

LoRa Gateway

IDG700-00L02

User Manual



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Chapter 1 Introduction

1.1 Introduction

Congratulations on your purchase of this outstanding product: LoRa Gateway. For M2M (Machine-to-Machine) applications, AMIT LoRa Gateway is absolutely the right choice. With built-in 8-channel LoRa gateway, your deployed LoRa end-nodes can easily connected to the gateway, and your application server / customer server can access to the data transferred from the end-nodes, and further make adequate control on your needs.

Main Features:

- Built-in one Gigabit Ethernet port to connect the LoRa gateway to a local network or router.
- Embedded an 8-channel LoRa gateway module for connecting with multiple LoRa nodes.
- LoRaWAN Compliance gateway, forward received LoRa packets to external network server.
- Provide one Gigabit Ethernet port for comprehensive LAN connection.
- Support the robust remote or local management to monitor network.

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

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1.2 Contents List

1.2.1 Package Contents

#Standard Package

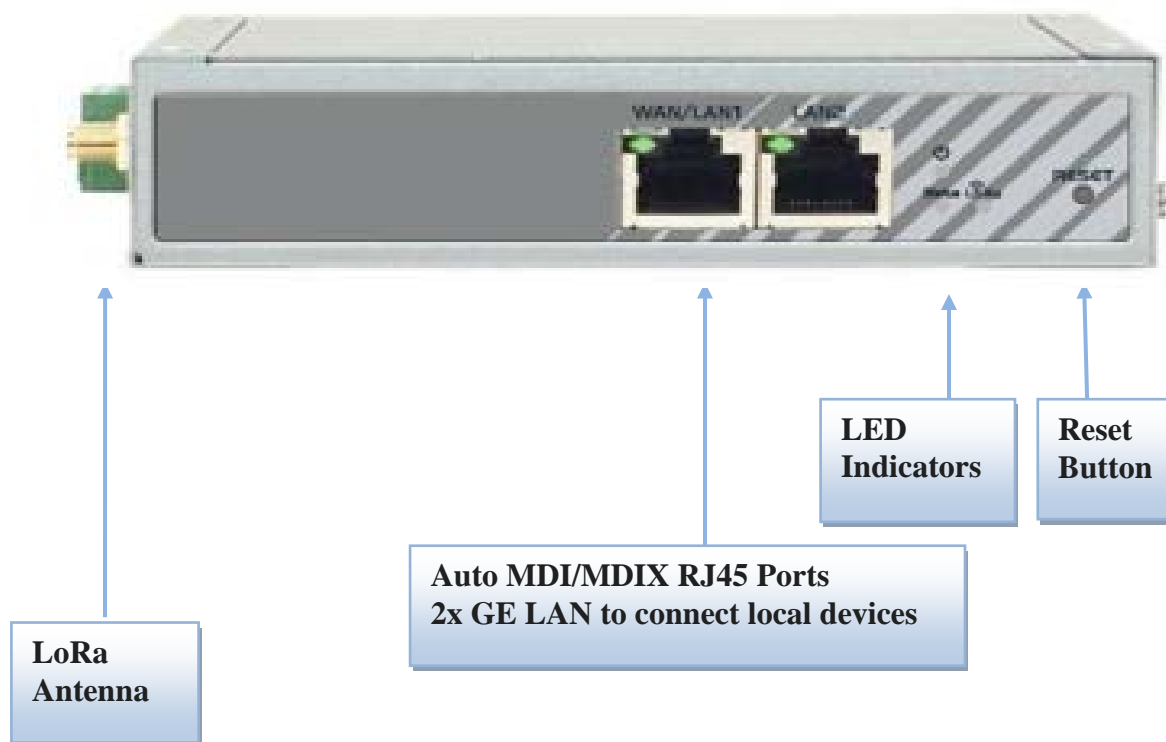
Items	Description	Contents	Quantity
1	IDG700-00L02 LoRa Gateway		1pcs
2	LoRa Antenna		1pcs
3	Power Adapter (DC 12V/1A) (*1)		1pcs
4	2 pin Terminal Block		1pcs
5	DIN-Rail Bracket		1pcs
6	CD (Manual)		1pcs

1 The maximum power consumption of IDG700-00L02 is 10.0W.

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1.3 Hardware Configuration

➤ Front View



⌘ Reset Button

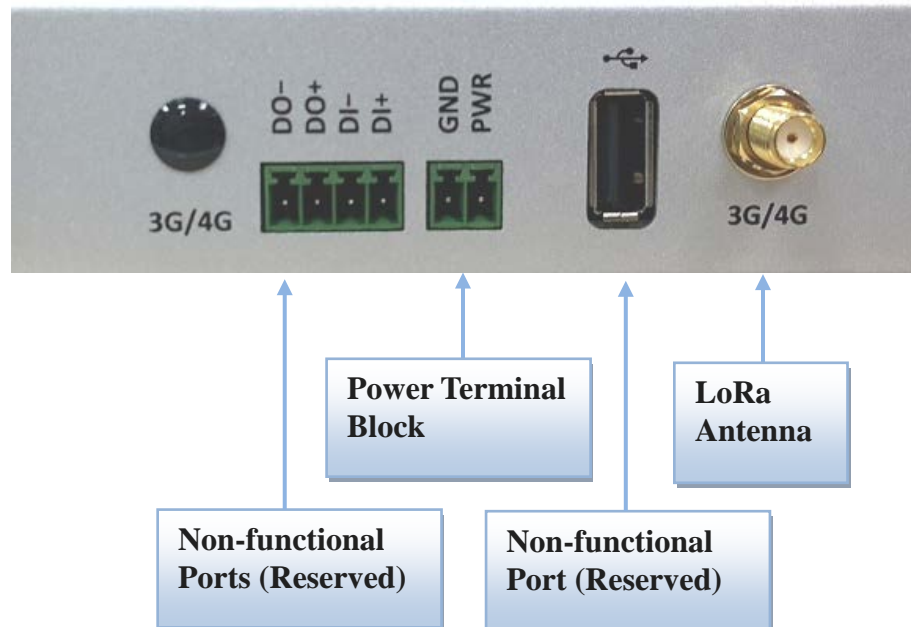
The RESET button provides user with a quick and easy way to resort the default setting. Press the RESET button continuously for 6 seconds, and then release it. The device will restore to factory default settings.

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➤ Bottom View

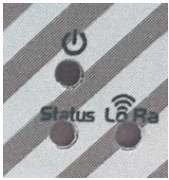



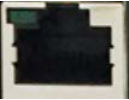
➤ Left View



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1.4 LED Indication



LED Icon	Indication	LED Color	Description
	Power Source	Blue	Steady ON: Device is powered ON.
Status	Status	Blue	Blue in flash (per second): Device works normally. Blue in very fast flash: Device is in Recovery Mode or abnormal. Note: If you encountered the abnormal situation, even power OFF / ON the device, there might be something wrong during the device boot up session and it was damaged. You need to call for RMA service to recover it.
LoRa	LoRa	Blue	OFF: LoRa Gateway function is disabled. Steady ON: LoRa Gateway function is enabled.
	WAN/LAN1 ~ LAN 2	Green	OFF: No Ethernet cable attached or Device not linked. Steady ON: Ethernet connection of LAN or WAN is established. Flash: Data packets are transferring.

1.5 Installation & Maintenance Notice

1.5.1 SYSTEM REQUIREMENTS

Network Requirements	<ul style="list-style-type: none">• An Gigabit Ethernet RJ45 cable or DSL modem• 10/100/1000 Ethernet adapter on PC
Web-based Configuration Utility Requirements	<p>Computer with the following:</p> <ul style="list-style-type: none">• Windows®, Macintosh, or Linux-based operating system• An installed Ethernet adapter <p>Browser Requirements:</p> <ul style="list-style-type: none">• 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 product is too hot, turn off the power immediately and have it repaired at a qualified service center.
- Place the product on a stable surface and avoid using this product and all accessories outdoors.

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 closed cabinet without air conditioning support, or in a high ambient temperature space.

DO NOT touch the hot surface with your fingers while servicing!!

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1.5.4 Product Information for CE RED Requirements

The following product information is required to be presented in product User Manual for latest CE RED requirements.²

(1) Frequency Band & Maximum Power

Band	Operating Frequency	Max. Output Power (EIRP)
868M	863 - 870MHz	100 mW
2.4G	N/A	N/A
5G	N/A	N/A

(2) DoC Information

You can get the DoC information of this product from the following URL:

<http://www.amit.com.tw/products-doc/>

(3) RF Exposure Statements

The antenna of the product, under normal use condition, is at least 20 cm away from the body of user.

² The information presented in this section is ONLY valid for the EU/EFTA regional version. For those non-CE/EFTA versions, please refer to the corresponding product specification.

1.6 Hardware Installation

This chapter describes how to install and configure the hardware

1.6.1 Mount the Unit

The IDG700 series product can be mounted on a wall, horizontal plane, or DIN Rail in a cabinet with the mounting accessories (brackets or DIN-rail kit). The mounting accessories are not screwed on the product when out of factory. Please screw the wall-mount kits or DIN-rail bracket on the product first.

1.6.2 Connecting Power

The IDG700 series product can be powered by connecting DC power sources to the terminal block. **It supports 9 to 36V DC power input.** Following picture indicates the power terminal block pin assignments. Please check carefully and connect to the right power requirements and polarity.



There is a DC12V/1A power adapter³ in the package for you to easily connect DC power adapter to this terminal block.



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

³ The maximum power consumption of IDG700 series product is 10W.

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1.6.3 Connecting to the Network or a Host

The IDG700 series product provides RJ45 ports to connect 10/100/1000Mbps 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 to the host PC's Ethernet port for configuring the device.

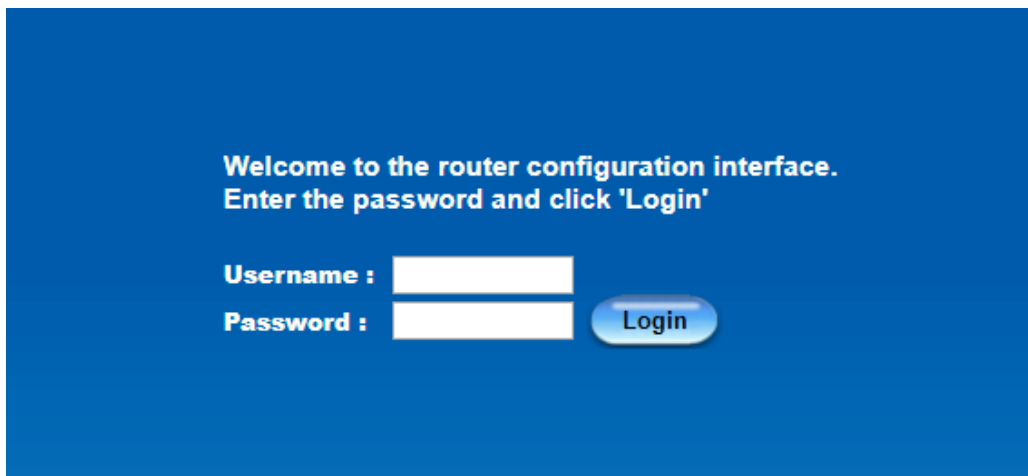
1.6.4 Setup by Configuring WEB UI

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 user name and password and then click '**Login**' button. The default setting for both username and password is '**admin**'⁵.



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 For security consideration, you are strongly recommended to change the login username and password from default values. Refer to Section 6.1.2 for how to change the setting.

Chapter 2 Basic Network

2.1 WAN & Uplink

The diagram illustrates the navigation path for configuring WAN and Uplink settings. The flow starts with 'Basic Network', followed by 'WAN & Uplink', 'Physical Interface', 'Internet Setup', and ends at 'End'. The screenshot shows the 'Physical Interface' configuration page with the following tables:

Interface Name	Physical Interface	Operation Mode	Action
WAN-1	Ethernet	Always on	Edit

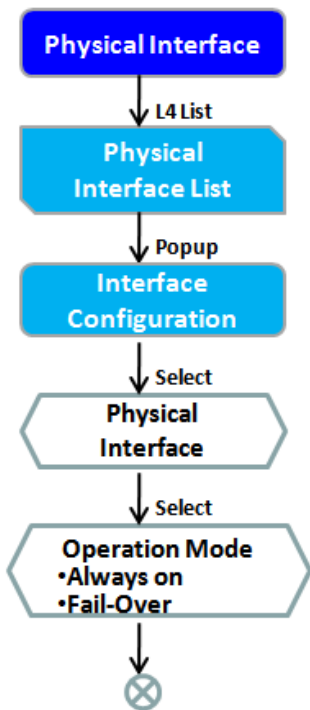
Item	Setting
Physical Interface	Ethernet
Operation Mode	Always on
VLAN Tagging	<input type="checkbox"/> Enable 2 (1-4095)

The gateway provides one WAN interface to let all client hosts in Intranet of the gateway access the Internet via ISP. 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 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 ISP.

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2.1.1 Physical Interface



Physical Interface List			
Interface Name	Physical Interface	Operation Mode	Action
WAN-1	Ethernet	Always on	<input type="button" value="Edit"/>

Interface Configuration (WAN - 1)	
Item	Setting
▶ Physical Interface	<input type="text" value="Ethernet"/>
▶ Operation Mode	<input type="text" value="Always on"/>
▶ VLAN Tagging	<input type="checkbox"/> Enable <input type="text" value="2"/> (1-4095)

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.

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Operation Mode:

There are three option items “Always on”, “Failover”, and “Disable” for the operation mode setting. However, for the single WAN device, only “Always on” 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.

VLAN Tagging

Sometimes, your ISP required a VLAN tag to be inserted into the WAN packets from Gateway for specific services. Please enable VLAN tagging and specify tag in the WAN physical interface. Please be noted that only Ethernet and ADSL physical interfaces support the feature. VLAN tagging is not available for the gateway.

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	Action
WAN-1	Ethernet	Always on	<input type="button" value="Edit"/>

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

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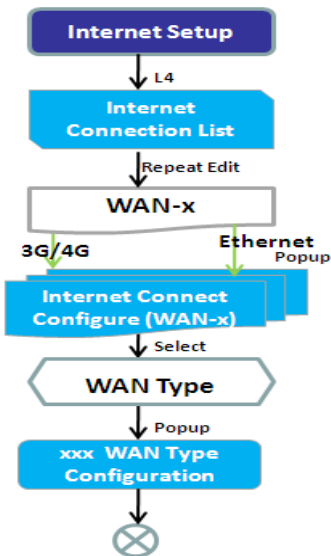
Interface Configuration:

Interface Configuration (WAN - 1)	
Item	Setting
▶ Physical Interface	Ethernet ▼
▶ Operation Mode	Always on ▼
▶ VLAN Tagging	<input type="checkbox"/> Enable <input type="text" value="2"/> (1-4095)

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.
Operation Mode	A Must fill setting	Define the operation mode of the interface. Select Always on to make this WAN always active. (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. <u>Value Range:</u> 1 ~ 4095.

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2.1.2 Internet Setup



Internet Connection List				
Interface Name	Physical Interface	Operation Mode	WAN Type	Action
WAN-1	Ethernet	Always on	Dynamic IP	<input type="button" value="Edit"/>

Internet Connection Configuration (WAN - 1)	
Item	Setting
▶ WAN Type	Dynamic IP ▼

Dynamic IP WAN Type Configuration	
Item	Setting
▶ Host Name	<input type="text"/> (Optional)
▶ ISP Registered MAC Address	<input type="text"/> <input type="button" value="Clone"/> (Optional)
▶ Connection Control	Auto-reconnect ▼
▶ MTU Setup	<input type="checkbox"/> Enable
▶ NAT	<input checked="" type="checkbox"/> Enable

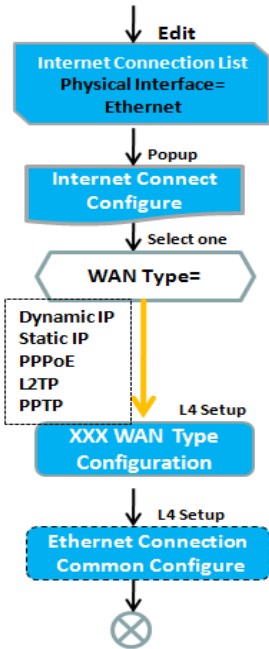
After specifying the physical interface for each WAN connection, administrator must configure their connection profile to meet the dial in process of ISP, so that all client hosts in the Intranet of the gateway can access the Internet.

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.

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Internet Connection List - Ethernet WAN



Internet Connection Configuration (WAN - 1)	
Item	Setting
▶ WAN Type	Dynamic IP ▼
Dynamic IP WAN Type Configuration	
Item	Setting
▶ Host Name	<input type="text"/> (Optional)
▶ ISP Registered MAC Address	<input type="text"/> <input type="button" value="Clone"/> (Optional)
▶ Connection Control	Auto-reconnect (Always on) ▼
▶ MTU	0 <input type="text"/> (0 is Auto)
▶ NAT	<input checked="" type="checkbox"/> Enable
	<input checked="" type="checkbox"/> Enable
	<input checked="" type="radio"/> DNS Query <input type="radio"/> ICMP Checking
	<input checked="" type="checkbox"/> Loading Check
	Check Interval <input type="text" value="5"/> (seconds)
	Check Timeout <input type="text" value="3"/> (seconds)
▶ Network Monitoring	Latency <input type="text" value="2000"/> (ms)

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 subscribe the service. Usually is more expensive but very important 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.

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WAN Type = Dynamic IP

Internet Connection Configuration (WAN - 1)	
Item	Setting
▶ 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	Setting
▶ Host Name	<input type="text"/> (Optional)
▶ ISP Registered MAC Address	<input type="text"/> <input type="button" value="Clone"/> (Optional)

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

Internet Connection Configuration (WAN - 1)	
Item	Setting
▶ 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	Setting
▶ WAN IP Address	<input type="text"/>
▶ WAN Subnet Mask	255.255.255.0 (/24) ▼
▶ WAN Gateway	<input type="text"/>
▶ Primary DNS	<input type="text"/>
▶ Secondary DNS	<input type="text"/> (Optional)

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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

Internet Connection Configuration (WAN - 1)	
Item	Setting
▶ WAN Type	PPPoE ▼

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

PPPoE WAN Type Configuration	
Item	Setting
▶ IPv6 Dual Stack	<input type="checkbox"/> Enable
▶ PPPoE Account	<input type="text"/>
▶ PPPoE Password	<input type="text"/>
▶ Primary DNS	<input type="text"/> (Optional)
▶ Secondary DNS	<input type="text"/> (Optional)
▶ Service Name	<input type="text"/> (Optional)
▶ Assigned IP Address	<input type="text"/> (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.

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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	<input type="text"/>
▶ PPTP Account	<input type="text"/>
▶ PPTP Password	<input type="text"/>
▶ Connection ID	<input type="text"/> (Optional)
▶ MPPE	<input type="checkbox"/> 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. <ul style="list-style-type: none"> ● When Static IP Address is selected, you will need to enter the WAN IP Address, WAN Subnet Mask, and WAN Gateway. <ul style="list-style-type: none"> ■ 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.

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WAN Type= L2TP

Internet Connection Configuration (WAN - 1)	
Item	Setting
▶ WAN Type	L2TP ▼

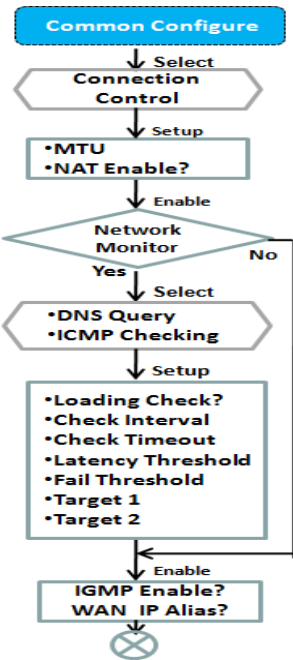
When you select it, "L2TP WAN Type Configuration" will appear. Items and setting is explained below

L2TP WAN Type Configuration	
Item	Setting
▶ IP Mode	Dynamic IP Address ▼
▶ Server IP Address / Name	<input type="text"/>
▶ L2TP Account	<input type="text"/>
▶ L2TP Password	<input type="text"/>
▶ Service Port	User-defined ▼ <input type="text" value="1702"/>
▶ MPPE	<input type="checkbox"/> Enable

L2TP WAN Type Configuration		
Item	Value setting	Description
IP Mode	A Must filled setting	<p>Select either Static or Dynamic IP address for L2TP Internet connection.</p> <ul style="list-style-type: none"> ● When Static IP Address is selected, you will need to enter the WAN IP Address, WAN Subnet Mask, and WAN Gateway. <ul style="list-style-type: none"> ■ 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	<p>Enter the service port that the Internet service.</p> <p>There are three options can be selected :</p> <ul style="list-style-type: none"> ● 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.

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Ethernet Connection Common Configuration

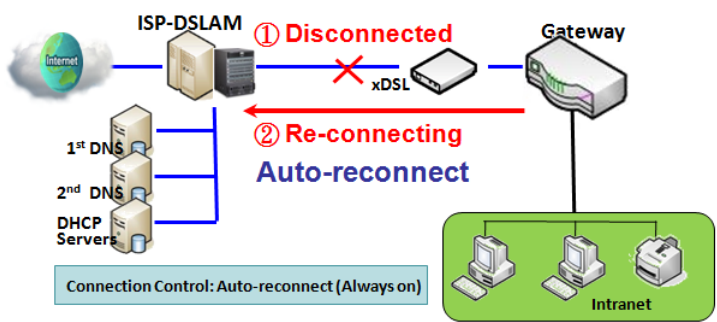


▶ Connection Control	Auto-reconnect ▼
▶ MTU Setup	<input type="checkbox"/> Enable
▶ NAT	<input checked="" type="checkbox"/> Enable
▶ IGMP	Disable ▼
▶ WAN IP Alias	<input type="checkbox"/> Enable 10.0.0.1

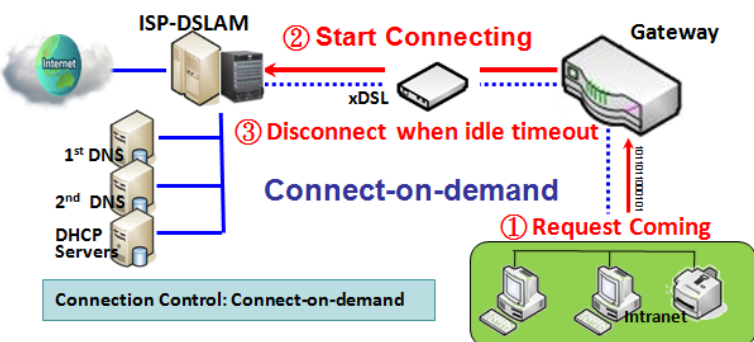
Network Monitoring Configuration	
Item	Setting
▶ Network Monitoring Configuration	<input checked="" type="checkbox"/> Enable
▶ Checking Method	DNS Query ▼
▶ Loading Check	<input checked="" type="checkbox"/> Enable
▶ Query Interval	5 (seconds)
▶ Latency Threshold	3000 (ms)
▶ Fail Threshold	5 (Times)
▶ Target1	DNS1 ▼
▶ Target2	None ▼

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

Connection Control.

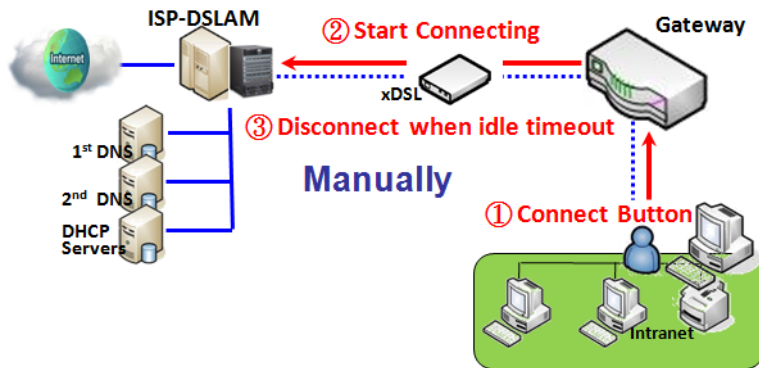


Auto-reconnect: This gateway will establish Internet connection automatically once it has been booted up, and try to reconnect once the connection is down. It's recommended to choose this scheme if for mission critical applications to ensure full-time Internet connection.



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.

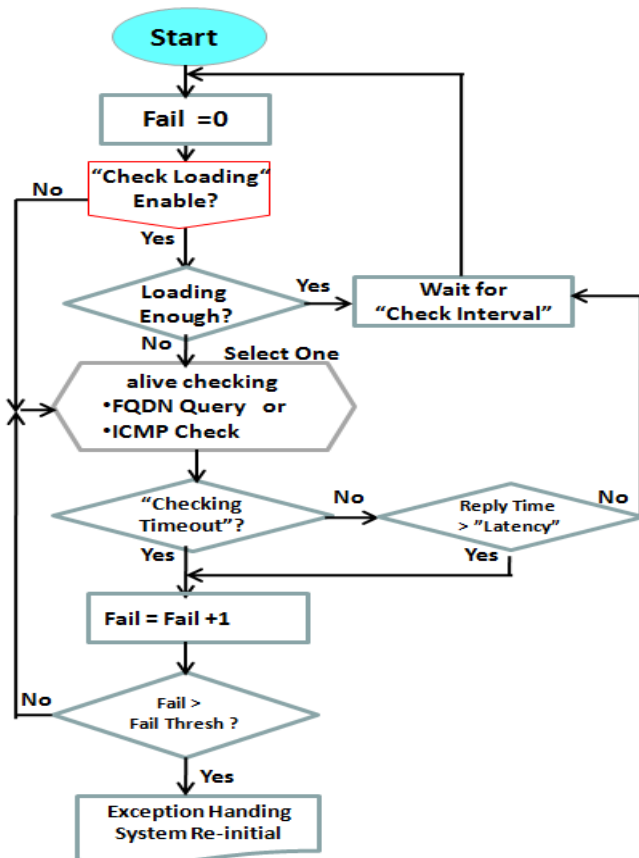
LoRa Gateway



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 traffic 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 handling process and re-initial this connection again. Otherwise, network monitoring process will be start again.

LoRa Gateway

Set up “Ethernet Common Configuration”

Ethernet WAN Common Configuration		
Item	Value setting	Description
Connection Control	A Must filled setting	<p>There are three connection modes.</p> <ul style="list-style-type: none"> ● Auto-reconnect 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.
Maximum Idle Time	<ol style="list-style-type: none"> 1. An Optional setting 2. By default 600 seconds is filled-in 	<p>Specify the maximum Idle time setting to disconnect the internet connection when the connection idle timed out.</p> <p>Value Range: 300 ~ 86400.</p> <p>Note: This field is available only when Connect-on-demand or Connect Manually is selected as the connection control scheme.</p>
MTU Setup	<ol style="list-style-type: none"> 1. An Optional setting 2. Uncheck by default 	<p>Check the Enable box to enable the MTU (Maximum Transmission Unit) limit, and specify the MTU for the 3G/4G connection.</p> <p>MTU refers to Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission.</p> <p>Value Range: 1200 ~ 1500.</p>
MTU Setup	<ol style="list-style-type: none"> 1. A Must filled setting 2. Auto (value zero) is set by default 3. Manual set range 1200~1500 	<p>MTU refers to Maximum Transmission Unit. It specifies the largest packet size permitted for Internet transmission.</p> <p>When set to Auto (value '0'), the router selects the best MTU for best Internet connection performance.</p>
NAT	<ol style="list-style-type: none"> 1. An optional setting 2. NAT is enabled by default 	<p>Enable NAT to apply NAT on the WAN connection. Uncheck the box to disable NAT function.</p>
Network Monitoring	<ol style="list-style-type: none"> 1. An optional setting 2. Enabled by default 	<p>When the Network Monitoring feature is enabled, the gateway will use DNS Query or ICMP to periodically check Internet connection –connected or disconnected.</p> <ul style="list-style-type: none"> ● 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

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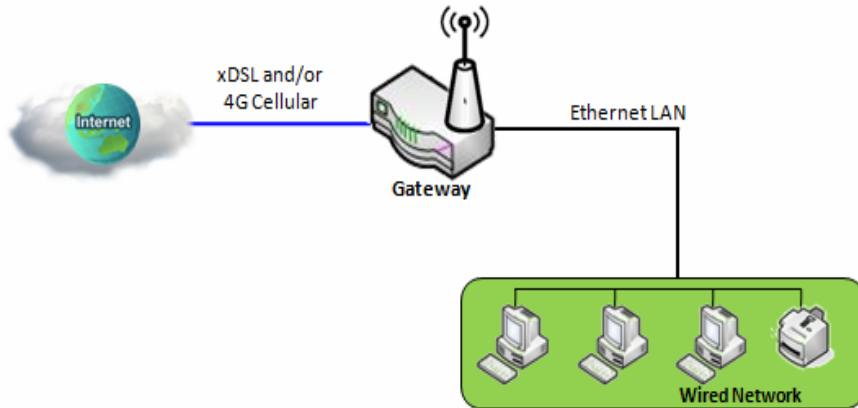
		<p>disconnection times to be the threshold before disconnection is acknowledged.</p> <ul style="list-style-type: none"> ● Target1 (DNS1 set by default) specifies the first target of sending DNS query/ICMP request. <ul style="list-style-type: none"> ■ DNS1: set the primary DNS to be the target. ■ DNS2: 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. <ul style="list-style-type: none"> ■ 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	<ol style="list-style-type: none"> 1. A Must filled setting 2. Disable is set by default 	<p>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.</p>
WAN IP Alias	<ol style="list-style-type: none"> 1. An optional setting 2. Uncheck by default 	<p>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.</p>
Save	<i>N/A</i>	Click Save to save the settings.
Undo	<i>N/A</i>	Click Undo to cancel the settings.

LoRa Gateway

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	Setting
▶ IP Mode	Static IP
▶ LAN IP Address	<input type="text" value="192.168.123.254"/>
▶ Subnet Mask	<input type="text" value="255.255.255.0 (/24)"/>

Configuration		
Item	Value setting	Description
IP Mode	N/A	It shows the LAN IP mode for the gateway according the related configuration. Static IP: If there is at least one WAN interface activated, the LAN IP mode is fixed in Static IP mode. Dynamic IP: If all the available WAN interfaces are disabled, the LAN IP mode can be Dynamic IP mode.
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) is set	Select the subnet mask for this gateway from the dropdown list. Subnet mask defines how many clients are allowed in one network or subnet.

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	by default	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.

Additional IP <input type="button" value="Add"/> <input type="button" value="Delete"/>						
ID	Name	Interface	IP Address	Subnet Mask	Enable	Action

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

Additional IP Configuration	
Item	Setting
▶ Name	<input type="text"/>
▶ Interface	lo ▼
▶ IP Address	<input type="text"/>
▶ Subnet Mask	255.255.255.0 (/24) ▼
▶ Enable	<input type="checkbox"/>
<input type="button" value="Save"/>	

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) is set by default	Select the subnet mask for this gateway from the dropdown list. 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

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		network. <i>Value Range:</i> 255.0.0.0 (/8) ~ 255.255.255.255 (/32).
Save	NA	Click the Save button to save the configuration

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2.2.2 VLAN (not supported)

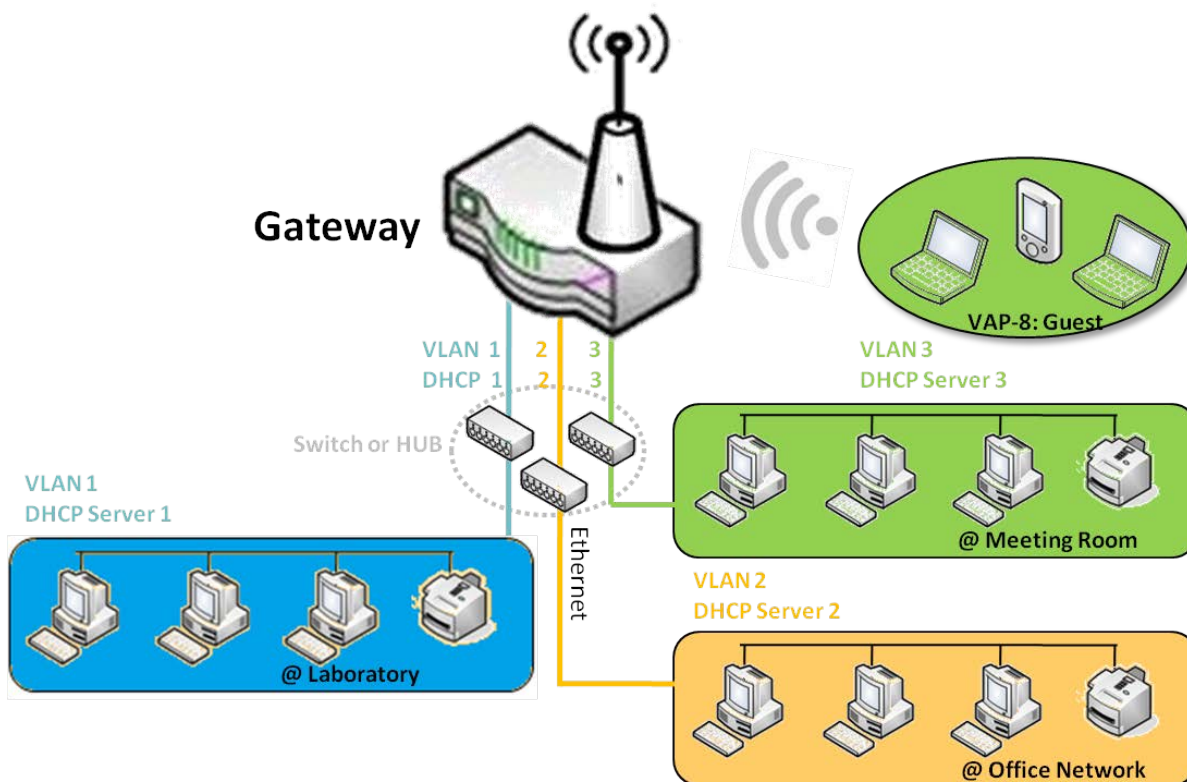
Not supported feature for the purchased product, leave it as blank.

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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.

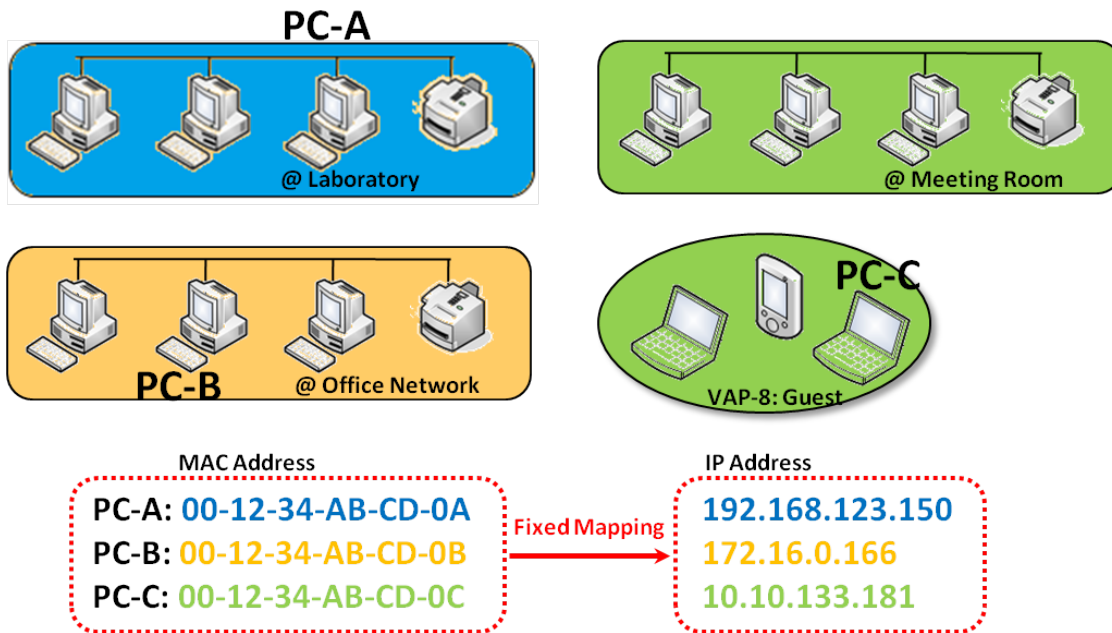


User can add more DHCP server configurations by clicking on the “Add” button behind “DHCP Server List”, or clicking on the “Edit” button at the end of each DHCP Server on list to edit its current settings. Besides, user can select a DHCP Server and delete it by clicking on the “Select” check-box and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

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➤ 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.



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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 <input type="button" value="Add"/> <input type="button" value="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	<input checked="" type="checkbox"/>	<input type="button" value="Edit"/> <input type="button" value="Fixed Mapping"/>

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

DHCP Server Configuration	
Item	Setting
▶ DHCP Server Name	<input type="text" value="DHCP 2"/>
▶ LAN IP Address	<input type="text" value="192.168.2.254"/>
▶ Subnet Mask	<input type="text" value="255.0.0.0 (/8)"/> ▼
▶ IP Pool	Starting Address: <input type="text"/> Ending Address: <input type="text"/>
▶ Lease Time	<input type="text" value="86400"/> seconds
▶ Domain Name	<input type="text"/> (Optional)
▶ Primary DNS	<input type="text"/> (Optional)
▶ Secondary DNS	<input type="text"/> (Optional)
▶ Primary WINS	<input type="text"/> (Optional)
▶ Secondary WINS	<input type="text"/> (Optional)
▶ Gateway	<input type="text"/> (Optional)
▶ Server	<input type="checkbox"/> Enable

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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. Numeric 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 gateway 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.

Mapping Rule List Add Delete [Help]			
MAC Address	IP Address	Enable	Actions

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

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Mapping Rule Configuration	
Item	Setting
▶ MAC Address	<input type="text"/>
▶ IP Address	<input type="text"/>
▶ Rule	<input type="checkbox"/> Enable

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.

DHCP Client List Copy to Fixed Mapping					
LAN Interface	IP Address	Host Name	MAC Address	Remaining Lease Time	Actions
Ethernet	Dynamic /192.168.123.100	James-P45V	74:D0:2B:62:8D:42	00:49:07	<input type="checkbox"/> Select

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.

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

Configuration	
Item	Setting
▶ DHCP Server Options	<input type="checkbox"/> Enable

Create / Edit DHCP Server Options

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

DHCP Server Option List <input type="button" value="Add"/> <input type="button" value="Delete"/>							
ID	Option Name	DHCP Sever Select	Option Select	Type	Value	Enable	Actions

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

DHCP Server Option Configuration <input type="button" value="Save"/> <input type="button" value="Undo"/>	
Item	Setting
Option Name	<input type="text" value="Option 1"/>
DHCP Sever Select	<input type="text" value="DHCP 1"/>
Option Select	<input type="text" value="DHCP OPTION 66"/>
Type	<input type="text" value="Single IP Address"/>
Value	<input type="text"/>
Enable	<input type="checkbox"/> Enable

DHCP Server Option Configuration		
Item	Value setting	Description
Option Name	1. String format can be any text 2. A Must filled setting.	Enter a DHCP Server Option name. Enter a name that is easy for you to understand.
DHCP Server Select	Dropdown list of all available DHCP servers.	Choose the DHCP server this option should apply to.
Option Select	1. A Must filled setting. 2. Option 66 is selected by default.	Choose the specific option from the dropdown list. It can be Option 66, Option 72, Option 144, Option 42, Option 150, or Option 160. Option 42 for ntp server; Option 66 for tftp; Option 72 for www;

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		Option 144 for url;		
Type	Dropdown list of DHCP server option value's type	Each different options has different value types.		
		66	Single IP Address	
			Single FQDN	
		72	IP Addresses List, separated by “,”	
		114	Single URL	
		42	IP Addresses List, separated by “,”	
		150	IP Addresses List, separated by “,”	
		160	Single IP Address	
		Single FQDN		
Value	1. IPv4 format 2. FQDN format 3. IP list 4. URL format 5. A Must filled setting	Should conform to Type :		
			Type	Value
		66	Single IP Address	IPv4 format
			Single FQDN	FQDN format
		72	IP Addresses List, separated by “,”	IPv4 format, separated by “,”
	114	Single URL	URL format	
Enable	The box is unchecked by default.	Click Enable box to activate this setting.		
Save	NA	Click the Save button to save the setting.		
Undo	NA	When the Undo button is clicked the screen will return back with nothing changed.		

Create / Edit DHCP Relay

The gateway supports up to a maximum of 6 DHCP Relay configurations.

DHCP Relay Configuration List						
<input type="button" value="Add"/> <input type="button" value="Delete"/>						
ID	Agent Name	LAN interface	WAN interface	Server IP	Enable	Actions

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

DHCP Relay Configuration	
<input type="button" value="Save"/> <input type="button" value="Undo"/>	
Item	Setting
Agent Name	<input type="text"/>
LAN interface	LAN ▾
WAN interface	WAN - 1 ▾
Server IP	<input type="text"/>
Enable	<input type="checkbox"/>

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DHCP Relay Configuration		
Item	Value setting	Description
Agent Name	1. String format can be any text 2. A Must filled setting.	Enter a DHCP Relay name. Enter a name that is easy for you to understand. <u>Value Range:</u> 1~64 characters.
LAN Interface	1. A Must filled setting. 2. LAN is selected by default.	Choose a LAN Interface for the dropdown list to apply with the DHCP Relay function.
WAN Interface	1. A Must filled setting. 2. WAN-1 is selected by default.	Choose a WAN Interface for the dropdown list to apply with the DHCP Relay function. It can be the available WAN interface(s), and L2TP connection.
Server IP	1. A Must filled setting. 2. null by default.	Assign a DHCP Server IP Address that the gateway will relay the DHCP requests to the assigned DHCP server via specified WAN interface.
Enable	The box is unchecked by default.	Click Enable box to activate this setting.
Save	NA	Click the Save button to save the setting.
Undo	NA	When the Undo button is clicked the screen will return back with nothing changed.

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2.3 WiFi (not supported)

Not supported feature for the purchased product, leave it as blank.

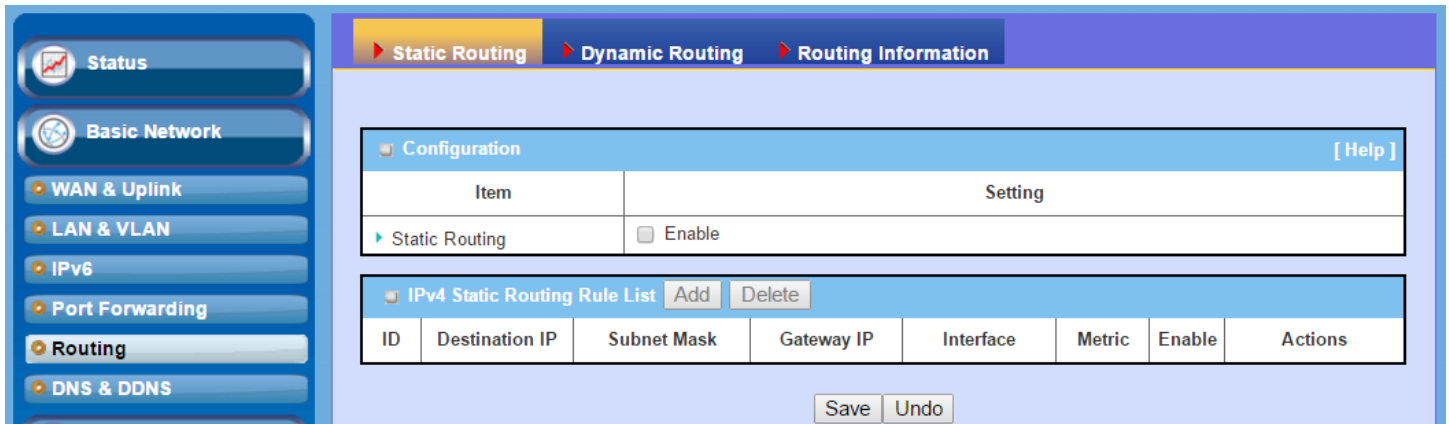
2.4 IPv6 (not supported)

Not supported feature for the purchased product, leave it as blank.

2.5 Port Forwarding (not supported)

Not supported feature for the purchased product, leave it as blank.

2.6 Routing

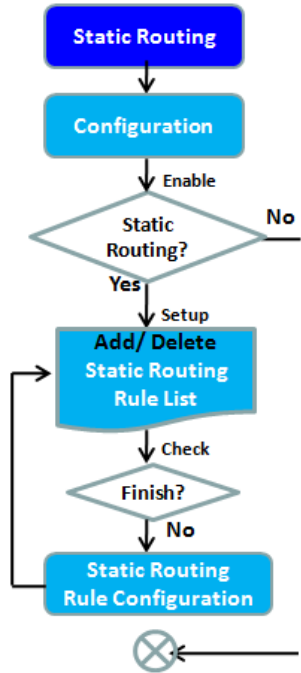


If you have more than one router and subnet, you will need to enable routing function to allow packets to find proper routing path and allow different subnets to communicate with each other. Routing is the process of selecting best paths in a network. It is performed for many kinds of networks, like 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.

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2.6.1 Static Routing

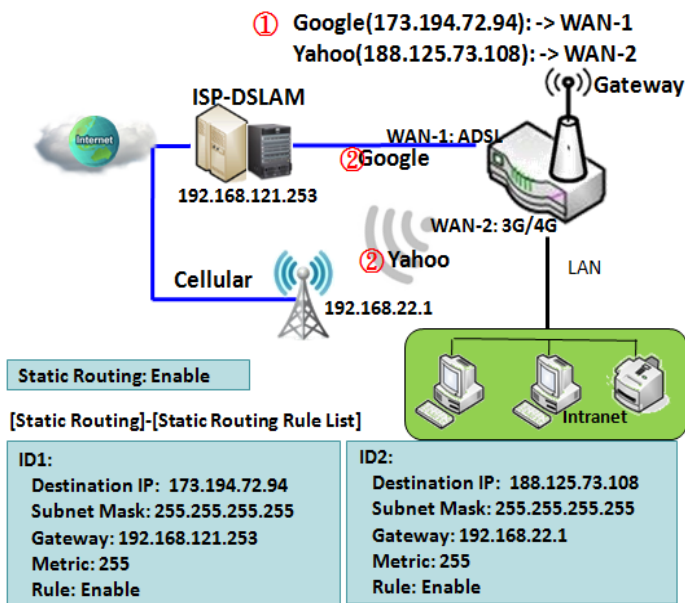


Configuration [Help]	
Item	Setting
Static Routing	<input checked="" type="checkbox"/> Enable

IPv4 Static Routing Rule List [Add] [Delete]							
ID	Destination IP	Subnet Mask	Gateway IP	Interface	Metric	Enable	Actions

IPv4 Static Routing Rule Configuration	
Item	Setting
Destination IP	<input type="text"/>
Subnet Mask	255.255.255.0 (/24) ▾
Gateway IP	<input type="text"/>
Interface	Auto ▾
Metric	<input type="text"/>
Rule	<input type="checkbox"/> Enable

"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.

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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.

Configuration [Help]	
Item	Setting
▶ Static Routing	<input checked="" type="checkbox"/> Enable

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.

IPv4 Static Routing Rule List Add Delete							
ID	Destination IP	Subnet Mask	Gateway IP	Interface	Metric	Enable	Actions

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

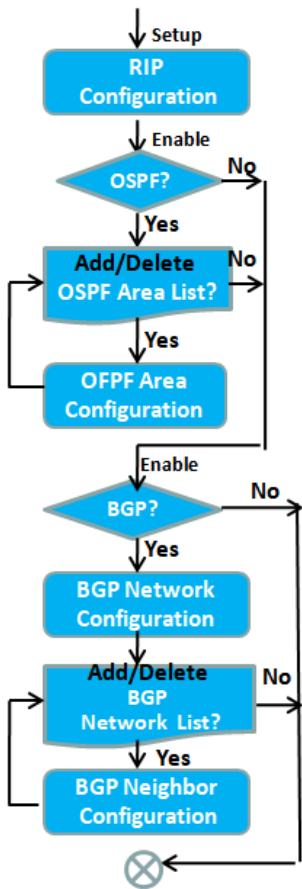
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of each static routing rule can let you modify the rule.

IPv4 Static Routing Rule Configuration	
Item	Setting
▶ Destination IP	<input type="text"/>
▶ Subnet Mask	<input type="text" value="255.255.255.0 (/24)"/>
▶ Gateway IP	<input type="text"/>
▶ Interface	<input type="text" value="Auto"/>
▶ Metric	<input type="text"/>
▶ Rule	<input type="checkbox"/> Enable

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. Numeric String Format 2. A Must filled setting	The Metric of this static routing rule. <i>Value Range: 0 ~ 255.</i>
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



RIP Configuration [Help]				
Item	Setting			
▶ RIP Enable	<input type="text" value="Disable"/>			

OSPF Configuration				
Item	Setting			
▶ OSPF	<input type="checkbox"/> Enable			

OSPF Area List <input type="button" value="Add"/> <input type="button" value="Delete"/>				
ID	Area Subnet	Area ID	Enable	Actions

OSPF Area Configuration	
Item	Setting
▶ Area Subnet	<input type="text"/>

BGP Configuration	
Item	Setting
▶ BGP	<input type="checkbox"/> Enable

BGP Network Configuration	
Item	Setting
▶ Network Subnet	IP : <input type="text"/> <input type="text" value="255.255.255.0 (/24)"/>

BGP Network List <input type="button" value="Add"/> <input type="button" value="Delete"/>				
ID	Network Subnet	Enable	Actions	

BGP Neighbor Configuration	
Item	Setting
▶ Neighbor IP	<input type="text"/>

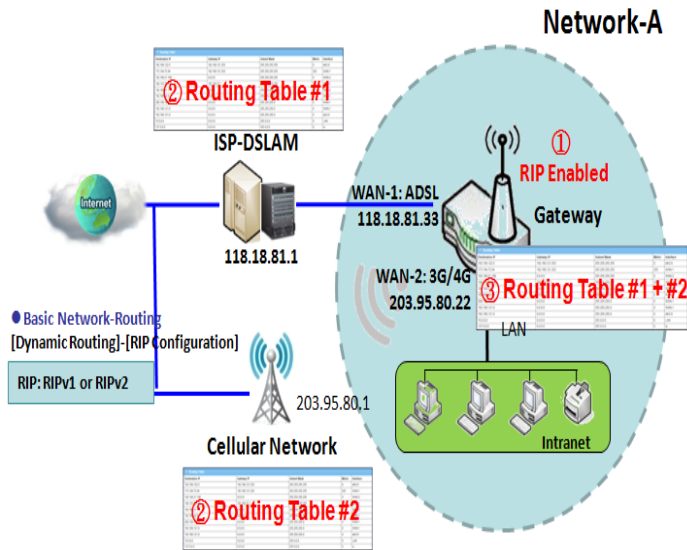
Dynamic Routing, also called adaptive routing, describes the capability of a system, through which routes are characterized by their destination, to alter the path that the route takes through the system in response to a change in network conditions.

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.

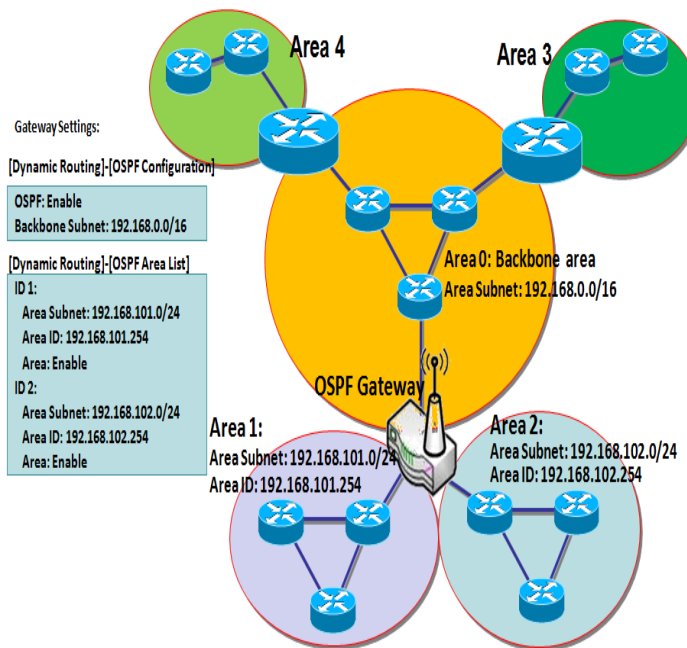
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RIP Scenario



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



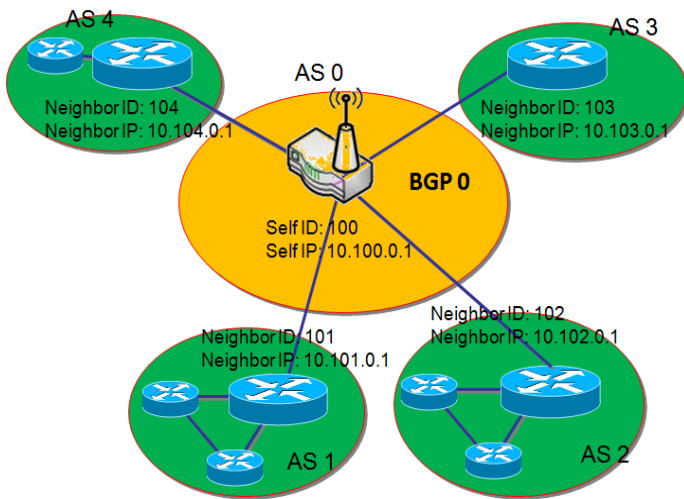
Open Shortest Path First (OSPF) is a routing protocol that uses link state routing algorithm. It is the most widely used interior gateway protocol (IGP) in large enterprise networks. It gathers link state information from available routers and constructs a topology map of the network. The topology is 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 not 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.

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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 link 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 AS 0 (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.

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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 several 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.

RIP Configuration

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

RIP Configuration [Help]	
Item	Setting
RIP Enable	Disable ▾

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.

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OSPF Configuration	
Item	Setting
▶ OSPF	<input type="checkbox"/> Enable
▶ Router ID	<input type="text"/>
▶ Authentication	None ▾
▶ Backbone Subnet	<input type="text"/>

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

OSPF Area List <input type="button" value="Add"/> <input type="button" value="Delete"/>				
ID	Area Subnet	Area ID	Enable	Actions

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

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OSPF Area Configuration	
Item	Setting
▶ Area Subnet	<input type="text"/>
▶ Area ID	<input type="text"/>
▶ Area	<input type="checkbox"/> Enable
<input type="button" value="Save"/>	

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

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BGP Configuration

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

BGP Configuration	
Item	Setting
▶ BGP	<input type="checkbox"/> Enable
▶ ASN	<input type="text"/>
▶ Router ID	<input type="text"/>

Item	Value setting	Description
BGP	The box is unchecked by default	Check the Enable box to activate the BGP protocol.
ASN	1. Numeric 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 gateway allows you to custom your BGP Network rules. It supports up to a maximum of 32 rule sets.

BGP Network List <input type="button" value="Add"/> <input type="button" value="Delete"/>			
ID	Network Subnet	Enable	Actions

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

BGP Network Configuration	
Item	Setting
▶ Network Subnet	IP : <input type="text"/> <input type="text" value="255.255.255.0 (/24)"/> ▼
▶ Network	<input type="checkbox"/> Enable

Item	Value setting	Description
Network Subnet	1. IPv4 Format	The Network Subnet of this router on BGP Network List. It composes of entered

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	2. A Must filled setting	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 gateway allows you to custom your BGP Neighbor rules. It supports up to a maximum of 32 rule sets.

BGP Neighbor List <input type="button" value="Add"/> <input type="button" value="Delete"/>				
ID	Neighbor IP	Remote ASN	Enable	Actions

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

BGP Neighbor Configuration	
Item	Setting
▶ Neighbor IP	<input type="text"/>
▶ Remote ASN	<input type="text"/>
▶ Neighbor	<input type="checkbox"/> Enable
<input type="button" value="Save"/>	

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. Numeric 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

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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	-	-	-	-

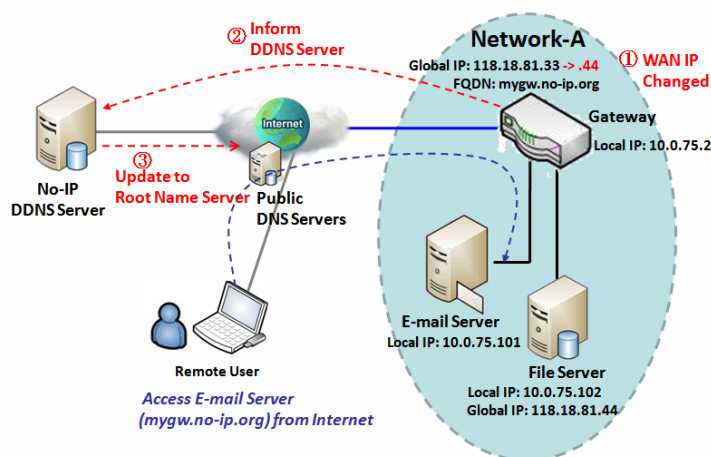
Policy Routing Information		
Item	Value setting	Description
Policy Routing Source	N/A	Policy Routing of Source. String Format.
Source IP	N/A	Policy Routing of Source IP. IPv4 Format.
Destination IP	N/A	Policy Routing of Destination IP. IPv4 Format.
Destination Port	N/A	Policy Routing of Destination Port.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

2.7 DNS & DDNS

How does user access your server if your WAN IP address changes all the time? One way is to register a new domain name, and maintain your own DNS server. Another simpler way is to apply a domain name to a third-party DDNS service provider. The service can be free or charged. If you want to understand the basic concepts of DNS and Dynamic DNS, you can refer to Wikipedia website^{6,7}.

2.7.1 DNS & DDNS Configuration

Dynamic DNS



To host your server on a changing IP address, you have to use dynamic domain name service (DDNS). Therefore, anyone wishing to reach your host only needs to know the domain name. Dynamic DNS will map the name of your host to your current IP address, which changes each time you connect your Internet service provider.

The Dynamic DNS service allows the gateway to alias a public dynamic IP address to a static domain name, allowing the gateway to be more easily accessed from various locations on the Internet. As shown in the diagram, user registered a domain name to a

third-party DDNS service provider (NO-IP) to use DDNS function. Once the IP address of designated WAN interface has changed, the dynamic DNS agent in the gateway will inform the DDNS server with the new IP address. The server automatically re-maps your domain name with the changed IP address. So, other hosts or remote users in the Internet world are able to link to your gateway by using your domain name regardless of the changing global IP address.

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

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

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DNS & DDNS Setting

Go to **Basic Network > DNS & DDNS > Configuration** Tab.

The DNS & DDNS setting allows user to setup Dynamic DNS feature and DNS redirect rules.

Setup Dynamic DNS

The gateway allows you to custom your Dynamic DNS settings.

Dynamic DNS [Help]	
Item	Setting
▶ DDNS	<input type="checkbox"/> Enable
▶ WAN Interface	WAN-1 ▼
▶ Provider	DynDNS.org(Dynamic) ▼
▶ Host Name	<input type="text"/>
▶ User Name / E-Mail	<input type="text"/>
▶ Password / Key	<input type="text"/>

DDNS (Dynamic DNS) Configuration		
Item	Value setting	Description
DDNS	The box is unchecked by default	Check the Enable box to activate this function.
WAN Interface	WAN 1 is set by default	Select the WAN Interface IP Address of the gateway.
Provider	DynDNS.org (Dynamic) is set by default	Select your DDNS provider of Dynamic DNS. It can be DynDNS.org(Dynamic) , DynDNS.org(Custom) , NO-IP.com , etc...
Host Name	1. String format can be any text 2. A Must filled setting	Your registered host name of Dynamic DNS. Value Range: 0 ~ 63 characters.
User Name / E-Mail	1. String format can be any text 2. A Must filled setting	Enter your User name or E-mail addresss of Dynamic DNS.
Password / Key	1. String format can be any text 2. A Must filled setting	Enter your Password or Key of Dynamic DNS.
Save	N/A	Click Save to save the settings
Undo	N/A	Click Undo to cancel the settings

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Setup DNS Redirect

DNS redirect is a special function to redirect certain traffics to a specified host. Administator can manage the internet / intranet traffics that are going to access some restricted DNS and force those traffics to be redirected to a specified host.

DNS Redirect	
Item	Setting
▶ DNS Redirect	<input type="checkbox"/> Enable

DNS Redirect Configuration		
Item	Value setting	Description
DNS Redirect	The box is unchecked by default	Check the Enable box to activate this function.
Save	N/A	Click Save to save the settings
Undo	N/A	Click Undo to cancel the settings

If you enabled the DNS Redirect function, you have to further specify the redirect rules. According to the rules, the gateway can redirect the traffic that matched the DNS to corresponding pre-defined IP address.

Redirect Rule Add Delete					
ID	Mapping Rule	Condition	Description	Enable	Action

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

Redirect Rule Save Back					
Item	Setting				
Mapping Rule	<table border="1"><thead><tr><th>Domain Name</th><th>IP</th></tr></thead><tbody><tr><td><input type="text"/> (* for Any)</td><td><input type="text"/></td></tr></tbody></table>	Domain Name	IP	<input type="text"/> (* for Any)	<input type="text"/>
Domain Name	IP				
<input type="text"/> (* for Any)	<input type="text"/>				
Condition	<input type="text" value="Always"/> ▼				
Description	<input type="text"/>				
Enable	<input type="checkbox"/> Enable				

Redirect Rule Configuration		
Item	Value setting	Description
Domain Name	1. String format can be any text	Enter a domain name to be redirect. The traffic to specified domain name will be redirect to the following IP address.

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	2. A Must filled setting	<i>Value Range:</i> at least 1 character is required; '*' for any.
IP	1. IPv4 format 2. A Must filled setting	Enter an IP Address as the target for the DNS redirect.
Condition	1. A Must filled setting 2. Always is selected by default.	Specify when will the DNS redirect action can be applied. It can be Always , or WAN Block . Always: The DNS redirect function can be applied to matched DNS all the time. WAN Block: The DNS redirect function can be applied to matched DNS only when the WAN connection is disconnected, or un-reachable.
Description	1. String format can be any text 2. A Must filled setting	Enter a brief description for this rule. <i>Value Range:</i> 0 ~ 63 characters.
Enable	The box is unchecked by default	Click the Enable button to activate this rule.
Save	N/A	Click Save to save the settings
Undo	N/A	Click Undo to cancel 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.

Time Schedule List		
ID	Rule Name	Actions
		<input type="button" value="Add"/> <input type="button" value="Delete"/>

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	Setting
▶ Rule Name	<input type="text"/>
▶ Rule Policy	<input type="button" value="Inactivate"/> the Selected Days and Hours Below.

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

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Time Period Definition			
ID	Week Day	Start Time (hh:mm)	End Time (hh:mm)
1	-- choose one -- ▼	<input type="text"/>	<input type="text"/>
2	-- choose one -- ▼	<input type="text"/>	<input type="text"/>
3	-- choose one -- ▼	<input type="text"/>	<input type="text"/>
4	-- choose one -- ▼	<input type="text"/>	<input type="text"/>
5	-- choose one -- ▼	<input type="text"/>	<input type="text"/>
6	-- choose one -- ▼	<input type="text"/>	<input type="text"/>
7	-- choose one -- ▼	<input type="text"/>	<input type="text"/>
8	-- choose one -- ▼	<input type="text"/>	<input type="text"/>

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 User (not supported)

Not supported feature for the purchased product, leave it as blank.

3.3 Grouping

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

3.3.1 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.

Host Group List <input type="button" value="Add"/> <input type="button" value="Delete"/>						
ID	Group Name	Group Type	Member List	Bound Services	Enable	Actions

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

Host Group Configuration	
Item	Setting
▶ Group Name	<input type="text"/>
▶ Group Type	<input type="text" value="IP Address-based"/> ▼
▶ Member to Join	<input type="text"/> <input type="button" value="Join"/>
▶ Member List	
▶ Bound Services	<input type="checkbox"/> Firewall
▶ Group	<input type="checkbox"/> Enable

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.
Group Type	1. IP Address-based is selected by default. 2. A Must filled setting	Select the group 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 .

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		<p>When MAC Address-based is selected, only MAC address can be added in Member to Join.</p> <p>When Host Name-based is selected, only host name can be added in Member to Join.</p> <p>Note: The available Group Type can be different for the purchased model.</p>
Member to Join	N/A	<p>Add the members to the group in this field.</p> <p>You can enter the member information as specified in the Member Type above, and press the Join button to add.</p> <p>Only one member can be add at a time, so you have to add the members to the group one by one.</p>
Member List	NA	This field will indicate the hosts (members) contained in the group.
Bound Services	The boxes are unchecked by default	<p>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 other available service types.</p> <p>Note: The supported service type can be different for the purchased product.</p>
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

3.4 External Server

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

The External Server setting allows user to add external server.

Create External Server

External Server List <input type="button" value="Add"/> <input type="button" value="Delete"/>						
ID	Server Name	Server Type	Server IP/FQDN	Server Port	Server Enable	Actions

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

External Server Configuration	
Item	Setting
▶ Server Name	<input type="text"/>
▶ Server Type	<input type="text" value="Email Server"/> User Name: <input type="text"/> Password: <input type="text"/>
▶ Server IP/FQDN	<input type="text"/>
▶ Server Port	<input type="text" value="25"/>
▶ Server	<input checked="" type="checkbox"/> Enable
<input type="button" value="Save"/> <input type="button" value="Undo"/>	

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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	<p>Specify the Server Type of the external server, and enter the required settings for the accessing the server.</p> <hr/> <p>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)</p> <hr/> <p>RADIUS Server (A Must filled setting) : When RADIUS Server is selected, the following settings are also required. 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 15. 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 15.</p> <hr/> <p>Active Directory Server (A Must filled setting) : When Active Directory Server is selected, Domain setting is also required. Domain (String format: any text)</p> <hr/> <p>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)</p> <hr/> <p>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) NAS/Gateway ID (String format: any text) Location ID (String format: any text) Location Name (String format: any text)</p>

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		<p>TACACS+ Server (A Must filled setting) :</p> <p>When TACACS+ Server is selected, the following settings are also required.</p> <p>Shared Key (String format: any text)</p> <p>Session Timeout (String format: any number)</p> <p>The values must be between 1 and 60.</p> <hr/> <p>SCEP Server (A Must filled setting) :</p> <p>When SCEP Server is selected, the following settings are also required.</p> <p>Path (String format: any text, By default cgi-bin is filled)</p> <p>Application (String format: any text, By default pkiclient.exe is filled)</p> <hr/> <p>FTP(SFTP) Server (A Must filled setting) :</p> <p>When FTP(SFTP) Server is selected, the following settings are also required.</p> <p>User Name (String format: any text)</p> <p>Password (String format: any text)</p> <p>Protocol (Select FTP or SFTP)</p> <p>Encryprion (Select Plain, Explicit FTPS or Implicit FTPS)</p> <p>Transfer mode (Select Passive or Active)</p>
Server IP/FQDN	A Must filled setting	Specify the IP address or FQDN used for the external server.
Server Port	A Must filled setting	<p>Specify the Port used for the external server. If you selected a certain server type, the default server port number will be set.</p> <p>For Email Server 25 will be set by default;</p> <p>For Syslog Server, port 514 will be set by default;</p> <p>For RADIUS Server, port 1812 will be set by default;</p> <p>For Active Directory Server, port 389 will be set by default;</p> <p>For LDAP Server, port 389 will be set by default;</p> <p>For UAM Server, port 80 will be set by default;</p> <p>For TACACS+ Server, port 49 will be set by default;</p> <p>For SCEP Server, port 80 will be set by default;</p> <p>For FTP(SFTP) Server, port 21 will be set by default;</p> <p>Value Range: 1 ~ 65535.</p>
Account Port	<p>1. A Must filled setting</p> <p>2. 1813 is set by default</p>	<p>Specify the accounting port used if you selected external RADIUS server.</p> <p>Value Range: 1 ~ 65535.</p>
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.

3.5 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 owner⁸.

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.

3.5.1 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



ID	Name	Subject	Issuer	Vaild To	Action
----	------	---------	--------	----------	--------

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.

⁸ http://en.wikipedia.org/wiki/Public_key_certificate.

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Root CA Certificate Configuration	
Item	Setting
▶ Name	<input type="text"/>
▶ Key	Key Type : <input type="text" value="RSA"/> Key Length : <input type="text" value="512-bits"/> Digest Algorithm : <input type="text" value="MD5"/>
▶ Subject Name	Country(C) : <input type="text"/> State(ST) : <input type="text"/> Location(L) : <input type="text"/> Organization(O) : <input type="text"/> Organization Unit(OU) : <input type="text"/> Common Name(CN) : <input type="text"/> Email : <input type="text"/>
▶ Validity Period	<input type="text" value="20-years"/>

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.

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Setup SCEP

SCEP Configuration	
Item	Setting
▶ SCEP	<input type="checkbox"/> Enable
▶ Automatically re-enroll aging certificates	<input type="checkbox"/> Enable

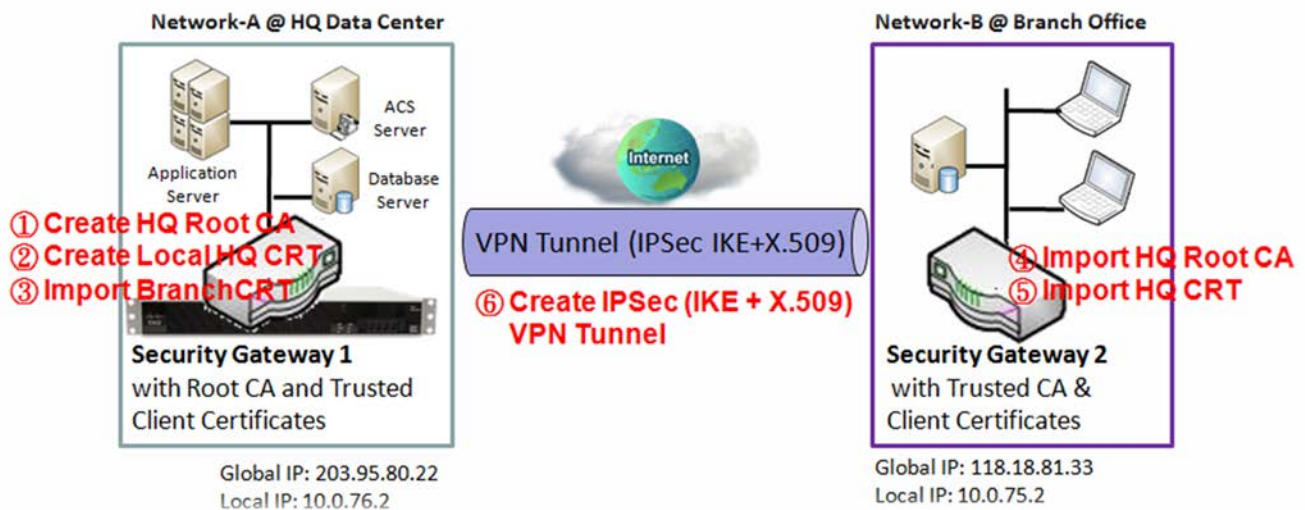
SCEP Configuration		
Item	Value setting	Description
SCEP	The box is unchecked by default	Check the Enable box to activate SCEP function.
Automatically re-enroll aging certificates	The box is unchecked by default	When SCEP is activated, check the Enable box to activate this function. It will be automatically 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

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3.5.2 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

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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@amit.com.tw

Configuration Path	[My Certificate]-[Local Certificate Configuration]
Name	HQCRT Self-signed: <input checked="" type="checkbox"/>
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: hqcert@amit.com.tw

Configuration Path	[IPSec]-[Configuration]
IPSec	<input checked="" type="checkbox"/> Enable

Configuration Path	[IPSec]-[Tunnel Configuration]
Tunnel	<input checked="" type="checkbox"/> 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

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

Configuration Path	[IPSec]-[IKE Phase]
Negotiation Mode	<i>Main Mode</i>
X-Auth	<i>None</i>

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	<i>BranchCRT</i> Self-signed: <input type="checkbox"/>
Key	Key Type: <i>RSA</i> Key Length: <i>1024-bits</i>
Subject Name	Country(C): <i>TW</i> State(ST): <i>Taiwan</i> Location(L): <i>Tainan</i> Organization(O): <i>AMITBranch</i> Organization Unit(OU): <i>BranchRD</i> Common Name(CN): <i>BranchCRT</i> E-mail: <i>branchcrt@amit.com.tw</i>

Configuration Path	[IPSec]-[Configuration]
IPSec	■ <i>Enable</i>

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

Configuration Path	[IPSec]-[Local & Remote Configuration]
Local Subnet	<i>10.0.75.0</i>
Local Netmask	<i>255.255.255.0</i>
Full Tunnel	<i>Disable</i>
Remote Subnet	<i>10.0.76.0</i>

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Remote Netmask	<i>255.255.255.0</i>
Remote Gateway	<i>203.95.80.22</i>

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

Configuration Path	[IPSec]-[IKE Phase]
Negotiation Mode	<i>Main Mode</i>
X-Auth	<i>None</i>

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.

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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

Local Certificate List					
	<input type="button" value="Add"/>	<input type="button" value="Import"/>	<input type="button" value="Delete"/>		
ID	Name	Subject	Issuer	Vaild To	Actions

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	Setting
▶ Name	<input type="text"/> Self-signed : <input type="checkbox"/>
▶ Key	Key Type : <input type="text" value="RSA"/> Key Length : <input type="text" value="1024-bits"/> Digest Algorithm : <input type="text" value="SHA-1"/>
▶ Subject Name	Country(C) : <input type="text"/> State(ST) : <input type="text"/> Location(L) : <input type="text"/> Organization(O) : <input type="text"/> Organization Unit(OU) : <input type="text"/> Common Name(CN) : <input type="text"/> Email : <input type="text"/>
▶ Extra Attributes	Challenge Password: <input type="text"/> Unstructured Name: <input type="text"/>
▶ SCEP Enrollment	Enable: <input type="checkbox"/> SCEP Server: <input type="text" value="-- Option --"/> <input type="button" value="Add Object"/> CA Certificate: <input type="text"/> CA Encryption Certificate: <input type="text" value="-- Option --"/> (Optional) CA Identifier: <input type="text"/> (Optional)

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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.

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The screenshot shows two panels. The top panel, titled 'Import', contains a 'Choose File' button followed by the text 'No file chosen'. Below this are 'Apply' and 'Cancel' buttons. The bottom panel, titled 'PEM Encoded', features a large, empty text input area. At the bottom of this panel are 'Apply' and 'Cancel' buttons.

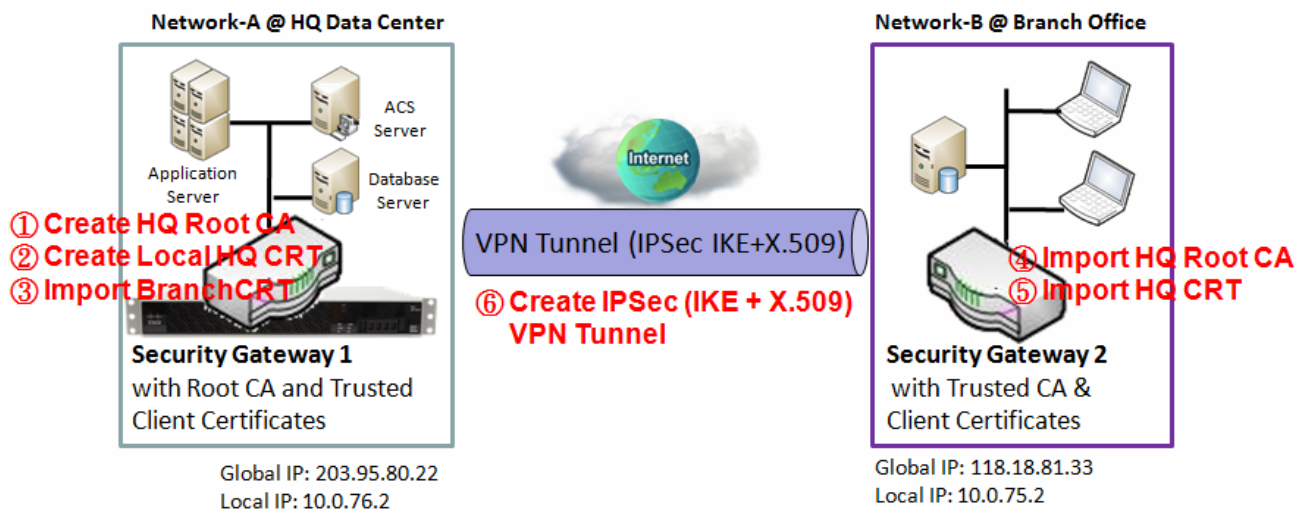
Import Item	Value setting	Description
Import	A Must filled setting	Select a certificate file from user's computer, and click the Apply button to import the specified certificate file to the gateway.
PEM Encoded	1. String format can be any text 2. A Must filled setting	This is an alternative approach 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.

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3.5.3 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)

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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	<i>Import</i>

Configuration Path	[Trusted Certificate]-[Trusted Client Certificate Import from a File]
File	<i>BranchCRT.crt</i>

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	<i>Import</i>

Configuration Path	[Trusted Certificate]-[Trusted CA Certificate Import from a File]
File	<i>HQRootCA.crt</i>

Configuration Path	[Trusted Certificate]-[Trusted Client Certificate List]
Command Button	<i>Import</i>

Configuration Path	[Trusted Certificate]-[Trusted Client Certificate Import from a File]
File	<i>HQCRT.crt</i>

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.

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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.

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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

Trusted CA Certificate List					
ID	Name	Subject	Issuer	Vaild To	Actions

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 Import from a File

Choose File No file chosen

Apply Cancel

Trusted CA Certificate Import from a PEM

Apply Cancel

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.

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Get CA Configuration	
Item	Setting
▶ SCEP Server	<input type="text" value="--- Option ---"/> <input type="button" value="Add Object"/>
▶ CA Identifier	<input type="text"/> (Optional)

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

Trusted Client Certificate List <input type="button" value="Import"/> <input type="button" value="Delete"/>					
ID	Name	Subject	Issuer	Vaild To	Actions

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 Import from a File	
<input type="button" value="Choose File"/> No file chosen	
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>	

Trusted Client Certificate Import from a PEM	
<input type="text"/>	
<input type="button" value="Apply"/> <input type="button" value="Cancel"/>	

Trusted Client Certificate List

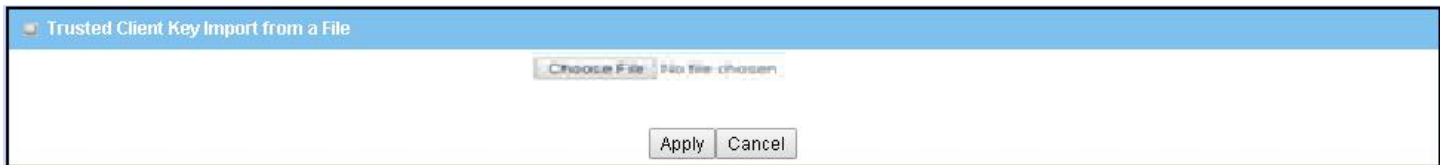
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Item	Value setting	Description
Import from a File	A Must filled setting	Select a certificate file from user's computer, and click the Apply button to import the specified certificate file to the gateway.
Import from a PEM	1. String format can be any 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.

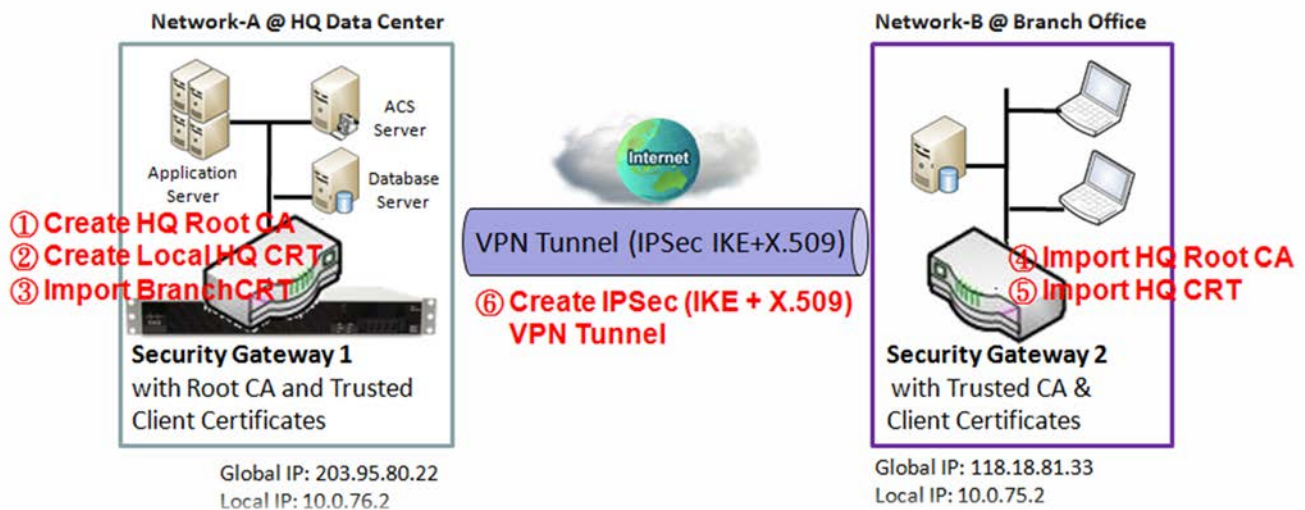
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3.5.4 Issue Certificate

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,

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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	<i>C:/BranchCSR</i>
Command Button	<i>Sign</i>

Configuration Path	[Issue Certificate]-[Signed Certificate View]
Command Button	<i>Download</i> (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.

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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

The screenshot shows two sections of the 'Issue Certificate' interface. The first section is titled 'Certificate Signing Request (CSR) Import from a File' and includes a 'Sign' button and a 'Choose File' button with the text 'No file chosen'. The second section is titled 'Certificate Signing Request (CSR) Import from a PEM' and includes a 'Sign' button and a large empty text area for pasting a PEM.

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.

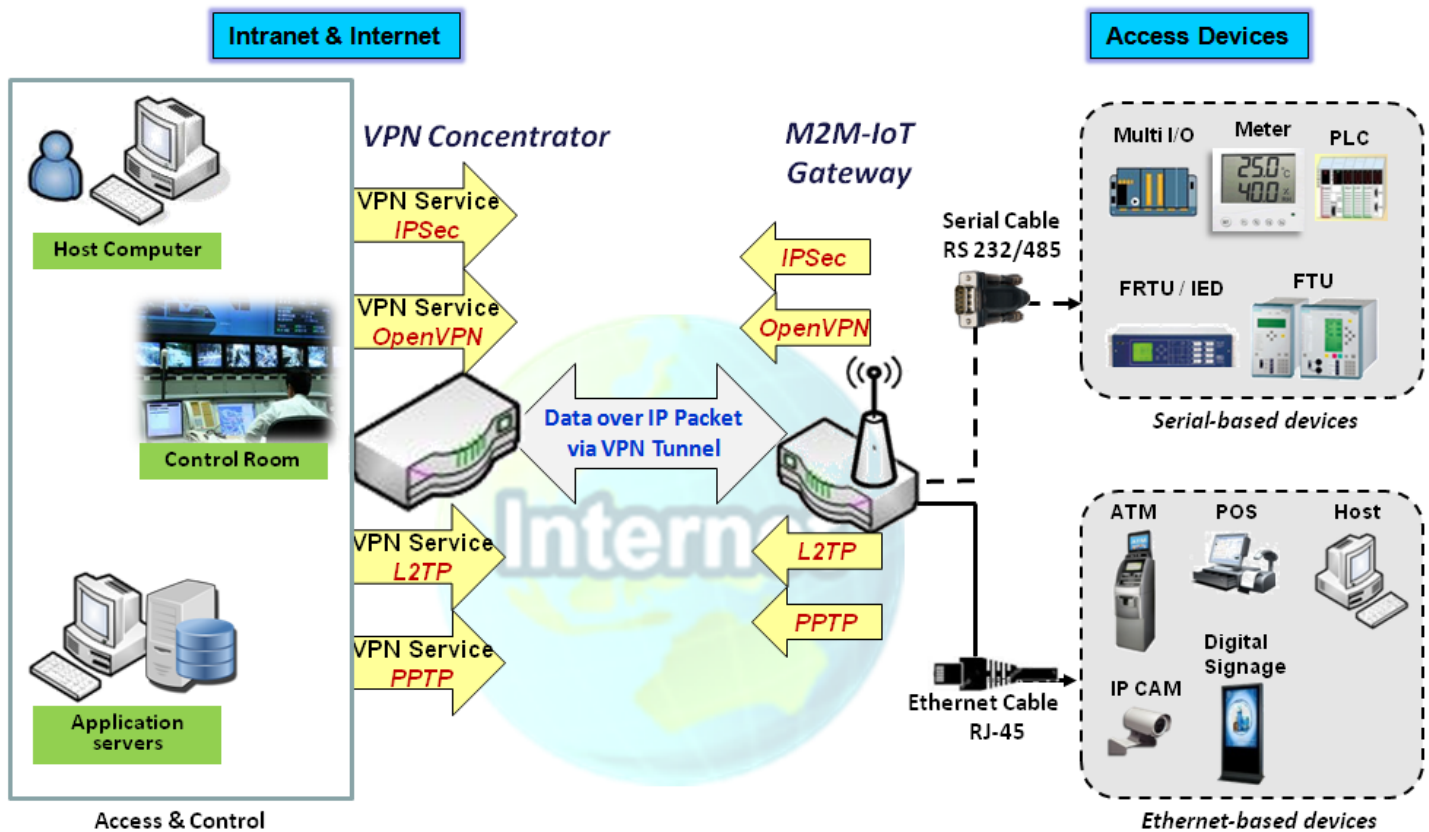
Chapter 4 Field Communication (not supported)

Not supported feature for the purchased product, leave it as blank.

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.

LoRa Gateway

5.1.1 IPSec

Configuration [Help]	
Item	Setting
▶ IPSec	<input type="checkbox"/> Enable
▶ NetBIOS over IPSec	<input type="checkbox"/> Enable
▶ NAT Traversal	<input checked="" type="checkbox"/> Enable
▶ Max. Concurrent IPSec Tunnels	3

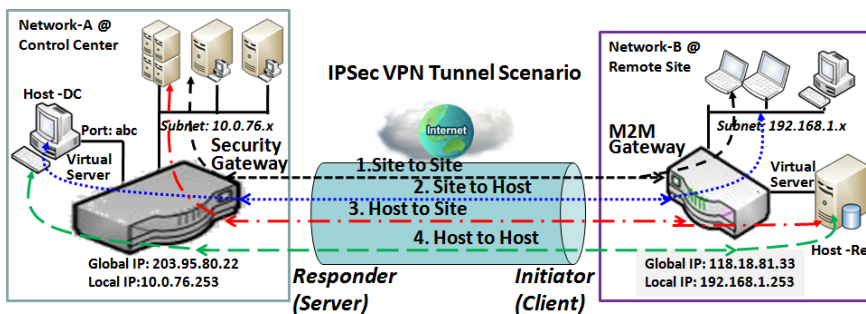
Dynamic VPN List Add Delete Refresh					
ID	Tunnel Name	Interface	Connected Client	Enable	Actions

IPSec Tunnel List Add Delete Refresh								
ID	Tunnel Name	Interface	Tunnel Scenario	Remote Gateway	Remote Subnet	Status	Enable	Actions

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

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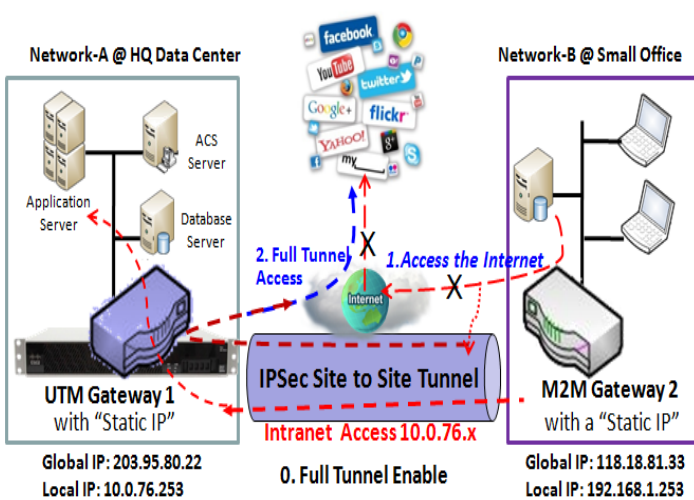
other through the tunnel.

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.

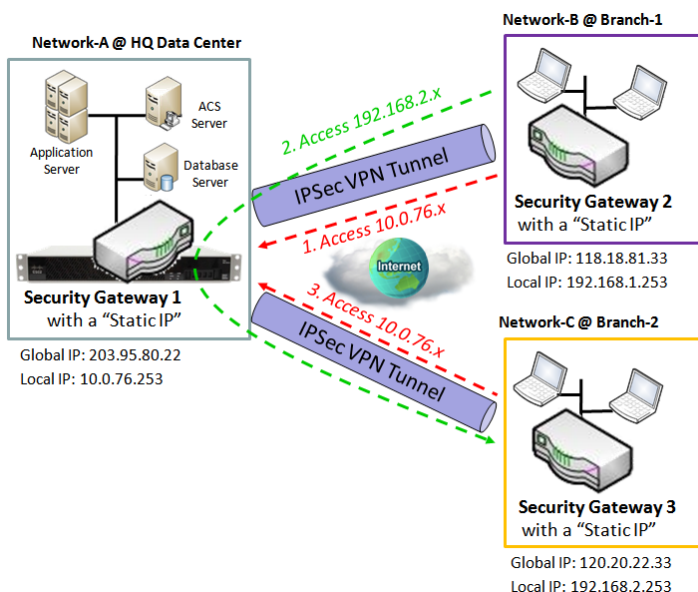
Host to Host: Host to Host is a special configuration for building a VPN tunnel between two single hosts.

Site to Site with "Full Tunnel" enabled



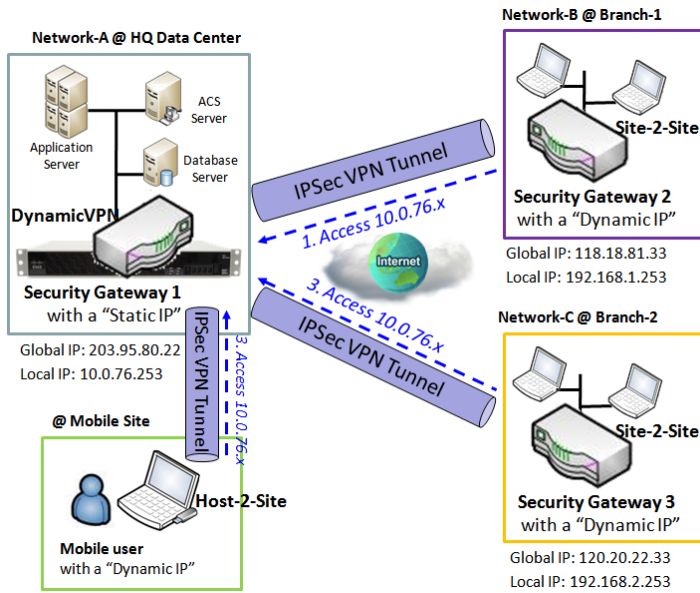
In "Site to Site" scenario, client hosts in remote site can access the enterprise resources in the Intranet of HQ gateway via an established IPSec tunnel, as described above. However, Internet access originates from remote site still go through its regular WAN connection. If you want all packets from 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.

LoRa Gateway

IPSec Setting

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

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

Enable IPSec

Configuration [Help]	
Item	Setting
▶ IPSec	<input type="checkbox"/> Enable
▶ NetBIOS over IPSec	<input type="checkbox"/> Enable
▶ NAT Traversal	<input checked="" type="checkbox"/> Enable
▶ Max. Concurrent IPSec Tunnels	3

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	Checked 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.

IPSec Tunnel List Add Delete Refresh								
ID	Tunnel Name	Interface	Tunnel Scenario	Remote Gateway	Remote Subnet	Status	Enable	Actions

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.

LoRa Gateway

Tunnel Configuration	
Item	Setting
▶ Tunnel	<input type="checkbox"/> Enable
▶ Tunnel Name	IPSec #1
▶ Interface	WAN1 ▼
▶ Tunnel Scenario	Site to Site ▼
▶ Tunnel TCP MSS	Auto ▼ 0 (64~1500 Bytes)
▶ Hub and Spoke	None ▼
▶ Operation Mode	Always on ▼
▶ Encapsulation Protocol	ESP ▼

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 the interface on which IPSec tunnel is to be established. It can be the available WAN and LAN interfaces.
Tunnel Scenario	1. A Must fill setting 2. Site to site is selected by default	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 . If LAN interface is selected, only Host-to-Host scenario is available. 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.
Tunnel TCP MSS	1. An optional setting 2. Auto is set by default	Select from the dropdown box to define the size of Tunnel TCP MSS. Select Auto , and all devices will adjust this parameter automatically. Select Manual , and specify an expected value for Tunnel TCP MSS. Value Range: 64 ~ 1500 bytes.
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. Always on is selected	Define operation mode for the IPSec Tunnel. It can be Always On , or Failover . If this tunnel is set as a failover tunnel, you need to further select a primary

LoRa Gateway

	by default	tunnel from which to failover to. Note: Failover mode is not available for the gateway with single WAN.
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

Item	Setting			
▶ Local Subnet List	ID	Subnet IP Address	Subnet Mask	Actions
	1	192.168.123.0	255.255.255.0(/24) ▼	Delete
	Add			
▶ Redirect Traffic	<input type="checkbox"/> Enable			
▶ Full Tunnel	<input type="checkbox"/> Enable			
▶ Remote Subnet List	ID	Subnet IP Address	Subnet Mask	Actions
	1		255.255.255.0(/24) ▼	Delete
	Add			
▶ Remote Gateway				(IP Address/FQDN)

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.
Redirect Traffic	Unchecked by default	Click Enable box to activate the Redirect Traffic function. Note: Redirect Traffic is available only for Host-to-Site specified in Tunnel Scenario. By default, it is disabled, so it can prevent the un-expected and dangerous access to the peer subnet. If you enable such function, all the network devices behind the VPN host (actually, it is an NAT gateway) can access to the peer subnet with the host IP.
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.

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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

Item	Setting
▶ Key Management	<div style="display: flex; align-items: center;"> <div style="border: 1px solid #ccc; padding: 2px; margin-right: 5px;">IKE+Pre-shared Key ▼</div> <input style="width: 60%; border: 1px solid #ccc;" type="text"/> (Min. 8 characters) </div>
▶ Local ID	Type: <div style="border: 1px solid #ccc; padding: 2px; display: inline-block;">User Name ▼</div> ID: <input style="width: 50%; border: 1px solid #ccc;" type="text"/> (Optional)
▶ Remote ID	Type: <div style="border: 1px solid #ccc; padding: 2px; display: inline-block;">User Name ▼</div> ID: <input style="width: 50%; border: 1px solid #ccc;" type="text"/>

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.

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IKE Phase	
Item	Setting
▶ IKE Version	v1 ▼
▶ Negotiation Mode	Main Mode ▼
▶ X-Auth	None ▼ <input type="button" value="X-Auth Account"/> (Optional) User Name : <input type="text"/> Password : <input type="text"/>
▶ Dead Peer Detection (DPD)	<input checked="" type="checkbox"/> Enable Timeout : <input type="text" value="180"/> (seconds) Delay : <input type="text" value="30"/> (seconds)
▶ Phase1 Key Life Time	<input type="text" value="3600"/> (seconds) (Max. 86400)

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. Checked 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.

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IKE Proposal Definition				
ID	Encryption	Authentication	DH Group	Definition
1	AES-auto ▼	SHA1 ▼	Group 2 ▼	<input checked="" type="checkbox"/> Enable
2	AES-auto ▼	MD5 ▼	Group 2 ▼	<input checked="" type="checkbox"/> Enable
3	DES ▼	SHA1 ▼	Group 2 ▼	<input checked="" type="checkbox"/> Enable
4	3DES ▼	SHA1 ▼	Group 2 ▼	<input checked="" type="checkbox"/> 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 DES / 3DES / AES-auto / AES-128 / AES-192 / AES-256.
		Specify the Authentication method. It can be None / MD5 / SHA1 / SHA2-256.
		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	<input type="text" value="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.

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IPSec Proposal Definition				
ID	Encryption	Authentication	PFS Group	Definition
1	AES-auto ▼	SHA1 ▼	Group 2 ▼	<input checked="" type="checkbox"/> Enable
2	AES-auto ▼	MD5 ▼		<input checked="" type="checkbox"/> Enable
3	DES ▼	SHA1 ▼		<input checked="" type="checkbox"/> Enable
4	3DES ▼	SHA1 ▼		<input checked="" type="checkbox"/> Enable

IPSec Proposal Definition Window		
Item	Value setting	Description
IPSec Proposal Definition	A Must fill setting	<p>Specify the Encryption method. It can be None / DES / 3DES / AES-auto / AES-128 / AES-192 / AES-256. Note: None is available only when Encapsulation Protocol is set as AH; it is not available for ESP Encapsulation.</p> <p>Specify the Authentication method. It can be None / MD5 / SHA1 / SHA2-256. Note: None and SHA2-256 are available only when Encapsulation Protocol is set as ESP; they are not available for AH Encapsulation.</p> <p>Specify the PFS Group. It can be None / Group1 / Group2 / Group5 / Group14 / Group15 / Group16 / Group17 / Group18.</p> <p>Click Enable to enable this setting</p>
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	
Item	Setting
▶ Key Management	Manually ▼
▶ Local ID	Type: KEY ID ▼ ID: <input type="text"/> (Optional)
▶ Remote ID	Type: KEY ID ▼ ID: <input type="text"/>

Authentication Window		
Item	Value setting	Description

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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	
Item	Setting
▶ Local Subnet	<input type="text"/>
▶ Local Netmask	<input type="text" value="255.255.255.0"/>
▶ Remote Subnet	<input type="text"/>
▶ Remote Netmask	<input type="text"/>
▶ Remote Gateway	<input type="text"/> (IP Address/FQDN)

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	
Item	Setting
▶ Outbound SPI	0x <input type="text"/>
▶ Inbound SPI	0x <input type="text"/>
▶ Encryption	DES <input type="text"/>
▶ Authentication	None <input type="text"/>

Manual Proposal Window		
Item	Value setting	Description
Outbound SPI	Hexadecimal format	Specify the Outbound SPI for this IPsec tunnel.

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		<i>Value Range: 0 ~ FFFF.</i>
Inbound SPI	Hexadecimal format	Specify the Inbound SPI for this IPsec tunnel. <i>Value Range: 0 ~ FFFF.</i>
Encryption	1. A Must fill setting 2. Hexadecimal format	Specify the Encryption Method and Encryption key. Available encryption methods are DES/3DES/AES-128/AES-192/AES-256. The key length for DES is 16, 3DES is 48, AES-128 is 32, AES-192 is 48, and AES-256 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. 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

Dynamic server List <input type="button" value="Add"/> <input type="button" value="Delete"/>					
ID	Tunnel Name	Interface	Connected Client	Enable	Actions

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	
Item	Setting
▶ Tunnel	<input type="checkbox"/> Enable
▶ Tunnel Name	<input type="text" value="Dynamic IPsec1"/>
▶ Interface	<input type="text" value="WAN1"/>
▶ Tunnel Scenario	<input type="text" value="Dynamic VPN"/>
▶ Operation Mode	<input type="text" value="Always on"/>
▶ Encapsulation Protocol	<input type="text" value="ESP"/>

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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. Always on is selected by default	The available operation mode is Always On . Failover option is 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

Item	Setting
▶ Local Subnet	<input type="text"/>
▶ Local Netmask	<input type="text"/>

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

Item	Setting
▶ Key Management	IKE+Pre-shared Key ▼ <input type="text"/> (Min. 8 characters)
▶ Local ID	Type: User Name ▼ ID: <input type="text"/> (Optional)
▶ Remote ID	Type: User Name ▼ ID: <input type="text"/>

Authentication Configuration Window		
Item	Value setting	Description
Key Management	1. A Must fill setting	Select Key Management from the dropdown box for this IPsec tunnel.

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	2. Pre-shared Key 8 to 32 characters.	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.

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5.1.2 OpenVPN

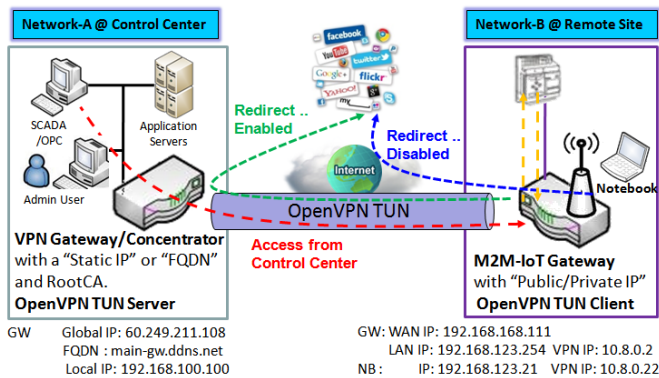
OpenVPN is an application that implements virtual private network (VPN) techniques for creating secure point-to-point or site-to-site connections in routed or bridged configurations and remote access facilities. It uses a custom security protocol that utilizes SSL/TLS for key exchange. It is capable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

solution.

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.

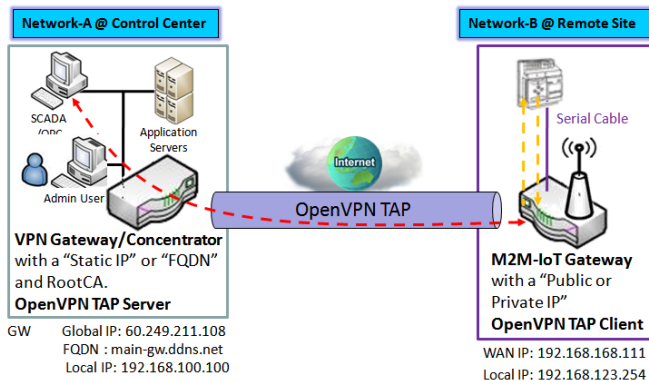
If you want to offer remote access to a VPN server from client(s), and inhibit the access to remote LAN resources under VPN server, OpenVPN TUN mode is the simplest

As shown in the diagram, the M2M-IoT Gateway is configured as an OpenVPN TUN Client, and connects to an OpenVPN TUN Server. Once the OpenVPN TUN connection is established, the connected TUN client will be

LoRa Gateway

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 established. (**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).

LoRa Gateway

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	Setting
▶ OpenVPN	<input type="checkbox"/> Enable
▶ Server / Client	Server ▾

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.

LoRa Gateway

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.

The OpenVPN Server supports up to 4 TUN / TAP tunnels at the same time.

OpenVPN Server Configuration	
Item	Setting
▶ OpenVPN Server	<input checked="" type="checkbox"/> 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	<input checked="" type="checkbox"/> Enable
▶ IP Pool	Starting Address: <input type="text"/> ~ Ending Address: <input type="text"/>
▶ Gateway	<input type="text"/>
▶ Netmask	255.255.255.0(/24) ▼
▶ Redirect Default Gateway	<input type="checkbox"/> Enable
▶ Encryption Cipher	Blowfish ▼
▶ Hash Algorithm	SHA-1 ▼
▶ LZO Compression	Adaptive ▼
▶ Persist Key	<input checked="" type="checkbox"/> Enable
▶ Persist Tun	<input checked="" type="checkbox"/> Enable
▶ Advanced Configuration	Edit

OpenVPN Server Configuration

LoRa Gateway

Item	Value setting	Description
OpenVPN Server	The box is unchecked by default.	Click the Enable to activate OpenVPN Server functions.
Protocol	<ol style="list-style-type: none"> 1. A Must filled setting 2. By default TCP is selected. 	Define the selected Protocol for connecting to the OpenVPN Server. <ul style="list-style-type: none"> • Select TCP , or 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. A Must filled setting 2. By default Static Key is selected. 	Specify the authorization mode for the OpenVPN Server. <ul style="list-style-type: none"> • 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	<ol style="list-style-type: none"> 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).

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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. <u>Value Range:</u> 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.

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

OpenVPN Server Advanced Configuration	
Item	Setting
▶ TLS Cipher	TLS-RSA-WITH-AES128-SHA ▼
▶ TLS Auth. Key	<input type="text"/> (Optional)
▶ Client to Client	<input checked="" type="checkbox"/> Enable
▶ Duplicate CN	<input checked="" type="checkbox"/> Enable
▶ Tunnel MTU	<input type="text" value="1500"/>
▶ Tunnel UDP Fragment	<input type="text" value="1500"/>
▶ Tunnel UDP MSS-Fix	<input type="checkbox"/> Enable
▶ CCD-Dir Default File	<input type="text"/>
▶ Client Connection Script	<input type="text"/>
▶ Additional Configuration	<input type="text"/>

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 None / TLS-RSA-WITH-RC4-MD5 / TLS-RSA-WITH-AES128-SHA / TLS-RSA-WITH-AES256-SHA / TLS-DHE-DSS-AES128-SHA / TLS-DHE-DSS-AES256-SHA . 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 1500 by default	Specify the Tunnel MTU . Value Range: 0 ~ 1500.
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

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		Protocol.
Tunnel UDP MSS-Fix	<ol style="list-style-type: none">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	<ol style="list-style-type: none">1. An Optional setting.2. String format: any text	Specify the CCD-Dir Default File . <i>Value Range: 0 ~ 256 characters.</i>
Client Connection Script	<ol style="list-style-type: none">1. An Optional setting.2. String format: any text	Specify the Client Connection Script . <i>Value Range: 0 ~ 256 characters.</i>
Additional Configuration	<ol style="list-style-type: none">1. An Optional setting.2. String format: any text	Specify the Additional Configuration . <i>Value Range: 0 ~ 256 characters.</i>

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As an OpenVPN Client

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

OpenVPN Client List <input type="button" value="Add"/> <input type="button" value="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	<input type="text" value="OpenVPN Client #1"/>
▶ Interface	<input type="text" value="WAN 1"/>
▶ Protocol	<input type="text" value="TCP"/> Port: <input type="text" value="443"/>
▶ Tunnel Scenario	<input type="text" value="TUN"/>
▶ Remote IP/FQDN	<input type="text"/>
▶ Remote Subnet	<input type="text"/> <input type="text" value="255.255.255.0(/24)"/>
▶ Redirect Internet Traffic	<input type="checkbox"/> Enable
▶ NAT	<input checked="" type="checkbox"/> Enable
▶ Authorization Mode	<input type="text" value="TLS"/> CA Cert.: <input type="text"/> Client Cert.: <input type="text"/> Client Key.: <input type="text"/> Please set the Certificate.
▶ Encryption Cipher	<input type="text" value="Blowfish"/>
▶ Hash Algorithm	<input type="text" value="SHA-1"/>
▶ LZO Compression	<input type="text" value="Adaptive"/>
▶ Persist Key	<input checked="" type="checkbox"/> Enable
▶ Persist Tun	<input checked="" type="checkbox"/> Enable
▶ Advanced Configuration	<input type="button" value="Edit"/>
▶ Tunnel	<input type="checkbox"/> Enable

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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. <ul style="list-style-type: none"> • 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	1. An Optional setting. 2. The box is unchecked by default.	Check the Enable box to activate remote subnet function, and 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. <ul style="list-style-type: none"> • 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.

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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.

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

OpenVPN Client Advanced Configuration	
Item	Setting
▶ TLS Cipher	TLS-RSA-WITH-AES128-SHA ▼
▶ TLS Auth. Key(Optional)	<input type="text"/> (Optional)
▶ User Name(Optional)	<input type="text"/> (Optional)
▶ Password(Optional)	<input type="text"/> (Optional)
▶ Bridge TAP to	VLAN 1 ▼
▶ Firewall Protection	<input type="checkbox"/> Enable
▶ Client IP Address	Dynamic IP ▼
▶ Tunnel MTU	<input type="text" value="1500"/>
▶ Tunnel UDP Fragment	<input type="text" value="1500"/>
▶ Tunnel UDP MSS-Fix	<input type="checkbox"/> Enable
▶ nsCertType Verification	<input type="checkbox"/> Enable
▶ TLS Renegotiation Time(seconds)	<input type="text" value="3600"/> (seconds)
▶ Connection Retry(seconds)	<input type="text" value="-1"/> (seconds)
▶ DNS	Automatically ▼
▶ Additional Configuration	<input type="text"/>

OpenVPN Advanced Client Configuration

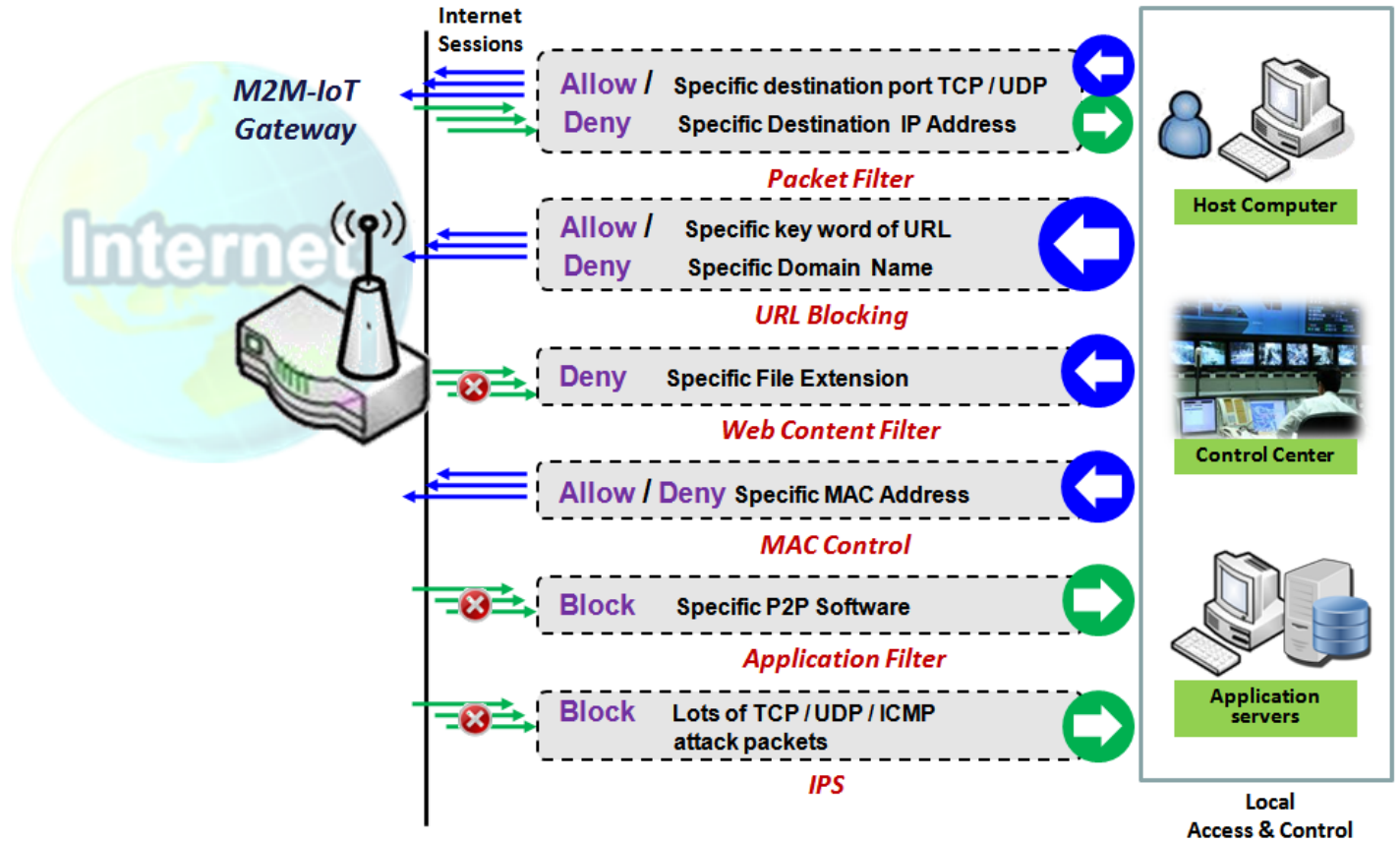
Item	Value setting	Description
TLS Cipher	<ol style="list-style-type: none"> 1. A Must filled setting. 2. TLS-RSA-WITH-AES128-SHA is selected by default 	<p>Specify the TLS Cipher from the dropdown list. It can be None / TLS-RSA-WITH-RC4-MD5 / TLS-RSA-WITH-AES128-SHA / TLS-RSA-WITH-AES256-SHA / TLS-DHE-DSS-AES128-SHA / TLS-DHE-DSS-AES256-SHA.</p> <p>Note: TLS Cipher will be available only when TLS is chosen in Authorization Mode.</p>
TLS Auth. Key	<ol style="list-style-type: none"> 1. An Optional setting. 2. String format: any text 	<p>Specify the TLS Auth. Key for connecting to an OpenVPN server, if the server required it.</p> <p>Note: TLS Auth. Key will be available only when TLS is chosen in Authorization Mode.</p>

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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 .
Additional Configuration	An Optional setting.	Enter optional configuration string here. Up to 256 characters is allowable. Value Range: 0 ~ 256characters.
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.

LoRa Gateway

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.

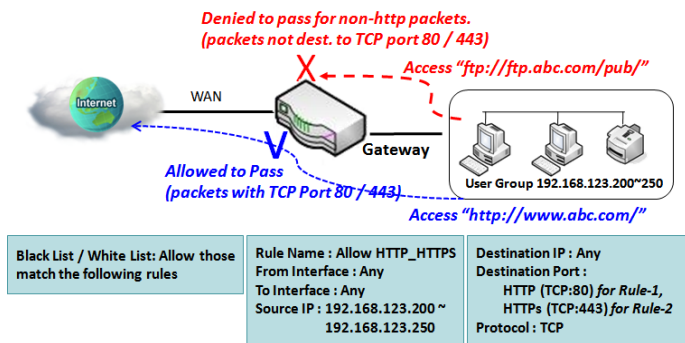
5.2.1 Packet Filter

Configuration [Help]												
Item	Setting											
▶ Packet Filters	<input checked="" type="checkbox"/> Enable											
▶ Black List / White List	Deny those match the following rules. ▼											
▶ Log Alert	<input type="checkbox"/> Log Alert											
Packet Filter List <input type="button" value="Add"/> <input type="button" value="Delete"/>												
ID	Rule Name	From Interface	To Interface	Source IP	Destination IP	Source MAC	Protocol	Source Port	Destination Port	Time Schedule	Enable	Actions

LoRa Gateway

"Packet Filter" function can let you define some filtering rules for incoming and outgoing packets. So the gateway can control what packets are allowed or blocked to pass through it. A packet filter rule should indicate from and to which interface the packet enters and leaves the gateway, the source and destination IP addresses, and destination service port type and port number. In addition, the time schedule to which the rule will be active.

Packet Filter with White List Scenario



As shown in the diagram, specify "Packet Filter Rule List" as white list (*Allow those match the following rules*) and define the rules. Rule-1 is to allow HTTP packets to pass, and Rule-2 is to allow HTTPS packets to pass.

Under such configuration, the gateway will allow only HTTP and HTTPS packets, issued from the IP range 192.168.123.200 to 250, which are targeted to TCP port 80 or 443 to pass the WAN interface.

Packet Filter Setting

Go to **Security > Firewall > Packet Filter** Tab.

The packet filter setting allows user to create and customize packet filter policies to allow or reject specific inbound/outbound packets through the router based on their office setting.

Enable Packet Filter

Configuration [Help]	
Item	Setting
▶ Packet Filters	<input type="checkbox"/> Enable
▶ Black List / White List	Deny those match the following rules. ▼
▶ Log Alert	<input type="checkbox"/> Log Alert

Configuration Window		
Item Name	Value setting	Description
Packet Filter	The box is unchecked by	Check the Enable box to activate Packet Filter function

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	default	
Black List / White List	Deny those match the following rules is set by default	When Deny those match the following rules is selected, as the name suggest, packets specified in the rules will be blocked –black listed. In contrast, with Allow those match the following rules , 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 Event Log.
Save	N/A	Click Save to save the settings
Undo	N/A	Click Undo to cancel the settings

Create/Edit Packet Filter Rules

The gateway allows you to customize your packet filtering rules. It supports up to a maximum of 20 filter rule sets.

Packet Filter List												
ID	Rule Name	From Interface	To Interface	Source IP	Destination IP	Source MAC	Protocol	Source Port	Destination Port	Time Schedule	Enable	Actions

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

Packet Filter Rule Configuration	
Item	Setting
▶ Rule Name	<input type="text" value="Rule1"/>
▶ From Interface	<input type="text" value="Any"/>
▶ To Interface	<input type="text" value="Any"/>
▶ Source IP	<input type="text" value="Any"/>
▶ Destination IP	<input type="text" value="Any"/>
▶ Source MAC	<input type="text" value="Any"/>
▶ Protocol	<input type="text" value="Any(0)"/>
▶ Source Port	<input type="text" value="User-defined Service"/> - <input type="text"/>
▶ Destination Port	<input type="text" value="User-defined Service"/> - <input type="text"/>
▶ Time Schedule	<input type="text" value="(0) Always"/>
▶ Rule	<input type="checkbox"/> Enable

Packet Filter Rule Configuration		
Item Name	Value setting	Description
Rule Name	1. String format can be	Enter a packet filter rule name. Enter a name that is easy for you to remember.

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	<p>any text</p> <p>2. A Must filled setting</p>	<p>Value Range: 1 ~ 30 characters.</p>
From Interface	<p>1. A Must filled setting</p> <p>2. By default Any is selected</p>	<p>Define the selected interface to be the packet-entering interface of the router. If the packets to be filtered are coming from LAN to WAN then select LAN for this field. Or VLAN-1 to WAN then select VLAN-1 for this field. Other examples are VLAN-1 to VLAN-2. VLAN-1 to WAN.</p> <p>Select Any to filter packets coming into the router from any interfaces. Please note that two identical interfaces are not accepted by the router. e.g., VLAN-1 to VLAN-1.</p>
To Interface	<p>1. A Must filled setting</p> <p>2. By default Any is selected</p>	<p>Define the selected interface to be the packet-leaving interface of the router. If the packets to be filtered are entering from LAN to WAN then select WAN for this field. Or VLAN-1 to WAN then select WAN for this field. Other examples are VLAN-1 to VLAN-2. VLAN-1 to WAN.</p> <p>Select Any to filter packets leaving the router from any interfaces. Please note that two identical interfaces are not accepted by the router. e.g., VLAN-1 to VLAN-1.</p>
Source IP	<p>1. A Must filled setting</p> <p>2. By default Any is selected</p>	<p>This field is to specify the Source IP address.</p> <p>Select Any to filter packets coming from any IP addresses.</p> <p>Select Specific IP Address to filter packets coming from an IP address.</p> <p>Select IP Range to filter packets coming from a specified range of IP address.</p> <p>Select IP Address-based Group to filter packets coming from a pre-defined group. Note: group must be pre-defined before this option become available. Refer to Object Definition > Grouping > Host grouping. You may also access to create a group by the Add Rule shortcut button.</p>
Destination IP	<p>1. A Must filled setting</p> <p>2. By default Any is selected</p>	<p>This field is to specify the Destination IP address.</p> <p>Select Any to filter packets that are entering to any IP addresses.</p> <p>Select Specific IP Address to filter packets entering to an IP address entered in this field.</p> <p>Select IP Range to filter packets entering to a specified range of IP address entered in this field.</p> <p>Select IP Address-based Group to filter packets entering to a pre-defined group selected. 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.</p>
Source MAC	<p>1. A Must filled setting</p> <p>2. By default Any is selected</p>	<p>This field is to specify the Source MAC address.</p> <p>Select Any to filter packets coming from any MAC addresses.</p> <p>Select Specific MAC Address to filter packets coming from a MAC address.</p> <p>Select MAC Address-based Group to filter packets coming from a pre-defined group selected. 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.</p>
Protocol	<p>1. A Must filled setting</p> <p>2. By default Any(0) is selected</p>	<p>For Protocol, select Any to filter any protocol packets</p> <p>Then for Source Port, select a predefined port dropdown box when Well-known Service is selected, otherwise select User-defined Service and specify a port range.</p>

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		<p>Then for Destination Port, select a predefined port dropdown box when Well-known Service is selected, otherwise select User-defined Service and specify a port range.</p> <p>Value Range: 1 ~ 65535 for Source Port, Destination Port.</p>
		<p>For Protocol, select ICMPv4 to filter ICMPv4 packets</p>
		<p>For Protocol, select TCP to filter TCP packets</p> <p>Then for Source Port, select a predefined port dropdown box when Well-known Service is selected, otherwise select User-defined Service and specify a port range.</p> <p>Then for Destination Port, select a predefined port dropdown box when Well-known Service is selected, otherwise select User-defined Service and specify a port range.</p> <p>Value Range: 1 ~ 65535 for Source Port, Destination Port.</p>
		<p>For Protocol, select UDP to filter UDP packets</p> <p>Then for Source Port, select a predefined port dropdown box when Well-known Service is selected, otherwise select User-defined Service and specify a port range.</p> <p>Then for Destination Port, select a predefined port dropdown box when Well-known Service is selected, otherwise select User-defined Service and specify a port range.</p> <p>Value Range: 1 ~ 65535 for Source Port, Destination Port.</p>
		<p>For Protocol, select GRE to filter GRE packets</p>
		<p>For Protocol, select ESP to filter ESP packets</p>
		<p>For Protocol, select SCTP to filter SCTP packets</p>
		<p>For Protocol, select User-defined to filter packets with specified port number.</p> <p>Then enter a port number in Protocol Number box.</p>
Time Schedule	A Must filled setting	<p>Apply Time Schedule to this rule, otherwise leave it as Always.</p> <p>If the dropdown list is empty ensure Time Schedule is pre-configured. Refer to Object Definition > Scheduling > Configuration tab.</p>
Rule	The box is unchecked by default.	<p>Click Enable box to activate this rule then save the settings.</p>
Save	N/A	<p>Click Save to save the settings</p>
Undo	N/A	<p>Click Undo to cancel the settings</p>
Back	N/A	<p>When the Back button is clicked the screen will return to the Packet Filter Configuration page.</p>

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5.2.2 URL Blocking

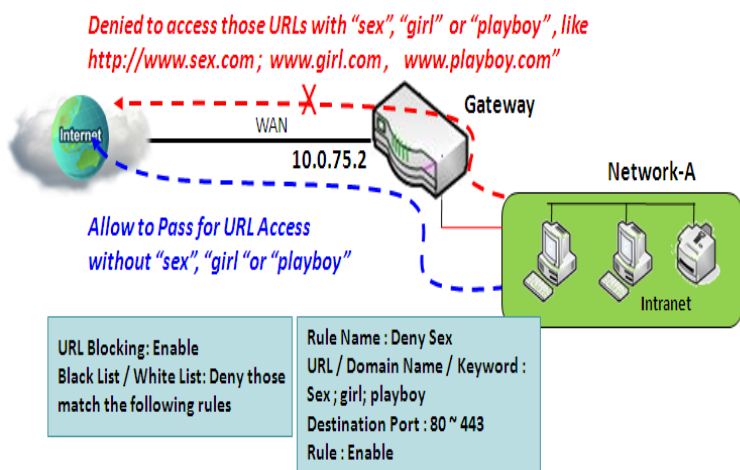
"URL Blocking" function can let you define blocking or allowing rules for incoming and outgoing Web request packets. With defined rules, gateway can control the Web requests containing the complete URL, partial domain name, or pre-defined keywords. For example, one can filter out or allow only the Web requests based on domain input suffixes like .com or .org or keywords like "bct" or "mpe".

An URL blocking rule should specify the URL, partial domain name, or included keywords in the Web requests from and to the gateway and also the destination service port. Besides, a certain time schedule can be applied to activate the URL Blocking rules during pre-defined time interval(s).

The gateway will logs and displays the disallowed web accessing requests that matched the defined URL blocking rule in the black-list or in the exclusion of the white-list.

When you choose "Allow all to pass except those match the following rules" for the "URL Blocking Rule List", you are setting the defined URL blocking rules to belong to the black list. The packets, listed in the rule list, will be blocked if one pattern in the requests matches to one rule. Other Web requests can pass through the gateway. In contrast, when you choose "Deny all to pass except those match the following rules" for the "URL Blocking Rule List", you are setting the defined packet filtering rules to belong to the white list. The Web requests, listed in the rule, will be allowed if one pattern in the requests matches to one rule. Other Web requests will be blocked.

URL Blocking Rule with Black List



deny the Web requests with "sex" or "sexygirl" patterns and the other to deny the Web requests with "playboy" pattern to go through the gateway. System will block the Web requests with "sex", "sexygirl" or "playboy" patterns to pass through the gateway.

When the administrator of the gateway wants to block the Web requests with some dedicated patterns, he can use the "URL Blocking" function to block specific Web requests by defining the black list as shown in above diagram. Certainly, when the administrator wants to allow only the Web requests with some dedicated patterns to go through the gateway, he can also use the "URL Blocking" function by defining the white list to meet the requirement.

As shown in the diagram, enable the URL blocking function and create the first rule to

LoRa Gateway

URL Blocking Setting

Go to **Security > Firewall > URL Blocking** Tab.

In "URL Blocking" page, there are three configuration windows. They are the "Configuration" window, "URL Blocking Rule List" window, and "URL Blocking Rule Configuration" window.

The "Configuration" window can let you activate the URL blocking function and specify to black listing or to white listing the packets defined in the "URL Blocking Rule List" entry. In addition, log alerting can be enabled to record on-going events for any disallowed Web request packets. Refer to "System Status" in "6.1.1 System Related" section in this user manual for how to view recorded log.

The "URL Blocking Rule List" window lists all your defined URL blocking rule entry. And finally, the "URL Blocking Rule Configuration" window can let you define URL blocking rules. The parameters in a rule include the rule name, the Source IP or MAC, the URL/Domain Name/Keyword, the destination service ports, the integrated time schedule rule and the rule activation.

Enable URL Blocking

Configuration [Help]	
Item	Setting
▶ URL Blocking	<input type="checkbox"/> Enable
▶ Black List / White List	Deny those match the following rules. ▾
▶ Log Alert	<input type="checkbox"/> Enable

Configuration		
Item	Value setting	Description
URL Blocking	The box is unchecked by default	Check the Enable box to activate URL Blocking function.
Black List / White List	Deny those match the following rules is set by default	Specify the URL Blocking Policy, either Black List or White List. Black List: When Deny those match the following rules is selected, as the name suggest, the matched Web request packets will be blocked. White List: When Allow those match the following rules is selected, the matched Web request packets can pass through the Gateway, and the others that don't match the rules will be blocked.
Log Alert	The box is unchecked by default	Check the Enable box to activate Event Log.
Save	NA	Click Save button to save the settings
Undo	NA	Click Undo button to cancel the settings

Create/Edit URL Blocking Rules

The Gateway supports up to a maximum of 20 URL blocking rule sets. Ensure that the URL Blocking is enabled before we can create blocking rules.

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URL Blocking Rule List <input type="button" value="Add"/> <input type="button" value="Delete"/>								
ID	Rule Name	Source IP	Source MAC	URL / Domain Name / Keyword	Destination Port	Time Schedule	Enable	Actions

When **Add** button is applied, the **URL Blocking Rule Configuration** screen will appear.

URL Blocking Rule Configuration	
Item	Setting
▶ Rule Name	<input type="text" value="Rule1"/>
▶ Source IP	<input type="text" value="Any"/>
▶ Source MAC	<input type="text" value="Any"/>
▶ URL / Domain Name / Keyword	<input type="text"/>
▶ Destination Port	<input type="text" value="Any"/>
▶ Time Schedule Rule	<input type="text" value="(0) Always"/>
▶ Rule	<input type="checkbox"/> Enable

URL Blocking Rules Configuration		
Item	Value setting	Description
Rule Name	<ol style="list-style-type: none"> String format can be any text A Must filled setting 	Specify an URL Blocking rule name. Enter a name that is easy for you to understand.
Source IP	<ol style="list-style-type: none"> A Must filled setting Any is set by default 	This field is to specify the Source IP address . <ul style="list-style-type: none"> Select Any to filter packets coming from any IP addresses. Select Specific IP Address to filter packets coming from an IP address entered in this field. Select IP Range to filter packets coming from a specified range of IP address entered in this field. Select IP Address-based Group to filter packets coming from a pre-defined group selected. Note: group must be pre-defined before this option become available. Refer to Object Definition > Grouping > Host grouping.
Source MAC	<ol style="list-style-type: none"> A Must filled setting Any is set by default 	This field is to specify the Source MAC address . <ul style="list-style-type: none"> Select Any to filter packets coming from any MAC addresses. Select Specific MAC Address to filter packets coming from a MAC address entered in this field. Select MAC Address-based Group to filter packets coming from a pre-defined group selected. Note: group must be pre-defined before this selection become available. Refer to Object Definition > Grouping > Host grouping.
URL / Domain Name / Keyword	<ol style="list-style-type: none"> A Must filled setting Supports up to a maximum of 10 Keywords in a rule by using the 	Specify URL, Domain Name, or Keyword list for URL checking. <ul style="list-style-type: none"> In the Black List mode, if a matched rule is found, the packets will be dropped. In the White List mode, if a matched rule is found, the packets will be accepted and the others which don't match any rule will be dropped.

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	delimiter “;”.	
Destination Port	<ol style="list-style-type: none">1. A Must filled setting2. Any is set by default	<p>This field is to specify the Destination Port number.</p> <ul style="list-style-type: none">• Select Any to filter packets going to any Port.• Select Specific Service Port to filter packets going to a specific Port entered in this field.• Select Port Range to filter packets going to a specific range of Ports entered in this field.
Time Schedule Rule	A Must filled setting	<p>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.</p>
Rule	The box is unchecked by default.	Click the Enable box to activate this rule.
Save	NA	Click the Save button to save the settings.
Undo	NA	Click the Undo button to cancel the changes.
Back	NA	Click the Back button to return to the URL Blocking Configuration page.

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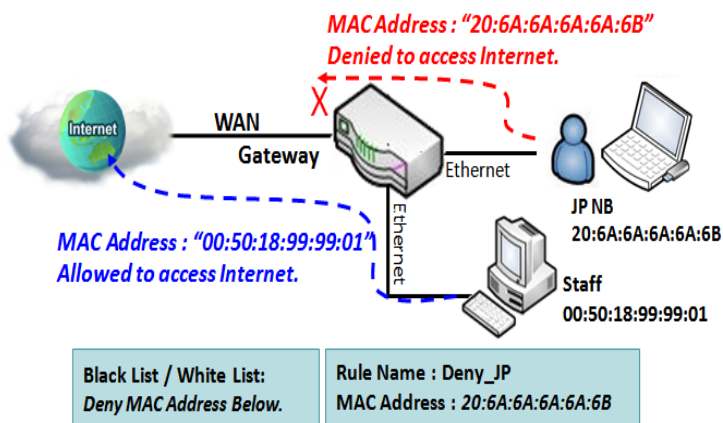
5.2.3 MAC Control

Configuration [Help]	
Item	Setting
▶ MAC Control	<input checked="" type="checkbox"/> Enable
▶ Black List / White List	Deny MAC Address Below. ▼
▶ Log Alert	<input type="checkbox"/> Enable
▶ Known MAC from LAN PC List	192.168.1.100(James-P45V) ▼ <input type="button" value="Copy to"/>

MAC Control Rule List <input type="button" value="Add"/> <input type="button" value="Delete"/>					
ID	Rule Name	MAC Address	Time Schedule Rule	Enable	Actions

"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.

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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 [Help]	
Item	Setting
▶ MAC Control	<input type="checkbox"/> Enable
▶ Black List / White List	Deny MAC Address Below. ▼
▶ Log Alert	<input type="checkbox"/> Enable
▶ Known MAC from LAN PC List	192.168.123.100(James-P45V) ▼ <input type="button" value="Copy to"/>

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

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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.

MAC Control Rule List <input type="button" value="Add"/> <input type="button" value="Delete"/>					
ID	Rule Name	MAC Address	Time Schedule Rule	Enable	Actions

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

MAC Control Rule Configuration			
Rule Name	MAC Address (Use : to Compose)	Time Schedule	Enable
<input type="text" value="Rule1"/>	<input type="text"/>	(0) Always ▾	<input type="checkbox"/>
<input type="button" value="Save"/>			

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.

5.2.4 Content Filter (not supported)

Not supported feature for the purchased product, leave it as blank.

5.2.5 Application Filter (not supported)

Not supported feature for the purchased product, leave it as blank.

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5.2.6 IPS

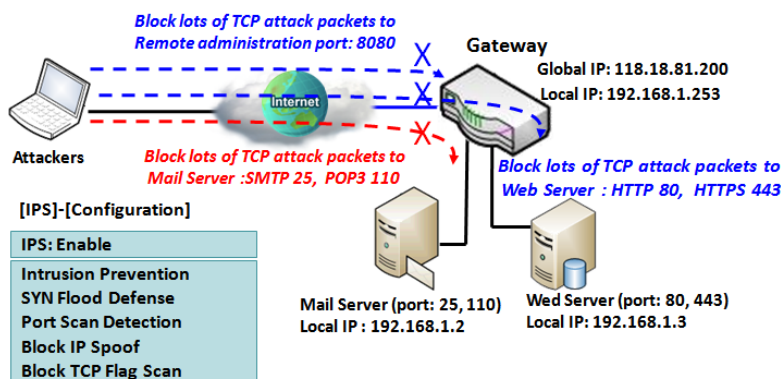
Configuration [Help]	
Item	Setting
▶ IPS	<input type="checkbox"/> Enable
▶ Log Alert	<input type="checkbox"/> Enable

Intrusion Prevention	
Item	Setting
▶ SYN Flood Defense	<input type="checkbox"/> Enable <input type="text" value="300"/> Packets/second (10~10000)
▶ UDP Flood Defense	<input type="checkbox"/> Enable <input type="text" value="300"/> Packets/second (10~10000)
▶ ICMP Flood Defense	<input type="checkbox"/> Enable <input type="text" value="300"/> Packets/second (10~10000)
▶ Port Scan Detection	<input type="checkbox"/> Enable <input type="text" value="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

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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 [Help]	
Item	Setting
▶ IPS	<input type="checkbox"/> Enable
▶ Log Alert	<input type="checkbox"/> Enable

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.

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Intrusion Prevention	
Item	Setting
▶ SYN Flood Defense	<input type="checkbox"/> Enable <input type="text" value="300"/> Packets/second (10~10000)
▶ UDP Flood Defense	<input type="checkbox"/> Enable <input type="text" value="300"/> Packets/second (10~10000)
▶ ICMP Flood Defense	<input type="checkbox"/> Enable <input type="text" value="300"/> Packets/second (10~10000)
▶ Port Scan Detection	<input type="checkbox"/> Enable <input type="text" value="200"/> Packets/second (10~10000)
▶ Block Land Attack	<input type="checkbox"/> Enable
▶ Block Ping of Death	<input type="checkbox"/> Enable
▶ Block IP Spoof	<input type="checkbox"/> Enable
▶ Block TCP Flag Scan	<input type="checkbox"/> Enable
▶ Block Smurf	<input type="checkbox"/> Enable
▶ Block Traceroute	<input type="checkbox"/> Enable
▶ Block Fraggle Attack	<input type="checkbox"/> Enable
▶ ARP Spoofing Defence	<input type="checkbox"/> Enable <input type="text" value="300"/> Packets/second (10~10000)

Setup Intrusion Prevention Rules		
Item Name	Value setting	Description
SYN Flood Defense	1. A Must filled setting	Click Enable box to activate this intrusion prevention rule and enter the traffic threshold in this field.
UDP Flood Defense	2. The box is unchecked by default.	Click Enable box to activate this intrusion prevention rule and enter the traffic threshold in this field.
ICMP Flood Defense	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. <u>Value Range: 10 ~ 10000.</u>
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. <u>Value Range: 10 ~ 10000.</u>
Block Land Attack Block Ping of Death Block IP Spoof Block TCP Flag Scan Block Smurf	The box is unchecked by default.	Click Enable box to activate this intrusion prevention rule.

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Block Traceroute Block Fraggle Attack		
ARP Spoofing Defence	<ol style="list-style-type: none">1. A Must filled setting2. The box is unchecked by default.3. Traffic threshold is set to 300 by default4. 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. <u>Value Range: 10 ~ 10000.</u>
Save	NA	Click Save to save the settings
Undo	NA	Click Undo to cancel the settings

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5.2.7 Options

Firewall Options [Help]	
Item	Setting
▶ Stealth Mode	<input type="checkbox"/> Enable
▶ SPI	<input checked="" type="checkbox"/> Enable
▶ Discard Ping from WAN	<input type="checkbox"/> Enable

Remote Administrator Host Definition							
ID	Interface	Protocol	IP	Subnet Mask	Service Port	Enable	Action
1	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	Edit
2	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	Edit
3	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	Edit
4	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	Edit
5	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	Edit

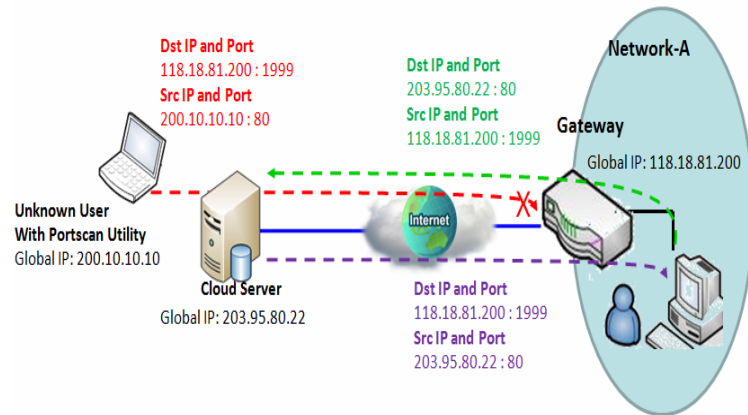
There are some additional useful firewall options in this page.

“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.

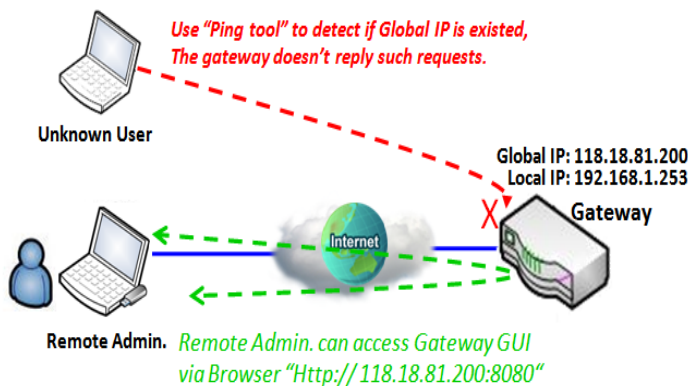
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Enable SPI Scenario



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

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Firewall Options [Help]	
Item	Setting
▶ Stealth Mode	<input type="checkbox"/> Enable
▶ SPI	<input checked="" type="checkbox"/> Enable
▶ Discard Ping from WAN	<input type="checkbox"/> Enable

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	<input type="checkbox"/>	<input type="button" value="Edit"/>
2	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	<input type="button" value="Edit"/>
3	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	<input type="button" value="Edit"/>
4	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	<input type="button" value="Edit"/>
5	All WAN	HTTP	Any IP	N/A	80	<input type="checkbox"/>	<input type="button" value="Edit"/>

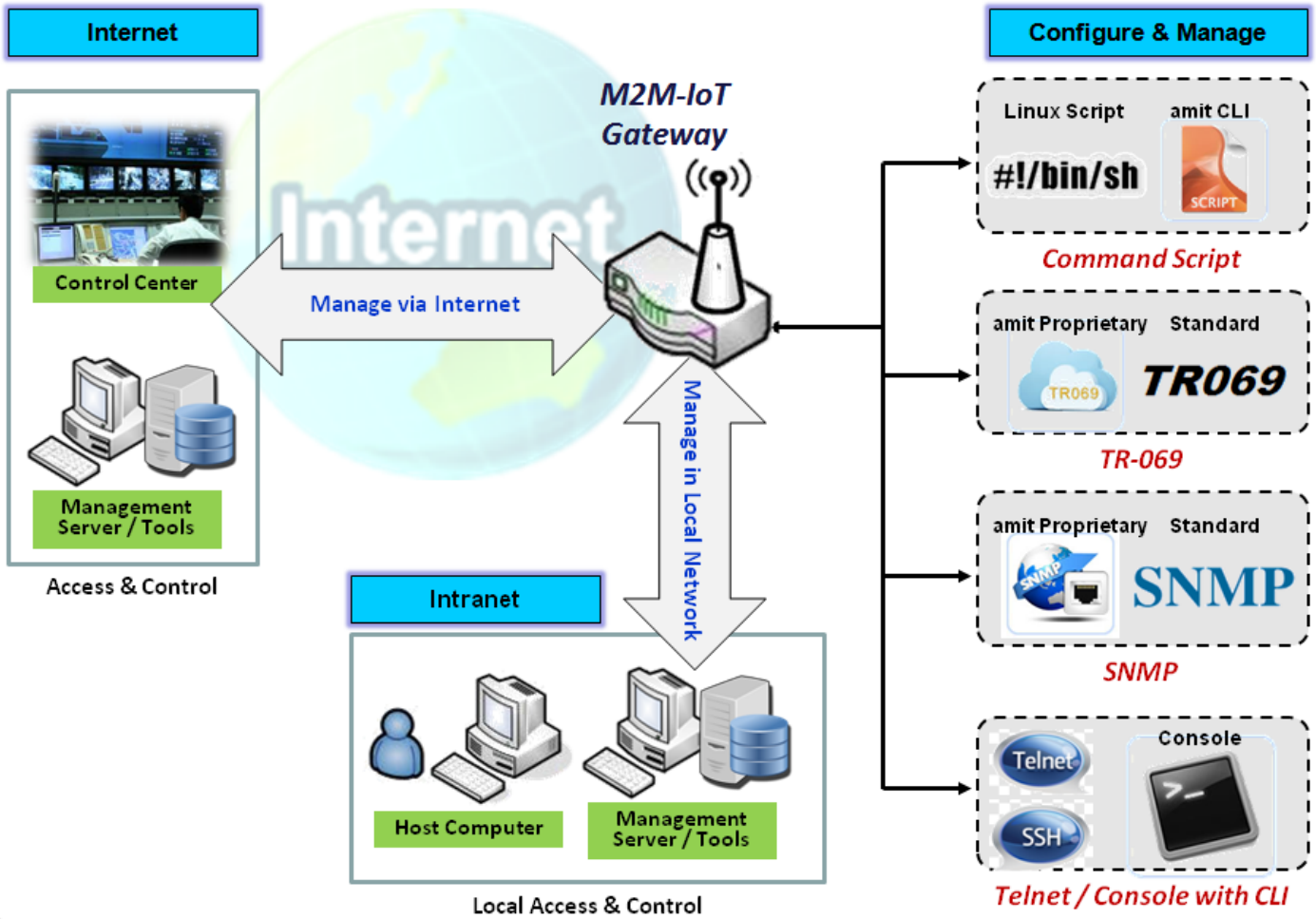
Remote Administrator Host Definition		
Item	Value setting	Description
Protocol	HTTP is set by default	Select HTTP or HTTPS method for router access.
IP	A Must filled setting	This field is to specify the remote host to assign access right for remote access. Select Any IP to allow any remote hosts Select 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.

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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. <i>Value Range: 1 ~ 65535.</i>
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

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.

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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**.

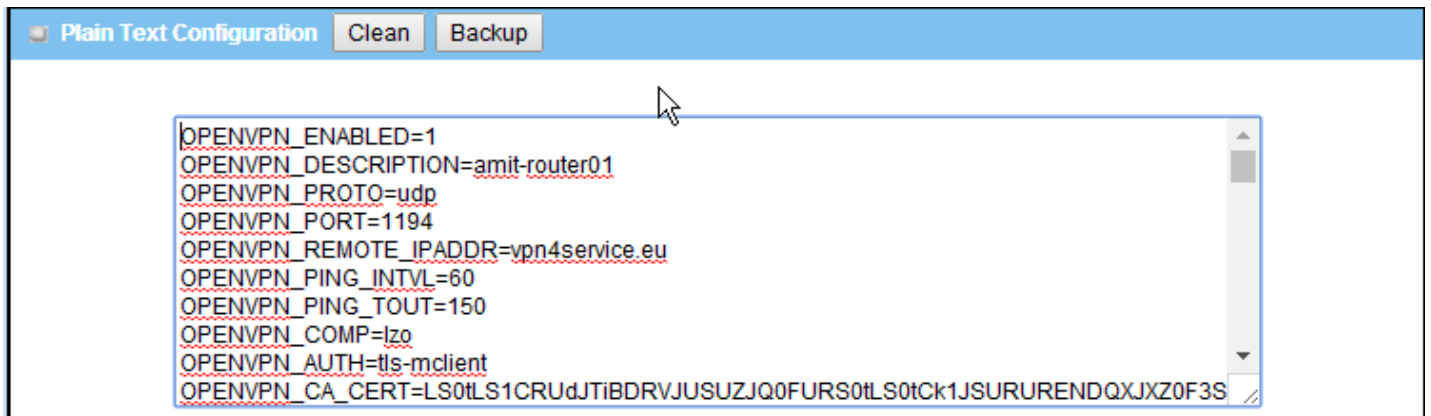
Enable Command Script Configuration

Configuration	
Item	Setting
▶ Configuration	<input type="checkbox"/> Enable
▶ Backup Script	<input type="button" value="Via Web UI"/>
▶ Upload Script	<input type="button" value="Via Web UI"/>
▶ Script Name	<input type="text"/>
▶ Version	<input type="text"/>
▶ Description	<div style="border: 1px solid #ccc; height: 40px; width: 100%;"></div>
▶ Update time	

Configuration Item	Value setting	Description
Configuration	The box is unchecked by default	Check the Enable box to activate the Command Script function.
Backup Script	N/A	Click the Via Web UI or Via Storage button to backup the existed command script in a .txt file. You can specify the script file name in Script Name below.
Upload Script	N/A	Click the Via Web UI or Via Storage button to Upload the existed command script from a specified .txt file.
Script Name	1.An Optional setting 2.Any valid file name	Specify a script file name for script backup, or display the selected upload script file name. Value Range: 0 ~ 32 characters.
Version	1.An Optional setting 2.Any string	Specify the version number for the applied Command script. Value Range: 0 ~ 32 characters.
Description	1.An Optional setting 2.Any string	Enter a short description for the applied Command script.
Update time	N/A	It records the upload time for last commad script upload.

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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. <ul style="list-style-type: none">• 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.

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		<ul style="list-style-type: none"> • 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	<i>Output file</i>	Duplicate the configuration content from database and stored as a configuration file. (ex: <code>txtConfig clone /tmp/config</code>) 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: <code>txtConfig commit /tmp/config</code>)
enable	NA	Enable plain text system config.

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		(ex: <i>txtConfig enable</i>)
disable	NA	Disable plain text system config. (ex: <i>txtConfig disable</i>)
run_immediately	NA	Apply the configuration content that has been committed in database. (ex: <i>txtConfig run_immediately</i>)
run_immediately	a existing file	Assign a configuration file to apply. (ex: <i>txtConfig run_immediately /tmp/config</i>)

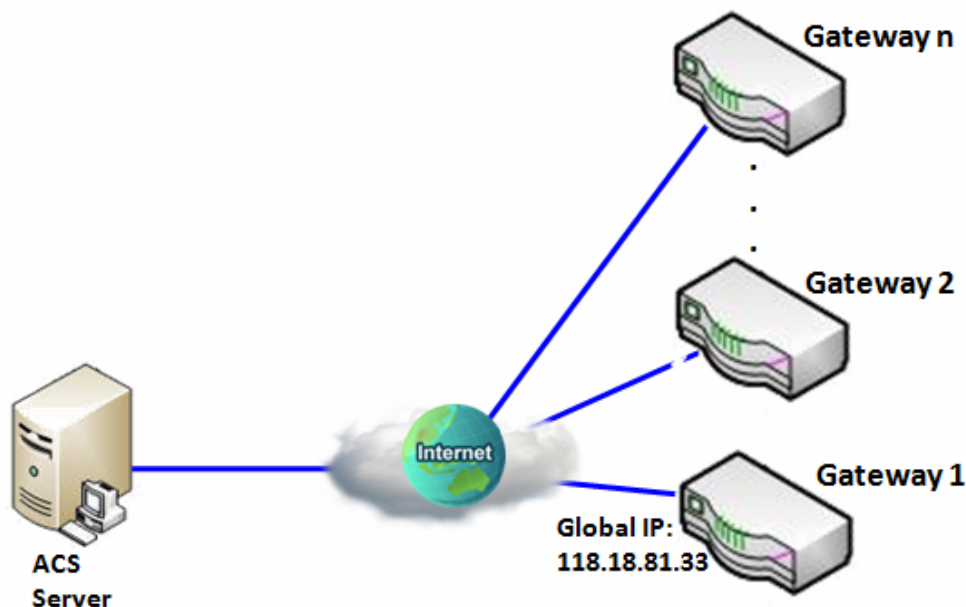
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6.1.2 TR-069

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

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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	■ <i>Enable</i>
ACS URL	http://qa.acslite.com/cpe.php
ACS User Name	<i>ACSUserName</i>
ACS Password	<i>ACSPassword</i>
ConnectionRequest Port	<i>8099</i>
ConnectionRequest User Name	<i>ConnReqUserName</i>
ConnectionRequest Password	<i>ConnReqPassword</i>
Inform	■ <i>Enable Interval 900</i>

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.

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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.

Enable TR-069

Configuration [Help]	
Item	Setting
▶ TR-069	<input type="checkbox"/> Enable
▶ Interface	WAN-1 ▼
▶ Data model	ACS Cloud Data Model ▼
▶ ACS URL	<input type="text"/>
▶ ACS UserName	<input type="text"/>
▶ ACS Password	<input type="text"/>
▶ Connection Request Port	8099
▶ Connection Request UserName	<input type="text"/>
▶ Connection Request Password	<input type="text"/>
▶ Inform	<input checked="" type="checkbox"/> Enable Interval <input type="text" value="300"/>
▶ Certification Setup	<input checked="" type="radio"/> default <input type="radio"/> Select from Certificate List Certificate: ▼

TR-069

Item	Value setting	Description
------	---------------	-------------

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TR-069	The box is unchecked by default	Check the Enable box to activate TR-069 function.
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	ACS Cloud Data Model 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. ACS Cloud Data Model : Select this data model if you intend to use 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 <u>Value Range</u> : 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 periodically send inform message to ACS Server according to the Interval setting. <u>Value Range</u> : 0 ~ 86400 for Inform Interval.
Certification Setup	The default box is selected by default	You can leave it as default or select an expected certificate and key from the drop down list. Refer to Object Definition > Certificate Section for the Certificate configuration.
Save	N/A	Click Save to save the settings.
Undo	N/A	Click Undo to cancel the modifications.

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.

Enable STUN Server

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STUN Settings [Help]	
Item	Setting
▶ STUN	<input checked="" type="checkbox"/> Enable
▶ Server Address	<input type="text"/>
▶ Server Port	<input type="text" value="3478"/> (1~65535)
▶ Keep Alive Period	<input type="text" value="0"/> (0~65535)second(s)

STUN Settings Configuration		
Item	Value setting	Description
STUN	The box is checked by default	Check the Enable box to activate STUN function.
Server Address	1. String format: any IPv4 address 2. It is an optional item.	Specify the IP address for the expected STUN Server.
Server Port	1. An optional setting 2. 3478 is set by default	Specify the port number for the expected STUN Server. <i>Value Range:</i> 1 ~ 65535.
Keep Alive Period	1. An optional setting 2. 0 is set by default	Specify the keep alive time period for the connection with STUN Server. <i>Value Range:</i> 0 ~ 65535.
Save	N/A	Click Save to save the settings.
Undo	N/A	Click Undo to cancel the modifications.

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6.1.3 SNMP

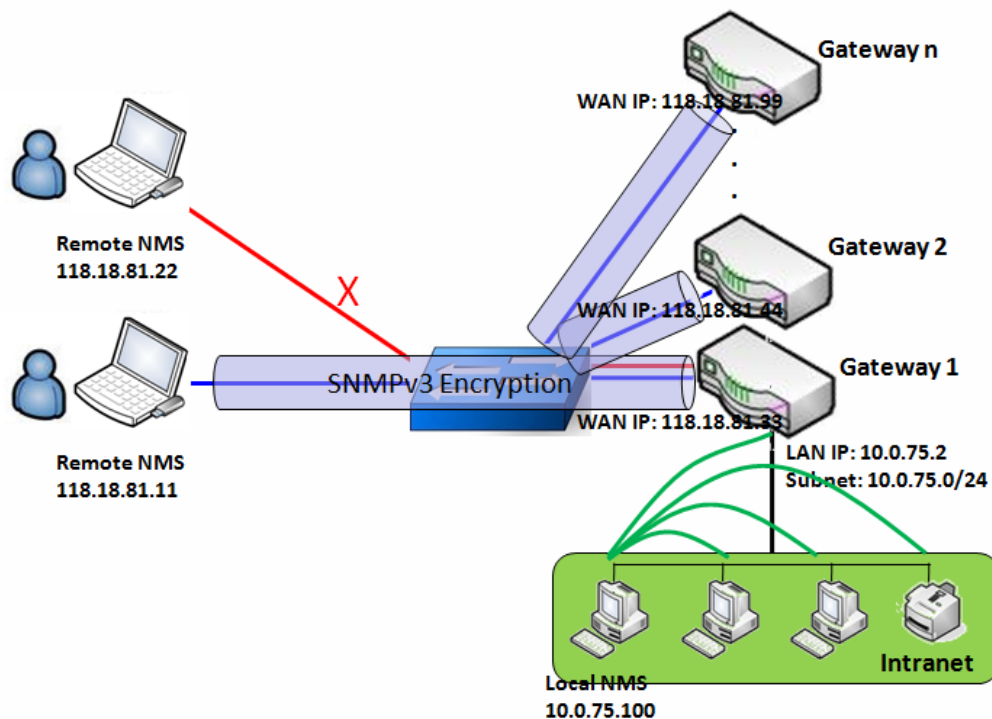
In brief, SNMP, the Simple Network Management Protocol, is a protocol designed to give a user the capability to remotely manage a computer network by polling and setting terminal values and monitoring network events.

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 (a Proprietary MIB)

SNMP Management Scenario



Scenario Application Timing

There are two application scenarios of SNMP Network Management Systems (NMS). Local NMS is in

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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.

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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.

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SNMP Setting

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

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

Enable SNMP

Configuration	
Item	Setting
▶ SNMP Enable	<input type="checkbox"/> LAN <input type="checkbox"/> WAN
▶ WAN Interface	All WANs ▼
▶ Supported Versions	<input type="checkbox"/> v1 <input type="checkbox"/> v2c <input type="checkbox"/> v3
▶ Remote Access IP	Specific IP Address ▼ <input type="text"/> (IP Address/FQDN)
▶ SNMP Port	161 <input type="text"/>

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.
WAN Interface	1.A Must filled setting 2. ALL WANs is selected by default	Specify the WAN interface that a remote SNMP host can access to the device. By default, All WANs is selected, and there is no limitation for the WAN interface.
Supported Versions	1.A Must filled setting 2.The boxes are unchecked 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 Access IP	1. String format: any IPv4 address 2. It is an optional item.	Specify the Remote Access IP for WAN. Select Specific IP Address , and fill in a certain IP address. It means only this IP address can access SNMP from LAN/WAN side. Select IP Range , and fill in a range of IP addresses. It means the IP address within specified range can access SNMP from LAN/WAN side. If you left it as blank, it means any IP address can access SNMP from WAN side.

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SNMP Port	<ol style="list-style-type: none"> String format: any port number The default SNMP port is 161. A Must filled setting 	Specify the SNMP Port . You can fill in any port number. But you must ensure the port number is not to be used. <u>Value Range: 1 ~ 65535.</u>
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.

Multiple Community List <input type="button" value="Add"/> <input type="button" value="Delete"/>			
ID	Community	Enable	Actions

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

Multiple Community Rule Configuration	
Item	Setting
▶ Community	Read Only ▾ <input type="text"/>
▶ Enable	<input checked="" type="checkbox"/> Enable

Multiple Community Rule Configuration		
Item	Value setting	Description
Community	<ol style="list-style-type: none"> Read Only is selected by default A Must filled setting 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.

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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.

User Privacy List <input type="button" value="Add"/> <input type="button" value="Delete"/>										
ID	User Name	Password	Authentication	Encryption	Privacy Mode	Privacy Key	Authority	OID Filter Prefix	Enable	Actions

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

User Privacy Rule Configuration	
Item	Setting
▶ User Name	<input type="text"/>
▶ Password	<input type="password"/>
▶ Authentication	None ▾
▶ Encryption	None ▾
▶ Privacy Mode	noAuthNoPriv ▾
▶ Privacy Key	<input type="password"/>
▶ Authority	Read ▾
▶ OID Filter Prefix	<input type="text" value="1"/>
▶ Enable	<input checked="" type="checkbox"/> Enable

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.

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Privacy Mode	1. noAuthNoPriv is selected by default	Specify the Privacy Mode for this version 3 user. 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.

Trap Event Receiver List												
ID	Server IP	Server Port	SNMP Version	Community Name	User Name	Password	Privacy Mode	Authentication	Encryption	Privacy Key	Enable	Actions

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.

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Trap Event Receiver Rule Configuration	
Item	Setting
▶ Server IP	<input type="text"/> (IP Address/FQDN)
▶ Server Port	<input type="text" value="162"/>
▶ SNMP Version	v1 ▼
▶ Community Name	<input type="text"/>
▶ Enable	<input checked="" type="checkbox"/> Enable

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	Setting
▶ Server IP	<input type="text"/> (IP Address/FQDN)
▶ Server Port	<input type="text" value="162"/>
▶ SNMP Version	v3 ▼
▶ Community Name	<input type="text"/>
▶ User Name	<input type="text"/>
▶ Password	<input type="text"/>
▶ Privacy Mode	noAuthNoPriv ▼
▶ Authentication	None ▼
▶ Encryption	None ▼
▶ Privacy Key	<input type="text"/>
▶ Enable	<input checked="" type="checkbox"/> Enable

Trap Event Receiver Rule Configuration		
Item	Value setting	Description
Server IP	<ol style="list-style-type: none"> 1. A Must filled setting 2. String format: any IPv4 address or FQDN 	<p>Specify the trap Server IP or FQDN.</p> <p>The DUT will send trap to the server IP/FQDN.</p>
Server Port	<ol style="list-style-type: none"> 1. String format: any port number 2. The default SNMP trap port is 162 3. A Must filled setting 	<p>Specify the trap Server Port.</p> <p>You can fill in any port number. But you must ensure the port number is not to be used.</p> <p><i>Value Range: 1 ~ 65535.</i></p>

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

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Specify SNMP MIB-2 System

If required, you can also specify the required information for the MIB-2 System.

SNMP MIB-2 System		
Item	Setting	
▶ sysContact	<input type="text"/>	
▶ sysLocation	<input type="text"/>	

SNMP MIB-2 System Configuration		
Item	Value setting	Description
sysContact	1. An Optional filled setting 2. String format: any text	Specify the contact information for MIB-2 system. <i>Value Range: 0 ~ 64 characters.</i>
sysLocation	1. An Optional filled setting 2. String format: any text	Specify the location information for MIB-2 system. <i>Value Range: 0 ~ 64 characters.</i>

Edit SNMP Options

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

Options		
Item	Setting	
▶ Enterprise Name	<input type="text" value="AMIT"/>	
▶ Enterprise Number	<input type="text" value="12823"/>	
▶ Enterprise OID	1.3.6.1.4.1.	<input type="text" value="12823.4.4.9"/>

Options		
Item	Setting	
▶ Enterprise Name	<input type="text" value="Default"/>	
▶ Enterprise Number	<input type="text" value="12823"/>	
▶ Enterprise OID	1.3.6.1.4.1.	<input type="text" value="12823.4.4.9"/>

Options

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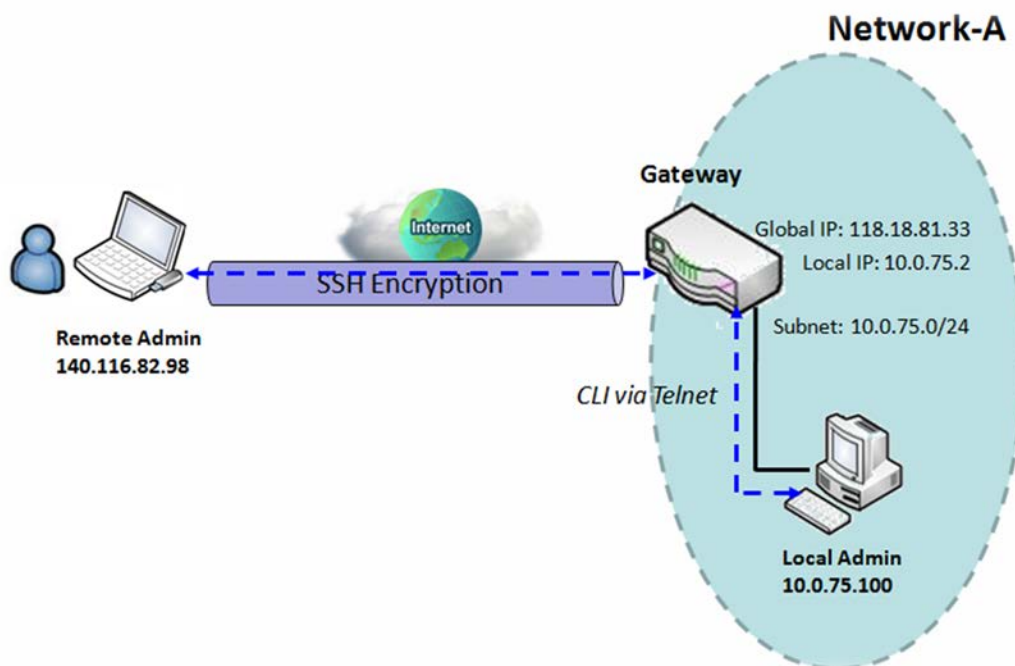
Item	Value setting	Description
Enterprise Name	<ol style="list-style-type: none">The default value is DefaultA Must filled settingString format: any text	Specify the Enterprise Name for the particular private MIB. <i>Value Range:</i> 1 ~ 10 characters, and only string with A~Z, a~z, 0~9, '-', '_'.
Enterprise Number	<p>The default value is 12823 (Default Enterprise Number)</p> <ol style="list-style-type: none">A Must filled settingString format: any number	Specify the Enterprise Number for the particular private MIB. <i>Value Range:</i> 1 ~2080768.
Enterprise OID	<ol style="list-style-type: none">The default value is 1.3.6.1.4.1.12823.4.4.9 (Default Enterprise OID)A Must filled settingString 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.

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6.1.4 Telnet & SSH

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.

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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 & SSH]-[Configuration]
Telnet	LAN: <input checked="" type="checkbox"/> Enable WAN: <input type="checkbox"/> Enable Service Port: 23
SSH	LAN: <input checked="" type="checkbox"/> Enable WAN: <input checked="" type="checkbox"/> Enable Service Port: 22

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.

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Telnet & SSH Setting

Go to **Administration > Configure & Manage > Telnet & SSH** tab.

The Telnet & SSH setting allows administrator to access this device through the traditional Telnet or SSH 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 <input type="button" value="Save"/> <input type="button" value="Undo"/>	
Item	Setting
▶ Telnet	LAN <input checked="" type="checkbox"/> Enable WAN <input type="checkbox"/> Enable Service Port <input type="text" value="23"/>
▶ SSH	LAN <input checked="" type="checkbox"/> Enable WAN <input type="checkbox"/> Enable Service Port <input type="text" value="22"/>

Configuration		
Item	Value setting	Description
Telnet	<ol style="list-style-type: none">The LAN Enable box is checked by default.By default Service Port is 23.	Check the Enable box to activate the Telnet function for connecting from LAN or WAN interfaces. You can set which number of Service Port you want to provide for the corresponding service. Value Range: 1 ~65535.
SSH	<ol style="list-style-type: none">The LAN Enable box is checked by default.By default Service Port is 22.	Check the Enable box to activate the SSH Telnet function for connecting from LAN or WAN interfaces. 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

Password Management <input type="button" value="Save"/> <input type="button" value="Undo"/>	
Item	Setting
▶ root	Old Password : <input type="text"/> New Password : <input type="text"/> New Password Confirmation : <input type="text"/>

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Configuration		
Item	Value setting	Description
root	1. String: any text but no blank character 2. The default password for telnet is 'wirelessm2m'.	Type old password and specify new password to change root password. Note_1: You are highly recommended to change the default telnet password with yours before the device is deployed. Note_2: If you have trouble for the default password for previous FW version, please check the corresponding User Manual to get the correct one.
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 UserName

Change Username screen allows network administrator to change the web-based MMI login account to access gateway. Click the **Modify** button and provide the new username setting.

Username [Help]	
Item	Setting
▶ Username	admin <input type="button" value="Modify"/>
▶ New UserName	<input type="text"/>
▶ Password	<input type="text"/>

Username Configuration		
Item	Value setting	Description
Username	1. The default Username for web-based MMI is 'admin'.	Display the current MMI login account (Username).
New Username	String: any text	Enter new Username to replace the current setting.
Password	String: any text	Enter current password to verify if you have the permission to change the username setting.
Save	N/A	Click Save button to save the settings
Undo	N/A	Click Undo button to cancel the settings

Change Password

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

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Password [Help]	
Item	Setting
▶ Old Password	<input type="text"/>
▶ New Password	<input type="text"/>
▶ New Password Confirmation	<input type="text"/>

Password Configuration		
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.

MMI [Help]	
Item	Setting
▶ Login	Password-Guessing Attack & MAX: <input type="text" value="3"/> (times)
▶ Login Timeout	<input checked="" type="checkbox"/> Enable <input type="text" value="300"/> (seconds)
▶ GUI Access Protocol	<input type="text" value="http/https"/> ▼
▶ HTTPs Certificate Setup	<input checked="" type="radio"/> default <input type="radio"/> Select from Certificate List Certificate: <input type="text"/> ▼ Key: <input type="text" value="locatkey"/> ▼
▶ HTTP Compression	<input type="checkbox"/> gzip <input type="checkbox"/> deflate
▶ System Boot Mode	<input type="text" value="Normal Mode"/> ▼

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MMI Configuration		
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 checked, and 300 is set 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 .
HTTPs Certificate Setup	The default box is selected by default	If the https Access Protocol is selected, the HTTPs Certificate Setup option will be available for further configuration. You can leave it as default or select a expected certificate and key from the drop down list. Refer to Object Definition > Certificate Section for the Certificate configuration.
http Compression	The box is unchecked by default.	Check the box (gzip , or deflate) if any comprerssion method is preferred.
System Boot Mode	Normal Mode is selected by default.	Select the system boot mode that will be adopted to boot up the device. Normal Mode: It takes longer boot up time, about 200 seconds, with complete firmware image check during the device booting. Fast Mode: It takes shorter boot up time, about 120 seconds, without checking the firmwareimage during the device booting. Quick Mode: It takes shorter boot up time, about 90 seconds, without checking the firmware image and create the internal database for User/Group/Captive Portal functions. Note: Use Quick Mode with care, once selected, the User/Group/Captive Portal function will become non-functional.
Save	N/A	Click Save button to save the settings
Undo	N/A	Click Undo button to cancel the settings

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6.2.2 System Information

System Information screen gives network administrator a quick look up on the device information for the purchased gateway.

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

System Information	
Item	Setting
▶ Model Name	
▶ Device Serial Number	
▶ Kernel Version	2.6.36
▶ FW Version	0000TE0.H81_e81.0000_08021800
▶ CPU Usage	9.80%
▶ Memory Usage	60%
▶ System Time	Mon, 07 Aug 2017 15:45:25 +0800
▶ Device Up-Time	4day 3hr 22min 24sec

System Information		
Item	Value Setting	Description
Model Name	N/A	It displays the model name of this product.
Device Serial Number	N/A	It displays the serial number of this product.
Kernel Version	N/A	It displays the Linux kernel version of the product
FW Version	N/A	It displays the firmware version of the product
CPU Usage	N/A	It displays the percentage of CPU utilization.
Memory Usage	N/A	It displays the percentage of device memory utilization.
System Time	N/A	It displays the current system time that you browsed this web page.
Device Up-Time	N/A	It displays the statistics for the device up-time since last boot up.
Refresh	N/A	Click the Refresh button to update the system Information immediately.

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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. The time supported synchronization methods can be Time Server, Manual, PC, Cellular Module, or GPS Signal. Select the method first, and then configure rest settings.

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 **Synchronize immediately** button.

The second one is “Sync with my PC”. Select the method and the system will synchronize its date and time to the time of the administration PC.

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

Synchronize with Time Server

System Time Configuration	
Item	Setting
▶ Synchronization method	Time Server ▼
▶ Time Zone	(GMT+00:00) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London ▼
▶ Auto-synchronization	Time Server: <input type="text"/> Available Time Servers (RFC-868): Auto ▼
▶ Daylight Saving Time	<input type="checkbox"/> Enable
▶ NTP Service	<input type="checkbox"/> Enable
▶ Synchronize immediately	Active

System Time Information		
Item	Value Setting	Description
Synchronization method	1. A Must-filled item. 2. Time Server is selected by default.	Select the Time Server as the synchronization method for the system time.
Time Zone	1. A Must-filled item. 2. GMT+00 :00 is selected by default.	Select a time zone where this device locates.
Auto-synchronization	1. A Must-filled item. 2. Auto is selected by default.	Enter the IP or FQDN for the NTP time server you expected, or leave it as auto mode so that the available server will be used for time synchronization one by one.

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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.
NTP Service	1. It is an optional item. 2. Un-checked by default	Check the Enable button to activate the NTP Service function. When you enabled this function, the gateway can provide NTP server service for its local connected devices.
Synchronize immediately	N/A	Click the Active button to synchronize the system time with specified time server immediately.
Save	N/A	Click the Save button to save the settings.
Refresh	N/A	Click the Refresh button to update the system time immediately.

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.

Synchronize with Manually Setting

System Time Configuration	
Item	Setting
▶ Synchronization method	Manual ▾
▶ Time Zone	(GMT+00:00) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London ▾
▶ Daylight Saving Time	<input type="checkbox"/> Enable
▶ Set Date & Time Manually	2018 ▾ / January ▾ / 09 ▾ (Year/Month/Day)
	15 ▾ : 37 ▾ : 58 ▾ (Hour:Minute:Second)
▶ NTP Service	<input type="checkbox"/> Enable

System Time Information		
Item	Value Setting	Description
Synchronization method	1. A Must-filled item. 2. Time Server is selected by default.	Select the Manual as the synchronization method for the system time. It means administrator has to set the Date & Time manually.
Time Zone	1. A Must-filled item. 2. GMT+00 :00 is selected by default.	Select a time zone where this device locates.
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 Manually	1. It is an optional item.	Manually set the date (Year/Month/Day) and time (Hour:Minute:Second) as the system time.
NTP Service	1. It is an optional item. 2. Un-checked by default	Check the Enable button to activate the NTP Service function. When you enabled this function, the gateway can provide NTP server service for

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		its local connected devices.
Save	N/A	Click the Save button to save the settings.

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Synchronize with PC

System Time Configuration	
Item	Setting
▶ Synchronization method	PC ▾
▶ NTP Service	<input type="checkbox"/> Enable
▶ Synchronize immediately	<input type="button" value="Active"/>

System Time Information		
Item	Value Setting	Description
Synchronization method	1. A Must-filled item. 2. Time Server is selected by default.	Select PC as the synchronization method for the system time to let system synchronize its date and time to the time of the administration PC.
NTP Service	1. It is an optional item. 2. Un-checked by default	Check the Enable button to activate the NTP Service function. When you enabled this function, the gateway can provide NTP server service for its local connected devices.
Synchronize immediately	N/A	Click the Active button to synchronize the system time with specified time server immediately.
Save	N/A	Click the Save button to save the settings.
Refresh	N/A	Click the Refresh button to update the system time immediately.

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Synchronize with Cellular Time Service

System Time Configuration	
Item	Setting
▶ Synchronization method	Cellular Module ▾
▶ Time Zone	(GMT+00:00) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London ▾
▶ NTP Service	<input type="checkbox"/> Enable
▶ Synchronize immediately	Active

System Time Information		
Item	Value Setting	Description
Synchronization method	1. A Must-filled item. 2. Time Server is selected by default.	Select Cellular Module as the synchronization method for the system time to let system synchronize its date and time to the time provided from the connected mobile ISP. Note: this option is only available for the product with Cellular WAN interface.
Time Zone	1. A Must-filled item. 2. GMT+00 :00 is selected by default.	Select a time zone where this device locates.
NTP Service	1. It is an optional item. 2. Un-checked by default	Check the Enable button to activate the NTP Service function. When you enabled this function, the gateway can provide NTP server service for its local connected devices.
Synchronize immediately	N/A	Click the Active button to synchronize the system time with specified time server immediately.
Save	N/A	Click the Save button to save the settings.
Refresh	N/A	Click the Refresh button to update the system time immediately.

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Synchronize with GPS Time Service

System Time Configuration	
Item	Setting
▶ Synchronization method	GPS Signal ▾
▶ Time Zone	(GMT+00:00) Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London ▾
▶ NTP Service	<input type="checkbox"/> Enable
▶ Synchronize immediately	Active

System Time Information		
Item	Value Setting	Description
Synchronization method	<ol style="list-style-type: none">1. A Must-filled item.2. Time Server is selected by default.	Select GPS Signal as the synchronization method for the system time to let system synchronize its date and time to the time provided from the GNSS service. Note: this option is only available for the product with GNSS interface.
Time Zone	<ol style="list-style-type: none">1. A Must-filled item.2. GMT+00 :00 is selected by default.	Select a time zone where this device locates.
NTP Service	<ol style="list-style-type: none">1. It is an optional item.2. Un-checked by default	Check the Enable button to activate the NTP Service function. When you enabled this function, the gateway can provide NTP server service for its local connected devices.
Synchronize immediately	N/A	Click the Active button to synchronize the system time with specified time server immediately.
Save	N/A	Click the Save button to save the settings.
Refresh	N/A	Click the Refresh button to update the system time immediately.

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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.

Item	Setting
▶ System Log	<input checked="" type="checkbox"/> System <input checked="" type="checkbox"/> Attacks <input checked="" type="checkbox"/> Drop <input checked="" type="checkbox"/> Login message <input type="checkbox"/> Debug
▶ Web Log Type Category	<input checked="" type="checkbox"/> System <input checked="" type="checkbox"/> Attacks <input checked="" type="checkbox"/> Drop <input checked="" type="checkbox"/> Login message <input type="checkbox"/> Debug
▶ Email Alert	<input type="checkbox"/> Enable Server: <input type="text" value="--- Option ---"/> <input type="button" value="Add Object"/> E-mail Addresses: <input type="text"/> Subject: <input type="text"/> Log type Category: <input type="checkbox"/> System <input type="checkbox"/> Attacks <input type="checkbox"/> Drop <input type="checkbox"/> Login message <input type="checkbox"/> Debug
▶ Syslogd	<input type="checkbox"/> Enable Server: <input type="text" value="--- Option ---"/> <input type="button" value="Add Object"/> Log type Category: <input type="checkbox"/> System <input type="checkbox"/> Attacks <input type="checkbox"/> Drop <input type="checkbox"/> Login message <input type="checkbox"/> Debug
▶ Log to Storage	<input type="checkbox"/> Enable Select Device: <input type="text" value="Internal"/> Log file name: <input type="text" value="syslog"/> Split file: <input type="checkbox"/> Enable Size: <input type="text" value="200"/> <input type="text" value="KB"/> <input type="button" value="Download log file"/> Log type Category: <input type="checkbox"/> System <input type="checkbox"/> Attacks <input type="checkbox"/> Drop <input type="checkbox"/> Login message <input type="checkbox"/> Debug

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.

View & Email Log History		
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.

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Web Log List	
Time	Log
Dec 2 18:38:23	kernel: klogd started: BusyBox v1.3.2 (2015-10-29 12:52:33 CST)
Dec 2 18:38:33	BEID: BEID STATUS : 0 , STATUS OK!
Dec 2 18:38:40	commander: NETWORK Initialization finished. Result: 0
Dec 2 18:38:40	commander: Initialize MultiWAN
Dec 2 18:38:40	commander: index = 14, failover_index = 14
Dec 2 18:38:40	commander: wantype = 32, wantype index = 99, wan mode = 1, route enable = 1
Dec 2 18:38:40	commander: fo enable = 14, fo stay enable = 0, fo trigger = 1, fo time = 30, fo sequence = 0
Dec 2 18:38:40	commander: wantype = 16, wantype index = 0, wan mode = 2, route enable = 1
Dec 2 18:38:40	commander: fo enable = 14, fo stay enable = 0, fo trigger = 0, fo time = 0, fo sequence = 0
Dec 2 18:38:40	commander: LOAD BALANCE!
Dec 2 18:38:40	commander: ROUTING!
Dec 2 18:38:42	syslog: server_config.pool_check = 1
Dec 2 18:38:42	syslog: start = 192.168.85.100, end = 192.168.85.200, lan_ip = 192.168.85.2, interface=br0, ifindex=0
Dec 2 18:38:42	udhcpd[1413]: udhcpd (v0.9.9-pre) started
Dec 2 18:38:43	syslog: Failure parsing line 13 of /etc/udhcpd_vlan0.conf

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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.

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System
 Attacks
 Drop
 Login message
 Debug

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.

Enable
 Server:
 E-mail Addresses:
 Subject:
 Log type Category: System Attacks Drop Login message Debug

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.

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Syslogd

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

<p>▶ Syslogd</p>	<input type="checkbox"/> Enable Server: --- Option --- ▾ Add Object Log type Category: <input type="checkbox"/> System <input type="checkbox"/> Attacks <input type="checkbox"/> Drop <input type="checkbox"/> Login message <input type="checkbox"/> Debug
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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 send 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.

<p>▶ Log to Storage</p>	<input type="checkbox"/> Enable Select Device: Internal ▾ Log file name: syslog Split file: <input type="checkbox"/> Enable Size: 200 KB ▾ Download log file Log type Category: <input type="checkbox"/> System <input type="checkbox"/> Attacks <input type="checkbox"/> Drop <input type="checkbox"/> Login message <input type="checkbox"/> Debug
-------------------------	--

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. <i>Value Range: 10 ~1000.</i>
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.

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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	Setting
▶ FW Upgrade	Via Web UI ▼ FW Upgrade
▶ Backup Configuration Settings	Download ▼ Via Web UI
▶ Auto Restore Configuration	<input type="checkbox"/> Enable Save Conf. Clean Conf. Conf. Info.
▶ Self-defined Logo	Download ▼ Via Web UI

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	Click 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.

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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	
Item	Setting
▶ Reboot	Now ▼ <input type="button" value="Reboot"/>
▶ Reset to Default	<input type="button" value="Reset"/>

System Operation Window		
Item	Value Setting	Description
Reboot	Now is selected by default	Click 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.

LoRa Gateway

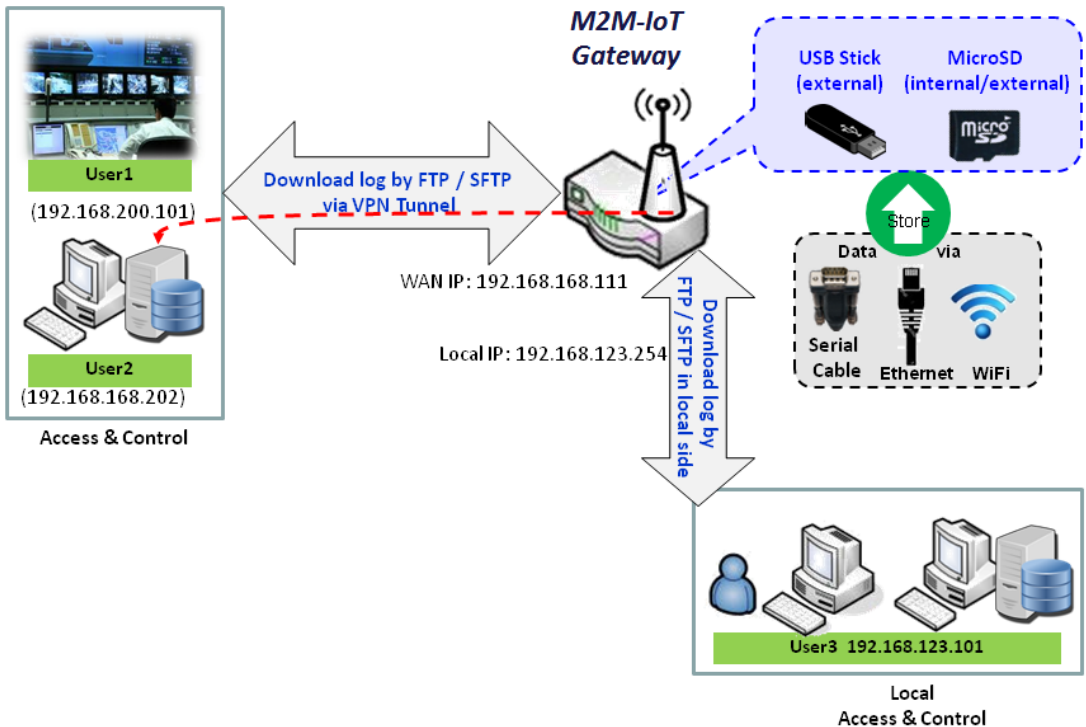
6.3 FTP

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.



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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

FTP Server Configuration Save	
Item	Setting
▶ FTP	<input type="checkbox"/> Enable
▶ FTP Port	<input type="text" value="21"/>
▶ Timeout	<input type="text" value="300"/> second(s)(60-7200)
▶ Max. Connections per IP	<input type="text" value="2"/> ▼
▶ Max. FTP Clients	<input type="text" value="5"/> ▼
▶ PASV Mode	<input type="checkbox"/> Enable
▶ Port Range of PASV Mode	<input type="text" value="50000"/> ~ <input type="text" value="50031"/>
▶ Auto Report External IP in PASV Mode	<input type="checkbox"/> Enable
▶ ASCII Transfer Mode	<input type="checkbox"/> Enable
▶ FTPS(FTP over SSL/TLS)	<input type="checkbox"/> Enable

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.

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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. <u>Value Range: 1024 ~ 65535.</u>
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

SFTP Server Configuration Save	
Item	Setting
▶ SFTP	<input type="checkbox"/> Enable
▶ SFTP Port	<input type="text" value="22"/>

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. <u>Value Range: 1 ~ 65535.</u>

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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

User Account List <input type="button" value="Add"/> <input type="button" value="Delete"/>						
ID	User Name	Password	Directory	Permission	Enable	Actions

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

User Account Configuration <input type="button" value="Save"/>	
Item	Setting
▶ User Name	<input type="text"/>
▶ Password	<input type="text"/>
▶ Directory	<input type="button" value="Browse"/>
▶ Permission	<input type="text" value="Read/Write"/>
▶ Enable	<input checked="" type="checkbox"/>

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.

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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	Setting
▶ Ping Test	Host IP: <input type="text"/> Interface: <input type="text" value="Auto"/> <input type="button" value="Ping"/>
▶ Tracert Test	Host IP: <input type="text"/> Interface: <input type="text" value="Auto"/> <input type="button" value="UDP"/> <input type="button" value="Tracert"/>
▶ Wake on LAN	<input type="text"/> <input type="button" value="Wake up"/>

Diagnostic Tools		
Item	Value setting	Description
Ping Test	Optional Setting	This allows you to specify an IP / FQDN and the test interface (LAN, WAN, or Auto), 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 (LAN, WAN, or Auto) 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.

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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	Setting
▶ Packet Analyzer	<input type="checkbox"/> Enable
▶ File Name	<input type="text"/>
▶ Split Files	<input type="checkbox"/> Enable File Size : <input type="text" value="200"/> <input type="text" value="KB"/>
▶ Packet Interfaces	<input type="checkbox"/> WAN-1 <input type="checkbox"/> WAN-2 <input type="checkbox"/> ASY-1 <input type="text" value="Binary Mode"/> 2.4G : <input type="checkbox"/> VAP-1 <input type="checkbox"/> VAP-2 <input type="checkbox"/> VAP-3 <input type="checkbox"/> VAP-4 <input type="checkbox"/> VAP-5 <input type="checkbox"/> VAP-6 <input type="checkbox"/> VAP-7 <input type="checkbox"/> VAP-8

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: <ul style="list-style-type: none"> ● 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.

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		Select Binary mode or String mode for the serial interface.
		<ul style="list-style-type: none"> ● 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 Filters	
Item	Setting
▶ Filter	<input type="checkbox"/> Enable
▶ Source MACs	<input type="text"/>
▶ Source IPs	<input type="text"/>
▶ Source Ports	<input type="text"/>
▶ Destination MACs	<input type="text"/>
▶ Destination IPs	<input type="text"/>
▶ Destination Ports	<input type="text"/>

Capture Filters		
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.

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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

7.1 Cellular Toolkit (not supported)

Not supported feature for the purchased product, leave it as blank.

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.

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, and collect the required status for administration 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 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, 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:

- Profiles (Rules):
 - SMS Configuration and Accounts
 - Email Accounts
- Managing Events:
 - Trigger Type: SMS, SNMP Trap
 - Actions: Get the Network Status; or Configure the LAN/VLAN behavior, NAT behavior, Firewall behavior, VPN behavior, System Management, Administration.
- Notifying Events:
 - Trigger Type: Connection Change (WAN, LAN & VLAN, DDNS), Administration, and Data Usage.
 - Actions: Notify the administrator with SMS, Syslog, SNMP Trap or Email Alert.

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, and Email Service 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.

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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	Setting
▶ Event Management	<input type="checkbox"/> Enable

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	Setting
▶ Message Prefix	<input type="checkbox"/> Enable & <input type="text"/>
▶ Physical Interface	<input type="text" value="3G/4G-1"/> SIM Status: SIM_A
▶ Delete Managed SMS after Processing	<input type="checkbox"/> Enable

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.

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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. Note: 3G/4G-2 is only available for for the product with dual cellular module.
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.

SMS Account List <input type="button" value="Add"/> <input type="button" value="Delete"/>						
ID	Phone Number	Phone Description	Application	Send confirmed SMS	Enable	Actions

You can click the **Add / Edit** button to configure the SMS account.

SMS Account Configuration	
Item	Setting
▶ Phone Number	Specific Number ▼ <input type="text"/>
▶ Phone Description	<input type="text"/>
▶ Application	<input type="checkbox"/> Event Trigger <input type="checkbox"/> Notify Handle
▶ Send confirmed SMS	<input type="checkbox"/> Enable
▶ Enable	<input checked="" type="checkbox"/> Enable
<input type="button" value="Save"/>	

SMS Account Configuration		
Item	Value setting	Description
Phone Number	1. Mobile phone number format 2. A Must filled setting	Select the Phone number policy from the drop list, and specify a mobile phone number as the SMS account identifier if required. It can be Specific Number , or Allow Any . If Specific Number is selected, you have to specify the 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 . If the Phone Number policy is Allow Any , the Noftify Handle will be unavailable.
Send confirmed	1. An Optional setting 2. The box is unchecked by	Click Enable box to active the SMS response function. The gateway will send a confirmed message back to the sender whenever it

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SMS	default.	received a SMS managing event. The confirmed message is similar to following format: "Device received a SMS with command xxxxx."
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.

Email Service List <input type="button" value="Add"/> <input type="button" value="Delete"/>				
ID	Email Server	Email Addresses	Enable	Actions

You can click the **Add / Edit** button to configure the Email account.

Email Service Configuration	
Item	Setting
▶ Email Server	--- Option --- ▼
▶ Email Addresses	<input type="text"/>
▶ Enable	<input checked="" type="checkbox"/> Enable
<input type="button" value="Save"/>	

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

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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	Setting
▶ Managing Events	<input type="checkbox"/> Enable

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.

Managing Event List <input type="button" value="Add"/> <input type="button" value="Delete"/>				
ID	Event	Description	Enable	Actions

When **Add** or **Edit** button is applied, the **Managing Event Configuration** screen will appear.

Managing Event Configuration	
Item	Setting
▶ Event	SMS <input type="text"/>
▶ Description	<input type="text"/>
▶ Action	<input type="checkbox"/> Network Status <input type="checkbox"/> LAN&VLAN <input type="checkbox"/> NAT <input type="checkbox"/> Firewall <input type="checkbox"/> VPN <input type="checkbox"/> GRE <input type="checkbox"/> System Manage <input type="checkbox"/> Administration <input type="checkbox"/> Digital Output
▶ Managing Event	<input checked="" type="checkbox"/> Enable
<input type="button" value="Save"/>	

Managing Event Configuration		
Item	Value setting	Description

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Event	SMS (or SNMP Trap) by default	Specify the Event type (SMS , SNMP Trap) 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; <i>Note: The available Event Type could be different for the purchased product.</i>
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; 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; <i>Note: The available Event Type could be different for the purchased product.</i>
Managing Event	The box is checked 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.

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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	Setting
▶ Notifying Events	<input checked="" type="checkbox"/> Enable

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.

Notifying Event List <input type="button" value="Add"/> <input type="button" value="Delete"/>					
ID	Event	Description	Action	Enable	Actions

When **Add** or **Edit** button is applied, the **Notifying Event Configuration** screen will appear.

Notifying Event Configuration	
Item	Setting
▶ Event	WAN <input type="button" value="v"/> WAN-1 Physical Link Up <input type="button" value="v"/>
▶ Description	<input type="text"/>
▶ Action	<input type="checkbox"/> Digital Output <input type="checkbox"/> SMS <input type="checkbox"/> Syslog <input type="checkbox"/> SNMP Trap <input type="checkbox"/> Email Alert
▶ Time Schedule	(0) Always <input type="button" value="v"/>
▶ Notifying Events	<input checked="" type="checkbox"/> Enable
<input type="button" value="Save"/>	

Notifying Event Configuration		
Item	Value setting	Description

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Event	Digital Input (or WAN) by default	<p>Specify the Event type and corresponding event configuration. The supported Event Type could be:</p> <p>WAN: Select WAN and a trigger condition to specify a certain WAN Event;</p> <p>LAN&VLAN: Select LAN&VLAN and a trigger condition to specify a certain LAN&VLAN Event;</p> <p>DDNS: Select DDNS and a trigger condition to specify a certain DDNS Event;</p> <p>Administration: Select Administration and a trigger condition to specify a certain Administration Event;</p> <p>Data Usage: Select Data Usage, the SIM Card (Cellular Service) and a trigger condition to specify a certain Data Usage Event;</p> <p><i>Note: The available Event Type could be different for the purchased product.</i></p>
Description	String format : any text.	Enter a brief description for the Notifying Event.
Action	All box is unchecked by default.	<p>Specify at least one action to take when the expected event is triggered.</p> <p>SMS: Select SMS, and the gateway will send out a SMS to all the defined SMS accounts as the action for the event;</p> <p>Syslog: Select Syslog and select/unselect the Enable Checkbox to as the action for the event;</p> <p>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;</p> <p>Email Alert: Select Email Alert, and the gateway will send out an Email to the defined Email accounts as the action for the event;</p> <p><i>Note: The available Event Type could be different for the purchased product.</i></p>
Time Schedule	(0) Always is selected by default	Select a time scheduling rule for the Notifying Event.
Notifying Events	The box is checked 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.

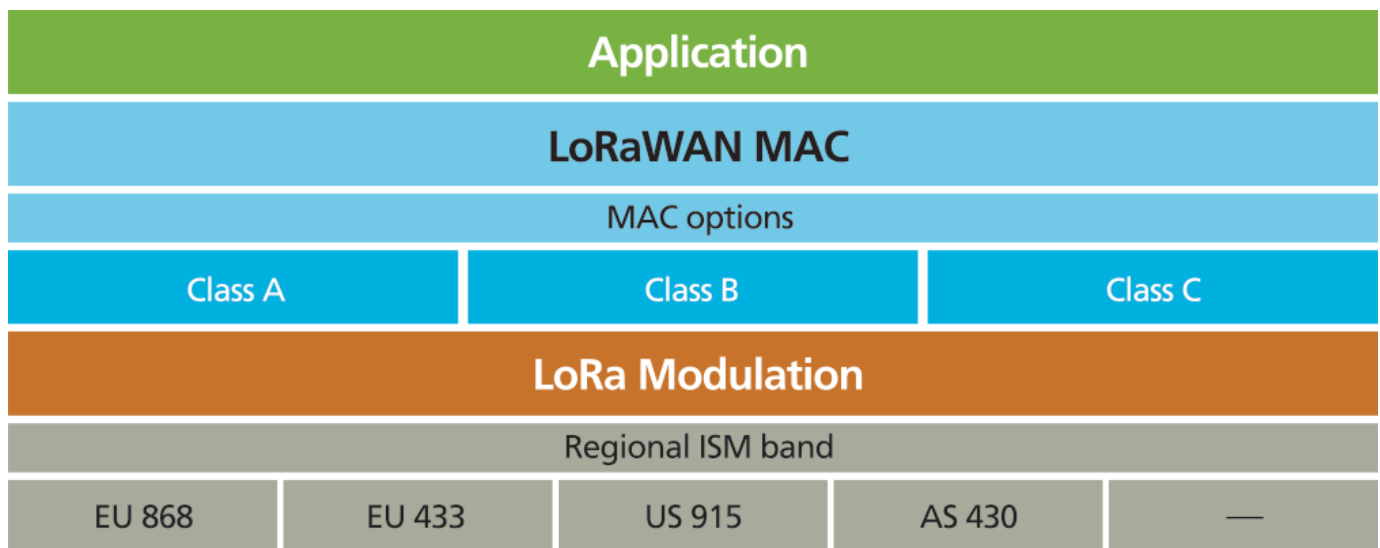
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7.3 LoRa

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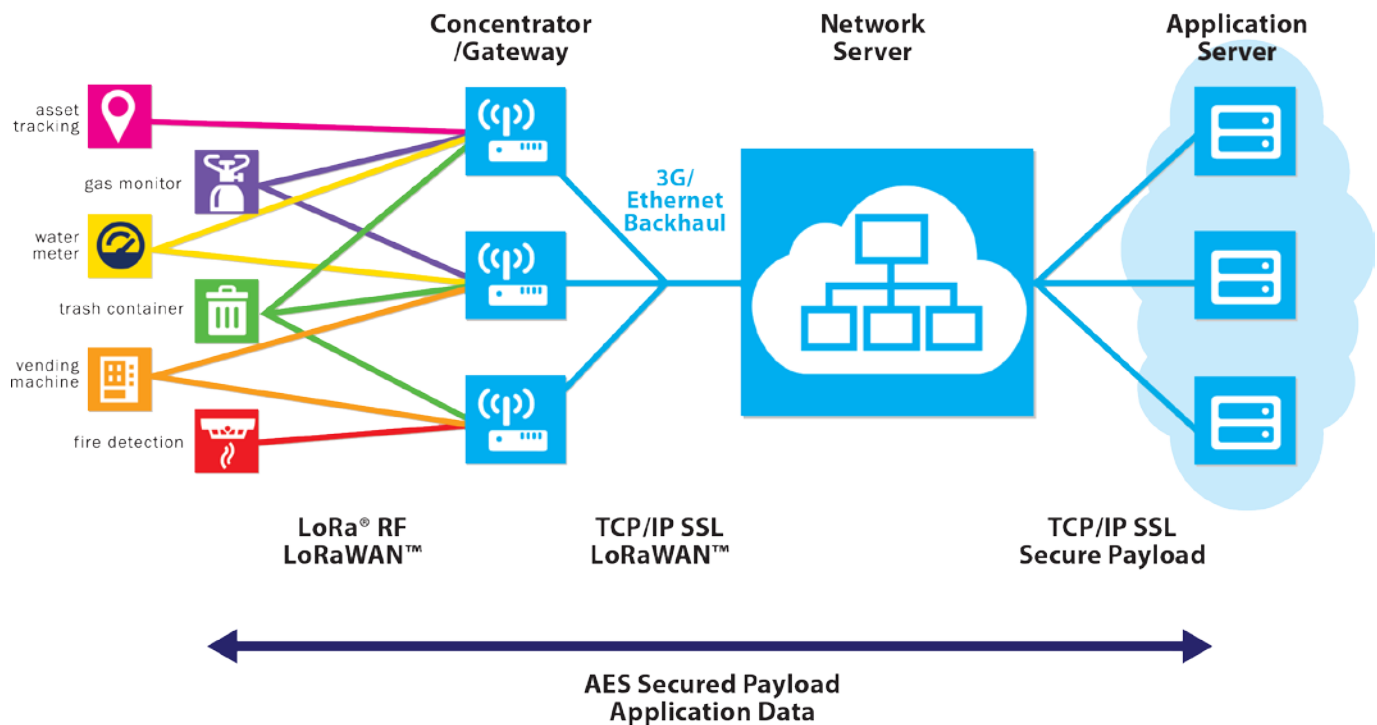
LoRa is a long range wireless data communication technology developed by Semtech. LoRa uses license-free sub-gigahertz radio frequency bands like 433 MHz, 868 MHz (Europe) and 915 MHz (North America). LoRa enables very-long-range transmissions (more than 10 km in rural areas) with low power consumption. The technology is presented in two parts — LoRa, the physical layer and LoRaWAN, the upper layers.⁹

Semtech builds LoRa Technology into its chipsets. These chipsets are then built into the commercial products, LoRa Gateway and LoRa Nodes, and integrated into LPWANs service by worldwide ISPs.



⁹ <https://www.semtech.com/technology/lora/what-is-lora>

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LoRaWAN Protocol

LoRaWAN is a protocol specification built on top of the LoRa technology developed by the LoRa Alliance. It uses unlicensed radio spectrum in the Industrial, Scientific and Medical (ISM) bands to enable low power, wide area communication between remote sensors and gateways connected to the network. This standard-based approach to building a LPWAN allows for quick set up of public or private IoT networks anywhere using hardware and software that is bi-directionally secure, interoperable and mobile, provides accurate localization, and works the way you expect.

LoRaWAN defines the communication protocol and system architecture for the network, while the LoRa physical layer enables the long-range communication link. LoRaWAN is also responsible managing the communication frequencies, data rate, and power for all devices. Devices in the network are asynchronous and transmit when they have data available to send. Data transmitted by an end-node device is received by multiple gateways, which forward the data packets to a centralized network server. The network server filters duplicate packets, performs security checks, and manages the network. Data is then forwarded to application servers.

As depicted in the LoRaWAN network diagram, all the application data between the end nodes and application server are AES-encrypted. The LoRa gateway and network server are merely responsible for data forwarding and security checks, they know nothing about the encrypted data transferred.

LoRa Gateway

7.3.1 LoRa Gateway

This product is integrated with an 8-channel LoRa Gateway module. With some basic configuration and specified an accompanied network server, the LoRa Gateway can connect with surrounding LoRa Nodes and forward the received data to Network Server for further processing.

LoRa Gateway Setting

Go to **Service > LoRa > LoRa Gateway** Tab.

The LoRa Gateway setting page enables user to configure the embedded LoRa gateway, and allow packet forwarding from LoRa nodes to Network Server, or from Network Server to LoRa Nodes.

Basic Configuration

Basic Configuration	
Item	Setting
▶ Operation Band	EU Band(868MHz) ▼

Basic Configuration		
Item	Value setting	Description
Operation Band	NA	Display the frequency band for the LoRa gateway to operate. It depends on the hardware version and regional regulation,. It can be EU Band(868MHz) or US Band(915MHz). Note: The supportedoperation band list is hardware dependent.

LoRa Gateway

LoRa Configuration

LoRa Configuration	
Item	Setting
▶ LoRa Gateway	<input type="checkbox"/> Enable
▶ MultiSF Channel	<input checked="" type="checkbox"/> 868.100 MHz <input checked="" type="checkbox"/> 868.300 MHz <input checked="" type="checkbox"/> 868.500 MHz <input checked="" type="checkbox"/> 867.100 MHz <input checked="" type="checkbox"/> 867.300 MHz <input checked="" type="checkbox"/> 867.500 MHz <input checked="" type="checkbox"/> 867.700 MHz <input checked="" type="checkbox"/> 867.900 MHz
▶ SF Range	SF7 ▼
▶ LoRa BW	250kHz ▼

LoRa Configuration		
Item	Value setting	Description
LoRa Gateway	The box is unchecked by default	Check Enable box to activate the LoRa Gateway function.
MultiSF Channel	All boxes are checked by default	Select the RF channels to be activated. The LoRa gateway supports up to 8 LoRa channels for connecting with LoRa Nodes. EU868 Frequency Plan: 868.100/868.300/868.500/867.100/867.300/867.500/867.700/867.900 MHz US915 Frequency Plan: 902.300/902.500/902.700/902.900/903.100/903.300/903.500/903.700 MHz By default, all channels are selected.
SF Range	SF7 is selected by default	Select the SF (Spread Factor) range for for the RF channel setting. The default setting is SF7 for EU band, SP8 for US band. Value Range: SF7 ~ SF12.
LoRa BW	250kHz is selected by default	Select theLoRa BW (bandwidth) for the RF channel allocation. The default setting is 250kHz for EU band, 500kHz for US band. Value Range: 125kHz, 250kHz, or 500kHz.
Save	NA	Click the Save button to save the configuration

LoRa Gateway

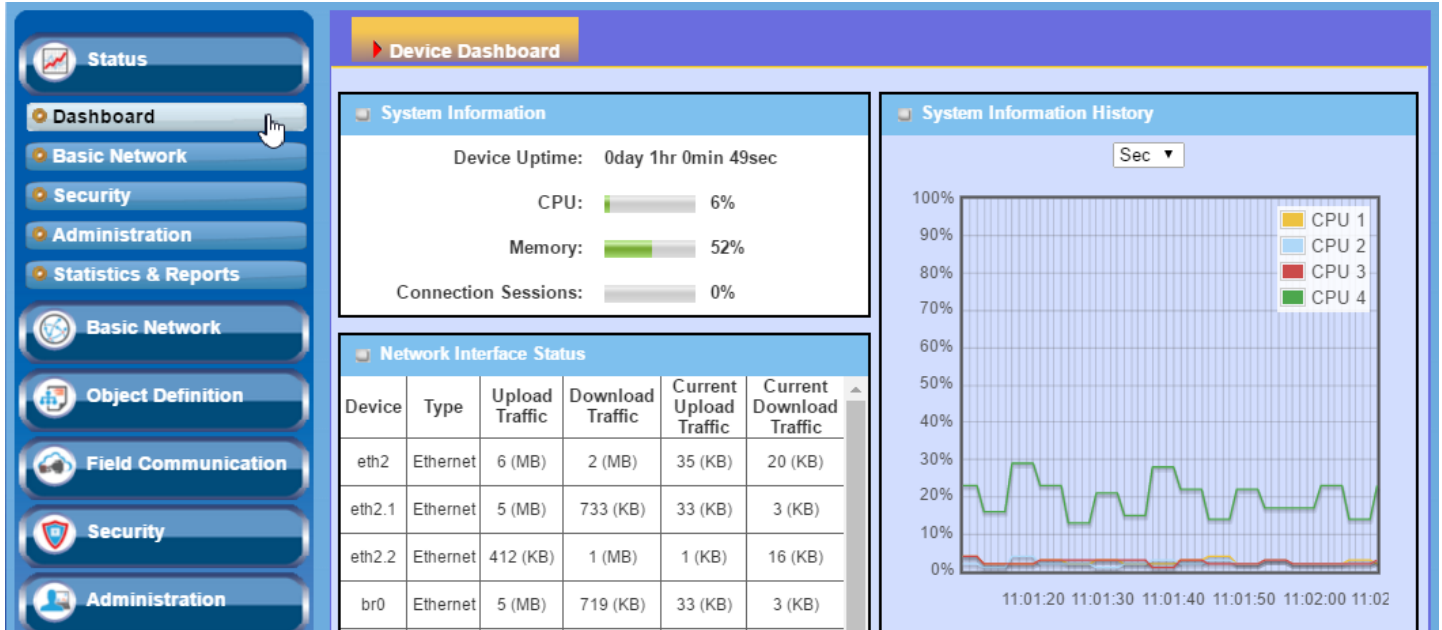
Network Server Configuration

Network Server	
Item	Setting
▶ Gateway ID	<input type="text"/>
▶ Server IP Address	<input type="text"/>
▶ Port	<input type="text"/>
▶ Keep Alive Interval	<input type="text" value="60"/> (seconds)

Network Server Configuration		
Item	Value setting	Description
Gateway ID	String format: MAC-like string, with eight 2-digit hex. numbers	Enter an unique ID for the LoRa Gateway. It will be used for communicating with Network Server. Please enter the WAN MAN for the device, and followed with two extra numbers. For example, WAN MAC is 00:50:18:00:08:FE, then input "00:50:18:00:08:FE:11:22" as the Gateway ID.
Server IP Address	A Must filled setting	Specify the IP Address of the network server. It will be use as destination IP for sending the received packets from LoRa nodes.
Port	A Must filled setting	Specify a Port Number as destination port for sending packets. Value Range: 1 ~ 65535.
Keep Alive Interval	A Must filled setting 60 seconds set by default	Specify the time interval (seconds) to keep the connection alive between network server and LoRa gateway even there is no LoRa traffic. Value Range: 10 ~ 999 seconds.
Save	NA	Click the Save button to save the configuration

Chapter 8 Status

8.1 Dashboard



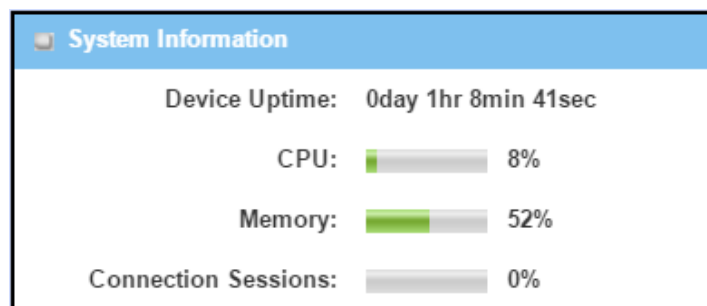
8.1.1 Device Dashboard

The **Device Dashboard** window shows the current status in graph or tables for quickly understanding the operation status for the gateway. They are the System Information, System Information History, and Network Interface Status. The display will be refreshed once per second.

From the menu on the left, select **Status > Dashboard > Device Dashboard** tab.

System Information Status

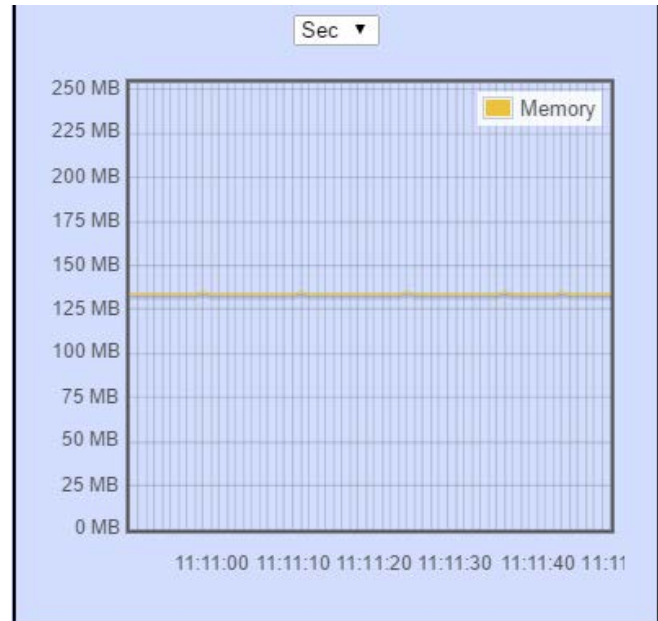
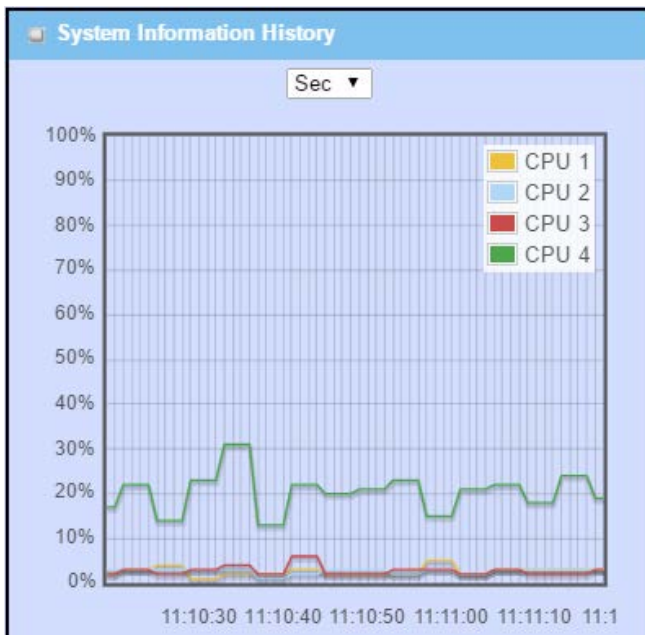
The **System Information** screen shows the device Up-time and the resource utilization for the CPU, Memory, and Connection Sessions.



LoRa Gateway

System Information History

The **System Information History** screen shows the statistic graphs for the CPU and memory.



Network Interface Status

The **Network Interface Status** screen shows the statistic information for each network interface of the gateway. The statistic information includes the Interface Type, Upload Traffic, Download Traffic, and Current Upload / Download Traffic.

Device	Type	Upload Traffic	Download Traffic	Current Upload Traffic	Current Download Traffic
eth2	Ethernet	27 (MB)	15 (MB)	35 (KB)	19 (KB)
eth2.1	Ethernet	26 (MB)	2 (MB)	34 (KB)	3 (KB)
eth2.2	Ethernet	1 (MB)	12 (MB)	1 (KB)	15 (KB)
br0	Ethernet	26 (MB)	2 (MB)	33 (KB)	3 (KB)
ra0	Wireless LAN	0 (Bytes)	0 (Bytes)	0 (Bytes)	0 (Bytes)
rai0	Wireless LAN	0 (Bytes)	0 (Bytes)	0 (Bytes)	0 (Bytes)
ra7	Wireless LAN	0 (Bytes)	0 (Bytes)	0 (Bytes)	0 (Bytes)
	Wireless				

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, and traffic statistics. The display will be refreshed on every five seconds.

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	Network Type	IP Addr.	Subnet Mask	Gateway	DNS	MAC Address	Conn. Status	Action
WAN-1	Ethernet	DHCP	NAT	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0, 0.0.0.0	00:50:18:78:96:06	Disconnected	Renew 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 Ethernet, 3G/4G, etc...
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 Static IP, DHCP, PPPoE, PPTP, L2TP, 3G/4G.
Network Type	N/A	It displays the network type for the WAN interface(s). Depending on the model purchased, it can be NAT, Routing, Bridge, or IP Pass-through.
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.

LoRa Gateway

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.

LAN Interface Network Status

LAN Interface Network Status screen shows IPv4 information of LAN network.

LAN Interface Network Status			
IPv4 Address	IPv4 Subnet Mask	MAC Address	Action
192.168.123.254	255.255.255.0	00:50:18:78:96:07	<input type="button" value="Edit IPv4"/>

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.
MAC Address	N/A	It displays the MAC Address for the LAN interface.
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).

Interface Traffic Statistics

Interface Traffic Statistics screen displays the Interface's total transmitted packets.

LoRa Gateway

Interface Traffic Statistics				
ID	Interface	Received Packets(Mb)	Transmitted Packets(Mb)	Action
WAN-1	Ethernet	0	0	<input type="button" value="Reset"/>

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 Ethernet, 3G/4G, etc...
Received Packets (Mb)	N/A	It displays the downstream packets (Mb). It is reset when the device is rebooted.
Transmitted Packets (Mb)	N/A	It displays the upstream packets (Mb). It is reset when the device is rebooted.

LoRa Gateway

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. The display will be refreshed on every five seconds.

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 (not supported)

Not supported feature for the purchased product, leave it as blank.

LoRa Gateway

8.2.4 DDNS Status

Go to **Status > Basic Network > DDNS** tab.

The **DDNS Status** window shows the current DDNS service in use, the last update status, and the last update time to the DDNS service server.

DDNS Status

DDNS Status List				
Host Name	Provider	Effective IP	Last Update Status	Last Update Time

DDNS Status		
Item	Value Setting	Description
Host Name	N/A	It displays the name you entered to identify DDNS service provider
Provider	N/A	It displays the DDNS server of DDNS service provider
Effective IP	N/A	It displays the public IP address of the device updated to the DDNS server
Last Update Status	N/A	It displays whether the last update of the device public IP address to the DDNS server has been successful (Ok) or failed (Fail).
Last Update Time	N/A	It displays time stamp of the last update of public IP address to the DDNS server.
Refresh	N/A	The refresh button allows user to force the display to refresh information.

8.3 Security

The screenshot shows the Security configuration page with the VPN tab selected. The interface includes a sidebar with navigation options like Status, Basic Network, Security, Administration, and Statistics & Reports. The main content area displays the following VPN status sections:

- IPSec Tunnel Status**: Edit button. Table with columns: Tunnel Name, Tunnel Scenario, Local Subnets, Remote IP/FQDN, Remote Subnets.
- OpenVPN Server Status**: Edit button. Table with columns: User Name, Remote IP/FQDN, Virtual IP/Mac.
- OpenVPN Client Status**: Edit button. Table with columns: OpenVPN Client Name, Interface, Remote IP/FQDN, Remote Subnet, TUN/TAP Read(bytes), TUN/TAP Write(bytes), TCP/UDP Read(bytes).
- L2TP Server Status**: Edit button. Table with columns: User Name, Remote IP, Remote Virtual IP, Remote Subnets.

8.3.1 VPN Status

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

The **VPN Status** window shows the overall VPN tunnel status. The display will be refreshed on every five seconds.

IPSec Tunnel Status

IPSec Tunnel Status windows show the configuration for establishing IPSec VPN connection and current connection status.

IPSec Tunnel Status Edit						
Tunnel Name	Tunnel Scenario	Local Subnets	Remote IP/FQDN	Remote Subnets	Conn. Time	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.

LoRa Gateway

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		Edit		
User Name	Remote IP/FQDN	Virtual IP/Mac	Conn. Time	Status
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		Edit							
OpenVPN Client Name	Interface	Remote IP/FQDN	Remote Subnet	TUN/TAP Read(bytes)	TUN/TAP Write(bytes)	TCP/UDP Read(bytes)	TCP/UDP Write(bytes)	Conn. Time	Conn. 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 Subnet	N/A	It displays the Remote Subnet specified.							
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.							

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L2TP Server/Client Status

L2TP Server/Client Status shows the configuration for establishing L2TP tunnel and current connection status.

L2TP Server Status Edit					
User Name	Remote IP	Remote Virtual IP	Remote Call ID	Conn. Time	Status
L2TP Server Status					
Item	Value setting	Description			
User Name	N/A	It displays the login name of the user used for the connection.			
Remote IP	N/A	It displays the public IP address (the WAN IP address) of the connected L2TP client.			
Remote Virtual IP	N/A	It displays the IP address assigned to the connected L2TP client.			
Remote Call ID	N/A	It displays the L2TP client Call ID.			
Conn. Time	N/A	It displays the connection time for the L2TP tunnel.			
Status	N/A	It displays the Status of each of the L2TP client connection. The status displays Connected, Disconnect, Connecting			
Edit	N/A	Click on Edit Button to change L2TP server setting, web-based utility will take you to the L2TP server page. (Security > VPN > L2TP tab)			

L2TP Client Status Edit							
L2TP Client Name	Interface	Virtual IP	Remote IP/FQDN	Default Gateway/Remote Subnet	Conn. Time	Status	
L2TP Client Status							
Item	Value setting	Description					
Client Name	N/A	It displays Name for the L2TP Client specified.					
Interface	N/A	It displays the WAN interface with which the gateway will use to request PPTP tunneling connection to the PPTP server.					
Virtual IP	N/A	It displays the IP address assigned by Virtual IP server of L2TP server.					
Remote IP/FQDN	N/A	It displays the L2TP Server's Public IP address (the WAN IP address) or FQDN.					
Default Gateway/Remote Subnet	N/A	It displays the specified IP address of the gateway device used to connect to the internet to connect to the L2TP server –the default gateway. Or other specified subnet if the default gateway is not used to connect to the L2TP server –the remote subnet.					
Conn. Time	N/A	It displays the connection time for the L2TP tunnel.					
Status	N/A	It displays the Status of the VPN connection. The status displays Connected, Disconnect, and Connecting.					
Edit	N/A	Click on Edit Button to change L2TP client setting, web-based utility will take you to the L2TP client page. (Security > VPN > L2TP tab)					

LoRa Gateway

PPTP Server/Client Status

PPTP Server/Client Status shows the configuration for establishing PPTP tunnel and current connection status.

PPTP Server Status Edit					
User Name	Remote IP	Remote Virtual IP	Remote Call ID	Conn. Time	Status
PPTP Server Status					
Item	Value setting	Description			
User Name	N/A	It displays the login name of the user used for the connection.			
Remote IP	N/A	It displays the public IP address (the WAN IP address) of the connected PPTP client.			
Remote Virtual IP	N/A	It displays the IP address assigned to the connected PPTP client.			
Remote Call ID	N/A	It displays the PPTP client Call ID.			
Conn. Time	N/A	It displays the connection time for the PPTP tunnel.			
Status	N/A	It displays the Status of each of the PPTP client connection. The status displays Connected, Disconnect, and Connecting.			
Edit Button	N/A	Click on Edit Button to change PPTP server setting, web-based utility will take you to the PPTP server page. (Security > VPN > PPTP tab)			

PPTP Client Status Edit						
PPTP Client Name	Interface	Virtual IP	Remote IP/FQDN	Default Gateway/Remote Subnet	Conn. Time	Status
PPTP Client Status						
Item	Value setting	Description				
Client Name	N/A	It displays Name for the PPTP Client specified.				
Interface	N/A	It displays the WAN interface with which the gateway will use to request PPTP tunneling connection to the PPTP server.				
Virtual IP	N/A	It displays the IP address assigned by Virtual IP server of PPTP server.				
Remote IP/FQDN	N/A	It displays the PPTP Server's Public IP address (the WAN IP address) or FQDN.				
Default Gateway / Remote Subnet	N/A	It displays the specified IP address of the gateway device used to connect to the internet to connect to the PPTP server –the default gateway. Or other specified subnet if the default gateway is not used to connect to the PPTP server –the remote subnet.				
Conn. Time	N/A	It displays the connection time for the PPTP tunnel.				
Status	N/A	It displays the Status of the VPN connection. The status displays Connected, Disconnect, and Connecting.				
Edit Button	N/A	Click on Edit Button to change PPTP client setting, web-based utility will take you to the PPTP server page. (Security > VPN > PPTP tab)				

LoRa Gateway

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. The display will be refreshed on every five seconds.

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 Filters Edit [+]			
Activated Filter Rule	Detected Contents	IP	Time

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 Edit [+]			
Activated Blocking Rule	Blocked URL	IP	Time

URL Blocking Status		
Item	Value setting	Description
Activated Blocking Rule	N/A	This is the URL Blocking Rule name.

LoRa Gateway

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 Filters Edit [+]			
Activated Filter Rule	Detected Contents		Time
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.*

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MAC Control Status

MAC Control Edit [+]			
Activated Control Rule	Blocked MAC Addresses	IP	Time

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 Edit [+]			
Filtered Application Category	Filtered Application Name	IP	Time

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.

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IPS Status

IPS Edit [+]		
Detected Intrusion	IP	Time

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

Options Edit [+]			
Stealth Mode	SPI	Discard Ping from WAN	Remote Administrator Management

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. The display will be refreshed on every five seconds.

SNMP Linking Status

SNMP Link Status screen shows the status of current active SNMP connections.

SNMP Linking Status						
User Name	IP Address	Port	Community	Auth. Mode	Privacy Mode	SNMP Version

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		
Trap Level	Time	Trap Event

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.

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Trap Event	N/A	It displays the IP address of the trap sender and event type.
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TR-069 Status

TR-069 Status screen shows the current connection status with the TR-068 server.

TR-069 Status
Link Status
Off

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.

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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

8.4.3 GNSS Status (not supported)

Not supported feature for the purchased product, leave it as blank.

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 Network Traffic (not supported)

Not supported feature for the purchased product, leave it as blank.

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8.5.3 Device Administration

Go to **Status > Statistics & Reports > Device Administration** tab.

Device Administration shows the login information.

Device Manager Login Statistics				
Previous				
Next				
First				
Last				
Export (.xml)				
Export (.csv)				
Refresh				
User Name	Protocol Type	IP Address	User Level	Duration Time
admin	http/https	192.168.123.100	Admin	2017/03/22 03:31~

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

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GPSTBabel

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

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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

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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

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<https://sourceforge.net/projects/mrts/>

Openswan

Version: v2.6.38 GNU GENERAL PUBLIC LICENSE Version 2, June 1991

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<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>

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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

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<http://pptpclient.sourceforge.net/>

PPTPServ

Version: 1.3.4

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L2TP

Version: 0.4

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any later version.

<http://www.roaringpenguin.com/>

L2TPServ

Version: v 1.3.1 GNU GENERAL PUBLIC LICENSE Version 2, June 1991

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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

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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

NTFS_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.

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Version: 20080615

Copyright (C) 1998-2004 WIDE Project.

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