateway	***118.18.81.33***

Configuration Path	[IPSec]-[Authentication]
Key Management	***IKE+X.509*** Local Certificate: ***HQCRT*** Remote Certificate: ***BranchCRT***
Local ID	***User Name Network-A***
Remote ID	***User Name Network-B***

Configuration Path	[IPSec]-[IKE Phase]
Negotiation Mode	***Main Mode***
X-Auth	***None***

For Network-B at Branch Office

Following tables list the parameter configuration as an example for the "My Certificate" function used in the user authentication of IPSec VPN tunnel establishing, as shown in above diagram. The configuration example must be combined with the ones in following two sections to complete the whole user scenario.

Use default value for those parameters that are not mentioned in the tables.

Configuration Path	[My Certificate]-[Local Certificate Configuration]
Name	***BranchCRT*** Self-signed: □
Key	Key Type: ***RSA*** Key Length: ***1024-bits***
Subject Name	Country(C): ***TW*** State(ST): ***Taiwan*** Location(L): ***Tainan*** Organization(O): ***AMITBranch*** Organization Unit(OU): ***BranchRD*** Common Name(CN): ***BranchCRT*** E-mail: ***branchcrt@icpdas.com***

Configuration Path	[IPSec]-[Configuration]
IPSec	■ ***Enable***

Configuration Path	[IPSec]-[Tunnel Configuration]
Tunnel	■ ***Enable***
Tunnel Name	***s2s-102***
Interface	***WAN 1***
Tunnel Scenario	***Site to Site***
Operation Mode	***Always on***

Configuration Path	[IPSec]-[Local & Remote Configuration]
Local Subnet	***10.0.75.0***
Local Netmask	***255.255.255.0***
Full Tunnel	***Disable***

Remote Subnet	***10.0.76.0***
Remote Netmask	***255.255.255.0***
Remote Gateway	***203.95.80.22***

Configuration Path	[IPSec]-[Authentication]
Key Management	***IKE+X.509*** Local Certificate: ***BranchCRT*** Remote Certificate: ***HQCRT***
Local ID	***User Name Network-B***
Remote ID	***User Name Network-A***

Configuration Path	[IPSec]-[IKE Phase]
Negotiation Mode	***Main Mode***
X-Auth	***None***

Scenario Operation Procedure

In above diagram, "Gateway 1" is the gateway of Network-A in headquarters and the subnet of its Intranet is 10.0.76.0/24. It has the IP address of 10.0.76.2 for LAN interface and 203.95.80.22 for WAN-1 interface. "Gateway 2" is the gateway of Network-B in branch office and the subnet of its Intranet is 10.0.75.0/24. It has the IP address of 10.0.75.2 for LAN interface and 118.18.81.33 for WAN-1 interface. They both serve as the NAT security gateways.

Gateway 1 generates the root CA and a local certificate (HQCRT) that is signed by itself. Import the certificates of the root CA and HQCRT into the "Trusted CA Certificate List" and "Trusted Client Certificate List" of Gateway 2.

Gateway 2 generates a Certificate Signing Request (BranchCSR) for its own certificate (BranchCRT) (Please generate one not self-signed certificate in the Gateway 2, and click on the "View" button for that CSR. Just downloads it). Take the CSR to be signed by the root CA of Gateway 1 and obtain the BranchCRT certificate (you need rename it). Import the certificate into the "Trusted Client Certificate List" of the Gateway 1 and the "Local Certificate List" of Gateway 2.

Gateway 2 can establish an IPSec VPN tunnel with "Site to Site" scenario and IKE and X.509 protocols to Gateway 1.

Finally, the client hosts in two subnets of 10.0.75.0/24 and 10.0.76.0/24 can communicate with each other.

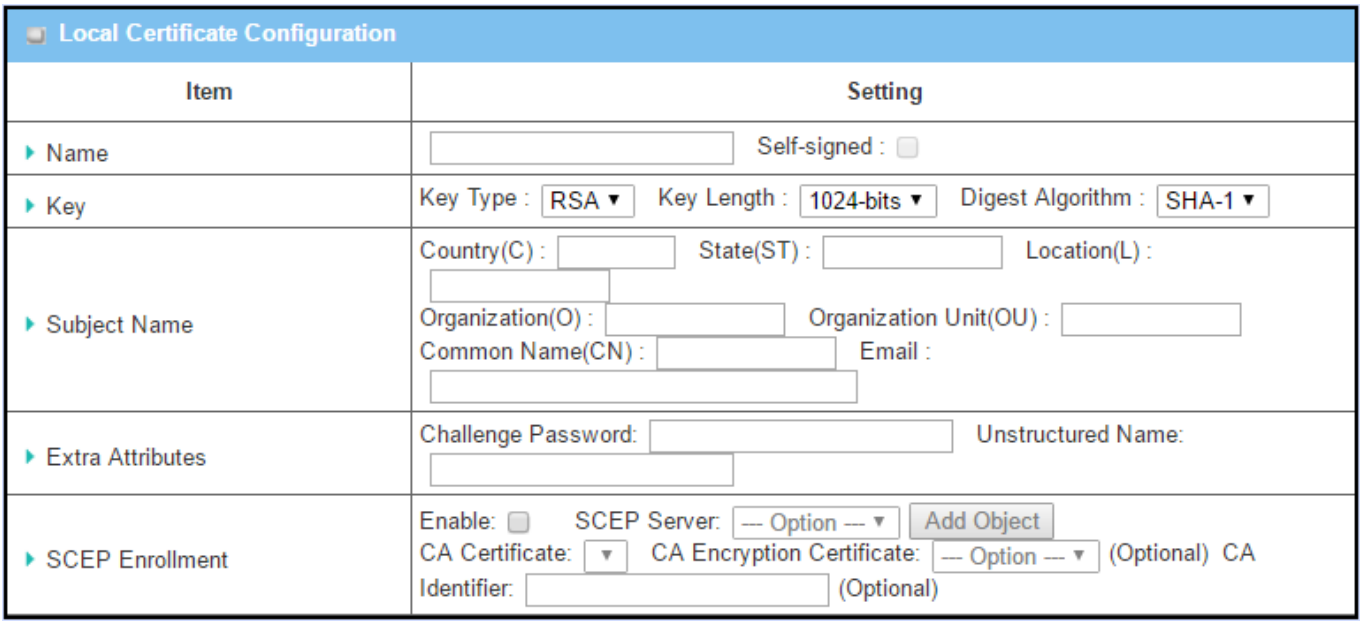
My Certificate Setting

Go to Object Definition > Certificate > My Certificate tab.

The My Certificate setting allows user to create local certificates. In "My Certificate" page, there are two configuration windows for the "My Certificate" function. The "Local Certificate List" window shows the stored certificates or CSRs for representing the gateway. The "Local Certificate Configuration" window can let you fill required information necessary for corresponding certificate to be generated by itself, or corresponding CSR to be signed by other CAs.

Create Local Certificate

When **Add** button is applied, **Local Certificate Configuration** screen will appear. The required information to be filled for the certificate or CSR includes the name, key and subject name. It is a certificate if the "Self-signed" box is checked; otherwise, it is a CSR.



Local Certificate Configuration		
Item	**Value setting**	**Description**
Name	1. String format can be any text 2. A Must filled setting	Enter a certificate name. It will be a certificate file name If **Self-signed** is checked, it will be signed by root CA. If **Self-signed** is not checked, it will generate a certificate signing request (CSR).
Key	A Must filled setting	This field is to specify the key attributes of certificate. **Key Type** to set public-key cryptosystems. Currently, only RSA is supported. **Key Length** to set the length in bits of the key used in a cryptographic algorithm. It can be 512/768/1024/1536/2048. **Digest Algorithm** to set identifier in the signature algorithm identifier of certificates. It can be MD5/SHA-1.
Subject Name	A Must filled setting	This field is to specify the information of certificate. **Country(C)** is the two-letter ISO code for the country where your organization is located. **State(ST)** is the state where your organization is located. **Location(L)** is the location where your organization is located. **Organization(O)** is the name of your organization. **Organization Unit(OU)** is the name of your organization unit. **Common Name(CN)** is the name of your organization. **Email** is the email of your organization. It has to be email address setting only.
Extra Attributes	A Must filled setting	This field is to specify the extra information for generating a certificate. **Challenge Password** for the password you can use to request certificate revocation in the future. **Unstructured Name** for additional information.
SCEP Enrollment	A Must filled setting	This field is to specify the information of SCEP. If user wants to generate a certificate signing request (CSR) and then signed by SCEP server online, user can check the **Enable** box. Select a **SCEP Server** to identify the SCEP server for use. The server detailed information could be specified in External Servers. Refer to **Object Definition** > **External Server** > **External Server**. You may click **Add Object** button to generate. Select a **CA Certificate** to identify which certificate could be accepted by SCEP server for authentication. It could be generated in Trusted Certificates. Select an optional **CA Encryption Certificate**, if it is required, to identify which certificate could be accepted by SCEP server for encryption data information. It could be generated in Trusted Certificates. Fill in optional **CA Identifier** to identify which CA could be used for signing certificates.
Save	N/A	Click the **Save** button to save the configuration.
Back	N/A	When the **Back** button is clicked, the screen will return to previous page.

When **Import** button is applied, an Import screen will appear. You can import a certificate from an

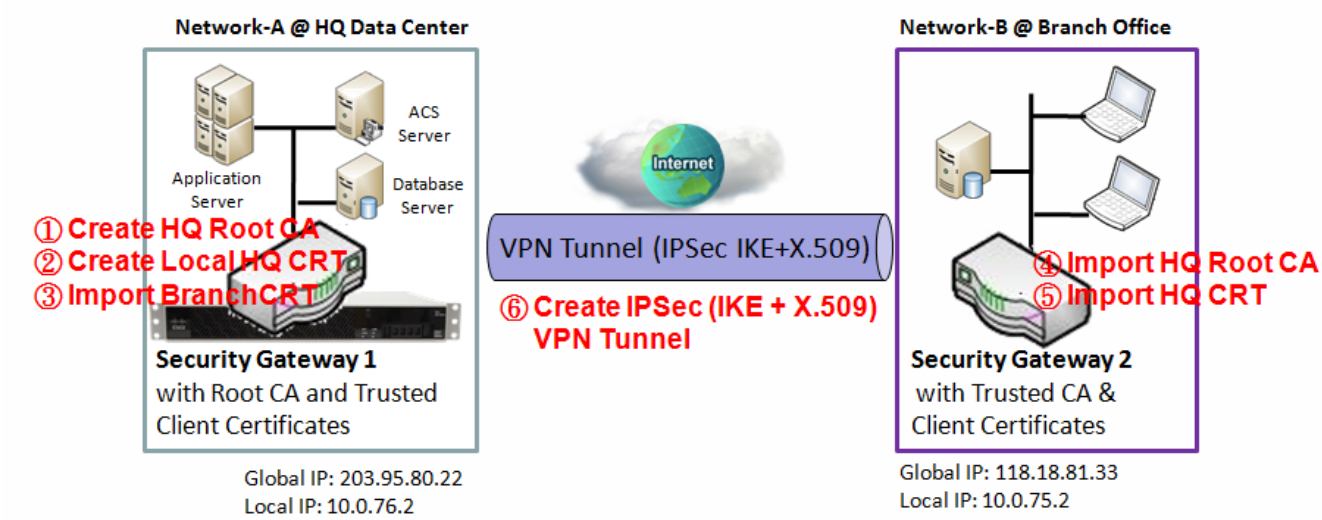
existed certificate file, or directly paste a PEM encoded string as the certificate.

Import Item	Value setting	Description
Import	A Must filled setting	Select a certificate file from user's computer, and click the **Apply** button to import the specified certificate file to the gateway.
PEM Encoded	1. String format can be any text 2. A Must filled setting	This is an alternative approach to import a certificate. You can directly fill in (Copy and Paste) the PEM encoded certificate string, and click the **Apply** button to import the specified certificate to the gateway.
Apply	N/A	Click the **Apply** button to import the certificate.
Cancel	N/A	Click the **Cancel** button to discard the import operation and the screen will return to the My Certificates page.

3.4.3 Trusted Certificate

Trusted Certificate includes Trusted CA Certificate List, Trusted Client Certificate List, and Trusted Client Key List. The Trusted CA Certificate List places the certificates of external trusted CAs. The Trusted Client Certificate List places the others' certificates what you trust. And the Trusted Client Key List places the others' keys what you trusted.

Self-signed Certificate Usage Scenario



Scenario Application Timing (same as the one described in "My Certificate" section)

When the enterprise gateway owns the root CA and VPN tunneling function, it can generate its own local certificates by being signed by itself. Also imports the trusted certificates for other CAs and Clients. These certificates can be used for two remote peers to make sure their identity during establishing a VPN tunnel.

Scenario Description (same as the one described in "My Certificate" section)

Gateway 1 generates the root CA and a local certificate (HQCRT) signed by itself. Import a trusted certificate (BranchCRT) –a BranchCSR certificate of Gateway 2 signed by root CA of Gateway 1. Gateway 2 creates a CSR (BranchCSR) to let the root CA of the Gateway 1 sign it to be the BranchCRT certificate. Import the certificate into the Gateway 2 as a local certificate. In addition, also imports the certificates of the root CA of Gateway 1 into the Gateway 2 as the trusted ones. (Please also refer to "My Certificate" and "Issue Certificate" sections).

Establish an IPSec VPN tunnel with IKE and X.509 protocols by starting from either peer, so that all client hosts in these both subnets can communicate with each other.
Parameter Setup Example (same as the one described in "My Certificate" section)

For Network-A at HQ

Following tables list the parameter configuration as an example for the "Trusted Certificate" function used in the user authentication of IPSec VPN tunnel establishing, as shown in above diagram. The configuration example must be combined with the ones in "My Certificate" and "Issue Certificate" sections to complete the setup for the whole user scenario.

Configuration Path	[Trusted Certificate]-[Trusted Client Certificate List]
Command Button	***Import***

Configuration Path	[Trusted Certificate]-[Trusted Client Certificate Import from a File]
File	***BranchCRT.crt***

For Network-B at Branch Office

Following tables list the parameter configuration as an example for the "Trusted Certificate" function used in the user authentication of IPSec VPN tunnel establishing, as shown in above diagram. The configuration example must be combined with the ones in "My Certificate" and "Issued Certificate" sections to complete the setup for the whole user scenario.

Configuration Path	[Trusted Certificate]-[Trusted CA Certificate List]
Command Button	***Import***

Configuration Path	[Trusted Certificate]-[Trusted CA Certificate Import from a File]
File	***HQRootCA.crt***

Configuration Path	[Trusted Certificate]-[Trusted Client Certificate List]
Command Button	***Import***

Configuration Path	[Trusted Certificate]-[Trusted Client Certificate Import from a File]
File	***HQCRT.crt***

Scenario Operation Procedure (same as the one described in "My Certificate" section)

In above diagram, the "Gateway 1" is the gateway of Network-A in headquarters and the subnet of its Intranet is 10.0.76.0/24. It has the IP address of 10.0.76.2 for LAN interface and 203.95.80.22 for WAN-1 interface. The "Gateway 2" is the gateway of Network-B in branch office and the subnet of its Intranet is 10.0.75.0/24. It has the IP address of 10.0.75.2 for LAN interface and 118.18.81.33 for WAN-1 interface. They both serve as the NAT security gateways.

In Gateway 2 import the certificates of the root CA and HQCRT that were generated and signed by Gateway 1 into the "Trusted CA Certificate List" and "Trusted Client Certificate List" of Gateway 2.

Import the obtained BranchCRT certificate (the derived BranchCSR certificate after Gateway 1's root CA signature) into the "Trusted Client Certificate List" of the Gateway 1 and the "Local Certificate List" of the Gateway 2. For more details, refer to the Network-B operation procedure in "My Certificate" section of this manual.

Gateway 2 can establish an IPSec VPN tunnel with "Site to Site" scenario and IKE and X.509 protocols to Gateway 1.

Finally, the client hosts in two subnets of 10.0.75.0/24 and 10.0.76.0/24 can communicate with each other.

Trusted Certificate Setting

Go to Object Definition > Certificate > Trusted Certificate tab.

The Trusted Certificate setting allows user to import trusted certificates and keys.

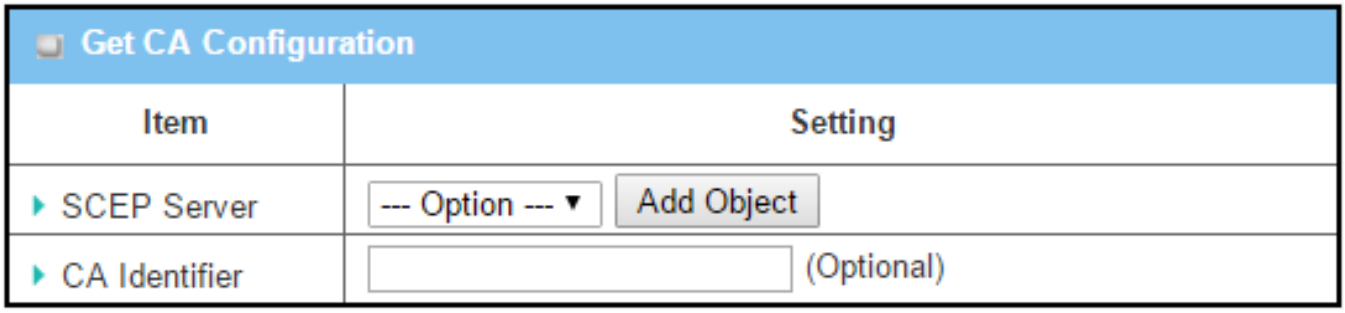
Import Trusted CA Certificate

When **Import** button is applied, a **Trusted CA import** screen will appear. You can import a Trusted CA certificate from an existed certificate file, or directly paste a PEM encoded string as the certificate.

Trusted CA Certificate List		
Item	**Value setting**	**Description**
Import from a File	A Must filled setting	Select a CA certificate file from user's computer, and click the **Apply** button to import the specified CA certificate file to the gateway.
Import from a PEM	1. String format can be any text 2. A Must filled setting	This is an alternative approach to import a CA certificate. You can directly fill in (Copy and Paste) the PEM encoded CA certificate string, and click the **Apply** button to import the specified CA certificate to the gateway.
Apply	N/A	Click the **Apply** button to import the certificate.
Cancel	N/A	Click the **Cancel** button to discard the import operation and the screen will return to the Trusted Certificates page.

Instead of importing a Trusted CA certificate with mentioned approaches, you can also get the CA certificate from the SECP server.

If **SCEP** is enabled (Refer to **Object Definition** > **Certificate** > **Configuration**), you can click **Get CA** button, a Get CA Configuration screen will appear.



Get CA Configuration		
Item	**Value setting**	**Description**
SCEP Server	A Must filled setting	Select a **SCEP Server** to identify the SCEP server for use. The server detailed information could be specified in External Servers. Refer to **Object Definition** > **External Server** > **External Server**. You may click **Add Object** button to generate.
CA Identifier	1. String format can be any text	Fill in optional **CA Identifier** to identify which CA could be used for signing certificates.
Save	N/A	Click **Save** to save the settings.
Close	N/A	Click the **Close** button to return to the Trusted Certificates page.

Import Trusted Client Certificate

When **Import** button is applied, a **Trusted Client Certificate Import** screen will appear. You can import a Trusted Client Certificate from an existed certificate file, or directly paste a PEM encoded string as the certificate.

Trusted Client Certificate List		
Item	**Value setting**	**Description**
Import from a File	A Must filled setting	Select a certificate file from user's computer, and click the **Apply** button to import the specified certificate file to the gateway.
Import from a PEM	1. String format can be any text 2. A Must filled setting	This is an alternative approach to import a certificate. You can directly fill in (Copy and Paste) the PEM encoded certificate string, and click the **Apply** button to import the specified certificate to the gateway.
Apply	N/A	Click the **Apply** button to import certificate.
Cancel	N/A	Click the **Cancel** button to discard the import operation and the screen will return to the Trusted Certificates page.

Import Trusted Client Key

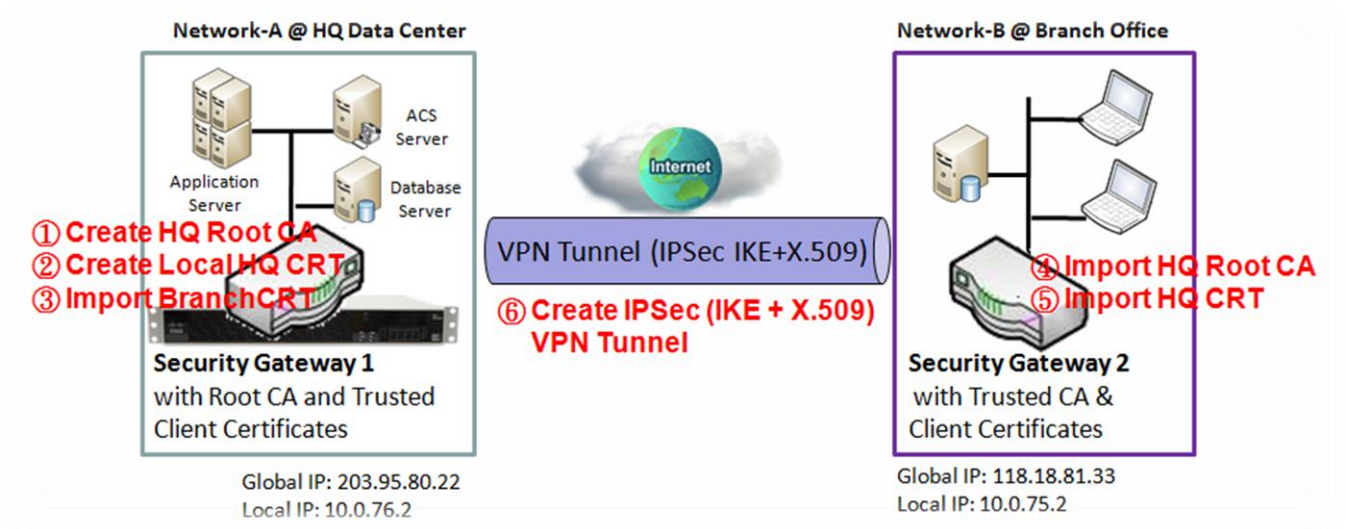
When **Import** button is applied, a **Trusted Client Key Import** screen will appear. You can import a Trusted Client Key from an existed file, or directly paste a PEM encoded string as the key.

Trusted Client Key List		
Item	**Value setting**	**Description**
Import from a File	A Must filled setting	Select a certificate key file from user's computer, and click the **Apply** button to import the specified key file to the gateway.
Import from a PEM	1. String format can be any text 2. A Must filled setting	This is an alternative approach to import a certificate key. You can directly fill in (Copy and Paste) the PEM encoded certificate key string, and click the **Apply** button to import the specified certificate key to the gateway.
Apply	N/A	Click the **Apply** button to import the certificate key.
Cancel	N/A	Click the **Cancel** button to discard the import operation and the screen will return to the Trusted Certificates page.

3.4.4 Issue Certificate

When you have a Certificate Signing Request (CSR) that needs to be certificated by the root CA of the device, you can issue the request here and let Root CA sign it. There are two approaches to issue a certificate. One is from a CSR file importing from the managing PC and another is copy-paste the CSR codes in gateway's web-based utility, and then click on the "Sign" button.
If the gateway signs a CSR successfully, the "Signed Certificate View" window will show the resulted certificate contents. In addition, a "Download" button is available for you to download the certificate to a file in the managing PC.

Self-signed Certificate Usage Scenario



Scenario Application Timing (same as the one described in "My Certificate" section)
When the enterprise gateway owns the root CA and VPN tunneling function, it can generate its own local certificates by being signed by itself. Also imports the trusted certificates for other CAs and Clients. These certificates can be used for two remote peers to make sure their identity during establishing a VPN tunnel.

Scenario Description (same as the one described in "My Certificate" section)
Gateway 1 generates the root CA and a local certificate (HQCRT) signed by itself. Also imports a trusted certificate (BranchCRT) –a BranchCSR certificate of Gateway 2 signed by root CA of

Gateway 1.

Gateway 2 creates a CSR (BranchCSR) to let the root CA of the Gateway 1 sign it to be the BranchCRT certificate. Import the certificate into the Gateway 2 as a local certificate. In addition, also imports the certificates of the root CA of the Gateway 1 into the Gateway 2 as the trusted ones. (Please also refer to "My Certificate" and "Trusted Certificate" sections).

Establish an IPSec VPN tunnel with IKE and X.509 protocols by starting from either peer, so that all client hosts in these both subnets can communicate with each other.

Parameter Setup Example (same as the one described in "My Certificate" section)

For Network-A at HQ

Following tables list the parameter configuration as an example for the "Issue Certificate" function used in the user authentication of IPSec VPN tunnel establishing, as shown in above diagram. The configuration example must be combined with the ones in "My Certificate" and "Trusted Certificate" sections to complete the setup for whole user scenario.

Configuration Path	[Issue Certificate]-[Certificate Signing Request Import from a File]
Browse	***C:/BranchCSR***
Command Button	***Sign***

Configuration Path	[Issue Certificate]-[Signed Certificate View]
Command Button	***Download*** (default name is "issued.crt")

Scenario Operation Procedure (same as the one described in "My Certificate" section)

In above diagram, the "Gateway 1" is the gateway of Network-A in headquarters and the subnet of its Intranet is 10.0.76.0/24. It has the IP address of 10.0.76.2 for LAN interface and 203.95.80.22 for WAN-1 interface. The "Gateway 2" is the gateway of Network-B in branch office and the subnet of its Intranet is 10.0.75.0/24. It has the IP address of 10.0.75.2 for LAN interface and 118.18.81.33 for WAN-1 interface. They both serve as the NAT security gateways.

Gateway 1 generates the root CA and a local certificate (HQCRT) that is signed by itself. Import the certificates of the root CA and HQCRT into the "Trusted CA Certificate List" and "Trusted Client Certificate List" of Gateway 2.

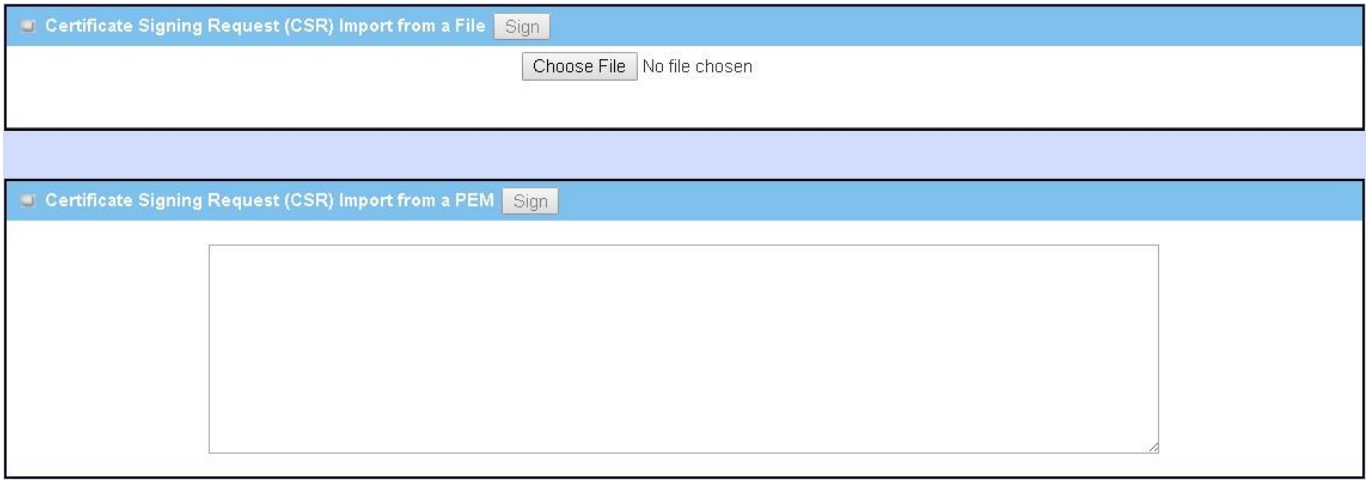
Gateway 2 generates a Certificate Signing Request (BranchCSR) for its own certificate BranchCRT to be signed by root CA (Please generate one not self-signed certificate in the Gateway 2, and click on the "View" button for that CSR. Just downloads it). Take the CSR to be signed by the root CA of the Gateway 1 and obtain the BranchCRT certificate (you need rename

it). Import the certificate into the "Trusted Client Certificate List" of the Gateway 1 and the "Local Certificate List" of the Gateway 2.
Gateway 2 can establish an IPSec VPN tunnel with "Site to Site" scenario and IKE and X.509 protocols to Gateway 1.
Finally, the client hosts in two subnets of 10.0.75.0/24 and 10.0.76.0/24 can communicate with each other.

Issue Certificate Setting

Go to Object Definition > Certificate > Issue Certificate tab.
The Issue Certificate setting allows user to import Certificate Signing Request (CSR) to be signed by root CA.

Import and Issue Certificate

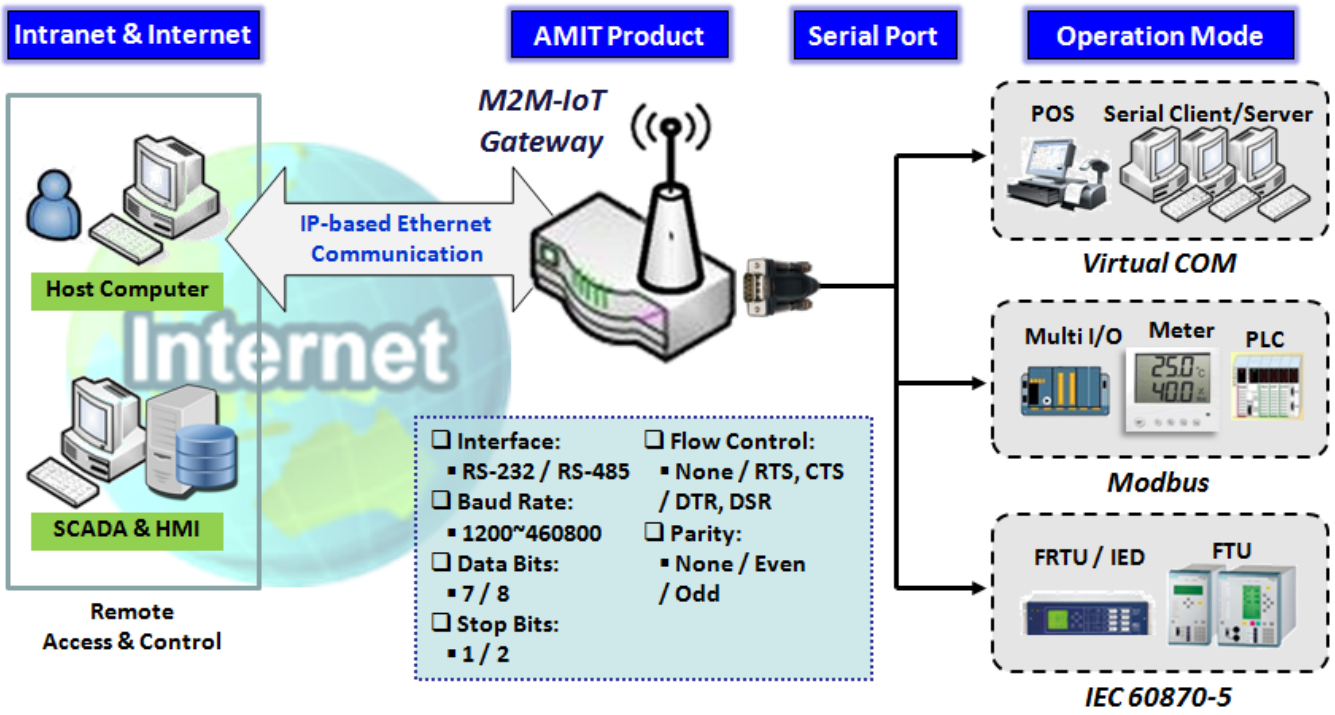


Certificate Signing Request (CSR) Import from a File		
Item	**Value setting**	**Description**
Certificate Signing Request (CSR) Import from a File	A Must filled setting	Select a certificate signing request file you're your computer for importing to the gateway.
Certificate Signing Request (CSR) Import from a PEM	1. String format can be any text 2. A Must filled setting	Enter (copy-paste) the certificate signing request PEM encoded certificate to the gateway.
Sign	N/A	When root CA is exist, click the **Sign** button sign and issue the imported certificate by root CA.

Chapter 4 Field Communication

4.1 Bus & Protocol

The gateway may equip a DB-9 male port or other type of serial port for various serial communication use through connecting the RS-232 or RS-485 serial device to an IP-based Ethernet LAN. These communication protocols make user access serial devices anywhere over a local LAN or the Internet easily. They can be "Virtual COM" and "Modbus".



4.1.1 Port Configuration

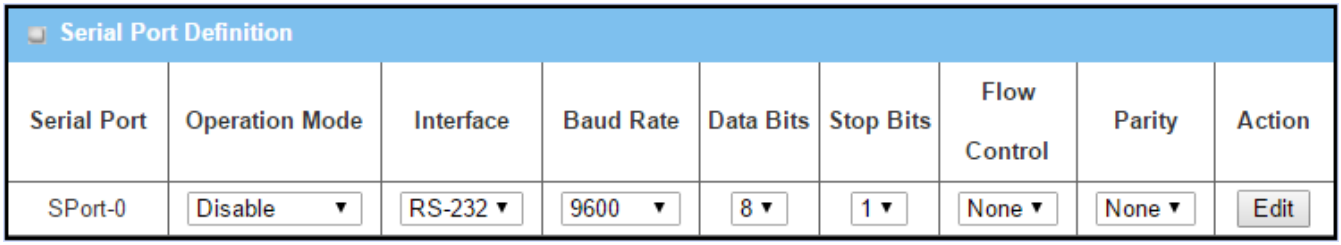
Before using the supported field communication function, like Virtual COM or Modbus, you need to configure the physical communication port first.

The port configuration screen allows user to configure the operation mode and physical layer settings for each serial interface, and also can quick switch from one communication protocol to another for the serial port. The number of ports and type of the supported protocols could be different for the purchased gateway model.

Port Configuration Setting

Go to Field Communication > Bus & Protocol > Port Configuration **tab.**

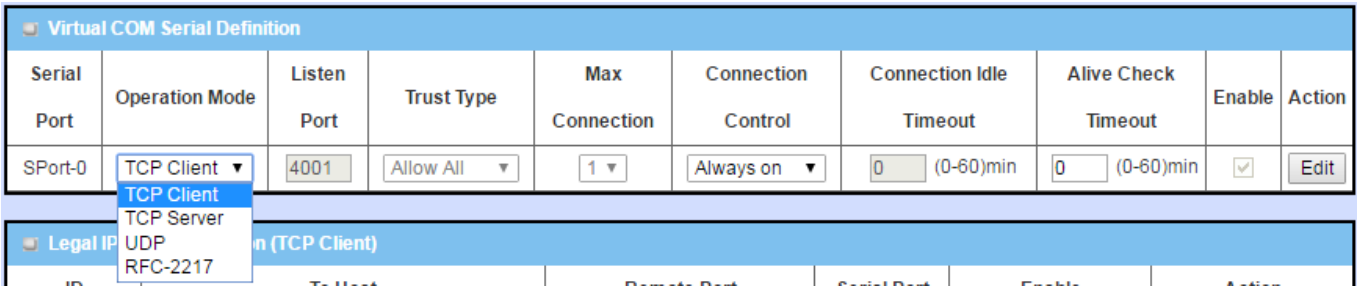
In "Port Configuration" page, there is only one configuration window for the serial port settings. The "Configuration" window can let you specify serial port parameters including the operation mode being "Virtual COM", "Modbus" or disabled, the interface being "RS-232" or "RS-485", the baud rate, the data bit length, the stop bit length, the flow control being "RTS/CTS", "DTS/DSR" or "None", and the parity.



Port Configuration Window		
Item	**Value setting**	**Description**
Serial Port	*N/A*	It displays the serial port ID of the serial port. The number of serial ports varies from the purchased model.
Operation Mode	Disable is set by default	It displays the current selected operation mode for the serial interface. Depending on the purchase model, the available modes can be Virtual COM, Modbus, and IEC 60870-5.
Interface	RS-232 is set by default	Select RS-232 or RS-485 physical interface for connecting to the access device(s) with the same interface specification.
Baud Rate	19200 is set by default	Select the appropriate baud rate for serial device communication. RS-232: 1200 / 2400 / 4800 / 9600 / 19200 / 38400 / 57600 / 115200 RS-485 can use higher baud rate for 230400 and 460800. It depends on the cable length and the installed environment. The longer cable, the lower baud rate for it.
Data Bits	8 is set by default	Select 8 or 7 for data bits.
Stop Bits	1 is set by default	Select 1 or 2 for stop bits.
Flow Control	None is set by default	Select None / RTS, CTS / DTS, DSR for Flow Control in RS-232 mode. The supporting of Flow Control depends on the purchased model.
Parity	None is set by default	Select None / Even / Odd for Parity bit.
Action	N/A	Click **Edit** button to change the operation mode, or modify the parameters mentioned above for the serial interface communication.
Save	N/A	Click **Save** button to save the settings.
Undo	N/A	Click **Undo** button to cancel the settings.

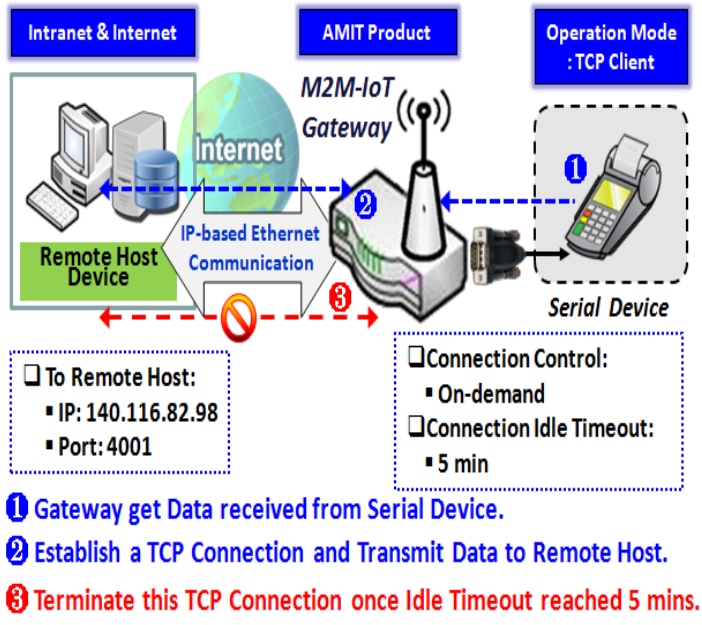
4.1.2 Virtual COM

Create a virtual COM port on user's PC/Host to provide access to serial device connected to the serial port on gateway. Therefore, users can access, control, and manage the connected serial device through Internet (fixed line, or cellular network) anywhere. This application is also known as Ethernet pass-through communication.



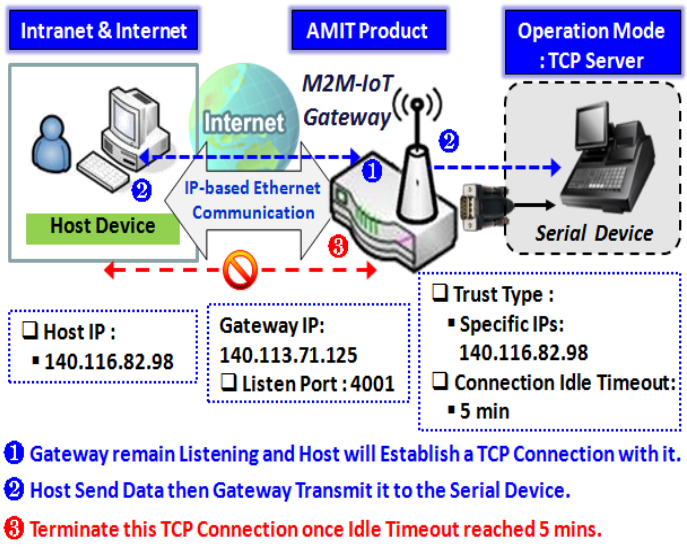
Virtual COM setting screen enables user to connect a Virtual COM port based device to the Internet. It allows user to access serial data remotely. There are TCP Client, TCP Server, UDP, and RFC2217 modes for remote accessing the connected serial device. These operation modes are illustrated as below.

TCP Client Mode



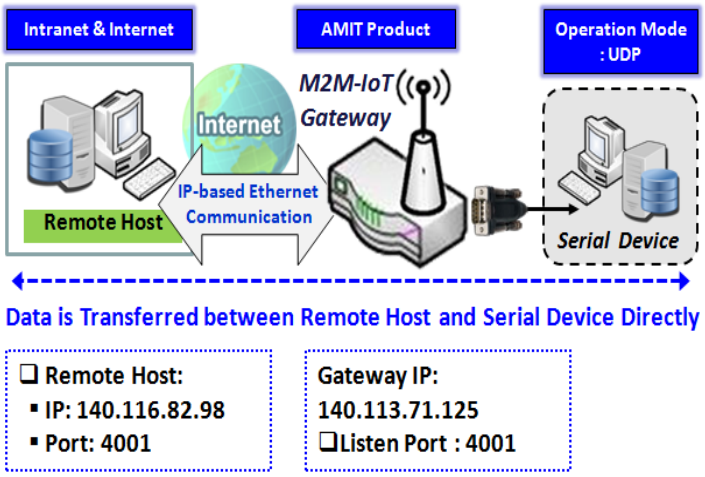
When the administrator expects the gateway to actively establish a TCP connection to a pre-defined host computer when serial data arrives, the operation mode for the "Virtual COM" function is required to be "TCP Client" and when the connection control of virtual COM is "On-demand", once the gateway receives data from the connected serial device, it will establish a TCP connection to transfer the received serial data to the remote host. Besides, after the data has been transferred, the gateway automatically disconnects the established TCP session from the host computer by using the TCP alive check timeout or idle timeout settings.

TCP Server Mode



When the administrator expects the gateway to wait passively for the serial data requests from the Host Device (usually we use a computer to play as a Host), and the Host will establish a TCP connection to get data from the serial device, the operation mode for the "Virtual COM" function is required to be "TCP Server". In this mode, the gateway provides a unique "IP: Port" address on a TCP/IP network. It supports up to 4 simultaneous connections, so that multiple hosts can collect data from the same serial device at the same time. After the data has been transferred, the TCP connection will be automatically disconnected from the host computer by using the TCP alive check timeout or idle timeout settings.

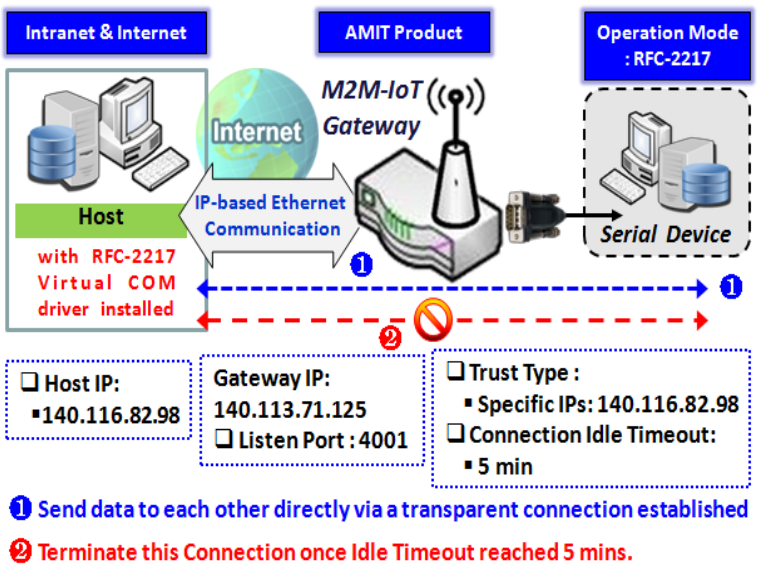
UDP Mode



If both the Remote Host Computer and the serial device are expected to initiate a data transfer when it requires doing that, the operation mode for the "Virtual COM" function in the gateway is required to be "UDP". In this mode, the UDP data can be transferred between the gateway and multiple host computers from either peer, making this mode ideal for message display applications.

The remote host computer can directly send UDP data to the serial device via the gateway, and also receive UDP data from the serial device via the gateway at the same time. The gateway supports up to 4 legal hosts to connect simultaneously to the serial device via the gateway.

RFC-2217 Mode



RFC-2217 defines general COM port control options based on telnet protocol. A host computer with RFC-2217 driver installed can monitor and manage the remote serial device attached to the gateway's serial port, as though they were connected to the local serial port. When a virtual serial port on the local serial device is being created, it is required to specify the IP-address of the host computers to establish connection with.

Any 3rd party driver supporting RFC2217 can be used to install in the host computer, the driver establishes a transparent connection between host and serial device by mapping the IP:Port of the gateway's serial port to a virtual local COM port on the host computer.

The host computer can directly send data to the serial device via the gateway, and also receive data from the serial device via the gateway at the same time. The gateway supports up to 4 Internet host computers.

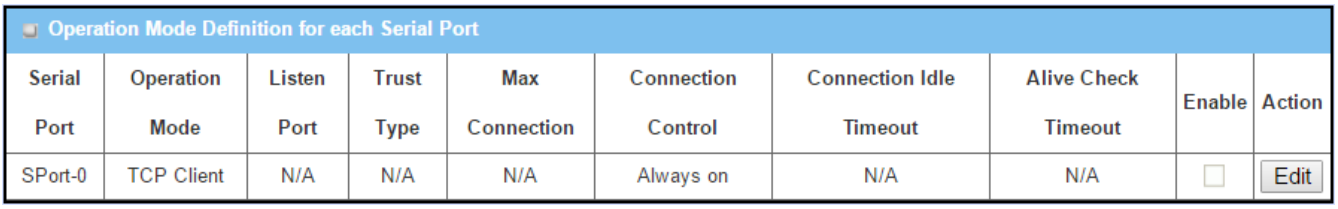
Virtual COM Setting

Virtual COM setting screen enables user to connect a Virtual COM port based device to the Internet. It allows user to access serial data remotely. There are TCP Client, TCP Server, UDP, and RFC2217 modes for remote accessing the connected serial device.

To use the Virtual COM function, you have to specify the operation mode for the multi-function serial port first. Go to Field Communication > Bus & Protocol > Port Configuration tab, select the Virtual COM as expected operation mode, and finish the related port configuration as well.
After that, go to **Field Communication > Bus & Protocol > Virtual COM** tab for detailed configuration of Virtual COM setting.

Enable TCP Client Mode

Configure the gateway as the TCP (Transmission Control Protocol) Client. In TCP Client mode, device initiates a TCP connection with a TCP server when there is data to transmit. Device disconnects from the server when the connection is Idle for a specified period. You may also enable full time connection with the TCP server.



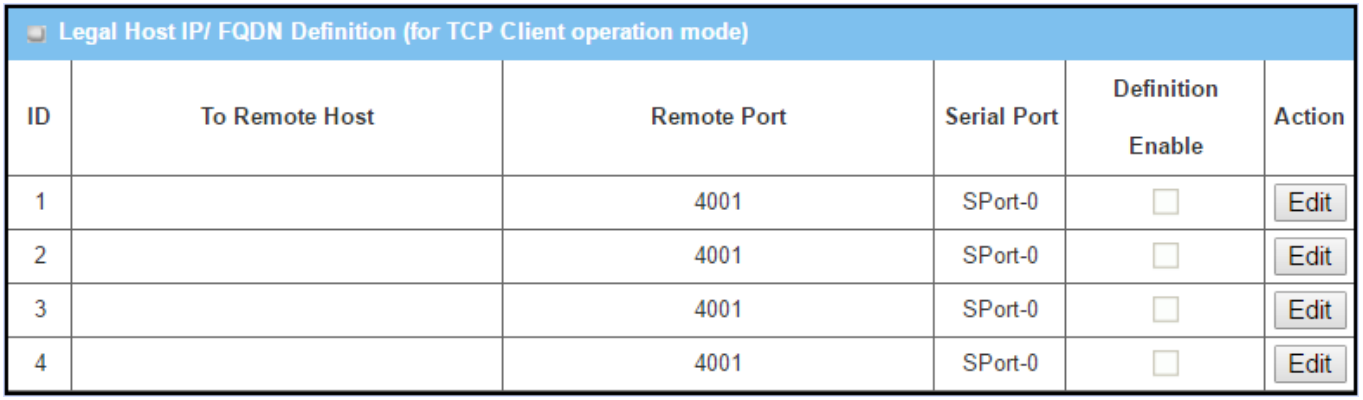
Operation Mode Definition for each Serial Port

Serial Port	Operation Mode	Listen Port	Trust Type	Max Connection	Connection Control	Connection Idle Timeout	Alive Check Timeout	Enable	Action
SPort-0	TCP Client	N/A	N/A	N/A	Always on	N/A	N/A	☐	Edit

Enable TCP Client Mode Window		
Item	**Value setting**	**Description**
Operation Mode	A Must filled setting	Select **TCP Client**.
Connection Control	**Always on** is set by default	Choose **Always on** for a TCP full time connection. Otherwise, choose **On-Demand** to initiate TCP connection only when required to transmit and disconnect at idle timeout.
Connection Idle Timeout	1. 0 is set by default 2. Range 0 to 60 min.	Enter the idle timeout in minutes. The idle timeout is used to disconnect the TCP connection when idle time elapsed . Idle timeout is only available when **On-Demand** is selected in the **Connection Control** field. ***Value Range***: 0 ~ 60 minutes.
Alive Check Timeout	1. 0 is set by default 2. Range 0 to 60	Enter the time period of alive check timeout. The TCP connection will be terminated if it doesn't receive response of alive-check longer than this timeout setting

	min.	***Value Range*:** 0 ~ 60 minutes.
Enable	The box is unchecked by default.	Check the **Enable** box to activate the corresponding serial port in specified operation mode.
Save	*N/A*	Click the **Save** button to save the configuration

Specify Remote TCP Server



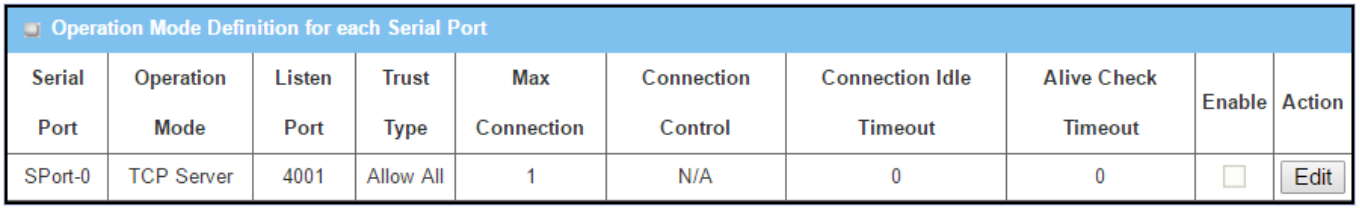
Legal Host IP/ FQDN Definition (for TCP Client operation mode)

ID	To Remote Host	Remote Port	Serial Port	Definition Enable	Action
1		4001	SPort-0	☐	Edit
2		4001	SPort-0	☐	Edit
3		4001	SPort-0	☐	Edit
4		4001	SPort-0	☐	Edit

Specify TCP Server Window		
Item	**Value setting**	**Description**
To Host	A Must filled setting	Press **Edit** button to enter IP address or FQDN of the remote TCP server to transmit serial data.
Remote Port	1.A Must filled setting 2.Default value is 4001	Enter the TCP port number. This is the listen port of the remote TCP server. ***Value Range***: 1 ~ 65535.
Serial Port	SPort-0 is set by default	Apply the TCP server connection for a selected serial port. Up to 4 TCP servers can be configured at the same time for each serial port.
Definition Enable	The box is unchecked by default	Check the **Enable** box to enable the TCP server configuration.
Save	*N/A*	Click the **Save** button to save the configuration

Enable TCP Server Mode

Configure the gateway as the TCP (Transmission Control Protocol) Server. The TCP Server waits for connections to be initiated by a remote TCP client device to receive serial data. The setting allows user to specify specific TCP clients or allow any to send serial data for serial data transmission bandwidth control and access control. The TCP Server supports up to 4 simultaneous connections to receive serial data from multiple TCP clients.



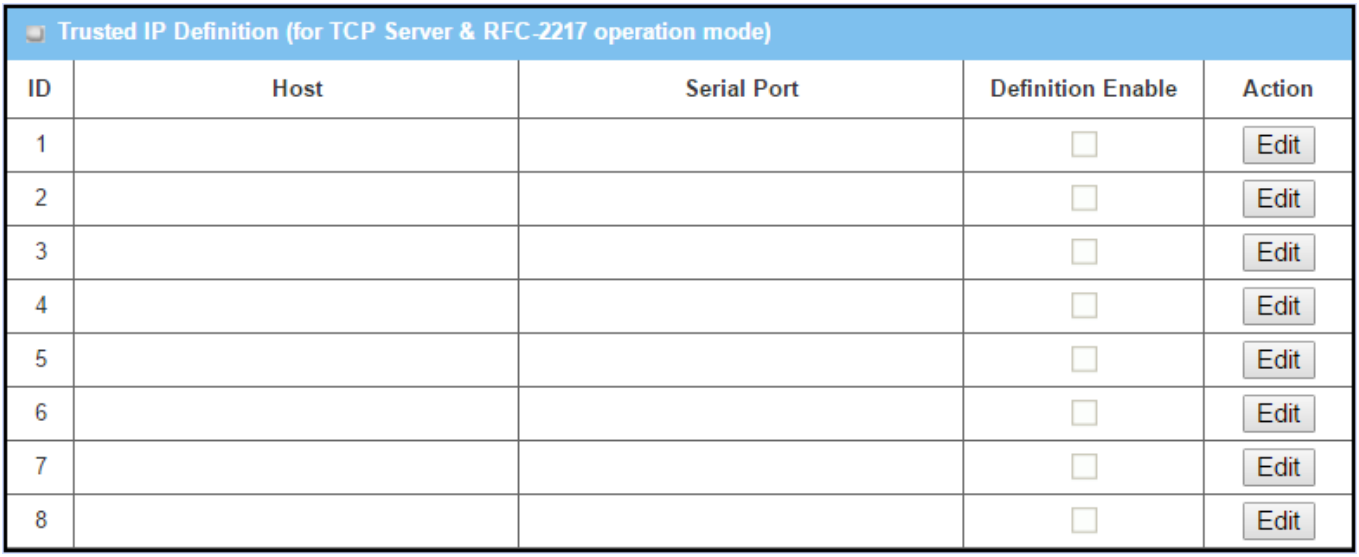
Operation Mode Definition for each Serial Port

Serial Port	Operation Mode	Listen Port	Trust Type	Max Connection	Connection Control	Connection Idle Timeout	Alive Check Timeout	Enable	Action
SPort-0	TCP Server	4001	Allow All	1	N/A	0	0	☐	Edit

Enable TCP Server Mode Window		
Item	**Value setting**	**Description**
Operation Mode	A Must filled setting	Select **TCP Server** mode.
Listen Port	4001 is set by default	Indicate the listening port of TCP connection. ***Value Range***: 1 ~ 65535.
Trust Type	**Allow All** is set by default	Choose **Allow All** to allow any TCP clients to connect. Otherwise choose **Specific IP** to limit certain TCP clients.
Max Connection	1. Max. 4 connections 2. 1 is set by default	Set the maximum number of concurrent TCP connections. Up to 4 simultaneous TCP connections can be established. ***Value Range***: 1 ~ 4.
Connection Idle Timeout	0 is set by default	Enter the idle timeout in minutes. The idle timeout is used to disconnect the TCP connection when idle time elapsed . Idle timeout is only available when **On-Demand** is selected in the **Connection Control** field. ***Value Range***: 0 ~ 60 minutes.
Alive Check Timeout	0 is set by default	Input the time period of alive check timeout. The TCP connection will be terminated if it doesn't receive response of alive-check longer than this timeout setting. ***Value Range***: 0 ~ 60 minutes.
Enable	The box is unchecked by default.	Check the **Enable** box to activate the corresponding serial port in specified operation mode.
Save	*N/A*	Click **Save** button to save the settings.

Specify TCP Clients for TCP Server Access

If you selected Specific IPs as the trust Type, the Trusted IP Definition window appears. The settings are valid for both TCP Server and RFC-2217 modes.



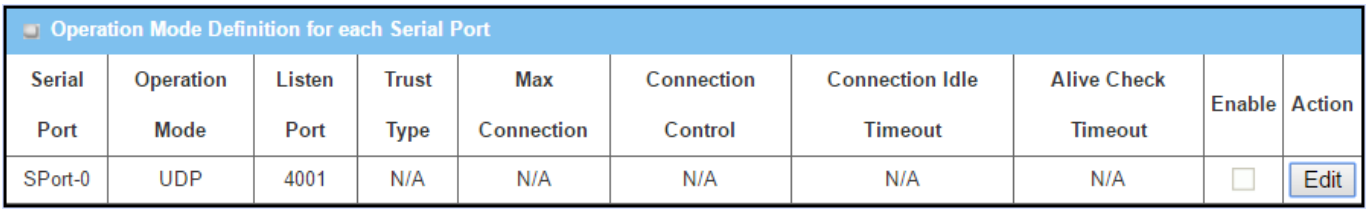
Trusted IP Definition (for TCP Server & RFC-2217 operation mode)

ID	Host	Serial Port	Definition Enable	Action
1			☐	Edit
2			☐	Edit
3			☐	Edit
4			☐	Edit
5			☐	Edit
6			☐	Edit
7			☐	Edit
8			☐	Edit

Specify TCP Clients Window		
Item	**Value setting**	**Description**
Host	A Must filled setting	Enter the IP address range of allowed TCP clients.
Serial Port	The box is unchecked by default	Check the box to specify the rule for selected Serial Port.
Definition Enable	The box is unchecked by default	Check the **Enable** box to enable the rule.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

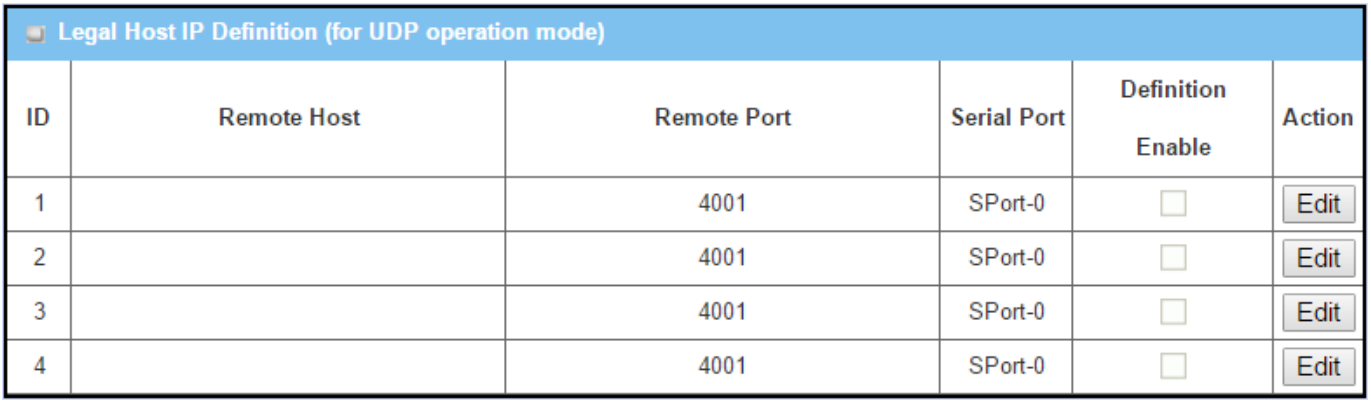
Enable UDP Mode

UDP (User Datagram Protocol) enables applications using UDP socket programs to communicate with the serial ports on the serial server. The UDP mode provides connectionless communications, which enable you to multicast data from the serial device to multiple host computers, and vice versa, making this mode ideal for message display applications.



Enable UDP Mode Window		
Item	**Value setting**	**Description**
Operation Mode	A Must filled setting	Select **UDP** mode.
Listen Port	4001 is set by default	Indicate the listening port of UDP connection. ***Value Range***: 1 ~ 65535
Enable	The box is unchecked by default.	Check the **Enable** box to activate the corresponding serial port in specified operation mode.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

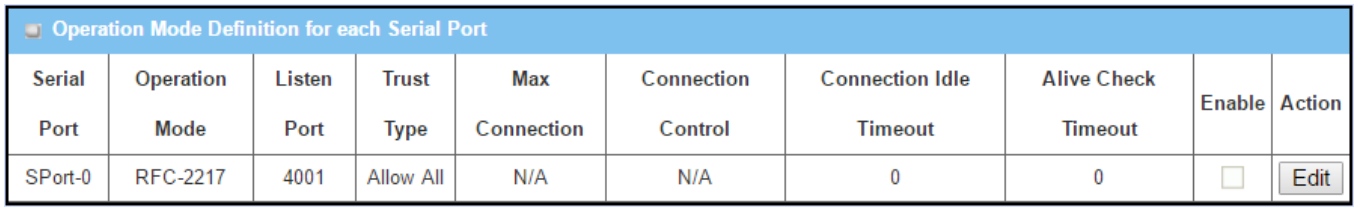
Specify Remote UDP



Specify Remote UDP hosts Window		
Item	**Value setting**	**Description**
Host	A Must filled setting	Press **Edit** button to enter IP address range of remote UDP hosts.
Remote Port	4001 is set by default	Indicate the UDP port of peer UDP hosts. ***Value Range***: 1 ~ 65535
Serial Port	SPort-0 is set by default	Apply the UDP hosts for a selected serial port. Up to 4 UDP servers can be configured at the same time for each serial port.
Definition Enable	The box is unchecked by default	Check the **Enable** box to enable the rule.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

Enable RFC-2217 Mode

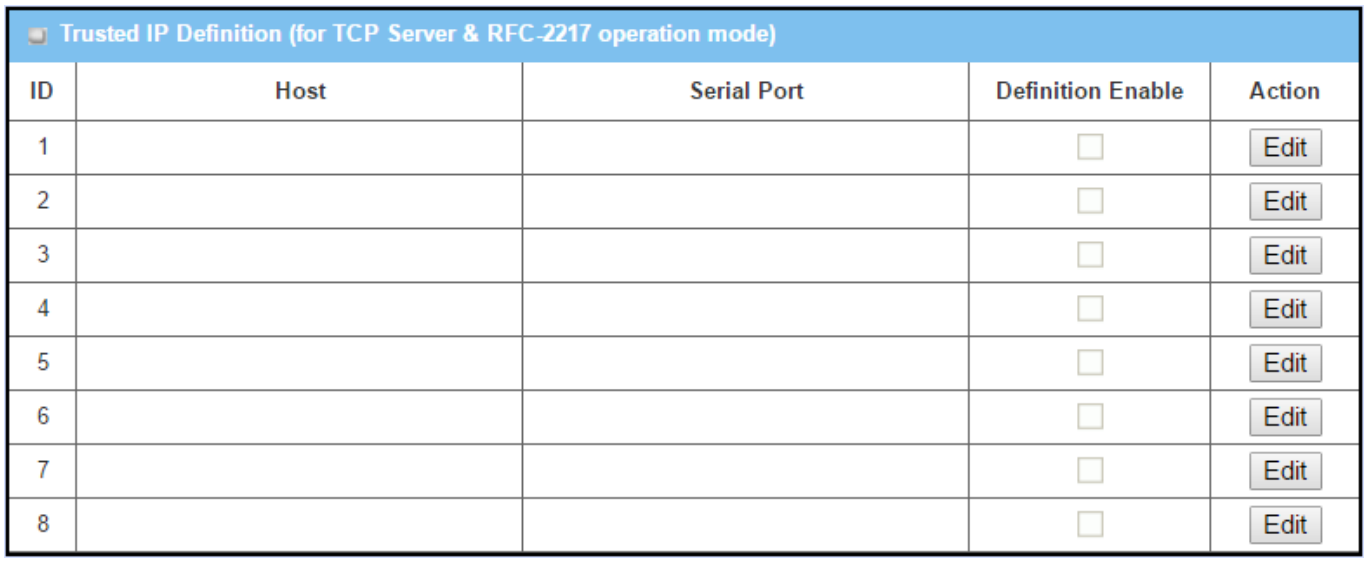
RFC-2217 defines general COM port control options based on telnet protocol. With the RFC-2217 mode, remote host can monitor and manage remote serially attached devices, as though they were connected to the local serial port. When a virtual serial port on the local serial device is being created, it is required to specify the IP-address of the remote hosts to establish connection with.



Enable RFC-2217 Mode Window		
Item	**Value setting**	**Description**
Operation Mode	A Must filled setting	Select **RFC-2217** mode.
Listen Port	4001 is set by default	Indicate the listening port of RFC-2217 connection. ***Value Range*:** 1 ~ 65535
Trust Type	**Allow All** is set by default	Choose **Allow All** to allow any clients to connect. Otherwise choose **Specific IP** to limit certain clients.
Connection Idle Timeout	0 is set by default	Enter the idle timeout in minutes. The idle timeout is used to disconnect the connection when idle time elapsed . ***Value Range*:** 0 ~ 60 minutes.
Alive Check Timeout	0 is set by default	Input the time period of alive check timeout. The connection will be terminated if it doesn't receive response of alive-check longer than this timeout setting. ***Value Range*:** 0 ~ 60 minutes.
Enable	The box is unchecked by default.	Check the **Enable** box to activate the corresponding serial port in specified operation mode.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

Specify Remote Host for Access

If you selected Specific IPs as the trust Type, the Trusted IP Definition window appears. The settings are valid for both TCP Server and RFC-2217 modes.



Specify RFC-2217 Clients for Access Window		
Item	**Value setting**	**Description**
Host	A Must filled setting	Enter the IP address range of allowed clients.
Serial Port	The box is unchecked by default	Check the box to specify the rule for selected Serial Port.
Definition Enable	The box is unchecked by default	Check the **Enable** box to enable the rule.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

4.1.3 Modbus

Modbus is one of the most popular automation protocols in the world, supporting traditional RS-232/422/485 devices and recently developed Ethernet devices. Many industrial devices, such as PLCs, DCSs, HMIs, instruments, and smart meters, use Modbus protocol as the communication standard. It is used to establish master-slave communication between intelligent devices.

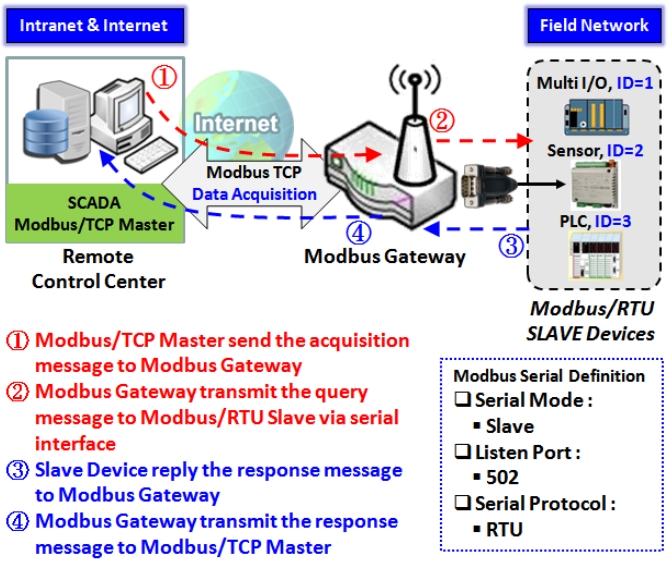
However, the Ethernet-based Modbus protocol is so different from the original serial-based protocols. In order to integrate Modbus networks, the IoT Gateway, including one or more serial ports that support RS-232 and RS-485 communication interface, can automatically and intelligently translate between Modbus TCP (Ethernet) and Modbus RTU/ASCII (serial) protocols, allowing Ethernet-based PLCs to control instruments over RS-485 without additional programming or effort.

Serial Port Definition

Serial Port	Operation Mode	Interface	Baud Rate	Data Bits	Stop Bits	Flow Control	Parity	Action
SPort-0	Modbus	RS-485	115200	8	1	None	None	Edit

NOTE: When Modbus devices are connected to/under the same serial port of IoT Modbus Gateway, those Modbus devices must use the same protocol with the same configuration (i.e., either Modbus RTU or Modbus ASCII with same Baud Rate setting).

Modbus Gateway Scenario

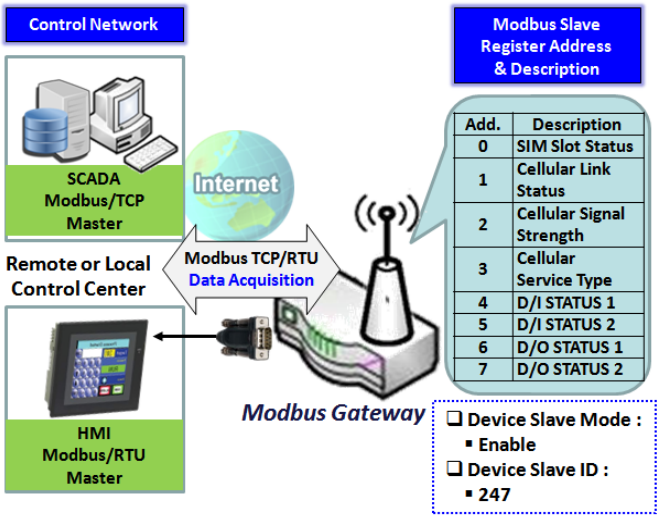


The IoT Gateway serves as a Modbus gateway to communicate with the Modbus TCP Master, the SCADA Server, located at remote control center for Modbus device accessing.

The Modbus TCP Master requests the IoT Gateway for Modbus devices' information, e.g., Data Acquisition or Register/Value Modification, via general Internet accessing, and the IoT Gateway serves as the gateway for data forwarding.

Under such configuration, the Modbus TCP Master requests the information from or sending control commands to various Modbus/RTU Slave devices that attached to the Modbus Gateway. And the Modbus gateway executes corresponding processes and replies the Modbus/TCP Master with the results.

Modbus Slave Scenario



In addition to behave as a Modbus Gateway, there is an integrated Modus Slave option for providing some device status, like Cellular Network Status, device DI/DO status, to remote Modbus Master via Modbus communication.

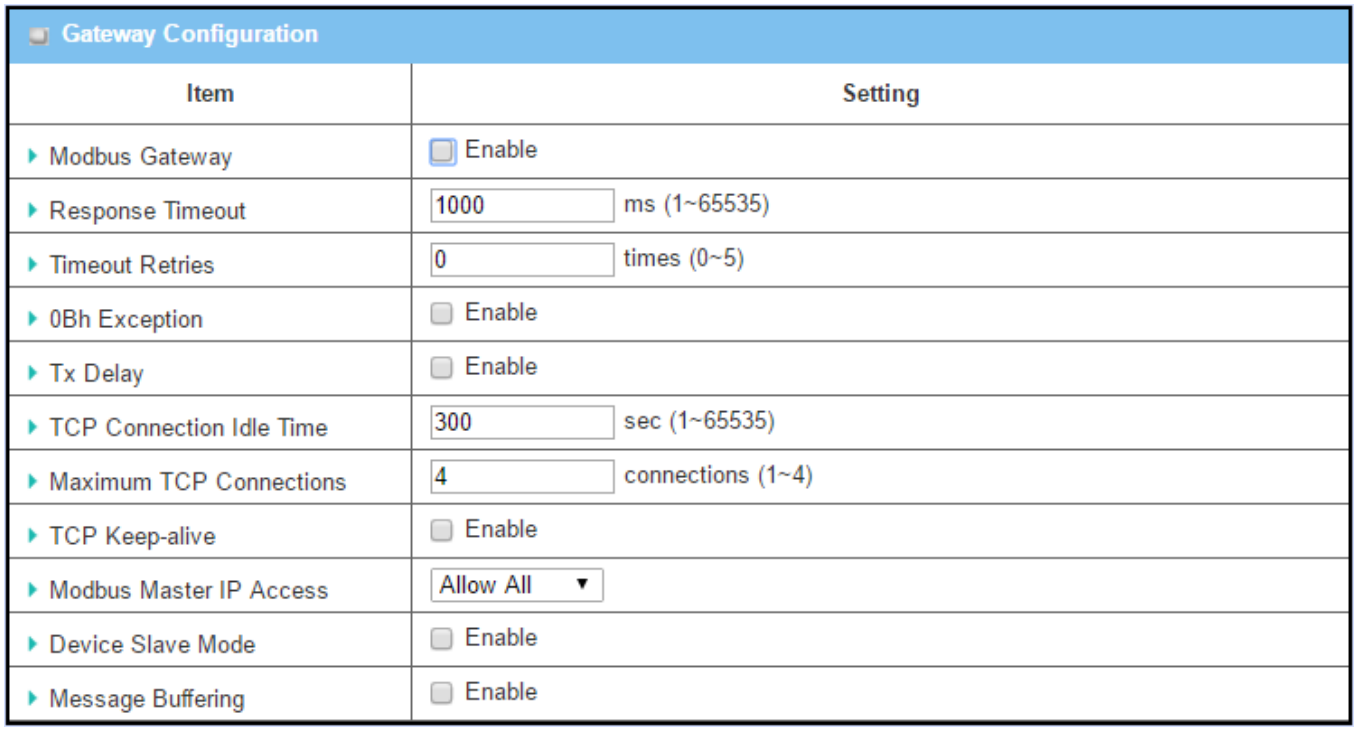
With the Slave option enabled, the Modbus Master device can request the information or sending control commands to the IoT Gateway, the Modbus TCP/RTU Slave device. And IoT Gateway executes corresponding processes and replies the Modbus Master devices.

Modbus Setting

Go to **Field Communication > Bus & Protocol > Modbus** tab.

The Modbus setting page enables user to configure the gateway to operate as a Modbus gateway, and allow access among Modbus TCP devices (which are connected to Ethernet network) and Modbus RTU/ASCII devices (which are connected to the Serial Port of the gateway). Once completed the Modbus settings in this section, ensure to select Modbus Operation Mode in Port Configuration screen to enable Modbus communication on the serial port.

Enable Modbus Gateway



Gateway Configuration		
Item	**Value setting**	**Description**
Modbus Gateway	The box is checked by default.	Check the **Enable** box to enable Modbus gateway function.
Response Timeout	**1000 ms** is set by default	This sets the response timeout of the slave after master request sent. If the slave does not response within the specified time, data would be discarded.

		This applies to the serially attached Master sent request over to the remote Slave or requests send from the remote Master sent to the serially attached Slave. ***Value Range*: 1 ~ 65535.**
Timeout Retries	**0** is set by default	If the slave does not respond to the Master's request, the gateway will resend the request stored in the buffer. If Timeout retries is set to null (value zero), the gateway would not buffer Master requests. If a value other than zero is specified, the gateway would store the Master request in the buffer and retries to send the request in a number of specified times. Once the retries are exhausted, the gateway will send a Modbus error message to the Master. However, if the 0Bh exception box is checked (see below), a 0Bh hex code based-error message will be send instead. ***Value Range*: 0 ~ 5.**
0Bh Exception	The box is unchecked by default.	Check the **Enable** box to enable gateway to send a 0Bh exception code message to Modbus Master to indicate that the slave device does not respond within the timeout interval.
Tx Delay	The box is unchecked by default.	Check the **Enable** box to activate to the minimum amount of time after receiving a response before the next message can be sent out. When Tx Delay is enabled the Gateway would insert a Tx delay between Master requests. The delay gives sufficient time for the slave devices to turn their transmitters off and their receivers back on.

Setup TCP/IP Connection for Receiving Modbus Master Request

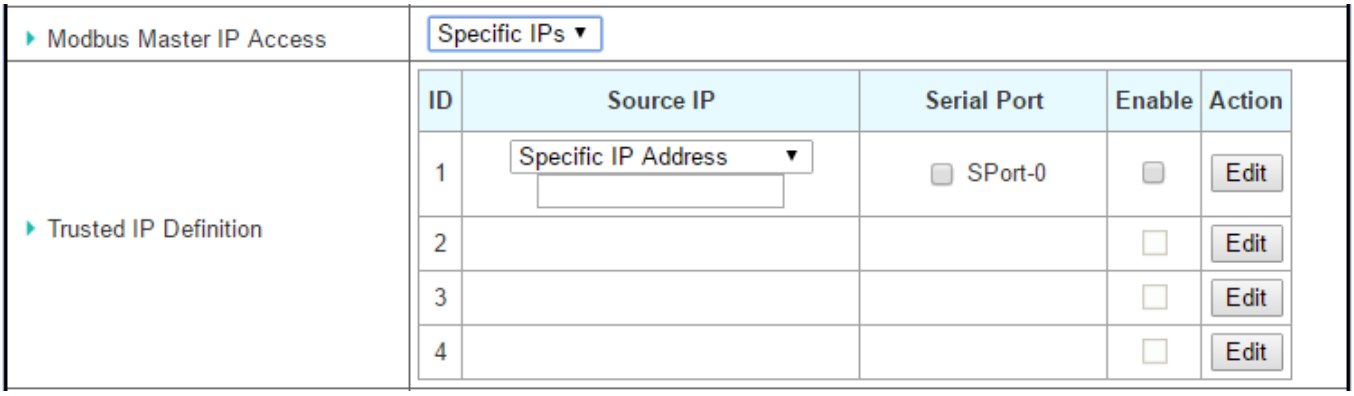
The following Modbus TCP Configuration items allow user to set up the TCP connection settings so that the remote Modbus Master can access to the Modbus gateway. Besides, it also allows user to specify authorized masters on the TCP network.

Item	Value setting	Description
TCP Connection Idle Time	1. **300** is set by default 2. Range 1 to 65535	Enter the idle timeout in seconds. If the gateway does not receive another TCP request before the idle timeout elapsed, the TCP session will be terminated automatically. ***Value Range*: 1 ~ 65535.**
Maximum TCP Connections	1. 4 is set by default 2. Range 1 to 4	Enter the allowed maximum simultaneous TCP connections. ***Value Range*: 1 ~ 4.**
TCP Keep-alive	The box is unchecked by default.	Check the **Enable** box to ensure to keep the TCP session connected.

Modbus Master IP Access	**Allow All** is selected by default.	Specify authorized masters on the TCP network. Select **Allow All** to allow any Modbus Master to reach the attached Slave(s). Otherwise, limit only specific Master to reach the Slave(s) by selecting **Specific IPs**. When **Specific IPs** is selected, a Trusted IP Definition dialog will appear.

Specify Trusted Modbus Masters on the TCP network

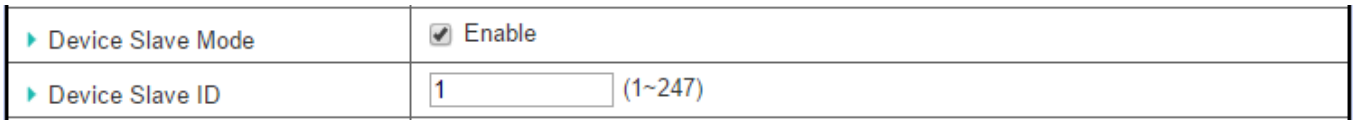
When **Specific IPs** is selectes, user has to specify the Master(s) by their IP addresses to reach the serially attached Slave(s).



Item	Value setting	Description
Source IP	A Must fill setting	Select **Specific IP Address** to only allow an IP address of the allowed Master to access the attached Slave(s). Select **IP Range** to only allow a set range of IP addresses of the allowed Master to access the attached Slave(s). Select **IP Address-based Group** to only allow pre-defined group of IP address of the allowed Master to access the attached Slave(s). Note: group must be pre-defined before this selection become available. Refer to **Object Definition > Grouping > Host grouping**. You may also access to create a group by the Add Rule shortcut button. Setting done through the Add Rule button will also appear in the Host grouping setting screen. Then check **Enable** box to enable this rule.
Serial Port	Unchecked by default	Check the **Enable** box to enable the rule in chosen Serial Port.
Enable	Unchecked by default	Check the **Enable** box to enable this rule.

Enable Integrated Modbus Slave for the Gateway

This setting can setup the Gateway as a standalone Modbus Slave Device. Local SCADA Management System can treat the Gateway as a Slave device, and hence is able to read its information for device monitoring.



Item	Value setting	Description
Device Slave Mode	The box is unchecked by default.	Check the **Enable** box to activate the integrated Modbus Salve function, so that it can function as a Modbus Slave device, and can be accessed with legacy Modbus Function Code from a SCADA management system. Supported Modbus commands are listed in the following Table.
Device Slave ID	1. 1 is set by default 2. Range 1 to 247	Enter the preferred ID for the integrated Modbus slave. ***Value Range*:** 1 ~ 247.

Currently, the integrated Modbus Slave device supports the following commands for accessing the 3G/4G Modem Status of the Gateway.

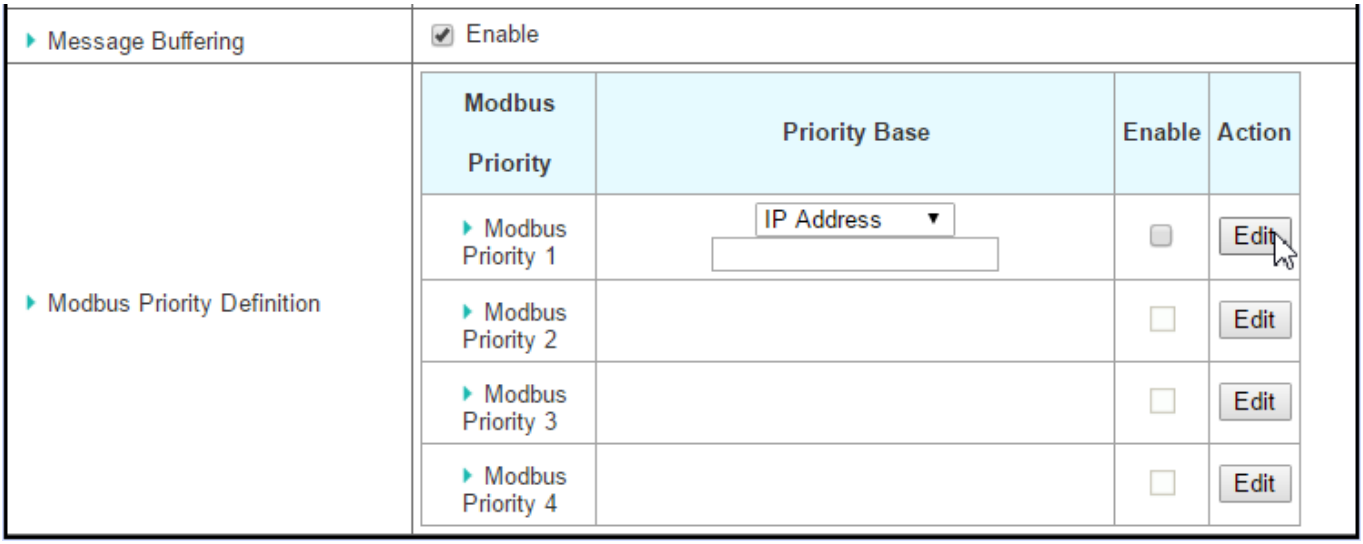
Function Code: 0x03(/Read). 0x06(/Write)

Address: 0 ~ 7

Register Address	Register Name	R / W	Register Range / Description
0	3G/4G_PHYSICAL_INTERFACE	R	1=3G/4G
1	3G/4G_LINK_STATUS	R	0 ~ 6, 0=Disconnected, 1=Connecting…, 2=Connected, 3=Disconnecting…, 5=Wait for Traffic…, 6=Diconnected
2	3G/4G_SIGNAL_STRENGTH	R	0 ~ 100
3	3G/4G_SERVICE_TYPE	R	0 ~ 7, 0=2G, 1=none, 2=3G, 3=3.5G, 4~6=3.75G, 7=LTE
4	DI_STATUS_1	R	0 : OFF, 1:ON
5	DI_STATUS_2	R	0 : OFF, 1:ON
6	DO_STATUS_1	R/W	0 : OFF, 1:ON
7	DO_STATUS_2	R/W	0 : OFF, 1:ON

Modbus Priority Definition

Message Buffering must be enabled to prioritize Master request queue to transmit to Modbus Slave as mentioned in the above. Click the **Edit** button to fill in the priority settings.



Item	Value setting	Description
Message Buffering	1. Unchecked by default 2. Buffer up to 32 requests	Check the **Enable** box to buffer up to 32 requests from Modbus Master. If the **Enable** box is checked, a Modbus Priority Definition dialog will appear consequently. So that, the buffered Master requests can further be configured to prioritize request queue to transmit to Slave based on Master's IP address if requests are coming from remote Master, or based on remote Slave ID if requests are coming from serially attached Master, or based on Function Code.
Modbus Priority	N/A	A Priority List for setting the priority of specified Modbus identity. Modbus Priority 1 ~ Modbus Priority 4.
Priority Base	IP Address by Default	User can specify a Modbus identity with **IP Address**, **Slave ID**, or **Function Code**. The buffered Modbus message that matched the specified identity will be handled with given priority. The Modbus Master requests can be buffered to a certain priority queue according to the Master's IP address if requests are coming from remote Master, or the remote Slave's device ID if requests are coming from serially attached Master, or the specific Function Code that issued by Master.
Enable	Unchecked by default	Check the **Enable** box to enable the priority settings.

Save	N/A	Click the **Save** button to save the settings.

Specify the definition of attached serial device(s)

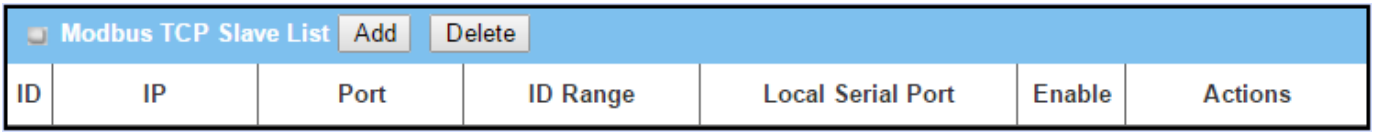
Press **Edit** Button to select serial mode and other configuration in the following setting.

Modbus Serial Definition		
Item	**Value setting**	**Description**
Serial Port	N/A	It displays the name of the serial port used. E.g. SPort-0. The number of serial ports varies from the purchased model.
Serial Mode	**Slave** is set by default	Specify the serial device mode for the attached Modbus device(s). It can be **Slave** or **Master**. A serial port can be attached with one Modbus Master, or daisy-chained a group of Modbus Salve devices.
Listen Port	1. 502 is set by default 2. Range 1 to 65535	Specify the Listen Port number if a Slave device is attached. It is a don't care setting if a Master device is attached. ***Value Range***: 1 ~ 65535.
Serial Protocol	RTU is set by default	Select the serial protocol that is adopted by the attached Modbus device(s) It can be **RTU** or **ASCII**.
Enable	N/A	It displays whether the specific Modbus Serial Port is enabled or disabled. To enable or disable Modbus Serial Port, go to **Field Communication > Bus & Protocol > Port Configuration** tab, and set the operation mode as **Modbus**.

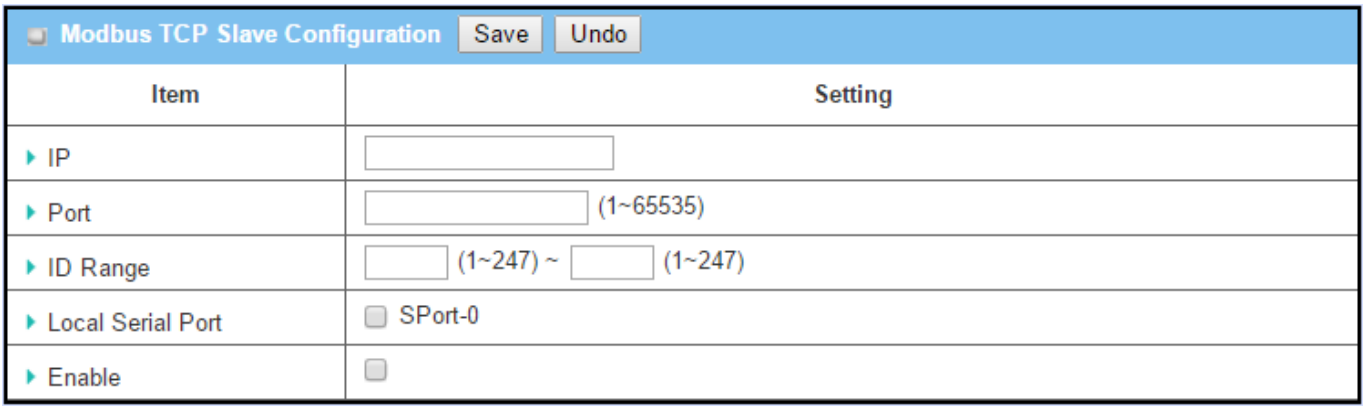
Specify Modbus TCP Slave device(s)

If there is a Modbus Master device is attached to the serial port of the Modbus Gateway, user has to further specify the Modbus TCP Slave device(s) to send requests to from the attached Modbus

RTU/ASCII Master device.



When the **Add** button is applied, a **Modbus TCP Slave Configuration** screen will appear.

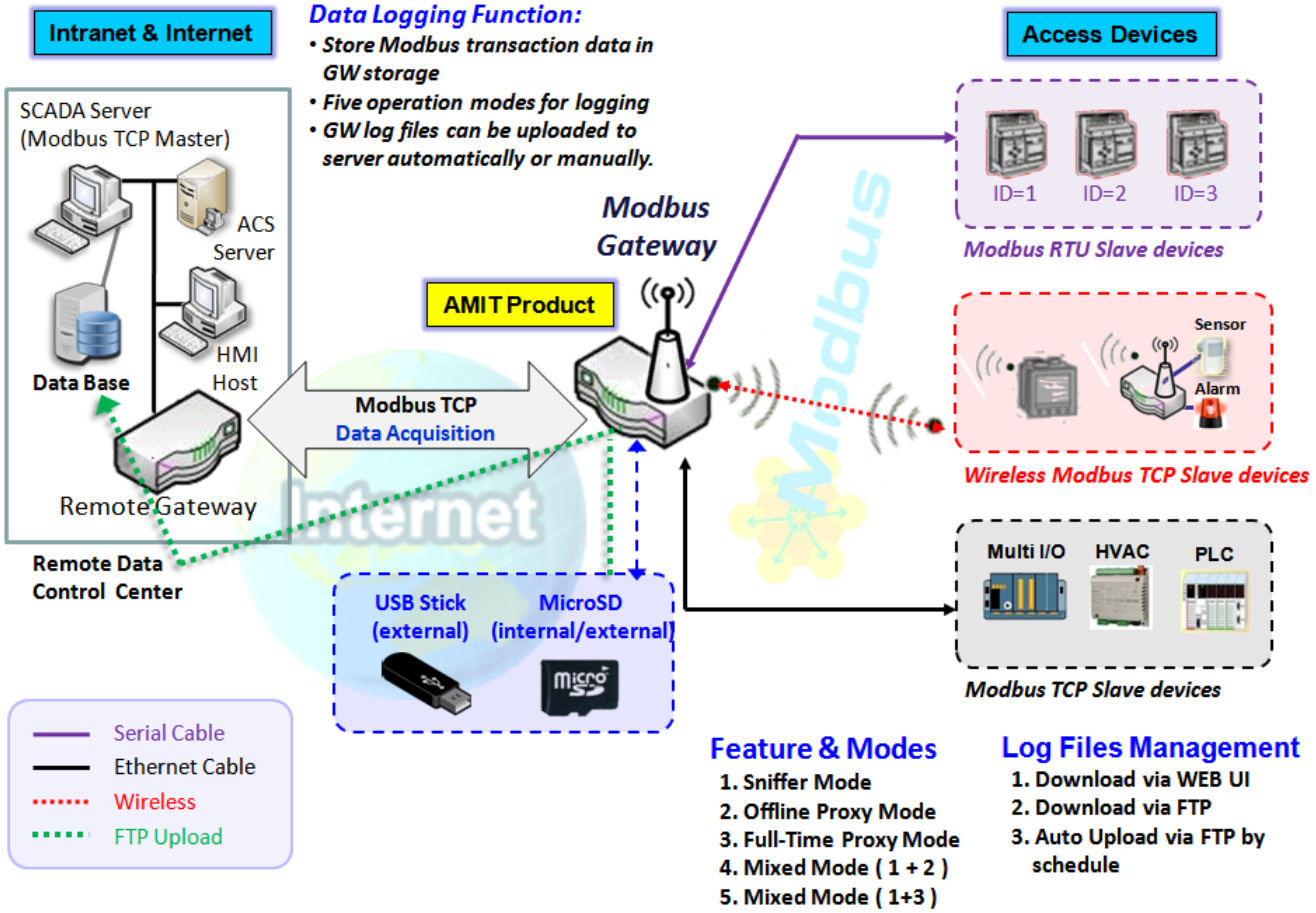


Modbus Remote Slave Configuration		
Item	**Value setting**	**Description**
IP	A Must fill setting	Enter the IP address of the remote Modbus TCP Slave device.
Port	1. A Must fill setting 2. Range 1 to 65535	Enter the TCP port on which the remote Modbus TCP Slave device listens (to the TCP client session request). ***Value Range*: 1 ~ 65535.**
ID Range	Range 1 to 247	Enter the Modbus ID range for the Modbus TCP Slave(s) that will respond to the Master's request. In addition to specify the Slave IP and Port, for accessing those Remote Modbus RTU Salve(s) located behind another Modbus Gateway, user has to specify the Modus ID range of the Modbus RTU Slave(s). ***Value Range*: 1 ~ 247.**
Local Serial Port	It is unchecked by default.	Select the Serial port(s) from which the Master's request will be sent to the Modbus TCP Slave(s). If the check box is grayed out and not available, ensure that you have Master option selected in the Modbus Serial Definition sub-screen and save the setting. Note: The number of Serial Port supported depends on the gateway model purchased.
Enable	It is unchecked by default.	Check the **Enable** box to enable this rule.
Save	N/A	Click the **Save** button to save the settings.
Undo	N/A	Click the **Undo** button to cancel the changes.

4.2 Data Logging

Data logging is the process of collecting and storing data over a period of time in order to analyze specific trends or record the data-based events/actions of a system, or connected devices. Data logging function is a very useful and also important feature for SCADA telemetry; it makes the monitoring and analyzing tasks easier by checking the status and historical data during whole data acquisition period.

Even facing the network connection problems with remote NOC/SCADA side, you can also enable the data logging proxy function provided by the purchased gateway and keep doing the data acquisition and storing the collected data in local storage (in .CSV file format). When the network connection recovered, admin/user can download the data log files manually via FTP or web UI for further reference and maintenance.



The Modbus Cellular Gateway provides a complete data logging function for collecting the

Modbus transaction data for application requirements. There are some data logging schemes to meet different management requirements. They are the Sniffer Mode, Offline Proxy Mode, Full-Time Proxy Mode, and the mixed modes for sniffer and proxy combinations.

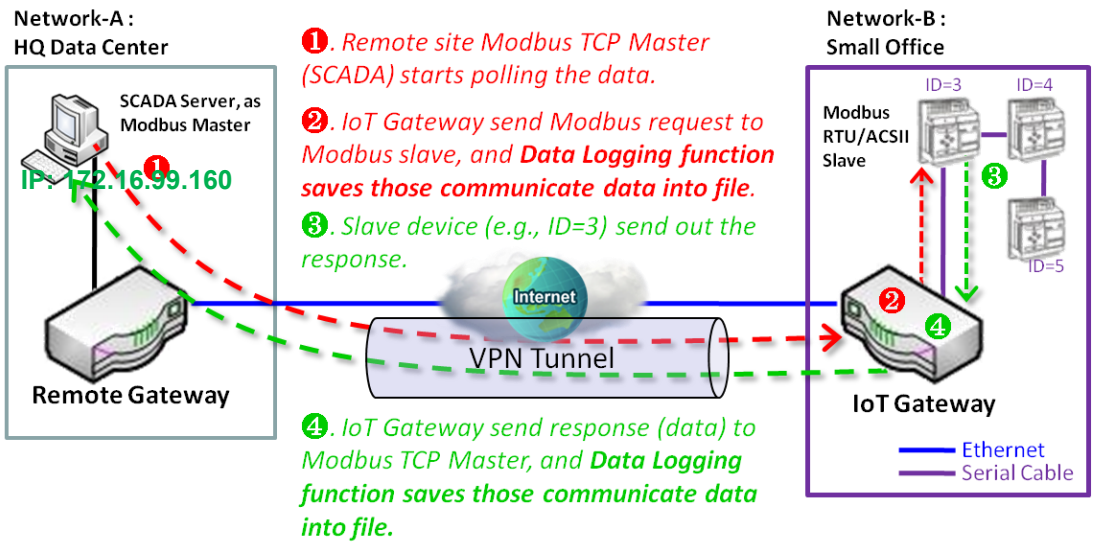
With the Sniffer mode enabled, the gateway will monitor and record the communication among a specific Modbus Master and related slaves. It will store the Modbus communication as log files and administrator can check what Modbus communication went over the Modbus gateway, and if there is any communication loss among the Master and Slave sides or not.

However, if there is any network connection problem between the Modbus gateway and remote NOC/SCADA, the remote Modbus server can't reach the Slave devices attached to the Modbus gateway, and consequently, nothing can be monitored and stored under such situation.

With the Proxy mode option enabled, when the Modbus gateway lost the connection with specified Modbus server, it will take over the data acquisition task and keep collecting the required data from Slave devices automatically. Once the connection is recovered, the Modbus gateway may stop the data log proxy function. Remote Modbus server can keep its data acquisition process, and if required, the administrator can also get the stored data log files to tell if everything goes well or not.

Under the Data Logging Proxy mode, user has to create some data acquisition rules via "Proxy Mode Rule Configuration" for collecting the Slave devices data by the Gateway when required. Once the network connection to remote SCADA was lost unexpectedly, the Data Logging Proxy function will be triggered and begin to do the data polling tasks by those pre-defined rules running in background.

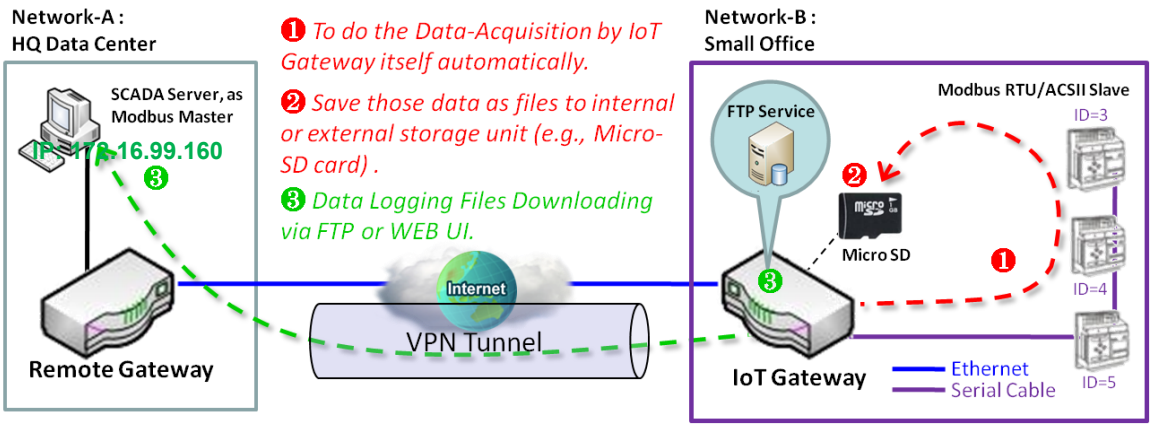
➢ Scenario for Sniffer Mode Data Logging



As Illustrated in the diagram, the Modbus gateway will store the following Modbus activities into a log file.

- The Modbus request sent from Remote Modbus TCP Master.
- The response (data) that sent out from the polled Slave device (ID=3)

➢ Scenario for Off-Line Proxy Mode Data Logging



As illustrated, when the connection to a remote Modbus Master broken, the Modbus Gateway will activate the data logging proxy function and execute the pre-defined data acquisition task by itself.

- The Modbus request issued by the Modbus Gateway (Data Logging Proxy).
- The response (data) that sent out from the polled Slave device (ID=3)

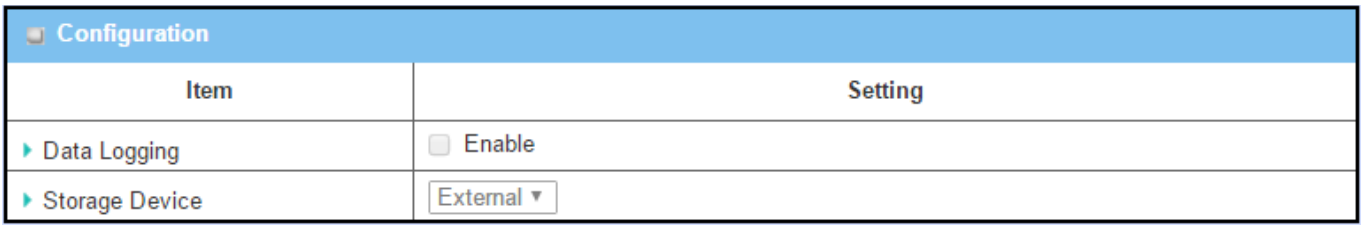
Repeat above data acquisition and data logging activities on every 5 sec interval until the connection recovered.

4.2.1 Data Logging Configuration

Data Logging is commonly used in monitoring systems to collect and analyze the field data. With proper configuration, the Gateway will record Modbus messages according to the specified rule list.

Go to **Field Communication > Data Logging > Configuration** tab.

Enable Data Logging



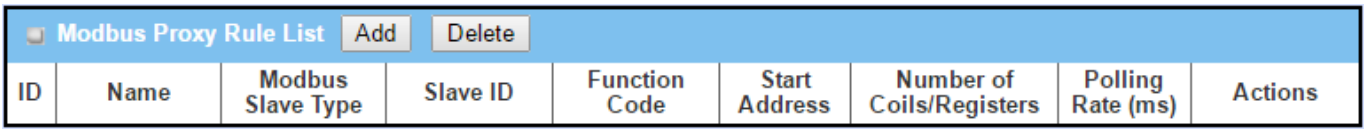
Configuration		
Item	**Value setting**	**Description**
Data Logging	The box is unchecked by default.	Check the **Enable** box to activate to data logging function.
Storage Device	**External** is set by default	Choose the sotrage device to store the log files. It can be **External** or **Internal**, depends on the product specification.
Save	*NA*	Click the **Save** button to save the settings.

Note:

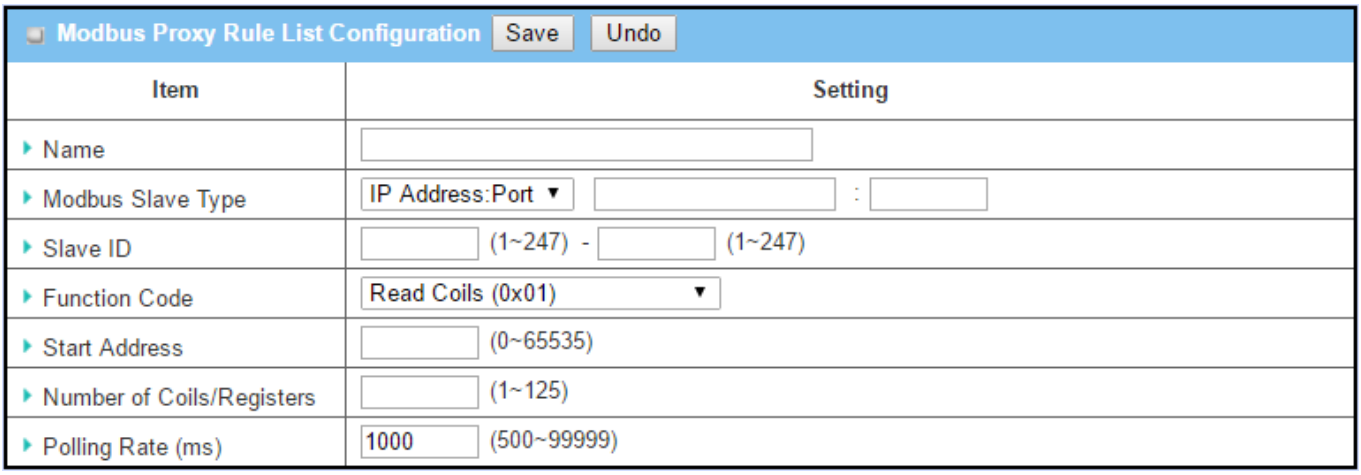
1. If there is no available storage device, the Enable checkbox will be grayed, and you can't enable it for the data logging. That is, if you selected External Storage, plug-in the storage first, and then enable the function and also make the required configuration.
2. Make sure the Modbus Operation Mode is selected and enabled, or there will be no Modbus transactions to be logged. Please refer to **Field Communication > Bus & Protocol > Port Configuration** and **Modbus** tabs.

Create/Edit Modbus Proxy Rules

The Gateway allows you to customize your proxy mode rule list. It supports up to a maximum of 20 rules.



When the **Add** button is applied, **Modbus Proxy Rule Configuration** screen will appear.



Modbus Proxy Rule Configuration		
Item	**Value setting**	**Description**
Name	A Must filled setting.	Specify a name as the identifier of the Modbus proxy rule. ***Value Range***: 1 ~ 32 characters.
Modbus Slave Type	**IP Address :Port** is selected by default.	Specify the Modbus Slave devices to apply with the Modbus proxy rule. It can be **IP Address:Port** for Modbus TCP slaves or **Local Serial Port** for local attached Modbus RTU/ASCII slaves. ***Value Range***: 1 ~ 65535 for port number
Slave ID	1. A Must filled setting. 2. Range 1 to 247	Specify the ID range for the slave device(s) to apply with the Modbus proxy rule. ***Value Range***: 1 ~ 247.
Function Code	**Read Coils (0x01)** is seelected by	Specify a certain read function for the Data Logging Proxy to issue and record the responses from device(s).

	default.	
Start Address	1. A Must filled setting. 2. Range 0 to 65535	Specify the Start Address of registers to apply with the specified function code. ***Value Range*****:** 0 ~ 65535.
Number of Coils/Registers	1. A Must filled setting. 2. Range 1 to 125	Specify the number of coils/registers to apply with the specified function code. ***Value Range*****:** 1 ~ 125. Note: **Start Address** plus **Number** must be smaller than 65536.
Polling Rate (ms)	1. A Must filled setting. 2. **1000** ms is set by default	Enter the poll time in milliseconds to apply the Proxy Mode Rule. Once the proxy mode is activated, the Modbus Gateway will issue pre-defined Modbus message on each Poll Time interval accordingly. ***Value Range*****:** 500 ~ 99999.
Save	N/A	Click the **Save** button to save the settings.
Undo	N/A	Click the **Undo** button to cancel the changes.

4.2.2 Scheme Setup

There are five data logging schemes to meet different management requirements. They are the Sniffer Mode, Offline Proxy Mode, Full-Time Proxy Mode, and the mixed modes for sniffer and proxy combinations. User has to configure the required data logging rules with selected scheme in this Scheme Setup page.

Go to **Field Communication > Data Logging > Scheme Setup** tab.

Create/Edit Data Logging Rules

When the **Add** button is applied, **Scheme Configuration** screen will appear.

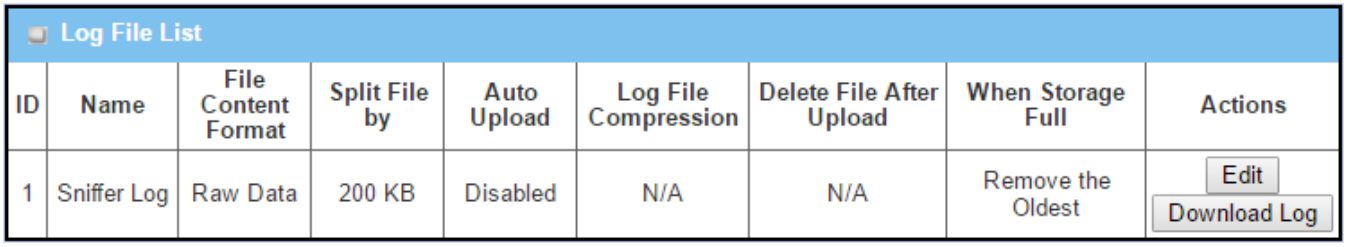
Scheme Configuration		
Item	**Value setting**	**Description**
Name	A Must filled setting.	Specify a name as the identifier of the data logging rule. ***Value Range*:** 1 ~ 16 characters.
Mode	**Sniffer** is selected by default.	Select an expected data logging scheme for the data logging rule. There are five available schemes : **Sniffer** : The Modbus gateway will record all the Modbus transcations between the Master and Slave devices. **Off-Line Proxy**: When the connection between the Modbus gateway and Master is lost, the pre-defined proxy rule will be triggered and the Modbus gateway will issue specified function code to collect and record the data / status from the slave devices **Full-Time Proxy**: The pre-defined proxy rule will be triggered all the time and the Modbus gateway will issue specified function code to collect and record the data / status from the slave devices **Sniffer & Off-Line Proxy**: This is a mixed mode for both Sniffer and Off-Line Proxy modes. **Sniffer & Full-Time Proxy**: This is a mixed mode for both Sniffer and Full-Time Proxy modes.
Master Type	**IP Address** is selected by default.	Specify the Modbus master device to apply with the data logging rule. It can be **IP Address** for Modbus TCP master, or **Local Serial Port** for local attached Modbus RTU/ASCII master.
Master Query Timeout (sec.)	1. An Optional setting. 2. **60** sec is set by default 3. Range 1 to 99999	Specify the timeout value for querying Modbus Master. If no response from the master for the specified timeout setting, selected proxy rule will be triggered and applied with the data logging rule. Note: If Off-Line proxy scheme is selected, the timeout setting will be used to check. Otherwise, it is a don't care value.
Proxy Rules	An Optional setting.	Select the Proxy rule to be applied with the data logging rule. Note: If any proxy scheme is selected, please create the required Proxy rules in advance, and select from the list.
Enable	The box is unchecked by default.	Check the box to activate the data logging rule.
Save	N/A	Click the **Save** button to save the settings.
Undo	N/A	Click the **Undo** button to cancel the changes.

4.2.3 Log File Management

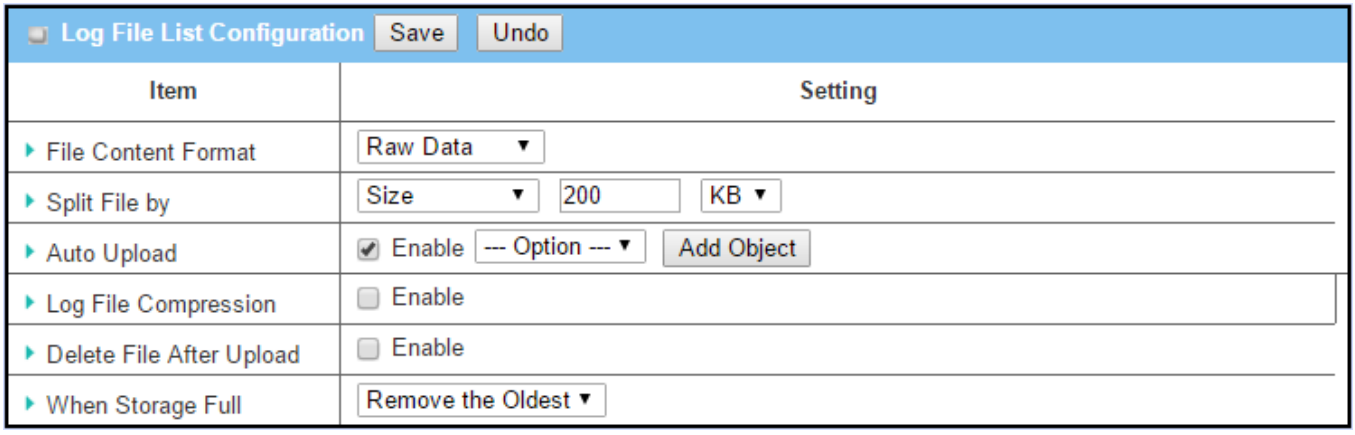
There are five data logging schemes to meet different management requirements. They are the Sniffer Mode, Off-Line Proxy Mode, Full-Time Proxy Mode, and the mixed modes for sniffer and proxy combinations. User has to configure the required data logging rules with selected scheme in this Scheme Setup page.

Go to Field Communication > Data Logging > Log File Management **tab.**

If user had created data log rules in the **Field Communication > Data Logging > Scheme Setup** tab, there will be a log file list shown in the following Log File list screen. The default Log File management settings will be applied if user didn't change it via the **Edit** button.



When the **Edit** button is applied, **Log File Configuration** screen will appear.



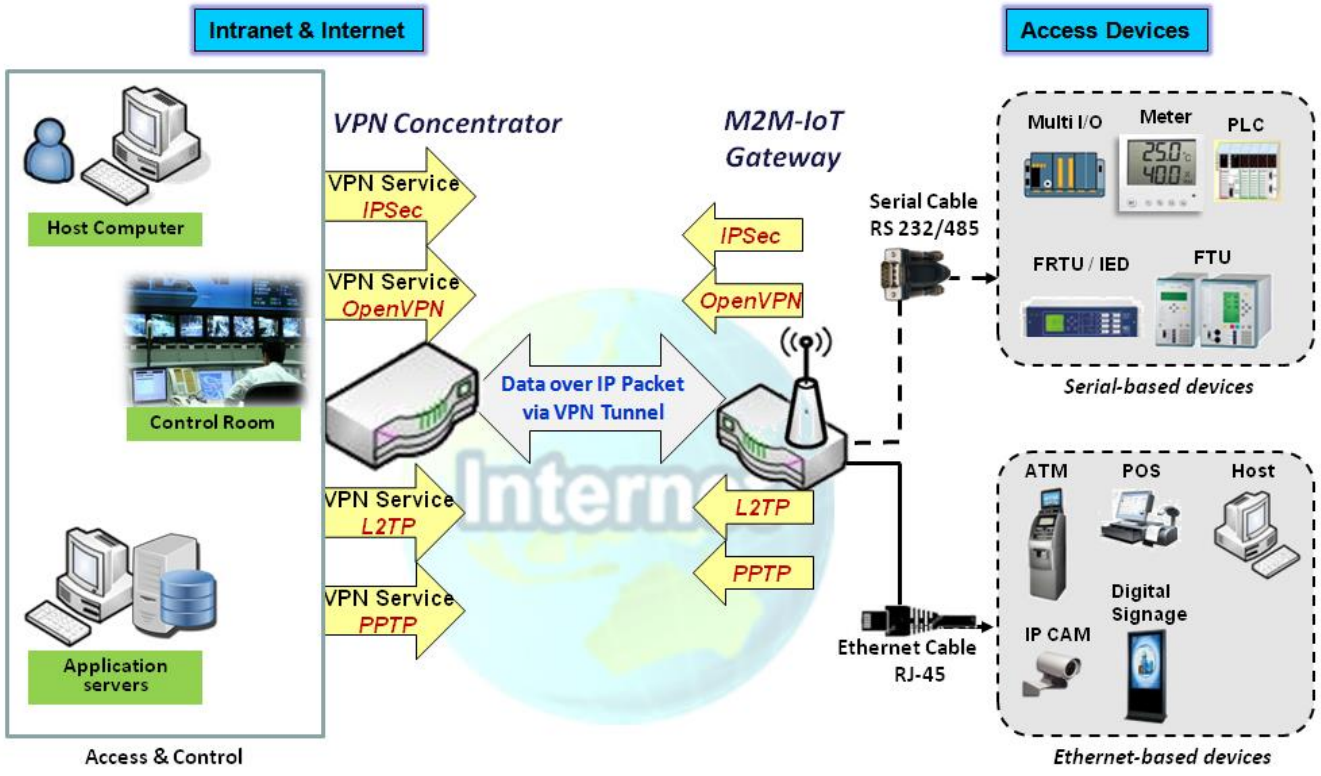
Log File Configuration		
Item	**Value setting**	**Description**
Name	N/A	The name of corresponding data log rule will be displayed. The default log file name will be named as ‘ Name_yyyyMMddHHmmSS.csv ‘.
File Content Format	**Raw Data** is selected by default	Select the data format for the log files. It can be **Raw Data**, or **Modbus Type**.
Split File by	**Size** and **200 KB** are set by default	Specify the split file methodology. It can be by **Size**, or by **Time Interval**. User has to dpecify a certain file size or time interval for splitting the data logs into a series of files. ***Value Range*:** 1 ~ 99999.
Auto Upload	1. An Optional filled setting 2. The box is unchecked by default.	Check the **Enable** box to activate the auto upload function for logged files. Once been enabled, user has to specify an external FTP server from the dropdown list for auto uploading the log files to the server. Refer to **Object Definition > External Server > External Server** tab, or create the FTP server with the **Add Object** button.
Log File Compression	1. An Optional filled setting 2. The box is unchecked by default	If Auto Upload is activated, user can further specify whether to compress the log file prior it is uploaded or not. Check the **Enable** button to activate the Log File Compression function...
Delete File After Upload	1. An Optional filled setting 2. The box is unchecked by default	If Auto Upload is activated, user can further specify whether to delete the transferred log from the gateway storage or not. Check the **Enable** button to activate the function.
When Storage Full	**Remove the Oldest** is selected by default	Specify the operation to take when the storage is full. It can be **Remove the Oldest** log file, or **Stop Recording**. When **Remove the Oldest** is selected, the gateway will delete the oldest file once the storage is full, and keep on the data logging activity; When **Stop Recording** is selected, the gateway will stop the data logging activity once the storage is full.
Save	*NA*	Click the **Save** button to save the settings.
Undo	*NA*	Click the **Undo** button to cancel the changes.

When the **Download Log** button is applied, the web browser will download a file named as ‘log.tar’ to the managing host computer.

Chapter 5 Security

5.1 VPN

A virtual private network (VPN) extends a private network across a public network, such as the Internet. It enables a computer to send and receive data across shared or public networks as if it were directly connected to the private network, while benefitting from the functionality, security and management policies of the private network. This is done by establishing a virtual point-to-point connection through the use of dedicated connections, encryption, or a combination of the two. The tunnel technology supports data confidentiality, data origin authentication and data integrity of network information by utilizing encapsulation protocols, encryption algorithms, and hashing algorithms.

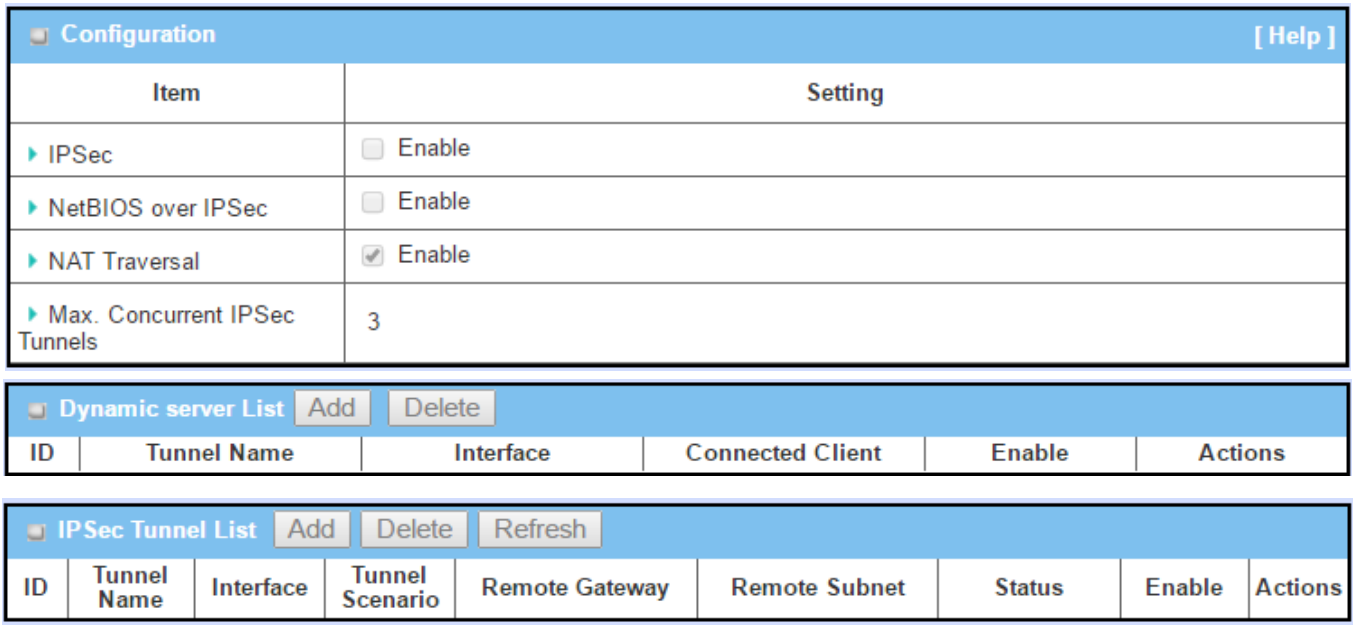


The product series supports different tunneling technologies to establish secure tunnels between multiple sites for data transferring, such as IPSec, OpenVPN, L2TP (over IPSec), PPTP and GRE. Besides, some advanced functions, like Full Tunnel, Tunnel Failover, Tunnel Load Balance, NetBIOS over IPSec, NAT Traversal and Dynamic VPN, are also supported.

Go to **Security > VPN > Configuration** tab. The VPN enable check box must be checked to

enable to allow IPSec, OpenVPN, L2TP, PPTP and GRE to function.

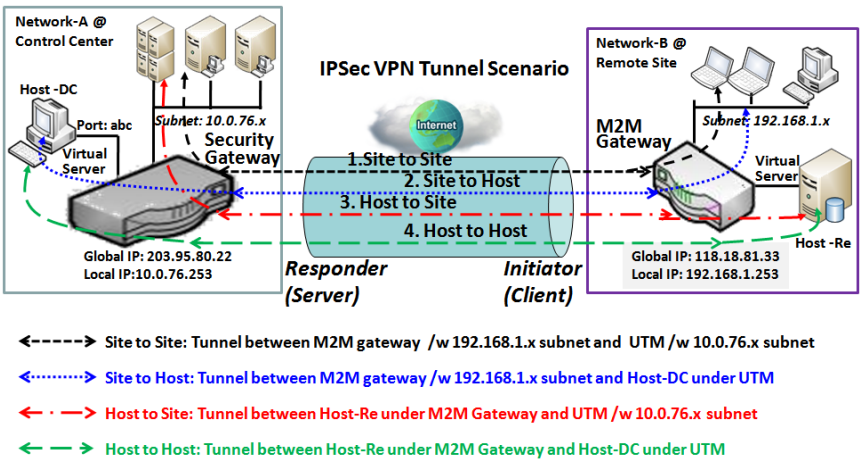
5.1.1 IPSec



Internet Protocol Security (IPSec) is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session. IPSec includes protocols for establishing mutual authentication between agents at the beginning of the session and negotiation of cryptographic keys to be used during the session.

An IPSec VPN tunnel is established between IPSec client and server. Sometimes, we call the IPSec VPN client as the initiator and the IPSec VPN server as the responder. This gateway can be configured as different roles and establish number of tunnels with various remote devices. Before going to setup the VPN connections, you may need to decide the scenario type for the tunneling.

IPSec Tunnel Scenarios



To build IPSec tunnel, you need to fill in remote gateway global IP, and optional subnet if the hosts behind IPSec peer can access to remote site or hosts. Under such configuration, there are four scenarios:

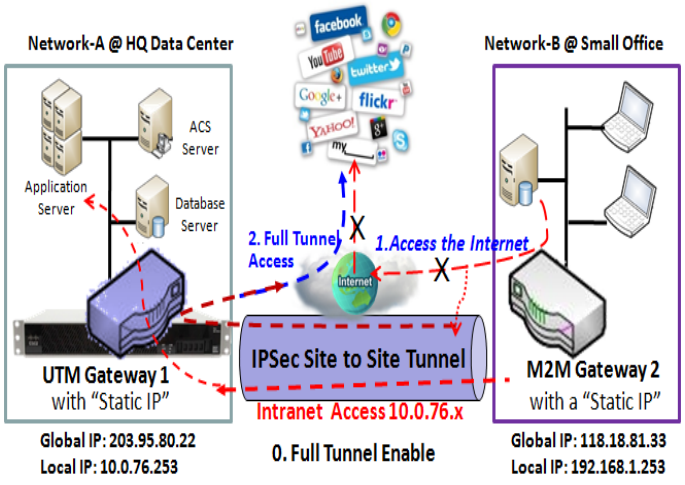
Site to Site: You need to setup remote gateway IP and subnet of both gateways. After the IPSec tunnel established, hosts behind both gateways can communication each other through the tunnel.

Site to Host: Site to Host is suitable for tunneling between clients in a subnet and an application server (host). As in the diagram, the clients behind the M2M gateway can access to the host "Host-DC" located in the control center through Site to Host VPN tunnel.

Host to Site: On the contrast, for a single host (or mobile user to) to access the resources located in an intranet, the Host to Site scenario can be applied.

Host to Host: Host to Host is a special configuration for building a VPN tunnel between two single hosts.

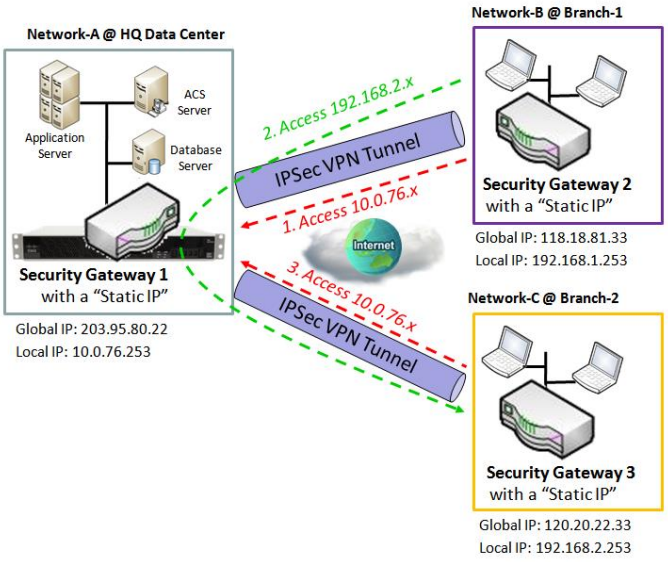
Site to Site with "Full Tunnel" enabled



In "Site to Site" scenario, client hosts in remote site can access the enterprise resources in the Intranet of HQ gateway via an established IPSec tunnel, as described above. However, Internet access originates from remote site still go through its regular WAN connection. If you want all packets from remote site to be routed via this IPSec tunnel, including HQ server access and Internet access, you can just enable the “Full Tunnel" setting. As a result,

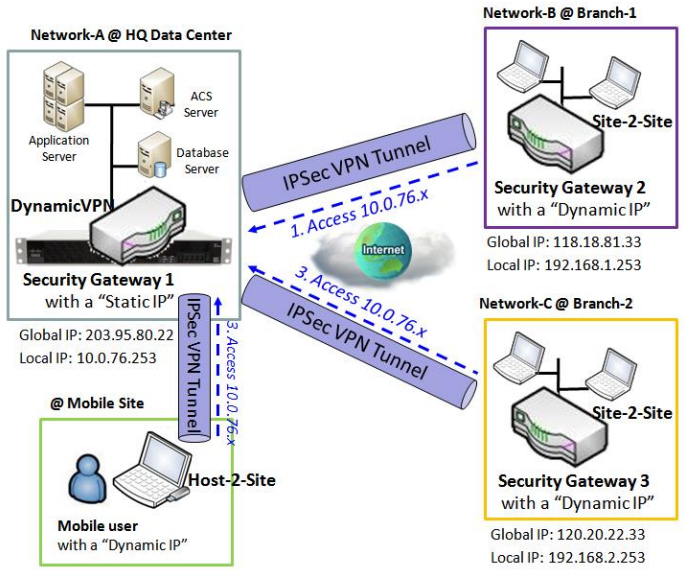
every time users surfs web or searching data on Internet, checking personal emails, or HQ server access, all traffics will go through the secure IPSec tunnel and route by the Security Gateway in control center..

Site to Site with "Hub and Spoke" mechanism



For a control center to manage the secure Intranet among all its remote sites, there is a simple configuration, called **Hub and Spoke**, for the whole VPN network. A Hub and Spoke VPN Network is set up in organizations with centralized control center over all its remote sites, like shops or offices. The control center acts as the Hub role and the remote shops or Offices act as Spokes. All VPN tunnels from remote sites terminate at this Hub, which acts as a concentrator. Site-to-site connections between spokes do not exist. Traffic originating from one spoke and destined for another spoke has to go via the Hub. Under such configuration, you don't need to maintain VPN tunnels between each two remote clients.

Dynamic VPN Server Scenario



Dynamic VPN Server Scenario is an efficient way to build multiple tunnels with remote sites, especially for mobile clients with dynamic IP. In this scenario, gateway can only be role of server (responder), and it must have a "Static IP" or "FQDN". It can allow many VPN clients (initiators) to connect to with various tunnel scenarios. In short, with a simple Dynamic VPN server setting, many VPN clients can connect to the server. But, in comparison to the Hub and Spoke mechanism, it is not

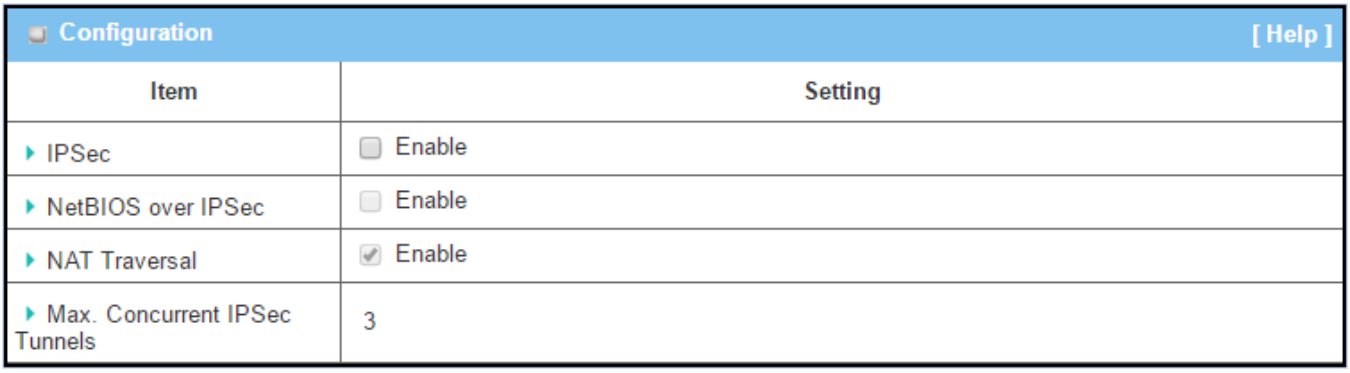
allowed to directly communicate between any two clients via the Dynamic VPN server.
For the purchased gateway, you can configure one Dynamic VPN server for each WAN interface.

IPSec Setting

Go to **Security > VPN > IPSec** tab.

The IPSec Setting allows user to create and configure IPSec tunnels.

Enable IPSec



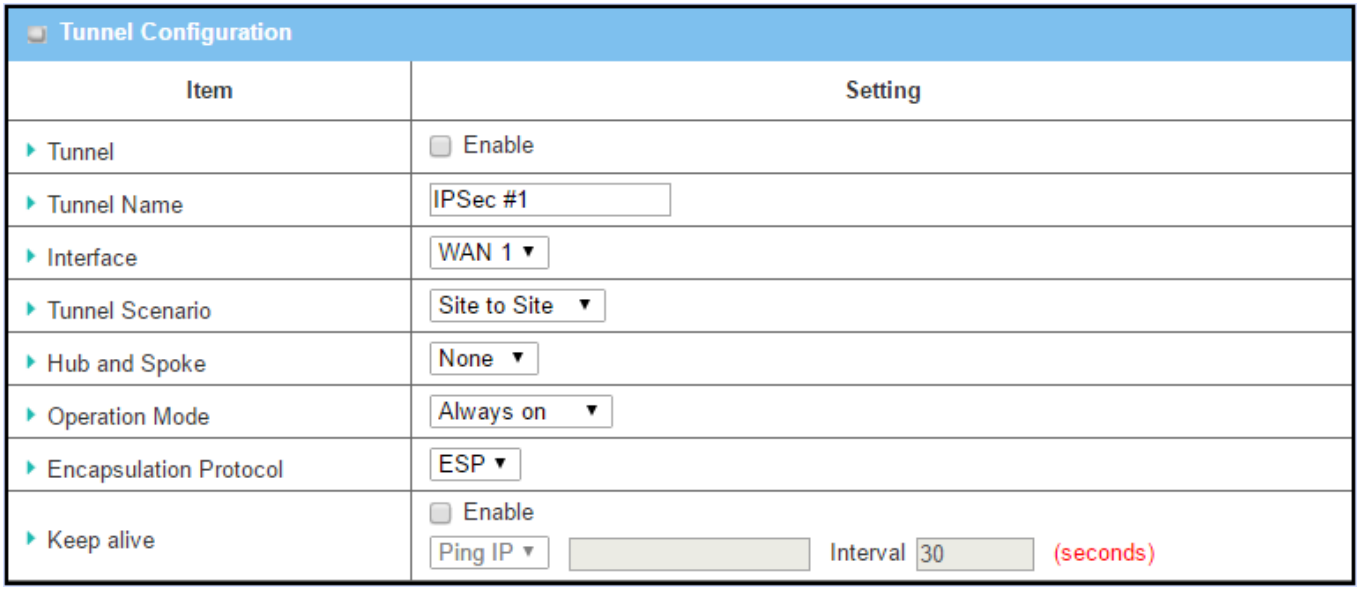
Configuration Window		
Item	**Value setting**	**Description**
IPsec	Unchecked by default	Click the **Enable** box to enable IPSec function.
NetBIOS over IPSec	Unchecked by default	Click the **Enable** box to enable NetBIOS over IPSec function.
NAT Traversal	Unchecked by default	Click the **Enable** box to enable NAT Traversal function.
Max. Concurrent IPSec Tunnels	Depends on Product specification.	The specified value will limit the maximum number of simultaneous IPSec tunnel connection. The default value can be different for the purchased model.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

Create/Edit IPSec tunnel

Ensure that the IPSec enable box is checked to enable before further configuring the IPSec tunnel

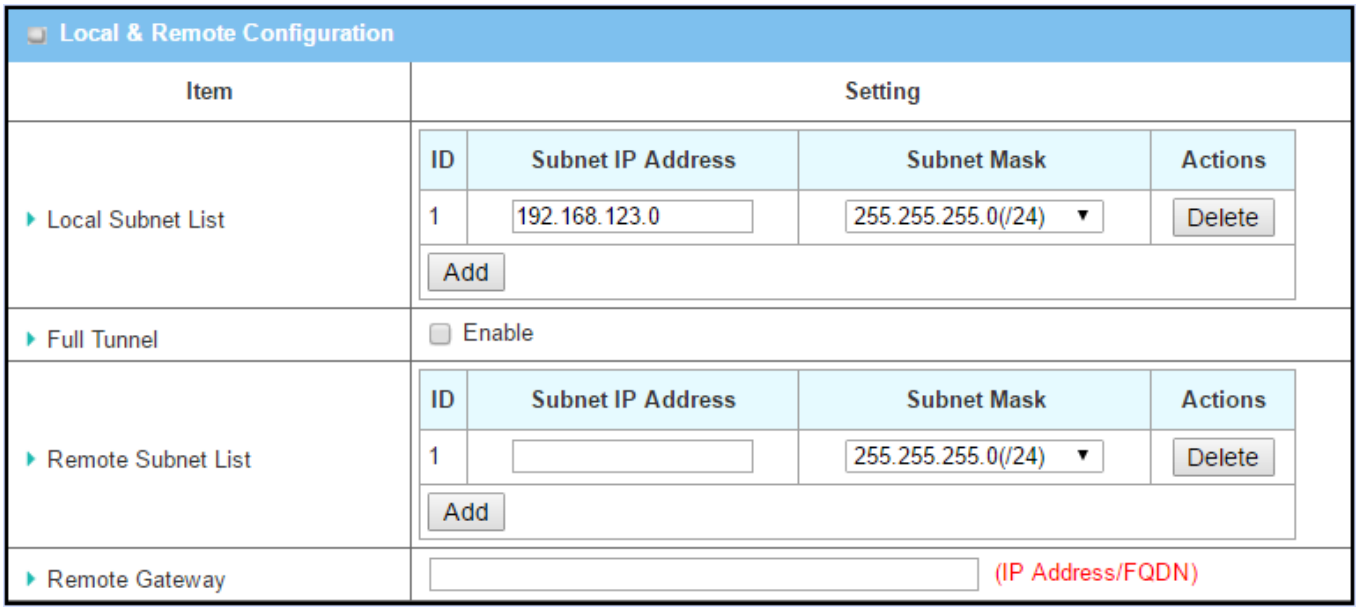
settings.

When **Add/Edit** button is applied, a series of configuration screens will appear. They are Tunnel Configuration, Local & Remote Configuration, Authentication, IKE Phase, IKE Proposal Definition, IPSec Phase, and IPSec Proposal Definition. You have to configure the tunnel details for both local and remote VPN devices.

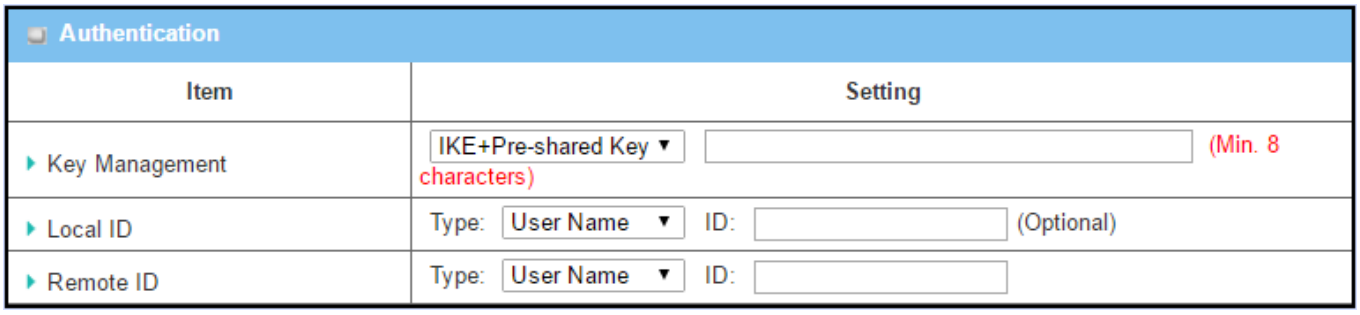


Tunnel Configuration Window		
Item	**Value setting**	**Description**
Tunnel	Unchecked by default	Check the **Enable** box to activate the IPSec tunnel
Tunnel Name	1. A Must fill setting 2. String format can be any text	Enter a tunnel name. Enter a name that is easy for you to identify. ***Value Range*:** 1 ~ 19 characters.
Interface	1. A Must fill setting 2. WAN 1 is selected by default	Select WAN interface on which IPSec tunnel is to be established.
Tunnel Scenario	1. A Must fill setting 2. Site to site is selected by	Select an IPSec tunneling scenario from the dropdown box for your application. Select **Site-to-Site**, **Site-to-Host**, **Host-to-Site**, or **Host-to-Host**.

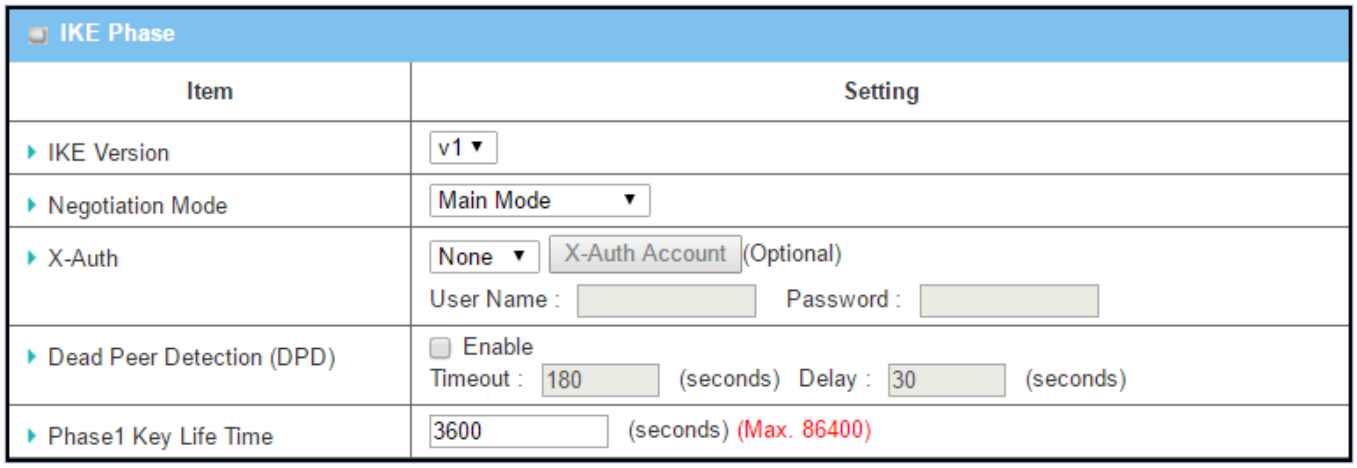
	default	With **Site-to-Site** or **Site-to-Host** or **Host-to-Site**, IPSec operates in tunnel mode. The difference among them is the number of subnets. With **Host-to-Host**, IPSec operates in transport mode.
Hub and Spoke	1. An optional setting 2. None is set by default	Select from the dropdown box to setup your gateway for Hub-and-Spoke IPSec VPN Deployments. Select **None** if your deployments will not support Hub or Spoke encryption. Select **Hub** for a Hub role in the IPSec design. Select **Spoke** for a Spoke role in the IPSec design. Note: Hub and Spoke are available only for Site-to-Site VPN tunneling specified in Tunnel Scenario. It is not available for Dynamic VPN tunneling application.
Operation Mode	1. A Must fill setting 2. Alway on is selected by default	There are three available operation modes. Always On, Failover, Load Balance. **Failover/ Always on**: Define whether the IPSec tunnel is a failover tunnel function or an Always on tunnel. Note: If this IPSec is a failover tunneling, you will need to select a primary IPSec tunnel from which to failover to. **Load Balance**: Define whether the IPSec tunnel connection will take part in load balance function of the gateway. You will not need to select with WAN interface as the system will automatically utilize the available WAN interfaces to balance traffic loads. For more details on WAN Load Balance, refer to **Basic Network > WAN > Load Balance** tab. Note_1: Load Balance function is not available for the gateway with single WAN. Note_2: Failover and Load Balance functions are not available for Dynamic VPN specified in Tunnel Scenario.
Encapsulation Protocol	1. A Must fill setting 2. ESP is selected by default	Select the Encapsulation Protocol from the dropdown box for this IPSec tunnel. Available encapsulations are ESP and AH.
Keep alive	1. Unchecked by default 2. 30s is set by default	Check the **Enable** box to enable Keep alive function. Select Ping IP to keep live and enter the IP address to ping. Enter the ping time interval in seconds. ***Value Range*:** 30 ~ 999 seconds. Note: Keep alive option is not available for Dynamic VPN specified in Tunnel Scenario.



Local & Remote Configuration Window		
Item	**Value setting**	**Description**
Local Subnet List	A Must fill setting	Specify the Local Subnet IP address and Subnet Mask. Click the Add or Delete button to add or delete a Local Subnet. Note_1: When Dynamic VPN option in Tunnel Scenario is selected, there will be only one subnet available. Note_2: When Host-to-Site or Host-to-Host option in Tunnel Scenario is selected, Local Subnet will not be available. Note_3: When Hub and Spoke option in Hub and Spoke is selected, there will be only one subnet available.
Full Tunnel	Unchecked by default	Click **Enable** box to enable Full Tunnel. Note: Full tunnel is available only for Site-to-Site specified in Tunnel Scenario.
Remote Subnet List	A Must fill setting	Specify the Remote Subnet IP address and Subnet Mask. Click the Add or Delete button to add or delete Remote Subnet setting.
Remote Gateway	1. A Must fill setting. 2. Format can be a ipv4 address or FQDN	Specify the Remote Gateway.



Authentication Configuration Window		
Item	**Value setting**	**Description**
Key Management	1. A Must fill setting 2. Pre-shared Key 8 to 32 characters.	Select Key Management from the dropdown box for this IPSec tunnel. **IKE+Pre-shared Key:** user needs to set a key (8 ~ 32 characters). **IKE+X.509:** user needs Certificate to authenticate. IKE+X.509 will be available only when Certificate has been configured properly. Refer to Certificate section of this manual and also **Object Definition > Certificate** in web-based utility. **Manually:** user needs to enter key ID to authenticate. Manual key configuration will be explained in the following Manual Key Management section.
Local ID	An optional setting	Specify the Local ID for this IPSec tunnel to authenticate. Select **User Name** for Local ID and enter the username. The username may include but can't be all numbers. Select **FQDN** for Local ID and enter the FQDN. Select **User@FQDN** for Local ID and enter the User@FQDN. Select **Key ID** for Local ID and enter the Key ID (English alphabet or number).
Remote ID	An optional setting	Specify the Remote ID for this IPSec tunnel to authenticate. Select **User Name** for Remote ID and enter the username. The username may include but can't be all numbers. Select **FQDN** for Local ID and enter the FQDN. Select **User@FQDN** for Remote ID and enter the User@FQDN. Select **Key ID** for Remote ID and enter the Key ID (English alphabet or number). Note: Remote ID will be not available when Dynamic VPN option in Tunnel Scenario is selected.



IKE Phase Window		
Item	**Value setting**	**Description**
IKE Version	1. A must fill setting 2. v1 is selected by default	Specify the IKE version for this IPSec tunnel. Select v1 or v2 Note: IKE versions will not be available when Dynamic VPN option in Tunnel Scenario is selected, or AH option in Encapsulation Protocol is selected.
Negotiation Mode	Main Mode is set by default default	Specify the Negotiation Mode for this IPSec tunnel. Select Main Mode or Aggressive Mode.
X-Auth	None is selected by default	Specify the X-Auth role for this IPSec tunnel. Select Server, Client, or None. Selected None no X-Auth authentication is required. Selected Server this gateway will be an X-Auth server. Click on the X-Auth Account button to create remote X-Auth client account. Selected Client this gateway will be an X-Auth client. Enter User name and Password to be authenticated by the X-Auth server gateway. Note: X-Auth Client will not be available for Dynamic VPN option selected in Tunnel Scenario.
Dead Peer Detection (DPD)	1. Unchecked by default 2. Default Timeout 180s and Delay 30s	Click **Enable** box to enable **DPD** function. Specify the **Timeout** and **Delay** time in seconds. ***Value Range*: 0 ~ 999 seconds for **Timeout** and **Delay**.**
Phase1 Key Life Time	1. A Must fill setting 2. Default 3600s 3. Max. 86400s	Specify the Phase1 Key Life Time. ***Value Range*: 30 ~ 86400.**

IKE Proposal Definition

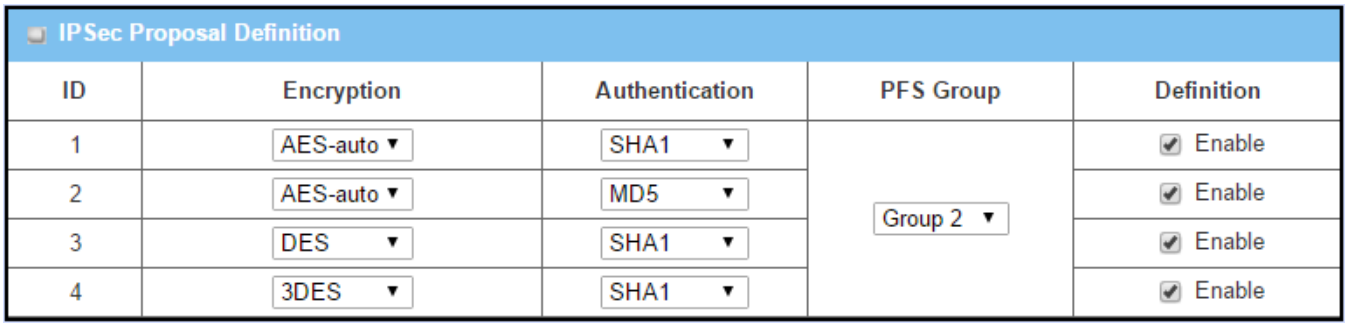
ID	Encryption	Authentication	DH Group	Definition
1	AES-auto	SHA1	Group 2	Enable
2	AES-auto	MD5	Group 2	Enable
3	DES	SHA1	Group 2	Enable
4	3DES	SHA1	Group 2	Enable

IKE Proposal Definition Window		
Item	**Value setting**	**Description**
IKE Proposal Definition	A Must fill setting	Specify the Phase 1 Encryption method. It can be AES-auto / AES128 / AES192 / AES256 / DES / 3DES. Specify the Authentication method. It can be None / MD5 / SHA1 / SHA2-256 / SHA2-512. Specify the DH Group. It can be None / Group1 / Group2 / Group5 / Group14 / Group15 / Group16 / Group17 / Group18. Check **Enable** box to enable this setting

IPSec Phase

Item	Setting
Phase2 Key Life Time	28800 (seconds) (Max. 86400)

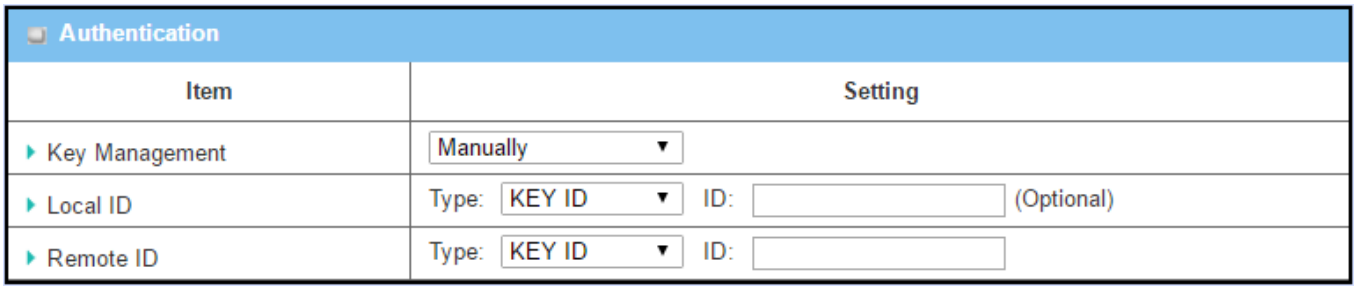
IPSec Phase Window		
Item	**Value setting**	**Description**
Phase2 Key Life Time	1. A Must fill setting 2. 28800s is set by default 3. Max. 86400s	Specify the Phase2 Key Life Time in second. ***Value Range***: 30 ~ 86400.



IPSec Proposal Definition Window		
Item	**Value setting**	**Description**
IPSec Proposal Definition	A Must fill setting	Specify the Encryption method. It can be None / AES-auto / AES128 / AES192 / AES256 / DES / 3DES. Specify the Authentication method. It can be None / MD5 / SHA1 / SHA2-256 / SHA2-512. Specify the PFS Group. It can be None / Group1 / Group2 / Group5 / Group14 / Group15 / Group16 / Group17 / Group18. Click **Enable** to enable this setting
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings
Back	N/A	Click **Back** to return to the previous page.

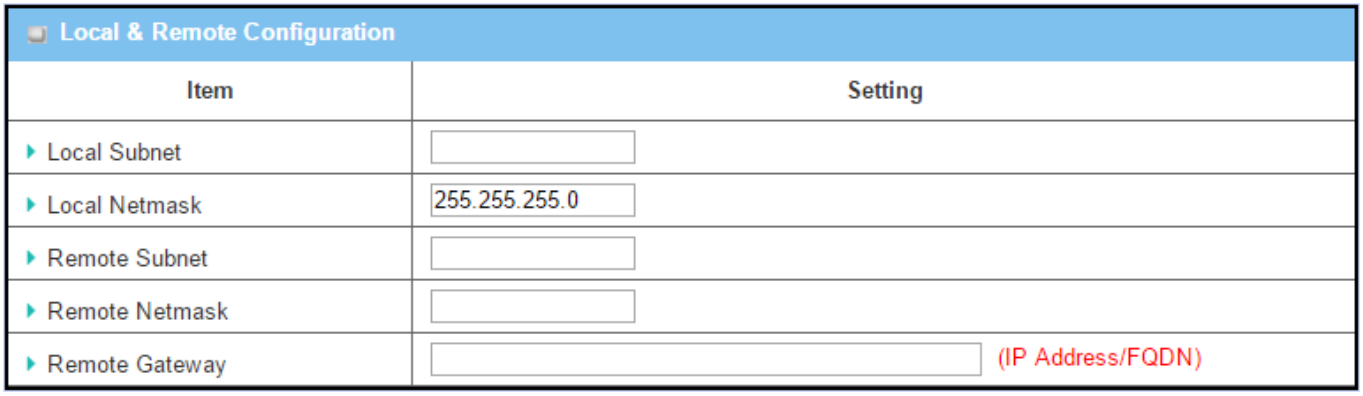
Manual Key Management

When the Manually option is selected for Key Management as described in Authentication Configuration Window, a series of configuration windows for Manual IPSec Tunnel configuration will appear. The configuration windows are the Local & Remote Configuration, the Authentication, and the Manual Proposal.



Authentication Window

Item	Value setting	Description
Key Management	A Must fill setting	Select Key Management from the dropdown box for this IPSec tunnel. In this section **Manually** is the option selected.
Local ID	An optional setting	Specify the **Local ID** for this IPSec tunnel to authenticate. Select the **Key ID** for Local ID and enter the Key ID (English alphabet or number).
Remote ID	An optional setting	Specify the **Remote ID** for this IPSec tunnel to authenticate. Select **Key ID** for Remote ID and enter the Key ID (English alphabet or number).



Local & Remote Configuration Window		
Item	**Value setting**	**Description**
Local Subnet	A Must fill setting	Specify the Local Subnet IP address and Subnet Mask.
Local Netmask	A Must fill setting	Specify the Local Subnet Mask.
Remote Subnet	A Must fill setting	Specify the Remote Subnet IP address
Remote Netmask	A Must fill setting	Specify the Remote Subnet Mask.
Remote Gateway	1. A Must fill setting 2. An IPv4 address or FQDN format	Specify the Remote Gateway. The Remote Gateway

Under the Manually Key Management authentication configuration, only one subnet is supported for both Local and Remote IPSec peer.

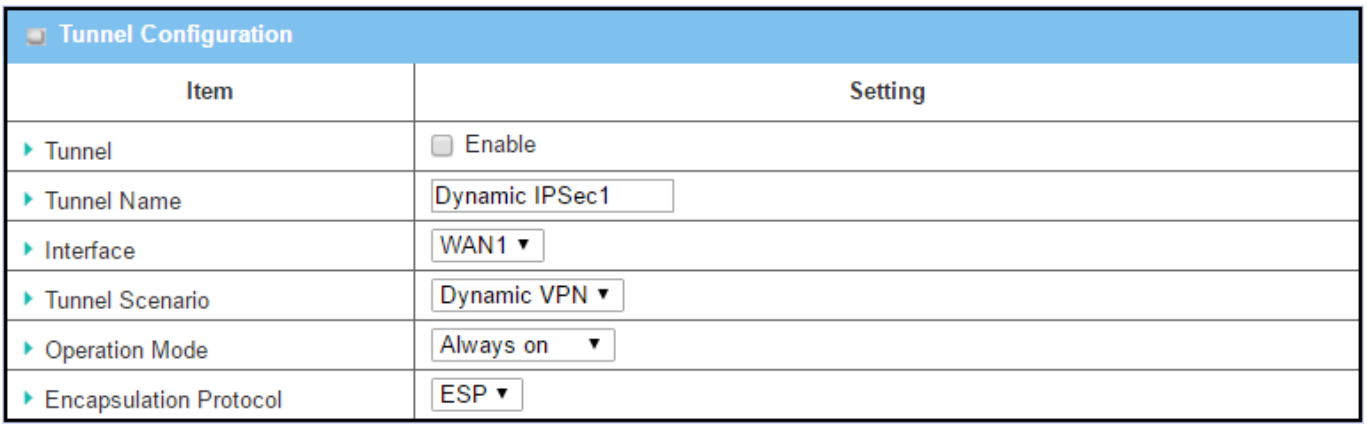
Manual Proposal Window		
Item	**Value setting**	**Description**
Outbound SPI	Hexadecimal format	Specify the Outbound SPI for this IPSec tunnel. *Value Range*: 0 ~ FFFF.
Inbound SPI	Hexadecimal format	Specify the Inbound SPI for this IPSec tunnel. *Value Range*: 0 ~ FFFF.
Encryption	1. A Must fill setting 2. Hexadecimal format	Specify the Encryption Method and Encryption key Available encryption methods are DES/3DES/AES128/AES192/AES256 The key length for DES is 16, 3DES is 48, AES128 is 32, AES192 is 48, and AES256 is 64. Note: When AH option in Encapsulation is selected, encryption will not be available.
Authentication	1. A Must fill setting 2. Hexadecimal format	Specify the Authentication Method and Authentication key Available encryptions are None/MD5/SHA1/SHA2-256 Enter the key string (String length by the method which choose) The key length for MD5 is 32, SHA1 is 40, and SHA2-256 is 64. Note: When AH option in Encapsulation Protocol is selected, None option in Authentication will not be available.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings
Back	N/A	Click **Back** to return to the previous page.

Create/Edit Dynamic VPN Server List

Similar to create an IPSec VPN Tunnel for site/host to site/host scenario, when **Edit** button is applied a series of configuration screen will appear. They are Tunnel Configuration, Local &

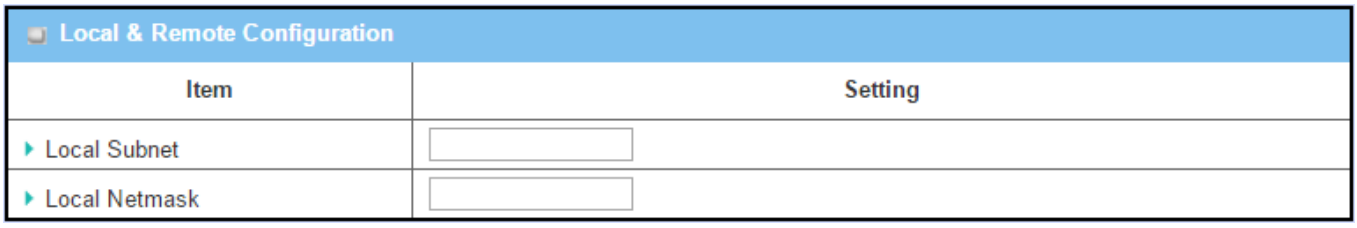
Remote Configuration, Authentication, IKE Phase, IKE Proposal Definition, IPSec Phase, and IPSec Proposal Definition. You have to configure the tunnel details for the gateway as a Dynamic VPN server.

Note: For the purchased gateway, you can configure one Dynamic VPN server for each WAN interface.

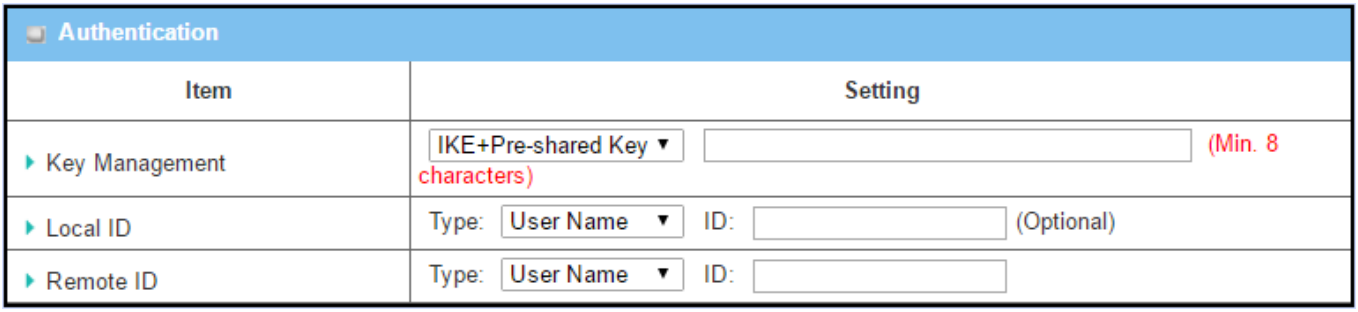


Tunnel Configuration Window		
Item	**Value setting**	**Description**
Tunnel	Unchecked by default	Check the **Enable** box to activate the Dynamic IPSec VPN tunnel
Tunnel Name	1. A Must fill setting 2. String format can be any text	Enter a tunnel name. Enter a name that is easy for you to identify. ***Value Range*:** 1 ~ 19 characters.
Interface	1. A Must fill setting 2. WAN 1 is selected by default	Select WAN interface on which IPSec tunnel is to be established.
Tunnel Scenario	1. A Must fill setting 2. Dynamic VPN is selected by default	The IPSec tunneling scenario is fixed to Dynamic VPN.
Operation Mode	1. A Must fill setting 2. Alway on is selected by default	The available operation mode is Always On. Failover and Load Balance options are not available for the Dynamic IPSec scenario.

Encapsulation Protocol	1. A Must fill setting 2. ESP is selected by default	Select the Encapsulation Protocol from the dropdown box for this IPSec tunnel. Available encapsulations are ESP and AH.



Local & Remote Configuration Window		
Item	**Value setting**	**Description**
Local Subnet	A Must fill setting	Specify the Local Subnet IP address.
Local Netmask	A Must fill setting	Specify the Local Subnet Mask.



Authentication Configuration Window		
Item	**Value setting**	**Description**
Key Management	1. A Must fill setting 2. Pre-shared Key 8 to 32 characters.	Select Key Management from the dropdown box for this IPSec tunnel. **IKE+Pre-shared Key:** user needs to set a key (8 ~ 32 characters).
Local ID	An optional setting	Specify the Local ID for this IPSec tunnel to authenticate. Select **User Name** for Local ID and enter the username. The username may include but can't be all numbers. Select **FQDN** for Local ID and enter the FQDN. Select **User@FQDN** for Local ID and enter the User@FQDN. Select **Key ID** for Local ID and enter the Key ID (English alphabet or number).
Remote ID	An optional setting	Specify the Remote ID for this IPSec tunnel to authenticate. Select **User Name** for Remote ID and enter the username. The username may include but can't be all numbers.

		Select **FQDN** for Local ID and enter the FQDN. Select **User@FQDN** for Remote ID and enter the User@FQDN. Select **Key ID** for Remote ID and enter the Key ID (English alphabet or number). Note: Remote ID will be not available when Dynamic VPN option in Tunnel Scenario is selected.

For the rest IKE Phase, IKE Proposal Definition, IPSec Phase, and IPSec Proposal Definition settings, they are the same as that of creating an IPSec Tunnel described in previous section. Please refer to the related description.

5.1.2 OpenVPN

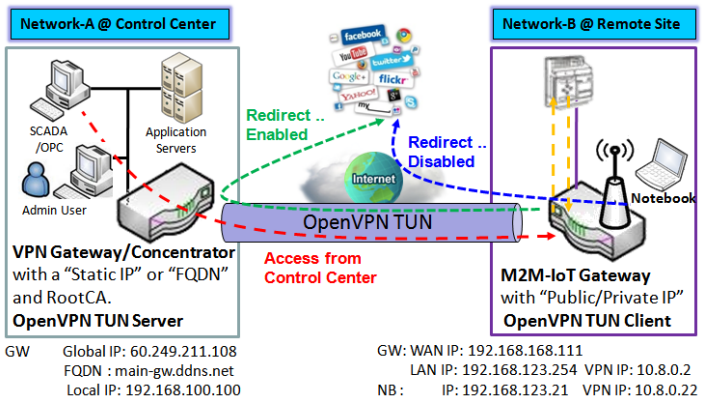
OpenVPN is an application that implements virtual private network (VPN) techniques for creating secure point-to-point or site-to-site connections in routed or bridged configurations and remote access facilities. It uses a custom security protocol that utilizes SSL/TLS for key exchange. It is capable of traversing network address translators (NATs) and firewalls.

OpenVPN allows peers to authenticate each other using a Static Key (pre-shared key) or certificates. When used in a multi-client-server configuration, it allows the server to release an authentication certificate for every client, using signature and certificate authority. It uses the OpenSSL encryption library extensively, as well as the SSLv3/TLSv1 protocol, and contains many security and control features.

OpenVPN Tunneling is a Client and Server based tunneling technology. The OpenVPN Server must have a Static IP or a FQDN, and maintain a Client list. The OpenVPN Client may be a mobile user or mobile site with public IP or private IP, and requesting the OpenVPN tunnel connection. The product supports both OpenVPN Server and OpenVPN Client features to meet different application requirements.

There are two OpenVPN connection scenarios. They are the TAP and TUN scenarios. The product can create either a layer-3 based IP tunnel (TUN), or a layer-2 based Ethernet TAP that can carry any type of Ethernet traffic. In addition to configuring the device as a Server or Client, you have to specify which type of OpenVPN connection scenario is to be adopted.

OpenVPN TUN Scenario



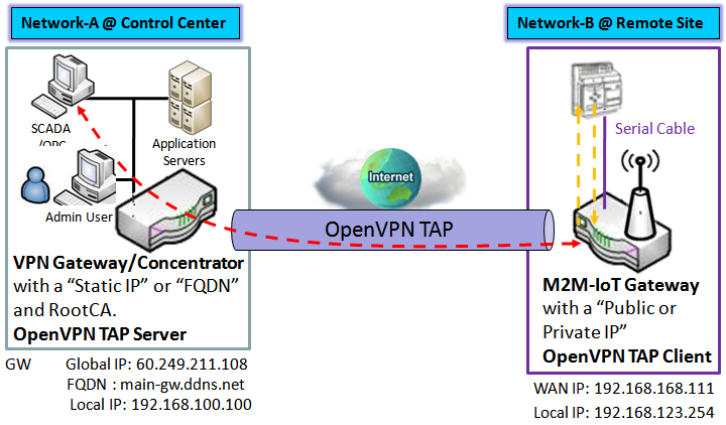
1. M2M-IoT Gateway (as OpenVPN TUN Client) connects to peer VPN Gateway/Concentrator (as OpenVPN TUN Server).
2. M2M-IoT Gateway will be assigned 10.8.0.2 IP Address after OpenVPN TUN Connection estabilshed. (10.8.0.x is a virtual subnet)
3. Local networked device will get a virtual IP 10.8.0.x if its traffic goes through the OpenVPN TUN connection (when NAT disabled & Redirect Internet Traffic enabled).
4. SCADA Server in Control Center can access remote attached device(s) with the assigned IP Address 10.8.0.2.

The term "TUN" mode is referred to routing mode and operates with layer 3 packets. In routing mode, the VPN client is given an IP address on a different subnet than the local LAN under the OpenVPN server. This virtual subnet is created for connecting to any remote VPN computers. In routing mode, the OpenVPN server creates a "TUN" interface with its own IP address pool which is different to the local LAN. Remote hosts that dial-in will get an IP address inside the virtual network and will have access only to the server where OpenVPN resides.

If you want to offer remote access to a VPN server from client(s), and inhibit the access to remote LAN resources under VPN server, OpenVPN TUN mode is the simplest solution.

As shown in the diagram, the M2M-IoT Gateway is configured as an OpenVPN TUN Client, and connects to an OpenVPN UN Server. Once the OpenVPN TUN connection is established, the connected TUN client will be assigned a virtual IP (10.8.0.2) which is belong to a virtual subnet that is different to the local subnet in Control Center. With such connection, the local networked devices will get a virtual IP 10.8.0.x if its traffic goes through the OpenVPN TUN connection when Redirect Internet Traffic settings is enabled; Besides, the SCADA Server in Control Center can access remote attached serial device(s) with the virtual IP address (10.8.0.2).

OpenVPN TAP Scenario



1. M2M-IoT Gateway (as OpenVPN TAP Client) connects to peer VPN Gateway/Concentrator (as OpenVPN TAP Server).
2. M2M-IoT Gateway will be assigned 192.168.100.210 IP Address after OpenVPN TAP Connection estabilshed. (same subnet as in Control Center)
3. SCADA Server in Control Center can access remote attached device(s) with the assigned IP Address 192.168.100.210.

The term "TAP" is referred to bridge mode and operates with layer 2 packets. In bridge mode, the VPN client is given an IP address on the same subnet as the LAN resided under the OpenVPN server. Under such configuration, the OpenVPN client can directly access to the resources in LAN. If you want to offer remote access to the entire remote LAN for VPN client(s), you have to setup OpenVPN in "TAP" bridge mode.

As shown in the diagram, the M2M-IoT Gateway is configured as an OpenVPN TAP Client, and connects to an OpenVPN TAP Server. Once the OpenVPN TAP connection is established, the connected TAP client will be assigned a virtual IP (192.168.100.210) which is the same subnet as that of local subnet in Control Center. With such connection, the SCADA Server in Control Center can access remote attached serial device(s) with the virtual IP address (192.168.100.210).

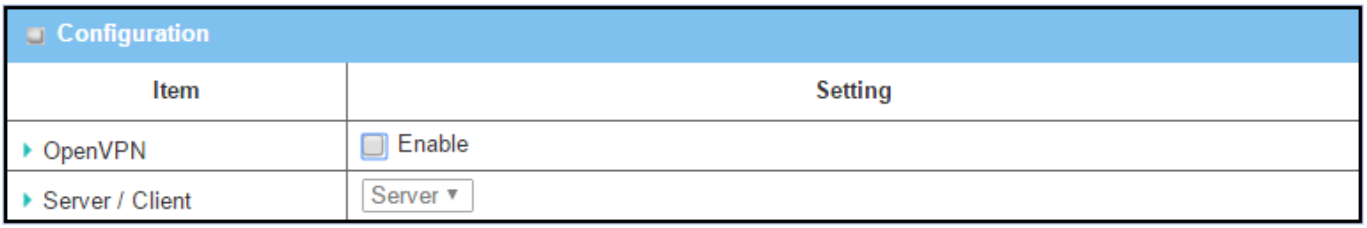
Open VPN Setting

Go to Security > VPN > OpenVPN **tab.**

The OpenVPN setting allows user to create and configure OpenVPN tunnels.

Enable OpenVPN

Enable OpenVPN and select an expected configuration, either server or client, for the gateway to operate.



Configuration Item	Value setting	Description
OpenVPN	The box is unchecked by default	Check the **Enable** box to activate the OpenVPN function.
Server/ Client	Server Configuration is selected by default.	When **Server** is selected, as the name indicated, server configuration will be displayed below for further setup. When **Client** is selected, you can specify the client settings in another client configuration window.

As an OpenVPN Server

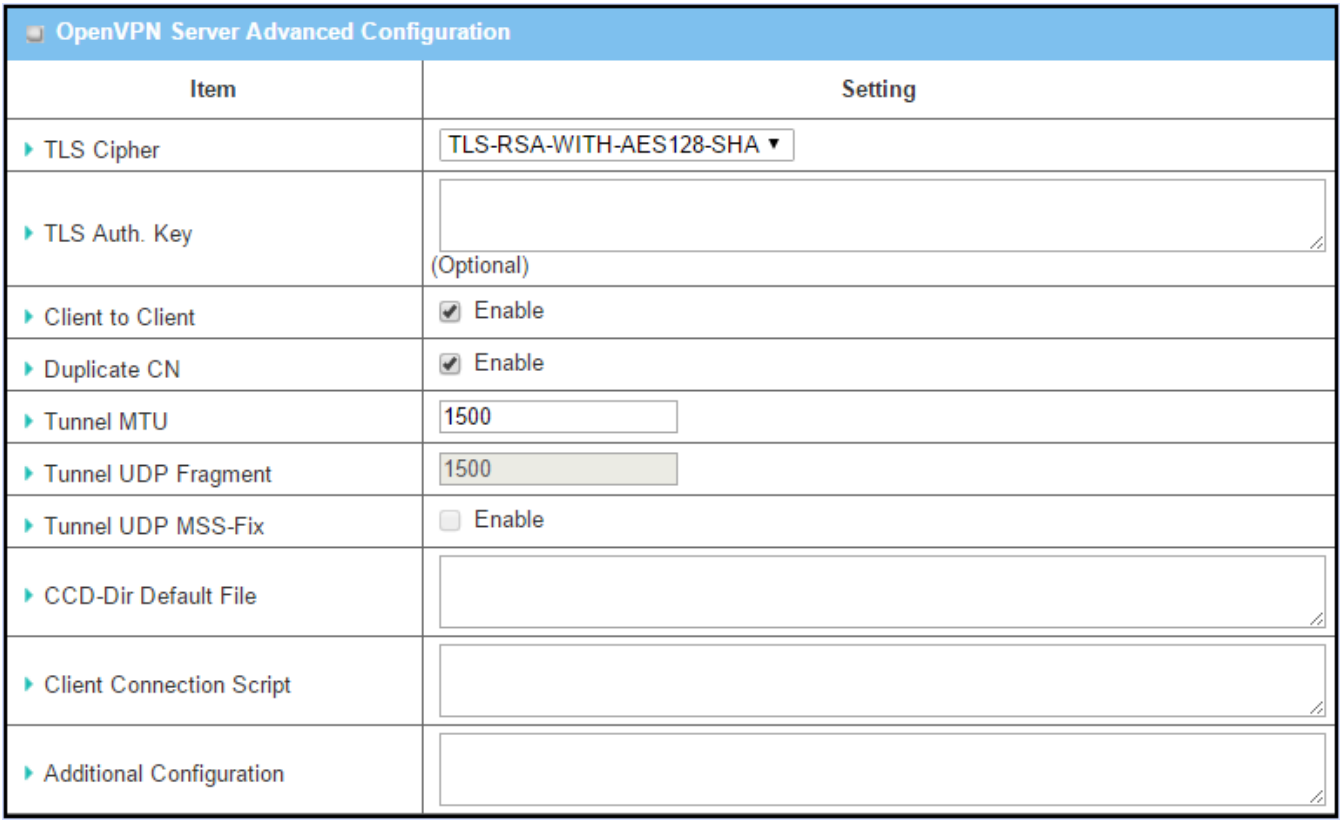
If **Server** is selected, an OpenVPN Server Configuration screen will appear. **OpenVPN Server Configuration** window can let you enable the OpenVPN server function, specify the virtual IP address of OpenVPN server, when remote OpenVPN clients dial in, and the authentication protocol.

OpenVPN Server Configuration	
Item	**Setting**
OpenVPN Server	☑ Enable
Protocol	TCP ▼
Port	4430
Tunnel Scenario	TUN ▼
Authorization Mode	Static Key ▼
Local Endpoint IP Address	
Remote Endpoint IP Address	
Static Key	
Server Virtual IP	10.8.0.0
DHCP-Proxy Mode	☑ Enable
IP Pool	Starting Address: ~ Ending Address:
Gateway	
Netmask	255.255.255.0(/24) ▼
Redirect Default Gateway	☐ Enable
Encryption Cipher	Blowfish ▼
Hash Algorithm	SHA-1 ▼
LZO Compression	Adaptive ▼
Persist Key	☑ Enable
Persist Tun	☑ Enable
Advanced Configuration	Edit

OpenVPN Server Configuration		
Item	**Value setting**	**Description**
OpenVPN Server	The box is unchecked by default.	Click the **Enable** to activate OpenVPN Server functions.
Protocol	1. A Must filled setting 2. By default **TCP** is selected.	Define the selected **Protocol** for connecting to the OpenVPN Server. • Select **TCP , or TCP /UDP** -> The TCP protocol will be used to access the OpenVPN Server, and **Port** will be set as 4430 automatically. • Select **UDP** -> The UDP protocol will be used to access the OpenVPN Server, and **Port** will be set as 1194 automatically.
Port	1. A Must filled setting 2. By default **4430** is set.	Specify the **Port** for connecting to the OpenVPN Server. ***Value Range***: 1 ~ 65535.
Tunnel Scenario	1. A Must filled setting 2. By default **TUN** is selected.	Specify the type of **Tunnel Scenario** for connecting to the OpenVPN Server. It can be **TUN** for TUN tunnel scenario, or **TAP** for TAP tunnel scenario.
Authorization Mode	1. A Must filled setting 2. By default **Static Key** is selected.	Specify the authorization mode for the OpenVPN Server. • **TLS** ->The OpenVPN will use TLS authorization mode, and the following items **CA Cert.**, **Server Cert.** and **DH PEM** will be displayed. **CA Cert.** could be generated in Certificate. Refer to **Object Definition** > **Certificate** > **Trusted Certificate**. **Server Cert.** could be generated in Certificate. Refer to **Object Definition** > **Certificate** > **My Certificate**. • **Static Key** ->The OpenVPN will use static key (pre-shared) authorization mode, and the following items **Local Endpoint IP Address**, **Remote Endpoint IP Address** and **Static Key** will be displayed. Note: Static Key will be available only when TUN is chosen in Tunnel Scenario.
Local Endpoint IP Address	A Must filled setting	Specify the virtual **Local Endpoint IP Address** of this OpenVPN gateway. ***Value Range***: The IP format is 10.8.0.x, the range of x is 1~254. Note: Local Endpoint IP Address will be available only when Static Key is chosen in Authorization Mode.
Remote Endpoint IP Address	A Must filled setting	Specify the virtual **Remote Endpoint IP Address** of the peer OpenVPN gateway. ***Value Range***: The IP format is 10.8.0.x, the range of x is 1~254. Note: Remote Endpoint IP Address will be available only when Static Key is chosen in Authorization Mode.
Static Key	A Must filled setting	Specify the **Static Key**. Note: Static Key will be available only when Static Key is chosen in Authorization Mode.
Server Virtual IP	A Must filled setting	Specify the **Server Virtual IP**. ***Value Range***: The IP format is 10.y.0.0, the range of y is 1~254. Note: Server Virtual IP will be available only when TLS is

		chosen in Authorization Mode.
DHCP-Proxy Mode	1. A Must filled setting 2. The box is checked by default.	Check the **Enable** box to activate the **DHCP-Proxy Mode**. Note: DHCP-Proxy Mode will be available only when TAP is chosen in Tunnel Device.
IP Pool	A Must filled setting	Specify the virtual **IP pool** setting for the OpenVPN server. You have to specify the **Starting Address** and **Ending Address** as the IP address pool for the OpenVPN clients. Note: IP Pool will be available only when TAP is chosen in Tunnel Device, and DHCP-Proxy Mode is unchecked (disabled).
Gateway	A Must filled setting	Specify the **Gateway** setting for the OpenVPN server. It will be assigned to the connected OpenVPN clients. Note: Gateway will be available only when TAP is chosen in Tunnel Device, and DHCP-Proxy Mode is unchecked (disabled).
Netmask	By default **- select one -** is selected.	Specify the **Netmask** setting for the OpenVPN server. It will be assigned to the connected OpenVPN clients. ***Value Range*:** 255.255.255.0/24 (only support class C) Note_1: Netmask will be available when TAP is chosen in Tunnel Device, and DHCP-Proxy Mode is unchecked (disabled). Note_2: Netmask will also be available when TUN is chosen in Tunnel Device.
Redirect Default Gateway	1. An Optional setting. 2. The box is unchecked by default.	Check the **Enable** box to activate the **Redirect Default Gateway** function.
Encryption Cipher	1. A Must filled setting. 2. By default **Blowfish** is selected.	Specify the **Encryption Cipher** from the dropdown list. It can be **Blowfish/AES-256/AES-192/AES-128/None.**
Hash Algorithm	By default **SHA-1** is selected.	Specify the **Hash Algorithm** from the dropdown list. It can be **SHA-1/MD5/MD4/SHA2-256/SHA2-512/None/Disable.**
LZO Compression	By default **Adaptive** is selected.	Specify the **LZO Compression** scheme. It can be **Adaptive/YES/NO/Default.**
Persis Key	1. An Optional setting. 2. The box is checked by default.	Check the **Enable** box to activate the **Persis Key** function.
Persis Tun	1. An Optional setting. 2. The box is checked by default.	Check the **Enable** box to activate the **Persis Tun** function.
Advanced Configuration	N/A	Click the **Edit** button to specify the **Advanced Configuration** setting for the OpenVPN server. If the button is clicked, **Advanced Configuration** will be displayed below.
Save	N/A	Click **Save** to save the settings.
Undo	N/A	Click **Undo** to cancel the changes.

When **Advanced Configuration** is selected, an OpenVPN Server Advanced Configuration screen will appear.

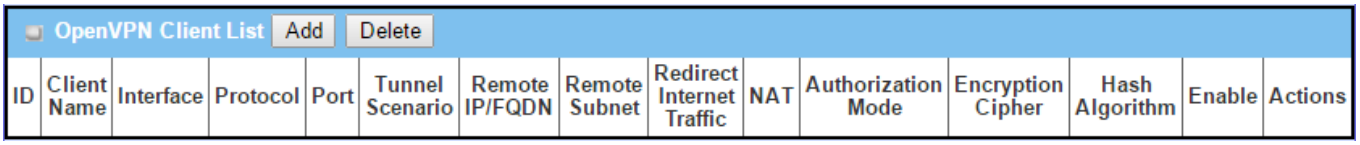


OpenVPN Server Advanced Configuration		
Item	**Value setting**	**Description**
TLS Cipher	1. A Must filled setting. 2. **TLS-RSA-WITH-AES128-SHA** is selected by default	Specify the **TLS Cipher** from the dropdown list. It can be **TLS-RSA-WITH-AES128-SHA / TLS-DHE-DSS-AES256-SHA / TLS-DHE-DSS-AES128-SHA / TLS-RSA-WITH-AES256-SHA / TLS-RSA-WITH-RC4-MD5 / None.** Note: TLS Cipher will be available only when TLS is chosen in Authorization Mode.
TLS Auth. Key	1. An Optional setting. 2. String format: any text	Specify the **TLS Auth. Key.** Note: TLS Auth. Key will be available only when TLS is chosen in Authorization Mode.
Client to Client	The box is checked by default	Check the **Enable** box to enable the traffics among different OpenVPN Clients. Note: Client to Client will be available only when TLS is chosen in Authorization Mode
Duplicate CN	The box is checked by default	Check the **Enable** box to activate the **Duplicate CN** function. Note: Duplicate CN will be available only when TLS is chosen in Authorization Mode
Tunnel MTU	1. A Must filled setting 2. The value is	Specify the **Tunnel MTU.** ***Value Range***: 0 ~ 1500.

	1500 by default	
Tunnel UDP Fragment	1. A Must filled setting 2. The value is **1500** by default	Specify the **Tunnel UDP Fragment.** By default, it is equal to **Tunnel MTU**. ***Value Range*****:** 0 ~ 1500. Note: Tunnel UDP Fragment will be available only when UDP is chosen in Protocol.
Tunnel UDP MSS-Fix	1. An Optional setting. 2. The box is unchecked by default.	Check the **Enable** box to activate the **Tunnel UDP MSS-Fix** Function. Note: Tunnel UDP MSS-Fix will be available only when UDP is chosen in Protocol.
CCD-Dir Default File	1. An Optional setting. 2. String format: any text	Specify the **CCD-Dir Default File.** ***Value Range*****:** 0 ~ 256 characters.
Client Connection Script	1. An Optional setting. 2. String format: any text	Specify the **Client Connection Script.** ***Value Range*****:** 0 ~ 256 characters.
Additional Configuration	1. An Optional setting. 2. String format: any text	Specify the **Additional Configuration.** ***Value Range*****:** 0 ~ 256 characters.

As an OpenVPN Client

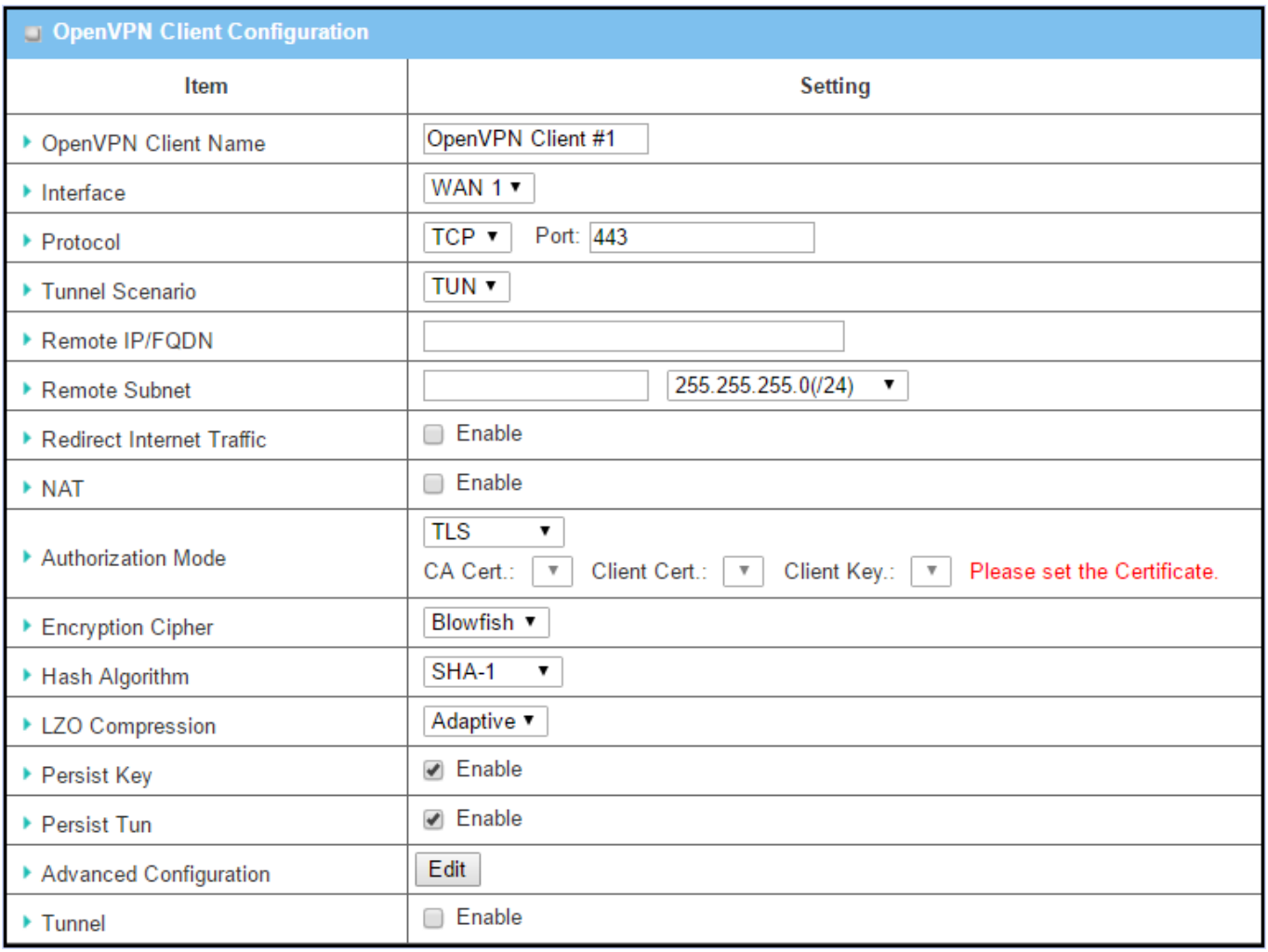
If **Client** is selected, an OpenVPN Client List screen will appear.



OpenVPN Client List | Add | Delete

ID	Client Name	Interface	Protocol	Port	Tunnel Scenario	Remote IP/FQDN	Remote Subnet	Redirect Internet Traffic	NAT	Authorization Mode	Encryption Cipher	Hash Algorithm	Enable	Actions

When **Add** button is applied, OpenVPN Client Configuration screen will appear. **OpenVPN Client Configuration** window let you specify the required parameters for an OpenVPN VPN client, such as "OpenVPN Client Name", "Interface", "Protocol", "Tunnel Scenario", "Remote IP/FQDN", "Remote Subnet", "Authorization Mode", "Encryption Cipher", "Hash Algorithm" and tunnel activation.



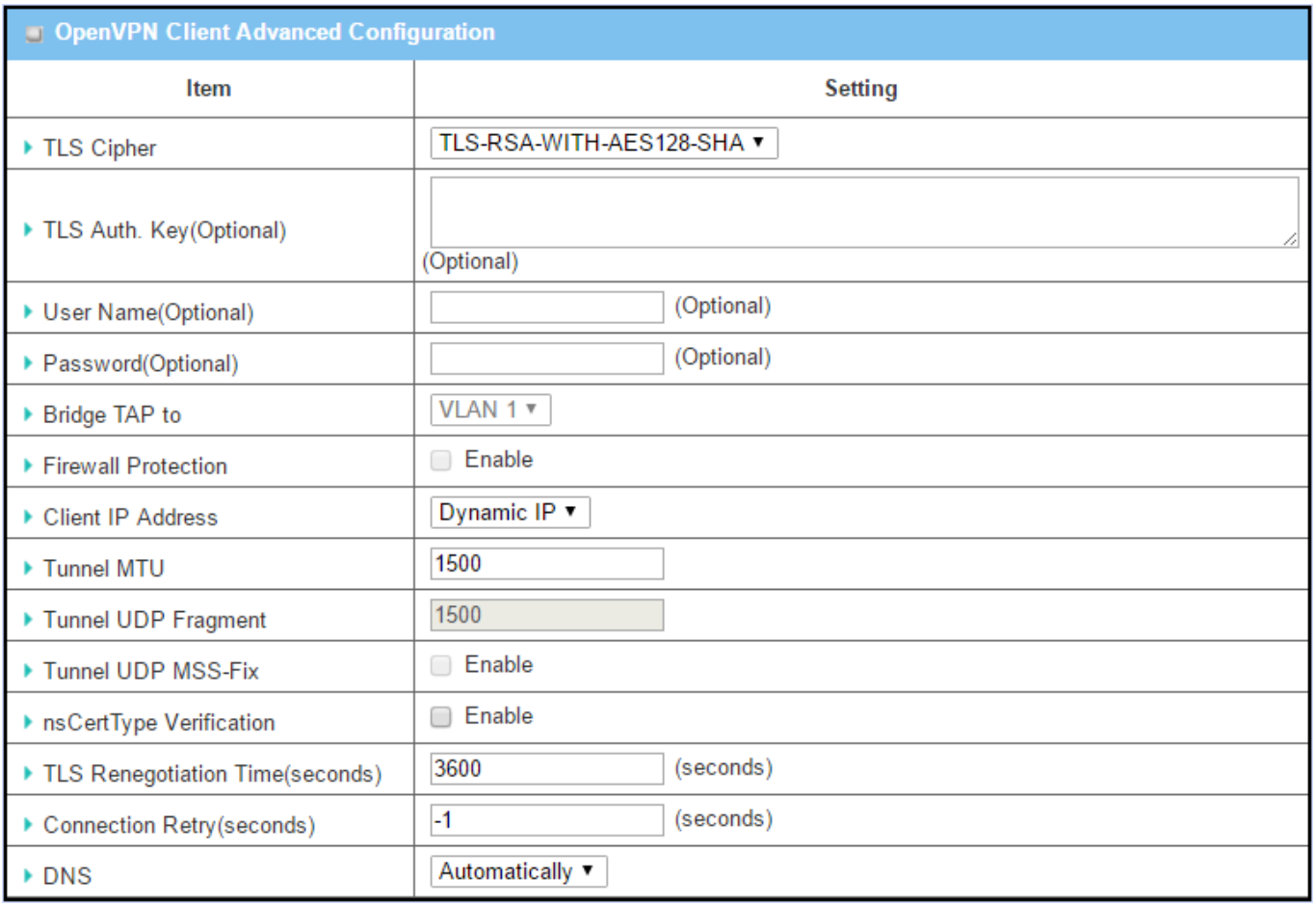
OpenVPN Client Configuration

Item	Setting
OpenVPN Client Name	OpenVPN Client #1
Interface	WAN 1
Protocol	TCP Port: 443
Tunnel Scenario	TUN
Remote IP/FQDN	
Remote Subnet	255.255.255.0(/24)
Redirect Internet Traffic	Enable
NAT	Enable
Authorization Mode	TLS CA Cert.: Client Cert.: Client Key.: Please set the Certificate.
Encryption Cipher	Blowfish
Hash Algorithm	SHA-1
LZO Compression	Adaptive
Persist Key	Enable
Persist Tun	Enable
Advanced Configuration	Edit
Tunnel	Enable

OpenVPN Client Configuration		
Item	**Value setting**	**Description**
OpenVPN Client Name	A Must filled setting	The **OpenVPN Client Name** will be used to identify the client in the tunnel list. ***Value Range***: 1 ~ 32 characters.
Interface	1. A Must filled setting 2. By default **WAN-1** is selected.	Define the physical interface to be used for this OpenVPN Client tunnel.
Protocol	1. A Must filled setting 2. By default **TCP** is selected.	Define the **Protocol** for the OpenVPN Client. • Select **TCP** ->The OpenVPN will use TCP protocol, and **Port** will be set as 443 automatically. • Select **UDP** -> The OpenVPN will use UDP protocol, and **Port** will be set as 1194 automatically.
Port	1. A Must filled setting 2. By default **443** is set.	Specify the **Port** for the OpenVPN Client to use. ***Value Range***: 1 ~ 65535.
Tunnel Scenario	1. A Must filled setting 2. By default **TUN** is selected.	Specify the type of **Tunnel Scenario** for the OpenVPN Client to use. It can be **TUN** for TUN tunnel scenario, or **TAP** for TAP tunnel scenario.
Remote IP/FQDN	A Must filled setting	Specify the **Remote IP/FQDN** of the peer OpenVPN Server for this OpenVPN Client tunnel. Fill in the IP address or FQDN.
Remote Subnet	A Must filled setting	Specify **Remote Subnet** of the peer OpenVPN Server for this OpenVPN Client tunnel. Fill in the remote subnet address and remote subnet mask.
Redirect Internet Traffic	1. An Optional setting. 2. The box is unchecked by default.	Check the **Enable** box to activate the **Redirect Internet Traffic** function.
NAT	1. An Optional setting. 2. The box is unchecked by default.	Check the **Enable** box to activate the **NAT** function.
Authorization Mode	1. A Must filled setting 2. By default **TLS** is selected.	Specify the authorization mode for the OpenVPN Server. • **TLS** ->The OpenVPN will use TLS authorization mode, and the following items **CA Cert.**, **Client Cert.** and **Client Key** will be displayed. **CA Cert.** could be selected in Trusted CA Certificate List. Refer to **Object Definition** > **Certificate** > **Trusted Certificate**. **Client Cert.** could be selected in Local Certificate List. Refer to **Object Definition** > **Certificate** > **My Certificate**. **Client Key** could be selected in Trusted Client key List. Refer to

		Object Definition > **Certificate** > **Trusted Certificate**. • **Static Key** ->The OpenVPN will use static key authorization mode, and the following items **Local Endpoint IP Address**, **Remote Endpoint IP Address** and **Static Key** will be displayed.
Local Endpoint IP Address	A Must filled setting	Specify the virtual **Local Endpoint IP Address** of this OpenVPN gateway. ***Value Range*:** The IP format is 10.8.0.x, the range of x is 1~254. Note: Local Endpoint IP Address will be available only when Static Key is chosen in Authorization Mode.
Remote Endpoint IP Address	A Must filled setting	Specify the virtual **Remote Endpoint IP Address** of the peer OpenVPN gateway. ***Value Range*:** The IP format is 10.8.0.x, the range of x is 1~254. Note: Remote Endpoint IP Address will be available only when Static Key is chosen in Authorization Mode.
Static Key	A Must filled setting	Specify the **Static Key**. Note: Static Key will be available only when Static Key is chosen in Authorization Mode.
Encryption Cipher	By default **Blowfish** is selected.	Specify the **Encryption Cipher.** It can be **Blowfish/AES-256/AES-192/AES-128/None.**
Hash Algorithm	By default **SHA-1** is selected.	Specify the **Hash Algorithm.** It can be **SHA-1/MD5/MD4/SHA2-256/SHA2-512/None/Disable.**
LZO Compression	By default **Adaptive** is selected.	Specify the **LZO Compression** scheme. It can be **Adaptive/YES/NO/Default.**
Persis Key	1. An Optional setting. 2. The box is checked by default.	Check the **Enable** box to activate the **Persis Key** function.
Persis Tun	1. An Optional setting. 2. The box is checked by default.	Check the **Enable** box to activate the **Persis Tun** function.
Advanced Configuration	N/A	Click the **Edit** button to specify the **Advanced Configuration** setting for the OpenVPN server. If the button is clicked, **Advanced Configuration** will be displayed below.
Tunnel	The box is unchecked by default	Check the **Enable** box to activate this OpenVPN tunnel.
Save	N/A	Click **Save** to save the settings.
Undo	N/A	Click **Undo** to cancel the changes.
Back	N/A	Click **Back** to return to last page.

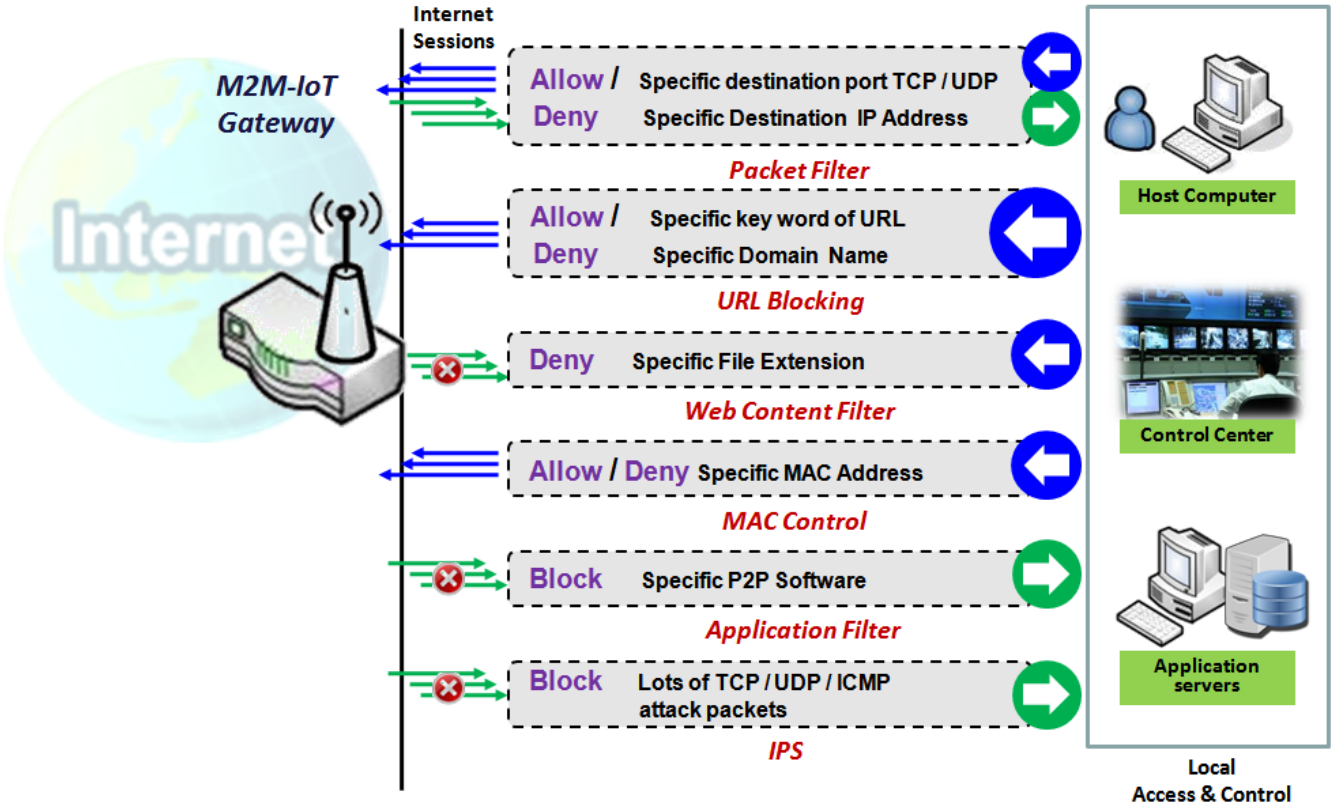
When **Advanced Configuration** is selected, an OpenVPN Client Advanced Configuration screen will appear.



OpenVPN Advanced Client Configuration		
Item	**Value setting**	**Description**
TLS Cipher	1. A Must filled setting. 2. **TLS-RSA-WITH-AES128-SHA** is selected by default	Specify the **TLS Cipher** from the dropdown list. It can be **TLS-RSA-WITH-AES128-SHA / TLS-DHE-DSS-AES256-SHA / TLS-DHE-DSS-AES128-SHA / TLS-RSA-WITH-AES256-SHA / TLS-RSA-WITH-RC4-MD5 / None.** Note: TLS Cipher will be available only when TLS is chosen in Authorization Mode.
TLS Auth. Key	1. An Optional setting. 2. String format: any text	Specify the **TLS Auth. Key** for connecting to an OpenVPN server, if the server required it. Note: TLS Auth. Key will be available only when TLS is chosen in Authorization Mode.
User Name	An Optional setting.	Enter the **User account** for connecting to an OpenVPN server, if the server required it. Note: User Name will be available only when TLS is chosen in Authorization Mode.
Password	An Optional setting.	Enter the **Password** for connecting to an OpenVPN server, if the server required it. Note: User Name will be available only when TLS is chosen in Authorization Mode.

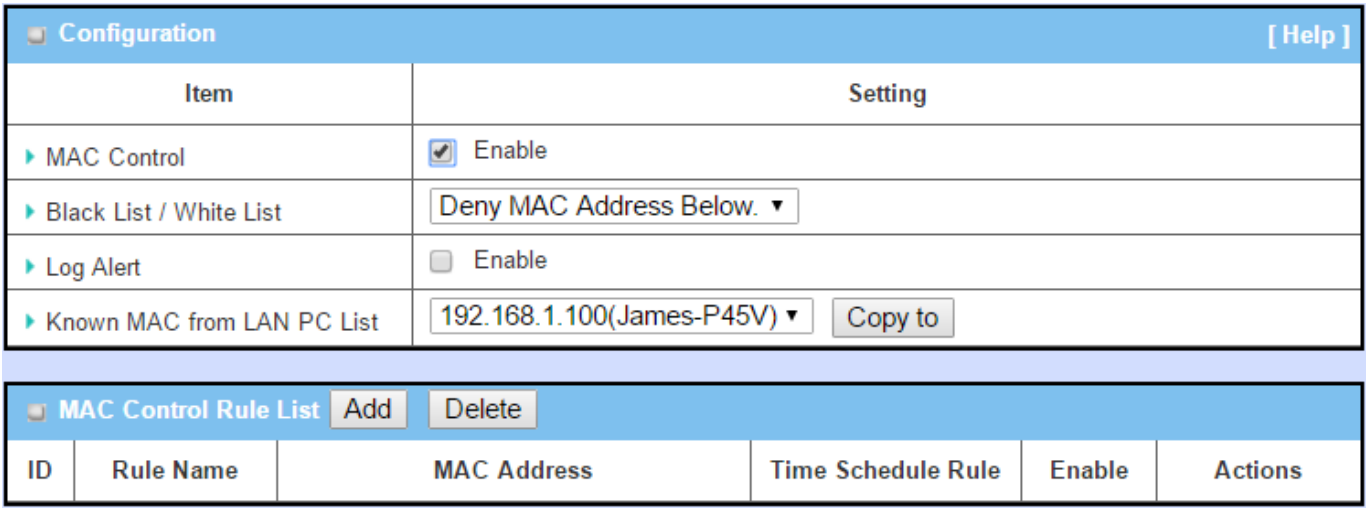
Bridge TAP to	By default **VLAN 1** is selected	Specify the setting of "**Bridge TAP to**" to bridge the TAP interface to a certain local network interface or VLAN. Note: Bridge TAP to will be available only when TAP is chosen in Tunnel Scenario and NAT is unchecked.
Firewall Protection	The box is unchecked by default.	Check the box to activate the **Firewall Protection** function. Note: Firewall Protection will be available only when NAT is enabled.
Client IP Address	By default **Dynamic IP** is selected	Specify the virtual IP Address for the OpenVPN Client. It can be **Dynamic IP/Static IP.**
Tunnel MTU	1. A Must filled setting 2. The value is 1500 by default	Specify the value of **Tunnel MTU.** ***Value Range*****:** 0 ~ 1500.
Tunnel UDP Fragment	The value is 1500 by default	Specify the value of **Tunnel UDP Fragment.** ***Value Range*****:** 0 ~ 1500. Note: Tunnel UDP Fragment will be available only when UDP is chosen in Protocol.
Tunnel UDP MSS-Fix	The box is unchecked by default.	Check the **Enable** box to activate the **Tunnel UDP MSS-Fix** function. Note: Tunnel UDP MSS-Fix will be available only when UDP is chosen in Protocol.
nsCerType Verification	The box is unchecked by default.	Check the **Enable** box to activate the **nsCerType Verification** function. Note: nsCerType Verification will be available only when TLS is chosen in Authorization Mode.
TLS Renegotiation Time (seconds)	The value is 3600 by default	Specify the time interval of **TLS Renegotiation Time.** ***Value Range*****:** -1 ~ 86400.
Connection Retry(seconds)	The value is -1 by default	Specify the time interval of **Connection Retry.** The default -1 means that it is no need to execute connection retry. ***Value Range*****:** -1 ~ 86400, and -1 means no retry is required.
DNS	By default **Automatically** is selected	Specify the setting of **DNS.** It can be **Automatically/Manually.**

5.2 Firewall



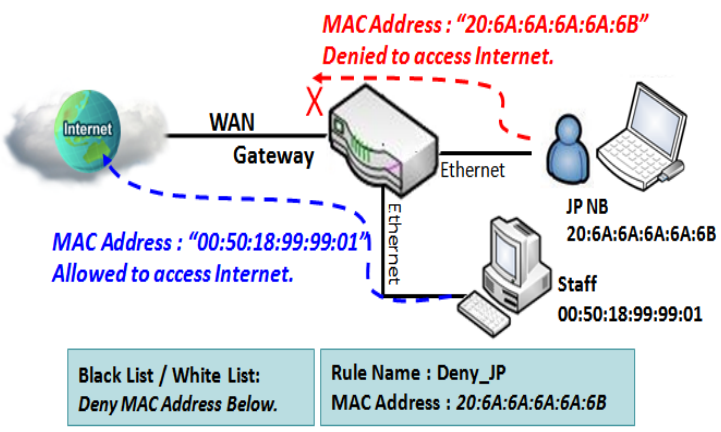
The firewall functions include Packet Filter, URL Blocking, Content Filter, MAC Control, Application Filter, IPS and some firewall options. The supported function can be different for the purchased gateway.

5.2.1 MAC Control



"MAC Control" function allows you to assign the accessibility to the gateway for different users based on device's MAC address. When the administrator wants to reject the traffics from some client hosts with specific MAC addresses, he can use the "MAC Control" function to reject with the black list configuration.

MAC Control with Black List Scenario



As shown in the diagram, enable the MAC control function and specify the "MAC Control Rule List" is a black list, and configure one MAC control rule for the gateway to deny the connection request from the "JP NB" with its own MAC address 20:6A:6A:6A:6A:6B.

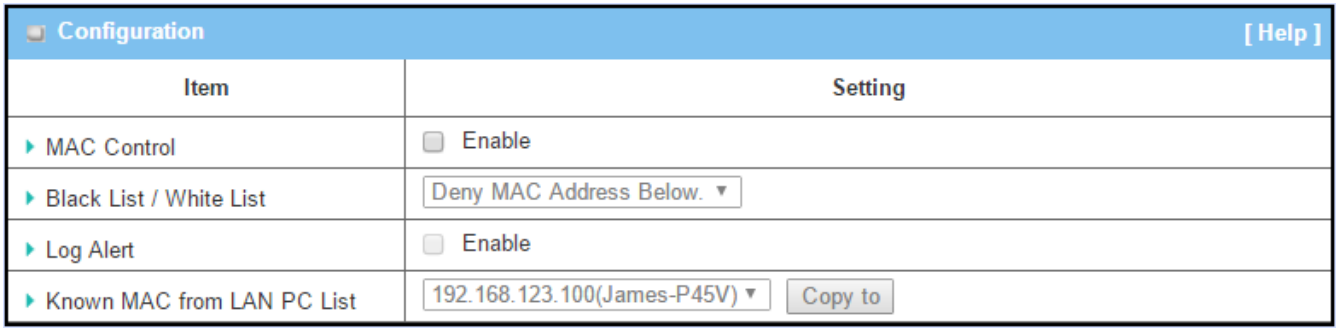
System will block the connecting from the "JP NB" to the gateway but allow others.

MAC Control Setting

Go to **Security > Firewall > MAC Control** Tab.

The MAC control setting allows user to create and customize MAC address policies to allow or reject packets with specific source MAC address.

Enable MAC Control

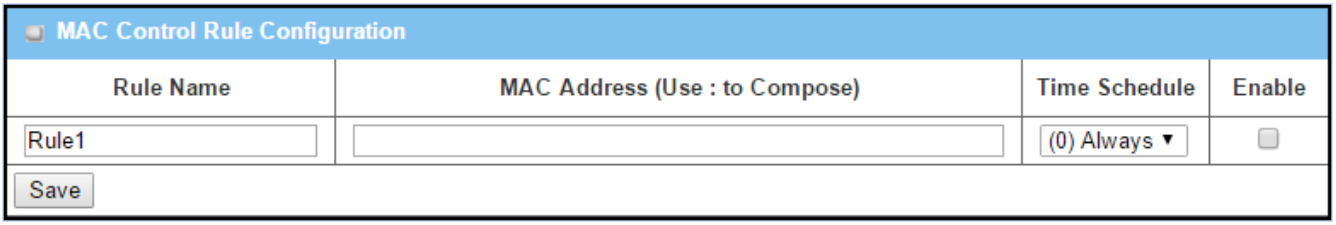


Configuration Window		
Item	**Value setting**	**Description**
MAC Control	The box is unchecked by default	Check the **Enable** box to activate the MAC filter function
Black List / White List	Deny MAC Address Below is set by default	When ***Deny MAC Address Below*** is selected, as the name suggest, packets specified in the rules will be blocked –black listed. In contrast, with ***Allow MAC Address Below***, you can specifically white list the packets to pass and the rest will be blocked.
Log Alert	The box is unchecked by default	Check the **Enable** box to activate to activate Event Log.
Known MAC from LAN PC List	N/A	Select a MAC Address from LAN Client List. Click the **Copy to** to copy the selected **MAC Address** to the filter rule.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

Create/Edit MAC Control Rules

The gateway supports up to a maximum of 20 filter rule sets. Ensure that the MAC Control is enabled before we can create control rules.

When **Add** button is applied, **Filter Rule Configuration** screen will appear.



MAC Control Rule Configuration		
Item	**Value setting**	**Description**
Rule Name	1. String format can be any text 2. A Must fill setting	Enter a MAC Control rule name. Enter a name that is easy for you to remember.
MAC Address (Use: to Compose)	1. MAC Address string Format 2. A Must fill setting	Specify the **Source MAC Address** to filter rule.
Time Schedule	A Must fill setting	Apply **Time Schedule** to this rule; otherwise leave it as **(0) Always**. If the dropdown list is empty, ensure **Time Schedule** is pre-configured. Refer to **Object Definition > Scheduling > Configuration tab**
Enable	The box is unchecked by default.	Click **Enable** box to activate this rule, and then save the settings.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings
Back	N/A	Click **Back** to return to the MAC Control Configuration page.

5.2.2 IPS

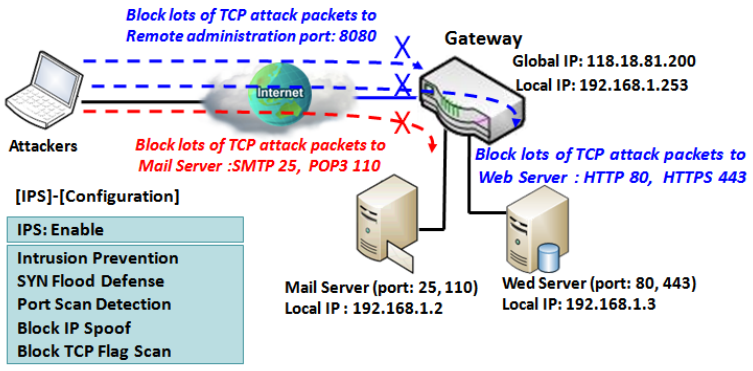
Configuration	[Help]
Item	Setting
IPS	Enable
Log Alert	Enable

Intrusion Prevention			
Item	Setting		
SYN Flood Defense	Enable	300	Packets/second (10~10000)
UDP Flood Defense	Enable	300	Packets/second (10~10000)
ICMP Flood Defense	Enable	300	Packets/second (10~10000)
Port Scan Detection	Enable	200	Packets/second (10~10000)

To provide application servers in the Internet, administrator may need to open specific ports for the services. However, there are some risks to always open service ports in the Internet. In order to avoid such attack risks, it is important to enable IPS functions.

Intrusion Prevention System (IPS) is network security appliances that monitor network and/or system activities for malicious activity. The main functions of IPS are to identify malicious activity, log information about this activity, attempt to block/stop it and report it. You can enable the IPS function and check the listed intrusion activities when needed. You can also enable the log alerting so that system will record Intrusion events when corresponding intrusions are detected.

IPS Scenario



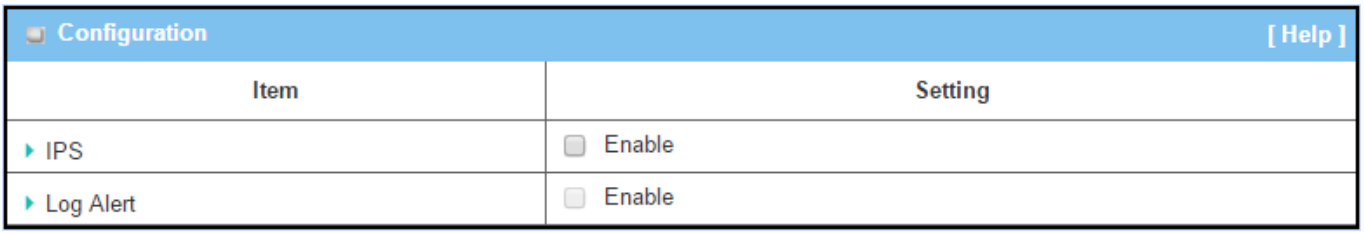
As shown in the diagram, the gateway serves as an E-mail server, Web Server and also provides TCP port 8080 for remote administration. So, remote users or unknown users can request those services from Internet. With IPS enabled, the gateway can detect incoming attack packets, including the TCP ports (25, 80, 110, 443 and 8080) with services. It will block the attack packets and let the normal access to pass through the gateway

IPS Setting

Go to **Security > Firewall > IPS** Tab.

The Intrusion Prevention System (IPS) setting allows user to customize intrusion prevention rules to prevent malicious packets.

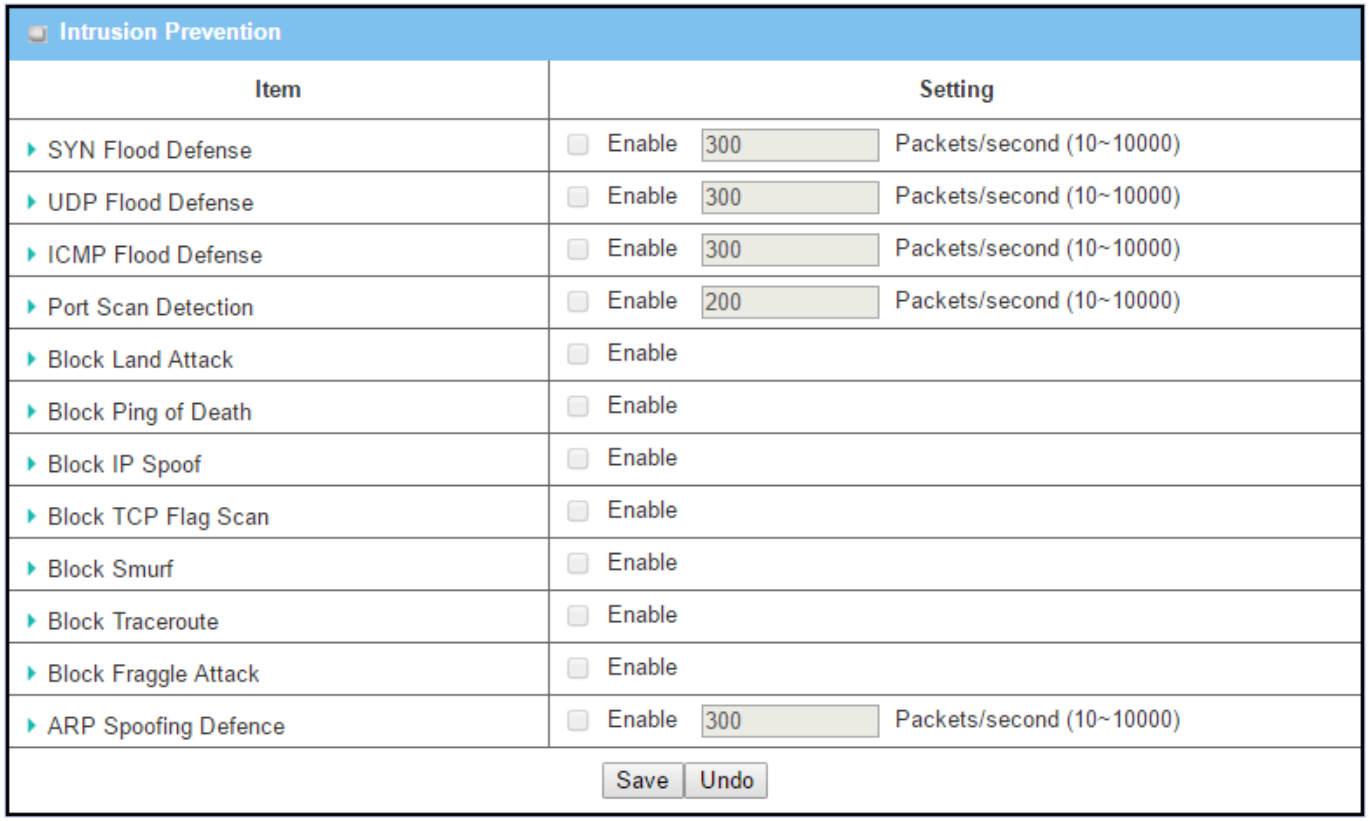
Enable IPS Firewall



Configuration Window		
Item	**Value setting**	**Description**
IPS	The box is unchecked by default	Check the **Enable** box to activate IPS function
Log Alert	The box is unchecked by default	Check the **Enable** box to activate to activate Event Log.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

Setup Intrusion Prevention Rules

The router allows you to select intrusion prevention rules you may want to enable. Ensure that the IPS is enabled before we can enable the defense function.



Setup Intrusion Prevention Rules		
Item Name	**Value setting**	**Description**
SYN Flood Defense	1. A Must filled setting 2. The box is unchecked by default. 3. Traffic threshold is set to 300 by default 4. The value range can be from 10 to 10000.	Click **Enable** box to activate this intrusion prevention rule and enter the traffic threshold in this field.
UDP Flood Defense		Click **Enable** box to activate this intrusion prevention rule and enter the traffic threshold in this field.
ICMP Flood Defense		Click **Enable** box to activate this intrusion prevention rule and enter the traffic threshold in this field. ***Value Range*:** 10 ~ 10000.
Port Scan Defection	1. A Must filled setting 2. The box is unchecked by default. 3. Traffic threshold is set to 200 by default 4. The value range can be from 10 to 10000.	Click **Enable** box to activate this intrusion prevention rule and enter the traffic threshold in this field. *Value Range*: 10 ~ 10000.
Block Land Attack	The box is unchecked by default.	Click **Enable** box to activate this intrusion prevention rule.
Block Ping of Death		
Block IP Spoof		
Block TCP Flag Scan		

Block Smurf		
Block Traceroute		
Block Fraggle Attack		
ARP Spoofing Defence	1. A Must filled setting 2. The box is unchecked by default. 3. Traffic threshold is set to 300 by default 4. The value range can be from 10 to 10000.	Click **Enable** box to activate this intrusion prevention rule and enter the traffic threshold in this field. ***Value Range*****:** 10 ~ 10000.
Save	NA	Click **Save** to save the settings
Undo	NA	Click **Undo** to cancel the settings

5.2.3 Options

Firewall Options [Help]

Item	Setting
Stealth Mode	☐ Enable
SPI	☑ Enable
Discard Ping from WAN	☐ Enable

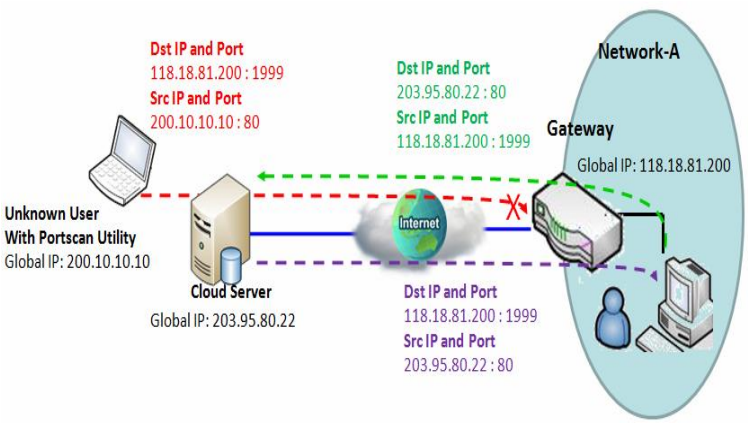
Remote Administrator Host Definition

ID	Interface	Protocol	IP	Subnet Mask	Service Port	Enable	Action
1	All WAN	HTTP	Any IP	N/A	80	☐	Edit
2	All WAN	HTTP	Any IP	N/A	80	☐	Edit
3	All WAN	HTTP	Any IP	N/A	80	☐	Edit
4	All WAN	HTTP	Any IP	N/A	80	☐	Edit
5	All WAN	HTTP	Any IP	N/A	80	☐	Edit

There are some additional useful firewall options in this page.
“Stealth Mode” lets gateway not to respond to port scans from the WAN so that makes it less susceptible to discovery and attacks on the Internet. ”SPI” enables gateway to record the packet information like IP address, port address, ACK, SEQ number and so on while they pass through the gateway, and the gateway checks every incoming packet to detect if this packet is valid.

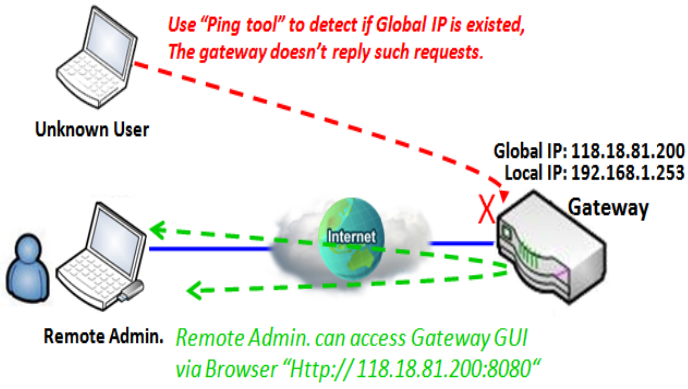
“Discard Ping from WAN” makes any host on the WAN side can`t ping this gateway. And finally, “Remote Administrator Hosts” enables you to perform administration task from a remote host. If this feature is enabled, only specified IP address(es) can perform remote administration.

Enable SPI Scenario



As shown in the diagram, Gateway has the IP address of 118.18.81.200 for WAN interface and 192.168.1.253 for LAN interface. It serves as a NAT gateway. Users in Network-A initiate to access cloud server through the gateway. Sometimes, unknown users will simulate the packets but use different source IP to masquerade. With the SPI feature been enabled at the gateway, it will block such packets from unknown users.

Discard Ping from WAN & Remote Administrator Hosts Scenario



"Discard Ping from WAN" makes any host on the WAN side can`t ping this gateway reply any ICMP packets. Enable the Discard Ping from WAN function to prevent security leak when local users surf the internet.

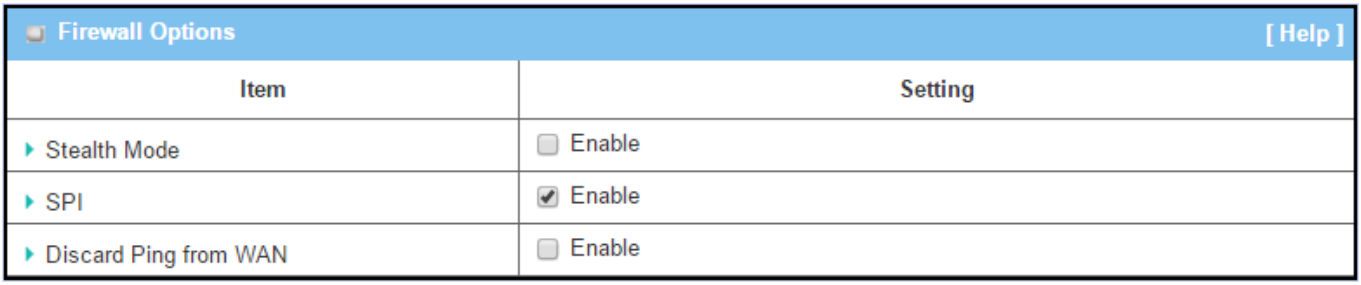
Remote administrator knows the gateway's global IP, and he can access the Gateway GUI via TCP port 8080.

Firewall Options Setting

Go to Security > Firewall > Options **Tab.**

The firewall options setting allows network administrator to modify the behavior of the firewall and to enable Remote Router Access Control.

Enable Firewall Options



Firewall Options		
Item	**Value setting**	**Description**
Stealth Mode	The box is unchecked by default	Check the **Enable** box to activate the Stealth Mode function
SPI	The box is checked by default	Check the **Enable** box to activate the SPI function
Discard Ping from WAN	The box is unchecked by default	Check the **Enable** box to activate the Discard Ping from WAN function

Define Remote Administrator Host

The router allows network administrator to manage router remotely. The network administrator can assign specific IP address and service port to allow accessing the router.

Remote Administrator Host Definition

ID	Interface	Protocol	IP	Subnet Mask	Service Port	Enable	Action
1	All WAN	HTTP	Any IP	N/A	80	☐	Edit
2	All WAN	HTTP	Any IP	N/A	80	☐	Edit
3	All WAN	HTTP	Any IP	N/A	80	☐	Edit
4	All WAN	HTTP	Any IP	N/A	80	☐	Edit
5	All WAN	HTTP	Any IP	N/A	80	☐	Edit

Remote Administrator Host Definition		
Item	**Value setting**	**Description**
Protocol	HTTP is set by default	Select **HTTP** or **HTTPS** method for router access.
IP	A Must filled setting	This field is to specify the remote host to assign access right for remote access. Select **Any IP** to allow any remote hosts Select **Specific IP** to allow the remote host coming from a specific subnet. An IP address entered in this field and a selected **Subnet Mask** to compose the subnet**.**
Service Port	1. 80 for HTTP by default 2. 443 for HTTPS by default	This field is to specify a Service Port to HTTP or HTTPS connection. ***Value Range***: 1 ~ 65535.
Enabling the rule	The box is unchecked by default.	Click **Enable** box to activate this rule.
Save	N/A	Click **Enable** box to activate this rule then save the settings.
Undo	N/A	Click **Undo** to cancel the settings

5.3 Authentication

To approve or confirm the truth of a certain object, you have to configure the required settings in the Authentication page. The supported functions could be Captive Portal and MAC Authentication, and the available function might be different for the purchased gateway. With proper configuration, whenever a certain object is accessing the portal or is asked for authentication to get access to internet, the specified authentication server is responsible for the authentication.

5.3.1 Captive Portal

A captive portal is a portal web page that is displayed before a user can browse Internet. The portal is often used to present a login page. This is done by intercepting most packets, regardless of address or port, until the user opens a browser and tries to access the web. At that time the browser is redirected to a web page which may require authentication and/or payment, or simply display an acceptable use policy and require the user to agree. Captive portals are used at many Wi-Fi hotspot services, and can be used to control wired access (e.g. apartment houses, hotel rooms, business centers, "open" Ethernet jacks) as well.[7]

The gateway supports the Captive Portal function to ask guests or passengers to pass the authentication process before they can surf the Internet via the gateway. There are two approaches, including external captive portal and internal captive portal.

For external captive portal, you must specify external RADIUS (Remote Authentication Dial In User Service) server and external UAM (Universal Access Method) server. In contrast, for internal captive portal, you will only select “Internal RADIUS Server” option for user authentication. The user account database can be an embedded database, an external AD database or an external LDAP database. However, the UAM server is not necessary for this case and that the captive portal Web site is embedded in the device.

Note: Internal captive portal may NOT be supported by the purchased gateway. It depends on the product specification.

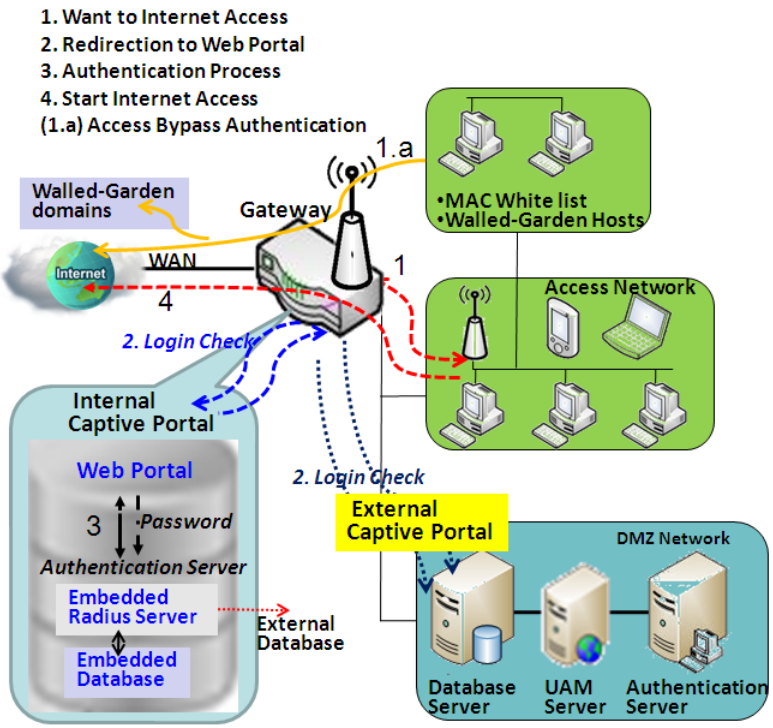
7 http://en.wikipedia.org/wiki/Captive_portal

External Captive Portal

For external captive portal, you must specify external RADIUS (Remote Authentication Dial In User Service) server and external UAM (Universal Access Method) server.

Before enabling the external Captive Portal function, please go to **[Object Definition]-[External Server]** to setup external server objects, like RADIUS server and UAM server. Then return to configure Captive Portal function back in this page to specific WAN Interface, select external Authentication Server and UAM Server from the pre-defined external server object list.

Internal Captive Portal



In contrast, for internal captive portal, you will only select “Internal RADIUS Server” option for user authentication. The user account database can be an embedded database, an external AD database or an external LDAP database. However, the UAM server is not necessary for this case and that the captive portal Web site is embedded in the device.

Before enabling internal Captive Portal function, please go to **[Object Definition]-[External Server]** to define some external server objects, like LDAP server or AD server if necessary. Then return to configure Captive Portal function back in this page to specific WAN

Interface, select “Internal RADIUS Server” option for user authentication and specify its user database to be the embedded one, an external LDAP server or an external AD server from the pre-defined external server object list.

NOTE: All Internet Packets will be forwarded to Captive Portal Web site of the gateway when Captive portal feature is enabled. Please make sure that at least one user account is created.

Once the user authentication process completes successfully, the gateway redirects the web page to the requested one. Furthermore, the gateway also records the MAC address of guest client host and allows its incoming Internet access requests.

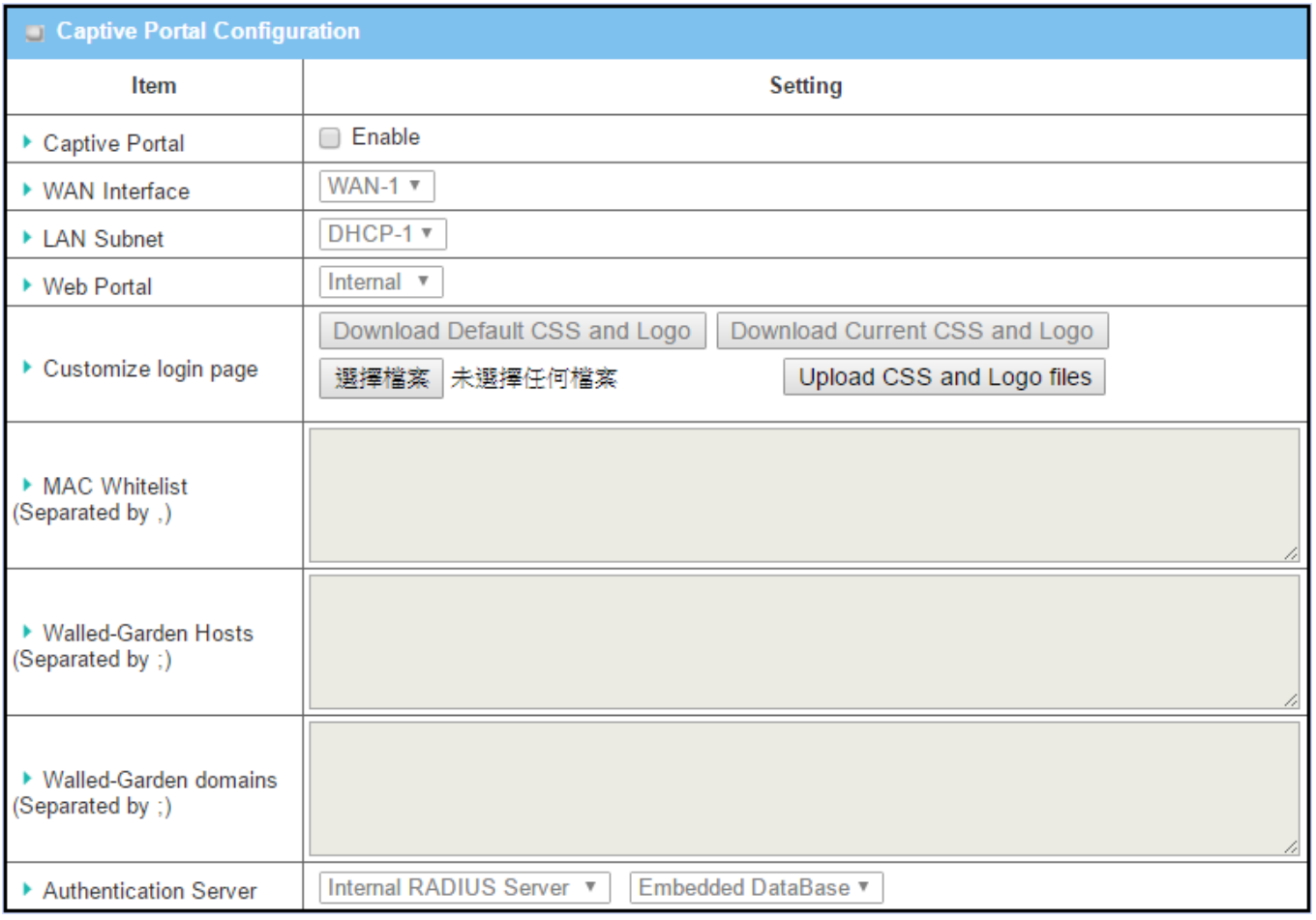
Each account has its own lease time and it will not be reused for authentication once the lease time has run out. The client host with that account will be rejected to surf the Internet.

However, there is a timeout setting for each account. When the client host with that account has been idle at the Internet surfing for a while that reaches the timeout setting, the gateway will re-authenticate the client host for further Internet connection.

Captive Portal Setting

Go to Security > Authentication > Captive Portal tab.

The gateway supports the Captive Portal function to ask connecting users to pass the authentication process before they can surf the Internet via the gateway. The Captive Portal will re-direct user to a login page when user try to access the Internet.

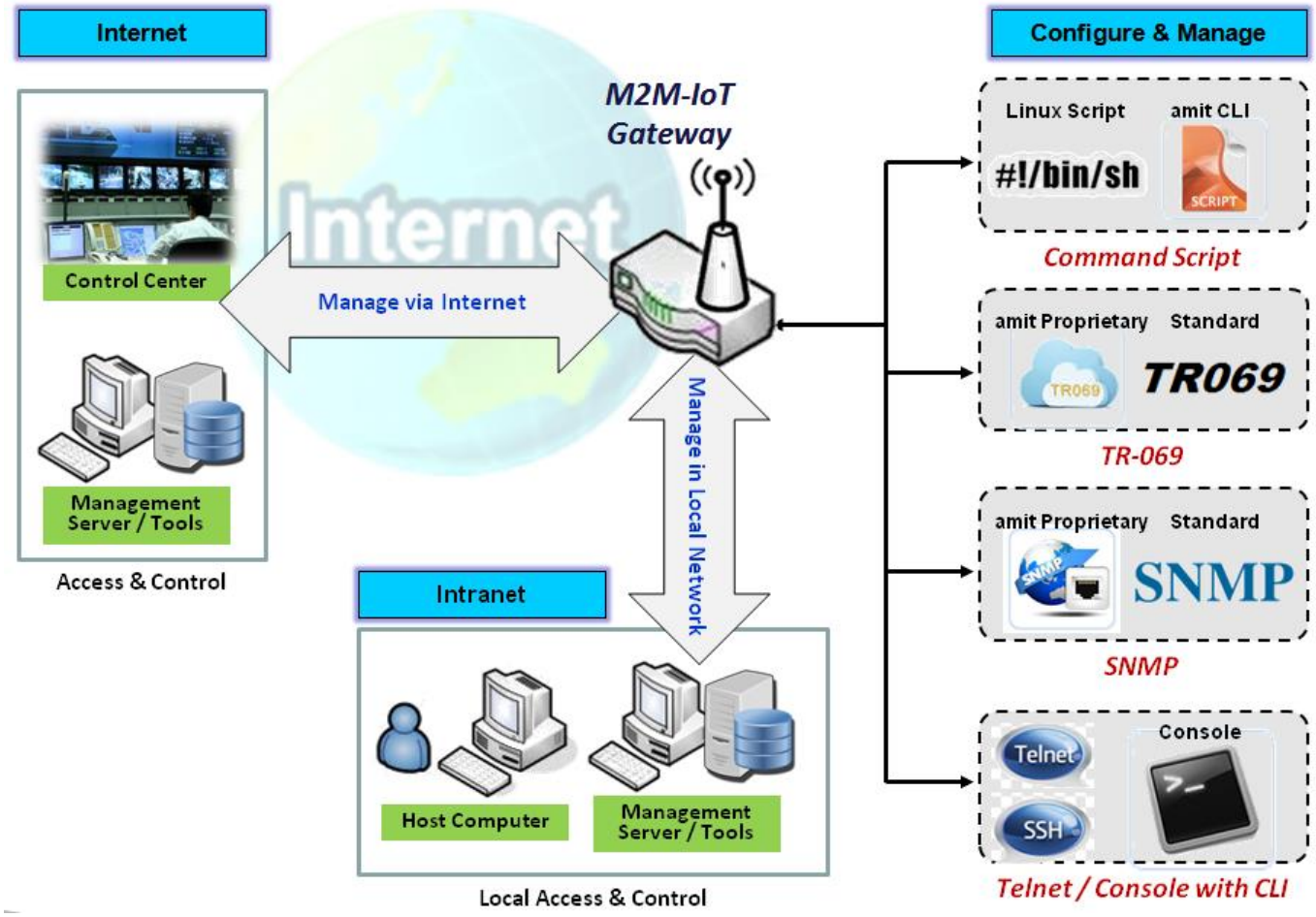


Captive Portal Configuration		
Item	**Value setting**	**Description**
Captive Portal	The box is unchecked by default	Check the **Enable** box to activate the Captive Portal function.
WAN Interface	1. A Must filled setting. 2. **WAN-1** is selected by default.	Specify a WAN Interface for the authenticated clients or hosts. All the traffics coming from the hosts will be directed to the specified WAN interface.
LAN Subnet	1. A Must filled setting. 2. **DHCP-1** is selected by default.	Specify the LAN subnet which is to be bound with captive portal function. It can be DHCP-1 ~ DHCP-4, if you configured the corresponding DHCP servers in **Basic Network > LAN & VLAN > DHCP Server**. If **DHCP-1** is selected, users connected to the physical LAN port which bound the DHCP-1 server, will be re-directed to a login page when accessing the Internet.
Web Portal	1. A Must filled setting. 2. The default setting depends on the product specification. It can be **Internal** or **External**.	Specify which kind of authentication server is to be used for captive portal function. It can be **Internal** or **External**, and depends on the product specification. *Not all products with internal option, some model ONLY has external option.* When **External** is selected, there is no **Customize login page** to be configured, but user must specify external **UAM Server** and **Authentication Server** for authentication. When **Internal** is selected, user just needs to specify an **Authentication Server** and the portal login page can be edited in **Customize login page.**
Customize login page	N/A	Click the **Download Default CSS and Logo** button to download the default CSS file and Logo of login page for the internal authentication server. Click the **Download Current CSS and Logo** button to download the current CSS file and Logo of login page for the internal authentication server. User can edit the CSS file or Logo downloaded from above buttons and upload them by **Upload CSS and Logo files** button.
MAC Whitelist (Separated by,)	Optional setting	Specify a MAC whitelist for the client devices that will not be subjected to the captive portal authentication function. The MAC(s) filled in this field can access Internet directly, instead of been re-direct to the login page.
Walled-Garden Hosts (Separated by;)	Optional setting	Specify the host IP(s) for the devices that will not be subjected to the captive portal authentication function. The IP(s) filled in this field can access Internet directly, instead of been re-direct to the login page.
Walled-Garden domains (Separated by;)	Optional setting	Specify the domain name(s) for the devices that will not be subjected to the captive portal authentication function. The domain names(s) filled in this field can access Internet directly, instead of been re-direct to the login page.
Authentication Server	A Must filled setting	Select the type of authentication server and corresponding user database. If Web Portal is **Internal**, the Internal RADIUS Server is used to authentication by default, and there are three databases

		you can choose. When **Embedded DataBase** is selected, the login IDs and Passwords are created in **Object Definition > User > User Profile** tab. When **External LDAP** is selected, the login IDs and passwords are from an external LDAP server. Please specify it as well. When **External AD** is selected, the login IDs and passwords are from an external AD server. Please specify it as well. If Web Portal is **External**, the External RADIUS Server is used to authentication by default, user need to specify the external RADIUS server. The external radius server can be added by pressing **AddObject** button directly or added in **Object Definition > External Server > External Server** tab.
UAM Server	A Must filled setting	UAM Server is available only when **External** Web Portal is selected. Click **Enable** box and specify an external UAM server from the external server list. The UAM Server can be added by pressing **AddObject** button directly or added in **Object Definition > External Server > External Server** tab.
Save	N/A	Click the **Save** button to save changes
Refresh	N/A	Click the **Refresh** button to refresh current page

Chapter 6 Administration

6.1 Configure & Manage



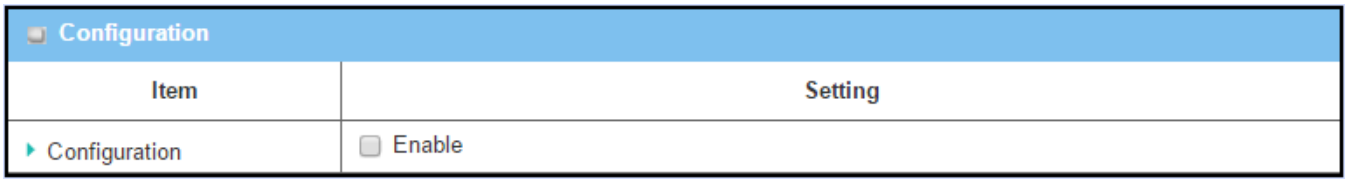
Configure & Manage refers to enterprise-wide administration of distributed systems including (and commonly in practice) computer systems. Centralized management has a time and effort trade-off that is related to the size of the company, the expertise of the IT staff, and the amount of technology being used. This device supports many system management protocols, such as Command Script, TR-069, SNMP, and Telnet with CLI. You can setup those configurations in the "Configure & Manage" section.

6.1.1 Command Script

Command script configuration is the application that allows administrator to setup the pre-defined configuration in plain text style and apply configuration on startup.

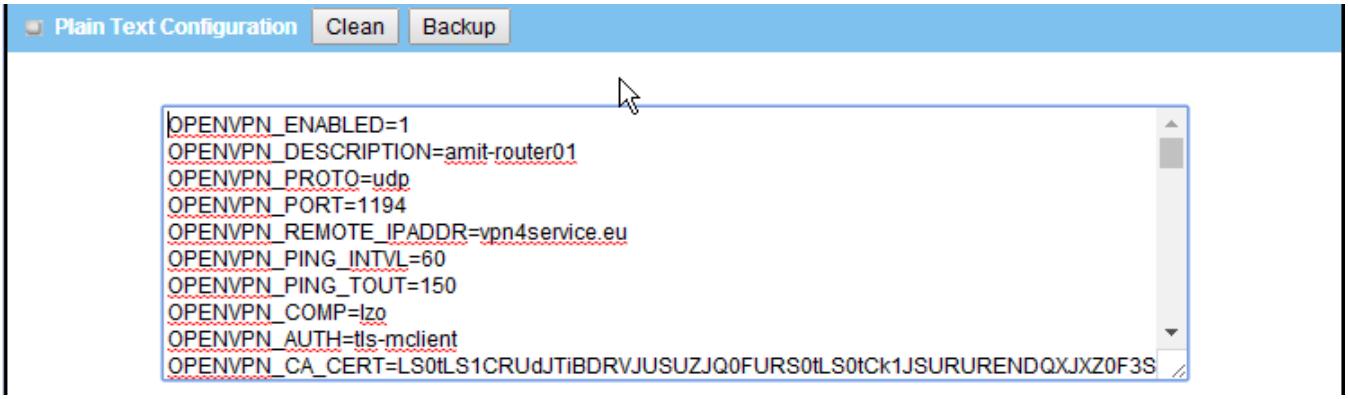
Go to Administration > Command Script > Configuration **Tab.**

Enable Command Script Configuration



Configuration		
Item	**Value setting**	**Description**
Configuration	The box is unchecked by default	Check the **Enable** box to activate the Command Script function.

Edit/Backup Plain Text Command Script



You can edit the plain text configuration settings in the configuration screen as above.

Plain Text Configuration		
Item	**Value setting**	**Description**
Clean	*NA*	Clean text area. (You should click **Save** button to further clean the configuration already saved in the system.)
Backup	*NA*	Backup and download configuration.
Save	*NA*	Save configuration

The supported plain text configuration items are shown in the following list. For the settings that

can be executed with standard Linux commands, you can put them in a script file, and apply to the system configure with **STARTUP** command. For those configurations without corresponding Linux command set to configure, you can configure them with proprietary command set.

Configuration Content		
Key	**Value setting**	**Description**
OPENVPN_ENABLED	1 : enable 0 : disable	Enable or disable OpenVPN Client function.
OPENVPN_DESCRIPTION	A Must filled Setting	Specify the tunnel name for the OpenVPN Client connection.
OPENVPN_PROTO	udp tcp	Define the **Protocol** for the OpenVPN Client. • Select **TCP** or **TCP /UDP** ->The OpenVPN will use TCP protocol, and **Port** will be set as 443 automatically. • Select **UDP** -> The OpenVPN will use UDP protocol, and **Port** will be set as 1194 automatically.
OPENVPN_PORT	A Must filled Setting	Specify the **Port** for the OpenVPN Client to use.
OPENVPN_REMOTE_IPADDR	IP or FQDN	Specify the **Remote IP/FQDN** of the peer OpenVPN Server for this OpenVPN Client tunnel. Fill in the IP address or FQDN.
OPENVPN_PING_INTVL	seconds	Specify the time interval for OpenVPN keep-alive checking.
OPENVPN_PING_TOUT	seconds	Specify the timeout value for OpenVPN Client keep-alive checking.
OPENVPN_COMP	Adaptive	Specify the **LZO Compression** algorithm for OpenVPN client.
OPENVPN_AUTH	Static Key/TLS	Specify the authorization mode for the OpenVPN tunnel. • **TLS** ->The OpenVPN will use TLS authorization mode, and the following items **CA Cert.**, **Client Cert.** and **Client Key** need to specify as well.
OPENVPN_CA_CERT	A Must filled Setting	Specify the Trusted CA certificate for the OpenVPN client. It will go through Base64 Conversion.
OPENVPN_LOCAL_CERT	A Must filled Setting	Specify the local certificate for OpenVPN client. It will go through Base64 Conversion.
OPENVPN_LOCAL_KEY	A Must filled Setting	Specify the local key for the OpenVPN client. It will go through Base64 Conversion.
OPENVPN_EXTRA_OPTS	Options	Specify the extra options setting for the OpenVPN client.
IP_ADDR1	Ip	Ethernet LAN IP
IP_NETM1	Net mask	Ethernet LAN MASK

PPP_MONITORING	1 : enable 0 : disable	When the Network Monitoring feature is enabled, the router will use DNS Query or ICMP to periodically check Internet connection –connected or disconnected.
PPP_PING	0 : DNS Query 1 : ICMP Query	With **DNS Query,** the system checks the connection by sending DNS Query packets to the destination specified in PPP_PING_IPADDR. With **ICMP Query,** the system will check connection by sending ICMP request packets to the destination specified in PPP_PING_IPADDR.
PPP_PING_IPADDR	IP	Specify an IP address as the target for sending DNS query/ICMP request.
PPP_PING_INTVL	seconds	Specify the time interval for between two DNS Query or ICMP checking packets.
STARTUP	Script file	For the configurations that can be configured with standard Linux commands, you can put them in a script file, and apply the script file with STARTUP command. For example, STARTUP=#!/bin/sh STARTUP=echo “startup done” > /tmp/demo

Plain Text System Configuration with Telnet

In addition to the web-style plain text configuration as mentioned above, the gateway system also allow the configuration via Telnet CLI. Administrator can use the proprietary telnet command “***txtConfig***” and related action items to perform the plain system configuration.

The command format is: txtConfig (action) [option]

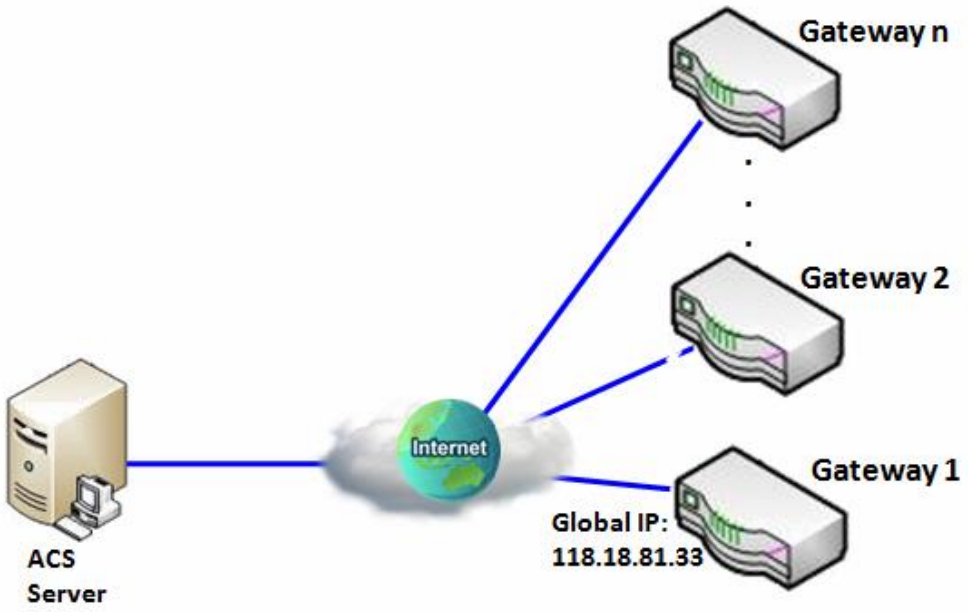
Action	Option	Description
clone	*Output file*	Duplicate the configuration content from database and stored as a configuration file. (ex: *txtConfig clone /tmp/config*) The contents in the configuration file are the same as the plain text commands mentioned above. This action is exactly the same as performing the “Backup” plain text configuration.
commit	a existing file	Commit the configuration content to database. (ex: *txtConfig commit /tmp/config*)
enable	*NA*	Enable plain text system config. (ex: *txtConfig enable*)
disable	*NA*	Disable plain text system config. (ex: *txtConfig disable*)
run_immediately	*NA*	Apply the configuration content that has been committed in database. (ex: *txtConfig run_immediately*)
run_immediately	a existing file	Assign a configuration file to apply. (ex: *txtConfig run_immediately /tmp/config*)

6.1.2 TR-069

TR-069 (Technical Report 069) is a Broadband Forum technical specification entitled CPE WAN Management Protocol (CWMP). It defines an application layer protocol for remote management of end-user devices, like this gateway device. As a bidirectional SOAP/HTTP-based protocol, it provides the communication between customer-premises equipment (CPE) and Auto Configuration Servers (ACS). The Security Gateway is such CPE.

TR-069 is a customized feature for ISP. It is not recommend that you change the configuration for this. If you have any problem in using this feature for device management, please contact with your ISP or the ACS provider for help. At the right upper corner of TR-069 Setting screen, one "[Help]" command let you see the same message about that.

Scenario - Managing deployed gateways through an ACS Server



Scenario Application Timing

When the enterprise data center wants to use an ACS server to manage remote gateways geographically distributed elsewhere in the world, the gateways in all branch offices must have an embedded TR-069 agent to communicate with the ACS server. So that the ACS server can configure, FW upgrade and monitor these gateways and their corresponding Intranets.

Scenario Description

The ACS server can configure, upgrade with latest FW and monitor these gateways.

Remote gateways inquire the ACS server for jobs to do in each time period.

The ACS server can ask the gateways to execute some urgent jobs.

Parameter Setup Example

Following tables list the parameter configuration as an example for the Gateway 1 in above diagram with "TR-069" enabling.

Use default value for those parameters that are not mentioned in the tables.

Configuration Path	[TR-069]-[Configuration]
TR-069	■ ***Enable***
ACS URL	**http://qaamit.acslite.com/cpe.php**
ACS User Name	***ACSUserName***
ACS Password	***ACSPassword***
ConnectionRequest Port	***8099***
ConnectionRequest User Name	***ConnReqUserName***
ConnectionRequest Password	***ConnReqPassword***
Inform	■ ***Enable Interval 900***

Scenario Operation Procedure

In above diagram, the ACS server can manage multiple gateways in the Internet. The "Gateway 1" is one of them and has 118.18.81.33 IP address for its WAN-1 interface.

When all remote gateways have booted up, they will try to connect to the ACS server.

Once the connections are established successfully, the ACS server can configure, upgrade with latest FW and monitor these gateways.

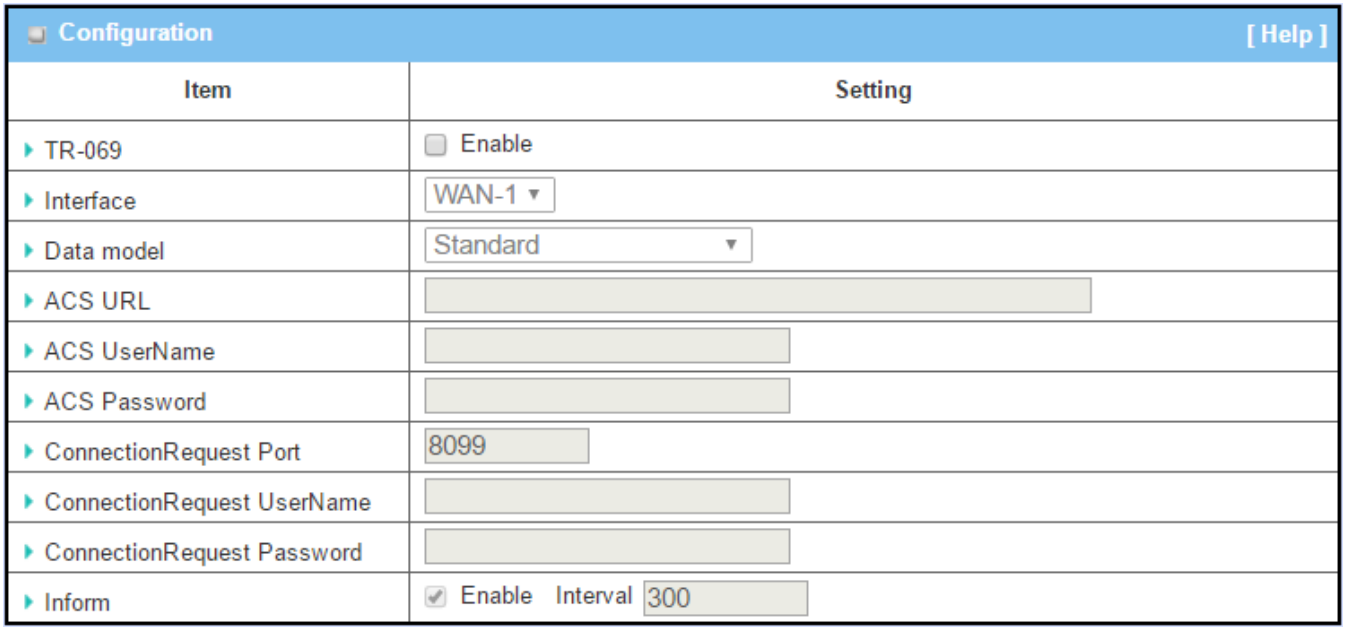
Remote gateways inquire the ACS server for jobs to do in each time period.

If the ACS server needs some urgent jobs to be done by the gateways, it will issue the "Connection Request" command to those gateways. And those gateways make immediate connections in response to the ACS server’s immediate connection request for executing the urgent jobs.

TR-069 Setting

Go to Administration > Configure & Manage > TR-069 **tab.**

In "TR-069" page, there is only one configuration window for TR-069 function. In the window, you must specify the related information for your security gateway to connect to the ACS. Drive the function to work by specifying the URL of the ACS server, the account information to login the ACS server, the service port and the account information for connection requesting from the ACS server, and the time interval for job inquiry. Except the inquiry time, there are no activities between the ACS server and the gateways until the next inquiry cycle. But if the ACS server has new jobs that are expected to do by the gateways urgently, it will ask these gateways by using connection request related information for immediate connection for inquiring jobs and executing.



TR-069		
Item	**Value setting**	**Description**
TR-069	The box is unchecked by default	Check the **Enable** box for activate TR-069

Interface	WAN-1 is selected by default.	When you finish set basic network WAN-1 ~ WAN-n, you can choose WAN-1 ~ WAN-n When you finish set Security > VPN > IPSec/OpenVPN/PPTP/L2TP/GRE, you can choose IPSec/OpenVPN/PPTP/L2TP/GRE tunnel, the interface just like “IPSec #1”
Data Model	Standard is selected by default.	Select the TR-069 dat model for the remote management. **Standard** : the ACS Server is a standard one, which is fully comply with TR-069. **AMIT’s ACS Data Model** : Select this data model if you intend to use AMIT’s Cloud ACS Server to managing the deployed gateways.
ACS URL	A Must filled setting	You can ask ACS manager provide ACS URL and manually set
ACS Username	A Must filled setting	You can ask ACS manager provide ACS username and manually set
ACS Password	A Must filled setting	You can ask ACS manager provide ACS password and manually set
ConnectionRequest Port	1. A Must filled setting. **2. By default 8099 is set.**	You can ask ACS manager provide ACS ConnectionRequest Port and manually set *Value Range*: 0 ~ 65535.
ConnectionRequest UserName	A Must filled setting	You can ask ACS manager provide ACS ConnectionRequest Username and manually set
ConnectionRequest Password	A Must filled setting	You can ask ACS manager provide ACS ConnectionRequest Password and manually set
Inform	1. The box is checked by default. **2. The Interval value is 300 by default.**	When the **Enable** box is checked, the gateway (CPE) will periodicly send inform message to ACS Server according to the **Interval** setting. *Value Range*: 0 ~ 86400 for Inform Interval.
Save	N/A	Click Save to save the settings

When you finish set **ACS URL ACS Username ACS Password,** your gateway (CPE, Client Premium Equipment) can send inform to ACS Server.

When you finish set **ConnectionRequest Port ConnectionRequest Username ConnectionRequest Password**, ACS Server can ask the gateway (CPE) to send inform to ACS Server.

6.1.3 SNMP

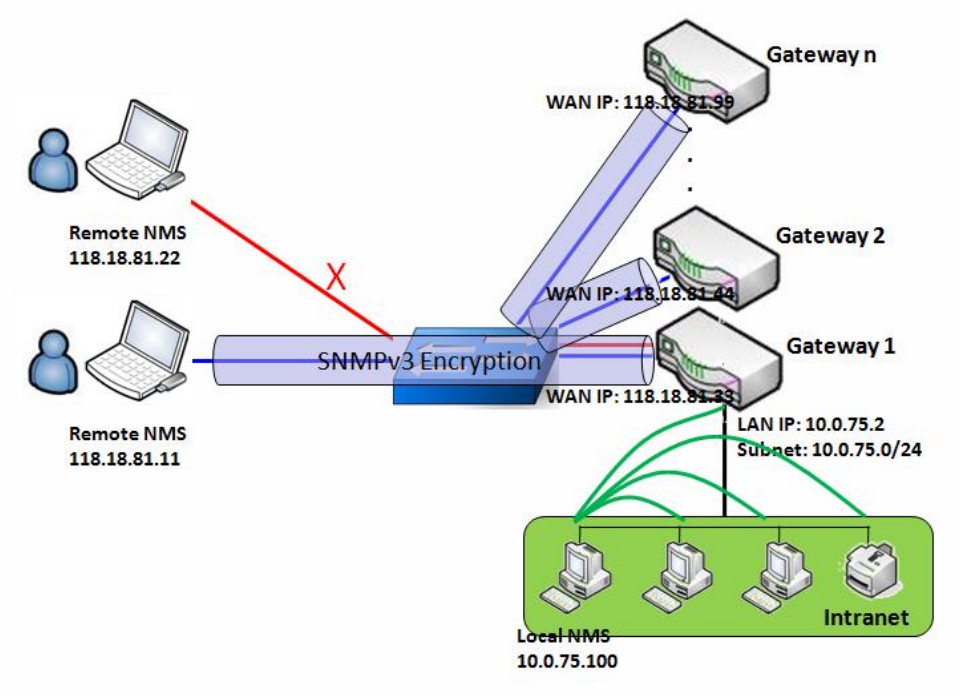
In brief, SNMP, the Simple Network Management Protocol, is a protocol designed to give a user the capability to remotely manage a computer network by polling and setting terminal values and monitoring network events.

In typical SNMP uses, one or more administrative computers, called managers, have the task of monitoring or managing a group of hosts or devices on a computer network. Each managed system executes, at all times, a software component called an agent which reports information via SNMP to the manager.

SNMP agents expose management data on the managed systems as variables. The protocol also permits active management tasks, such as modifying and applying a new configuration through remote modification of these variables. The variables accessible via SNMP are organized in hierarchies. These hierarchies, and other metadata (such as type and description of the variable), are described by Management Information Bases (MIBs).

The device supports several public MIBs and one private MIB for the SNMP agent. The supported MIBs are as follow: MIB-II (RFC 1213, Include IPv6), IF-MIB, IP-MIB, TCP-MIB, UDP-MIB, SMIv1 and SMIv2, SNMPv2-TM and SNMPv2-MIB, and AMIB (AMIT Private MIB)

SNMP Management Scenario



Scenario Application Timing

There are two application scenarios of SNMP Network Management Systems (NMS). Local NMS is in the Intranet and manage all devices that support SNMP protocol in the Intranet. Another one is the Remote NMS to manage some devices whose WAN interfaces are connected together by using a switch or a router with UDP forwarding. If you want to manage some devices and they all have supported SNMP protocol, use either one application scenario, especially the management of devices in the Intranet. In managing devices in the Internet, the TR-069 is the better solution. Please refer to last sub-section.

Scenario Description

The NMS server can monitor and configure the managed devices by using SNMP protocol, and those devices are located at where UDP packets can reach from NMS.

The managed devices report urgent trap events to the NMS servers.

Use SNMPv3 version of protocol can protected the transmitting of SNMP commands and responses.

The remote NMS with privilege IP address can manage the devices, but other remote NMS can't.

Parameter Setup Example

Following tables list the parameter configuration as an example for the Gateway 1 in above

diagram with "SNMP" enabling at LAN and WAN interfaces.

Use default value for those parameters that are not mentioned in the tables.

Configuration Path	[SNMP]-[Configuration]
SNMP Enable	■ LAN ■ WAN
Supported Versions	■ v1 ■ v2c ■ v3
Get / Set Community	ReadCommunity / WriteCommunity
Trap Event Receiver 1	118.18.81.11
WAN Access IP Address	118.18.81.11

Configuration Path	[SNMP]-[User Privacy Definition]		
ID	1	2	3
User Name	UserName1	UserName2	UserName3
Password	Password1	Password2	Disable
Authentication	MD5	SHA-1	Disable
Encryption	DES	Disable	Disable
Privacy Mode	authPriv	authNoPriv	noAuthNoPriv
Privacy Key	12345678	Disable	Disable
Authority	Read/Write	Read	Read
Enable	■ Enable	■ Enable	■ Enable

Scenario Operation Procedure

In above diagram, the NMS server can manage multiple devices in the Intranet or a UDP-reachable network. The "Gateway 1" is one of the managed devices, and it has the IP address of 10.0.75.2 for LAN interface and 118.18.81.33 for WAN-1 interface. It serves as a NAT router.

At first stage, the NMS manager prepares related information for all managed devices and records them in the NMS system. Then NMS system gets the status of all managed devices by using SNMP get commands.

When the manager wants to configure the managed devices, the NMS system allows him to do that by using SNMP set commands. The "UserName1" account is used if the manager uses SNMPv3 protocol for configuring the "Gateway 1". Only the "UserName1" account can let the "Gateway 1" accept the configuration from the NMS since the authority of the account is "Read/Write".

Once a managed device has an urgent event to send, the device will issue a trap to the Trap Event Receivers. The NMS itself could be one among them.

If you want to secure the transmitted SNMP commands and responses between the NMS and the managed devices, use SNMPv3 version of protocol.

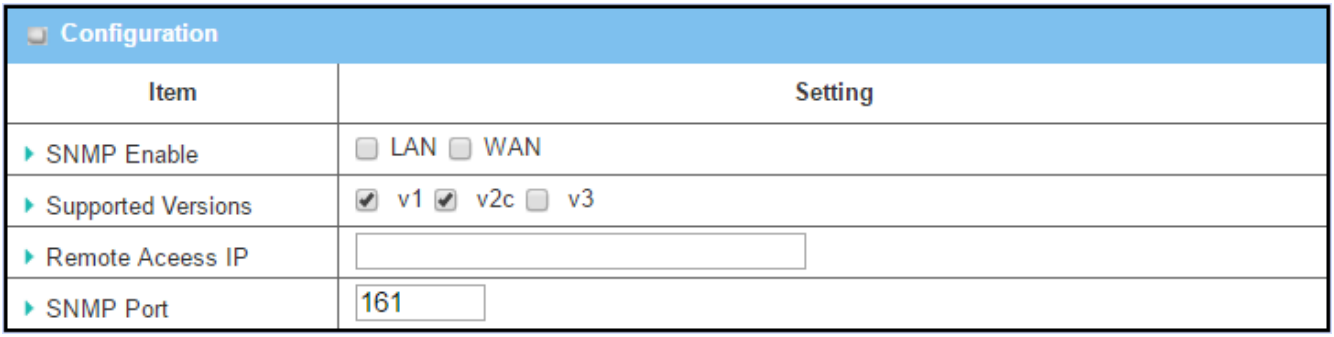
The remote NMS without privilege IP address can't manage the "Gateway 1", since "Gateway 1" allows only the NMS with privilege IP address can manage it via its WAN interface.

SNMP Setting

The SNMP allows user to configure SNMP relevant setting which includes interface, version, access control and trap receiver.

Go to Administration > Configure & Manage > SNMP **tab.**

Enable SNMP



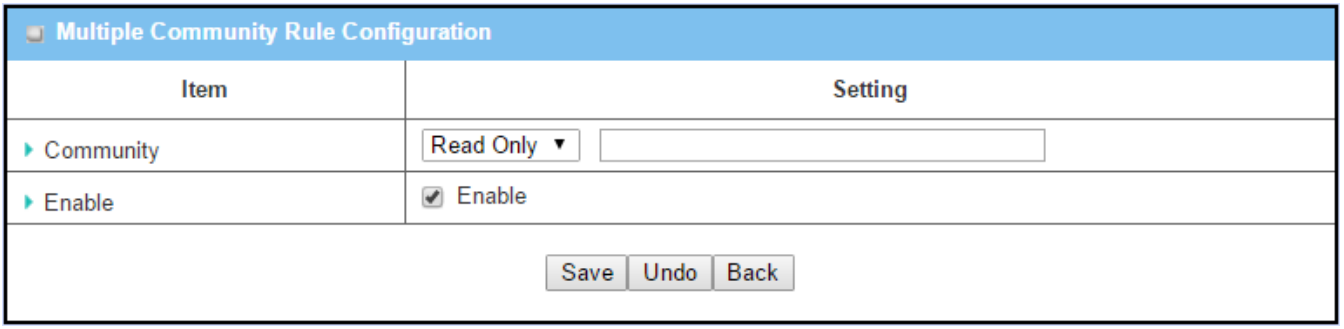
SNMP		
Item	**Value setting**	**Description**
SNMP Enable	1.The boxes are unchecked by default	Select the interface for the SNMP and enable SNMP functions. When Check the **LAN** box, it will activate SNMP functions and you can access SNMP from LAN side; When Check the **WAN** box, it will activate SNMP functions and you can access SNMP from WAN side.
Supported Versions	1.The **v1** box is checked by default 2.The **v2c** box is checked by default	Select the version for the SNMP When Check the **v1** box. It means you can access SNMP by version 1. When Check the **v2c** box. It means you can access SNMP by version 2c. When Check the **v3** box. It means you can access SNMP by version 3.
Remote Aceess IP	1. String format: any Ipv4 address 2. It is an optional item.	Specify the **Remote Access IP** for WAN. If you filled in a certain IP address. It means only this IP address can access SNMP from WAN side. If you left it as blank, it means any IP address can access SNMP from WAN side.
SNMP Port	1. String format: any port number 2. The default SNMP port is **161**.	Specify the **SNMP Port**. You can fill in any port number. But you must ensure the port number is not to be used. *Value Range*: 1 ~ 65535.

	3. A Must filled setting	
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

Create/Edit Multiple Community

The SNMP allows you to custom your access control for version 1 and version 2 user. The router supports up to a maximum of 10 community sets.

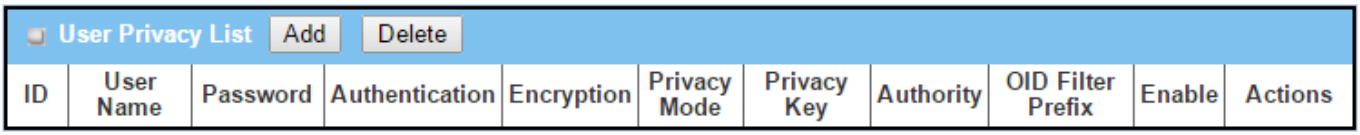
When **Add** button is applied, **Multiple Community Rule Configuration** screen will appear.



Multiple Community Rule Configuration		
Item	**Value setting**	**Description**
Community	1. Read Only is selected by default 2. A Must filled setting 3. String format: any text	Specify this version 1 or version v2c user's community that will be allowed Read Only (GET and GETNEXT) or Read-Write (GET, GETNEXT and SET) access respectively. The maximum length of the community is 32.
Enable	1.The box is checked by default	Click Enable to enable this version 1 or version v2c user.
Save	N/A	Click the **Save** button to save the configuration. But it does not apply to SNMP functions. When you return to the SNMP main page. It will show "Click on save button to apply your changes" remind user to click main page Save button.
Undo	N/A	Click the **Undo** button to cancel the settings.
Back	N/A	Click the **Back** button to return to last page.

Create/Edit User Privacy

The SNMP allows you to custom your access control for version 3 user. The router supports up to a maximum of 128 User Privacy sets.



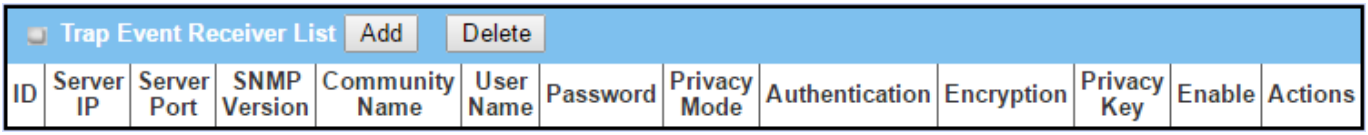
When **Add** button is applied, **User Privacy Rule Configuration** screen will appear.

User Privacy Rule Configuration		
Item	**Value setting**	**Description**
User Name	1. A Must filled setting 2. String format: any text	Specify the **User Name** for this version 3 user. ***Value Range*:** 1 ~ 32 characters.
Password	1. String format: any text	When your **Privacy Mode** is **authNoPriv** or **authPriv**, you must specify the **Password** for this version 3 user. ***Value Range*:** 8 ~ 64 characters.
Authentication	1. **None** is selected by default	When your **Privacy Mode** is **authNoPriv** or **authPriv**, you must specify the **Authentication** types for this version 3 user. Selected the authentication types **MD5/ SHA-1** to use.
Encryption	1. **None** is selected by default	When your **Privacy Mode** is **authPriv**, you must specify the **Encryption** protocols for this version 3 user. Selected the encryption protocols **DES / AES** to use.
Privacy Mode	1. **noAuthNoPriv**	Specify the **Privacy Mode** for this version 3 user.

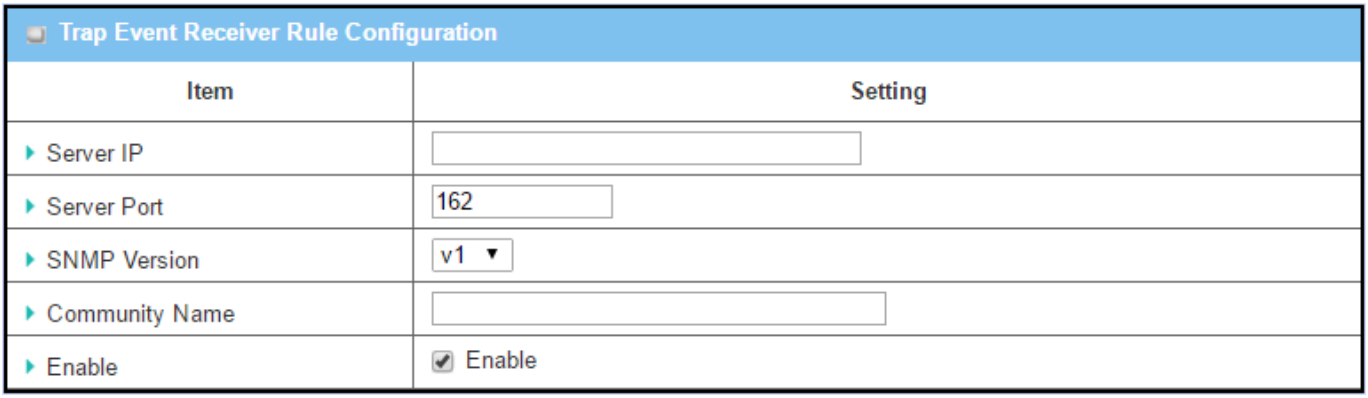
	is selected by default	Selected the **noAuthNoPriv**. You do not use any authentication types and encryption protocols. Selected the **authNoPriv**. You must specify the **Authentication** and **Password**. Selected the **authPriv**. You must specify the Authentication, Password, Encryption and Privacy Key.
Privacy Key	1. String format: any text	When your **Privacy Mode** is **authPriv**, you must specify the **Privacy Key** (8 ~ 64 characters) for this version 3 user.
Authority	1. **Read** is selected by default	Specify this version 3 user's **Authority** that will be allowed **Read Only** (GET and GETNEXT) or **Read-Write** (GET, GETNEXT and SET) access respectively.
OID Filter Prefix	1. The default value is 1 2. A Must filled setting 3. String format: any legal OID	The **OID Filter Prefix** restricts access for this version 3 user to the sub-tree rooted at the given OID. ***Value Range*:** 1 ~2080768.
Enable	1.The box is checked by default	Click **Enable** to enable this version 3 user.
Save	N/A	Click the **Save** button to save the configuration. But it does not apply to SNMP functions. When you return to the SNMP main page. It will show "Click on save button to apply your changes" remind user to click main page **Save** button.
Undo	N/A	Click the **Undo** button to cancel the settings
Back	N/A	Click the **Back** button to return the last page.

Create/Edit Trap Event Receiver

The SNMP allows you to custom your trap event receiver. The router supports up to a maximum of 4 Trap Event Receiver sets.

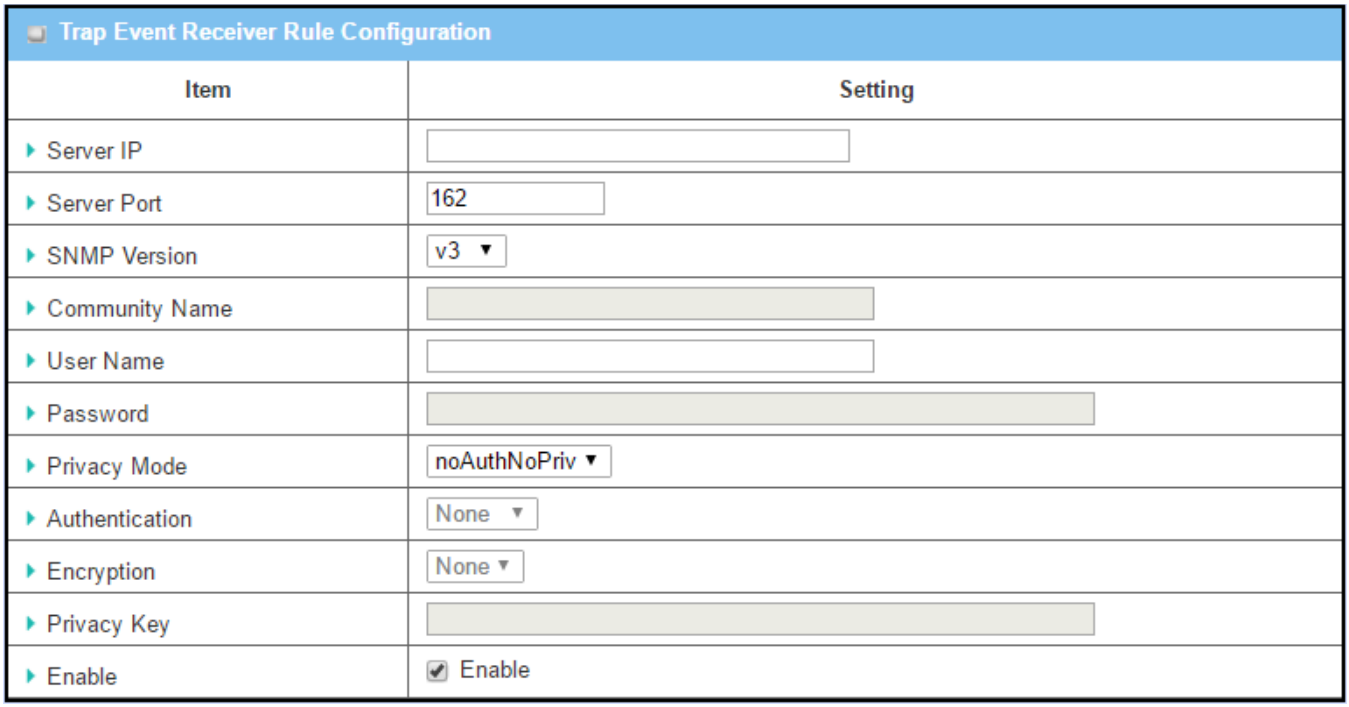


When **Add** button is applied, **Trap Event Receiver Rule Configuration** screen will appear. The default SNMP Version is v1. The configuration screen will provide the version 1 must filled items.



When you selected v2c, the configuration screen is exactly the same as that of v1, except the version.

When you selected v3, the configuration screen will provide more setting items for the version 3 Trap.



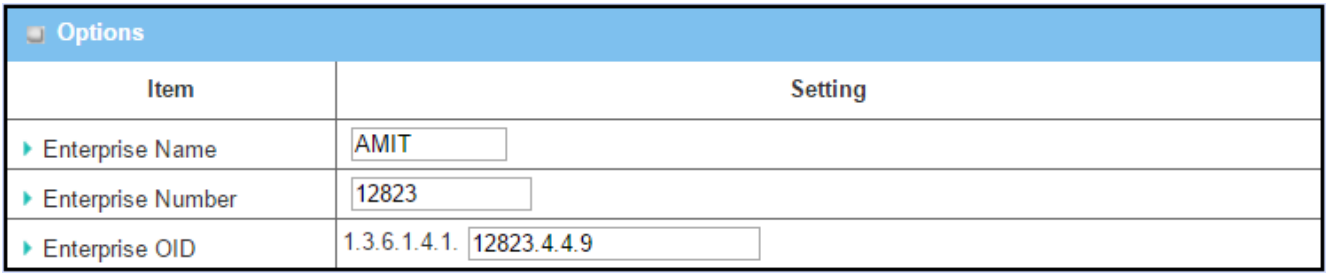
Trap Event Receiver Rule Configuration		
Item	**Value setting**	**Description**
Server IP	1. A Must filled setting 2. String format: any Ipv4 address	Specify the trap **Server IP**. The DUT will send trap to the server IP.
Server Port	1. String format: any port number 2. The default SNMP trap port is 162 3. A Must filled	Specify the trap **Server Port**. You can fill in any port number. But you must ensure the port number is not to be used. *Value Range*: 1 ~ 65535.

	setting	
SNMP Version	1. **v1** is selected by default	Select the version for the trap Selected the **v1**. The configuration screen will provide the version 1 must filled items. Selected the **v2c**. The configuration screen will provide the version 2c must filled items. Selected the **v3**. The configuration screen will provide the version 3 must filled items.
Community Name	1. A **v1** and **v2c** Must filled setting 2. String format: any text	Specify the **Community Name** for this version 1 or version v2c trap. ***Value Range*****:** 1 ~ 32 characters.
User Name	1. A **v3** Must filled setting 2. String format: any text	Specify the **User Name** for this version 3 trap. ***Value Range*****:** 1 ~ 32 characters.
Password	1. A **v3** Must filled setting 2. String format: any text	When your **Privacy Mode** is **authNoPriv** or **authPriv**, you must specify the **Password** for this version 3 trap. ***Value Range*****:** 8 ~ 64 characters.
Privacy Mode	1. A **v3** Must filled setting 2. **noAuthNoPriv** is selected by default	Specify the **Privacy Mode** for this version 3 trap. Selected the **noAuthNoPriv**. You do not use any authentication types and encryption protocols. Selected the **authNoPriv**. You must specify the **Authentication** and **Password**. Selected the **authPriv**. You must specify the Authentication, Password, Encryption and Privacy Key.
Authentication	1. A **v3** Must filled setting 2. **None** is selected by default	When your **Privacy Mode** is **authNoPriv** or **authPriv**, you must specify the **Authentication** types for this version 3 trap. Selected the authentication types **MD5/ SHA-1** to use.
Encryption	1. A **v3** Must filled setting 2. **None** is selected by default	When your **Privacy Mode** is **authPriv**, you must specify the **Encryption** protocols for this version 3 trap. Selected the encryption protocols **DES / AES** to use.
Privacy Key	1. A **v3** Must filled setting 2. String format: any text	When your **Privacy Mode** is **authPriv**, you must specify the **Privacy Key** (8 ~ 64 characters) for this version 3 trap.
Enable	1.The box is checked by	Click **Enable** to enable this trap receiver.

	default	
Save	N/A	Click the **Save** button to save the configuration. But it does not apply to SNMP functions. When you return to the SNMP main page. It will show “Click on save button to apply your changes” remind user to click main page **Save** button.
Undo	N/A	Click the **Undo** button to cancel the settings.
Back	N/A	Click the **Back** button to return the last page.

Edit SNMP Options

If you use some particular private MIB, you must fill the enterprise name, number and OID.

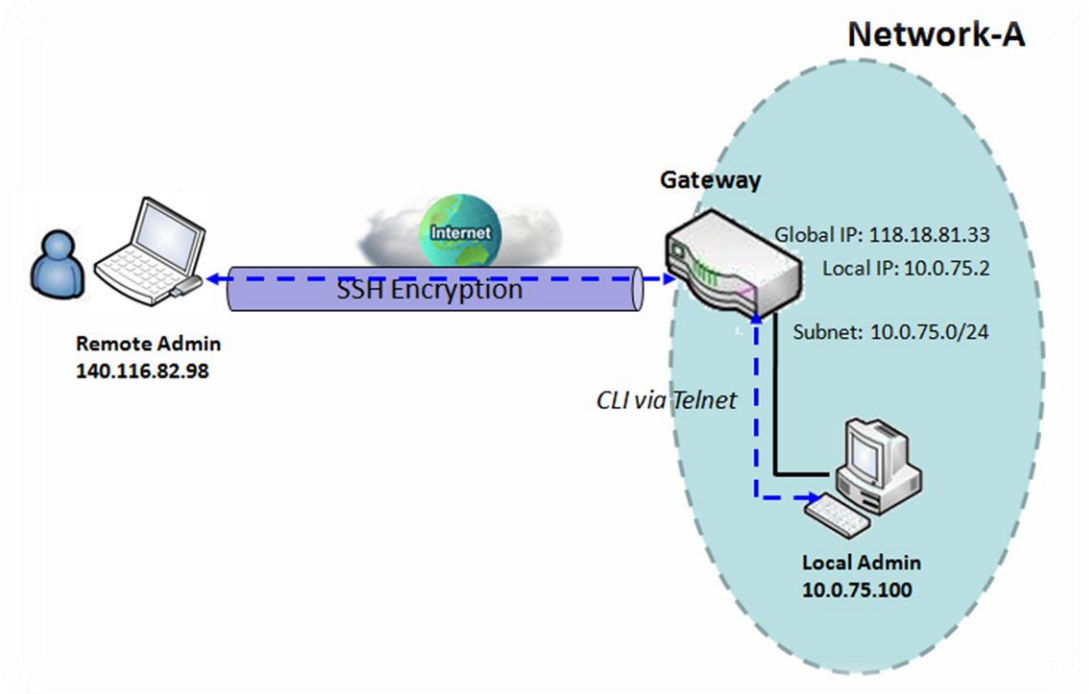


Options		
Item	**Value setting**	**Description**
Enterprise Name	1. The default value is AMIT 2. A Must filled setting 3. String format: any text	Specify the **Enterprise Name** for the particular private MIB. ***Value Range*:** 1 ~ 10 characters, and only string with A~Z, a~z, 0~9, ’–‘, ‘_’.
Enterprise Number	The default value is 12823 (AMIT Enterprise Number) 2. A Must filled setting 3. String format: any number	Specify the **Enterprise Number** for the particular private MIB. ***Value Range*:** 1 ~2080768.
Enterprise OID	1. The default value is 1.3.6.1.4.1.12823.4.4.9 (AMIT Enterprise OID) 2. A Must filled setting 3. String format: any legal OID	Specify the **Enterprise OID** for the particular private MIB. The range of the each OID number is 1-2080768. The maximum length of the enterprise OID is 31. The seventh number must be identical with the enterprise number.
Save	N/A	Click the **Save** button to save the configuration and apply your changes to SNMP functions.
Undo	N/A	Click the **Undo** button to cancel the settings.

6.1.4 Telnet with CLI

A command-line interface (CLI), also known as command-line user interface, and console user interface are means of interacting with a computer program where the user (or client) issues commands to the program in the form of successive lines of text (command lines). The interface is usually implemented with a command line shell, which is a program that accepts commands as text input and converts commands to appropriate operating system functions. Programs with command-line interfaces are generally easier to automate via scripting. The device supports both Telnet and SSH (Secure Shell) CLI with default service port 23 and 22, respectively.

Telnet & SSH Scenario



Scenario Application Timing

When the administrator of the gateway wants to manage it from remote site in the Intranet or Internet, he may use "Telnet with CLI" function to do that by using "Telnet" or "SSH" utility.

Scenario Description

The Local Admin or the Remote Admin can manage the Gateway by using "Telnet" or "SSH" utility with privileged user name and password.

The data packets between the Local Admin and the Gateway or between the Remote Admin and

the Gateway can be plain texts or encrypted texts. Suggest they are plain texts in the Intranet for Local Admin to use "Telnet" utility, and encrypted texts in the Internet for Remote Admin to use "SSH" utility.

Parameter Setup Example

Following table lists the parameter configuration as an example for the Gateway in above diagram with "Telnet with CLI" enabling at LAN and WAN interfaces.

Use default value for those parameters that are not mentioned in the table.

Configuration Path	[Telnet with CLI]-[Configuration]
Telnet with CLI	LAN: ■ **Enable** WAN: ■ **Enable**
Connection Type	Telnet: Service Port **23** ■ **Enable** SSH: Service Port **22** ■ **Enable**

Scenario Operation Procedure

In above diagram, "Local Admin" or "Remote Admin" can manage the "Gateway" in the Intranet or Internet. The "Gateway" is the gateway of Network-A, and the subnet of its Intranet is 10.0.75.0/24. It has the IP address of 10.0.75.2 for LAN interface and 118.18.81.33 for WAN-1 interface. It serves as a NAT gateway.

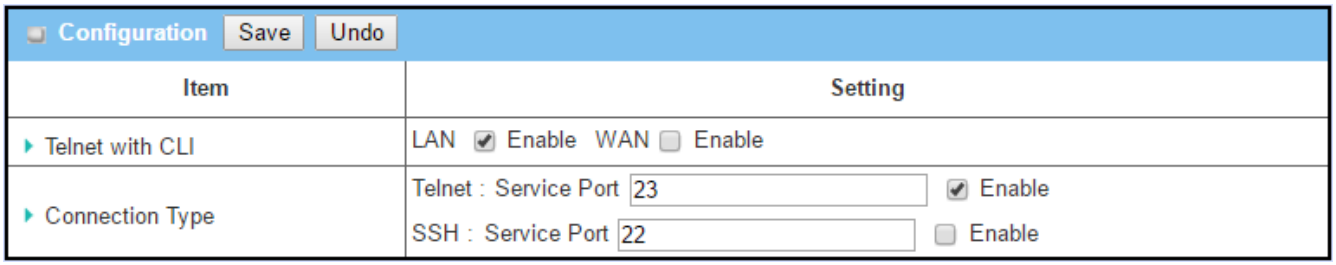
The "Local Admin" in the Intranet uses "Telnet" utility with privileged account to login the Gateway. Or the "Remote Admin" in the Internet uses "SSH" utility with privileged account to login the Gateway.

The administrator of the gateway can control the device as like he is in front of the gateway.

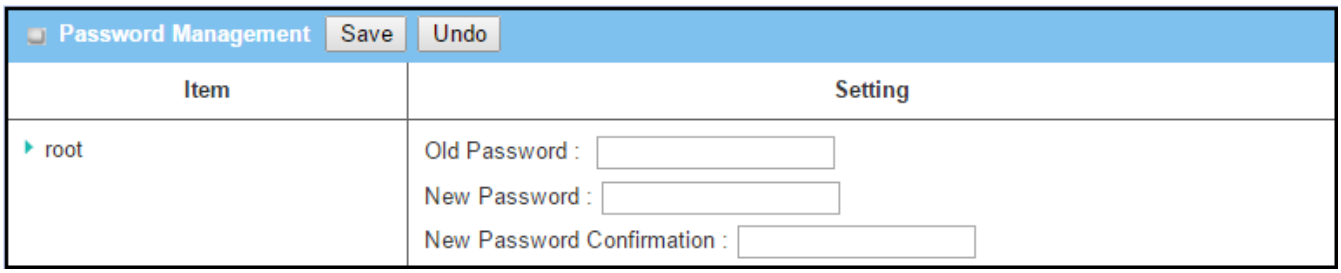
Telnet with CLI Setting

Go to Administration > Configure & Manage > Telnet with CLI tab.

The Telnet with CLI setting allows administrator to access this device through the traditional Telnet program. Before you can telnet (login) to the device, please configure the related settings and password with care. The password management part allows you to set root password for logging telnet and SSH.



Configuration		
Item	**Value setting**	**Description**
Telnet with CLI	1. The LAN Enable box is checked by default. 2. The WAN Enable box is unchecked by default.	Check the **Enable** box to activate the Telnet with CLI function for connecting from WAN/LAN interfaces.
Connection Type	1. The Telnet Enable box is checked by default. By default **Service Port** is 23. 2. The SSH Enable box is unchecked by default. By default **Service Port** is 22.	Check the Telnet **Enable** box to activate telnet service. Check the SSH **Enable** box to activate SSH service. You can set which number of **Service Port** you want to provide for the corresponding service. ***Value Range***: 1 ~65535.
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings



Configuration		
Item	**Value setting**	**Description**
root	1. String: any text but no blank character 2. The default password for telnet is ‘m2mamit’.	Type old password and specify new password to change root password. ***Note: You are highly recommended to change the default telnet password with yours before the device is deployed.***
Save	N/A	Click **Save** to save the settings
Undo	N/A	Click **Undo** to cancel the settings

6.2 System Operation

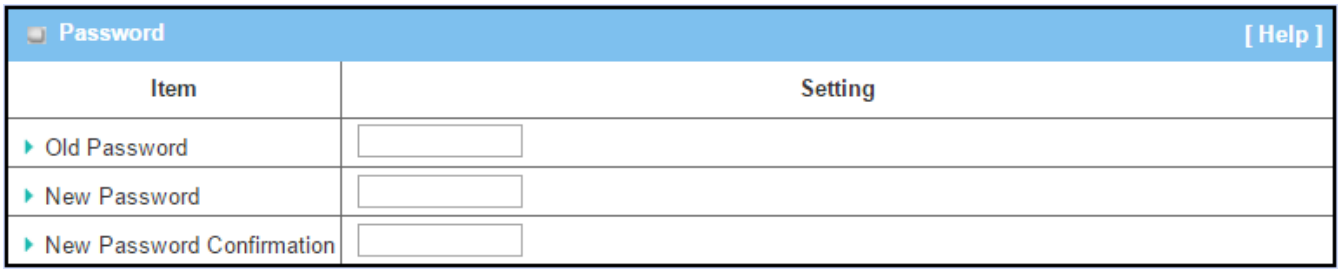
System Operation allows the network administrator to manage system, settings such as web-based utility access password change, system information, system time, system log, firmware/configuration backup & restore, and reset & reboot.

6.2.1 Password & MMI

Go to Administration > System Operation > Password & MMI **tab.**

Change Password

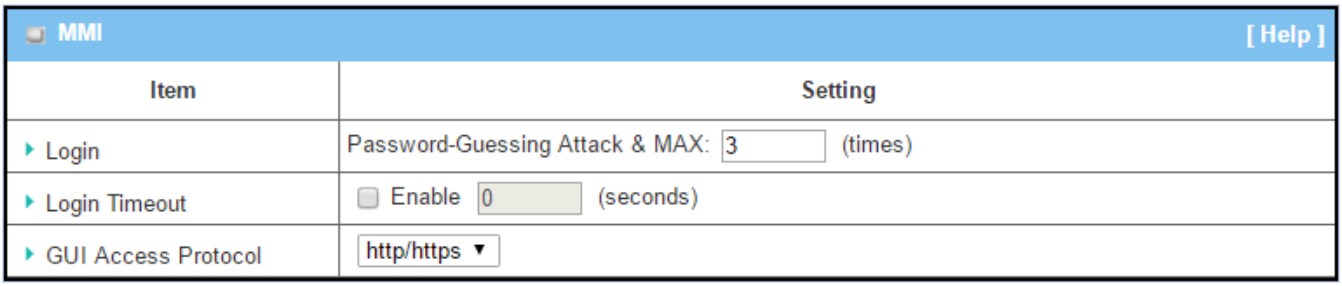
Change password screen allows network administrator to change the web-based MMI login password to access gateway.



Change Password		
Item	**Value Setting**	**Description**
Old Password	1. String: any text **2. The default password for web-based MMI is 'admin'.**	Enter the current password to enable you unlock to change password.
New Password	String: any text	Enter new password
New Password Confirmation	String: any text	Enter new password again to confirm
Save	N/A	Click **Save** button to save the settings
Undo	N/A	Click **Undo** button to cancel the settings

Change MMI Setting for Accessing

This is the gateway's web-based MMI access which allows administrator to access the gateway for management. The gateway's web-based MMI will automatically logout when the idle time has elapsed. The setting allows administrator to enable automatic logout and set the logout idle time. When the login timeout is disabled, the system won't logout the administrator automatically.



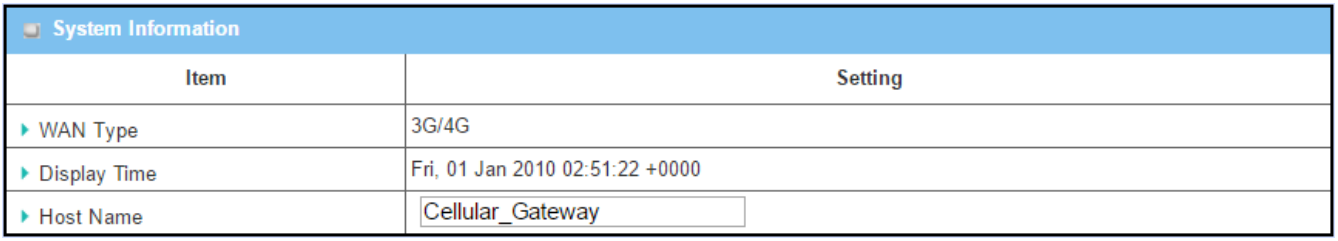
Web UI		
Item	**Value Setting**	**Description**
Login	3 times is set by default	Enter the login trial counting value. ***Value Range***: 3 ~ 10. If someone tried to login the web GUI with incorrect password for more than the counting value, an warning message "***Already reaching maximum Password-Guessing times, please wait a few seconds!***" will be displayed and ignore the following login trials.
Login Timeout	The Enable box is unchecked by default	Check the Enable box to activate the auto logout function, and specify the maximum idle time as well. ***Value Range***: 30 ~ 65535.
GUI Access Protocol	http/https is selected by default.	Select the protocol that will be used for GUI access. It can be **http/https**, **http only**, or **https only**.
Save	N/A	Click **Save** button to save the settings
Undo	N/A	Click **Undo** button to cancel the settings

6.2.2 System Information

System Information screen gives network administrator a quick look up on the type of WAN connection being used. The display also shows the current System time. It is particularly useful when firmware has been upgraded and system configuration file has been loaded.

Go to Administration > System Operation > System Information **tab.**

System Name		
Item	**Value Setting**	**Description**
System Name	1. an optional item 2. AMIT is set by default.	Enter the system name for identification purpose. It can be the manufacture, or any name for a device deployment.

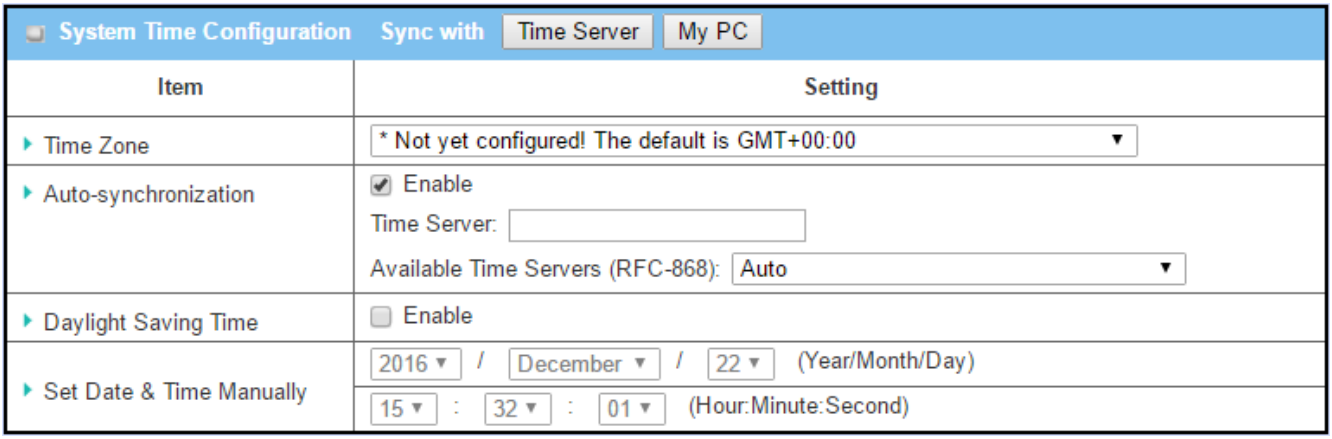


System Information		
Item	**Value Setting**	**Description**
WAN Type	N/A	It displays the WAN Type of WAN-1 Interface Internet connection configured.
Display Time	N/A	It displays the current system time that you browsed this web page.
Host Name	1. It is an optional item 2. **Cellular_Gayeway** is set by default.	Enter the host name for the gateway. It can be used to interact with external network servers for identifying the name of requesting device.
Save	N/A	Click the **Save** button to save the settings.
Refresh	N/A	Click the **Refresh** button to update the system Information immediately.

6.2.3 System Time

The gateway provides manually setup and auto-synchronized approaches for the administrator to setup the system time for the gateway.

Go to Administration > System Operation > System Time **tab.**



System Time Information		
Item	**Value Setting**	**Description**
Time Zone	1. It is an optional item. 2. **GMT+00 :00** is selected by default.	Select a time zone where this device locates.
Auto-synchronization	1. Checked by default. 2. Auto is selected by default.	Check the **Enable** button to activate the time auto-synchronization function with a certain NTP server. You can enter the IP or FQDN for the NTP server you expected, or leave it as auto mode so that the available server will be used for time synchronization one by one.
Daylight Saving Time	1. It is an optional item. 2. Un-checked by default	Check the **Enable** button to activate the daylight saving function. When you enabled this function, you have to specify the start date and end date for the daylight saving time duration.
Set Date & Time	1. It is an optional item.	If you do not enable the time auto-synchronization function, you can also manually set the date (Year/Month/Day) and time (Hour:Minute:Second).
Save	N/A	Click the **Save** button to save the settings.
Refresh	N/A	Click the **Refresh** button to update the system time immediately.

Instead of manually configuring the system time for the gateway, there are two simple and quick solutions for you to set the correct time information and set it as the system time for the gateway.

The first one is “Sync with Timer Server”. Based on your selection of time zone and time server in above time information configuration window, system will communicate with time server by NTP Protocol to get system date and time after you click on the **Sync with Timer Server** button.

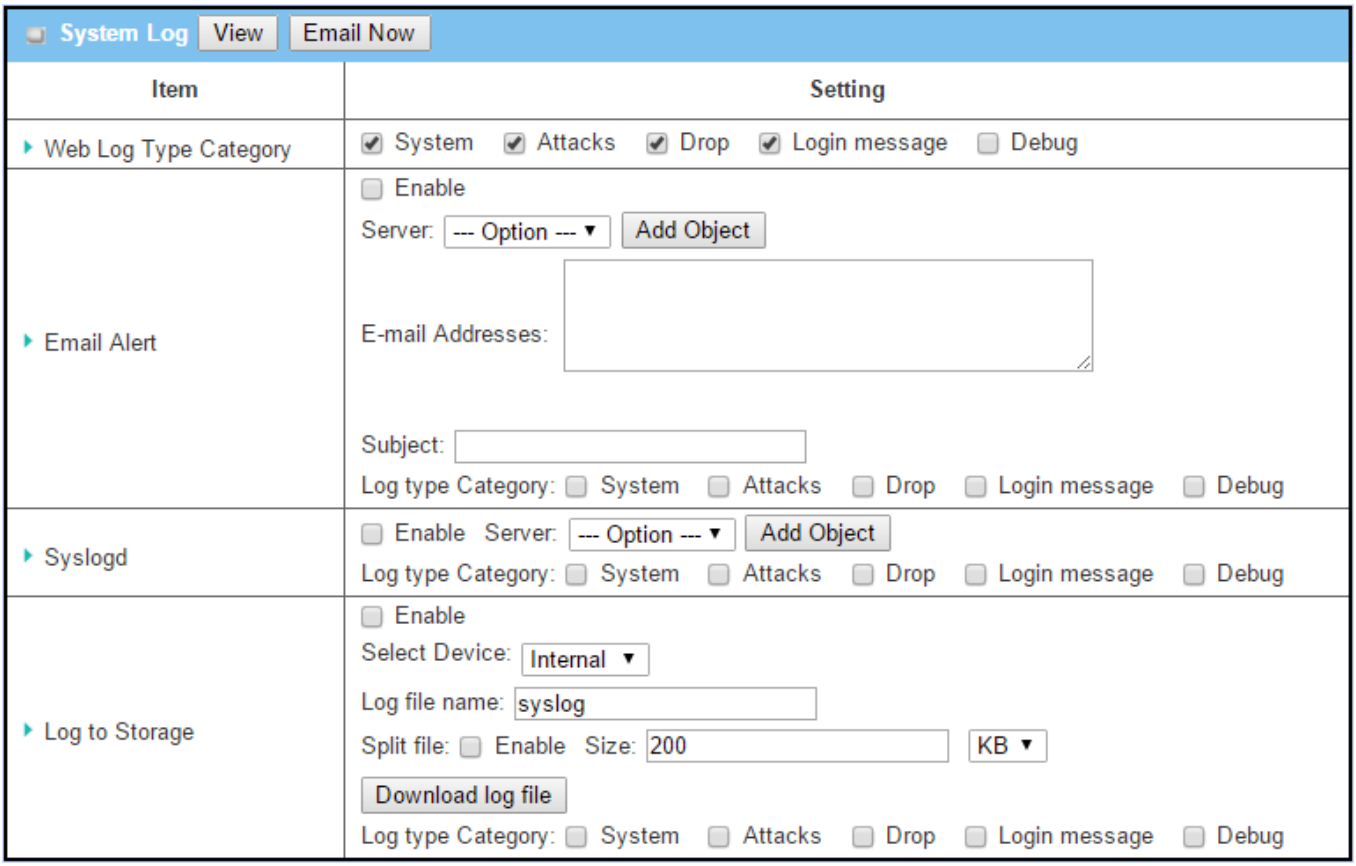
Note: Remember to select a correct time zone for the device, otherwise, you will just get the UTC (Coordinated Universal Time) time, not the local time for the device.

The second one is “Sync with my PC”. Click on the **Sync with my PC** button to let system synchronize its date and time to the time of the administration PC.

6.2.4 System Log

System Log screen contains various event log tools facilitating network administrator to perform local event logging and remote reporting.

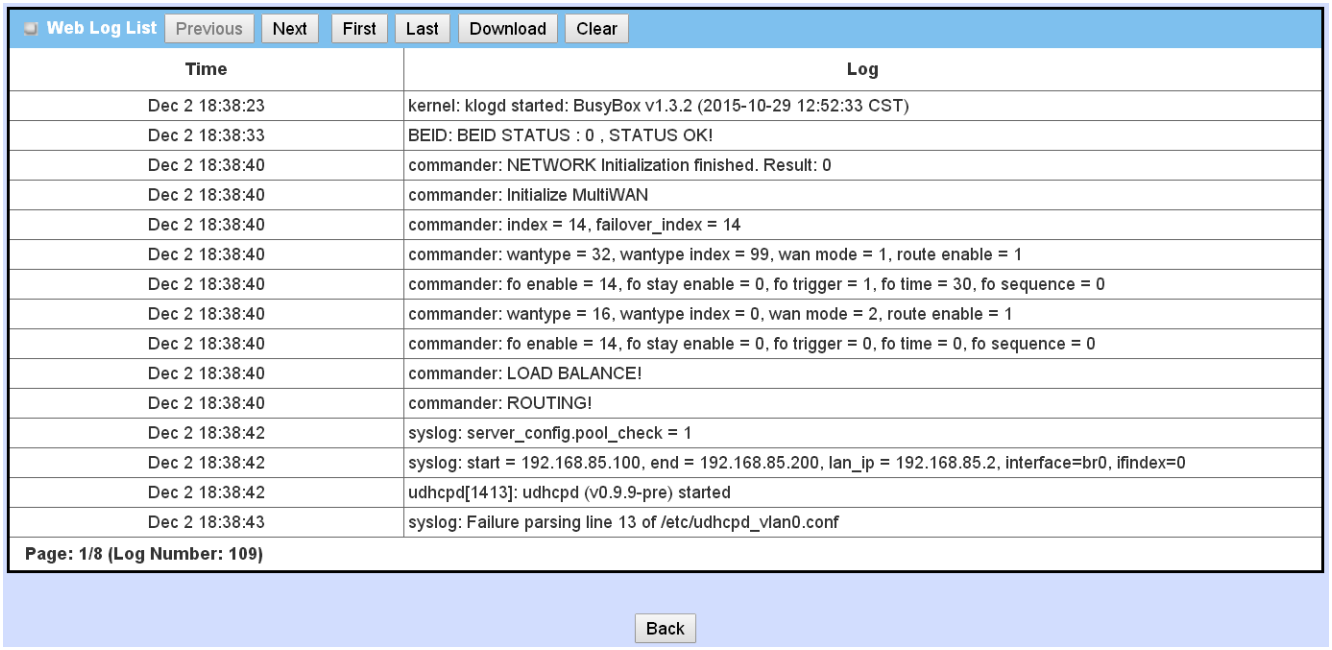
Go to Administration > System Operation > System Log **tab.**



View & Email Log History

View button is provided for network administrator to view log history on the gateway. **Email Now** button enables administrator to send instant Email for analysis.

Item	Value setting	Description
View button	N/A	Click the **View** button to view Log History in Web Log List Window.
Email Now button	N/A	Click the **Email Now** button to send Log History via Email instantly.

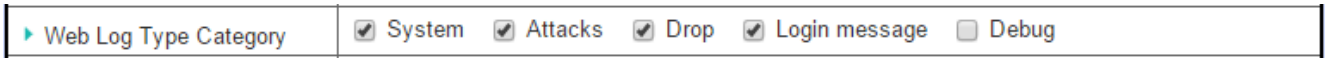


Web Log List Window		
Item	**Value Setting**	**Description**
Time column	N/A	It displays event time stamps
Log column	N/A	It displays Log messages

Web Log List Button Description		
Item	**Value setting**	**Description**
Previous	N/A	Click the **Previous** button to move to the previous page.
Next	N/A	Click the **Next** button to move to the next page.
First	N/A	Click the **First** button to jump to the first page.
Last	N/A	Click the **Last** button to jump to the last page.
Download	N/A	Click the **Download** button to download log to your PC in tar file format.
Clear	N/A	Click the **Clear** button to clear all log.
Back	N/A	Click the **Back** button to return to the previous page.

Web Log Type Category

Web Log Type Category screen allows network administrator to select the type of events to log and be displayed in the Web Log List Window as described in the previous section. Click on the View button to view Log History in the Web Log List window.



Web Log Type Category Setting Window		
Item	**Value Setting**	**Description**
System	Checked by default	Check to log system events and to display in the Web Log List window.
Attacks	Checked by default	Check to log attack events and to display in the Web Log List window.
Drop	Checked by default	Check to log packet drop events and to display in the Web Log List window.
Login message	Checked by default	Check to log system login events and to display in the Web Log List window.
Debug	Un-checked by default	Check to log debug events and to display in the Web Log List window.

Email Alert

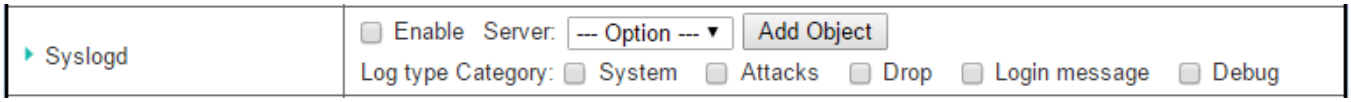
Email Alert screen allows network administrator to select the type of event to log and be sent to the destined Email account.

Email Alert Setting Window		
Item	**Value Setting**	**Description**
Enable	Un-checked by default	Check **Enable** box to enable sending event log messages to destined Email account defined in the E-mail Addresses blank space.

Server	N/A	Select one email server from the Server dropdown box to send Email. If none has been available, click the **Add Object** button to create an outgoing Email server. You may also add an outgoing Email server from Object Definition > External Server > External Server tab.
E-mail address	String : email format	Enter the recipient's Email address. Separate Email addresses with comma ',' or semicolon ' ;' Enter the Email address in the format of '*myemail@domain.com*'
Subject	String : any text	Enter an Email subject that is easy for you to identify on the Email client.
Log type category	Default unchecked	Select the type of events to log and be sent to the designated Email account. Available events are System, Attacks, Drop, Login message, and Debug.

Syslogd

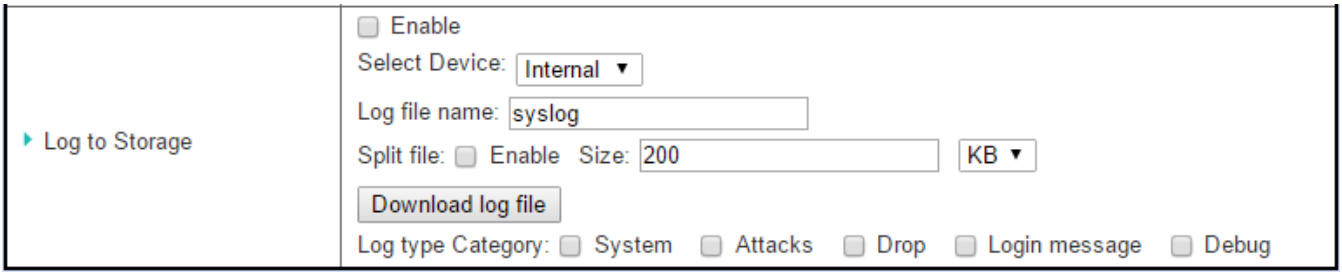
Syslogd screen allows network administrator to select the type of event to log and be sent to the designated Syslog server.



Syslogd Setting Window		
Item	**Value Setting**	**Description**
Enable	Un-checked by default	Check Enable box to activate the Syslogd function, and send event logs to a syslog server
Server	N/A	Select one syslog server from the Server dropdown box to sent event log to. If none has been available, click the **Add Object** button to create a system log server. You may also add an system log server from the Object Definition > External Server > External Server tab.
Log type category	Un-checked by default	Select the type of event to log and be sent to the destined syslog server. Available events are System, Attacks, Drop, Login message, and Debug.

Log to Storage

Log to Storage screen allows network administrator to select the type of events to log and be stored at an internal or an external storage.



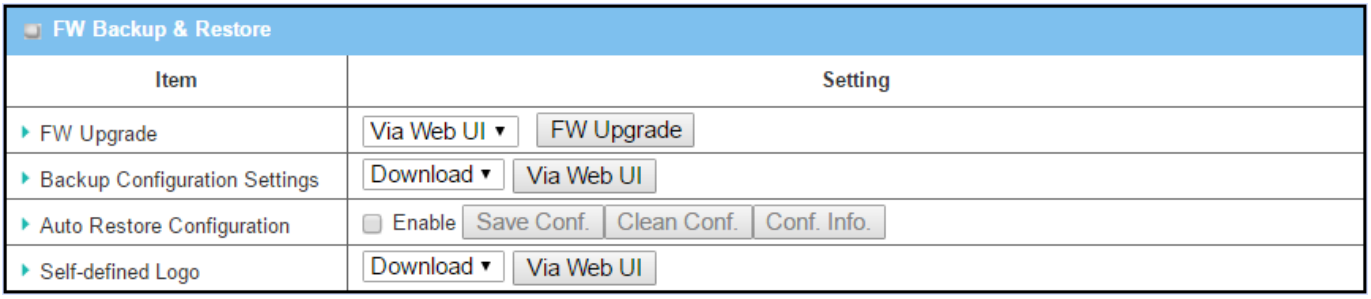
Log to Storage Setting Window		
Item	**Value Setting**	**Description**
Enable	Un-checked by default	Check to enable sending log to storage.
Select Device	Internal is selected by default	Select internal or external storage.
Log file name	Un-checked by default	Enter log file name to save logs in designated storage.
Split file Enable	Un-checked by default	Check **enable** box to split file whenever log file reaching the specified limit.
Split file Size	**200 KB** is set by default	Enter the file size limit for each split log file. ***Value Range***: 10 ~1000.
Log type category	Un-checked by default	Check which type of logs to send: System, Attacks, Drop, Login message, Debug

Log to Storage Button Description		
Item	**Value setting**	**Description**
Download log file	N/A	Click the **Download log file** button to download log files to a log.tar file.

6.2.5 Backup & Restore

In the Backup & Restore window, you can upgrade the device firmware when new firmware is available and also backup / restore the device configuration.
In addition to the factory default settings, you can also customize a special configuration setting as a customized default value. With this customized default value, you can reset the device to the expected default setting if needed.

Go to Administration > System Operation > Backup & Restore **tab.**



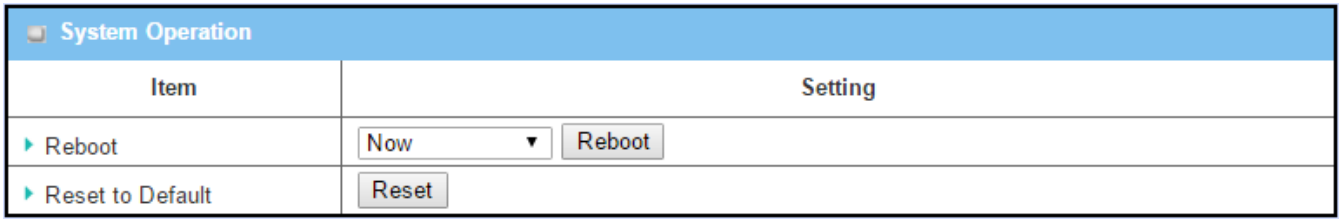
FW Backup & Restore		
Item	**Value Setting**	**Description**
FW Upgrade	Via Web UI is selected by default	If new firmware is available, click the **FW Upgrade** button to upgrade the device firmware **via Web UI**, or **Via Storage**. After clicking on the “FW Upgrade” command button, you need to specify the file name of new firmware by using “Browse” button, and then click “Upgrade” button to start the FW upgrading process on this device. If you want to upgrade a firmware which is from GPL policy, please check “Accept unofficial firmware”
Backup Configuration Settings	Download is selected by default	You can backup or restore the device configuration settings by clicking the ***Via Web UI*** button. **Download**: for backup the device configuration to a config.bin file. **Upload**: for restore a designated configuration file to the device. **Via Web UI**: to retrieve the configuration file via Web GUI.
Auto Restore Configuration	The Enable box is unchecked by default	Chick the **Enable** button to activate the customized default setting function. Once the function is activated, you can save the expected setting as a customized default setting by clicking the **Save Conf.** button, or clicking the **Clean Conf.** button to erase the stored customized configuration.

6.2.6 Reboot & Reset

For some special reason or situation, you may need to reboot the gateway or reset the device configuration to its default value. In addition to perform these operations through the Power ON/OFF, or pressing the reset button on the device panel, you can do it through the web GUI too.

Go to Administration > System Operation > Reboot & Reset **tab.**

In the Reboot & Reset window, you can reboot this device by clicking the “Reboot” button, and reset this device to default settings by clicking the “Reset” button.



System Operation Window		
Item	**Value Setting**	**Description**
Reboot	Now is selected by default	Chick the **Reboot** button to reboot the gateway immediately or on a pre-defined time schedule. **Now**: Reboot immediately **Time Schedule**: Select a pre-defined auto-reboot time schedule rule to reboot the auto device on a designated tim. To define a time schedule rule, go to **Object Definition > Scheduling > Configuration** tab.
Reset to Default	N/A	Click the **Reset** button to reset the device configuration to its default value.

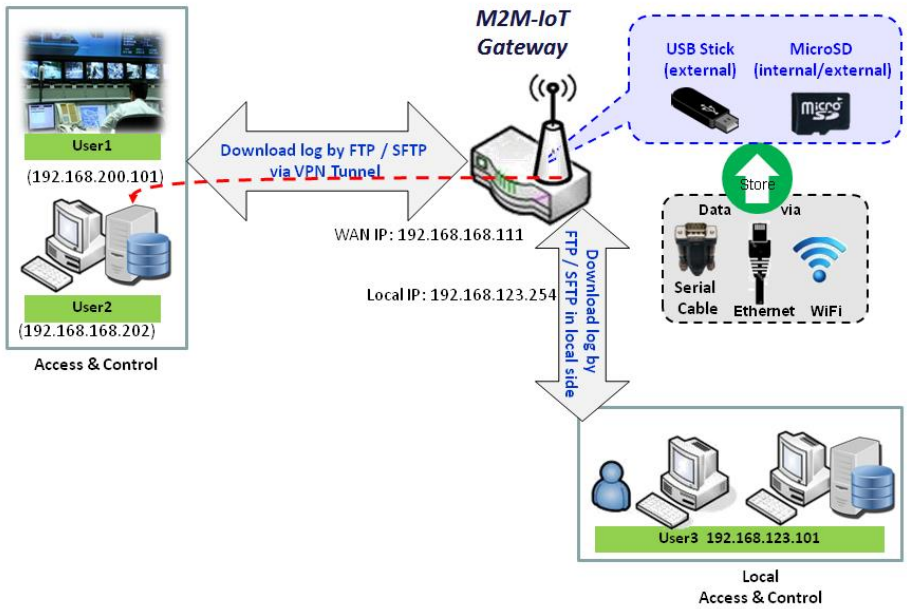
6.3 FTP

The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files between a client and server on a computer network. FTP is built on a client-server model architecture and uses separate control and data connections between the client and the server. FTP users may authenticate themselves with a clear-text sign-in protocol, normally in the form of a username and password, but can connect anonymously if the server is configured to allow it.

For secure transmission that protects the username and password, and encrypts the content, FTP is often secured with SSL/TLS (FTPS). Besides, SSH File Transfer Protocol (SFTP) is sometimes also used instead, but is technologically different.

This gateway embedded FTP / SFTP server for administrator to download the log files to his computer or database. In the following two sections, you can configure the FTP server and create the user accounts that can login to the server. After login to the FTP server, you can browse the log directory and have the permission to download the stored log files and delete the files you have downloaded to make more storage space for further data logs.

The available log files can be system logs (refer to Administration > System Operation > System Log), Network Packets (refer to Administrator > Diagnostic > Packet Analyzer), Data Log (refer to Field Communication > Data Logging > Log File Management), and GNSS Log (refer to Service > Location Tracking > GNSS). With proper configuration for the various log functions that supported on your purchased product, you can download the log via FTP / SFTP connections.

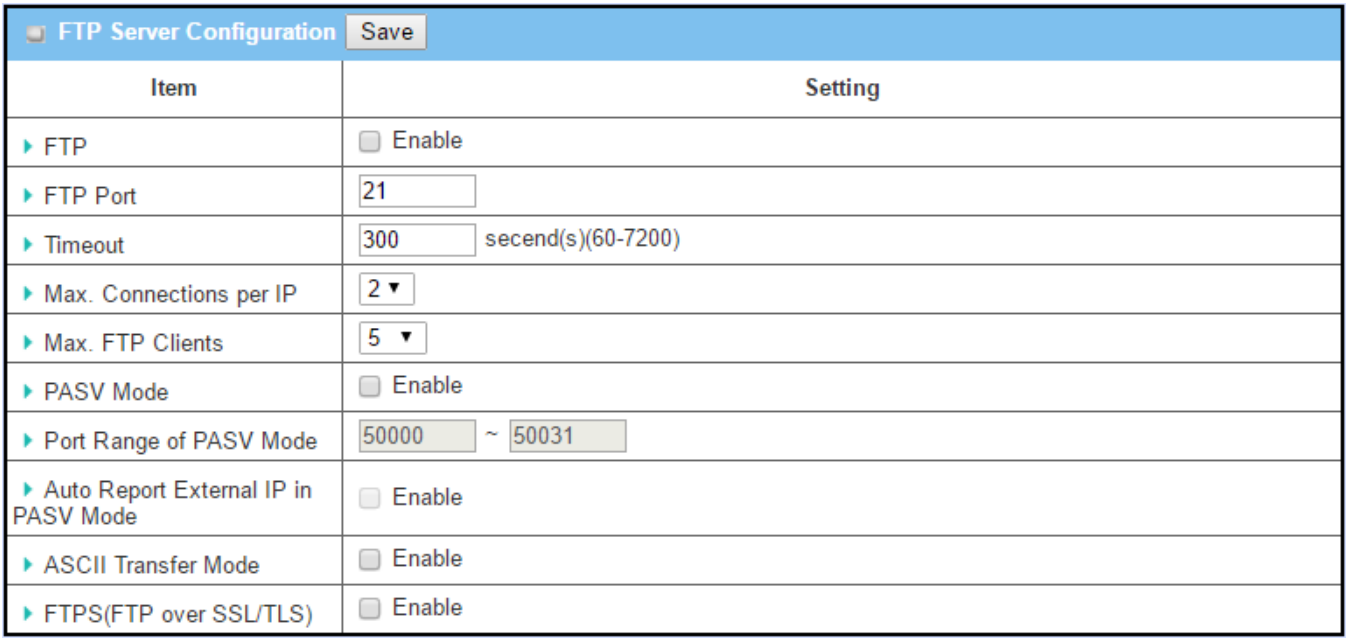


6.3.1 Server Configuration

This section allows user to setup the embedded FTP and SFTP server for retrieving the interested fog files.

Go to Administration > FTP > Server Configuration tab.

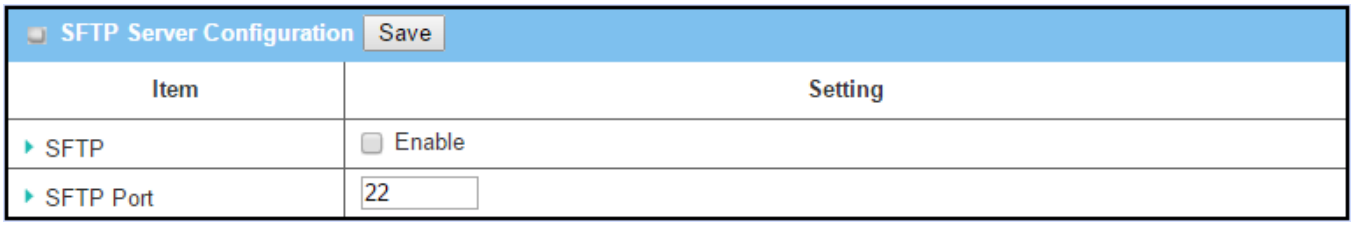
Enable FTP Server



Configuration		
Item	**Value setting**	**Description**
FTP	The box is unchecked by default.	Check **Enable** box to activate the embedded FTP Server function. With the FTP Server enabled, you can retrieve or delete the stored log files via FTP connection. Note: The embedded FTP Server is only for log downloading, so no any write permission is implemented for user file upload to the storage.
FTP Port	Port **21** is set by default	Specify a port number for FTP connection. The gateway will listen for incoming FTP connections on the specified port. ***Value Range*:** 1 ~ 65535.
Timeout	**300** seconds is set by default.	Specify the maximum timeout interval for the FTP connection. Supported range is 60 to 7200 seconds.
Max. Connections per IP	**2** Clients are set by default.	Specify the maximum number of clients from the same IP address for the FTP connection. Up to 5 clients from the same IP address is supported.

Max. FTP Clients	**5** Clients are set by default.	Specify the maximum number of clients for the FTP connection. Up to 32 clients is supported.
PASV Mode	Optional setting	Check the **Enable** box to activate the support of PASV mode for a FTP connection from FTP clients.
Port Range of PASV Mode	Port **50000** ~ **50031** is set by default.	Specify the port range to allocate for PASV style data connection. ***Value Range*:** 1024 ~ 65535.
Auto Report External IP in PASV Mode	Optional setting	Check the **Enable** box to activate the support of overriding the IP address advertising in response to the PASV command.
ASCII Transfer Mode	Optional setting	Check the **Enable** box to activate the support of ASCII mode data transfers. Binary mode is supported by default.
FTPS (FTP over SSL/TLS)	Optional setting	Check the **Enable** box to activate the support of secure connections via SSL/TLS.

Enable SFTP Server



Configuration		
Item	**Value setting**	**Description**
SFTP	The box is unchecked by default.	Check **Enable** box to activate the embedded SFTP Server function. With the SFTP Server enabled, you can retrieve or delete the stored log files via secure SFTP connection.
SFTP Port	Default 22	Specify a port number for SFTP connection. The gateway will listen for incoming SFTP connections on the specified port. ***Value Range*:** 1 ~ 65535.

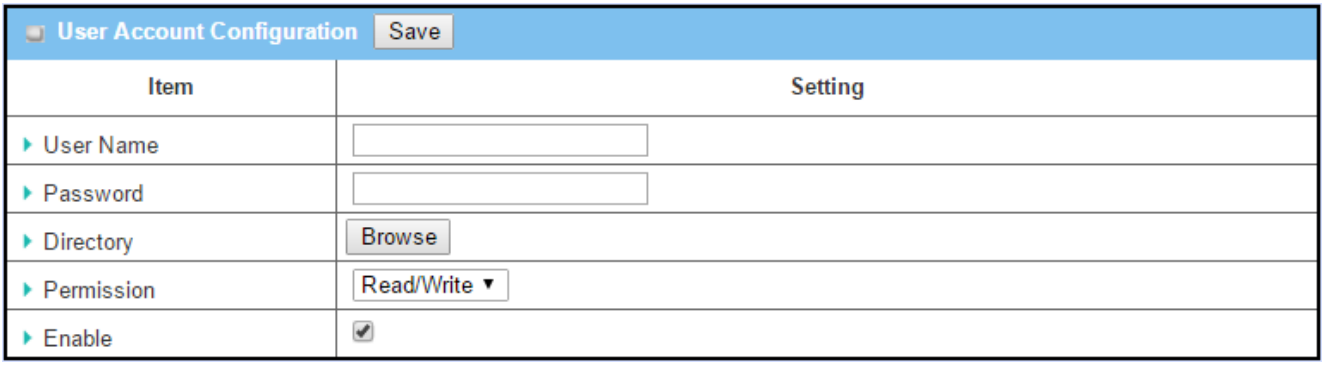
6.3.2 User Account

This section allows user to setup user accounts for logging to the embedded FTP and SFTP server to retrieve the interested fog files.

Go to Administration > FTP > User Account tab.

Create/Edit FTP User Accounts

When **Add** button is applied, **User Account Configuration screen** will appear.



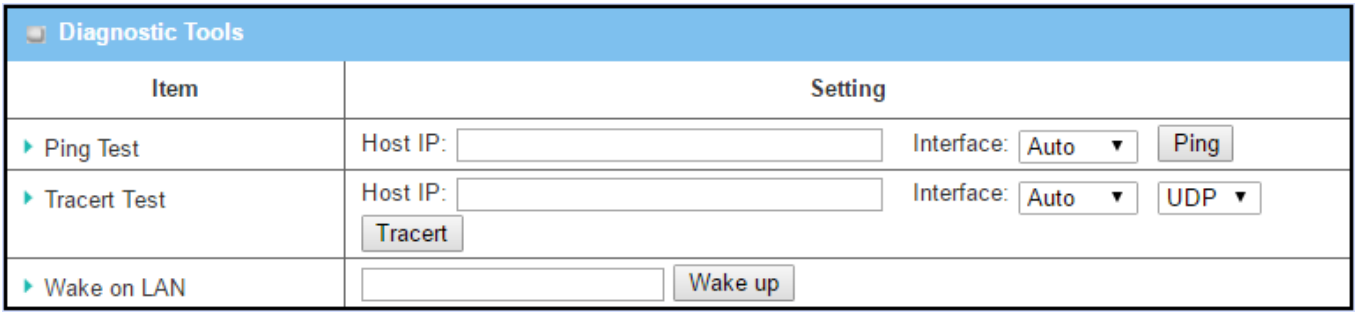
Configuration		
Item	**Value setting**	**Description**
User Name	String : non-blank string	Enter the user account for login to the FTP server. ***Value Range*:** 1 ~ 15 characters.
Password	String : no blank	Enter the user password for login to the FTP server.
Directory	N/A	Select a root directory after user login.
Permission	**Read/Write** is selected by default.	Select the Read/write permission. Note: The embedded FTP Server is only for log downloading, so no any write permission is implemented for user file upload to the storage, even **Read/Write** option is selected.
Enable	The box is checked by default.	Check the box to activate the FTP user account.

6.4 Diagnostic

This gateway supports simple network diagnosis tools for the administrator to troubleshoot and find the root cause of the abnormal behavior or traffics passing through the gateway. There can be a Packet Analyzer to help record the packets for a designated interface or specific source/destination host, and another Ping and Tracert tools for testing the network connectivity issues.

6.4.1 Diagnostic Tools

The Diagnostic Tools provide some frequently used network connectivity diagnostic tools (approaches) for the network administrator to check the device connectivity.
Go to **Administration > Diagnostic > Diagnostic Tools** tab.



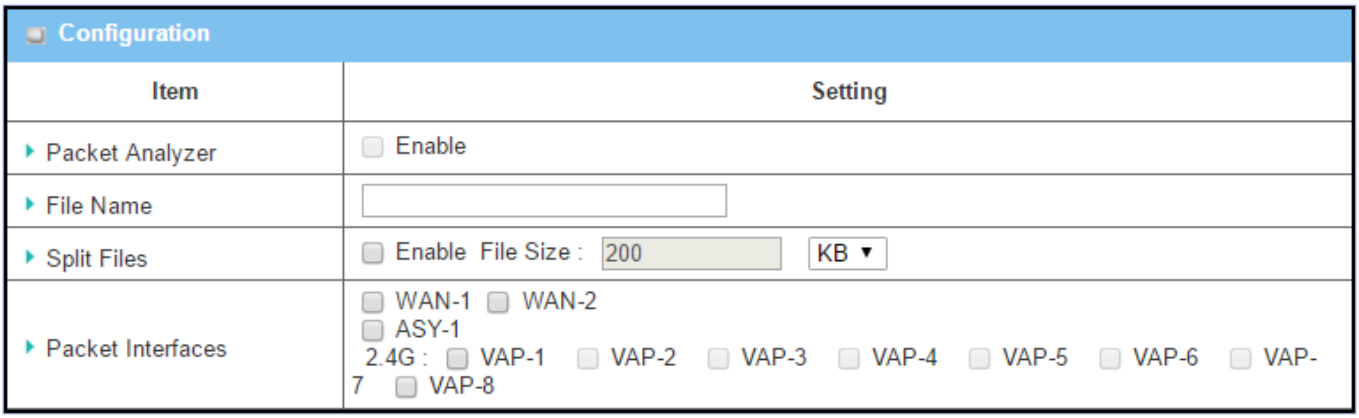
Diagnostic Tools		
Item	**Value setting**	**Description**
Ping Test	Optional Setting	This allows you to specify an IP / FQDN and the test interface, so system will try to ping the specified device to test whether it is alive after clicking on the **Ping** button. A test result window will appear beneath it.
Tracert Test	Optional setting	Trace route (tracert) command is a network diagnostic tool for displaying the route (path) and measuring transit delays of packets across an IP network. Trace route proceeds until all (three) sent packets are lost for more than twice, then the connection is lost and the route cannot be evaluated.

		First, you need to specify an IP / FQDN, the test interface and the protocol (UDP or ICMP), and by default, it is **UDP**. Then, system will try to trace the specified host to test whether it is alive after clicking on **Tracert** button. A test result window will appear beneath it.
Wake on LAN	Optional setting	Wake on LAN (WOL) is an Ethernet networking standard that allows a computer to be turned on or awakened by a network message. You can specify the MAC address of the computer, in your LAN network, to be remotely turned on by clicking on the **Wake up** command button.
Save	N/A	Click the **Save** button to save the configuration.

6.4.2 Packet Analyzer

The Packet Analyzer can capture packets depend on user settings. User can specify interfaces to capture packets and filter by setting rule. Ensure the log storage is available (either embedded SD-Card or external USB Storage), otherwise **Packet Analyzer** cannot be enabled.

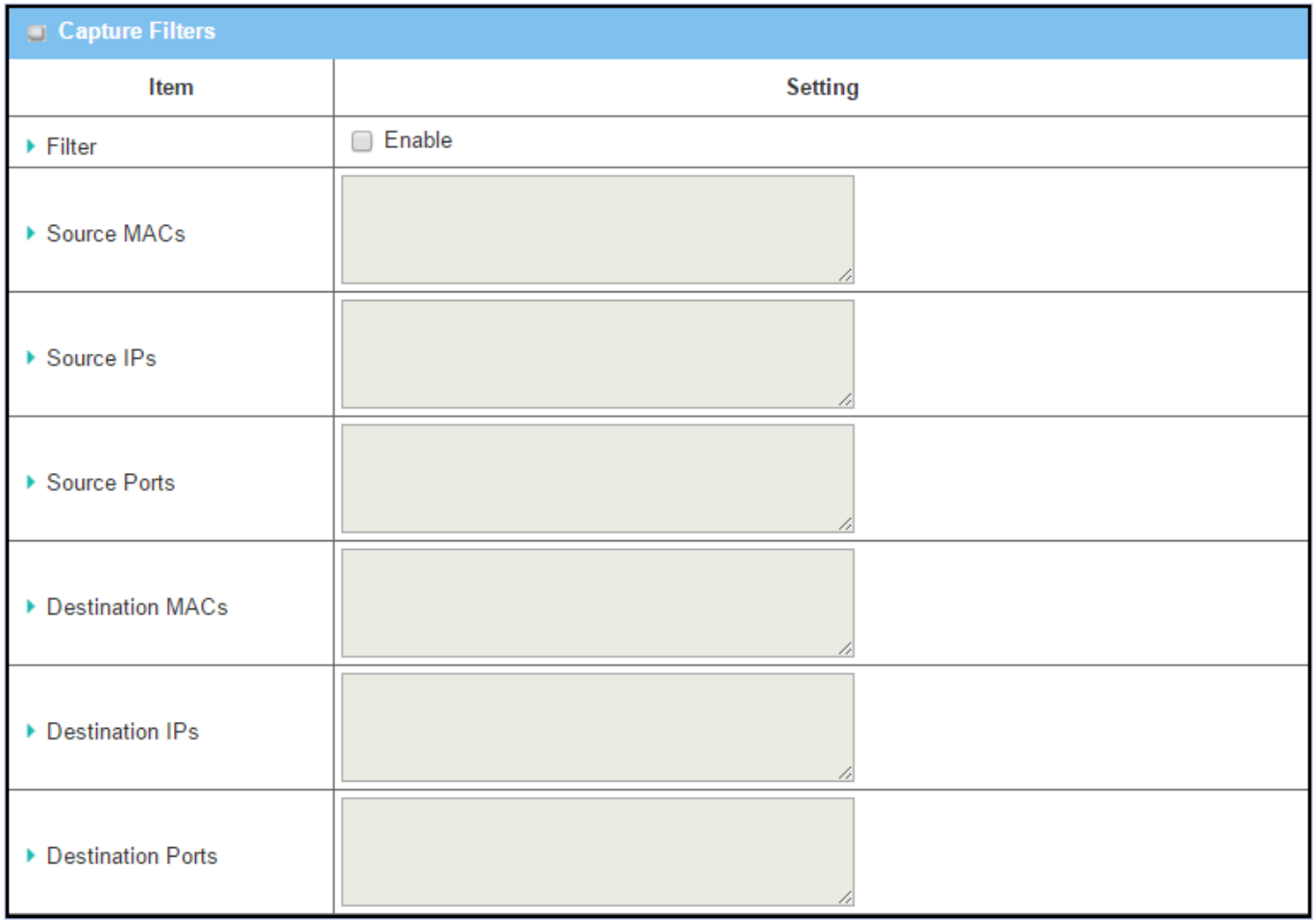
Go to **Administration > Diagnostic > Packet Analyzer** tab.



Configuration		
Item	**Value setting**	**Description**
Packet Analyzer	The box is unchecked by default.	Check **Enable** box to activate the Packet Analyzer function. If you cannot enable the checkbox, please check if the storage is available or not. Plug in the USB storage and then enable the Package Analyzer function.
File Name	1. An optional setting 2. Blank is set by default, and the default file name is **<Interface>_<Date>_<index>.**	Enter the file name to save the captured packets in log storage. If **Split Files** option is also enabled, the file name will be appended with an index code "**_<index>**". The extension file name is **.pcap**.
Split Files	1. An optional setting 2. The default value of **File Size** is 200 KB.	Check **enable** box to split file whenever log file reaching the specified limit. If the **Split Files** option is enabled, you can further specify the **File Size** and **Unit** for the split files. ***Value Range*:** 10 ~ 99999. NOTE: **File Size** cannot be less than 10 KB
Packet Interfaces	An optional setting	Define the interface(s) that **Packet Analyzer** should work on. At least, one interface is required, but multiple selections are also accepted. The supported interfaces can be: ● **WAN**: When the WAN is enabled at **Physical Interface**, it can be selected here.

		• **ASY**: This means the serial communication interface. It is used to capture packets appearing in the **Field Communication**. Therefore, it can only be selected when specific field communication protocol, like Modbus, is enabled. • **VAP**: This means the virtual AP. When WiFi and VAP are enabled, it can be selected here.
Save	N/A	Click the **Save** button to save the configuration.
Undo	N/A	Click the **Undo** button to restore what you just configured back to the previous setting.

Once you enabled the Packet Analyzer function on specific Interface(s), you can further specify some filter rules to capture the packets which matched the rules.



Capture Fitters		
Item	**Value setting**	**Description**
Filter	Optional setting	Check **Enable** box to activate the Capture Filter function.
Source MACs	Optional setting	Define the filter rule with **Source MACs**, which means the source MAC address of packets.

		Packets which match the rule will be captured. Up to 10 MACs are supported, but they must be separated with "**;**", e.g. AA:BB:CC:DD:EE:FF; 11:22:33:44:55:66 The packets will be captured when match any one MAC in the rule.
Source IPs	Optional setting	Define the filter rule with **Source IPs**, which means the source IP address of packets. Packets which match the rule will be captured. Up to 10 IPs are supported, but they must be separated with "**;**", e.g. 192.168.1.1; 192.168.1.2 The packets will be captured when match any one IP in the rule.
Source Ports	Optional setting	Define the filter rule with **Source Ports**, which means the source port of packets. The packets will be captured when match any port in the rule. Up to 10 ports are supported, but they must be separated with "**;**", e.g. 80; 53 ***Value Range*****:** 1 ~ 65535.
Destination MACs	Optional setting	Define the filter rule with **Destination MACs**, which means the destination MAC address of packets. Packets which match the rule will be captured. Up to 10 MACs are supported, but they must be separated with "**;**", e.g. AA:BB:CC:DD:EE:FF; 11:22:33:44:55:66 The packets will be captured when match any one MAC in the rule.
Destination IPs	Optional setting	Define the filter rule with **Destination IPs**, which means the destination IP address of packets. Packets which match the rule will be captured. Up to 10 IPs are supported, but they must be separated with "**;**", e.g. 192.168.1.1; 192.168.1.2 The packets will be captured when match any one IP in the rule.
Destination Ports	Optional setting	Define the filter rule with **Destination Ports**, which means the destination port of packets. The packets will be captured when match any port in the rule. Up to 10 ports are supported, but they must be separated with "**;**", e.g. 80; 53 ***Value Range*****:** 1 ~ 65535.

Chapter 7 Service

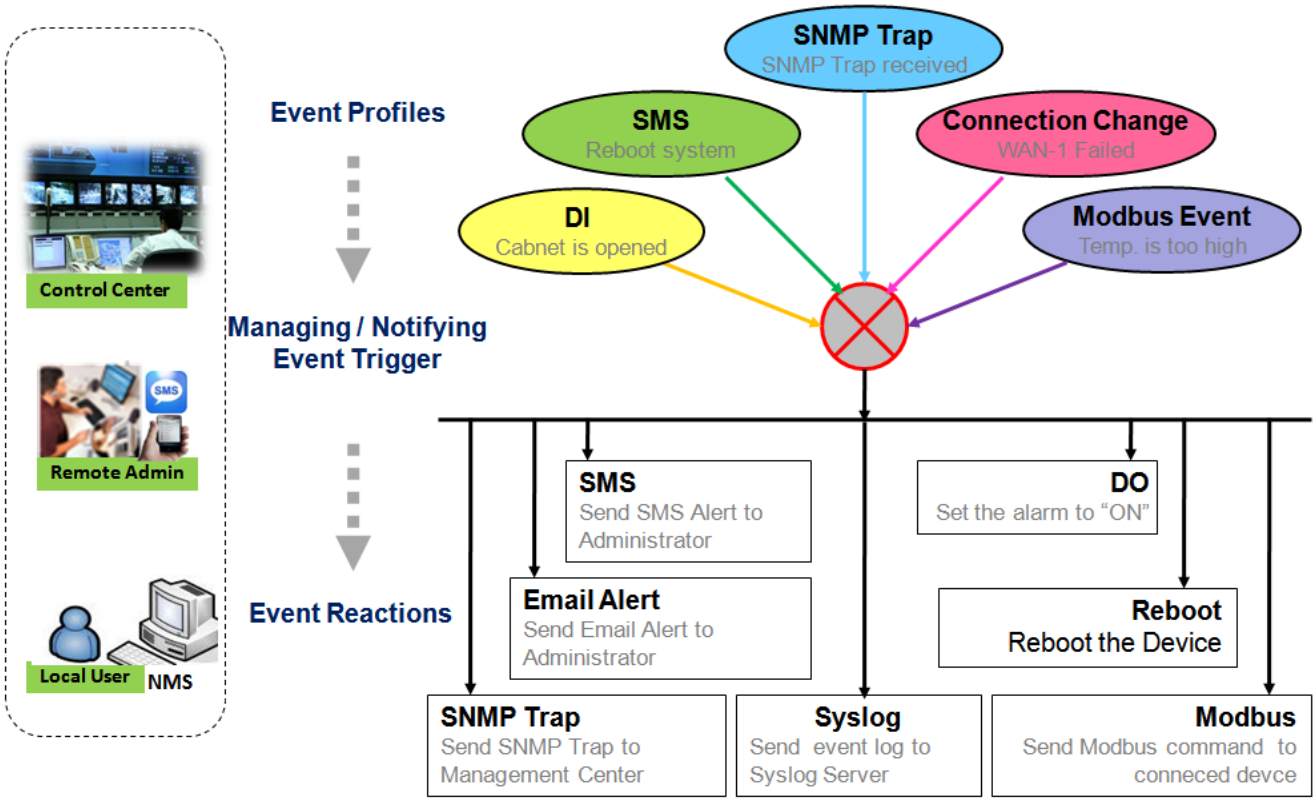
7.2 Event Handling

Event handling is the application that allows administrator to setup the pre-defined events, handlers, or response behavior with individual profiles. With properly configuring the event handling function, administrator can easily and remotely obtain the status and information via the purchased gateway. Moreover, he can also handle and manage some important system related functions, even the field bus devices and D/O devices which are already well connected to.

The supported events are categorized into two groups: the **managing events** and **notifying events**.

The **managing events** are the events that are used to manage the gateway or change the setting / status of the specific functionality of the gateway. On receiving the managing event, the gateway will take action to change the functionality, collect the required status for administration, and also change the status of a certain connected field bus device simultaneously.

The **notifying events** are the events that some related objects have been triggered and take corresponding actions on the occurrence of the events. It could be an event generated from the connected sensor, or a certain connected field bus device for alerting the administrator something happened with SMS message, Email, and SNMP Trap, etc...



For ease of configuration, administrator can create and edit the common pre-defined managing / notifying event profiles for taking instant reaction on a certain event or managing the devices for some advanced useful purposes. For example, sending/receiving remote managing SMS for the gateway's routine maintaining, the field bus device status monitoring, digital sensors detection controlling, and so on. All of such management and notification function can be realized effectively via the Event Handling feature.

The following is the summary lists for the provided profiles, and events:

(**Note**: The available profiles and events could be different for the purchased product.)

- Profiles (Rules):
  - SMS Configuration and Accounts
  - Email Accounts
  - Digital Input (DI) profiles
  - Digital Output (DO) profiles
  - Modbus Managing Event profiles
  - Modbus Notifying Event profiles

- Managing Events:

- Trigger Type: SMS, SNMP Trap, and Digital Input (DI).
- Actions: Get the Network Status; or Configure the LAN/VLAN behavior, WIFI behavior, NAT behavior, Firewall behavior, VPN behavior, System Management, Administration, Digital Output behavior, and connected Modbus devices.

- Notifying Events:
  - Trigger Type: Digital Input, Power Change, Connection Change (WAN, LAN & VLAN, WiFi, DDNS), Administration, Modbus, and Data Usage.
  - Actions: Notify the administrator with SMS, Syslog, SNMP Trap or Email Alert; Change the status of connected Digital Output or Modbus devices.

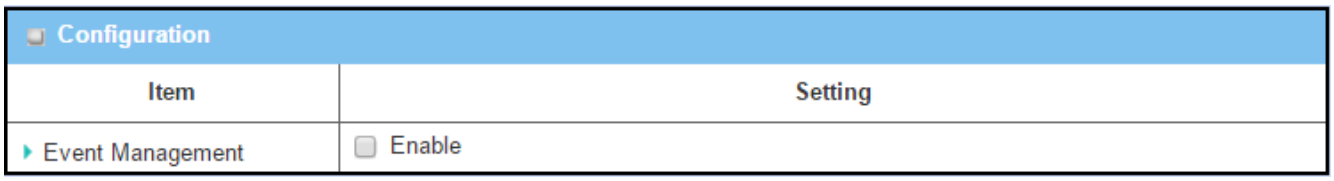
To use the event handling function, First of all, you have to enable the event management setting and configure the event details with the provided profile settings. You can create or edit pre-defined profiles for individual managing / notifying events. The profile settings are separated into several items; they are the SMS Account Definition, Email Service Definition, Digital Input (DI) Profile Configuration, Digital Output (DO) Profile Configuration, and Modbus Definition.
Then, you have to configure each managing / notifying event with identifying the event's trigger condition, and the corresponding actions (reaction for the event) for the event. For each event, more than one action can be activated simultaneously.

7.2.1 Configuration

Go to Service > Event Handling > Configuration Tab.

Event handling is the service that allows administrator to setup the pre-defined events, handlers, or response behavior with individual profiles.

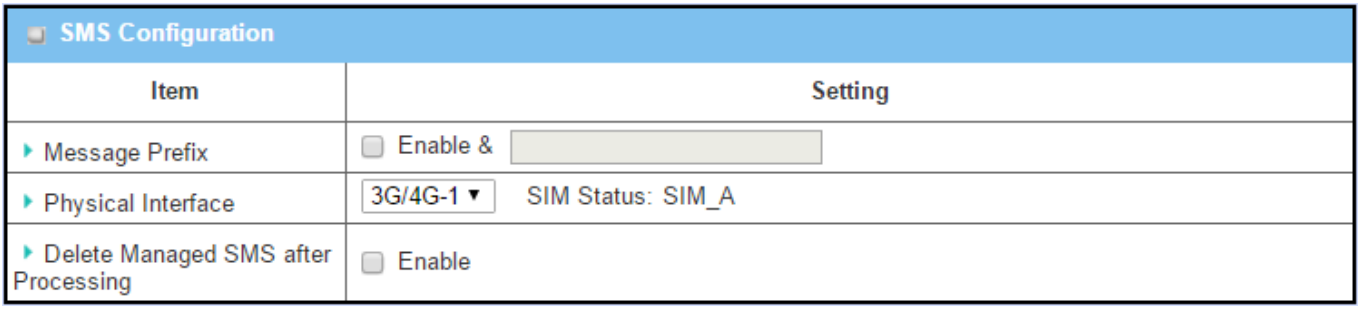
Enable Event Management



Configuration		
Item	**Value setting**	**Description**
Event Management	The box is unchecked by default	Check the **Enable** box to activate the Event Management function.

Enable SMS Management

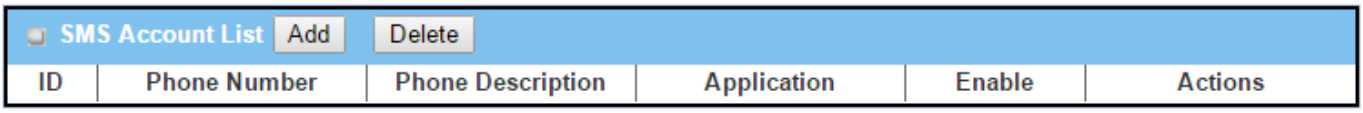
To use the SMS management function, you have to configure some important settings first.



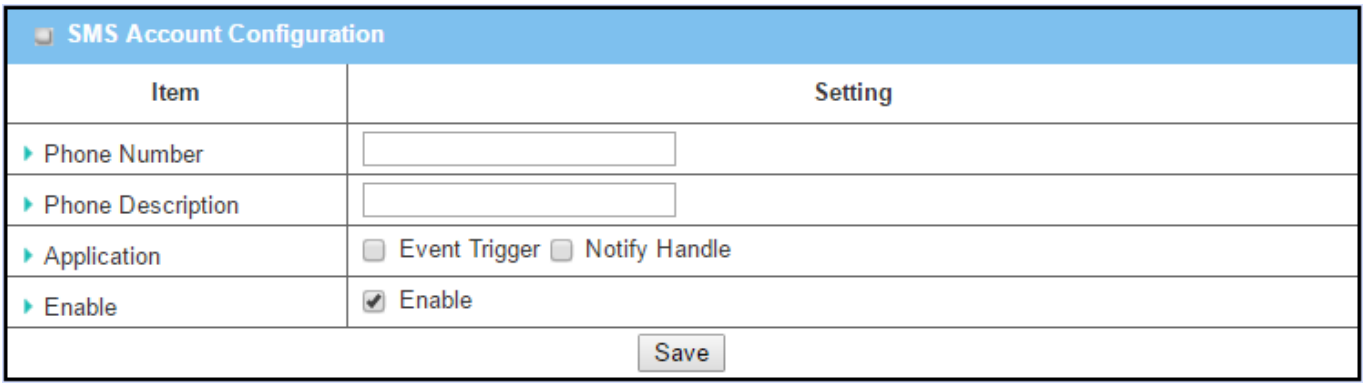
SMS Configuration		
Item	**Value setting**	**Description**
Message Prefix	The box is unchecked by default	Click the **Enable** box to enable the SMS prefix for validating the received SMS. Once the function is enabled, you have to enter the prefix behind the checkbox. The received managing events SMS must have the designated prefix as an initial identifier, then corresponding handlers will become effective for further processing.
Physical Interface	The box is 3G/4G-1 by default.	Choose a cellular interface (**3G/4G-**1 or **3G/4G-2**) to configure the SMS management setting.
SIM Status	N/A	Show the connected cellular service (identified with **SIM_A** or **SIM_B**).
Delete Managed SMS after Processing	The box is unchecked by default	Check the **Enable** box to delete the received managing event SMS after it has been processed.

Create / Edit SMS Account

Setup the SMS Account for managing the gateway through the SMS. It supports up to a maximum of 5 accounts.



You can click the **Add / Edit** button to configure the SMS account.



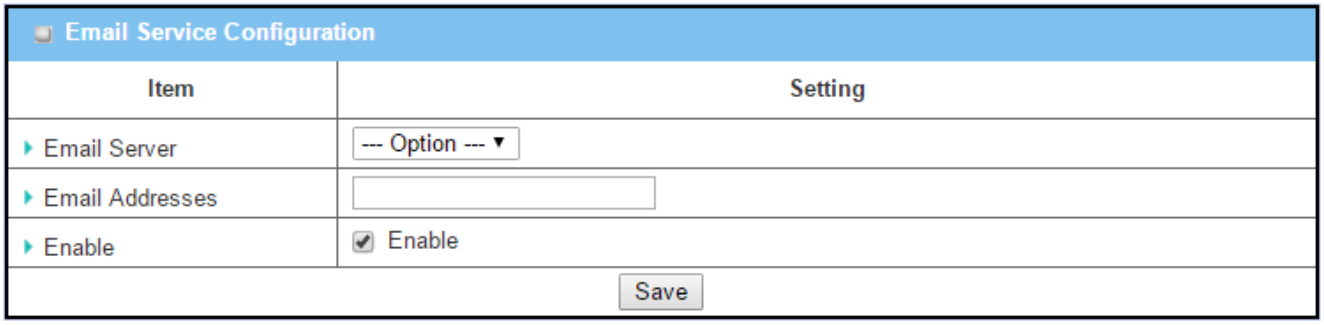
SMS Account Configuration		
Item	**Value setting**	**Description**
Phone Number	1. Mobile phone number format 2. A Must filled setting	Specify a mobile phone number as the SMS account identifier. ***Value Range***: -1 ~ 32 digits.
Phone Description	1. Any text 2. An Optional setting	Specify a brief description for the SMS account.
Application	A Must filled setting	Specify the application type. It could be **Event Trigger, Notify Handle,** or **both**.

Enable	The box is unchecked by default.	Click **Enable** box to activate this account.
Save	*NA*	Click the **Save** button to save the configuration.

Create / Edit Email Service Account

Setup the Email Service Account for event notification. It supports up to a maximum of 5 accounts.

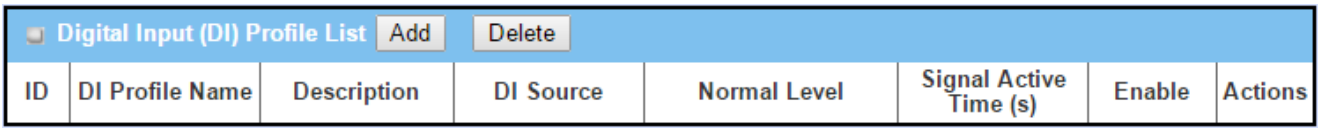
You can click the **Add / Edit** button to configure the Email account.



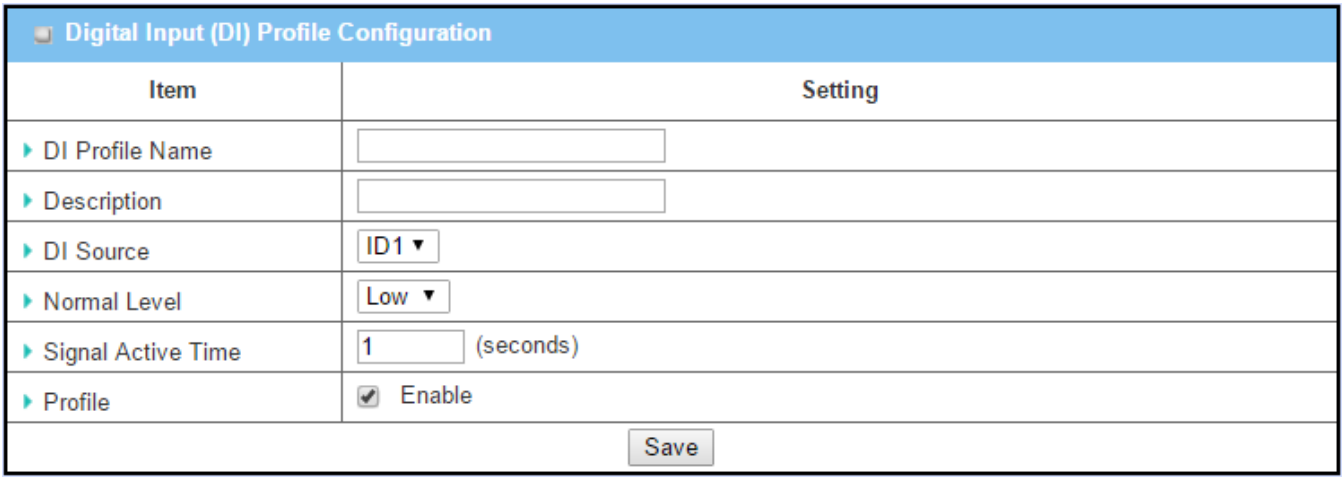
Email Service Configuration		
Item	**Value setting**	**Description**
Email Server	--- Option ---	Select an Email Server profile from **External Server** setting for the email account setting.
Email Addresses	1. Internet E-mail address format 2. A Must filled setting	Specify the Destination Email Addresses.
Enable	The box is unchecked by default.	Click **Enable** box to activate this account.
Save	*NA*	Click the **Save** button to save the configuration

Create / Edit Digital Input (DI) Profile Rule (DI/DO support required)

Setup the Digital Input (DI) Profile rules. It supports up to a maximum of 10 profiles.



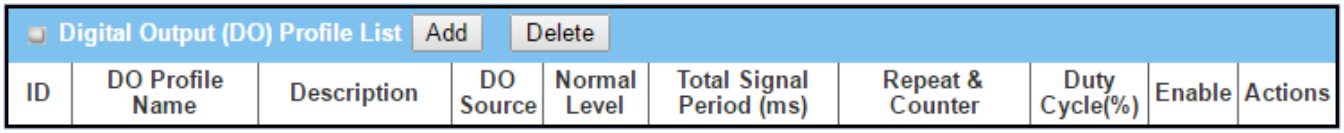
When **Add** button is applied, the **Digital Input (DI) Profile Configuration** screen will appear.



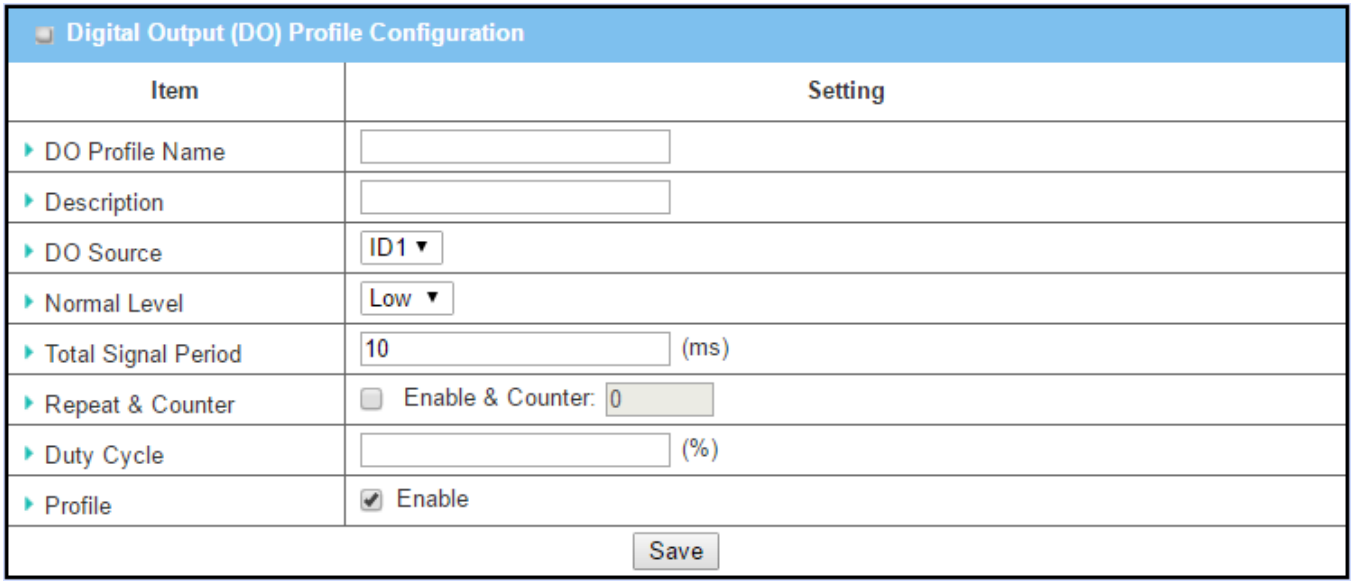
Digital Input (DI) Profile Configuration		
Item	**Value setting**	**Description**
DI Profile Name	1. String format 2. A Must filled setting	Specify the DI Profile Name. ***Value Range*:** -1 ~ 32 characters.
Description	1. Any text 2. An Optional setting	Specify a brief description for the profile.
DI Source	**ID1** by default	Specify the DI Source. It could be **ID1** or **ID2**. The number of available DI source could be different for the purchased product.
Normal Level	Low by default	Specify the Normal Level. It could be **Low** or **High**.
Signal Active Time	1. Numberic String format 2. A Must filled setting	Specify the Signal Active Time. It could be from 1 to 10 seconds. ***Value Range*:** 1 ~ 10 seconds.
Profile	The box is unchecked by default.	Click **Enable** box to activate this profile setting.
Save	*NA*	Click the **Save** button to save the configuration.

Create / Edit Digital Output (DO) Profile Rule (DI/DO support required)

Setup the Digital Output (DO) Profile rules. It supports up to a maximum of 10 profiles.



When **Add** button is applied, the **Digital Output (DO) Profile Configuration** screen will appear.

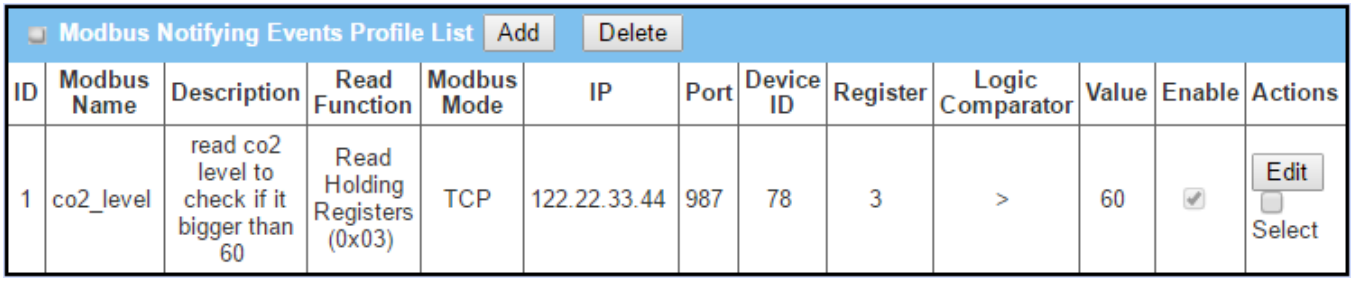


Digital Output (DO) Profile Configuration		
Item	**Value setting**	**Description**
DO Profile Name	1. String format 2. A Must filled setting	Specify the DO Profile Name. ***Value Range*:** -1 ~ 32 characters.
Description	1. Any text 2. An Optional setting	Specify a brief description for the profile.
DO Source	**ID1** by default	Specify the DO Source. It could be **ID1**.
Normal Level	Low by default	Specify the Normal Level. It could be **Low** or **High**.
Total Signal Period	1. Numberic String format 2. A Must filled setting	Specify the Total Signal Period. ***Value Range*:** 10 ~ 10000 ms.
Repeat & Counter	The box is unchecked by default.	Check the Enable box to activate the repeated Digital Output, and specify the Repeat times. ***Value Range*:** 0 ~ 65535.
Duty Cycle	1. Numberic String format 2. A Must filled setting	Specify the Duty Cycle for the Digital Output. ***Value Range*:** 1 ~100 %.

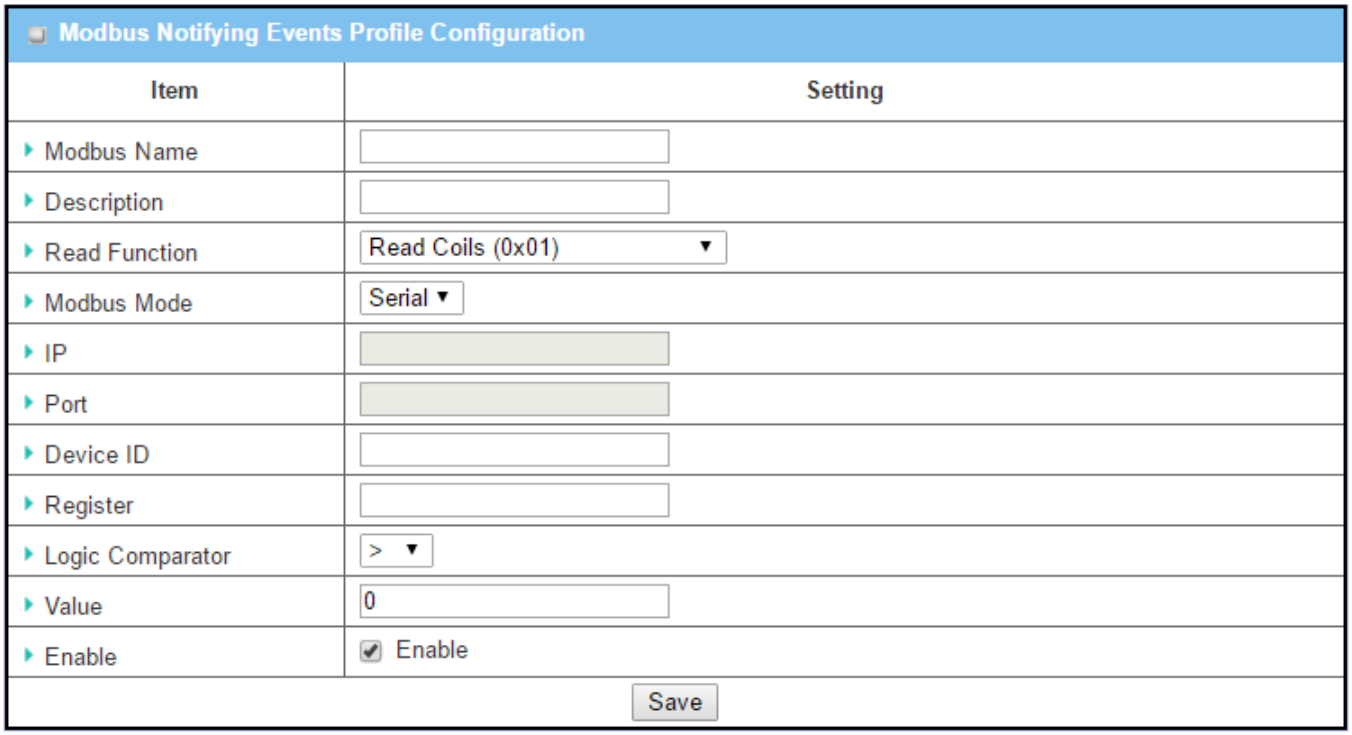
Profile	The box is unchecked by default.	Click **Enable** box to activate this profile setting.
Save	N/A	Click the **Save** button to save the configuration.

Create / Edit Modbus Notifying Events Profile (Modbus support required)

Setup the Modbus Notifying Events Profile. It supports up to a maximum of 10 profiles.



You can click the **Add / Edit** button to configure the profile.

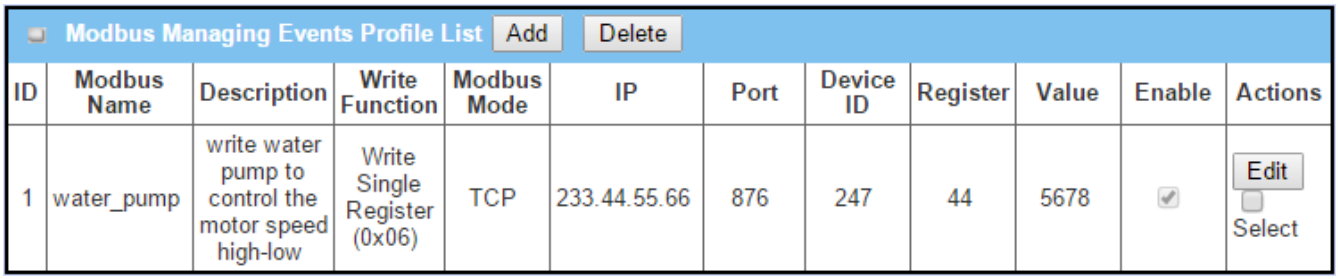


Modbus Notifying Events Profile		
Item	**Value setting**	**Description**
Modbus Name	1. String format 2. A Must filled	Specify the Modbus profile name. ***Value Range*:** -1 ~ 32 characters.

	setting	
Description	1. Any text 2. An Optional setting	Specify a brief description for the profile.
Read Function	Read Holding Registers by default	Specify the Read Function for **Notifying Events**.
Modbus Mode	**Serial** by default	Specify the Modbus Mode. It could be **Serial** or **TCP**.
IP	1. NA for Serial on Modbus Mode. 2. A Must filled setting for TCP on Modbus Mode.	Specify the IP for TCP on Modbus Mode. IPv4 Format.
Port	1. NA for Serial on Modbus Mode. 2. A Must filled setting for TCP on Modbus Mode.	Specify the Port for TCP on Modbus Mode. ***Value Range*:** 1 ~ 65535.
Device ID	1. Numberic String format 2. A Must filled setting	Specify the Device ID of the modbus device. It could be from 1 to 247.
Register	1. Numberic String format 2. A Must filled setting	Specify the Register number of the modbus device. ***Value Range*:** 0 ~ 65535.
Logic Comparator	Logic Comparator '>' by default.	Specify the Logic Comparator for **Notifying Events**. It could be '>', '<', '=', '>=', or '<='.
Value	1. Numberic String format 2. A Must filled setting	Specify the Value. ***Value Range*:** 0 ~ 65535.
Enable	The box is unchecked by default.	Click **Enable** box to activate this profile setting.
Save	*NA*	Click the **Save** button to save the configuration
Undo	*NA*	Click the **Undo** button to restore what you just configured back to the previous setting.

Create / Edit Modbus Managing Events Profile (Modbus support required)

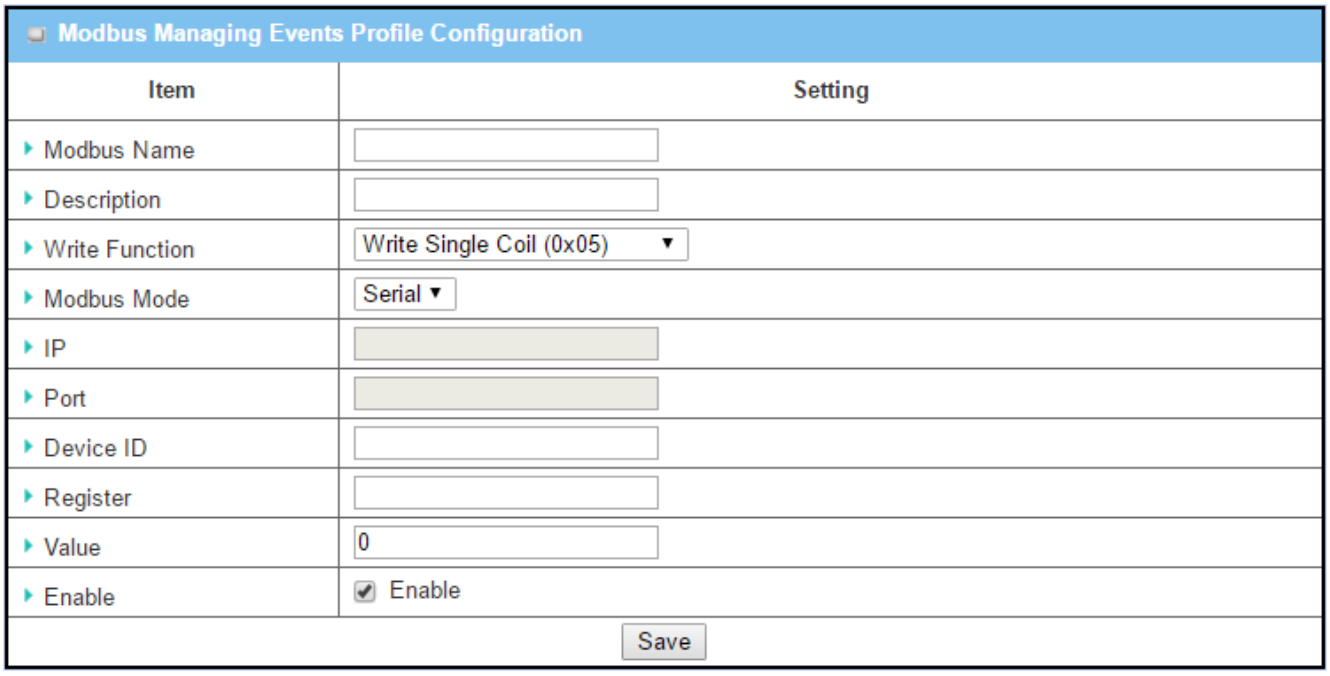
Setup the Modbus Managing Events Profile. It supports up to a maximum of 10 profiles.



Modbus Managing Events Profile List | Add | Delete

ID	Modbus Name	Description	Write Function	Modbus Mode	IP	Port	Device ID	Register	Value	Enable	Actions
1	water_pump	write water pump to control the motor speed high-low	Write Single Register (0x06)	TCP	233.44.55.66	876	247	44	5678	☑	Edit ☐ Select

You can click the **Add / Edit** button to configure the profile.



Modbus Managing Events Profile Configuration

Item	Setting
Modbus Name	
Description	
Write Function	Write Single Coil (0x05) ▼
Modbus Mode	Serial ▼
IP	
Port	
Device ID	
Register	
Value	0
Enable	☑ Enable

Save

Modbus Managing Events Profile		
Item	**Value setting**	**Description**
Modbus Name	1. String format 2. A Must filled setting	Specify the Modbus profile name. ***Value Range***: -1 ~ 32 characters.
Description	1. Any text 2. An Optional setting	Specify a brief description for the profile.
Write Function	Write Single Registers by default	Specify the Write Function for **Managing Events**.
Modbus Mode	**Serial** by default	Specify the Modbus Mode. It could be **Serial or TCP**.
IP	1. NA for Serial on	Specify the IP for TCP on Modbus Mode. IPv4 Format.

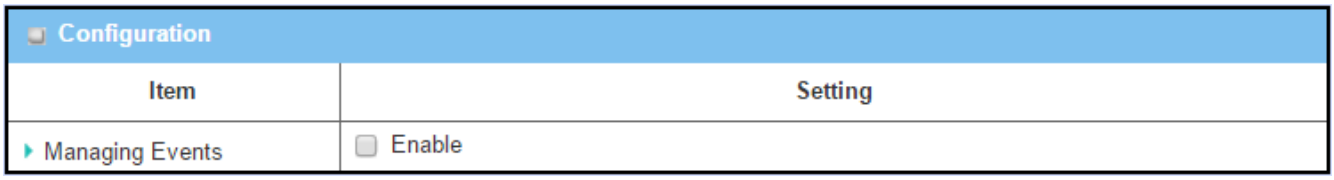
	Modbus Mode. 2. A Must filled setting for TCP on Modbus Mode.	
Port	1. NA for Serial on Modbus Mode. 2. A Must filled setting for TCP on Modbus Mode.	Specify the Port for TCP on Modbus Mode. ***Value Range*****:** 1 ~ 65535.
Device ID	1. Numberic String format 2. A Must filled setting	Specify the Device ID of the modbus device. ***Value Range*****:** 1 ~ 247.
Register	1. Numberic String format 2. A Must filled setting	Specify the Register number of the modbus device. ***Value Range*****:** 0 ~ 65535.
Value	1. Numberic String format 2. A Must filled setting	Specify the Value. ***Value Range*****:** 0 ~ 65535.
Enable	The box is unchecked by default.	Click **Enable** box to activate this profile setting.
Save	*NA*	Click the **Save** button to save the configuration
Undo	*NA*	Click the **Undo** button to restore what you just configured back to the previous setting.

7.2.2 Managing Events

Managing Events allow administrator to define the relationship (rule) among event trigger, handlers and response.

Go to **Service** > **Event Handling** > **Managing Events** Tab.

Enable Managing Events

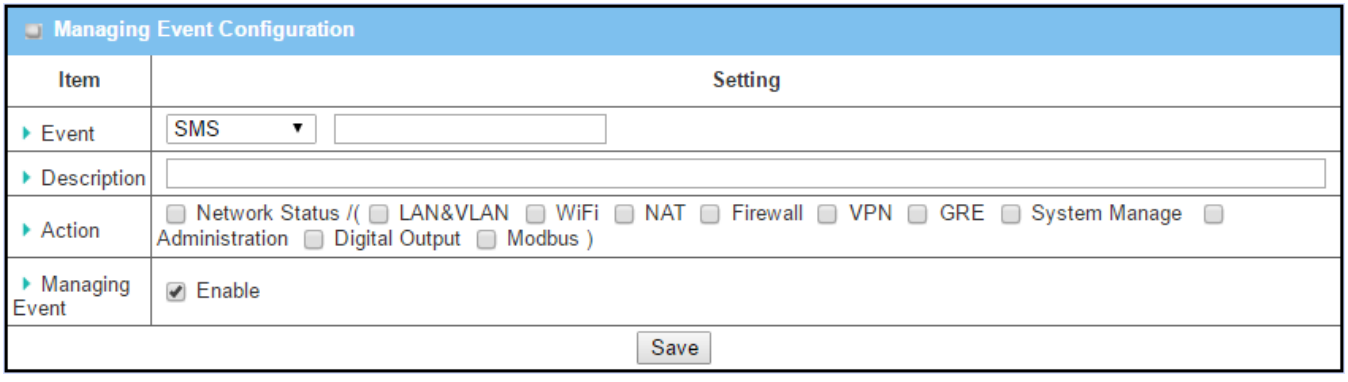


Configuration		
Item	**Value setting**	**Description**
Managing Events	The box is unchecked by default	Check the **Enable** box to activate the Managing Events function.

Create / Edit Managing Event Rules

Setup the Managing Event rules. It supports up to a maximum of 128 rules.

When **Add** button is applied, the **Managing Event Configuration** screen will appear.



Managing Event Configuration		
Item	**Value setting**	**Description**
Event	**SMS** (or **SNMP Trap**) by default	Specify the Event type (**SMS**, **SNMP Trap**, or **DI**) and an event identifier / profile. **SMS**: Select **SMS** and fill the message in the textbox to as the trigger condition for the event; **SNMP**: Select **SNMP Trap** and fill the message in the

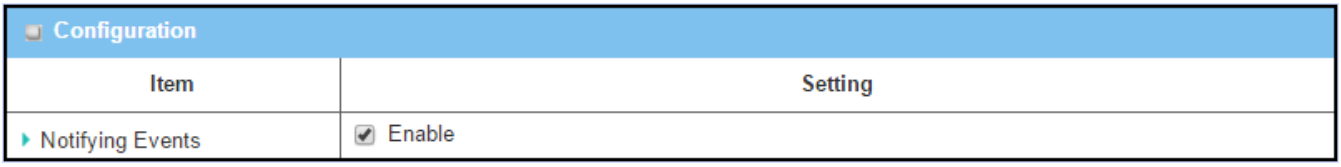
		textbox to specify SNMP Trap Event; **Digital Input**: Select **Digital Input** and a DI profile you defined to specify a certain Digital Input Event; *Note: The available Event Type could be different for the purchased product.*
Description	String format : any text.	Enter a brief description for the Managing Event.
Action	All box is unchecked by default.	Specify **Network Status**, or at least one rest action to take when the expected event is triggered. **Network Status**: Select Network Status Checkbox to get the network status as the action for the event; **LAN&VLAN**: Select **LAN&VLAN** Checkbox and the interested sub-items (Port link On/Off), the gateway will change the settings as the action for the event; **WiFi**: Select **WiFi** Checkbox and the interested sub-items (WiFi radio On/Off), the gateway will change the settings as the action for the event; **NAT**: Select **NAT** Checkbox and the interested sub-items (Virtual Server Rule On/Off, DMZ On/Off), the gateway will change the settings as the action for the event; **Firewall**: Select **Firewall** Checkbox and the interested sub-items (Remote Administrator Host ID On/Off), the gateway will change the settings as the action for the event; **VPN**: Select **VPN** Checkbox and the interested sub-items (IPSec Tunnel ON/Off, PPTP Client On/Off, L2TP Client On/Off, OpenVPN Client On/Off), the gateway will change the settings as the action for the event; **GRE**: Select **GRE** Checkbox and the interested sub-items (GRE Tunnel On/Off), the gateway will change the settings as the action for the event; **System Manage**: Select **System Manage** Checkbox and the interested sub-items (WAN SSH Service On/Off, TR-069 On/Off), the gateway will change the settings as the action for the event; **Administration**: Select **Administration** Checkbox and the interested sub-items (Backup Config, Restore Config, Reboot, Save Current Setting as Default), the gateway will change the settings as the action for the event; **Digital Output**: Select **Digital Output** checkbox and a DO profile you defined as the action for the event; **Modbus**: Select **Modbus** checkbox and a Modbus Managing Event profile you defined as the action for the event; *Note: The available Event Type could be different for the purchased product.*
Managing Event	The box is unchecked by default.	Click **Enable** box to activate this Managing Event setting.
Save	*NA*	Click the **Save** button to save the configuration
Undo	*NA*	Click the **Undo** button to restore what you just configured back to the previous setting.

7.2.3 Notifying Events

Go to Service > Event Handling > Notifying Events Tab.

Notifying Events Setting allows administrator to define the relationship (rule) between event trigger and handlers.

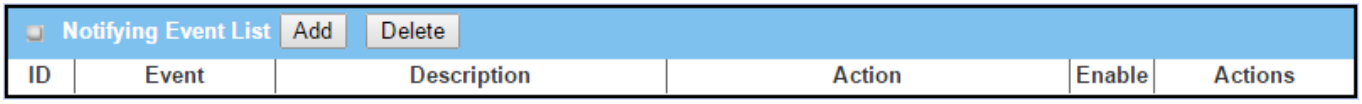
Enable Notifying Events



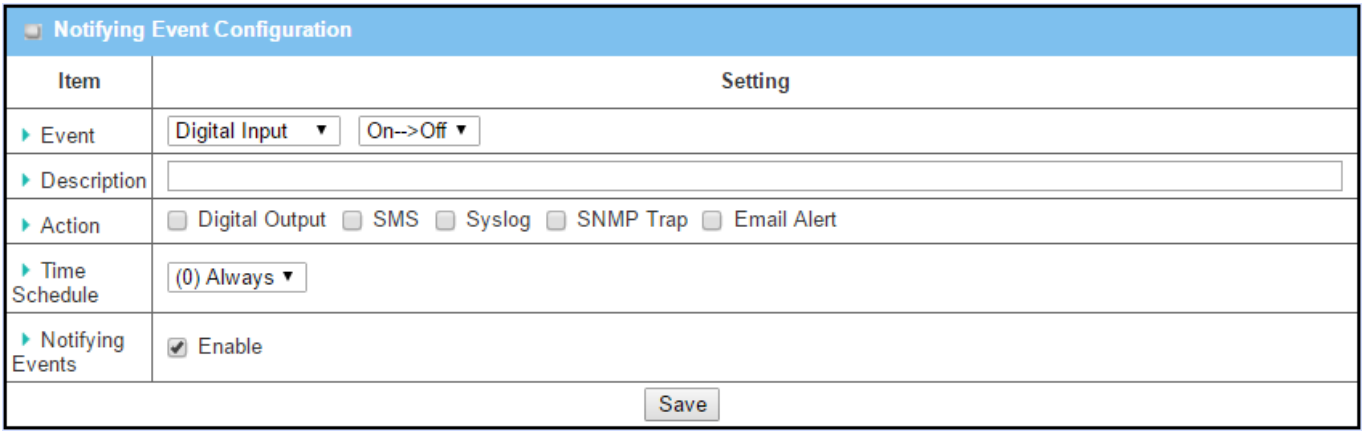
Configuration		
Item	**Value setting**	**Description**
Notifying Events	The box is unchecked by default	Check the **Enable** box to activate the Notifying Events function.

Create / Edit Notifying Event Rules

Setup your Notifying Event rules. It supports up to a maximum of 128 rules.



When **Add** button is applied, the **Notifying Event Configuration** screen will appear.



Notifying Event Configuration		
Item	**Value setting**	**Description**
Event	**Digital Input** (or **WAN**) by default	Specify the Event type and corresponding event configuration. The supported Event Type could be: **Digital Input**: Select **Digital Input** and a DI profile you defined to specify a certain Digital Input Event; **WAN**: Select **WAN** and a trigger condition to specify a certain WAN Event; **LAN&VLAN**: Select **LAN&VLAN** and a trigger condition to specify a certain LAN&VLAN Event; **WiFi**: Select **WiFi** and a trigger condition to specify a certain WiFi Event; **DDNS**: Select **DDNS** and a trigger condition to specify a certain DDNS Event; **Administration**: Select **Administration** and a trigger condition to specify a certain Administration Event; **Modbus**: Select **Modbus** and a Modbus Notifying Event profile you defined to specify a certain Modbus Event; **Data Usage**: Select **Data Usage**, the SIM Card (Cellular Service) and a trigger condition to specify a certain Data Usage Event; *Note: The available Event Type could be different for the purchased product.*
Description	String format : any text.	Enter a brief description for the Notifying Event.
Action	All box is unchecked by default.	Specify at least one action to take when the expected event is triggered. **Digital Output**: Select **Digital Output** checkbox and a DO profile you defined as the action for the event; **SMS**: Select **SMS**, and the gateway will send out a SMS to all the defined SMS accounts as the action for the event; **Syslog**: Select **Syslog** and select/unselect the Enable Checkbox to as the action for the event; **SNMP Trap**: Select **SNMP Trap**, and the gateway will send out SNMP Trap to the defined SNMP Event Receivers as the action for the event; **Email Alert**: Select **Email Alert**, and the gateway will send out an Email to the defined Email accounts as the action for the event; *Note: The available Event Type could be different for the purchased product.*
Time Schedule	**(0) Always** is selected by default	Select a time scheduling rule for the Notifying Event.
Notifying Events	The box is unchecked by default.	Click **Enable** box to activate this Notifying Event setting.
Save	*NA*	Click the **Save** button to save the configuration
Undo	*NA*	Click the **Undo** button to restore what you just configured back to the previous setting.

Chapter 8 Status

8.2 Basic Network

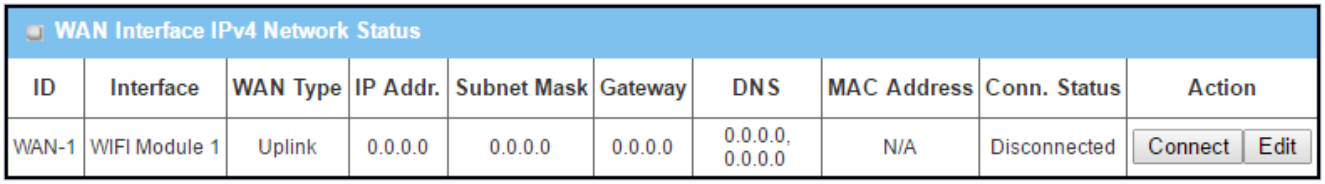
8.2.1 WAN & Uplink Status

Go to **Status > Basic Network > WAN & Uplink** tab.

The **WAN & Uplink Status** window shows the current status for different network type, including network configuration, connecting information, modem status and traffic statistics.

WAN interface IPv4 Network Status

WAN interface IPv4 Network Status screen shows status information for IPv4 network.



WAN Interface IPv4 Network Status

ID	Interface	WAN Type	IP Addr.	Subnet Mask	Gateway	DNS	MAC Address	Conn. Status	Action
WAN-1	WIFI Module 1	Uplink	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0, 0.0.0.0	N/A	Disconnected	Connect Edit

WAN interface IPv4 Network Status		
Item	**Value setting**	**Description**
ID	N/A	It displays corresponding WAN interface WAN IDs.
Interface	N/A	It displays the type of WAN physical interface. Depending on the model purchased, it can be WiFi Module or Ethernet..
WAN Type	N/A	It displays the method which public IP address is obtained from your ISP. Depending on the model purchased, it can be WiFi Uplink, Static IP, Dynamic IP, PPPoE, PPTP, or L2TP.
IP Addr.	N/A	It displays the public IP address obtained from your ISP for Internet connection. Default value is 0.0.0.0 if left unconfigured.
Subnet Mask	N/A	It displays the Subnet Mask for public IP address obtained from your ISP for Internet connection. Default value is 0.0.0.0 if left unconfigured.
Gateway	N/A	It displays the Gateway IP address obtained from your ISP for Internet connection. Default value is 0.0.0.0 if left unconfigured.

DNS	N/A	It displays the IP address of DNS server obtained from your ISP for Internet connection. Default value is 0.0.0.0 if left unconfigured.
MAC Address	N/A	It displays the MAC Address for your ISP to allow you for Internet access. Note: Not all ISP may require this field.
Conn. Status	N/A	It displays the connection status of the device to your ISP. Status are Connected or disconnected.
Action	N/A	This area provides functional buttons. **Renew** button allows user to force the device to request an IP address from the DHCP server. Note: **Renew** button is available when DHCP WAN Type is used and WAN connection is disconnected. **Release** button allows user to force the device to clear its IP address setting to disconnect from DHCP server. Note: **Release** button is available when DHCP WAN Type is used and WAN connection is connected. **Connect** button allows user to manually connect the device to the Internet. Note: Connect button is available when Connection Control in WAN Type setting is set to Connect Manually (Refer to **Edit** button in **Basic Network > WAN & Uplink > Internet Setup**) and WAN connection status is disconnected. **Disconnect** button allows user to manually disconnect the device from the Internet. Note: **Connect** button is available when Connection Control in WAN Type setting is set to Connect Manually (Refer to **Edit** button in **Basic Network > WAN & Uplink > Internet Setup**) and WAN connection status is connected.

WAN interface IPv6 Network Status

WAN interface IPv6 Network Status screen shows status information for IPv6 network.

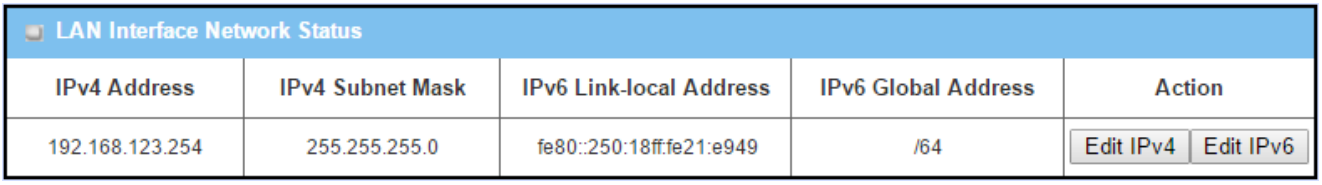
WAN Interface IPv6 Network Status

ID	Interface	WAN Type	Link-local IP Address	Global IP Address	Conn. Status	Action
WAN-1	Ethernet	6 to 4	N/A	/64	Disconnected	Edit

WAN interface IPv6 Network Status		
Item	**Value setting**	**Description**
ID	N/A	It displays corresponding WAN interface WAN IDs.
Interface	N/A	It displays the type of WAN physical interface. Depending on the model purchased, it can be WiFi Module or Ethernet.
WAN Type	N/A	It displays the method which public IP address is obtained from your ISP. WAN type setting can be changed from **Basic Network > IPv6 > Configuration**.
Link-local IP Address	N/A	It displays the LAN IPv6 Link-Local address.
Global IP Address	N/A	It displays the IPv6 global IP address assigned by your ISP for your Internet connection.
Conn. Status	N/A	It displays the connection status. The status can be connected, disconnected and connecting.
Action	N/A	This area provides functional buttons. **Edit Button** when pressed, web-based utility will take you to the IPv6 configuration page. (**Basic Network > IPv6 > Configuration**.)

LAN Interface Network Status

LAN Interface Network Status screen shows IPv4 and IPv6 information of LAN network.

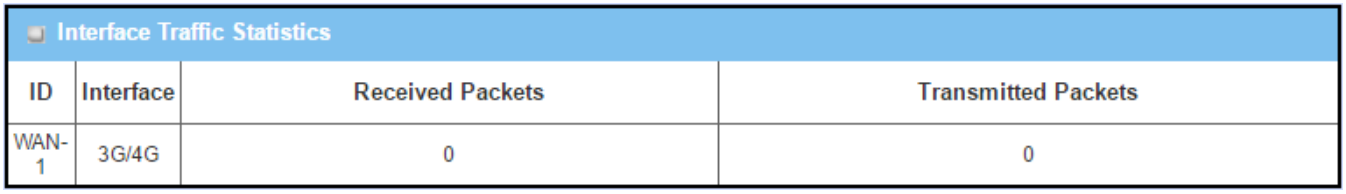


LAN Interface Network Status		
Item	**Value setting**	**Description**
IPv4 Address	N/A	It displays the current IPv4 IP Address of the gateway This is also the IP Address user use to access Router's Web-based Utility.
IPv4 Subnet Mask	N/A	It displays the current mask of the subnet.
IPv6 Link-local Address	N/A	It displays the current LAN IPv6 Link-Local address. This is also the IPv6 IP Address user use to access Router's Web-based Utility.
IPv6 Global Address	N/A	It displays the current IPv6 global IP address assigned by your ISP for your Internet connection.
Action	N/A	This area provides functional buttons.

		Edit IPv4 Button when press, web-based utility will take you to the Ethernet LAN configuration page. (**Basic Network > LAN & VLAN > Ethernet LAN** tab). **Edit IPv6 Button** when press, web-based utility will take you to the IPv6 configuration page. (**Basic Network > IPv6 > Configuration**.)

Interface Traffic Statistics

Interface Traffic Statistics screen displays the Interface's total transmitted packets.



Interface Traffic Statistics

ID	Interface	Received Packets	Transmitted Packets
WAN-1	3G/4G	0	0

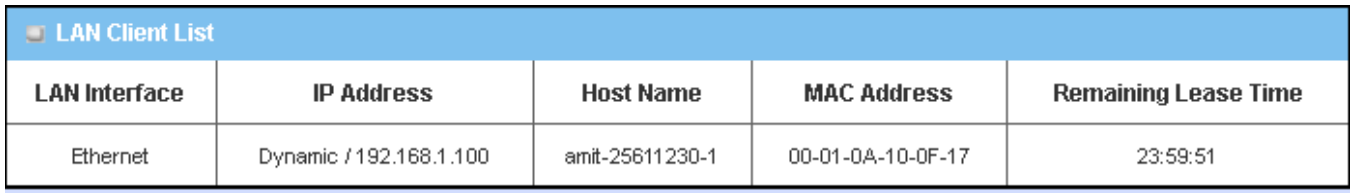
Interface Traffic Statistics		
Item	**Value setting**	**Description**
ID	N/A	It displays corresponding WAN interface WAN IDs.
Interface	N/A	It displays the type of WAN physical interface. Depending on the model purchased, it can be WiFi Module or Ethernet.
Received Packets	N/A	It displays the downstream packets. It is reset when the device is rebooted.
Transmitted Packets	N/A	It displays the upstream packets. It is reset when the device is rebooted.

8.2.2 LAN & VLAN Status

Go to Status > Basic Network > LAN & VLAN tab.

Client List

The **Client List** shows you the LAN Interface, IP address, Host Name, MAC Address, and Remaining Lease Time of each device that is connected to this gateway.



LAN Client List

LAN Interface	IP Address	Host Name	MAC Address	Remaining Lease Time
Ethernet	Dynamic / 192.168.1.100	amit-25611230-1	00-01-0A-10-0F-17	23:59:51

LAN Client List		
Item	**Value setting**	**Description**
LAN Interface	N/A	Client record of LAN Interface. String Format.
IP Address	N/A	Client record of IP Address Type and the IP Address. Type is String Format and the IP Address is IPv4 Format.
Host Name	N/A	Client record of Host Name. String Format.
MAC Address	N/A	Client record of MAC Address. MAC Address Format.
Remaining Lease Time	N/A	Client record of Remaining Lease Time. Time Format.

8.2.3 WiFi Status

Go to Status > Basic Network > WiFi tab.

The WiFi Status window shows the overall statistics of WiFi VAP entries.

WiFi Virtual AP List

The WiFi Virtual AP List shows all of the virtual AP information. The **Edit** button allows for quick configuration changes.

WiFi Module One Virtual AP List

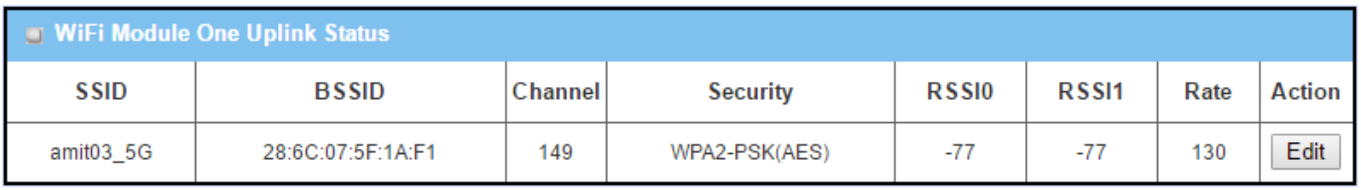
Op. Band	ID	WiFi Enable	Op. Mode	SSID	Channel	WiFi System	Auth.&Security	MAC Address	Action
5G	VAP-1	☑	WiFi Uplink	Staff_5G	48	a/n/ac Mixed	Auto(None)	00:50:18:13:21:43	Edit QR Code
5G	VAP-2	☐	WiFi Uplink	default	48	a/n/ac Mixed	Open(None)	02:50:18:10:21:43	Edit QR Code
5G	VAP-3	☐	WiFi Uplink	default	48	a/n/ac Mixed	Open(None)	02:50:18:11:21:43	Edit QR Code
5G	VAP-4	☐	WiFi Uplink	default	48	a/n/ac Mixed	Open(None)	02:50:18:12:21:43	Edit QR Code
5G	VAP-5	☐	WiFi Uplink	default	48	a/n/ac Mixed	Open(None)	02:50:18:13:21:43	Edit QR Code
5G	VAP-6	☐	WiFi Uplink	default	48	a/n/ac Mixed	Open(None)	02:50:18:14:21:43	Edit QR Code
5G	VAP-7	☐	WiFi Uplink	default	48	a/n/ac Mixed	Open(None)	02:50:18:15:21:43	Edit QR Code

WiFi Virtual AP List		
Item	**Value setting**	**Description**
Op. Band	N/A	It displays the Wi-Fi Operation Band (2.4G or 5G) of VAP.
ID	N/A	It displays the ID of VAP.
WiFi Enable	N/A	It displays whether the VAP wireless signal is enabled or disabled.
Op. Mode	N/A	The Wi-Fi Operation Mode of VAP. Depends of device model, modes are AP Router, WDS Only and WDS Hybrid, Universal Repeater and Client.
SSID	N/A	It displays the network ID of VAP.
Channel	N/A	It displays the wireless channel used.
WiFi System	N/A	The WiFi System of VAP.
Auth. & Security	N/A	It displays the authentication and encryption type used.
MAC Address	N/A	It displays MAC Address of VAP.
Action	N/A	Click the **Edit** button to make a quick access to the WiFi configuration page. (**Basic Network > WiFi > Configuration** tab)

		The **QR Code** button allow you to generate QR code for quick connect to the VAP by scanning the QR code.

WiFi Uplink Status

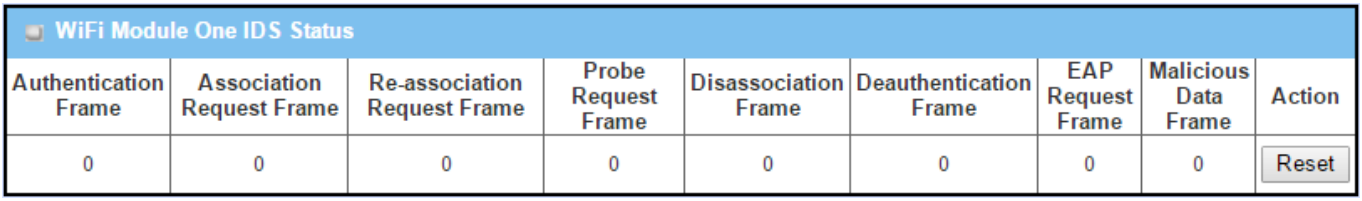
The WiFi Uplink Status shows all information of connected WiFi uplink network.



WiFi IDS Status		
Item	**Value setting**	**Description**
SSID	N/A	It displays the network ID of VAP.
BSSID	N/A	It displays the theBSSID for the connected wireless network.
Channel	N/A	It displays the wireless channel used.
Security	N/A	It displays the authentication and encryption setting for the WiFi uplink connection.
RSSI0, RSSI1	N/A	It displays the Rx sensitivity on each radio path..
Rate	N/A	It displays the link rate for the WiFi uplink connection.
Action	N/A	Click the **Edit** button to make a quick access to the WiFi uplink configuration page. (**Basic Network > WAN & Uplink > Internet Setup** tab)

WiFi IDS Status

The WiFi Traffic Statistic shows all the received and transmitted packets on WiFi network.



WiFi IDS Status		
Item	**Value setting**	**Description**
Authentication Frame	N/A	It displays the receiving Authentication Frame count.
Association Request Frame	N/A	It displays the receiving Association Request Frame count.
Re-association Request Frame	N/A	It displays the receiving Re-association Request Frame count.
Probe Request Frame	N/A	It displays the receiving Probe Request Frame count.
Disassociation Frame	N/A	It displays the receiving Disassociation Frame count.

Deauthenticati on Frame	N/A	It displays the receiving Deauthentication Frame count.
EAP Request Frame	N/A	It displays the receiving EAP Request Frame count.
Malicious Data Frame	N/A	It displays the number of receiving unauthorized wireless packets.
Action	N/A	Click the **Reset** button to clear the entire statistic and reset counter to 0.

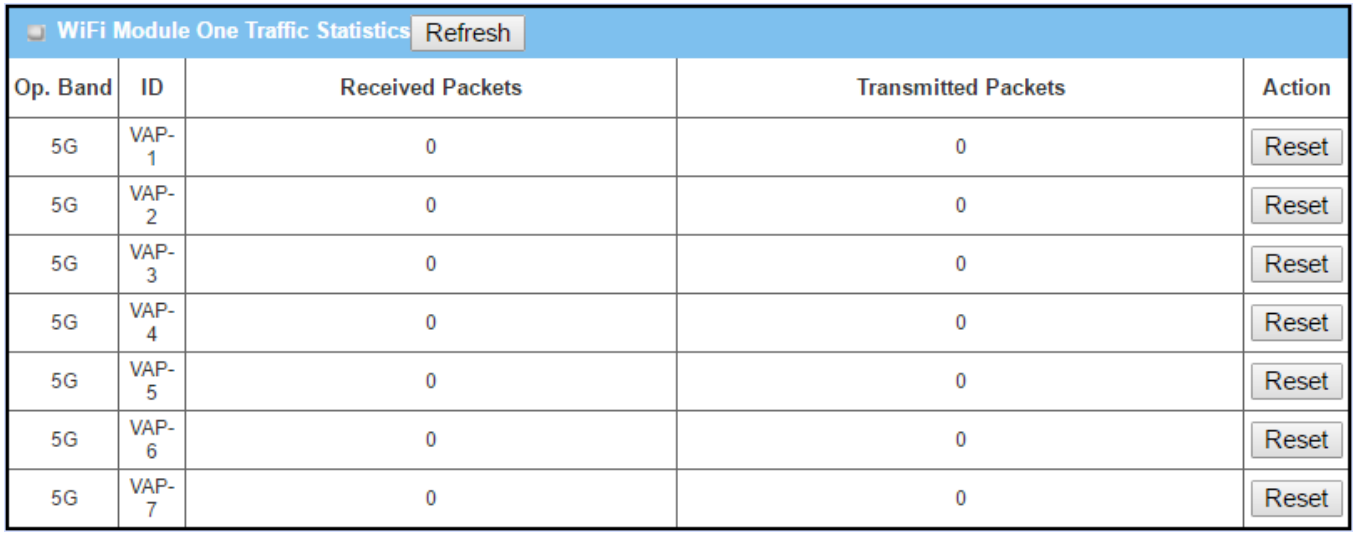
Ensure WIDS function is enabled

Go to **Basic Network** > **WiFi** > **Advanced Configuration tab**

Note that the WIDS of **2.4G** or **5G** should be configured **separately**.

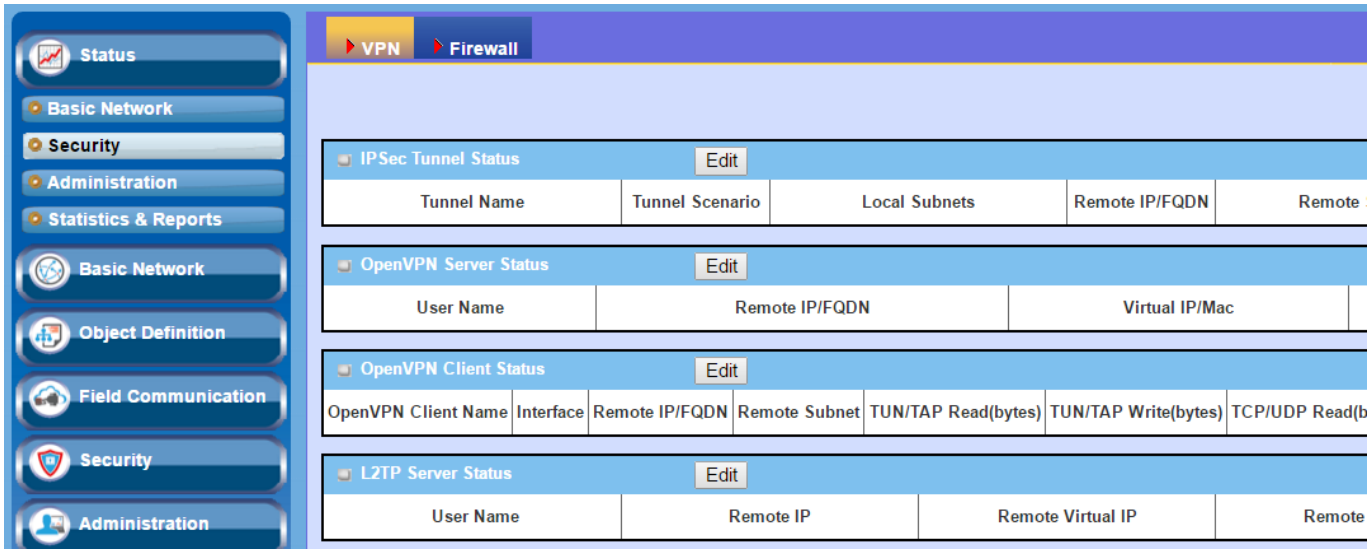
WiFi Traffic Statistic

The WiFi Traffic Statistic shows all the received and transmitted packets on WiFi network.



WiFi Traffic Statistic		
Item	**Value setting**	**Description**
Op. Band	N/A	It displays the Wi-Fi Operation Band (2.4G or 5G) of VAP.
ID	N/A	It displays the VAP ID.
Received Packets	N/A	It displays the number of reveived packets.
Transmitted Packet	N/A	It displays the number of transmitted packets.
Action	N/A	Click the **Reset** button to clear individual VAP statistics.
Refresh Button	N/A	Click the **Refresh** button to update the entire VAP Traffic Statistic instantly.

8.3 Security



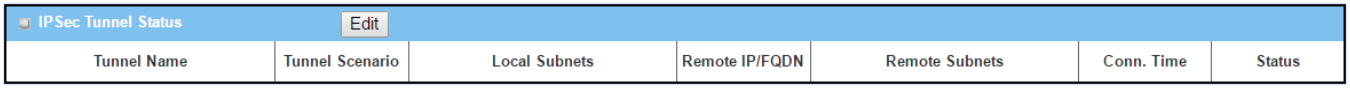
8.3.1 VPN Status

Go to **Status > Security > VPN** tab.

The **VPN Status** widow shows the overall VPN tunnel status.

IPSec Tunnel Status

IPSec Tunnel Status windows show the configuration for establishing IPSec VPN connection and current connection status.



IPSec Tunnel Status		
Item	**Value setting**	**Description**
Tunnel Name	N/A	It displays the tunnel name you have entered to identify.
Tunnel Scenario	N/A	It displays the Tunnel Scenario specified.
Local Subnets	N/A	It displays the Local Subnets specified.
Remote IP/FQDN	N/A	It displays the Remote IP/FQDN specified.
Remote Subnets	N/A	It displays the Remote Subnets specified.

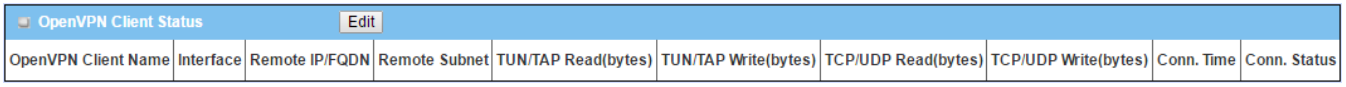
Conn. Time	N/A	It displays the connection time for the IPSec tunnel.
Status	N/A	It displays the Status of the VPN connection. The status displays are Connected, Disconnected, Wait for traffic, and Connecting.
Edit Button	N/A	Click on Edit Button to change IPSec setting, web-based utility will take you to the IPSec configuration page. (**Security > VPN > IPSec** tab)

OpenVPN Server Status

According to OpenVPN configuration, the **OpenVPN Server/Client Status** shows the status and statistics for the OpenVPN connection from the server side or client side.

OpenVPN Server Status		
Item	**Value setting**	**Description**
User Name	N/A	It displays the Client name you have entered for identification.
Remote IP/FQDN	N/A	It displays the public IP address (the WAN IP address) of the connected OpenVPN Client
Virtual IP/MAC	N/A	It displays the virtual IP/MAC address assigned to the connected OpenVPN client.
Conn. Time	N/A	It displays the connection time for the corresponding OpenVPN tunnel.
Status	N/A	It displays the connection status of the corresponding OpenVPN tunnel. The status can be Connected, or Disconnected.

OpenVPN Client Status



OpenVPN Client Status		
Item	**Value setting**	**Description**
OpenVPN Client Name	N/A	It displays the Client name you have entered for identification.
Interface	N/A	It displays the WAN interface specified for the OpenVPN client connection.
Remote IP/FQDN	N/A	It displays the peer OpenVPN Server's Public IP address (the WAN IP address) or FQDN.
Remote	N/A	It displays the Remote Subnet specified.

Subnet		
TUN/TAP Read(bytes)	N/A	It displays the TUN/TAP Read Bytes of OpenVPN Client.
TUN/TAP Write(bytes)	N/A	It displays the TUN/TAP Write Bytes of OpenVPN Client.
TCP/UDP Read(bytes)	N/A	It displays the TCP/UDP Read Bytes of OpenVPN Client.
TCP/UDP Write(bytes)	N/A	It displays the TCP/UDP Write Bytes of OpenVPN Client. Connection
Conn. Time	N/A	It displays the connection time for the corresponding OpenVPN tunnel.
Conn. Status	N/A	It displays the connection status of the corresponding OpenVPN tunnel. The status can be Connected, or Disconnected.

8.3.2 Firewall Status

Go to Status > Security > Firewall Status **Tab.**

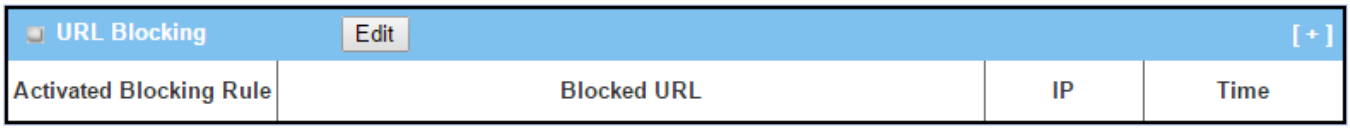
The **Firewall Status** provides user a quick view of the firewall status and current firewall settings. It also keeps the log history of the dropped packets by the firewall rule policies, and includes the administrator remote login settings specified in the Firewall Options.
By clicking the icon [+], the status table will be expanded to display log history. Clicking the **Edit** button the screen will be switched to the configuration page.

Packet Filter Status

Packet Filter Status		
Item	**Value setting**	**Description**
Activated Filter Rule	N/A	This is the Packet Filter Rule name.
Detected Contents	N/A	This is the logged packet information, including the source IP, destination IP, protocol, and destination port –the TCP or UDP. String format: Source IP to Destination IP : Destination Protocol (TCP or UDP)
IP	N/A	The Source IP (IPv4) of the logged packet.
Time	N/A	The Date and Time stamp of the logged packet. Date & time format. ("Month" "Day" "Hours":"Minutes":"Seconds")

Note: Ensure Packet Filter Log Alert is enabled.
*Refer to **Security > Firewall > Packet Filter** tab. Check Log Alert and save the setting.*

URL Blocking Status

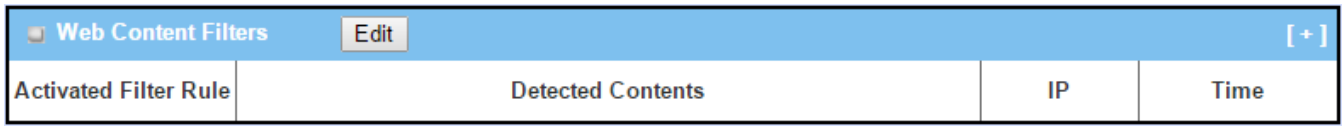


URL Blocking Status		
Item	**Value setting**	**Description**
Activated Blocking Rule	N/A	This is the URL Blocking Rule name.
Blocked URL	N/A	This is the logged packet information.
IP	N/A	The Source IP (IPv4) of the logged packet.
Time	N/A	The Date and Time stamp of the logged packet. Date & time format. ("Month" "Day" "Hours":"Minutes":"Seconds")

Note: Ensure URL Blocking Log Alert is enabled.

*Refer **to Security > Firewall > URL Blocking** tab. Check Log Alert and save the setting.*

Web Content Filter Status



Web Content Filter Status		
Item	**Value setting**	**Description**
Activated Filter Rule	N/A	Logged packet of the rule name. String format.
Detected Contents	N/A	Logged packet of the filter rule. String format.
IP	N/A	Logged packet of the Source IP. IPv4 format.
Time	N/A	Logged packet of the Date Time. Date time format ("Month" "Day" "Hours":"Minutes":"Seconds")

Note: Ensure Web Content Filter Log Alert is enabled.

*Refer to **Security > Firewall > Web Content Filter** tab. Check Log Alert and save the setting.*

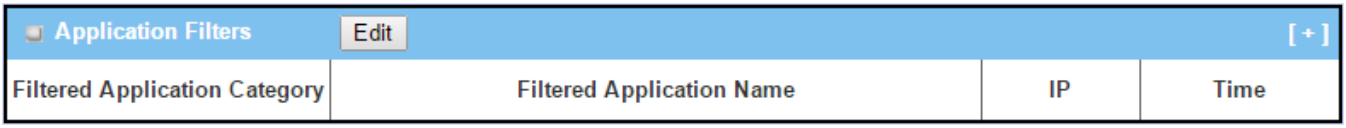
MAC Control Status

MAC Control Status		
Item	**Value setting**	**Description**
Activated Control Rule	N/A	This is the MAC Control Rule name.
Blocked MAC Addresses	N/A	This is the MAC address of the logged packet.
IP	N/A	The Source IP (IPv4) of the logged packet.
Time	N/A	The Date and Time stamp of the logged packet. Date & time format. ("Month" "Day" "Hours":"Minutes":"Seconds")

Note: Ensure MAC Control Log Alert is enabled.

*Refer to **Security > Firewall > MAC Control** tab. Check Log Alert and save the setting.*

Application Filters Status



Application Filters Status		
Item	**Value setting**	**Description**
Filtered Application Category	N/A	The name of the Application Category being blocked.
Filtered Application Name	N/A	The name of the Application being blocked.
IP	N/A	The Source IP (IPv4) of the logged packet.
Time	N/A	The Date and Time stamp of the logged packet. Date & time format. ("Month" "Day" "Hours":"Minutes":"Seconds")

Note: Ensure Application Filter Log Alert is enabled.

*Refer to **Security > Firewall > Application Filter** tab. Check Log Alert and save the setting.*

IPS Status

IPS Firewall Status		
Item	**Value setting**	**Description**
Detected Intrusion	N/A	This is the intrusion type of the packets being blocked.
IP	N/A	The Source IP (IPv4) of the logged packet.
Time	N/A	The Date and Time stamp of the logged packet. Date & time format. ("Month" "Day" "Hours":"Minutes":"Seconds")

Note: Ensure IPS Log Alert is enabled.

*Refer to **Security > Firewall > IPS** tab. Check Log Alert and save the setting.*

Firewall Options Status

Firewall Options Status		
Item	**Value setting**	**Description**
Stealth Mode	N/A	Enable or Disable setting status of Stealth Mode on Firewall Options. String Format: Disable or Enable
SPI	N/A	Enable or Disable setting status of SPI on Firewall Options. String Format : Disable or Enable
Discard Ping from WAN	N/A	Enable or Disable setting status of Discard Ping from WAN on Firewall Options. String Format: Disable or Enable
Remote Administrator Management	N/A	Enable or Disable setting status of Remote Administrator. If Remote Administrator is enabled, it shows the currently logged in administrator's source IP address and login user name and the login time. Format: IP : "Source IP", User Name: "Login User Name", Time: "Date time" Example: IP: 192.168.127.39, User Name: admin, Time: Mar 3 01:34:13

Note: Ensure Firewall Options Log Alert is enabled.

*Refer to **Security > Firewall > Options** tab. Check Log Alert and save the setting.*

8.4 Administration

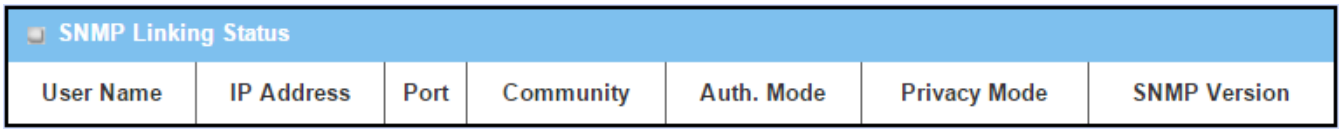
8.4.1 Configure & Manage Status

Go to **Status > Administration > Configure & Manage** tab.

The **Configure & Manage Status** window shows the status for managing remote network devices. The type of management available in your device is depended on the device model purchased. The commonly used ones are the SNMP, TR-069, and UPnP.

SNMP Linking Status

SNMP Link Status screen shows the status of current active SNMP connections.



SNMP Link Status		
Item	**Value setting**	**Description**
User Name	N/A	It displays the user name for authentication. This is only available for SNMP version 3.
IP Address	N/A	It displays the IP address of SNMP manager.
Port	N/A	It displays the port number used to maintain connection with the SNMP manager.
Community	N/A	It displays the community for SNMP version 1 or version 2c only.
Auth. Mode	N/A	It displays the authentication method for SNMP version 3 only.
Privacy Mode	N/A	It displays the privacy mode for version 3 only.
SNMP Version	N/A	It displays the SNMP Version employed.

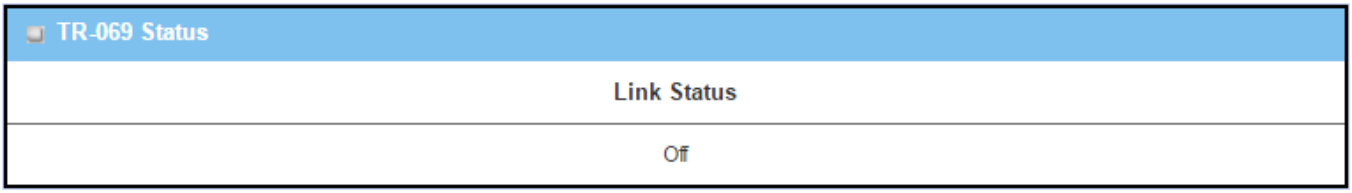
SNMP Trap Information

SNMP Trap Information screen shows the status of current received SNMP traps.

SNMP Trap Information		
Item	**Value setting**	**Description**
Trap Level	N/A	It displays the trap level.
Time	N/A	It displays the timestamp of trap event.
Trap Event	N/A	It displays the IP address of the trap sender and event type.

TR-069 Status

TR-069 Status screen shows the current connection status with the TR-068 server.



TR-069 Status		
Item	**Value setting**	**Description**
Link Status	N/A	It displays the current connection status with the TR-068 server. The connection status is either On when the device is connected with the TR-068 server or Off when disconnected.

8.4.2 Log Storage Status

Go to **Status > Administration > Log Storage** tab.

The **Log Storage Status** screen shows the status for selected device storage.

Log Storage Status

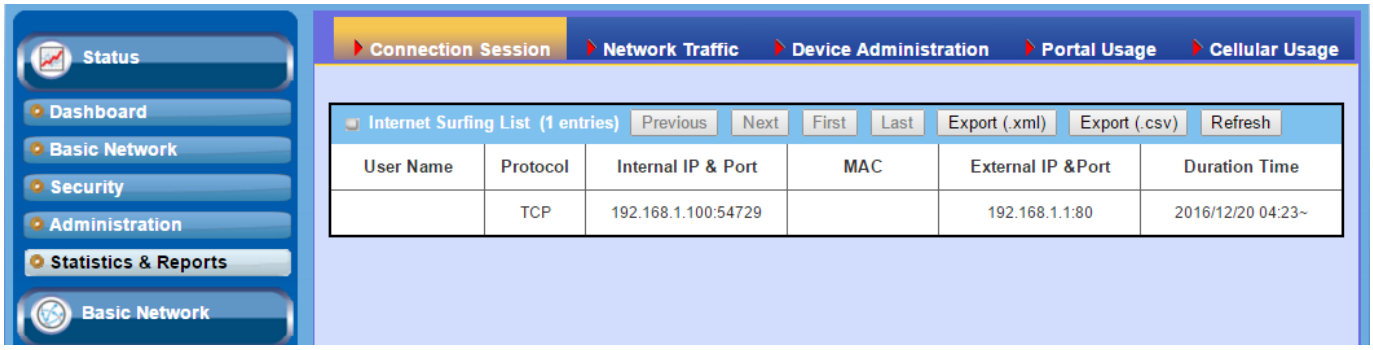
Log Storage Status screen shows the status of current the selected device storage. The status includes Device Select, Device Description, Usage, File System, Speed, and status

.

Storage Information

Device Select	Device Description	Usage	File System	Speed	Status
Storage 1 ▾	USB Storage	0 / 3788 MB	FAT/FAT32	USB 2.0	Ready

8.5 Statistics & Report



8.5.1 Connection Session

Go to **Status > Statistics & Reports > Connection Session** tab.

Internet Surfing Statistic shows the connection tracks on this router.

Internet Surfing List (33 entries) | Previous | Next | First | Last | Export (.xml) | Export (.csv) | Refresh

User Name	Protocol	Internal IP & Port	MAC	External IP &Port	Duration Time
	UDP	192.168.123.100:51736		192.168.123.254:53	2017/03/22 03:43~
	UDP	192.168.123.100:55986		192.168.123.254:53	2017/03/22 03:43~
	UDP	192.168.123.100:49548		192.168.123.254:53	2017/03/22 03:43~
	UDP	192.168.123.100:60969		192.168.123.254:53	2017/03/22 03:43~
	UDP	192.168.123.100:56053		192.168.123.254:53	2017/03/22 03:43~

Internet Surfing Statistic		
Item	**Value setting**	**Description**
Previous	N/A	Click the **Previous** button; you will see the previous page of track list.
Next	N/A	Click the **Next** button; you will see the next page of track list.
First	N/A	Click the **First** button; you will see the first page of track list.
Last	N/A	Click the **Last** button; you will see the last page of track list.
Export (.xml)	N/A	Click the **Export (.xml)** button to export the list to xml file.
Export (.csv)	N/A	Click the **Export (.csv)** button to export the list to csv file.
Refresh	N/A	Click the **Refresh** button to refresh the list.

8.5.2 Device Administration

Go to **Status > Statistics & Reports > Device Administration** tab.

Device Administration shows the login information.

Device Manager Login Statistic		
Item	**Value setting**	**Description**
Previous	N/A	Click the **Previous** button; you will see the previous page of login statistics.
Next	N/A	Click the **Next** button; you will see the next page of login statistics.
First	N/A	Click the **First** button; you will see the first page of login statistics.
Last	N/A	Click the **Last** button; you will see the last page of login statistics.
Export (.xml)	N/A	Click the **Export (.xml)** button to export the login statistics to xml file.
Export (.csv)	N/A	Click the **Export (.csv)** button to export the login statistics to csv file.
Refresh	N/A	Click the **Refresh** button to refresh the login statistics.

Appendix A GPL WRITTEN OFFER

This product incorporates open source software components covered by the terms of third party copyright notices and license agreements contained below.

GPSBabel
Version 1.4.4
Copyright (C) 2002-2005 Robert Lipe<robertlipe@usa.net>
GPL License: https://www.gpsbabel.org/

Curl
Version 7.19.6
Copyright (c) 1996-2009, Daniel Stenberg, <daniel@haxx.se>.
MIT/X derivate License: https://curl.haxx.se/

OpenSSL
Version 1.0.2c
Copyright (C) 1995-1998 Eric Young (eay@cryptsoft.com)
GPL License: https://www.openssl.org/

brctl - ethernet bridge administration
Stephen Hemminger <shemminger@osdl.org>
Lennert Buytenhek <buytenh@gnu.org>
version 1.1
GNU GENERAL PUBLIC LICENSE Version 2, June 1991

tc - show / manipulate traffic control settings
Stephen Hemminger<shemminger@osdl.org>
Alexey Kuznetsov<kuznet@ms2.inr.ac.ru>
version iproute2-ss050330
GNU GENERAL PUBLIC LICENSE Version 2, June 1991

dhcp-fwd — starts the DHCP forwarding agent

Enrico Scholz <enrico.scholz@informatik.tu-chemnitz.de>
version 0.7
GNU GENERAL PUBLIC LICENSE Version 2, June 1991

lftp - Sophisticated file transfer program
Alexander V. Lukyanov <lav@yars.free.net>
version:4.5.x
Copyright (c) 1996-2014 by Alexander V. Lukyanov (lav@yars.free.net)

dnsmasq - A lightweight DHCP and caching DNS server.
Simon Kelley <simon@thekelleys.org.uk>
version:2.72
dnsmasq is Copyright (c) 2000-2014 Simon Kelley

socat - Multipurpose relay
Version: 2.0.0-b8
GPLv2
http://www.dest-unreach.org/socat/

LibModbus
Version: 3.0.3
LGPL v2
http://libmodbus.org/news/

LibIEC60870
GPLv2
Copyright (C) 1989, 1991 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
https://sourceforge.net/projects/mrts/

Openswan
Version: v2.6.38 GNU GENERAL PUBLIC LICENSE Version 2, June 1991
Copyright (C) 1989, 1991 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.
https://www.openswan.org/

Opennhrp
Version: v0.14.1
OpenNHRP is an NHRP implementation for Linux. It has most of the RFC2332
and Cisco IOS extensions.
Project homepage: http://sourceforge.net/projects/opennhrp
Git repository: git://opennhrp.git.sourceforge.net/gitroot/opennhrp
LICENSE
OpenNHRP is licensed under the MIT License. See MIT-LICENSE.txt for
additional details.
OpenNHRP embeds libev. libev is dual licensed with 2-clause BSD and
GPLv2+ licenses. See libev/LICENSE for additional details.
OpenNHRP links to c-ares. c-ares is licensed under the MIT License.
https://sourceforge.net/projects/opennhrp/

IPSec-tools
Version: v0.8
No GPL be written
http://ipsec-tools.sourceforge.net/

PPTP
Version: pptp-1.7.1
GNU GENERAL PUBLIC LICENSE Version 2, June 1991
Copyright (C) 1989, 1991 Free Software Foundation, Inc. 675 Mass Ave, Cambridge, MA 02139,
USA
Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.
http://pptpclient.sourceforge.net/

PPTPServ
Version: 1.3.4

GNU GENERAL PUBLIC LICENSE Version 2, June 1991
Copyright (C) 1989, 1991 Free Software Foundation, Inc. 675 Mass Ave, Cambridge, MA 02139, USA
Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed. http://poptop.sourceforge.net/

L2TP
Version: 0.4
Copying All software included in this package is Copyright 2002 Roaring Penguin Software Inc. You may distribute it under the terms of the GNU General Public License (the "GPL"), Version 2, or (at your option) any later version.
http://www.roaringpenguin.com/

L2TPServ
Version: v 1.3.1 GNU GENERAL PUBLIC LICENSEVersion 2, June 1991
Copyright (C) 1989, 1991 Free Software Foundation, Inc.59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
Everyone is permitted to copy and distribute verbatim copies
of this license document, but changing it is not allowed.
http://www.xelerance.com/software/xl2tpd/

Mpstat: from sysstat, system performance tools for Linux
Version: 10.1.6
Copyright: (C) 1999-2013 by Sebastien Godard (sysstat <at> orange.fr)

SSHD: dropbear, a SSH2 server
Version: 0.53.1
Copyright: (c) 2002-2008 Matt Johnston

Libncurses: The ncurses (new curses) library is a free software emulation of curses in System V Release 4.0 (SVr4), and more.
Version: 5.9
Copyright: (c) 1998,2000,2004,2005,2006,2008,2011,2015 Free Software Foundation, Inc., 51

Franklin Street, Boston, MA 02110-1301, USA

MiniUPnP: The miniUPnP daemon is an UPnP IGD (internet gateway device) which provide NAT traversal services to any UPnP enabled client on the network.
Version: 1.7
Copyright: (c) 2006-2011, Thomas BERNARD

CoovaChilli is an open-source software access controller for captive portal (UAM) and 802.1X access provisioning.
Version: 1.3.0
Copyright: (C) 2007-2012 David Bird (Coova Technologies) <support@coova.com>

Krb5: Kerberos is a network authentication protocol. It is designed to provide strong authentication for client/server applications by using secret-key cryptography.
Version: 1.11.3
Copyright: (C) 1985-2013 by the Massachusetts Institute of Technology and its contributors

OpenLDAP: a suite of the Lightweight Directory Access Protocol (v3) servers, clients, utilities, and development tools.
Version: 2.4
Copyright: 1998-2014 The OpenLDAP Foundation

Samba3311: the free SMB and CIFS client and server for UNIX and other operating systems
Version: 3.3.11
Copyright: (C) 2007 Free Software Foundation, Inc. <http://fsf.org/>

NTPClient: an NTP (RFC-1305, RFC-4330) client for unix-alike computers
Version: 2007_365
Copyright: 1997, 1999, 2000, 2003, 2006, 2007 Larry Doolittle

exFAT: FUSE-based exFAT implementation
Version: 0.9.8
Copyright: (C) 2010-2012 Andrew Nayenko

ONTFS_3G: The NTFS-3G driver is an open source, freely available read/write NTFS driver for Linux, FreeBSD, Mac OS X, NetBSD, Solaris and Haiku.
Version: 2009.4.4
Copyright: (C) 1989, 1991 Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

mysql-5_1_72: a release of MySQL, a dual-license SQL database server
Version: 5.1.72
Copyright: (c) 2000, 2013, Oracle and/or its affiliates
FreeRadius: a high performance and highly configurable RADIUS server
Version: 2.1.12
Copyright: (C) 1999-2011 The FreeRADIUS server project and contributors

Linux IPv6 Router Advertisement Daemon – radvd
Version: V 1.15
Copyright (c) 1996,1997 by Lars Fenneberg<lf@elemental.net>
BSD License: http://www.litech.org/radvd/

WIDE-DHCPv6
Dynamic Host Configuration Protocol for IPv6 (DHCPv6) clients, servers, and relay agents.
Version: 20080615
Copyright (C) 1998-2004 WIDE Project.
BSD License: https://sourceforge.net/projects/wide-dhcpv6/