Semi-industrial LoRaWAN® Gateway

UG65

User Guide

Preface

Thanks for choosing Milesight UG65 LoRaWAN® gateway. UG65 delivers tenacious connection over network with full-featured design such as automated failover/failback, extended operating temperature, hardware watchdog, VPN, Gigabit Ethernet and beyond.

This guide shows you how to configure and operate the UG65 LoRaWAN® gateway. You can refer to it for detailed functionality and gateway configuration.

Readers

This guide is mainly intended for the following users:

- Network Planners
- On-site technical support and maintenance personnel
- Network administrators responsible for network configuration and maintenance

Related Documents

Document	Description
UG65 Datasheet	Datasheet for UG65 LoRaWAN® gateway.
UG65 Quick Start Guide	Quick Installation Guide for UG65 LoRaWAN® gateway.

Declaration of Conformity

UG65 is in conformity with the essential requirements and other relevant provisions of the CE, FCC, and RoHS.

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Revision History

Date	Doc Version	Description
Aug. 31, 2020	V1.0	Initial version
Dec. 10, 2020	V2.0	Layout replace
Apr. 30, 2021	V2.1	1. Support LoRaWAN® Class B 2. Add Node-RED feature 3. Add Noise-Analyzer feature 4. Add Multicast Group feature 5. Add application examples
Aug. 24, 2021	V2.2	1. Support Yeastar Workplace platform integration 2. Delete Package Forward status page 3. Phone & Email webpage update
Dec. 15, 2021	V2.3	1. Add AS923-3&AS923-4 2. Change network server channel mask box to channel 3. Add device channel setting in profile
Feb. 18, 2022	V2.4	1. Add batch backup 2. Log in webpage update 3. Change default antenna type to external antenna 4. Adjust time of Class C ACK timeout
Jun. 1, 2022	V2.5	1. Support VLAN Trunk client 2. Add System Name in SNMP 3. Add Use L2TP Peer DNS option
Dec.26, 2022	V2.6	1. Add BACnet Server feature 2. Add Payload Codec feature 3. Add Reset and all flows export feature on Node-RED 4. Add data retransmission feature on Packet Forward
Feb. 21, 2024	V2.7	1. Compatible with Milesight Development Platform 2. Update default secondary ICMP and DNS server address 3. Add cellular IMS and custom MTU feature 4. Add 8 pre-set device profiles 5. Add beacon time offset setting
June 7, 2024	V2.8	1. Support to import ovpn file for OpenVPN connection; 2. Support packet filter feature;

		3. Add default WLAN connection password; 4. Add username on SMTP client setting; 5. Add BACnet object types, support object instance customization.

Contents

Chapter 1 Product Introduction

1.1 Overview

UG65 is a robust 8-channel indoor LoRaWAN® gateway. Adopting SX1302 LoRa chip and high-performance quad-core CPU, UG65 supports connection with more than 2000 nodes. UG65 has line of sight up to 15 km and can cover about 2 km in urbanized environment, which is ideally suited to smart office, smart building and many other indoor applications.

UG65 supports not only multiple back-haul backups with Ethernet, Wi-Fi and cellular, but also has integrated mainstream network servers (such as The Things Industries, ChirpStack, etc.) and built-in network server and Milesight IoT Cloud for easy deployment.

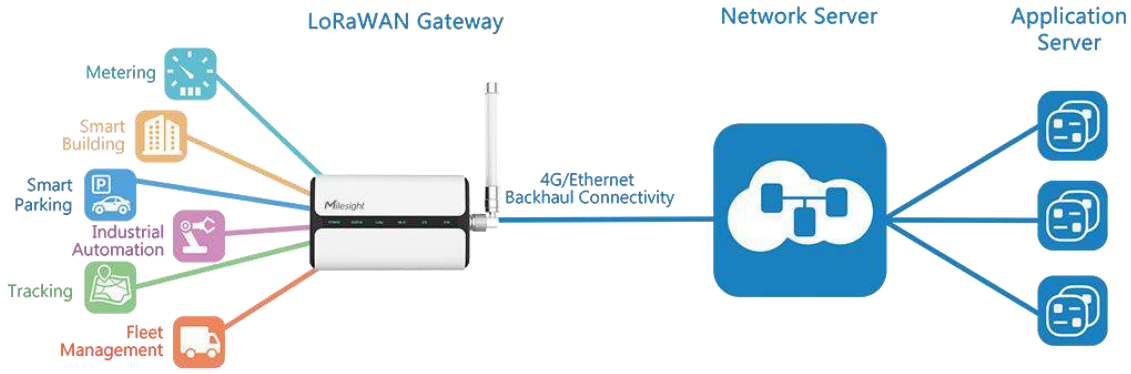


Figure 1-1

1.2 Advantages

Benefits

- Built-in industrial CPU and big memory
- Ethernet, 2.4GHz Wi-Fi and global 2G/3G/LTE options make it easy to get connected
- Embedded network server and compliant with several third party network servers
- MQTT(s) or HTTP(s) protocol for data transmission to application server
- Rugged enclosure, optimized for wall or pole mounting
- 3-year warranty included

Security & Reliability

- Automated failover/failback between Ethernet and Cellular
- Enable unit with security frameworks like IPsec/OpenVPN/GRE/L2TP/PPTP/ DMVPN
- Embedded hardware watchdog to automatically recover from various failure and ensure highest level of availability

Easy Maintenance

- Milesight DeviceHub provides easy setup, mass configuration, and centralized management of remote devices
- The user-friendly web interface design and various upgrading options help administrator to manage the device as easy as pie
- Web GUI and CLI enable the admin to achieve quick configuration and simple management among a large quantity of devices
- Users can efficiently manage the remote devices on the existing platform through the industrial standard SNMP

Capabilities

- Link remote devices in an environment where communication technologies are constantly changing
- Industrial quad core 64-bit ARM Cortex-A53 processor, high-performance operating up to 1.5 GHz with low power consumption, and 8GB eMMC available to support more applications
- Support wide operating temperature ranging from -40°C to 70°C/-40°F to 158°F

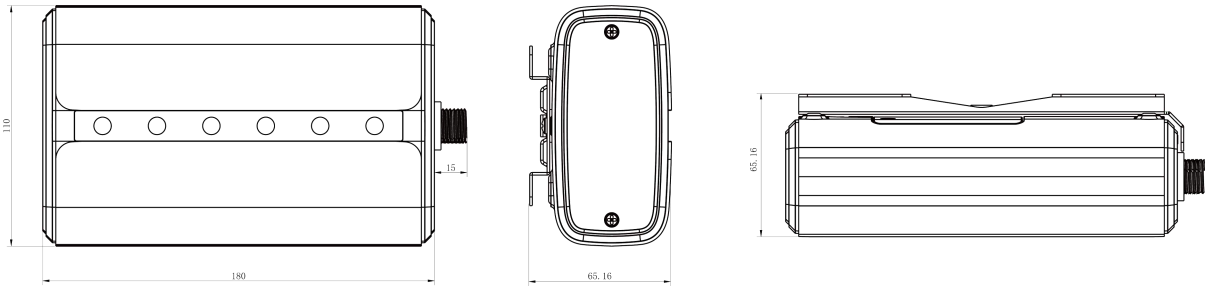
1.3 Specifications

Hardware System	
CPU	Quad-core 1.5GHz, 64-bit ARM Cortex-A53
Memory	8 GB eMMC Flash, 512 MB DDR4 RAM
LoRaWAN	
Antenna	Fully Integrated and Internal Antenna (Optional: 1 × 50 Ω N-Female External Connector)
Channel	8
Frequency Band	CN470/IN865/EU868/RU864/US915/AU915/KR920/AS923-1&2&3&4
Sensitivity	-140dBm Sensitivity @292bps
Output Power	27dBm Max
Protocol	V1.0 Class A/Class B/Class C and V1.0.2 Class A/Class B/Class C
Ethernet	
Ports	1 × RJ-45 (PoE PD supported)
Physical Layer	10/100/1000 Base-T (IEEE 802.3)

Data Rate	10/100/1000 Mbps (auto-sensing)
Interface	Auto MDI/MDIX
Mode	Full or half duplex (auto-sensing)
Wi-Fi Interfaces	
Antenna	Fully Integrated and Internal Antenna
Standards	IEEE 802.11 b/g/n, 2.4 GHz
Tx Power	802.11b: 18 dBm +/-2.0 dBm (11 Mbps) 802.11g: 15 dBm +/-2.0 dBm (6 Mbps) 802.11g: 15 dBm +/-2.0 dBm (54 Mbps) 802.11n@2.4 GHz: 14 dBm +/-2.0 dBm (MCS0_HT20) 802.11n@2.4 GHz: 14 dBm +/-2.0 dBm (MCS7_HT20) 802.11n@2.4 GHz: 13 dBm +/-2.0 dBm (MCS0_HT40) 802.11n@2.4 GHz: 13 dBm +/-2.0 dBm (MCS7_HT40)
Cellular Interfaces (Optional)	
Antenna	Internal Antenna
SIM Slots	1
Software	
Network Protocols	PPPoE, SNMP v1/v2c/v3, TCP, UDP, DHCP, DDNS, HTTP, HTTPS, DNS, SNTP, Telnet, SSH, MQTT, MQTTS, BACnet/IP etc.
VPN Tunnel	DMVPN/IPsec/OpenVPN/PPTP/L2TP/GRE
Firewall	ACL/DMZ/Port Mapping/MAC Binding
Management	Web, CLI, SMS, On-demand dial up, DeviceHub, Milesight IoT Cloud, Yeastar Workplace Platform, Milesight Development Platform
App	Python SDK, Node-RED
Power Supply and Consumption	
Power Supply	1. DC Jack Connector for 9-24 VDC power supply 2. 1 × 802.3 af PoE input
Consumption	Typical 2.9W, Max 4.2W
Physical Characteristics	
Ingress Protection	IP65
Dimensions	180 x 110 x 56.5 mm
Mounting	Desktop, Wall or Pole Mounting
Others	
Reset Button	1 × RST

LED Indicators	1 × POWER, 1 × STATUS, 1 × LoRa, 1 × Wi-Fi, 1 × LTE, 1 × ETH
Built-in	Watchdog, RTC, Timer
Environmental	
Operating Temperature	-40°C to +70°C (-40°F to +158°F) Reduced cellular performance above 60°C
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Ethernet Isolation	1.5 kV RMS
Relative Humidity	0% to 95% (non-condensing) at 25°C/77°F

1.4 Dimensions (mm)



Chapter 2 Access to Web GUI

This chapter explains how to access to Web GUI of the UG65.

Username: **admin**

Password: **password**

2.1 Wireless Access

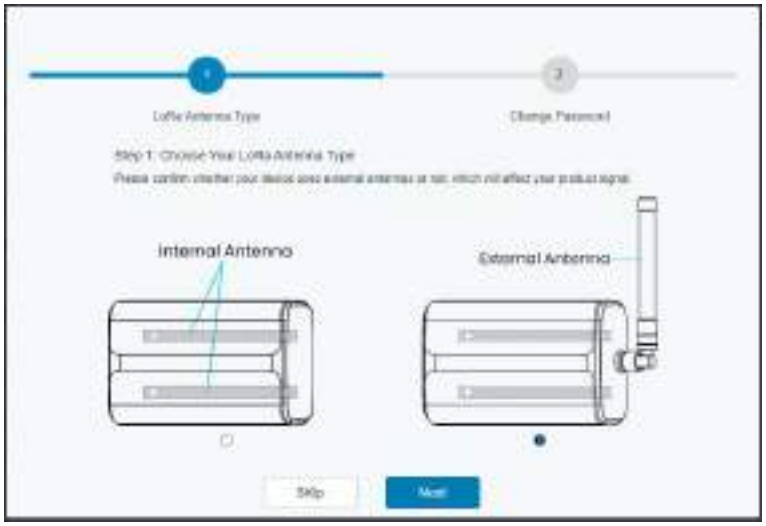
1. Enable Wireless Network Connection on your computer and search for access point **Gateway_******** to connect it, the default Wi-Fi password is **iotpassword**.

2. Open a Web browser on your PC (Chrome is recommended) and type in the IP address **192.168.1.1** to access the web GUI.

3. Enter the username and password, click “Login”.

If you enter the username or password incorrectly more than 5 times, the login page will be locked for 10 minutes.

4. After logging the web GUI, follow the guide to complete the basic configurations. It’s suggested that you change the password for the sake of security.

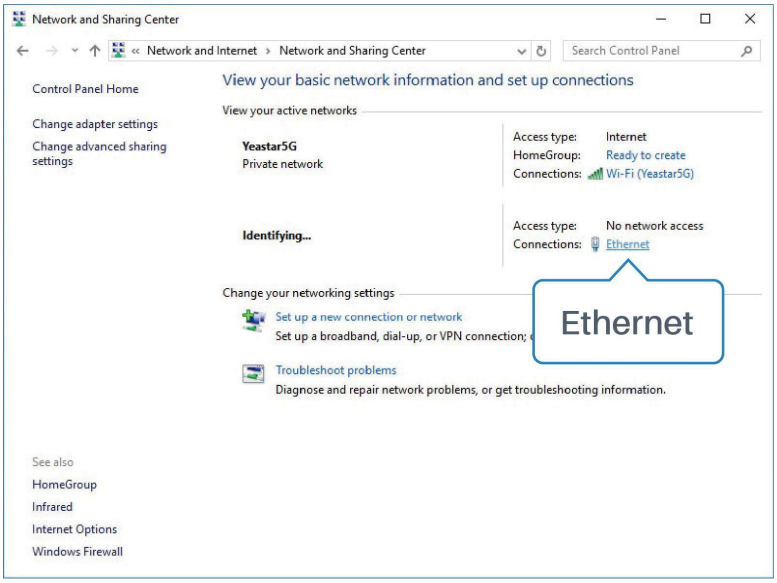


5. You can view system information and perform configuration of the gateway.

2.2 Wired Access

Connect PC to UG65 ETH port directly or through PoE injector to access the web GUI of gateway. The following steps are based on Windows 10 system for your reference.

1. Go to “Control Panel” → “Network and Internet” → “Network and Sharing Center”, then click “Ethernet” (May have different names).



2. Go to “Properties” → “Internet Protocol Version 4(TCP/IPv4) ”and select “Use the following IP address”, then assign a static IP manually within the same subnet of the gateway.

3. Open a Web browser on your PC (Chrome is recommended) and type in the IP address **192.168.23.150** to access the web GUI.
4. Enter the username and password, click “Login”.

If you enter the username or password incorrectly more than 5 times, the login page will be locked for 10 minutes.

5. After logging the web GUI, follow the guide to complete the basic configurations. It’s suggested that you change the password for the sake of security.

6. After guide complete, you can view system information and perform configuration of the gateway.

Chapter 3 Web Configuration

3.1 Status

3.1.1 Overview

You can view the system information of the gateway on this page.

Figure 3-1-1-1

System Information	
Item	**Description**
Model	Show the model name of gateway.
Region	Show the LoRaWAN® frequency region of gateway.
Serial Number	Show the serial number of gateway.
Firmware Version	Show the currently firmware version of gateway.
Hardware Version	Show the currently hardware version of gateway.
Local Time	Show the currently local time of system.
Uptime	Show the information on how long the gateway has been running.
CPU Load	Show the current CPU utilization of the gateway.
RAM (Capacity/Available)	Show the RAM capacity and the available RAM memory.
eMMC (Capacity/Available)	Show the eMMC capacity and the available eMMC memory.

Table 3-1-1-1 System Information

When Milesight UPS is connected to the device, the UPS basic information will also show on the Status page. For more details please refer to *Milesight UPS User Guide*.

Figure 3-1-1-2

3.1.2 Cellular

You can view the cellular network status of gateway on this page.

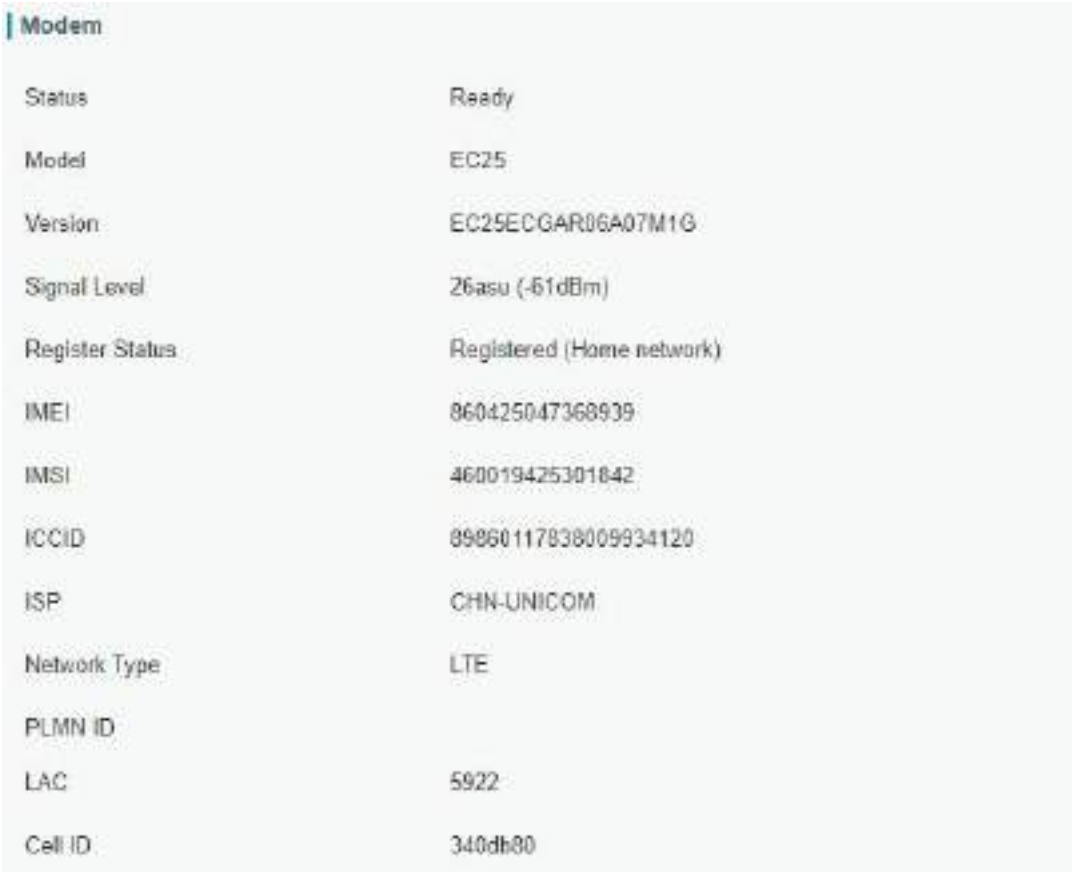


Figure 3-1-2-1

Modem Information	
Item	**Description**
Status	Show corresponding detection status of module and SIM card.
Model	Show the model name of cellular module.
Version	Show the version of cellular module.
Signal Level	Show the cellular signal level.
Register Status	Show the registration status of SIM card.
IMEI	Show the IMEI of the module.
IMSI	Show IMSI of the SIM card.
ICCID	Show ICCID of the SIM card.
ISP	Show the network provider which the SIM card registers on.
Network Type	Show the connected network type, such as LTE, 3G, etc.
PLMN ID	Show the current PLMN ID, including MCC, MNC, LAC and Cell ID.
LAC	Show the location area code of the SIM card.
Cell ID	Show the Cell ID of the SIM card location.

Table 3-1-2-1 Modem Information

Figure 3-1-2-2

Network Status	
Item	**Description**
Status	Show the connection status of cellular network.
IP Address	Show the IP address of cellular network.
Netmask	Show the netmask of cellular network.
Gateway	Show the gateway of cellular network.
DNS	Show the DNS of cellular network.
Connection Duration	Show information on how long the cellular network has been connected.

Table 3-1-2-2 Network Status

3.1.3 Network

On this page you can check the Ethernet port status of the gateway.

Figure 3-1-3-1

Network	
Item	**Description**
Port	Show the name of the Ethernet port.
Status	Show the status of the Ethernet port. "Up" refers to a status that WAN is enabled and Ethernet cable is connected. "Down" means Ethernet cable is disconnected or WAN function is disabled.
Type	Show the dial-up type of the Ethernet port.
IP Address	Show the IP address of the Ethernet port.
Netmask	Show the netmask of the Ethernet port.
Gateway	Show the gateway of the Ethernet port.
DNS	Show the DNS of the Ethernet port.
Duration	Show the information about how long the Ethernet cable has been connected to the Ethernet port when the port is enabled. Once the port is disabled or Ethernet cable is disconnected, the duration will stop.

Table 3-1-3-1 WAN Status

3.1.4 WLAN

You can check Wi-Fi status on this page, including the information of access point and client.

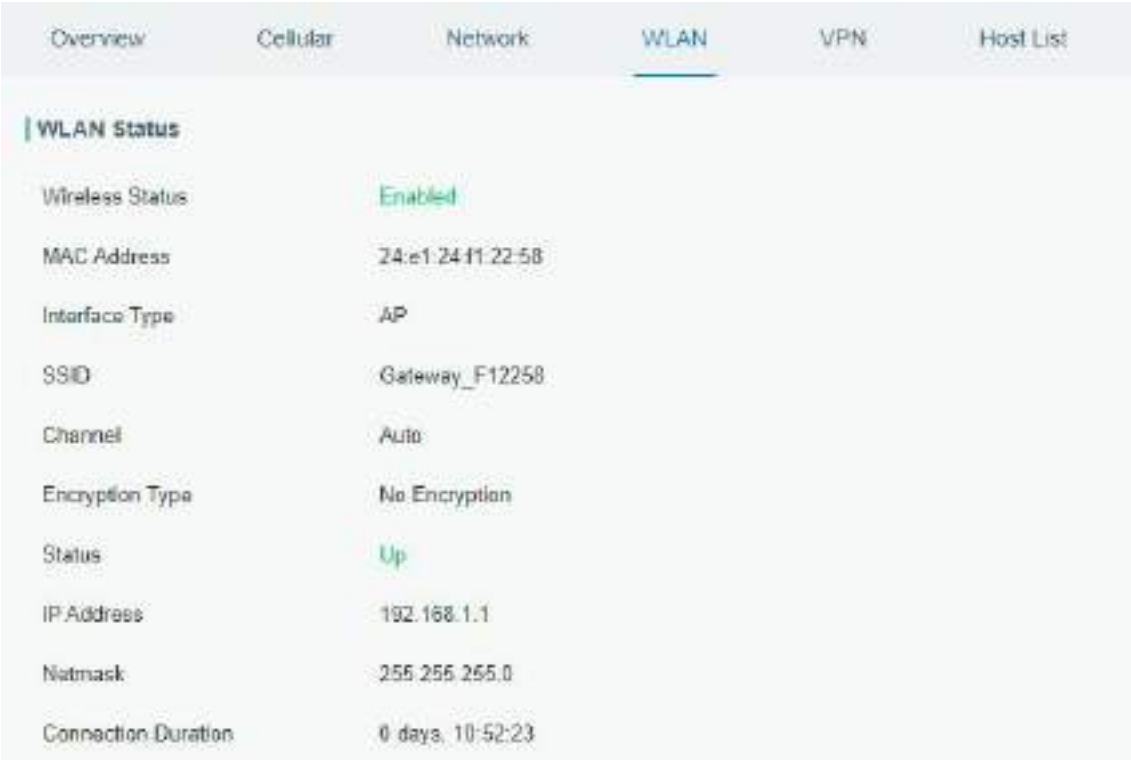


Figure 3-1-4-1

WLAN Status	
Item	**Description**
Wireless Status	Show the wireless status.
MAC Address	Show the MAC address.
Interface Type	Show the interface type, such as "AP" or “Client".
SSID	Show the SSID.
Channel	Show the wireless channel.
Encryption Type	Show the encryption type.
Status	Show the connection status.
IP Address	Show the IP address of the gateway.
Netmask	Show the wireless MAC address of the gateway.
Gateway	Show the gateway address in wireless network.
Connection Duration	Show information on how long the Wi-Fi network has been connected.

Table 3-1-4-1 WLAN Status

Figure 3-1-4-2

Associated Stations	
Item	**Description**
IP Address	Show the IP address of access point or client.
MAC Address	Show the MAC address of the access point or client.
Connection Duration	Show information on how long the Wi-Fi network has been

	connected.

Table 3-1-4-2 WLAN Status

3.1.5 VPN

You can check VPN status on this page, including PPTP, L2TP, IPsec, OpenVPN and DMVPN.

Figure 3-1-5-1

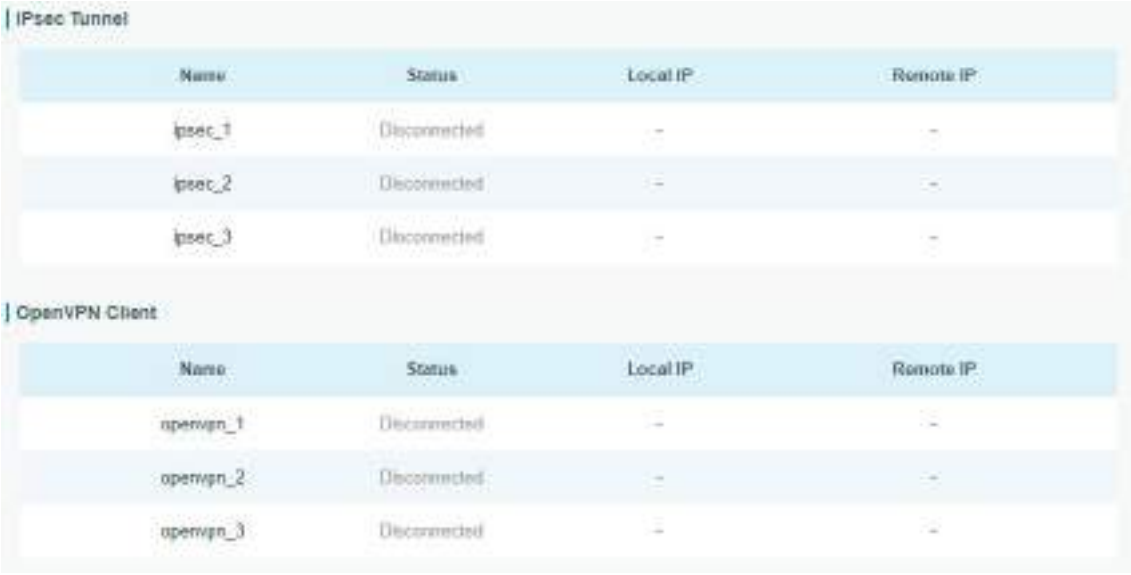


Figure 3-1-5-2

Figure 3-1-5-3

VPN Status	
Item	**Description**
Name	Show the name of the VPN tunnel.
Status	Show the status of the VPN tunnel.
Local IP	Show the local tunnel IP of VPN tunnel.
Remote IP	Show the remote tunnel IP of VPN tunnel.

Table 3-1-5-1 VPN Status

3.1.6 Host List

You can view the host information on this page.

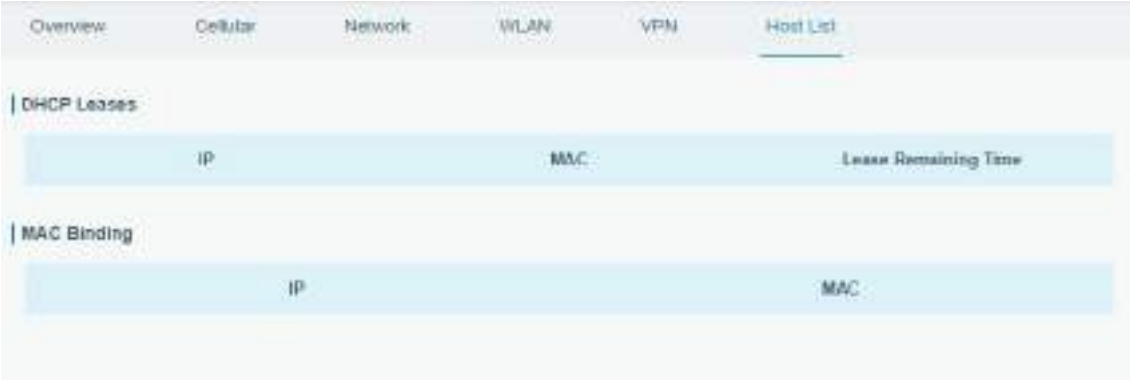


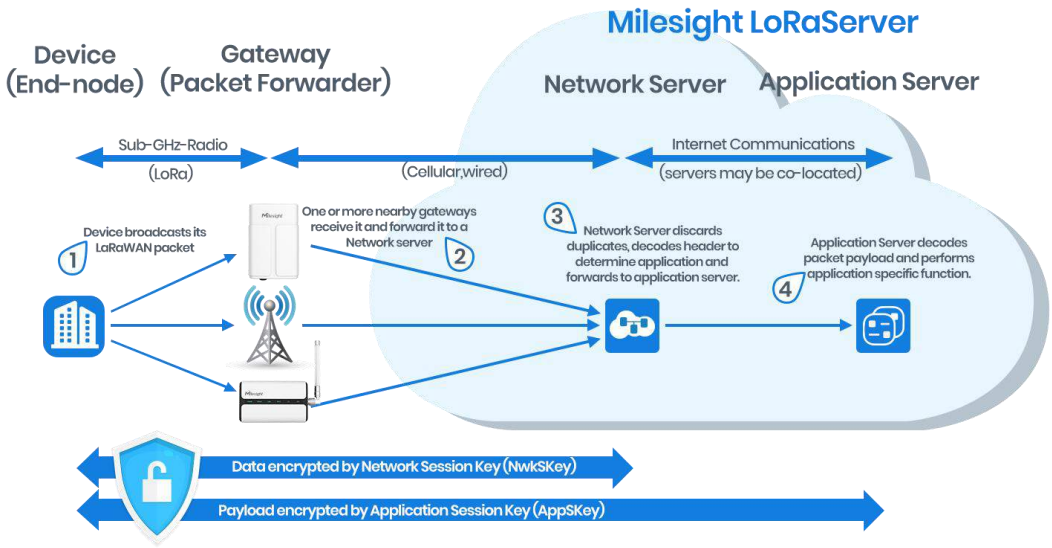
Figure 3-1-6-1

Host List	
Item	**Description**
DHCP Leases	
IP Address	Show IP address of DHCP client
MAC Address	Show MAC address of DHCP client
Lease Time Remaining	Show the remaining lease time of DHCP client.
MAC Binding	
IP & MAC	Show the IP address and MAC address set in the Static IP

	list of DHCP service.

Table 3-1-6-1 Host List Description

3.2 LoRaWAN



3.2.1 Packet Forwarder

3.2.1.1 General

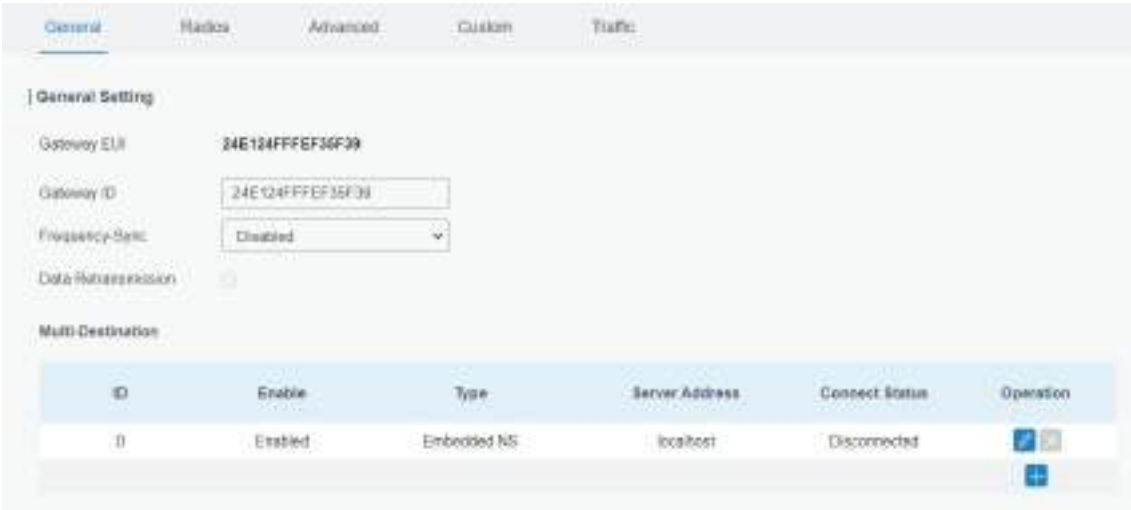


Figure 3-2-1-1

General Settings	
Item	**Description**
Gateway EUI	Show the unique identifier of the gateway and it's non-editable.
Gateway ID	Fill in the corresponding ID which you've used for registering the gateway to the remote network server. It is usually the same as

	gateway EUI and can be changed.
Frequency-Sync	Sync frequency configurations from the network server by selecting the corresponding multi-destination ID.
Data Retransmission	When the gateway connects to a single Chirpstack/Semtech/Remote Embedded NS/Basic Station type package forwarder, it supports data storage of up to 1 million pieces of data when the network is disconnected and re-transmits the data after network recovery.
Multi-Destination	The gateway will forward the data to the network server address that was created and enabled in the list.
Connection Status	Show the connection status of the package forwarder.

Table 3-2-1-1 General Setting Parameters

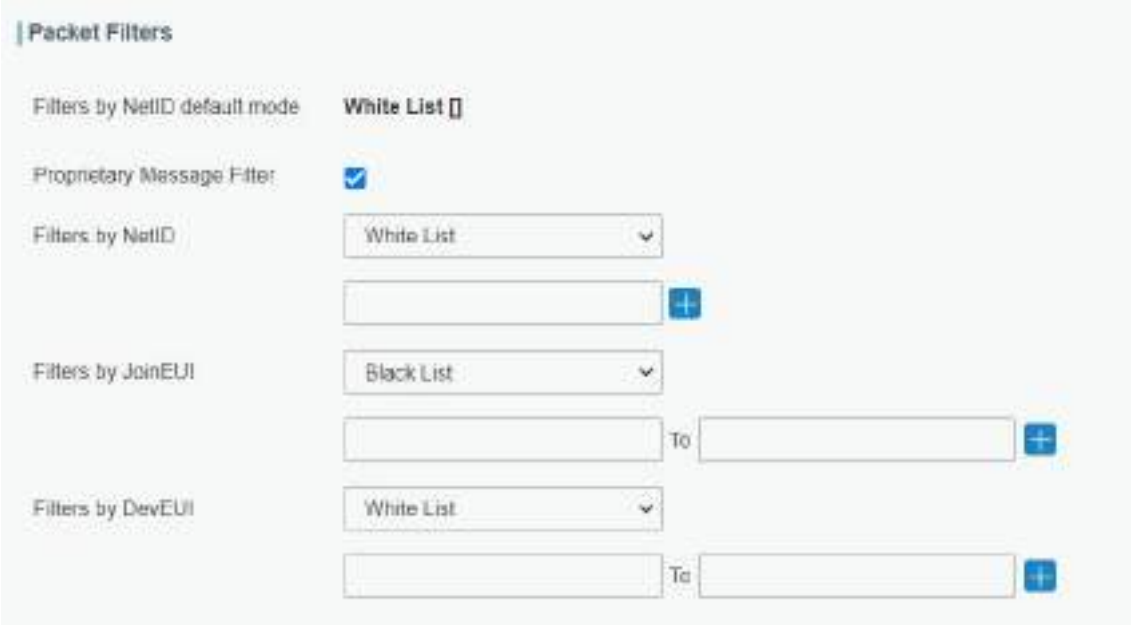


Figure 3-2-1-2

Packet Filters	
Parameters	**Description**
Filters by NetID Default Mode	Select the filter mode as black list or white list. **White List:** Only forward the packets on this list to the network server. **Black List:** Only forward the packets except this list to the network server.
Proprietary Message Filter	This only works when the packet forwarder type is Milesight Development Platform LNS or DeviceHub LNS.
Filters by NetID	Forward/Not forward the uplink packets that match the NetID.
Filters by JoinEUI	Forward/Not forward the join request packets that match the

	JoinEUI range.
Filters by DevEUI	Forward/Not forward the join request packets that match the DevEUI range.
List	Set the specific filtering value or range list. Every condition supports to add 5 lists at most.

Table 3-2-1-2 Packet Filters Parameters

Note:

1. When join EUI and dev EUI are both configured, only packets that match both conditions will be forwarded.
2. This feature is not supported when the packet forwarder type is Loriot or Everynet.
3. When a third-party network server assigns filter condition to gateway, the gateway will use network server settings in priority.

Related Configuration Example

Packet forwarder configuration

3.2.1.2 Radios

Figure 3-2-1-3

Figure 3-2-1-4

Radios-Radio Channel Setting

Item	Description
Antenna Type	Select the transmission type of antennas when using EA version.
Region	Choose the LoRaWAN® frequency plan used for the upstream and downlink frequencies and datarates. Available channel plans depend on the gateway's model.
Center Frequency	Change the frequencies to receive packets from LoRaWAN® nodes.

Table 3-2-1-3 Radio Channels Setting Parameters

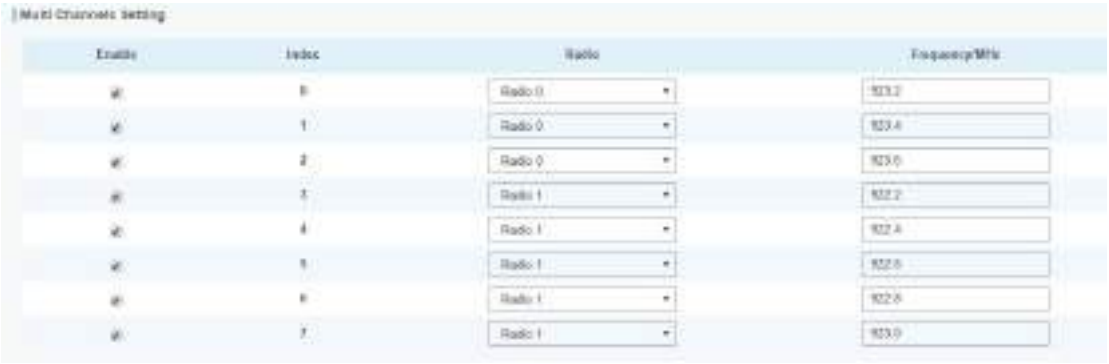


Figure 3-2-1-5

Radios-Multi Channel Setting	
Item	**Description**
Enable	Click to enable this channel to transmit packets.
Index	Indicate the ordinal of the list.
Radio	Choose Radio 0 or Radio 1 as center frequency.
Frequency/MHz	Enter the frequency of this channel. Range: center frequency±0.4625.

Table 3-2-1-4 Multi Channel Setting Parameters

Figure 3-2-1-6

Radios-LoRa Channel Setting	
Item	**Description**
Enable	Click to enable this channel to transmit packets.
Radio	Choose Radio 0 or Radio 1 as center frequency.
Frequency/MHz	Enter the frequency of this channel. Range: center frequency±0.9.
Bandwidth/MHz	Enter the bandwidth of this channel.
Spread Factor	Choose the selectable spreading factor. The channel with large spreading factor corresponds to a low rate, while the small one corresponds to a high rate.

Table 3-2-1-5 LoRa Channel Setting Parameters

Figure 3-2-1-7

Radios-FSK Channel Setting	
Item	**Description**
Enable	Click to enable this channel to transmit packets.
Radio	Choose Radio 0 or Radio 1 as center frequency.
Frequency/MHz	Enter the frequency of this channel. Range: center frequency±0.9.
Bandwidth/MHz	Enter the bandwidth of this channel. Recommended value: 125KHz, 250KHz, 500KHz
Data Rate	Enter the data rate. Range：500-25000.

Table 3-2-1-6 FSK Channel Setting Parameters

3.2.1.3 Noise Analyzer

Noise analyzer is used for scanning the noise of every frequency channel and giving a diagram for users to analyze the environment interference condition and select best deployment. RSSI indicates the sensitivity for every channel. Lower the RSSI value, better the signal. It's not suggested to enable this feature when using package forwarder since it will affect the downlink transmission.

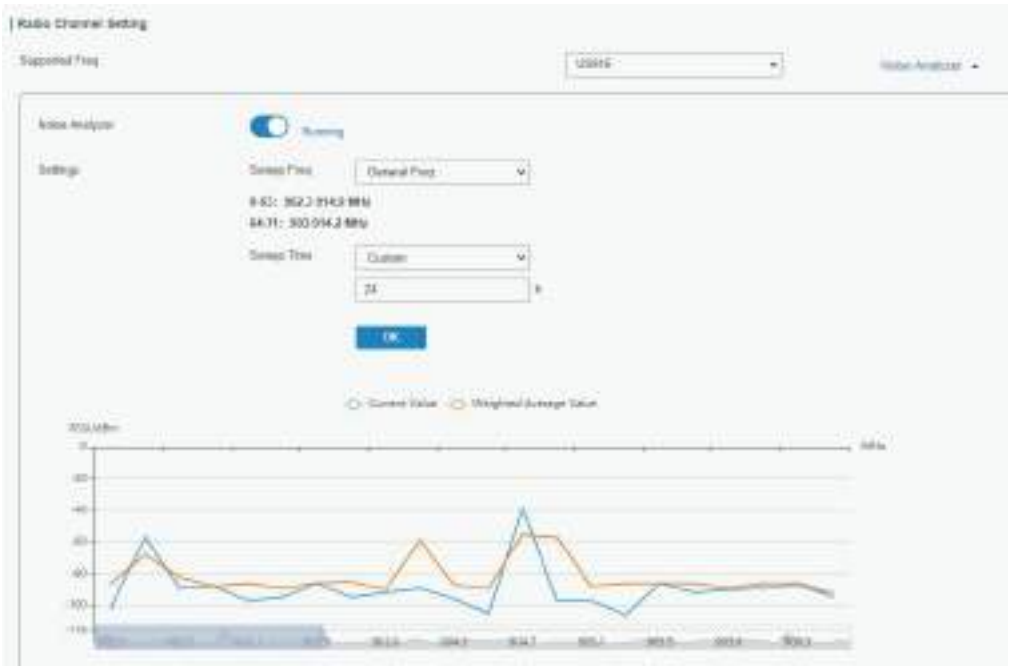


Figure 3-2-1-8

Noise Analyzer		
Item	**Description**	**Default**
Enable	Click to enable noise analyzer feature.	Disabled
Sweep Freq	Select the frequency sweeping range.	General Feq

	General Freq: frequencies based on the LoRaWAN® regional parameters document **Custom:** custom the frequency range	
Sweep Time	Enable the noise analyzer continuously or within a period of time. If Custom is selected, the noise analyzer will stop automatically after the pre-configured time. Note: It's suggested to custom the time since noise analyzer feature will affect the normal data transmission.	Custom/24h

Table 3-2-1-7 Noise Analyzer Setting Parameters

3.2.1.4 Advanced

This section is about settings in details of beacon transmitting and validating.

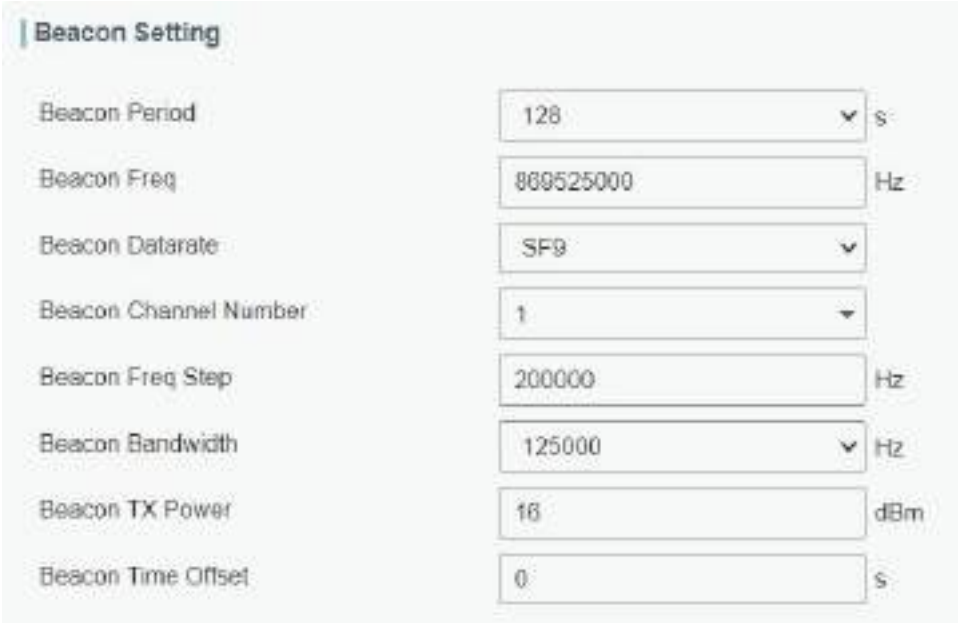


Figure 3-2-1-9

Advanced-Beacon Setting		
Item	**Description**	**Default**
Beacon Period	Interval of gateway sending beacons for Class B device time synchronization. 0 means the gateway will not send beacons.	0
Beacon Freq	The frequency of beacons.	Based on the supported frequency
Beacon Datarate	The datarate of beacons.	Based on the supported frequency
Beacon Channel Number	When selecting Custom, it allows users to custom range from 1 to 8.	1

Beacon Freq Step	Frequency interval of beacons.	200000
Beacon Bandwidth	The bandwidth of beacons. Unit: Hz	12500 Hz
Beacon TX Power	The TX power of beacons.	Based on the supported frequency
Beacon Time Offset	Add this offset to system time and assign the time result to class B devices. This can avoid the interference when multiple class B devices are close.	0

Table 3-2-1-8 Advanced-Beacon Parameters

Figure 3-2-1-10

Item	Description	Default
Keep Alive Interval	Enter the interval of keepalive packet which is sent from gateway to network server to keep the connection stable and alive. Range: 1-3600.	10
Stat Interval	Enter the interval to update the network server with gateway statistics. Range: 1-3600.	30
Push Timeout	Enter the timeout to wait for the response from server after the gateway sends data of node. Rang: 1-1999.	100
Forward CRC Disabled	Enable to send packets received with CRC disabled to the network server.	Disabled
Forward CRC Error	Enable to send packets received with CRC errors to the network server.	Disabled
Forward CRC Valid	Enable to send packets received with CRC valid to the network server.	Enabled

Table 3-2-1-9 Advanced Parameters

3.2.1.5 Custom

When Custom Configuration mode is enabled, you can write your own packet forwarder configuration file in the edit box to configure packet forwarder. Click “Save” to save your custom configuration file content, and click “Apply” to take effect. You can click “Clear” to erase all content in the edit box. If you don’t know how to write configuration file, please click “Example” to go to reference page.

Note: customized configuration will overwrite the packet forward configurations of web GUI.

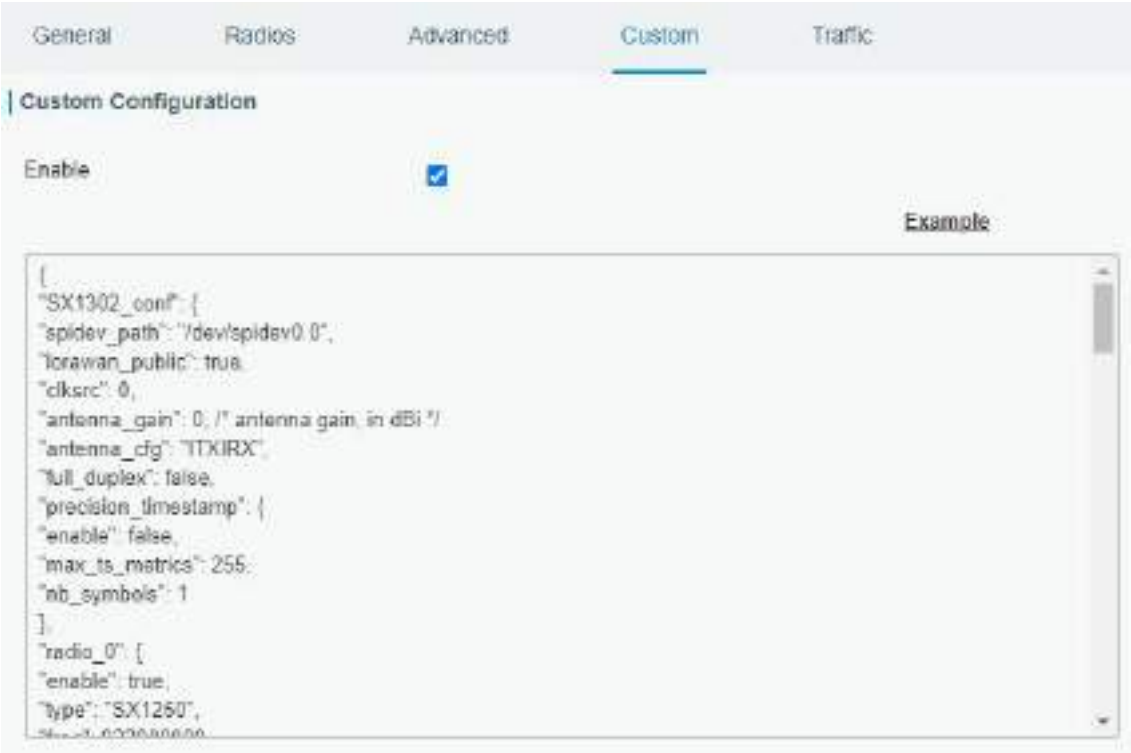


Figure 3-2-1-11

3.2.1.6 Traffic

When navigating to the traffic page, any recent traffic received by the gateway will display. To watch live traffic, click **Refresh**.

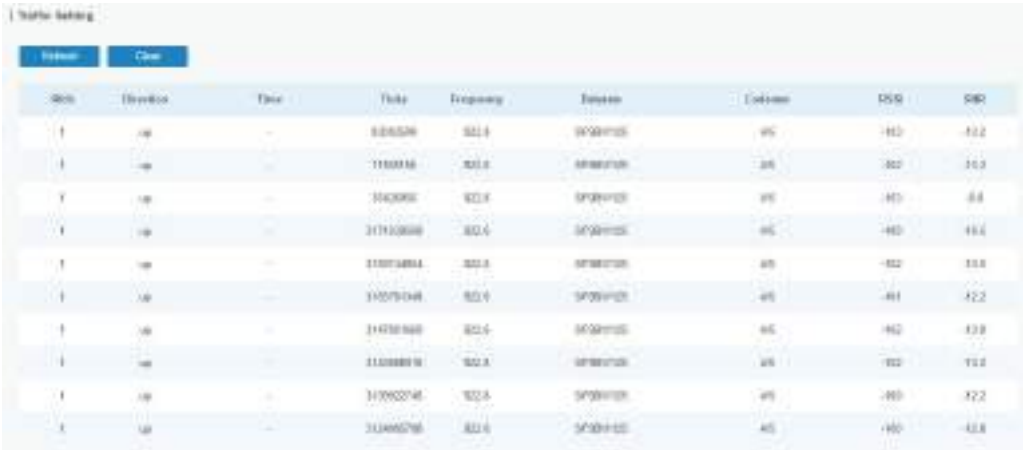


Figure 3-2-1-12

Item	Description
Refresh	Click to obtain the latest data.
Clear	Click to clear all data.
Rfch	Show the channel of this packet.
Direction	Show the direction of this packet.
Time	Show the receiving time of this packet.
Ticks	Show the ticks of this packet.
Frequency	Show the frequency of the channel.
Datarate	Show the datarate of the channel.
Coderate	Show the coderate of this packet.
RSSI	Show the received signal strength.
SNR	Show the signal to noise ratio of this packet.

Table 3-2-1-10 Traffic Parameters

3.2.2 Network Server

3.2.2.1 General

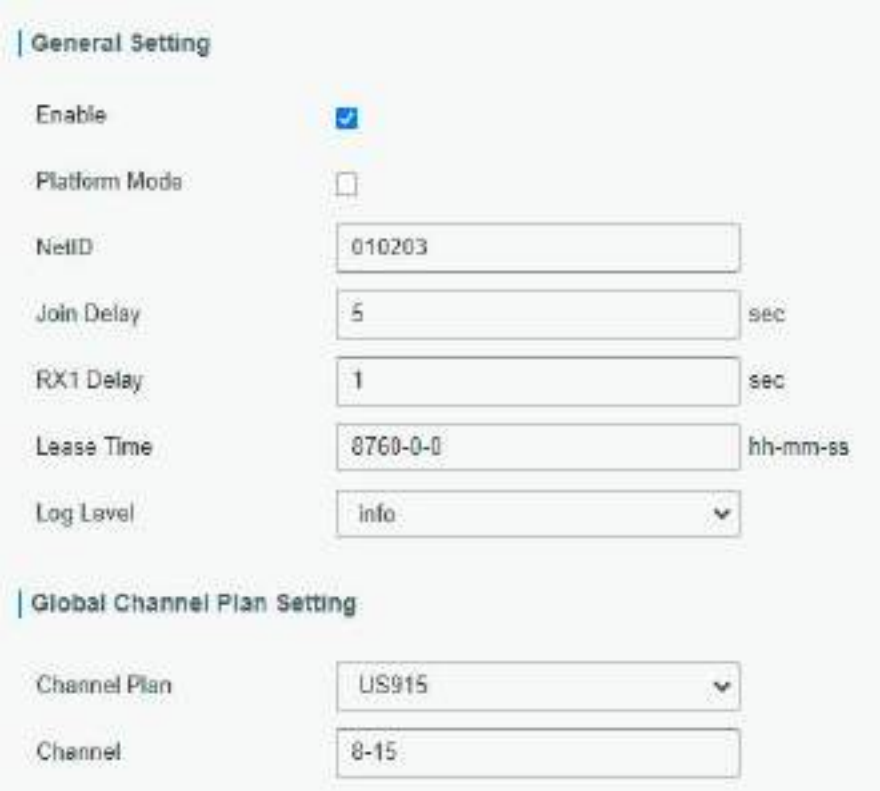


Figure 3-2-2-1

Item	Description	Default
General Setting		
Enable	Click to enable Network Server mode.	Enabled
Platform Mode	Enabled to connect gateway to Milesight IoT	Disabled

	Cloud or Yeastar Workplace platform .	
NetID	Enter the network identifier.	010203
Join Delay	Enter the interval time between when the end-device sends a Join_request_message to network server and when the end-device prepares to open RX1 to receive the Join_accept_message sent from network server.	5
RX1 Delay	Enter the interval time between when the end-device sends uplink packets and when the end-device prepares to open RX1 to receive the downlink packet.	1
Lease Time	Enter the amount of time till a successful join expires. The format is hours-minutes-seconds. If the join-type is OTAA, then the end-devices need to join the network server again when it exceeds the lease time.	876000-00-00
Log level	Choose the log level.	Info
Channel Plan Setting		
Channel Plan	Choose LoRaWAN® channel plan used for the upstream and downlink frequencies and datarates. Available channel plans depend on the gateway's model.	Depend on the gateway's frequency
Channel	Allow end devices to communicate with specific frequency channels. Leave it blank means using all the default standard usable channels specified in the LoRaWAN® regional parameters document. It allows to enter the index of the channels. **Examples:** 1, 40: Enabling Channel 1 and Channel 40 1-40: Enabling Channel 1 to Channel 40 1-40, 60: Enabling Channel 1 to Channel 40 and Channel 60	Depend on the gateway's frequency

Table 3-2-2-1 General Parameters

Note: For some regional variants, if allowed by your LoRaWAN® region, you can use Additional Plan to configure additional channels undefined by the LoRaWAN® Regional Parameters, like EU868 and KR920, as the following picture shows:

Figure 3-2-2-2

Additional Channels	
Item	**Description**
Frequency/MHz	Enter the frequency of the additional plan.
Max Datarate	Enter the max datarate for the end-device. The range is based on what is specified in the LoRaWAN® regional parameters document.
Min Datarate	Enter the min datarate for the end-device. The range is based on what is specified in the LoRaWAN® regional parameters document.

Table 3-2-2-2 Additional Plan Parameters

3.2.2.2 Application

An application is a collection of devices with the same purpose/of the same type. Users can add a series of devices to the same application which needs to send to the same server.

You can edit the application by clicking  or create a new application by clicking  .

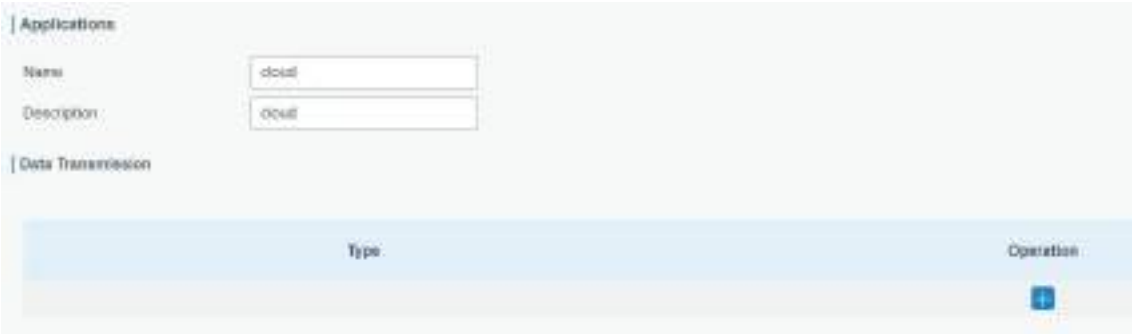


Figure 3-2-2-3

Application	
Item	**Description**
Name	Enter the name of the application profile. E.g: smoker-sensor-app.
Description	Enter the description of this application. E.g: an application for smoker sensor.
Data Transmission	Data will be sent to your custom server using the MQTT, HTTP, HTTPS or BACnet/IP protocol. One application can add 3 data transmissions at most and every protocol can be selected only once.

Table 3-2-2-3 Application Parameters

MQTT Integration

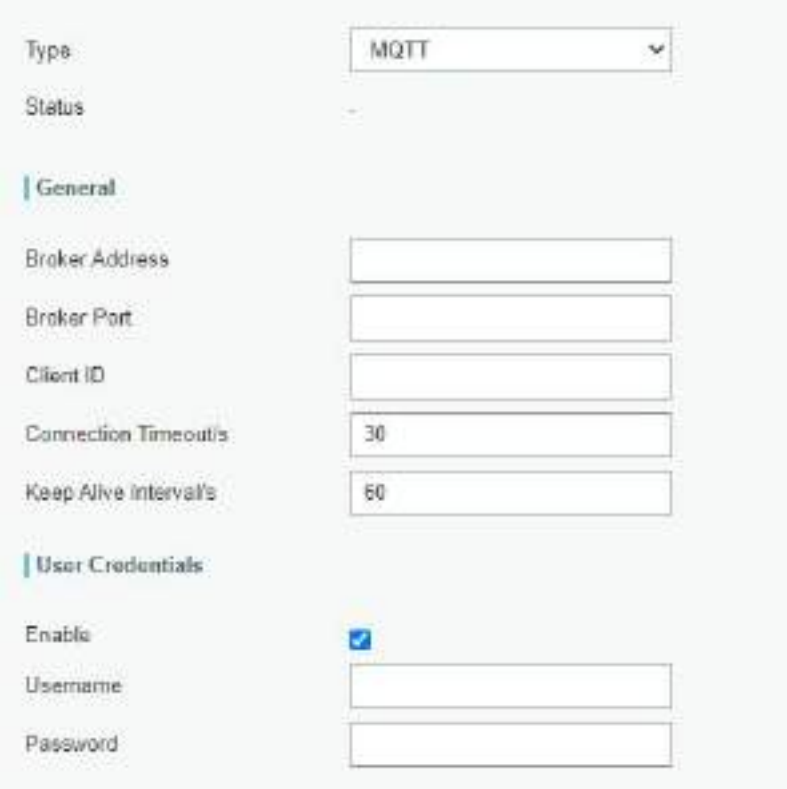


Figure 3-2-2-4

Figure 3-2-2-5

MQTT Settings	
Item	**Description**
General	
Broker Address	MQTT broker address to receive data.
Broker Port	MQTT broker port to receive data.
Client ID	Client ID is the unique identity of the client to the server. It must be unique when all clients are connected to the same server, and it is the key to handle messages at QoS 1 and 2.

Connection Timeout/s	If the client does not get a response after the connection timeout, the connection will be considered as broken. The Range: 1-65535.
Keep Alive Interval/s	After the client is connected to the server, the client will send heartbeat packet to the server regularly to keep alive. Range: 1-65535.
User Credentials	
Enable	Enable user credentials.
Username	The username used for connecting to the MQTT broker.
Password	The password used for connecting to the MQTT broker.
TLS	
Enable	Enable the TLS encryption in MQTT communication.
Mode	Select from "Self signed certificates", "CA signed server certificate". **CA signed server certificate:** verify with the certificate issued by Certificate Authority (CA) that pre-loaded on the device. **Self signed certificates:** upload the custom CA certificates(.crt or .pem), client Certificates(.crt) and secret key(.key) for verification.
Topic	
Data Type	Data type to communicate with MQTT broker: **Uplink Data:** receive device uplink packets **Downlink Data:** send downlink commands to device **Multicast Downlink Data:** send downlink commands to multicast group **Join Notification:** receive join request packets from devices **ACK Notification:** receive ACK packets from devices **Error Notification:** receive error packets from devices **Request data:** send requests to enquire and configure the gateway NS **Response data:** receive the request responses
Topic	Topic name of the data type used for publishing.
QoS	QoS 0 – Only Once This is the fastest method and requires only 1 message. It is also the most unreliable transfer mode. QoS 1 – At Least Once This level guarantees that the message will be delivered at least once, but may be delivered more than once. QoS 2 – Exactly Once QoS 2 is the highest level of service in MQTT. This level guarantees that each message is received only once by the intended recipients. QoS 2 is the safest and slowest quality of service level.

Table 3-2-2-4 MQTT Settings Parameters

Note: if MQTT broker type is HiveMQ, please enable **TLS** and set the option as **CA signed server certificate.**

HTTP/HTTPS Integration

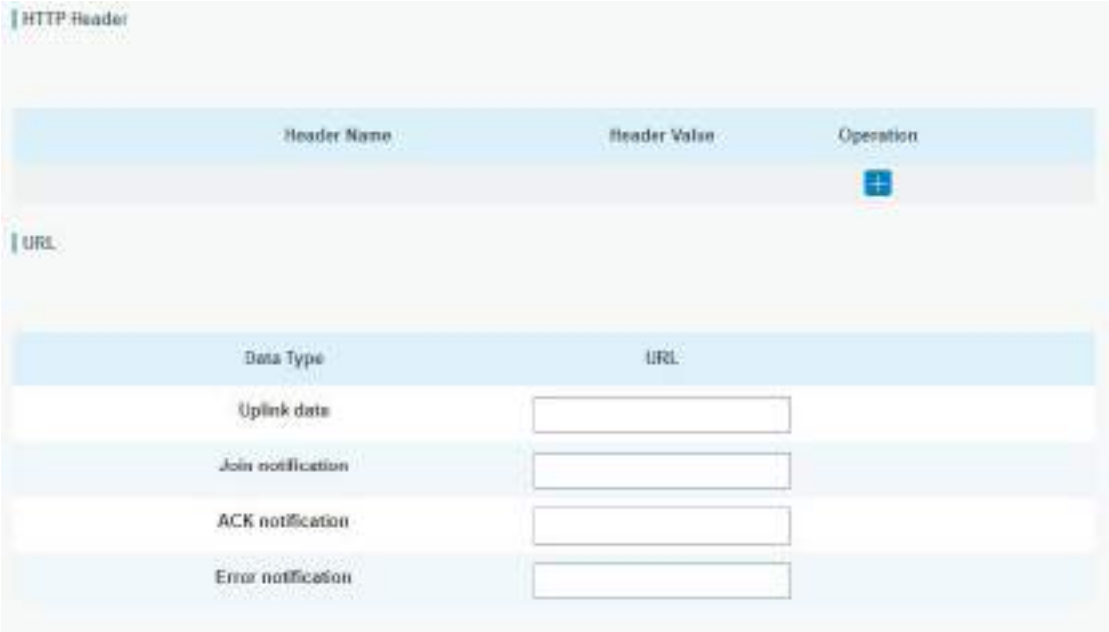


Figure 3-2-2-6

HTTP/HTTPS Settings	
Item	**Description**
HTTP Header	
Header Name	A core set of fields in the HTTP header.
Header Value	Value of the HTTP header.
URL	
Data Type	Data type sent to HTTP/HTTPS server.
Topic	Topic name of the data type used for publishing.
URL	HTTP/HTTPS server URL to receive data.

Table 3-2-2-5 HTTP/HTTPS Settings Parameters

Related Configuration Example

Application configuration

3.2.2.3 Payload Codec

Payload Codec provides the inbuilt payload codec library of Milesight LoRaWAN devices to decode and encode the data easily. Users can also customize the payload codec of other brands of devices or adjust the uplink and downlink contents as requirements.

Figure 3-2-2-7

Inbuilt Payload Codec Library	
Item	**Description**
Library Version	Show the version of the Milesight LoRaWAN node payload codec library.
Obtaining Type	Select the type to update the Milesight devices payload codec library. **Online:** update automatically if gateway detects there is version update every time gateway powers on and accesses the Internet. Users can also click **Obtain** button to check update status manually. **Local Upload:** click **Browse** to upload the zip format payload codec package and click **Import** to update the library.
Name	Show the corresponding Milesight product model of the payload codec.
Payload decoder/encoder function	Show if decoder and encoder are existed.
Details	Show the details of decoder and encoder. If this does not meet your requirement, please customize your payload codec.

Table 3-2-2-6 Inbuilt Payload Codec Library Parameters

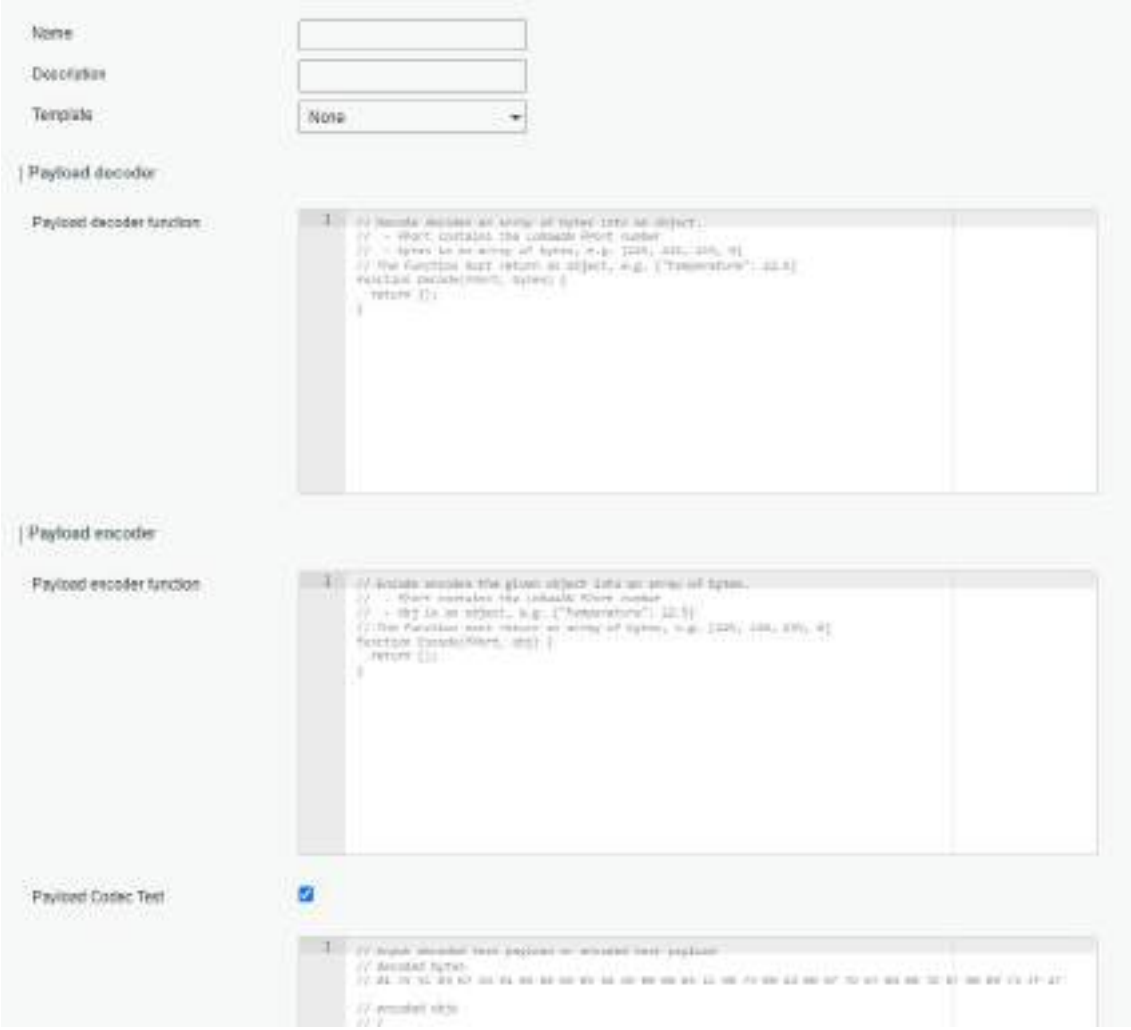


Figure 3-2-2-8

Custom Payload Codec	
Item	**Description**
Name	Enter the unique name of the custom payload codec.
Description	Enter the description of this payload codec.
Template	Select an existing inbuilt payload codec as a template.
Payload Decoder/Encoder Function	Customize the device payload decoder or encoder. Note that the function header should be the same as the example on the blanks.
Payload Codec test	Disable or enable payload codec test.
fPort	Application port of LoRaWAN devices. It's 85 by default for Milesight LoRaWAN devices.
Decode	Enter the hex format raw data and click **Decode** to check the result.
Encode	Enter the JSON format command and check **Encode** to check the result.

Table 3-2-2-7 Custom Payload Codec Parameters

3.2.2.4 Profiles

A Profile defines the device capabilities and boot parameters that are needed by the Network Server for setting the LoRaWAN® radio access service. These information elements shall be provided by the end-device manufacturer. UG65 has pre-configured 8 device files and users can also create a new device profile.

Figure 3-2-2-9

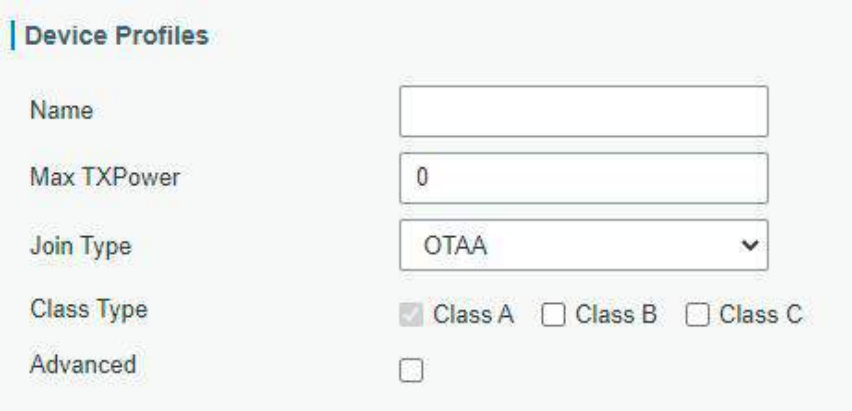


Figure 3-2-2-10

Device Profiles Settings	
Item	**Description**
Name	Enter the name of the device profile.
Max TXPower	Enter the maximum transmit power. The TXPower indicates power levels relative to the Max EIRP level of the end-device. 0 means using the max EIRP. EIRP refers to the Equivalent Isotropically Radiated Power.
Join Type	Select from: “OTAA” and “ABP”.
Class Type	Class A is fixed as enabled. Users can check the box of Class B or Class C to add the class type. Note: Beacon period should be set to nonzero value in **Packet Forwarder > Advanced** if using Class B.

Table 3-2-2-8 Device Profiles Setting Parameters

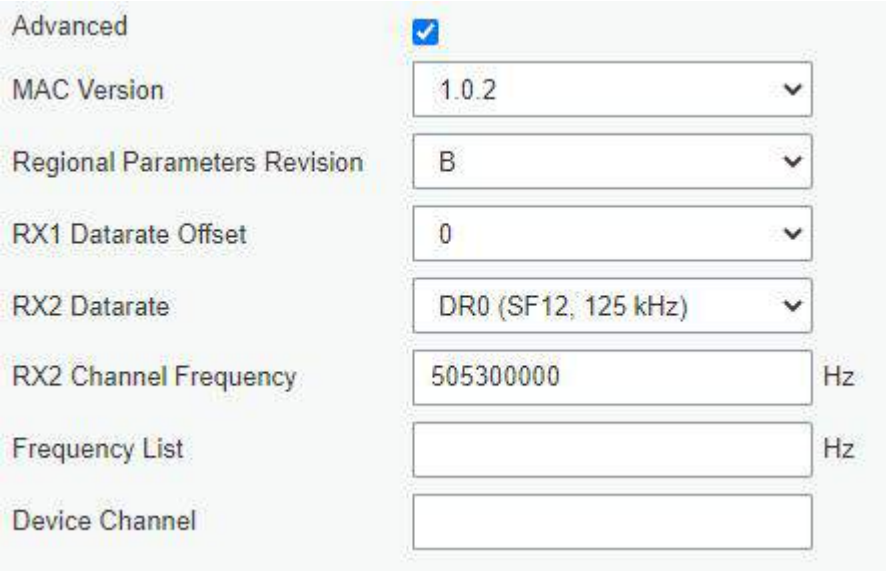


Figure 3-2-2-11

Device Profile Advanced Settings		
Item	**Description**	**Default**
MAC Version	Choose the version of the LoRaWAN® supported by the end-device.	1.0.2
Regional Parameter Revision	Revision of the Regional Parameters document supported by the end-device.	B
RX1 Datarate Offset	The offset which used for calculating the RX1 data-rate, based on the uplink data-rate.	Based on what is specified in the LoRaWAN® regional parameters document
RX2 Datarate	Enter the RX2 datarate which used for the RX2 receive-window.	
RX2 Channel Frequency	RX2 channel frequency which used for the RX2 receive-window.	
Frequency List	List of factory-preset frequencies. The range is based on what is specified in the LoRaWAN® regional parameters document.	Null
Device Channel	Change this device frequency channel by typing the channel indexs. When configured, it takes precedence over the global channel. This setting only works for CN470/US915/AU915.	Null
PingSlot Period	Period of opening the pingslot.	Every Second
PingSlot DataRate	Datarate of the node receiving downlinks.	Based on the supported frequency
PingSlot Freq	Frequency of the node receiving downlinks.	Based on the supported frequency
ACK Timeout	The time for confirmed downlink transmissions. This option is only applicable to class B and class	Class B: 10 Class C: 10

	C.	

Table 3-2-2-9 Device Profiles Advanced Setting Parameters

3.2.2.5 Device

A device is the end-device connecting to, and communicating over the LoRaWAN® network.

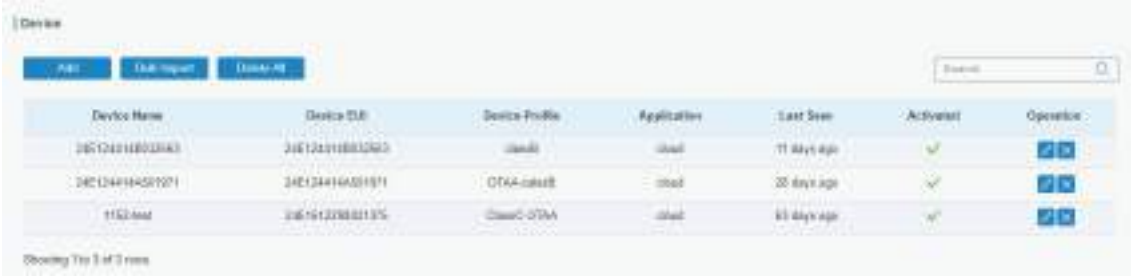


Figure 3-2-2-12

Item	Description
Add	Add a device.
Bulk Import	Download template and import multiple devices.
Delete All	Delete all devices in the list.
Device Name	Show the name of the device.
Device EUI	Show the EUI of the device.
Device-Profile	Show the name of the device's device profile.
Application	Show the name of the device's application.
Last Seen	Show the time of last packet received.
Activated	Show the status of the device . ✓ means that the device has been activated.
Operation	Edit or delete the device.

Table 3-2-2-10 Device Parameters

Figure 3-2-2-13

Device Configuration	
Item	**Description**
Device Name	Enter the name of this device.
Description	Enter the description of this device.
Device EUI	Enter the EUI of this device.
Device-Profile	Choose the device profile.
Application	Choose the application profile.
Payload Codec	Choose the payload codec existed on **Payload Codec** page.
fPort	Enter the downlink port of device, it's 85 by default for Milesight devices.
Modbus RTU Data Transmission	Choose from: "Disable", "Modbus RTU to TCP", "Modbus RTU over TCP". This feature is only applicable to Milesight LoRaWAN® controllers.(UC501/UC300, etc.) **Modbus RTU to TCP:** TCP client can send Modbus TCP commands to ask for controller Modbus data. **Modbus RTU over TCP:** TCP client can send Modbus RTU commands to ask for controller Modbus data.
Modbus RTU Fport	Enter the LoRaWAN® frame port for transparent transmission between Milesight LoRaWAN® controllers and UG65.

	Range: 2-84, 86-223. Note: this value must be the same as the Milesight LoRaWAN® controller's fPort.
TCP Port	Enter the TCP port for data transmission between the TCP Client and UG65 (as TCP Server).Range: 1-65535.
Frame-Counter Validation	If disable the frame-counter validation, it will compromise security as it enables people to perform replay-attacks.
Application Key	Whenever an end-device joins a network via over-the-air activation, the application key is used for derive the Application Session key.
Device Address	The device address identifies the end-device within the current network.
Network Session Key	The network session key specific for the end-device. It is used by the end-device to calculate the MIC or part of the MIC (message integrity code) of all uplink data messages to ensure data integrity.
Application Session Key	The AppSKey is an application session key specific for the end-device. It is used by both the application server and the end-device to encrypt and decrypt the payload field of application-specific data messages.
Uplink Frame-counter	The number of data frames which sent uplink to the network server. It will be incremented by the end-device and received by the end-device. Users can reset the a personalized end-device manually, then the frame counters on the end-device and the frame counters on the network server for that end-device will be reset to 0.
Downlink Frame-counter	The number of data frames which received by the end-device downlink from the network server. It will be incremented by the network server. Users can reset the a personalized end-device manually, then the frame counters on the end-device and the frame counters on the network server for that end-device will be reset to 0.

Table 3-2-2-11 Device Setting Parameters

Related Configuration Example

Device configuration

3.2.2.6 Multicast Groups

Milesight gateways support for creating Class B or Class C multicast groups to send downlink messages to a group of end devices. A multicast group is a virtual ABP device (i.e. shared session keys), does not support uplink, confirmed downlink nor MAC commands.

Figure 3-2-2-14

Item	Description
Add	Add a multicast group.
Group Name	Show the name of the group.
Number of Devices	Show the device number of the group.
Operation	Edit or delete the multicast group.

Table 3-2-2-12 Multicast Group Parameters

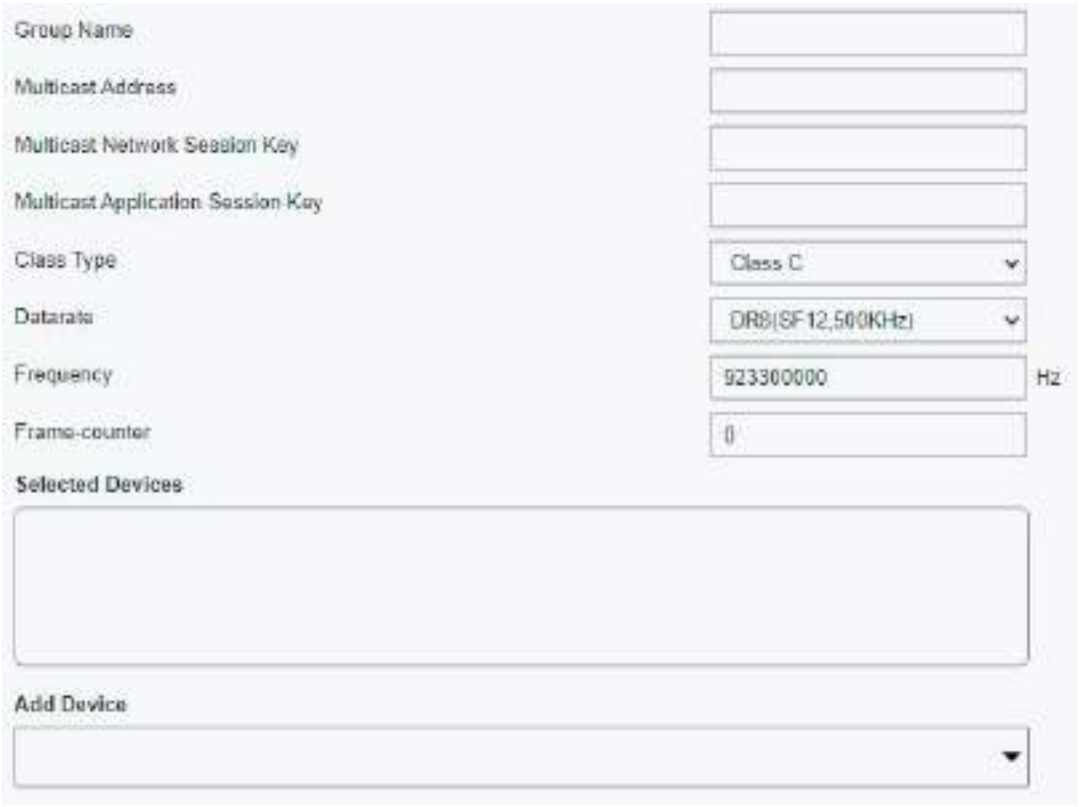


Figure 3-2-2-15

Multicast Group Configuration	
Item	**Description**
Group Name	Enter the name of this multicast group.
Multicast Address	Device address (Dev Addr) of all devices in this group.
Multicast Network Session Key	The network session key (Netwks Key) of all devices in this group.
Multicast Application Session Key	The application session key (AppSKey) of all devices in this group.

Class Type	Class B and Class C are optional.
Datarate	Datarate of the node receiving downlinks.
Frequency	Downlink frequency of all devices in this group.
Frame-counter	The number of data frames which received by the end-device downlink from the network server. It will be incremented by the network server.
Ping Slot Periodicity	Period of opening the pingslot. This is only applied to Class B end devices.
Selected Devices	Show all device names in this group.
Add Device	Add devices in the pull-down list.

Table 3-2-2-13 Multicast Group Setting Parameters

3.2.2.7 Gateway Fleet

Milesight gateways can connect to UG65 network server. A gateway supports to add 100 gateways at most.

Figure 3-2-2-16

Item	Description
Gateway ID	Show the gateway ID.
Name	Show the name of the gateway.
Status	Show the connection status of the gateway.
Last Seen	Show the time of last packet received.
Operation	Edit or delete the gateway.

Table 3-2-2-14 Gateway Fleet Parameters

Figure 3-2-2-17

Item	Description
Gateway ID	Enter the unique gateway ID to recognize the gateway.
Name	Enter the name of this gateway.
Location	GPS data of the gateway can be edited here. If gateway sends GPS data it will replace your customized data.

Table 3-2-2-15 Gateway Setting Parameters

3.2.2.8 Packets

Figure 3-2-2-18

Send Data To Device/Multicast Group	
Item	**Description**
Device EUI	Enter the EUI of the device to receive the payload.
Multicast Group	Select the multicast group to send downlinks. Multicast groups can be added under **Multicast Groups** tab.
Type	Choose the payload type to enter in the payload Input box: ASCII, Hex, base64.
Payload	Enter the message to be sent to this device.
Port	Enter the LoRaWAN® frame port for packet transmission between device and Network Server.
Confirmed	After enabled, the end device will receive downlink packet and should answer “confirmed” to the network server. Multicast feature does not support confirmed downlink.

Table 3-2-2-16 Send Data to Device Parameters

Network Server	
Item	**Description**
Device EUI/Group	Show the EUI of the device or multicast group.
Frequency	Show the used frequency to transmit packets.

Datarate	Show the used datarate to transmit packets.
SNR	Show the signal-noise ratio.
RSSI	Show the received signal strength indicator.
Size	Show the size of payload.
Fcnt	Show the frame counter.
Type	Show the type of the packet: JnAcc - Join Accept Packet JnReq - Join Request Packet UpUnc - Uplink Unconfirmed Packet UpCnf - Uplink Confirmed Packet - ACK response from network requested DnUnc - Downlink Unconfirmed Packet DnCnf - Downlink Confirmed Packet- ACK response from end-device requested
Time	Show the time of packet was sent or received.

Table 3-2-2-17 Packet Parameters

Click  to get more details about the packet. As shown:

Figure 3-2-2-19

Item	Description
Dev Addr/Multicast Addr	Show the address of the device/multicast group.
GwEUI	Show the EUI of the gateway.
AppEUI	Show the EUI of the application.
DevEUI/Group Name	Show the EUI of the device/multicast group name.
Class Type	Show the class type of the device or multicast group.

Immediately	True: Device may transmit an explicit (possibly empty) acknowledgement data message immediately after the reception of a data message requiring a confirmation.
Timestamp	Show the timestamp of this packet.
Type	Show the type of the packet: JnAcc - Join Accept Packet JnReq - Join Request Packet UpUnc - Uplink Unconfirmed Packet UpCnf - Uplink Confirmed Packet - ACK response from network requested DnUnc - Downlink Unconfirmed Packet DnCnf - Downlink Confirmed Packet- ACK response from end-device requested
Adr	True: The end-node has enabled ADR. False: The end-node has not enabled ADR.
AdrAcKReq	In order to validate that the network is receiving the uplink messages, nodes periodically transmit ADRACKReq message. This is 1 bit long. True: Network should respond in ADR_ACK_DELAY time to confirm that it is receiving the uplink messages. False: ADR is disabled or Network does not respond in ADR_ACK_DELAY.
Ack	True: This frame is ACK. False: This frame is not ACK.
Fcnt	Show the frame-counter of this packet.The network server tracks the uplink frame counter and generates the downlink counter for each end-device.
FPort	FPort is a multiplexing port field. If the frame payload field is not empty, the port field must be present. If present, a FPort 16 value of 0 indicates that the FRMPayload contains MAC commands only.When this is the case, the FOptsLen field must be zero. FOptsLen is the length of the FOpts field in bytes.
Modulation	LoRa means the physical layer uses the LoRa modulation.
Bandwidth	Show the bandwidth of this channel.
SpreadFactor	Show the spreadFactor of this channel.
Bitrate	Show the bitrate of this channel.
CodeRate	Show the coderate of this channel.
SNR	Show the SNR of this channel.
RSSI	Show the RSSI of this channel.
Power	Show the transmit power of the device.
Payload (b64)	Show the application payload of this packet.
Payload (hex)	Show the application payload of this packet.
Json	Show the data after decoded.
MIC	Show the MIC of this packet. MIC is a cryptographic message integrity code, computed over the fields MHDR, FHDR, FPort and the encrypted

	FRMPayload.

Table 3-2-2-18 Packets Details Parameters

Related Topic

Send Data to Device

3.3 Protocol Integration

3.3.1 BACnet Server

UG65 can work as LoRaWAN to BACnet gateway to integrate with BMS system easily.

3.3.1.1 Server

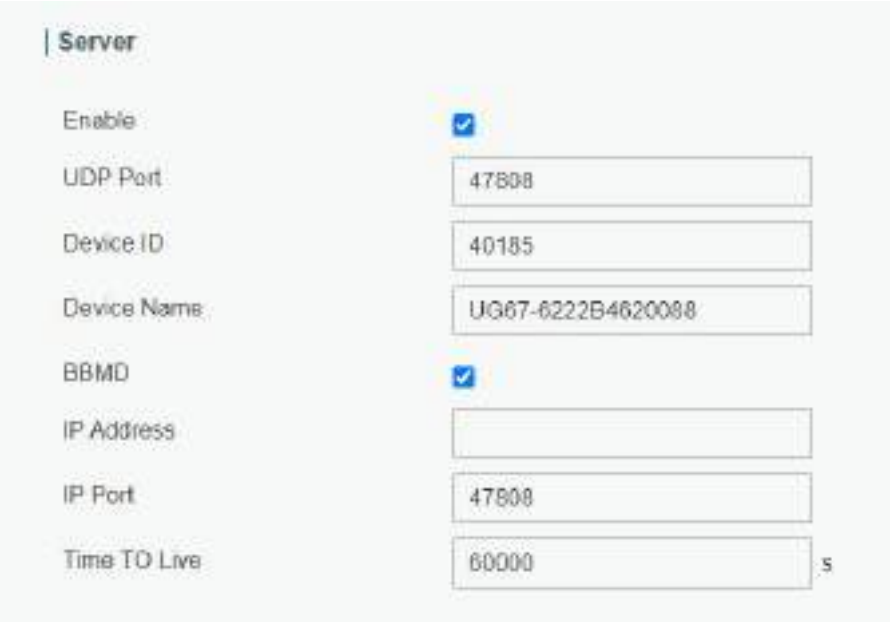


Figure 3-3-1-1

Server Settings	
Item	**Description**
Enable	Enable or disable BACnet server function.
UDP Port	Set communication port of BACnet/IP. Range: 1-65535. The default port is 47808.
Device ID	The unique BACnet device identifier which needs to avoid conflict with other devices.
Device Name	The device name to represent the device.
BBMD	Enable BBMD(BACnet/IP Broadcast Management Device) if BACnet devices of different network subnets should work together.
IP Address	Fill in the IP address of BBMD device or external device registrar.
IP Port	Fill in the UDP/IP port for external device registration.
Time TO Live	Number of seconds used on external device registration.

Table 3-3-1-1 Server Parameters

3.3.1.2 BACnet Object

Figure 3-3-1-2

Item	Description
Add	Add a BACnet object. The gateway supports adding 2000 objects at most.
Bulk Import	Download template and import multiple BACnet objects.
Bulk Export	Export all generated BACnet object settings.
Delete All	Delete all objects in the list.
Object Name	Show the name of the BACnet object.
Object Type	Show the type of this object.
Object Instance Nr	Show the instance number of this object.
Present Value	Show the latest value of object.
Units	Show the unit of this object value.
Updates	Show the update times of this object value.
Update time	Show the time for this object to get and update the data.
COV	Show if COV (Change of value) is enabled.
Operation	Edit or delete the object.

Table 3-3-1-2 BACnet Object List Parameters

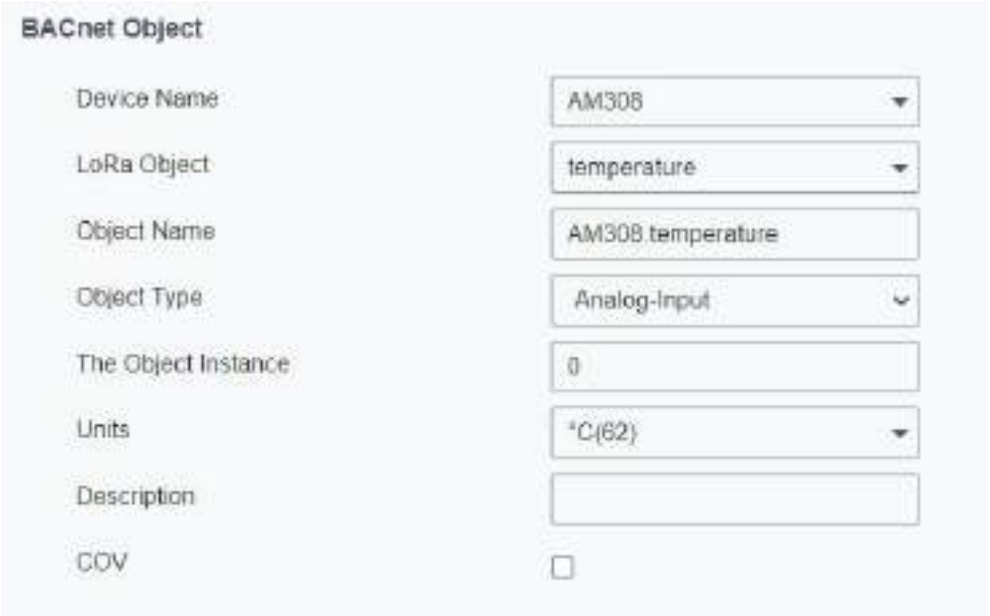


Figure 3-3-1-3

BACnet Object Configuration	
Item	**Description**

Device Name	Select the device added on **Network Server > Device** page.
LoRa Object	Select one of device variables as an object.
Object Name	Customize an unique name for this object.
Object Type	Select the object type as binary input/output/value, analog input/output/value, multistate input/output/value and charcterString value.
The Object Instance	Customize the object instance.
Description	Enter the description of this object.
Analog Input/Output/Value	
Units	Select the unit of this object value.
COV	When object value changes, the BACnet server (gateway) will send notification of new value to BACnet client. This only applies to analog type objects.
COV Increment	Only when the object value reaches or over this increment, the BACnet server (gateway) will send the notification.
Relinquish Default	If there is no command, the analog output will be set as this relinquish default value.
Binary Input/Output/Value	
Polarity	Define the binary input/output status as Normal or Reverse.
Active Text	Characterize the intended effect of active state of binary type object value. **Example:** when a button is pressed and binary input is 1, active text can be defined as “Pressed”.
Inactive Text	Characterize the intended effect of inactive state of binary type object value. **Example:** for a button, inactive text can be defined as “Unpressed”.
Relinquish Default	If there is no command, the binary output will be set as this relinquish default value.
MultiState Input/Output/Value	
Number of States	Set the number of states and define the name of every state.
Relinquish Default	If there is no command, the multistate output will be set as this relinquish default value.

Table 3-3-1-3 BACnet Object Configuration Parameters

3.4 Network

3.4.1 Interface

3.4.1.1 Port

The Ethernet port can be connected with Ethernet cable to get Internet access. It supports 3 connection types.

- **Static IP**: configure IP address, netmask and gateway for Ethernet WAN interface.
- **DHCP Client**: configure Ethernet WAN interface as DHCP Client to obtain IP address automatically.
- **PPPoE**: configure Ethernet WAN interface as PPPoE Client.

Figure 3-4-1-1

Port Setting		
Item	**Description**	**Default**
Port	The port that is fixed as eth0 port and enabled.	eth 0
Connection Type	Select from "Static IP", "DHCP Client" and "PPPoE".	Static IP
MTU	Set the maximum transmission unit.	1500
Primary DNS Server	Set the primary DNS.	8.8.8.8
Secondary DNS Server	Set the secondary DNS.	223.5.5.5
Enable NAT	Enable or disable NAT function. When enabled, a private IP can be translated to a public IP.	Enable

Table 3-4-1-1 Port Parameters

Related Configuration Example

Ethernet Connection

1. Static IP Configuration

If the external network assigns a fixed IP for the Ethernet port, user can select “Static IP” mode.

Figure 3-4-1-2

Static IP		
Item	**Description**	**Default**
IP Address	Set the IP address which can access Internet.	192.168.23.150
Netmask	Set the Netmask for Ethernet port.	255.255.255.0
Gateway	Set the gateway's IP address for Ethernet port.	192.168.23.1
Multiple IP Address	Set the multiple IP addresses for Ethernet port.	Null

Table 3-4-1-2 Static IP Parameters

2. DHCP Client

If the external network has DHCP server enabled and has assigned IP addresses to the Ethernet WAN interface, user can select “DHCP client” mode to obtain IP address automatically.

Figure 3-4-1-3

DHCP Client	
Item	**Description**
Use Peer DNS	Obtain peer DNS automatically during PPP dialing. DNS is necessary when user visits domain name.

Table 3-4-1-3 DHCP Client Parameters

3. PPPoE

PPPoE refers to a point to point protocol over Ethernet. User has to install a PPPoE client on the basis of original connection way. With PPPoE, remote access devices can get control of each user.

Figure 3-4-1-4

PPPoE	
Item	**Description**
Username	Enter the username provided by your Internet Service Provider (ISP).
Password	Enter the password provided by your Internet Service Provider (ISP).
Link Detection Interval (s)	Set the heartbeat interval for link detection. Range: 1-600.
Max Retries	Set the maximum retry times after it fails to dial up. Range: 0-9.
Use Peer DNS	Obtain peer DNS automatically during PPP dialing. DNS is necessary when user visits domain name.

Table 3-4-1-4 PPOE Parameters

3.4.1.2 WLAN

This section explains how to set the related parameters for Wi-Fi network. UG65 supports 802.11 b/g/n, as AP or client mode.

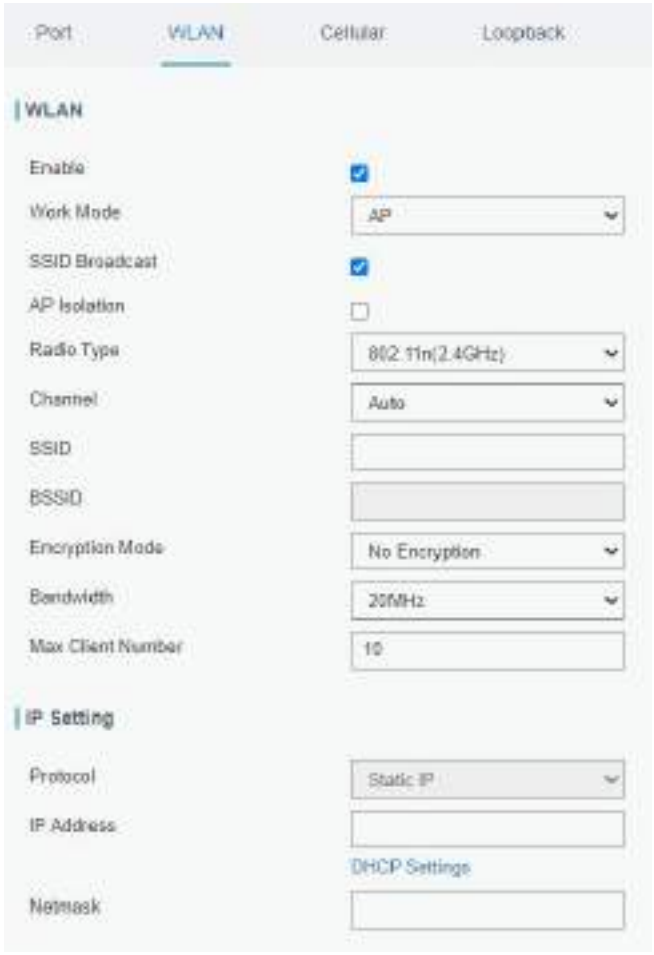


Figure 3-4-1-5

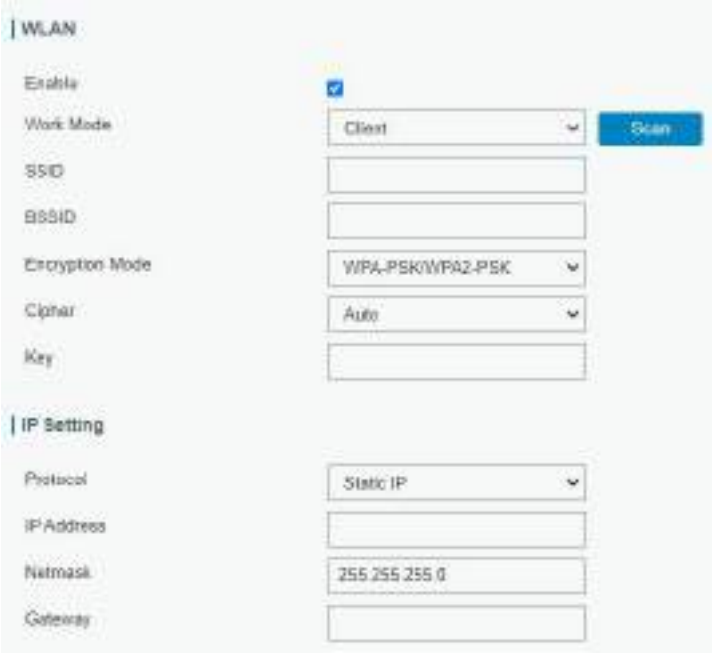


Figure 3-4-1-6

WLAN Settings	
Item	**Description**
Enable	Enable/disable WLAN.

Work Mode	Select gateway's work mode. The options are "Client" or "AP".
BSSID	Fill in the MAC address of the access point. Either SSID or BSSID can be filled to join the network.
SSID	Fill in the SSID of the access point.
Client Mode	
Scan	Click "Scan" button to search the nearby access point.
Encryption Mode	Select encryption mode. The options are “No Encryption", “WEP Open System" , “WEP Shared Key", “WPA-PSK", “WPA2-PSK" , “WPA-PSK/WPA2-PSK", “WPA-Enterprise”, “WPA2-Enterprise”and “WPA-Enterprise/WPA2-Enterprise”.
Cipher	Select cipher. The options are “Auto", “AES", “TKIP" and “AES/TKIP".
Key	Fill the pre-shared key of WEP/WPA encryption.
XSupplicant Type	Select from “Peap”, “Leap”, “TLS” and “TTLS”.
User	Fill the user of WPA/WPA2-Enterprise.
Anonymous Identity	Fill the anonymous identity of WPA/WPA2-Enterprise.
Phase2	Fill the phase2 of WPA/WPA2-Enterprise.
Public Server Certificate	The public server certificate used for verifying with WPA/WPA2-Enterprise access point.
AP Mode	
SSID Broadcast	When SSID broadcast is disabled, other wireless devices can't not find the SSID, and users have to enter the SSID manually to access to the wireless network.
AP Isolation	When AP isolation is enabled, all users which access to the AP are isolated without communication with each other.
Radio Type	Select Radio type. The options are “802.11b (2.4 GHz)", “802.11g (2.4 GHz)", “802.11n (2.4 GHz)””.
Channel	Select wireless channel. The options are "Auto", "1", "2"....."11".
Encryption Mode	Select encryption mode. The options are “No Encryption", “WEP Open System" , “WEP Shared Key", “WPA-PSK", “WPA2-PSK" and “WPA-PSK/WPA2-PSK".
Cipher	Select cipher. The options are “Auto", “AES", “TKIP" and “AES/TKIP".
Key	Fill the pre-shared key of WPA encryption. The default password is **iotpassword**.
Bandwidth	Select bandwidth. The options are "20MHz" and "40MHz".
Max Client Number	Set the maximum number of client to access when the gateway is configured as AP.
IP Setting	
Protocol	Set the protocol in wireless network.
IP Address	Set the IP address in wireless network.
Netmask	Set the netmask in wireless network.

Gateway	Set the gateway in wireless network.

Table 3-4-1-5 WLAN Parameters

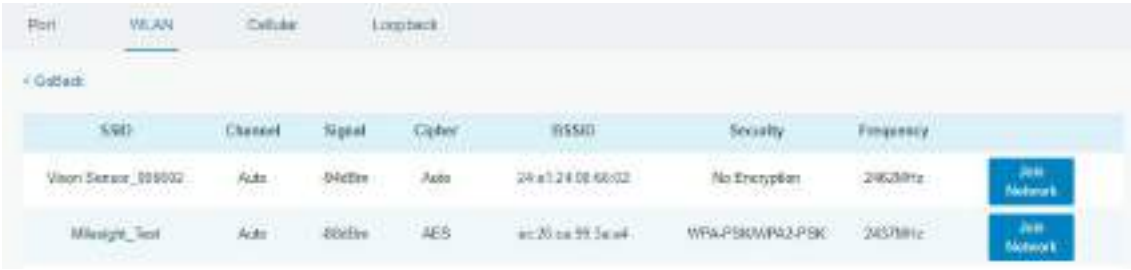


Figure 3-4-1-7

Client Mode-Scan	
SSID	Show SSID.
Channel	Show wireless channel.
Signal	Show wireless signal.
BSSID	Show the MAC address of the access point.
Security	Show the encryption mode.
Frequency	Show the frequency of radio.
Join Network	Click the button to join the wireless network.

Table 3-4-1-6 WLAN Scan Parameters

Related Topic

Wi-Fi Application Example

3.4.1.3 Cellular (Cellular Version Only)

This section explains how to set the related parameters for cellular network.

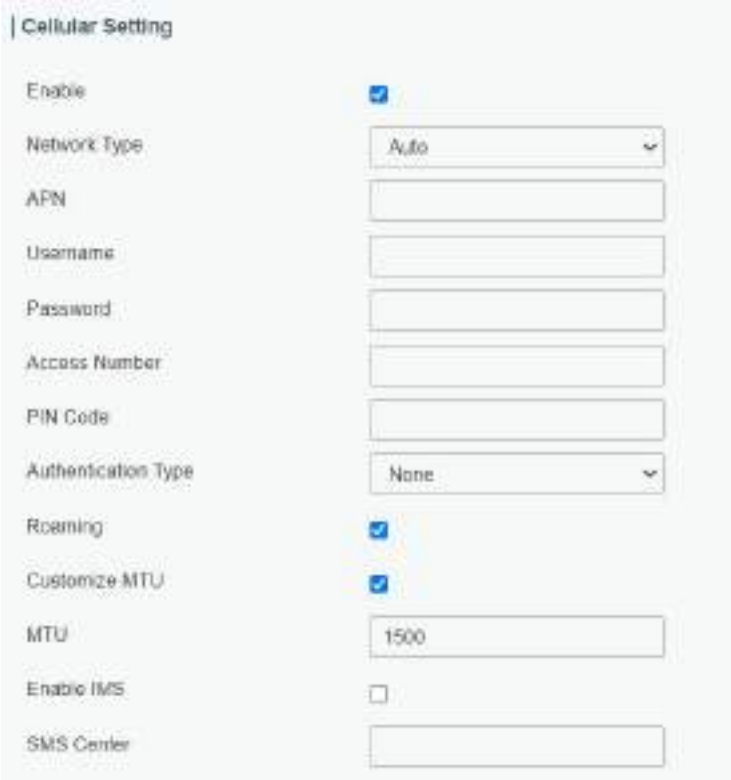


Figure 3-4-1-8

Figure 3-4-1-9

General Settings	
Item	**Description**
Enable	Check the option to enable cellular feature.
Network Type	Select from "Auto", "Auto 3G/4G", "4G Only" and "3G Only". Auto: connect to the network with the strongest signal automatically.

	4G Only: connect to 4G network only. And so on.
APN	Enter the Access Point Name for cellular dial-up connection provided by local ISP.
Username	Enter the username for cellular dial-up connection provided by local ISP.
Password	Enter the password for cellular dial-up connection provided by local ISP.
Access Number	Enter the dial-up center NO. For cellular dial-up connection provided by local ISP.
PIN Code	Enter a 4-8 characters PIN code to unlock the SIM.
Authentication Type	Select from "None", "PAP", "CHAP".
Roaming	Enable or disable roaming.
Customized MTU	Enable or disable to customize the maximum transmission units. When disabled, the device will use operator's MTU settings.
MTU	Set the maximum transmission units. Range: 68-1500.
Enable IMS	Enable or disable IMS function.
SMS Center	Enter the local SMS center number for storing, forwarding, converting and delivering SMS message.
Enable NAT	Enable or disable NAT function.
Restart When Dial-up failed	When this function is enabled, the gateway will restart automatically if the dial-up fails several times.
ICMP Server	Set the ICMP detection server's IP address.
Secondary ICMP Server	Set the secondary ICMP detection server's IP address.
ICMP Detection Max Retries	Set max number of retries when ICMP detection fails.
ICMP Detection Timeout	Set timeout of ICMP detection.
ICMP Detection Interval	Set interval of ICMP detection.
SMS Mode	Select SMS mode from "TEXT" and "PDU".

Table 3-4-1-7 Cellular Parameters

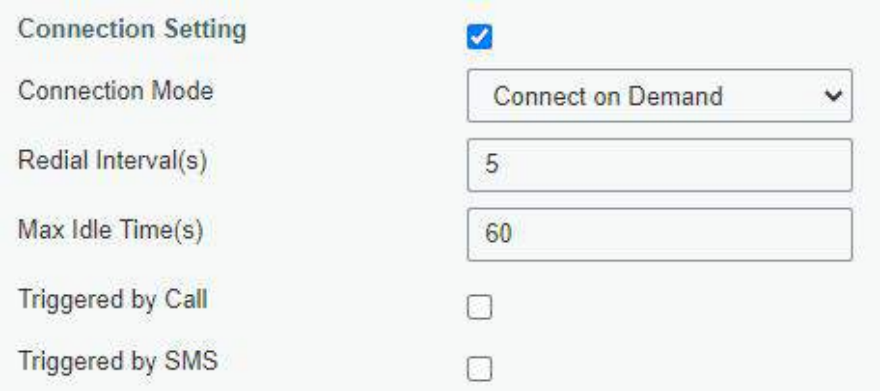


Figure 3-4-1-10

Item	Description
Connection Mode	
Connection Mode	Select from "Always Online" and "Connect on Demand".
Redial Interval(s)	Set the time interval between redials. Range: 0-3600.
Max Idle Time(s)	Set the maximum duration of the gateway when current link is under idle status. Range: 10-3600.
Triggered by Call	The gateway will switch from offline mode to cellular network mode automatically when it receives a call from the specific phone number.
Call Group	Select a call group for call trigger. Go to "System > General Settings > Phone" to set up phone group.
Triggered by SMS	The gateway will switch from offline mode to cellular network mode automatically when it receives a specific SMS from the specific mobile phone.
SMS Group	Select a SMS group for trigger. Go to "System > General Settings > Phone" to set up SMS group.
SMS Text	Fill in the SMS content for triggering.

Table 3-4-1-8 Cellular Parameters

Related Topics

Cellular Connection Application Example

Phone Group

3.4.1.4 Loopback

Loopback interface is used for replacing gateway's ID as long as it is activated. When the interface is DOWN, the ID of the gateway has to be selected again which leads to long convergence time of OSPF. Therefore, Loopback interface is generally recommended as the ID of the gateway.

Loopback interface is a logic and virtual interface on gateway. Under default conditions, there's no loopback interface on gateway, but it can be created as required.

Figure 3-4-1-11

Loopback		
Item	**Description**	**Default**
IP Address	Unalterable	127.0.0.1
Netmask	Unalterable	255.0.0.0
Multiple IP Addresses	Apart from the IP above, user can configure other IP addresses.	Null

Table 3-4-1-9 Loopback Parameters

3.4.1.5 VLAN Trunk

UG65 gateway supports the Ethernet port working as VLAN Trunk client and be assigned a VLAN ID, which easy to traffic classification. When VLAN ID is set, port on **"Network" > "Interface" > "Port"** can be chosen as eth0.x with x being VLAN ID. VLAN Setting is blank by default, you can add a new VLAN label to certain interface by clicking  .

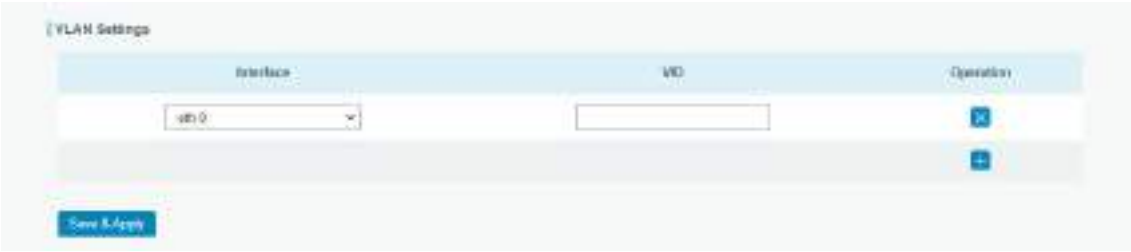


Figure 3-4-1-12

VLAN Trunk	
Item	**Description**
Interface	Select the VLAN interface, it's fixed as eth0.
VID	Set the label ID of the VLAN. Range: 1-4094.

Table 3-4-1-10 VLAN Trunk Parameters

3.4.2 Firewall

This section describes how to set the firewall parameters, including website block, ACL, DMZ, Port Mapping and MAC Binding.

The firewall implements corresponding control of data flow at entry direction (from Internet to local area network) and exit direction (from local area network to Internet) according to the content features of packets, such as protocol style, source/destination IP address, etc. It ensures that the gateway operate in a safe environment and host in local area network.

3.4.2.1 Security

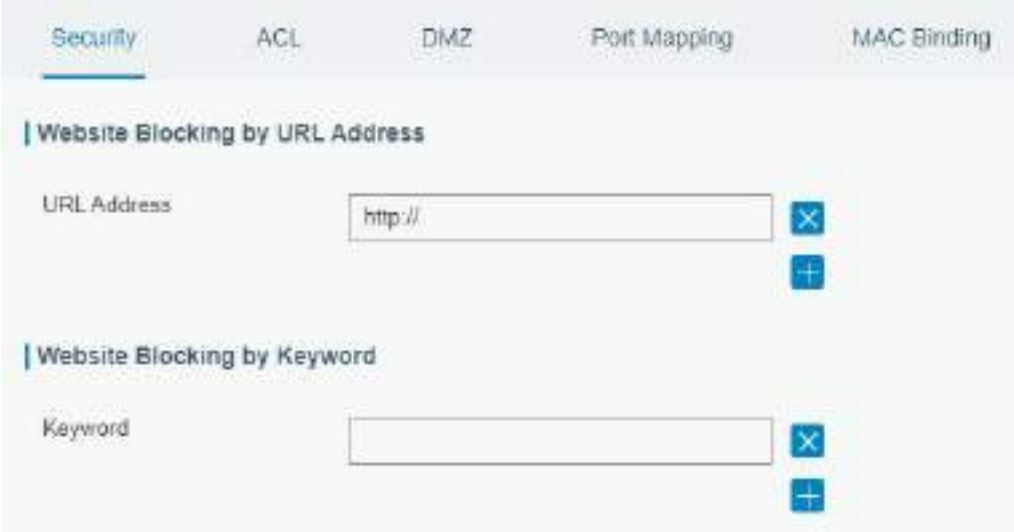


Figure 3-4-2-1

Website Blocking	
URL Address	Enter the HTTP address which you want to block.
Keyword	You can block specific website by entering keyword. The maximum number of character allowed is 64.

Table 3-2-2-1 Security Parameters

3.4.2.2 ACL

Access control list, also called ACL, implements permission or prohibition of access for specified network traffic (such as the source IP address) by configuring a series of matching rules so as to filter the network interface traffic. When gateway receives packet, the field will be analyzed according to the ACL rule applied to the current interface. After the special packet is identified, the permission or prohibition of corresponding packet will be implemented according to preset strategy.

The data package matching rules defined by ACL can also be used by other functions requiring flow distinction.

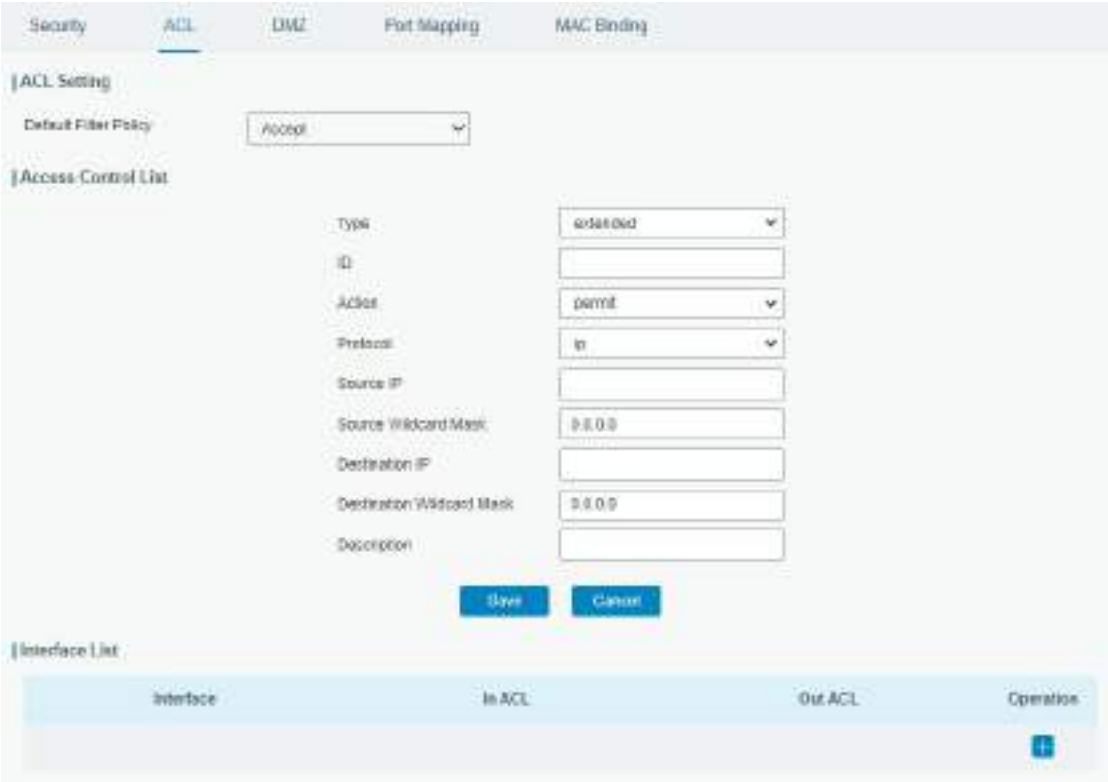


Figure 3-4-2-2

Item	Description
ACL Setting	
Default Filter Policy	Select from "Accept" and "Deny". The packets which are not included in the access control list will be processed by the default filter policy.
Access Control List	
Type	Select type from "Extended" and "Standard".
ID	User-defined ACL number. Range: 1-199.
Action	Select from "Permit" and "Deny".
Protocol	Select protocol from "ip", "icmp", "tcp", "udp", and "1-255".
Source IP	Source network address (leaving it blank means all).
Source Wildcard Mask	Wildcard mask of the source network address.
Destination IP	Destination network address (0.0.0.0 means all).
Destination Wildcard Mask	Wildcard mask of destination address.
Description	Fill in a description for the groups with the same ID.
ICMP Type	Enter the type of ICMP packet. Range: 0-255.
ICMP Code	Enter the code of ICMP packet. Range: 0-255.
Source Port Type	Select source port type, such as specified port, port range, etc.
Source Port	Set source port number. Range: 1-65535.
Start Source Port	Set start source port number. Range: 1-65535.

End Source Port	Set end source port number. Range: 1-65535.
Destination Port Type	Select destination port type, such as specified port, port range, etc.
Destination Port	Set destination port number. Range: 1-65535.
Start Destination Port	Set start destination port number. Range: 1-65535.
End Destination Port	Set end destination port number. Range: 1-65535.
More Details	Show information of the port.
Interface List	
Interface	Select network interface for access control.
In ACL	Select a rule for incoming traffic from ACL ID.
Out ACL	Select a rule for outgoing traffic from ACL ID.

Table 3-4-2-2 ACL Parameters

3.4.2.4 Port Mapping (DNAT)

When external services are needed internally (for example, when a website is published ext ernally), the external address initiates an active connection. And, the router or the gateway on the firewall receives the connection. Then it will convert the connection into the an internal connection. This conversion is called DNAT, which is mainly used for external and interval services.

Click  to add a new port mapping rules.

Figure 3-4-2-4

Port Mapping	
Item	**Description**
Source IP	Specify the host or network which can access local IP address. 0.0.0.0/0 means all.
Source Port	Enter the TCP or UDP port from which incoming packets are forwarded. Range: 1-65535.
Destination IP	Enter the IP address that packets are forwarded to after being received on the incoming interface.
Destination Port	Enter the TCP or UDP port that packets are forwarded to after being received on the incoming port(s). Range: 1-65535.
Protocol	Select from "TCP" and "UDP" as your application required.
Description	The description of this rule.

Table 3-4-2-4 Port Mapping Parameters

Related Configuration Example

NAT Application Example

3.4.2.3 DMZ

DMZ is a host within the internal network that has all ports exposed, except those forwarded ports in port mapping.

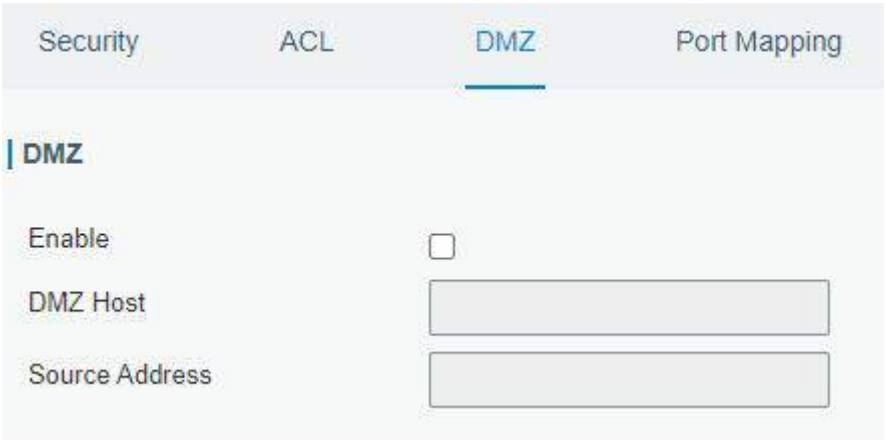


Figure 3-4-2-3

DMZ	
Item	**Description**
Enable	Enable or disable DMZ.
DMZ Host	Enter the IP address of the DMZ host on the internal network.
Source Address	Set the source IP address which can access to DMZ host. "0.0.0.0/0" means any address.

Table 3-4-2-3 DMZ Parameters

3.4.2.5 MAC Binding

MAC Binding is used for specifying hosts by matching MAC addresses and IP addresses that are in the list of allowed outer network access.

Figure 3-4-2-5

MAC Binding List

Item	Description
MAC Address	Set the binding MAC address.
IP Address	Set the binding IP address.
Description	Fill in a description for convenience of recording the meaning of the binding rule for each piece of MAC-IP.

Table 3-4-2-5 MAC Binding Parameters

3.4.3 DHCP

UG65 can be set as a DHCP server to distribute IP address when Wi-Fi work as AP mode.

Figure 3-4-3-1

DHCP Server		
Item	**Description**	**Default**
Enable	Enable or disable DHCP server.	Enable
Interface	Only wlan interface is allowed to distribute IP addresses.	wlan0
Start Address	Define the beginning of the pool of IP addresses which will be leased to DHCP clients.	192.168.1.100
End Address	Define the end of the pool of IP addresses which will be leased to DHCP clients.	192.168.1.199
Netmask	Define the subnet mask of IP address obtained by DHCP clients from DHCP server.	255.255.255.0
Lease Time	Set the lease time on which the client can use the IP	1440

(Min)	address obtained from DHCP server. Range: 1-10080.	
Primary DNS Server	Set the primary DNS server.	8.8.8.8
Secondary DNS Server	Set the secondary DNS server.	Null
Windows Name Server	Define the Windows Internet Naming Service obtained by DHCP clients from DHCP sever. Generally you can leave it blank.	Null
Static IP		
MAC Address	Set a static and specific MAC address for the DHCP client (it should be different from other MACs so as to avoid conflict).	Null
IP Address	Set a static and specific IP address for the DHCP client (it should be outside of the DHCP range).	Null

Table 3-4-3-1 DHCP Server Parameters

3.4.4 DDNS

Dynamic DNS (DDNS) is a method that automatically updates a name server in the Domain Name System, which allows user to alias a dynamic IP address to a static domain name. DDNS serves as a client tool and needs to coordinate with DDNS server. Before starting configuration, user shall register on a website of proper domain name provider and apply for a domain name.

Figure 3-4-4-1

DDNS	
Item	**Description**
Name	Give the DDNS a descriptive name.
Interface	Set interface bundled with the DDNS.
Service Type	Select the DDNS service provider.
Username	Enter the username for DDNS register.
User ID	Enter User ID of the custom DDNS server.
Password	Enter the password for DDNS register.
Server	Enter the name of DDNS server.
Hostname	Enter the hostname for DDNS.
Append IP	Append your current IP to the DDNS server update path.

Table 3-4-4-1 DDNS Parameters

3.4.5 Link Failover

This section describes how to configure link failover strategies, such as VRRP strategies.

Configuration Steps

1. Define one or more SLA operations (ICMP probe).
2. Define one or more track objects to track the status of SLA operation.
3. Define applications associated with track objects, such as VRRP or static routing.

3.4.5.1 SLA

SLA setting is used for configuring link probe method. The default probe type is ICMP.

Figure 3-4-5-1

SLA		
Item	**Description**	**Default**
ID	SLA index. Up to 10 SLA settings can be added. Range: 1-10.	1
Type	ICMP-ECHO is the default type to detect if the link is alive.	icmp-echo
Destination Address	The detected IP address.	8.8.8.8
Secondary Destination Address	The secondary detected IP address.	223.5.5.5
Data Size	User-defined data size. Range: 0-1000.	56
Interval (s)	User-defined detection interval. Range: 1-608400.	30
Timeout (ms)	User-defined timeout for response to determine ICMP detection failure. Range: 1-300000.	5000
Packet Loss Count	Define packet loss count in each SLA probe. SLA probe fails when the preset packet loss count is exceeded.	5
Start Time	Detection start time; select from "Now" and blank character. Blank character means this SLA detection doesn't start.	now

Table 3-4-5-1 SLA Parameters

3.4.5.2 Track

Track setting is designed for achieving linkage among SLA module, Track module and

Application module. Track setting is located between application module and SLA module with main function of shielding the differences of various SLA modules and providing unified interfaces for application module.

Linkage between Track Module and SLA module

Once you complete the configuration, the linkage relationship between Track module and SLA module will be established. SLA module is used for detection of link status, network performance and notification of Track module. The detection results help track status change timely.

- For successful detection, the corresponding track item is Positive.
- For failed detection, the corresponding track item is Negative.

Linkage between Track Module and Application Module

After configuration, the linkage relationship between Track module and Application module will be established. When any change occurs in track item, a notification that requires corresponding treatment will be sent to Application module.

Currently, the application modules like VRRP and static routing can get linkage with track module.

If it sends an instant notification to Application module, the communication may be interrupted in some circumstances due to routing's failure like timely restoration or other reasons. Therefore, user can set up a period of time to delay notifying application module when the track item status changes.

Figure 3-4-5-2

Item	Description	Default
Index	Track index. Up to 10 track settings can be configured. Range: 1-10.	1
Type	The options are "sla" and "interface".	SLA
SLA ID	Defined SLA ID.	1
Interface	Select the interface whose status will be detected.	cellular0
Negative Delay (s)	When interface is down or SLA probing fails, it will wait according to the time set here before actually changing its status to Down. Range: 0-180 (0 refers to immediate switching).	0
Positive Delay (s)	When failure recovery occurs, it will wait according to the time set here before actually changing its status to Up. Range: 0-180 (0 refers to immediate	1

	switching).	

Table 3-4-5-2 Track Parameters

3.4.5.3 WAN Failover

WAN failover refers to failover between Ethernet WAN interface and cellular interface. When service transmission can't be carried out normally due to malfunction of a certain interface or lack of bandwidth, the rate of flow can be switched to backup interface quickly. Then the backup interface will carry out service transmission and share network flow so as to improve reliability of communication of data equipment.

When link state of main interface is switched from up to down, system will have the pre-set delay works instead of switching to link of backup interface immediately. Only if the state of main interface is still down after delay, will the system switch to link of backup interface. Otherwise, system will remain unchanged.

Figure 3-4-5-3

WAN Failover		
Parameters	**Description**	**Default**
Main Interface	Select a link interface as the main link.	--
Backup Interface	Select a link interface as the backup link.	--
Startup Delay (s)	Set how long to wait for the startup tracking detection policy to take effect. Range: 0-300.	30
Up Delay (s)	When the primary interface switches from failed detection to successful detection, switching can be delayed based on the set time. Range: 0-180 (0 refers to immediate switching)	0
Down Delay (s)	When the primary interface switches from successful detection to failed detection, switching can be delayed based on the set time. Range: 0-180 (0 refers to immediate switching).	0
Track ID	Track detection, select the defined track ID.	--

Table 3-4-5-3 WAN Failover Parameters

3.4.6 VPN

Virtual Private Networks, also called VPNs, are used to securely connect two private

networks together so that devices can connect from one network to the other network via secure channels.

UG65 supports DMVPN, IPsec, GRE, L2TP, PPTP, OpenVPN, as well as GRE over IPsec and L2TP over IPsec.

3.4.6.1 DMVPN

A dynamic multi-point virtual private network (DMVPN), combining mGRE and IPsec, is a secure network that exchanges data between sites without passing traffic through an organization's headquarter VPN server or gateway.

Figure 3-4-6-1

Figure 3-4-6-2

DMVPN	
Item	**Description**
Enable	Enable or disable DMVPN.
Hub Address	The IP address or domain name of DMVPN Hub.
Local IP address	DMVPN local tunnel IP address.
GRE Hub IP Address	GRE Hub tunnel IP address.
GRE Local IP Address	GRE local tunnel IP address.

GRE Netmask	GRE local tunnel netmask.
GRE Key	GRE tunnel key.
Negotiation Mode	Select from "Main" and "Aggressive".
Authentication Algorithm	Select from "DES", "3DES", "AES128", "AES192" and "AES256".
Encryption Algorithm	Select from "MD5" and "SHA1".
DH Group	Select from "MODP768_1", "MODP1024_2" and "MODP1536_5".
Key	Enter the preshared key.
Local ID Type	Select from "Default", "ID", "FQDN", and "User FQDN"
IKE Life Time (s)	Set the lifetime in IKE negotiation. Range: 60-86400.
SA Algorithm	Select from "DES_MD5", "DES_SHA1", "3DES_MD5", "3DES_SHA1", "AES128_MD5", "AES128_SHA1", "AES192_MD5", "AES192_SHA1", "AES256_MD5" and "AES256_SHA1".
PFS Group	Select from "NULL", "MODP768_1", "MODP1024_2" and "MODP1536-5".
Life Time (s)	Set the lifetime of IPsec SA. Range: 60-86400.
DPD Interval Time (s)	Set DPD interval time
DPD Timeout (s)	Set DPD timeout.
Cisco Secret	Cisco Nhrp key.
NHRP Holdtime (s)	The holdtime of Nhrp protocol.

Table 3-4-6-1 DMVPN Parameters

3.4.6.2 IPSec

IPsec is especially useful for implementing virtual private networks and for remote user access through dial-up connection to private networks. A big advantage of IPsec is that security arrangements can be handled without requiring changes to individual user computers.

IPsec provides three choices of security service: Authentication Header (AH), Encapsulating Security Payload (ESP), and Internet Key Exchange (IKE). AH essentially allows authentication of the senders' data. ESP supports both authentication of the sender and data encryption. IKE is used for cipher code exchange. All of them can protect one and more data flows between hosts, between host and gateway, and between gateways.

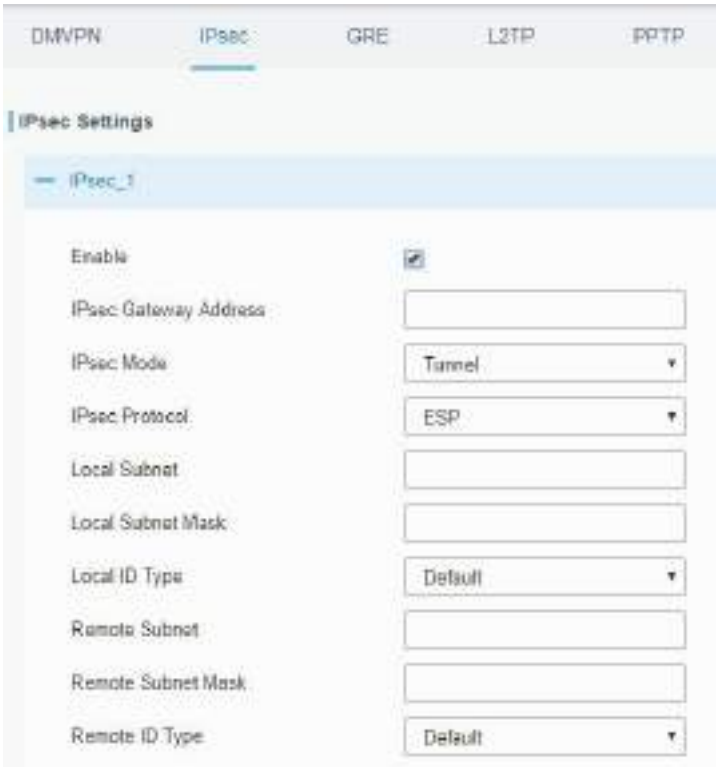


Figure 3-4-6-3

IPsec	
Item	**Description**
Enable	Enable IPsec tunnel. A maximum of 3 tunnels is allowed.
IPsec Gateway Address	Enter the IP address or domain name of remote IPsec server.
IPsec Mode	Select from "Tunnel" and "Transport".
IPsec Protocol	Select from "ESP" and "AH".
Local Subnet	Enter the local subnet IP address that IPsec protects.
Local Subnet Netmask	Enter the local netmask that IPsec protects.
Local ID Type	Select from "Default", "ID", "FQDN", and "User FQDN".
Remote Subnet	Enter the remote subnet IP address that IPsec protects.
Remote Subnet Mask	Enter the remote netmask that IPsec protects.
Remote ID type	Select from "Default", "ID", "FQDN", and "User FQDN".

Table 3-4-6-2 IPsec Parameters

Figure 3-4-6-4

IKE Parameter	
Item	**Description**
IKE Version	Select from "IKEv1" and "IKEv2".
Negotiation Mode	Select from "Main" and "Aggressive".
Encryption Algorithm	Select from "DES", "3DES", "AES128", "AES192" and "AES256".
Authentication Algorithm	Select from "MD5" and " SHA1"
DH Group	Select from "MODP768_1", "MODP1024_2" and "MODP1536_5".
Local Authentication	Select from "PSK" and "CA".
Local Secrets	Enter the preshared key.
XAUTH	Enter XAUTH username and password after XAUTH is enabled.
Lifetime (s)	Set the lifetime in IKE negotiation. Range: 60-86400.
SA Parameter	
SA Algorithm	Select from "DES_MD5", "DES_SHA1", "3DES_MD5", "3DES_SHA1", "AES128_MD5", "AES128_SHA1", "AES192_MD5", "AES192_SHA1", "AES256_MD5" and "AES256_SHA1".
PFS Group	Select from "NULL", "MODP768_1" , "MODP1024_2" and "MODP1536_5".
Lifetime (s)	Set the lifetime of IPsec SA. Range: 60-86400.

DPD Interval Time(s)	Set DPD interval time to detect if the remote side fails.
DPD Timeout(s)	Set DPD timeout. Range: 10-3600.
IPsec Advanced	
Enable Compression	The head of IP packet will be compressed after it's enabled.
VPN Over IPsec Type	Select from "NONE", "GRE" and "L2TP" to enable VPN over IPsec function.

Table 3-4-6-3 IPsec Parameters

3.4.6.3 GRE

Generic Routing Encapsulation (GRE) is a protocol that encapsulates packets in order to route other protocols over IP networks. It's a tunneling technology that provides a channel through which encapsulated data message can be transmitted and encapsulation and decapsulation can be realized at both ends.

In the following circumstances the GRE tunnel transmission can be applied:

- GRE tunnel can transmit multicast data packets as if it were a true network interface. Single use of IPSec cannot achieve the encryption of multicast.
- A certain protocol adopted cannot be routed.
- A network of different IP addresses shall be required to connect other two similar networks.

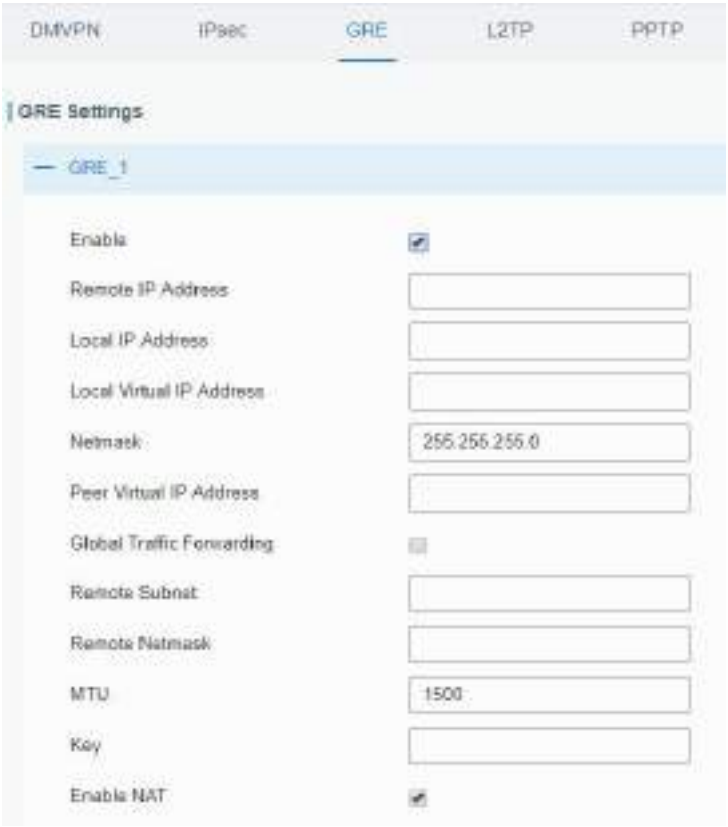


Figure 3-4-6-5

GRE	
Item	**Description**
Enable	Check to enable GRE function.

Remote IP Address	Enter the real remote IP address of GRE tunnel.
Local IP Address	Set the local IP address.
Local Virtual IP Address	Set the local tunnel IP address of GRE tunnel.
Netmask	Set the local netmask.
Peer Virtual IP Address	Enter remote tunnel IP address of GRE tunnel.
Global Traffic Forwarding	All the data traffic will be sent out via GRE tunnel when this function is enabled.
Remote Subnet	Enter the remote subnet IP address of GRE tunnel.
Remote Netmask	Enter the remote netmask of GRE tunnel.
MTU	Enter the maximum transmission unit. Range: 64-1500.
Key	Set GRE tunnel key.
Enable NAT	Enable NAT traversal function.

Table 3-4-6-4 GRE Parameters

3.4.6.4 L2TP

Layer Two Tunneling Protocol (L2TP) is an extension of the Point-to-Point Tunneling Protocol (PPTP) used by an Internet service provider (ISP) to enable the operation of a virtual private network (VPN) over the Internet.

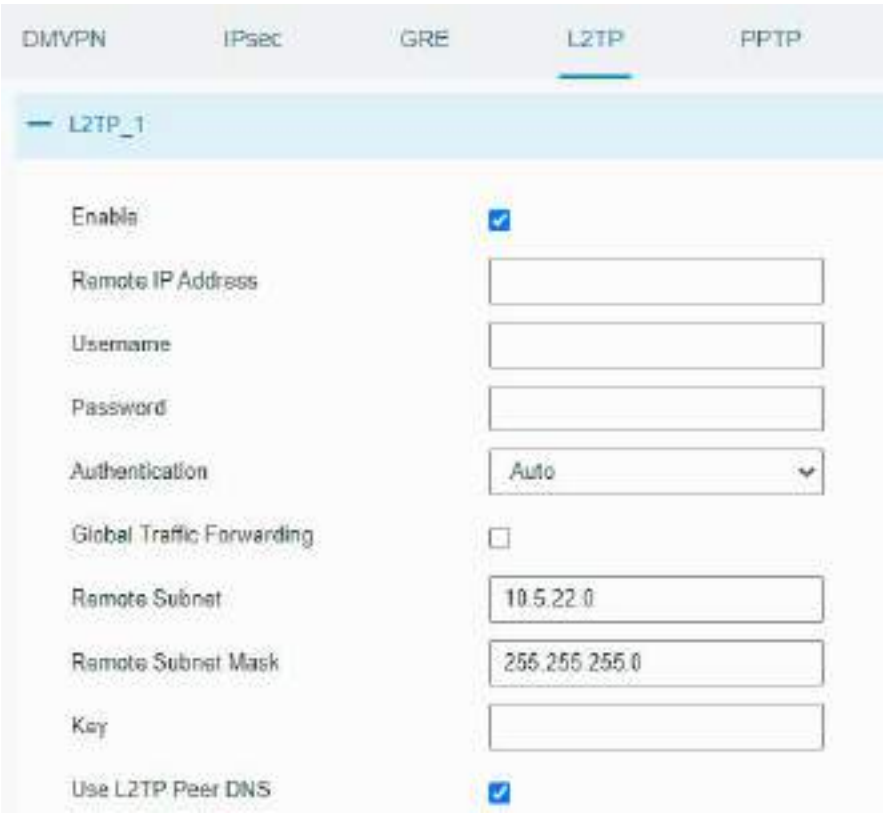


Figure 3-4-6-6

L2TP	
Item	**Description**
Enable	Check to enable L2TP function.
Remote IP Address	Enter the public IP address or domain name of L2TP server.

Username	Enter the username that L2TP server provides.
Password	Enter the password that L2TP server provides.
Authentication	Select from "Auto", "PAP", "CHAP", "MS-CHAPv1" and "MS-CHAPv2".
Global Traffic Forwarding	All of the data traffic will be sent out via L2TP tunnel after this function is enabled.
Remote Subnet	Enter the remote IP address that L2TP protects.
Remote Subnet Mask	Enter the remote netmask that L2TP protects.
Key	Enter the password of L2TP tunnel.
Use L2TP Peer DNS	Enable to use the DNS address of peer L2TP server .

Table 3-4-6-5 L2TP Parameters

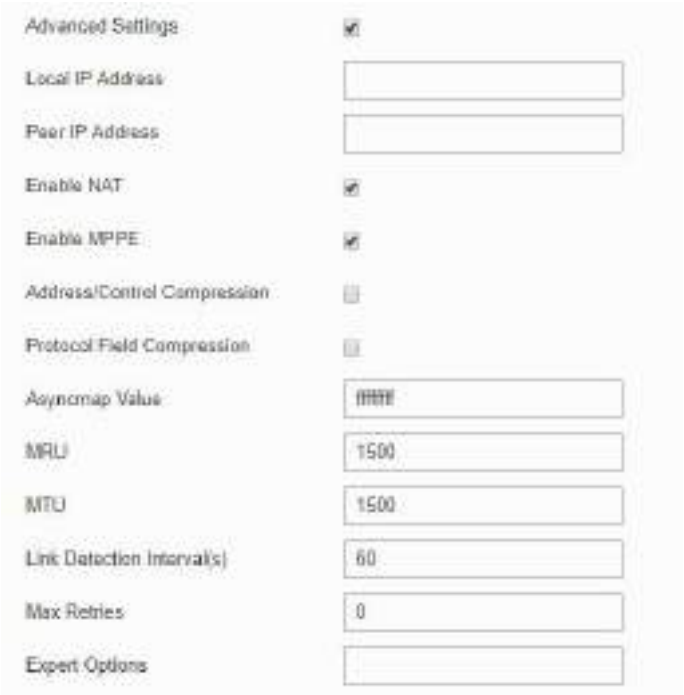


Figure 3-4-6-7

Advanced Settings	
Item	**Description**
Local IP Address	Set tunnel IP address of L2TP client. Client will obtain tunnel IP address automatically from the server when it's null.
Peer IP Address	Enter tunnel IP address of L2TP server.
Enable NAT	Enable NAT traversal function.
Enable MPPE	Enable MPPE encryption.
Address/Control Compression	For PPP initialization. User can keep the default option.
Protocol Field Compression	For PPP initialization. User can keep the default option.
Asyncmap Value	One of the PPP protocol initialization strings. User can keep the default value. Range: 0-ffffffff.

MRU	Set the maximum receive unit. Range: 64-1500.
MTU	Set the maximum transmission unit. Range: 64-1500
Link Detection Interval (s)	Set the link detection interval time to ensure tunnel connection. Range: 0-600.
Max Retries	Set the maximum times of retry to detect the L2TP connection failure. Range: 0-10.
Expert Options	User can enter some other PPP initialization strings in this field and separate the strings with blank space.

Table 3-4-6-6 L2TP Parameters

3.4.6.5 PPTP

Point-to-Point Tunneling Protocol (PPTP) is a protocol that allows corporations to extend their own corporate network through private "tunnels" over the public Internet. Effectively, a corporation uses a wide-area network as a single large local area network.

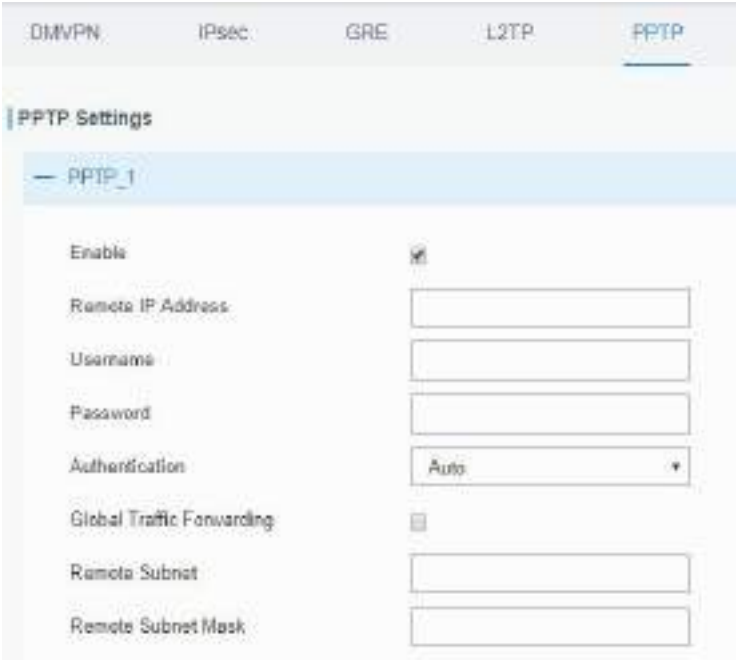


Figure 3-4-6-8

PPTP	
Item	**Description**
Enable	Enable PPTP client. A maximum of 3 tunnels is allowed.
Remote IP Address	Enter the public IP address or domain name of PPTP server.
Username	Enter the username that PPTP server provides.
Password	Enter the password that PPTP server provides.
Authentication	Select from "Auto", "PAP", "CHAP", "MS-CHAPv1", and "MS-CHAPv2".
Global Traffic Forwarding	All of the data traffic will be sent out via PPTP tunnel once enable this function.
Remote Subnet	Set the peer subnet of PPTP.

Remote Subnet Mask	Set the netmask of peer PPTP server.

Table 3-4-6-7 PPTP Parameters

Figure 3-4-6-9

PPTP Advanced Settings	
Item	**Description**
Local IP Address	Set IP address of PPTP client.
Peer IP Address	Enter tunnel IP address of PPTP server.
Enable NAT	Enable the NAT faction of PPTP.
Enable MPPE	Enable MPPE encryption.
Address/Control Compression	For PPP initialization. User can keep the default option.
Protocol Field Compression	For PPP initialization. User can keep the default option.
Asyncmap Value	One of the PPP protocol initialization strings. User can keep the default value. Range: 0-ffffffff.
MRU	Enter the maximum receive unit. Range: 0-1500.
MTU	Enter the maximum transmission unit. Range: 0-1500.
Link Detection Interval (s)	Set the link detection interval time to ensure tunnel connection. Range: 0-600.
Max Retries	Set the maximum times of retrying to detect the PPTP connection failure. Range: 0-10.
Expert Options	User can enter some other PPP initialization strings in this field and separate the strings with blank space.

Table 3-4-6-8 PPTP Parameters

3.4.6.6 OpenVPN Client

OpenVPN is an open source virtual private network (VPN) product that offers a simplified security framework, modular network design, and cross-platform portability. UG65 supports running at most 3 OpenVPN clients at the same time. You can import the ovpn file directly or configure the parameters on this page to set clients.

Figure 3-4-6-10

OpenVPN Client - File Configuration	
Item	**Description**
Browse	Click to browse the client configuration ovpn format file including the settings and certificate contents. Please refer to the client configuration file according to sample: client.conf
Edit	Click to edit the imported file.
Export	Export the server configuration file.
Delete	Click to delete the configuration file.

Table 3-4-6-9 OpenVPN Client Parameters

Figure 3-4-6-11

OpenVPN Client - Page Configuration	
Item	**Description**
Protocol	Select a transport protocol used by connecting UDP and TCP.
Remote IP Address	Enter remote OpenVPN server's IP address or domain name.

Port	Enter the TCP/UCP service number of remote OpenVPN server. Range: 1-65535.
Interface	Select virtual VPN network interface type from TUN and TAP. TUN devices encapsulate IPv4 or IPv6 (OSI Layer 3) while TAP devices encapsulate Ethernet 802.3 (OSI Layer 2).
Authentication Type	Select authentication type used to secure data sessions. **Pre-shared:** use the same secret key as server to complete the authentication. After selecting, go to **Network > VPN > Certifications** page to import a static.key to **PSK** field. **Username/Password:** use username/password which is preset in server side to complete the authentication. **X.509 cert:** use X.509 type certificate to complete the authentication. After selecting, go to **Network > VPN > Certifications** page to import CA certificate, client certificate and client private key to corresponding fields. **X.509 cert + user:** use both username/password and X.509 cert authentication type.
Local Virtual IP	Set local tunnel address when authentication type is **None** or **Pre-shared**.
Remote Virtual IP	Set remote tunnel address when authentication type is **None** or **Pre-shared**.
Global Traffic Forwarding	All the data traffic will be sent out via OpenVPN tunnel when this function is enabled.
Enable TLS Authentication	Disable or enable TLS authentication when authentication type is X.509 cert. After being enabled, go to **Network > VPN > Certifications** page to import a ta.key to **TA** field. **Note:** this option only supports tls-auth. For tls-crypt, please add this format string on expert option: tls-crypt /etc/openvpn/openvpn-client1-ta.key
Compression	Select to enable or disable LZO to compress data.
Link Detection Interval (s)	Set link detection interval time to ensure tunnel connection. If this is set on both server and client, the value pushed from server will override the client local values. Range: 10-1800 s.
Link Detection Timeout (s)	OpenVPN will be reestablished after timeout. If this is set on both server and client, the value pushed from server will override the client local values. Range: 60-3600 s.
Cipher	Select from NONE, BF-CBC, DES-CBC, DES-EDE3-CBC, AES-128-CBC, AES-192-CBC and AES-256-CBC.
MTU	Enter the maximum transmission unit. Range: 128-1500.
Max Frame Size	Set the maximum frame size. Range: 128-1500.
Verbose Level	Select from ERROR, WARING, NOTICE and DEBUG.
Expert Options	User can enter some initialization strings in this field and separate the strings with semicolon. **Example:** ncp-ciphers AES-128-GCM; key direction 1
Local Route	
Subnet	Set the local route's IP address.

Subnet Mask	Set the local route's netmask.

Table 3-4-6-10 OpenVPN Client Parameters

3.4.6.7 OpenVPN Server

UG65 supports OpenVPN server to create secure point-to-point or site-to-site connections in routed or bridged configurations and remote access facilities. You can import the ovpn file directly or configure the parameters on this page to set this server.

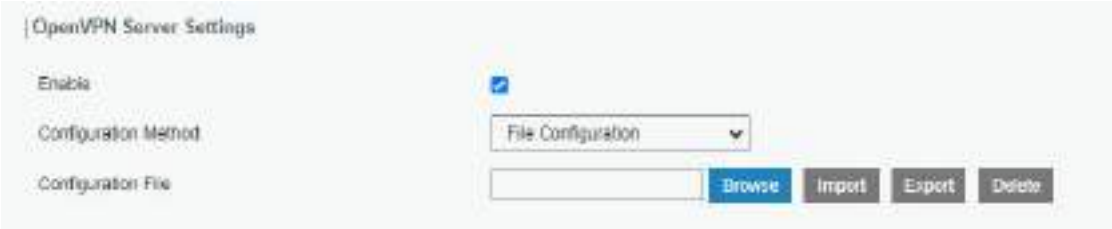


Figure 3-4-6-12

OpenVPN Server - File Configuration	
Item	**Description**
Browse	Click to browse the server configuration ovpn format file including the settings and certificate contents. Please refer to the server configuration file according to sample: server.conf
Edit	Click to edit the imported file.
Export	Export the server configuration file.
Delete	Click to delete the configuration file.

Table 3-4-6-11 OpenVPN Server Parameters

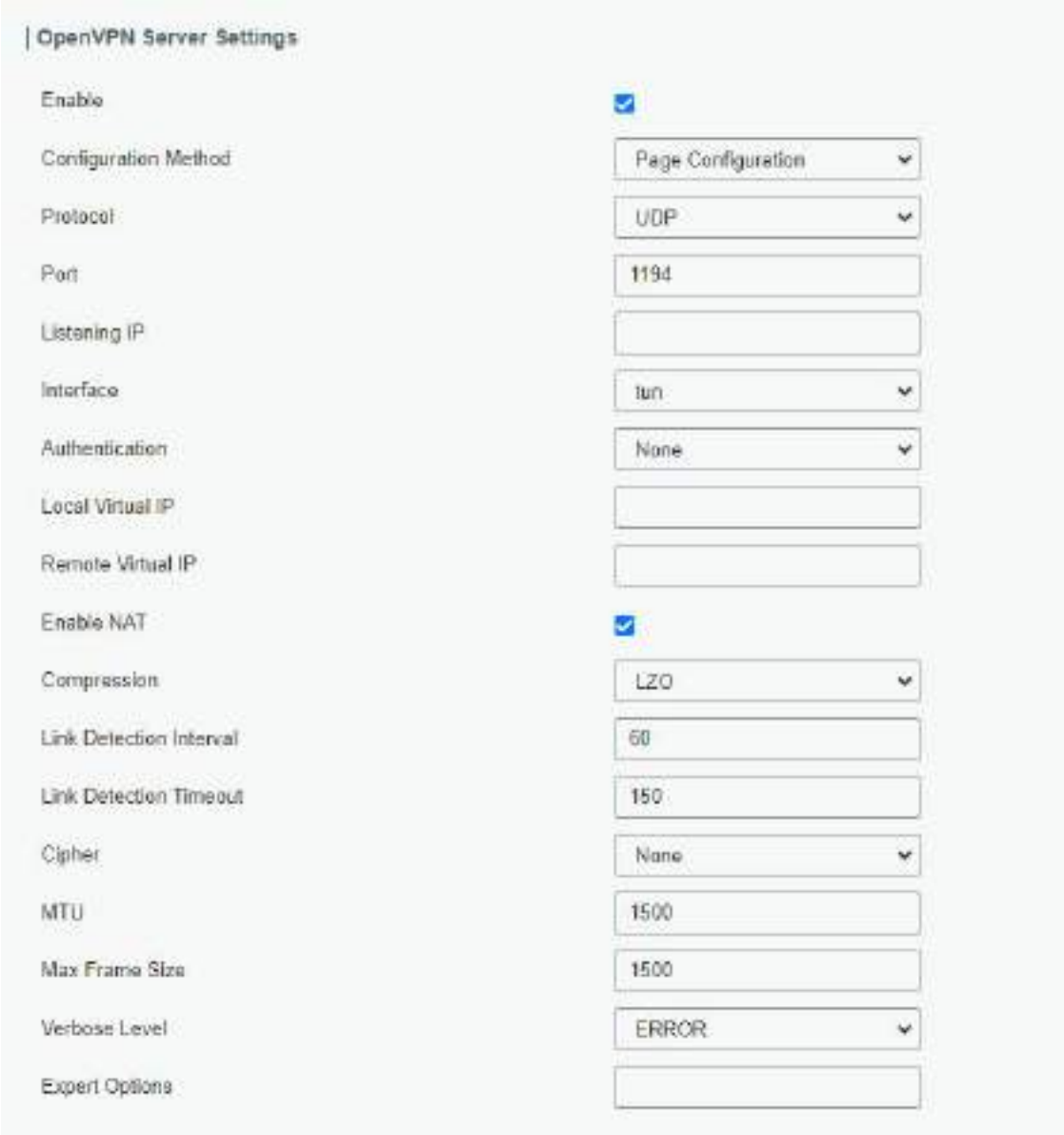


Figure 3-4-6-13

Figure 3-4-6-14

OpenVPN Server - Page Configuration	
Item	**Description**
Protocol	Select a transport protocol used by connection from UDP and TCP.
Listening IP	Enter the local hostname or IP address for bind. If left blank, OpenVPN

	server will bind to all interfaces.
Port	Enter the TCP/UCP service number for OpenVPN client connection. Range: 1-65535.
Interface	Select virtual VPN network interface type from TUN and TAP. TUN devices encapsulate IPv4 or IPv6 (OSI Layer 3) while TAP devices encapsulate Ethernet 802.3 (OSI Layer 2).
Authentication Type	Select authentication type used to secure data sessions. **Pre-shared:** use the same secret key as server to complete the authentication. After select, go to **Network > VPN > Certifications** page to import a static.key to **PSK** field. **Username/Password:** use username/password which is preset in server side to complete the authentication. **X.509 cert:** use X.509 type certificate to complete the authentication. After select, go to **Network > VPN > Certifications** page to import CA certificate, client certificate and client private key to corresponding fields. **X.509 cert + user:** use both username/password and X.509 cert authentication type.
Local Virtual IP	Set local tunnel address when authentication type is **None** or **Pre-shared**.
Remote Virtual IP	Set remote tunnel address when authentication type is **None** or **Pre-shared**.
Client Subnet	Define an IP address pool for openVPN client.
Client Netmask	Set the client subnet netmask to limit the IP address range.
Renegotiation Interval	Renegotiate data channel key after this interval. 0 means disable.
Max Clients	Limit server to a maximum of concurrent clients, range: 1-20. **Note:** please adjust log severity to Info if you need to connect many clients.
Enable CRL	Enable or disable CRL verify.
Enable Client to Client	When enabled, openVPN clients can communicate with each other.
Enable Dup Client	Allow multiple clients to connect with the same common name or certification.
Enable TLS Authentication	Disable or enable TLS authentication when authentication type is X.509 cert. After being enabled, go to **Network > VPN > Certifications** page to import a ta.key to **TA** field. **Note:** this option only supports tls-auth. For tls-crypt, please add this format string on expert option: tls-crypt /etc/openvpn/openvpn-client1-ta.key
Compression	Select to enable or disable LZO to compress data.
Link Detection Interval (s)	Set link detection interval time to ensure tunnel connection. If this is set on both server and client, the value pushed from server will override the client local values. Range: 10-1800 s.
Link Detection Timeout (s)	OpenVPN will be reestablished after timeout. If this is set on both server and client, the value pushed from server will override the client local values. Range: 60-3600 s.
Cipher	Select from NONE, BF-CBC, DES-CBC, DES-EDE3-CBC, AES-128-CBC,

	AES-192-CBC and AES-256-CBC.
MTU	Enter the maximum transmission unit. Range: 64-1500.
Max Frame Size	Set the maximum frame size. Range: 64-1500.
Verbose Level	Select from ERROR, WARING, NOTICE and DEBUG.
Expert Options	User can enter some initialization strings in this field and separate the strings with semicolon. **Example:** ncp-ciphers AES-128-GCM; key direction 1
Account	
Username & Password	Set username and password for OpenVPN client when authentication type is username/password.
Local Route	
Subnet	Set the local route's IP address.
Subnet Mask	Set the local route's netmask.
Client Subnet	
Name	Set the name as OpenVPN client certificate common name.
Subnet	Set the subnet of OpenVPN client.
Subnet Mask	Set the subnet netmask of OpenVPN client.

Table 3-4-6-12 OpenVPN Server Parameters

3.4.6.8 Certifications

When working as OpenVPN server, OpenVPN client or IPsec Server, user can import/export necessary certificate and key files to this page according to the authentication types.

Figure 3-4-6-15

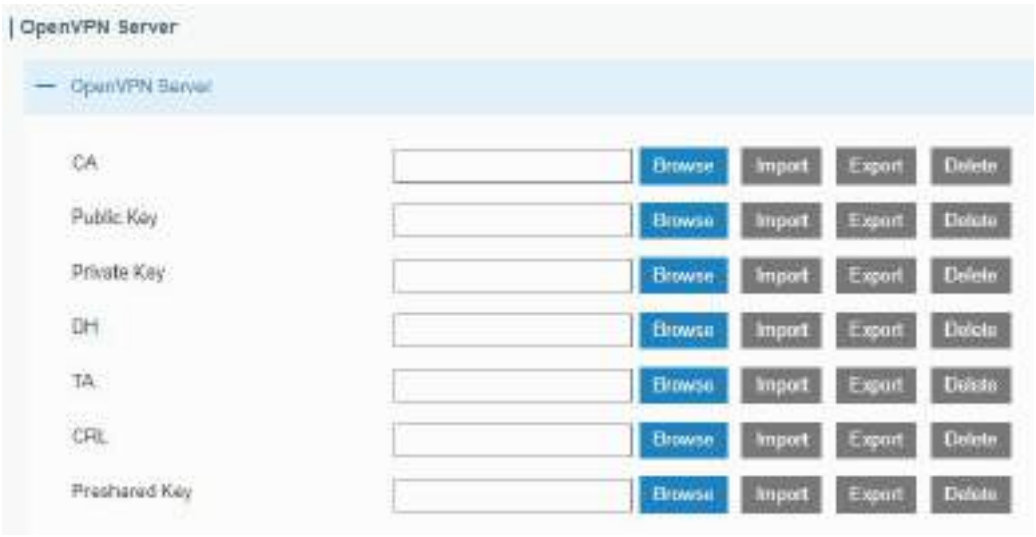


Figure 3-4-6-16

Figure 3-4-6-17

3.5 System

This section describes how to configure general settings, such as administration account, access service, system time, common user management, SNMP, event alarms, etc.

3.5.1 General Settings

3.5.1.1 General

General settings include system info, access service and HTTPS certificates.

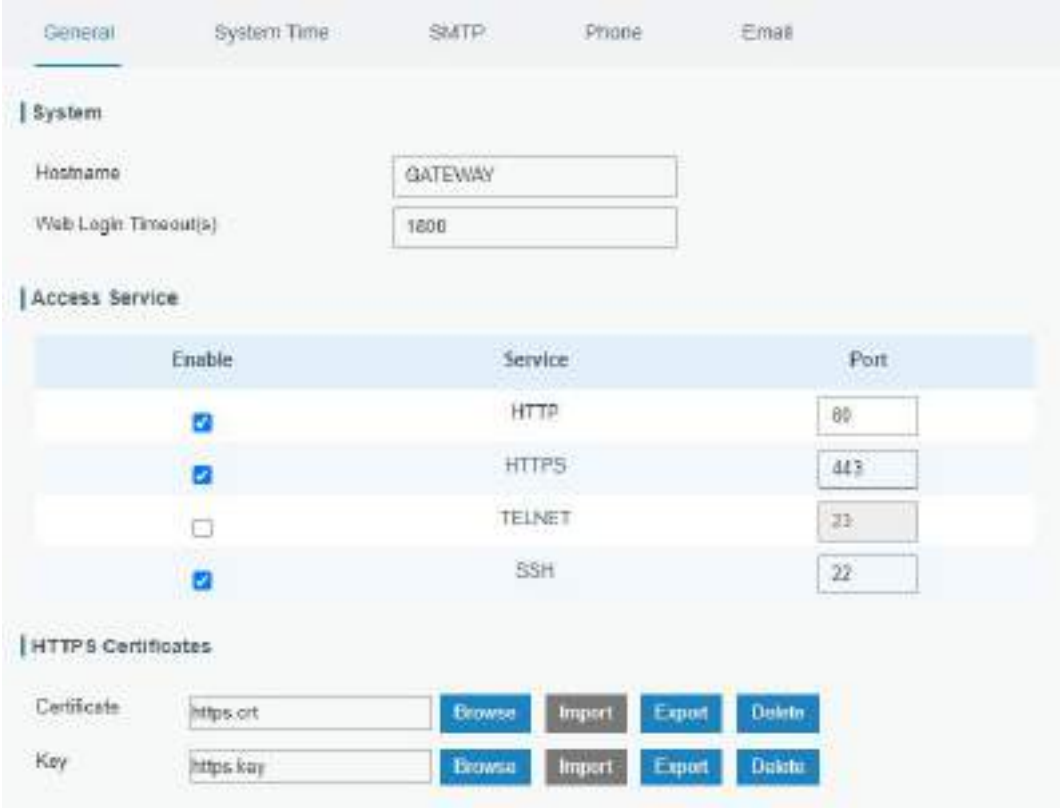


Figure 3-5-1-1

General		
Item	**Description**	**Default**
System		
Hostname	User-defined gateway name, needs to start with a letter.	GATEWAY
Web Login Timeout (s)	You need to log in again if it times out. Range: 100-3600.	1800
Access Service		
Port	Set port number of the services. Range: 1-65535.	--
HTTP	Users can log in the device locally via HTTP to access and control it through Web after the option is checked.	80
HTTPS	Users can log in the device locally and remotely via HTTPS to access and control it through Web after option is checked.	443
TELNET	Users can log in the device locally and remotely via TELNET to access and control it through Web after option is checked.	23
SSH	Users can log in the device locally and remotely via SSH after the option is checked.	22
HTTPS Certificates		
Certificate	Click "Browse" button, choose certificate file on the PC, and then click "Import" button to upload the file into gateway. Click "Export" button will export the file to the PC. Click "Delete" button will delete the file.	--

Key	Click "Browse" button, choose key file on the PC, and then click "Import" button to upload the file into gateway. Click "Export" button will export file to the PC. Click "Delete" button will delete the file.	--

Table 3-5-1-1 General Setting Parameters

3.5.1.2 System Time

This section explains how to set the system time including time zone and time synchronization type.

Note: to ensure that the gateway runs with the correct time, it's recommended that you set the system time when configuring the gateway.

Figure 3-5-1-2

System Time	
Item	**Description**
Current Time	Show the current system time.
Time Zone	Click the drop down list to select the time zone you are in.
Sync Type	Click the drop down list to select the time synchronization type. **Sync with Browser:** Synchronize time with browser. **Sync with NTP Server:** Synchronize time with NTP Server. **Set up Manually:** configure the time manually.
Sync with NTP Server	
NTP Server Address	Set NTP server address (domain name/IP).
Enable NTP Server	After checked, NTP client on the network can achieve time synchronization with gateway.

Table 3-5-1-2 System Time Parameters

3.5.1.3 SMTP

SMTP, short for Simple Mail Transfer Protocol, is a TCP/IP protocol used in sending and receiving e-mail. This section describes how to configure email settings.

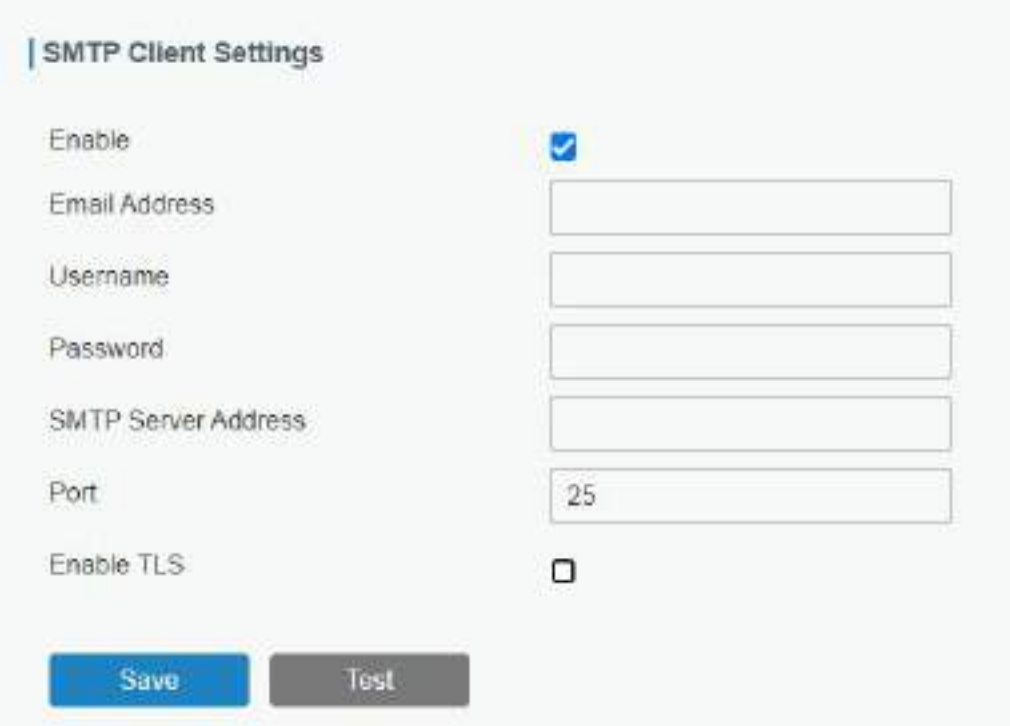


Figure 3-5-1-3

SMTP	
Item	**Description**
SMTP Client Settings	
Enable	Enable or disable SMTP client function.
Email Address	Enter the sender's email address.
Username	Enter the sender's email username.
Password	Enter the sender's email password.
SMTP Server Address	Enter SMTP server's domain name.
Port	Enter SMTP server port. Range: 1-65535.
Enable TLS	Enable or disable TLS encryption.

Table 3-5-1-3 SMTP Setting

Related Topics

Events Setting

3.5.1.4 Phone

Phone settings involve in call/SMS trigger and SMS alarm for events. This is only applied to gateway with cellular feature.

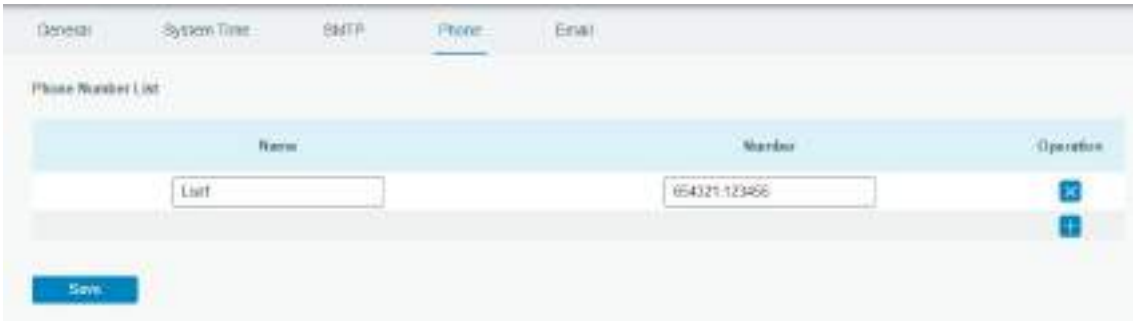


Figure 3-5-1-4

Phone	
Item	**Description**
Phone Number List	
Name	Set phone group name.
Number	Enter the telephone number. Digits, "+" and "-" are allowed. You can divide multiple numbers by ";".

Table 3-5-1-4 Phone Settings

Related Topic

Connect on Demand

3.5.1.5 Email

Email settings involve email alarm for events.

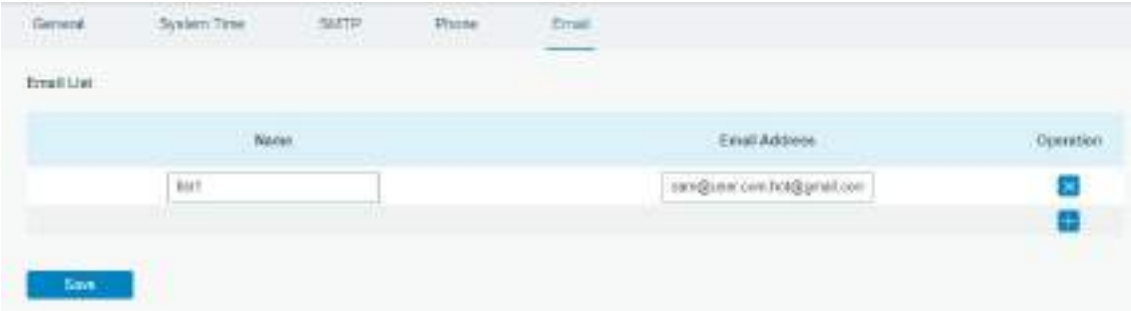


Figure 3-5-1-5

Email	
Item	**Description**
Email List	
Name	Set Email group name.
Email Address	Enter the Email address. You can divide multiple Email addresses by ";".

Table 3-5-1-5 Email Settings

3.5.2 User Management

3.5.2.1 Account

Here you can change the login username and password of the administrator.

Note: it is strongly recommended that you modify them for the sake of security.

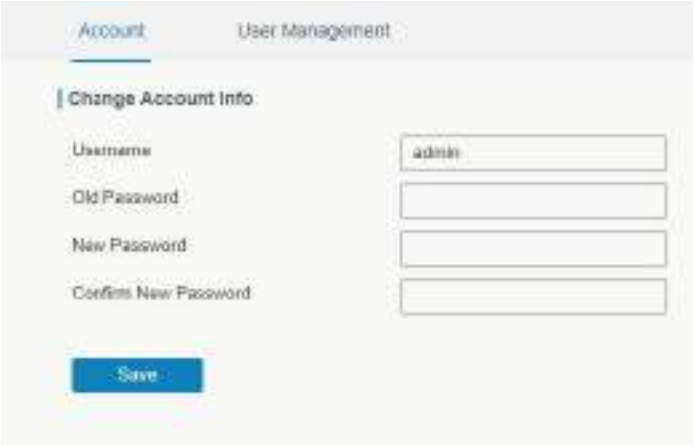


Figure 3-5-2-1

Account	
Item	**Description**
Username	Enter a new username. You can use characters such as a-z, 0-9, "_", "-", "$". The first character can't be a digit.
Old Password	Enter the old password.
New Password	Enter a new password. You can use any ASCII characters except blank.
Confirm New Password	Enter the new password again.

Table 3-5-2-1 Account Information

3.5.2.2 User Management

This section describes how to create common user accounts.

The common user permission includes Read-Only and Read-Write.

Figure 3-5-2-2

User Management	
Item	**Description**
Username	Enter a new username. You can use characters such as a-z, 0-9, "_", "-". The first character can't be a digit.
Password	Set password. You can use any ASCII characters except

	blank.
Permission	Select user permission from “Read-Only” and “Read-Write”. - Read-Only: users can only view the configuration of gateway in this level. - Read-Write: users can view and set the configuration of gateway in this level.

Table 3-5-2-2 User Management

3.5.3 SNMP

SNMP is widely used in network management for network monitoring. SNMP exposes management data with variables form in managed system. The system is organized in a management information base (MIB) which describes the system status and configuration. These variables can be remotely queried by managing applications.

Configuring SNMP in networking, NMS, and a management program of SNMP should be set up at the Manager.

Configuration steps are listed as below for achieving query from NMS:

1. Enable SNMP setting.
2. Download MIB file and load it into NMS.
3. Configure MIB View.
4. Configure VCAM.

3.5.3.1 SNMP

UG65 supports SNMPv1, SNMPv2c and SNMPv3 version. SNMPv1 and SNMPv2c employ community name authentication. SNMPv3 employs authentication encryption by username and password.

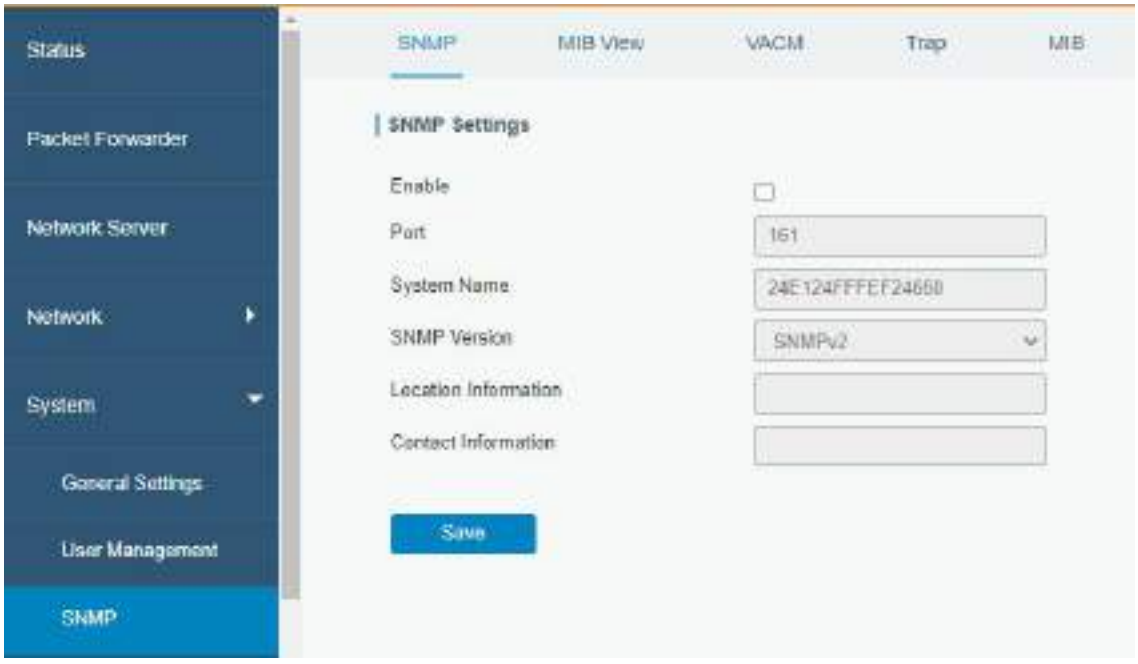


Figure 3-5-3-1

SNMP Settings	
Item	**Description**
Enable	Enable or disable SNMP function.
Port	Set SNMP listened port. Range: 1-65535. The default port is 161.
System Name	Fill in the system name to represent the gateway.
SNMP Version	Select SNMP version; support SNMP v1/v2c/v3.
Location Information	Fill in the location information.
Contact Information	Fill in the contact information.

Table 3-5-3-1 SNMP Parameters

3.5.3.2 MIB View

This section explains how to configure MIB view for the objects.

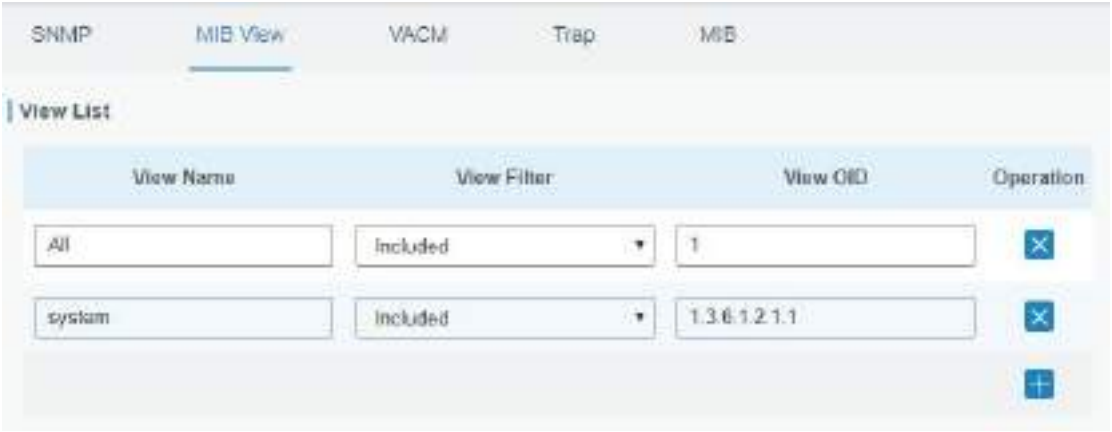


Figure 3-5-3-2

MIB View	
Item	**Description**
View Name	Set MIB view's name.
View Filter	Select from "Included" and "Excluded".
View OID	Enter the OID number.
Included	You can query all nodes within the specified MIB node.
Excluded	You can query all nodes except for the specified MIB node.

Table 3-5-3-2 MIB View Parameters

3.5.3.3 VACM

This section describes how to configure VCAM parameters.

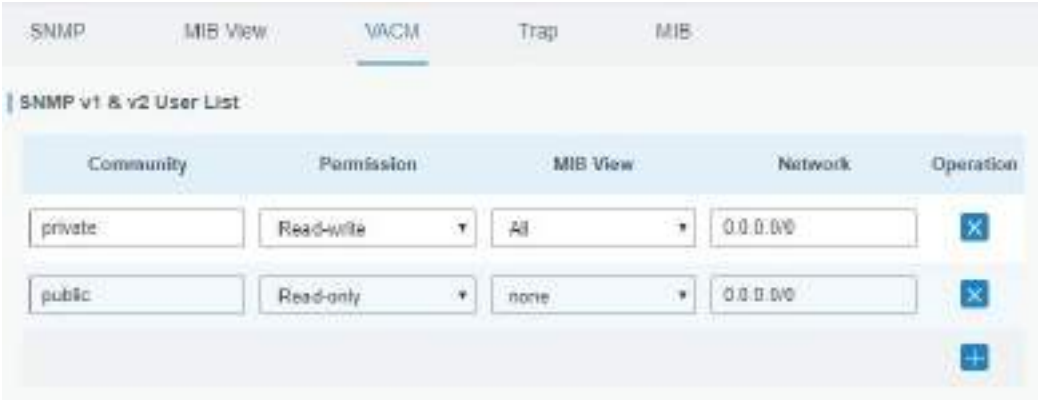


Figure 3-5-3-3

VACM	
Item	**Description**
SNMP v1 & v2 User List	
Community	Set the community name.
Permission	Select from "Read-Only" and "Read-Write".
MIB View	Select an MIB view to set permissions from the MIB view list.
Network	The IP address and bits of the external network accessing the MIB view.
Read-Write	The permission of the specified MIB node is read and write.
Read-Only	The permission of the specified MIB node is read only.
SNMP v3 User List	
Group Name	Set the name of SNMPv3 group.
Security Level	Select from "NoAuth/NoPriv", "Auth/NoPriv", and " Auth/Priv".
Read-Only View	Select an MIB view to set permission as "Read-only" from the MIB view list.
Read-Write View	Select an MIB view to set permission as "Read-write" from the MIB view list.
Inform View	Select an MIB view to set permission as "Inform" from the MIB view list.

Table 3-5-3-3 VACM Parameters

3.5.3.4 Trap

This section explains how to enable network monitoring by SNMP trap.

Figure 3-5-3-4

SNMP Trap	
Item	**Description**
Enable	Enable or disable SNMP Trap function.
SNMP Version	Select SNMP version; support SNMP v1/v2c/v3.
Server Address	Fill in NMS's IP address or domain name.
Port	Fill in UDP port. Port range is 1-65535. The default port is 162.
Name	Fill in the group name when using SNMP v1/v2c; fill in the username when using SNMP v3.
Auth/Priv Mode	Select from "NoAuth & No Priv", "Auth & NoPriv", and "Auth & Priv".

Table 3-5-3-4 Trap Parameters

3.5.3.5 MIB

This section describes how to download MIB files.

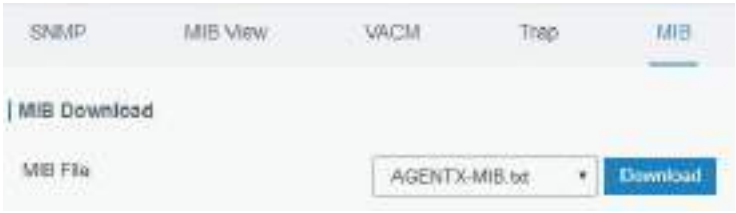


Figure 3-5-3-5

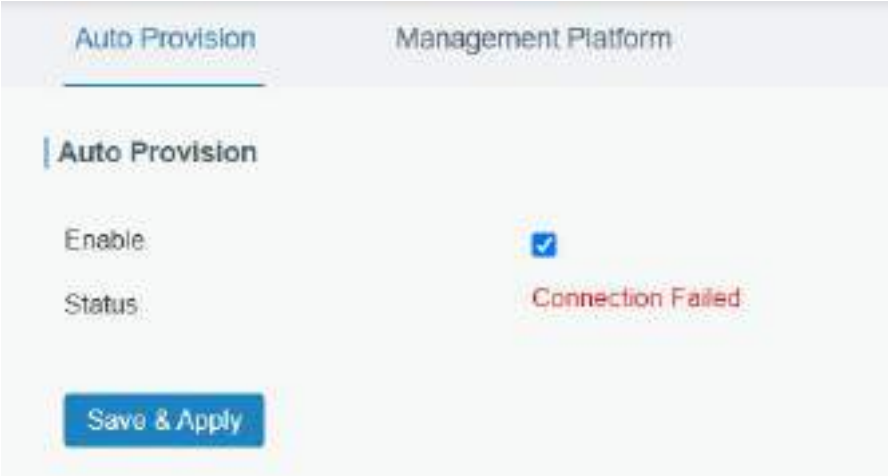
MIB	
Item	**Description**
MIB File	Select the MIB file you need.
Download	Click "Download" button to download the MIB file to PC.

Table 3-5-3-5 MIB Download

3.5.4 Device Management

3.5.4.1 Auto Provision

Users can customize and select the configuration profile from Milesight Development Platform. When Auto Provision is enabled and the device is connected to Internet, the device will receive the profile to achieve initial configuration. This feature will work even the device does not configure to connect Milesight Development Platform.



3.5.4.2 Management Platform

You can connect the device to the DeviceHub or Milesight Development Platform on this page so as to manage the gateway centrally and remotely.

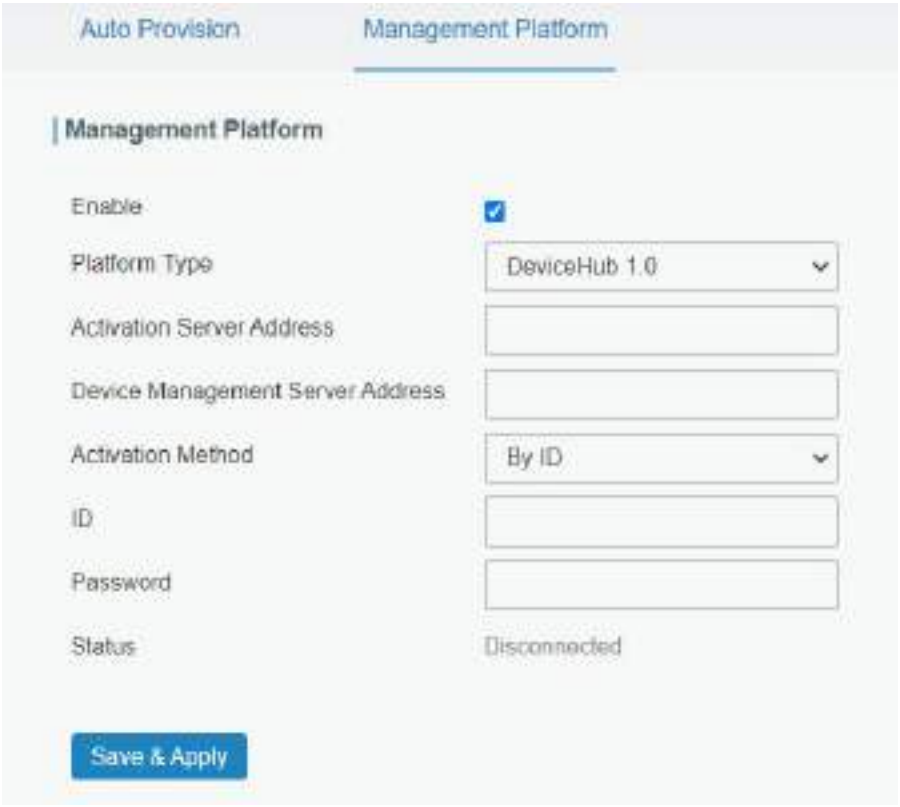


Figure 3-5-4-1

Management Platform	
Item	**Description**
Enable	Enable or disable to connect gateway to management platform.
Platform Type	Milesight DeviceHub 1.0 or Milesight Development Platform is optional.

Status	Show the connection status between the gateway and the management platform.
DeviceHub 1.0	
Activation Server Address	IP address or domain of the DeviceHub.
DeviceHub Management Address	The URL address for the device to connect to the DeviceHub, e.g. http://220.82.63.79:8080/acs.
Activation Method	Select activation method to connect the gateway to the DeviceHub server, options are "By Authentication ID" and "By ID".
Authentication Code	Fill in the authentication code generated from the DeviceHub.
ID	Fill in the registered DeviceHub account (email) and password.
Password	

Table 3-5-4-1

3.5.5 Events

Event feature is capable of sending alerts by Email when certain system events occur.

3.5.5.1 Events

You can view alarm messages on this page.

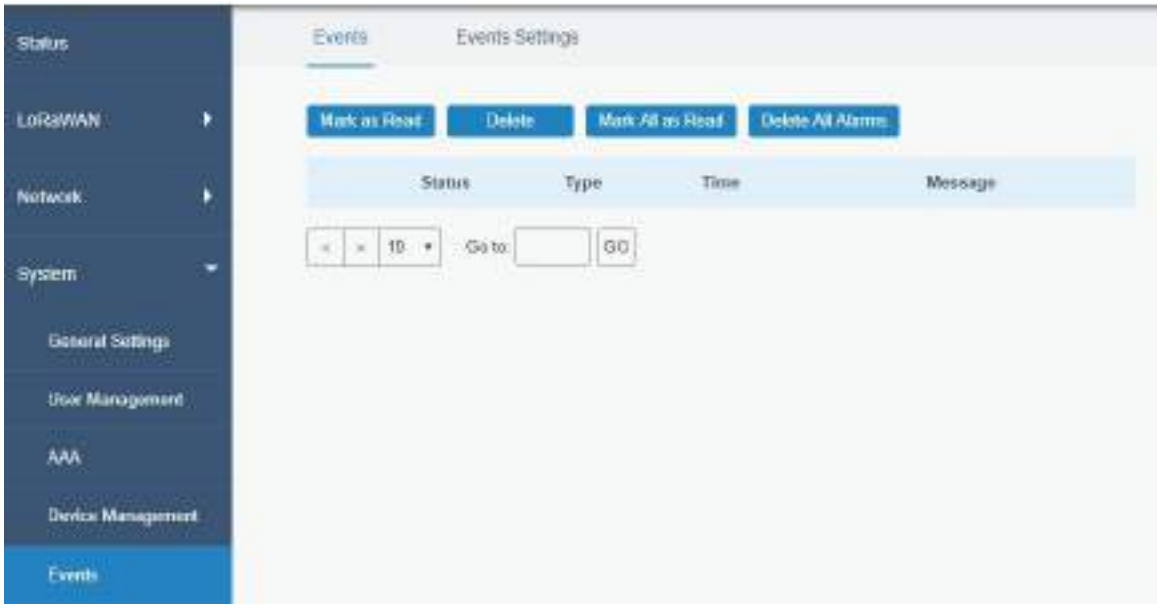


Figure 3-5-5-1

Events	
Item	**Description**
Mark as Read	Mark the selected event alarm as read.
Delete	Delete the selected event alarm.
Mark All as Read	Mark all event alarms as read.
Delete All Alarms	Delete all event alarms.

Status	Show the reading status of the event alarms.
Type	Show the event type that should be alarmed.
Time	Show the alarm time.
Message	Show the alarm content.

Table 3-5-5-1 Events Parameters

3.5.5.2 Events Settings

In this section, you can decide what events to record and whether you want to receive email and SMS notifications when any change occurs.

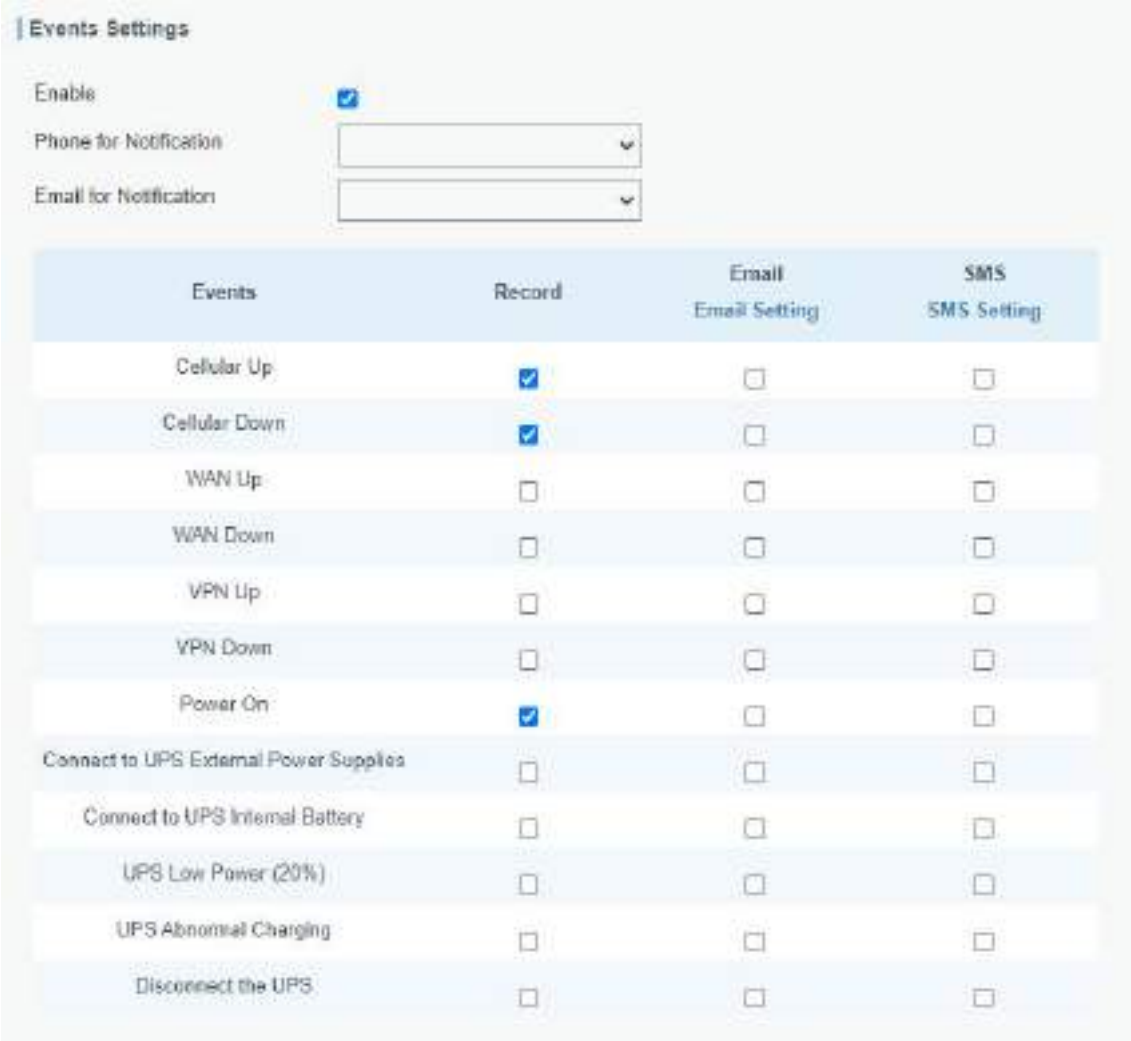


Figure 3-5-5-2

Event Settings	
Item	**Description**
Enable	Check to enable "Events Settings".
Phone for Notification	Select phone group to receive SMS alarm.
Email for Notification	Select Email group to receive Email alarm.
Events	Event type the gateway supports to record.

Record	The relevant content of event alarm will be recorded on "Event" page if this option is checked.
Email	The relevant content of event alarm will be sent out via email if this option is checked.
Email Setting	Click and you will be redirected to the page "Email" to configure the Email group.
SMS	The relevant content of event alarm will be sent out via SMS if this option is checked.
SMS Setting	Click and you will be redirected to the page of "Phone" to configure phone group list.
Phone Group List	Select phone group to receive SMS alarm.
Email Group List	Select Email group to receive Email alarm.

Table 3-5-5-2 Events Parameters

Related Topics

Email Setting

Phone Setting

3.6 Maintenance

This section describes system maintenance tools and management.

3.6.1 Tools

Troubleshooting tools includes ping and traceroute.

3.6.1.1 Ping

Ping tool is engineered to ping outer network.

Figure 3-6-1-1

PING	
Item	**Description**
Host	Ping outer network from the gateway.

Table 3-6-1-1 IP Ping Parameters

3.6.1.2 Traceroute

Traceroute tool is used for troubleshooting network routing failures.

Figure 3-6-1-2

Traceroute	
Item	**Description**
Host	Address of the destination host to be detected.

Table 3-6-1-2 Traceroute Parameters

3.6.1.3 Qxdmlog

This section allow collecting diagnostic logs of cellular module via QXDM tool.

Figure 3-6-1-3

3.6.2 Schedule

This section explains how to configure scheduled reboot on the gateway.

Figure 3-6-2-1

Schedule	
Item	**Description**
Schedule	Select schedule event:

	Reboot: Reboot the gateway regularly.
Frequency	Select the frequency to execute the schedule.
Hour & Minute	Select the time to execute the schedule.

Table 3-6-2-1 Schedule Parameters

3.6.3 Log

The system log contains a record of informational, error and warning events that indicates how the system processes. By reviewing the data contained in the log, an administrator or user troubleshooting the system can identify the cause of a problem or whether the system processes are loading successfully. Remote log server is feasible, and gateway will upload all system logs to remote log server such as Syslog Watcher.

3.6.3.1 System Log

This section describes how to download log file and view the recent log on web.

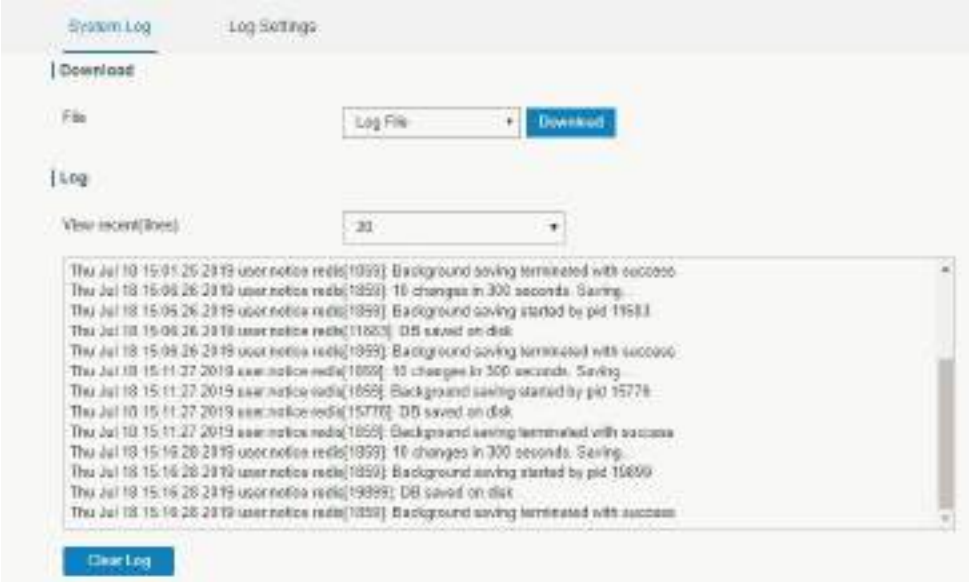


Figure 3-6-3-1

System Log	
Item	**Description**
Download	Download log file.
View recent (lines)	View the specified lines of system log.
Clear Log	Clear the current system log.

Table 3-6-3-1 System Log Parameters

3.6.3.2 Log Settings

This section explains how to enable remote log server and local log setting.

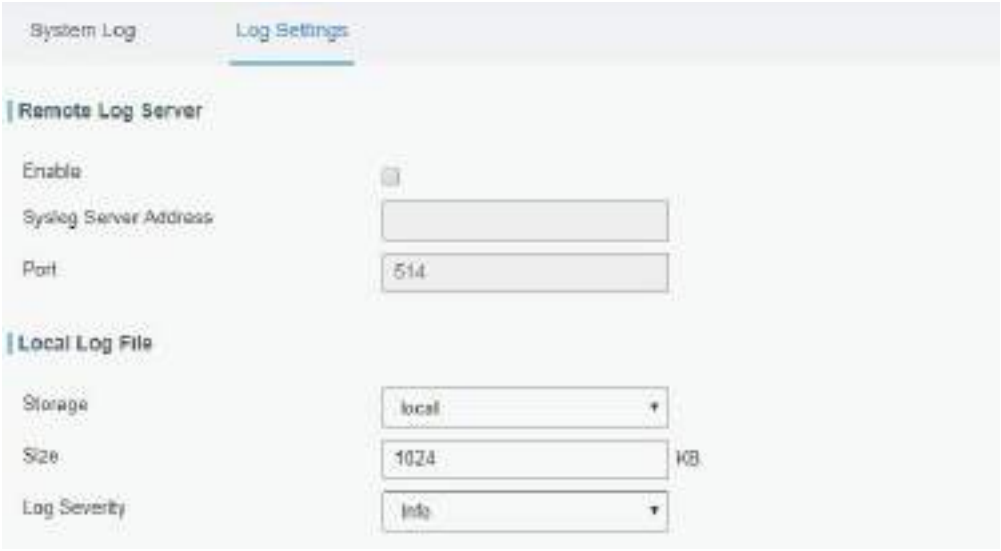


Figure 3-6-3-2

Log Settings	
Item	**Description**
Remote Log Server	
Enable	With “Remote Log Server” enabled, gateway will send all system logs to the remote server.
Syslog Server Address	Fill in the remote system log server address (IP/domain name).
Port	Fill in the remote system log server port.
Local Log File	
Storage	User can store the log file in memory.
Size	Set the size of the log file to be stored.
Log Severity	The list of severities follows the syslog protocol.

Table 3-6-3-2 System Log Parameters

3.6.4 Upgrade

This section describes how to upgrade the gateway firmware via web. Generally you don’t need to do the firmware upgrade.

Note: any operation on web page is not allowed during firmware upgrade, otherwise the upgrade will be interrupted, or even the device will break down.

Figure 3-6-4-1

Upgrade	
Item	**Description**
Firmware Version	Show the current firmware version.
Reset Configuration to Factory Default	When this option is checked, the gateway will be reset to factory defaults after upgrade.
Upgrade Firmware	Click "Browse" button to select the new firmware file, and click "Upgrade" to upgrade firmware.

Table 3-6-4-1 Upgrade Parameters

Related Configuration Example

Firmware Upgrade

3.6.5 Backup and Restore

This section explains how to create a backup of the whole system configurations to a file, replicate parts of important configuration only for batch backup, restore the config file to the gateway and reset to factory defaults.

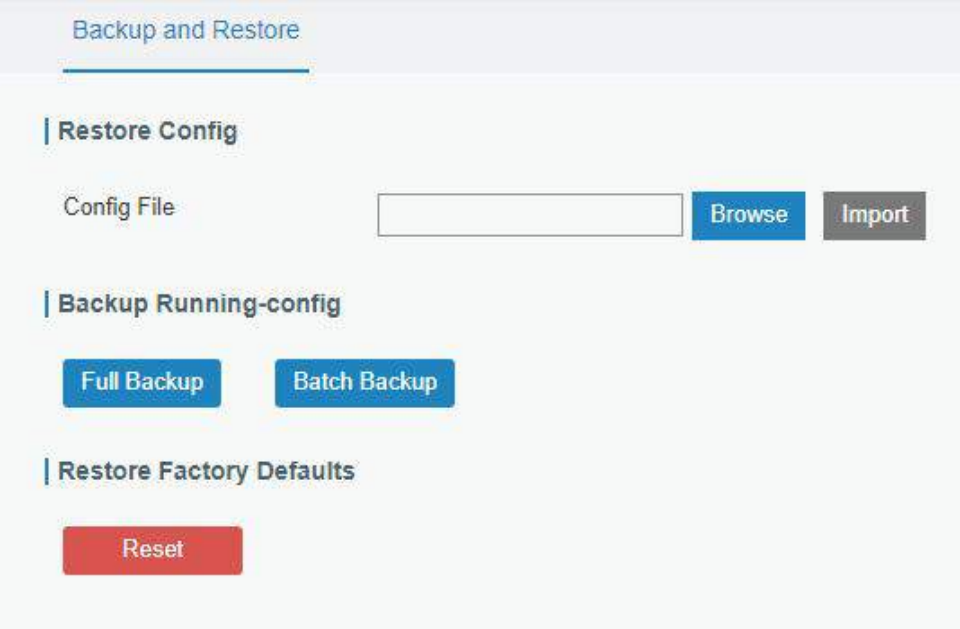


Figure 3-6-5-1

Backup and Restore	
Item	**Description**
Config File	Click "Browse" button to select configuration file, and then click "Import" button to upload the configuration file to the gateway.
Full Backup	Click "Full Backup" to export the current configuration file to the PC.
Batch Backup	Click “Batch Backup” to export current configuration except gateway ID of packet forwarder, all embedded NS settings, static IP address of WAN, WLAN settings, user management settings, DeviceHub authentication code, all APP settings.
Reset	Click "Reset" button to reset factory default settings. gateway will restart after reset process is done.

Table 3-6-5-1 Backup and Restore Parameters

Related Configuration Example

Restore Factory Defaults

3.6.6 Reboot

On this page you can reboot the gateway and return to the login page. We strongly recommend clicking “Save” button before rebooting the gateway so as to avoid losing the new configuration.

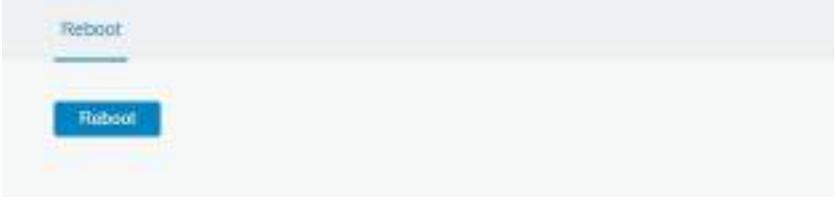


Figure 3-6-6-1

3.7 APP

3.7.1 Python

Python is an object-oriented programming language that has gained popularity because of its clear syntax and readability.

As an interpreted language, Python has a design philosophy that emphasizes code readability, notably using whitespace indentation to delimit code blocks rather than curly brackets or keywords, and a syntax that allows programmers to express concepts in fewer lines of code than it's used in other languages such as C++ or Java. The language provides constructs and intends to enable writing clear programs on both small and large scale.

Users can use Python to quickly generate the prototype of the program, which can be the final interface of the program, rewrite it with a more appropriate language, and then encapsulate the extended class library that Python can call.

This section describes how to view the relevant running status such as App-manager, SDK version, extended storage, etc. Also you can change the App-manager configuration, and import the Python App package from here.

3.7.1.1 Python

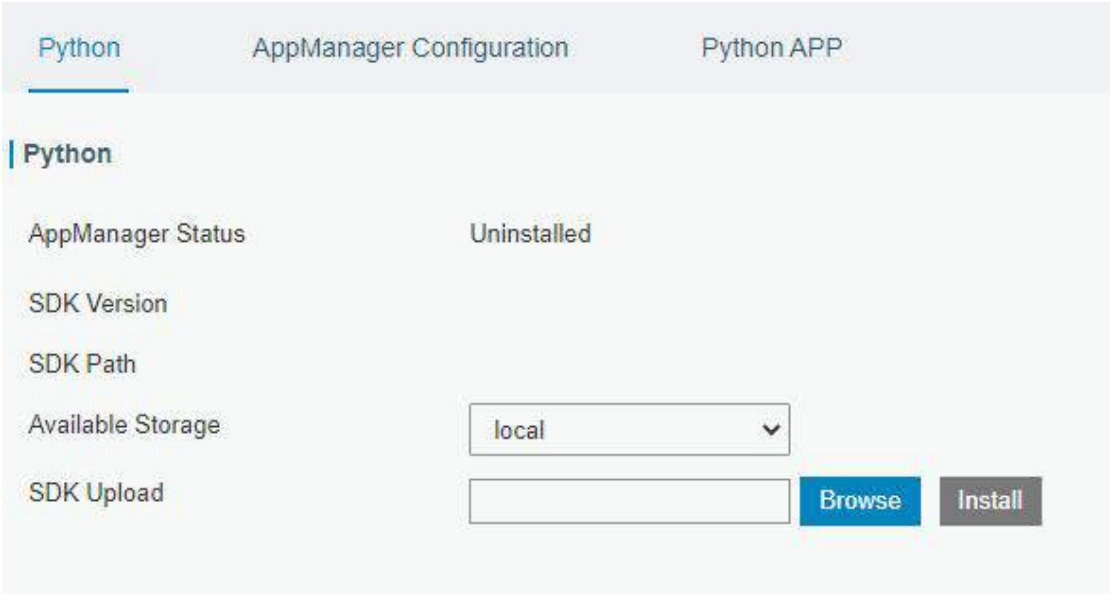


Figure 3-7-1-1

Python	
Item	**Description**
AppManager Status	Show AppManager's running status, like "Uninstalled", "Running" or "Stopped".
SDK Version	Show the version of the installed SDK.
SDK Path	Show the SDK installation path.
Available Storage	Select available storage to install SDK.
SDK Upload	Upload and install SDK for Python.

Uninstall	Uninstall SDK.
View	View application status managed by AppManager.

Table 3-7-1-1 Python Parameters

3.7.1.2 App Manager Configuration

Figure 3-7-1-2

AppManager Configuration	
Item	**Description**
Enable	After enabling Python AppManager, user can click "View" button on the "Python" webpage to view the application status managed by AppManager.
App Management	
ID	Show the ID of the imported App.
App Command	Show the name of the imported App.
Logfile Size(MB)	User-defined Logfile size. Range: 1-50.
Uninstall	Uninstall APP.
App Status	
App Name	Show the name of the imported App.
App Version	Show the version of the imported App.
SDK Version	Show the SDK version which the imported App is based on.

Table 3-7-1-2 APP Manager Parameters

3.7.1.3 Python App

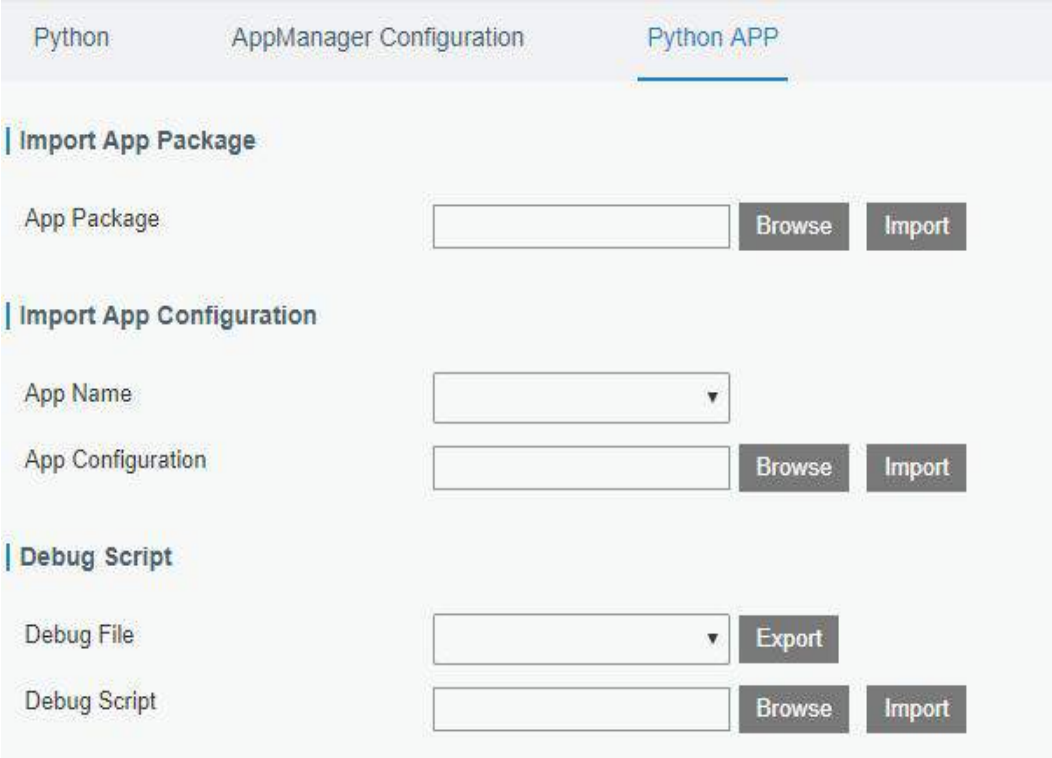


Figure 3-7-1-3

Python APP	
Item	**Description**
App Package	Select App package and import.
App Name	Select App to import configuration.
App Configuration	Select configuration file and import.
Debug File	Export script file.
Debug Script	Select Python script to be debugged and import.

Table 3-7-1-3 APP Parameters

3.7.2 Node-RED

Node-RED is a flow-based development tool for visual programming and wiring together hardware devices, APIs and online services as part of the Internet of Things. Node-RED provides a web-browser-based flow editor, which can easily wire together flows using the wide range of nodes in the palette. For more guidance and documentation please refer to Node-RED official website.

3.7.2.1 Node-RED

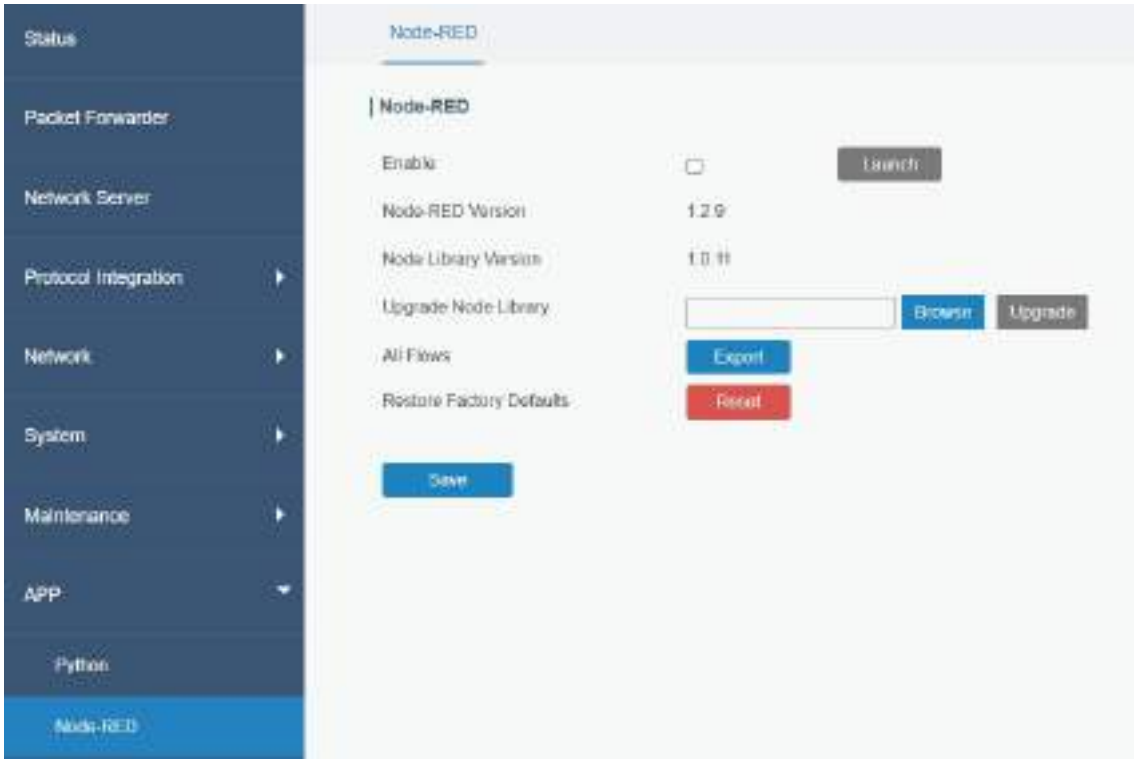


Figure 3-7-2-1

Node-RED	
Item	**Description**
Enable	Enable the Node-RED.
Launch	Click to launch the web GUI of Node-RED.
Node-RED Version	Show the version of the Node-RED. The Node-RED version can be upgraded only when you upgrade the gateway.
Node Library Version	Show the version of the node library.
Upgrade Node Library	Upgrade the node library by importing the library package.
All Flows Export	Export all flows as a JSON format file.
Restore Factory Default	Erase all flow data of Node-RED.

Table 3-7-2-1 Node-RED Parameters

Milesight provides a customized node library to use the interfaces of the gateway.

Figure 3-7-2-2

Node Library	
Node	**Description**
LoRa Input	Receive LoRaWAN® packets from the gateway. This only works when the network server is enabled.
LoRa Output	Send downlink commands to LoRaWAN® nodes.
Device Filter	Filter out the data of one or more specific LoRaWAN® nodes via device EUIs.
GW Info	Monitor events of gateway, this needs to ensure the event detection is enabled in **General > Events > Events Settings**.
Email Output	Send an Email. If you select STMP option as “Same as the gateway”, it is necessary to go to **System > General Settings > SMTP** page to configure SMTP client settings.
SMS Input	Receive SMS message. This only works when the cellular is connected.
SMS Output	Send an SMS message. This only works when the cellular is connected.

Table 3-7-2-2 Node Library Parameters

Related Configuration Example

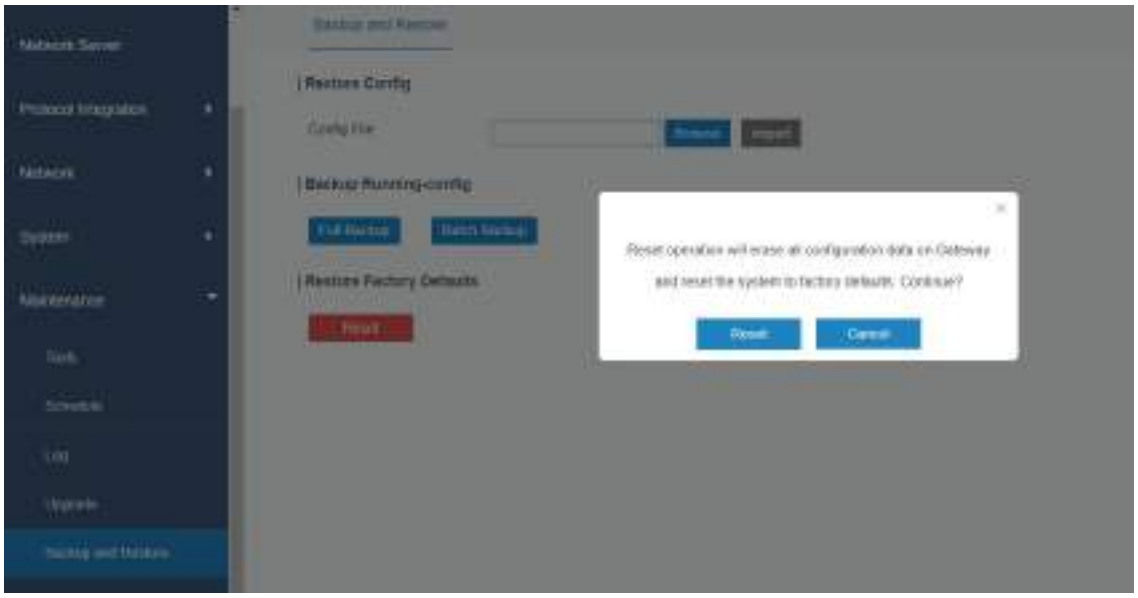
Node-RED

Chapter 4 Application Examples

4.1 Restore Factory Defaults

Method 1:

Log in web interface, and go to **Maintenance > Backup and Restore**, click **Reset** button, you will be asked to confirm if you'd like to reset it to factory defaults. Then click **Reset** button.



Then the gateway will reboot and restore to factory settings immediately.

Please wait till SYS light staticly and the login page pops up again, which means the gateway has already been reset to factory defaults successfully.

Related Topic

Restore Factory Defaults

Method 2:

Locate the reset button on the gateway, press and hold the reset button for more than 5s

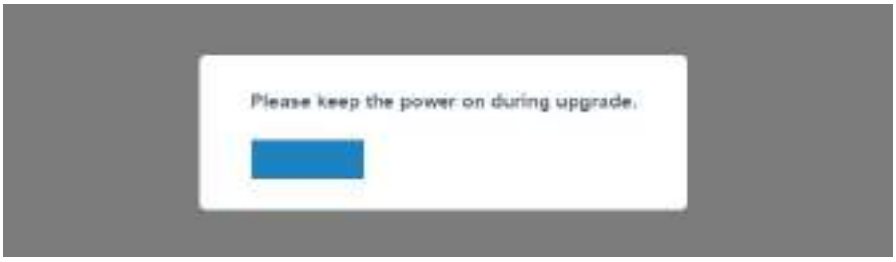
until the SYS LED blinks.

4.2 Firmware Upgrade

It is suggested that you contact Milesight technical support first before you upgrade gateway firmware. Gateway firmware file suffix is ".bin".

After getting firmware file please refer to the following steps to complete the upgrade.

1. Go to "Maintenance > Upgrade".
2. Click "Browse" and select the correct firmware file from the PC.
3. Click "Upgrade" and the gateway will check if the firmware file is correct. If it's correct, the firmware will be imported to the gateway, and then the gateway will start to upgrade.



Related Topic

Upgrade

4.3 Ethernet Connection

1. Go to "Network > Interface > Port" page to select the connection type and configure Ethernet port configuration, click "Save & Apply" for configuration to take effect.

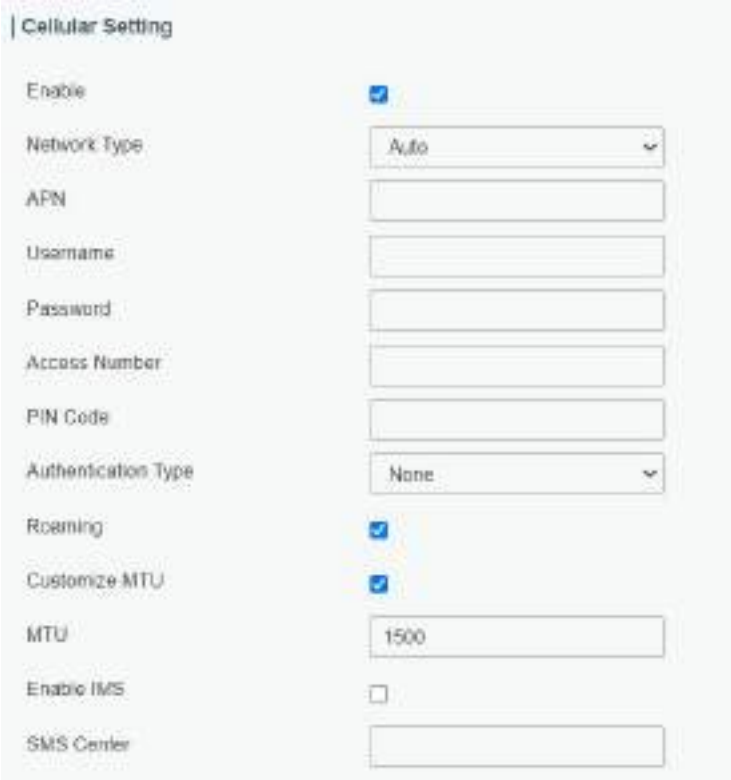
2. Connect Ethernet port of gateway to devices like router or modem.
3. Go to “Maintenance > Tools > Ping” to check network connectivity.

Related Topic

Port Setting

4.4 Cellular Connection (Cellular Version Only)

1. Go to “Network > Interface > Cellular > Cellular Setting” and configure the necessary cellular info of SIM card, lick “Save” and “Apply” for configuration to take effect.



2. Go to “Status > Cellular” to view the status of the cellular connection. If it shows 'Connected', SIM has dialed up successfully.

Related Topic

Cellular Setting

Cellular Status

4.5 Wi-Fi Application Example

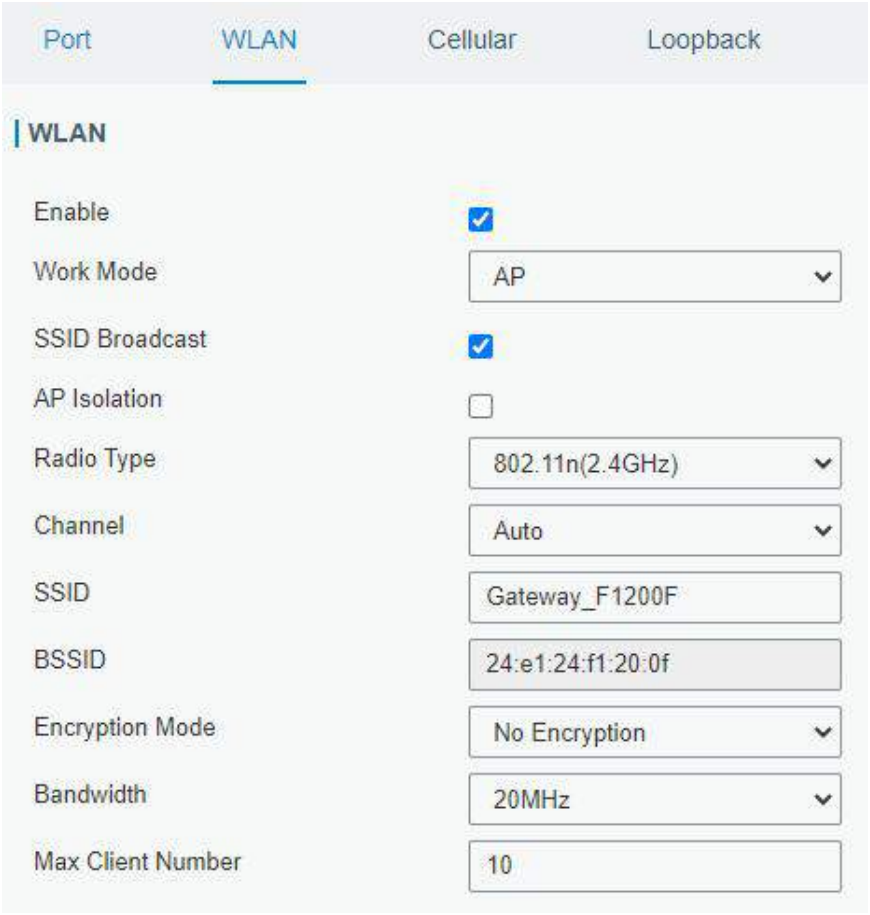
4.5.1 AP Mode

Application Example

Configure UG65 as AP to allow connection from users or devices.

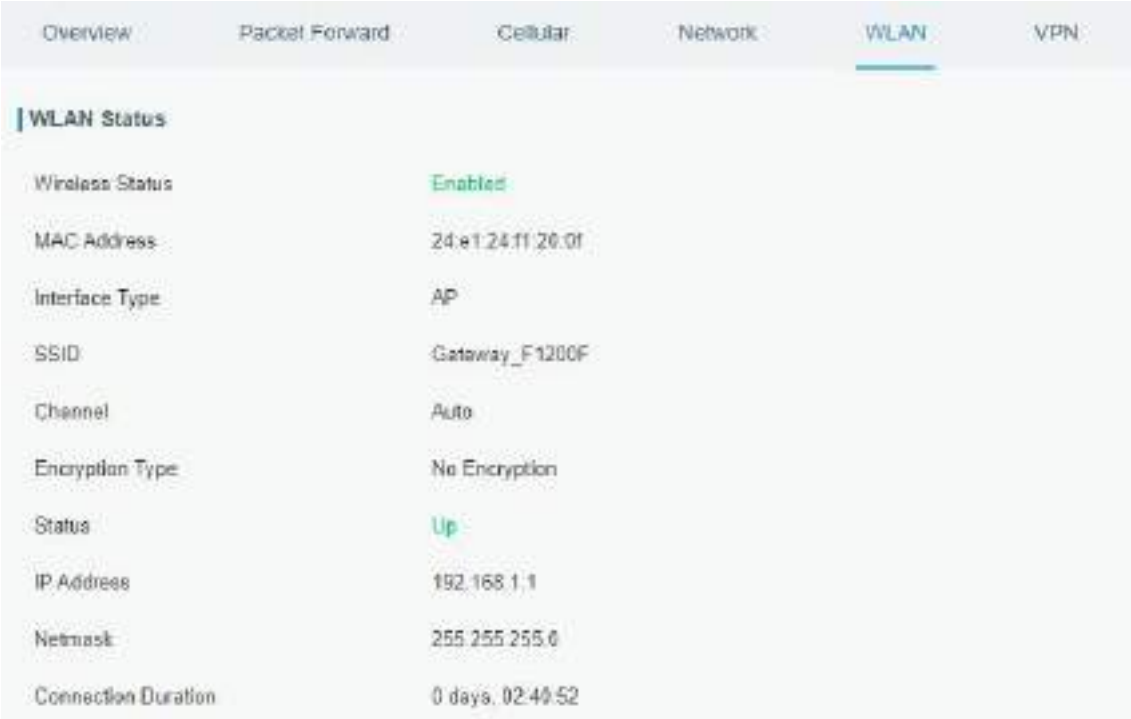
Configuration Steps

1. Go to “Network > Interface > WLAN” to configure wireless parameters as below.



Click “Save” and “Apply” buttons after all configurations are done.

2. Use a smart phone to connect the access point of gateway. Go to “Status > WLAN”, and you can check the AP settings and information of the connected client/user.



4.5.2 Client Mode

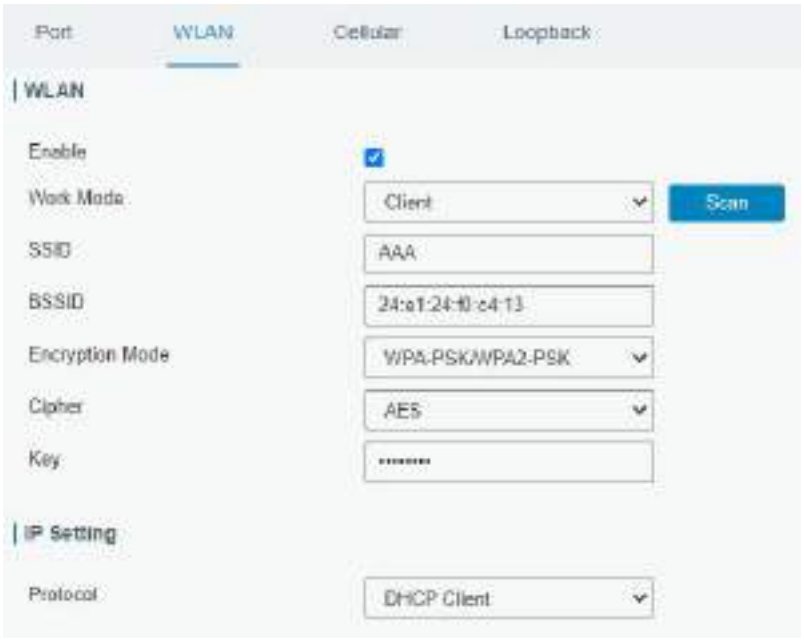
Application Example

Configure UG65 as Wi-Fi client to connect to an access point to have Internet access.

Configuration Steps

1. Go to “Network > Interface > WLAN” and click “Scan” to search for WiFi access point.

2. Select one access point and click “Join Network”, then type the password of the access point.



Click “Save” and “Apply” buttons after all configurations are done.

3. Go to “Status > WLAN”, and you can check the connection status of the client.

Related Topic

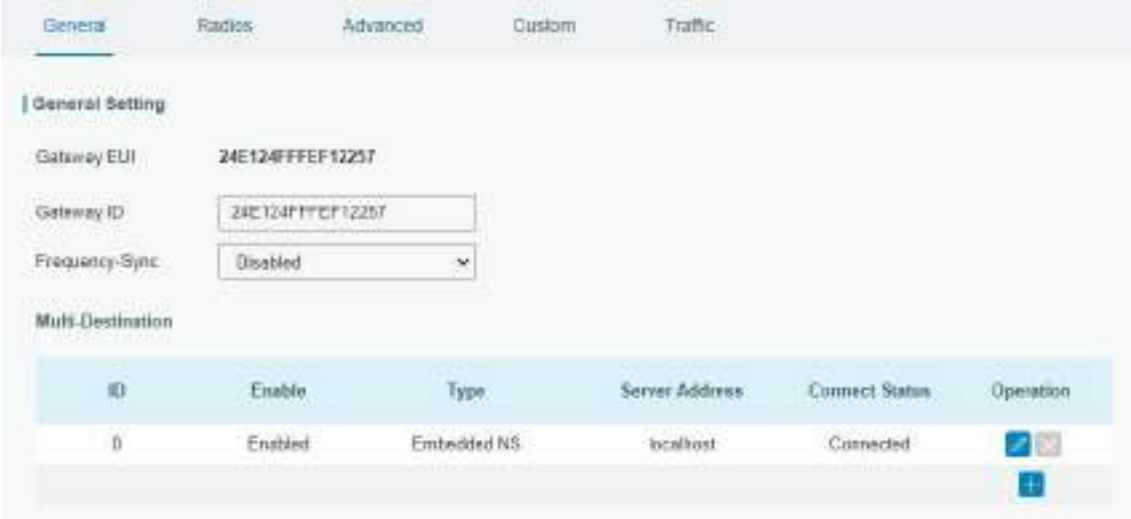
WLAN Setting

WLAN Status

4.6 Packet Forwarder Configuration

UG65 gateway has installed multiple packet forwarders including Semtech, Basic station, Chirpstack-Generic, etc. Before connecting make sure the gateway has connected to network.

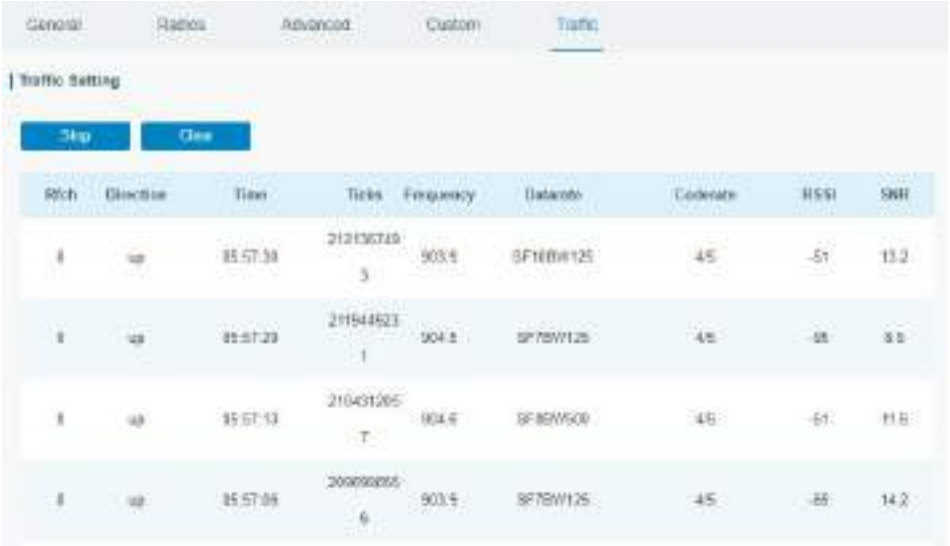
1. Go to “Packet Forwarder” > “General”.



2. Click  to add a new network server. Fill in the network server information and enable this server.

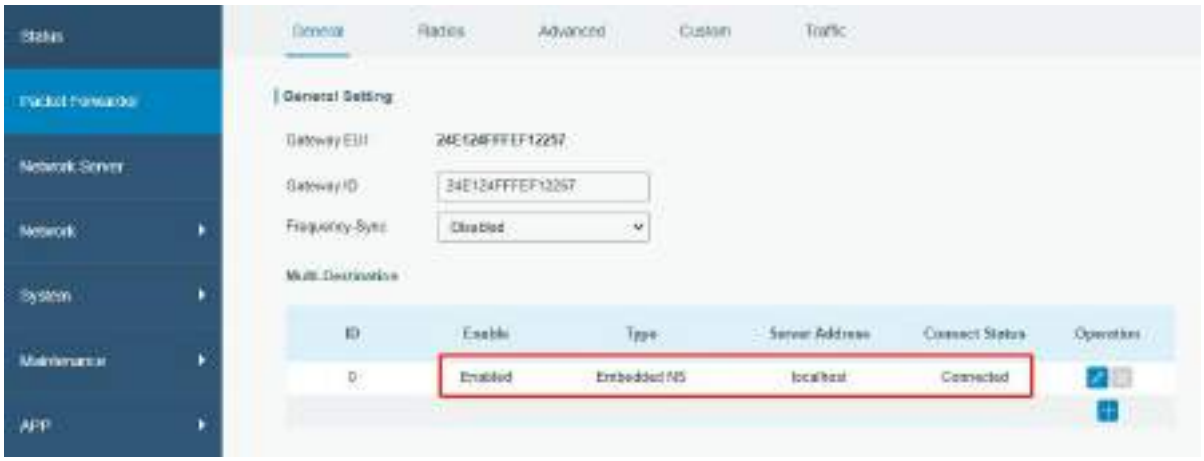
3. Go to “Packet Forwarder > Radio” page to configure antenna type, center frequency and channels. The channels of the gateway and network server need to be the same.

4. Add the gateway on network server page. For more details about the network server connection please refer to Milesight IoT Support portal.
5. Go to “Traffic” page to view the data communication of UG65.



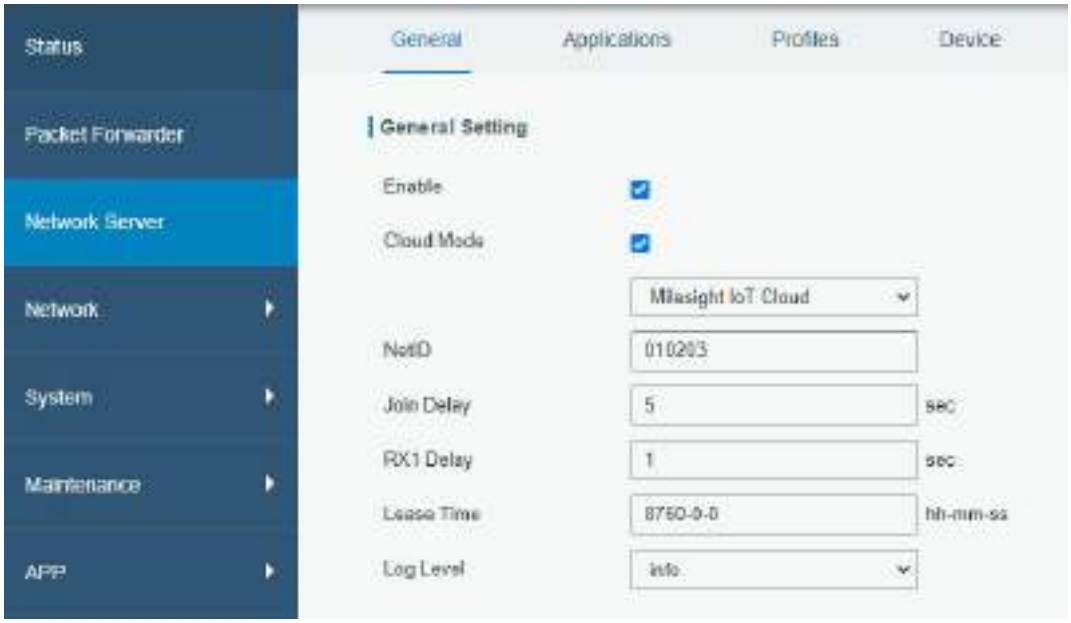
4.7 Connect to Milesight IoT Cloud

1. Go to “Packet Forwarder > General” page to enable the embedded network server.

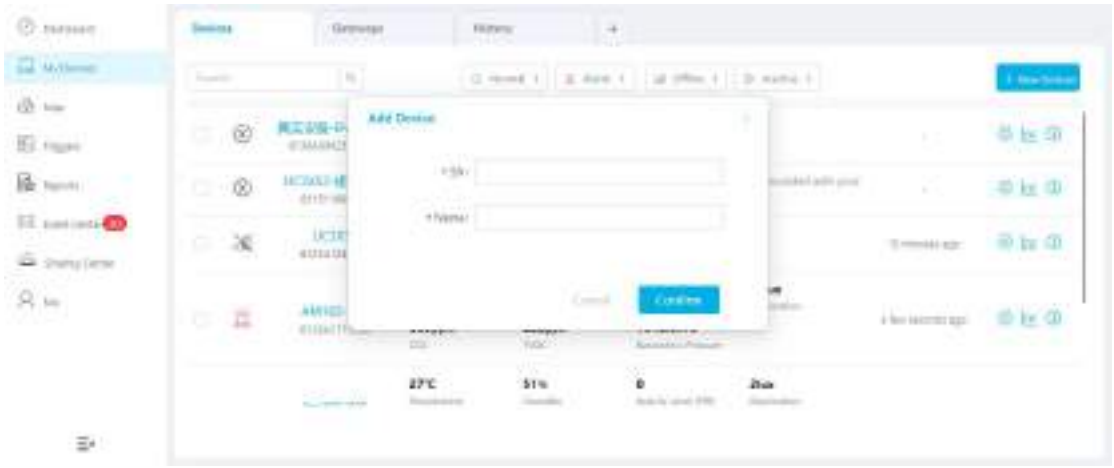


2. Go to “Packet Forwarder > Radio” page to select the antenna type, center frequency and channels. The channels of the gateway and nodes need to be the same.

3. Go to “Network Server > General” page to enable the network server and “Cloud mode”, then select “Milesight IoT Cloud”.



4. Log in the Milesight IoT Cloud. Then go to “My Devices” page and click “+New Devices” to add gateway to Milesight IoT Cloud via SN. Gateway will be added under “Gateways” menu.



5. The gateway is online on Milesight IoT Cloud.

4.8 Application Configuration

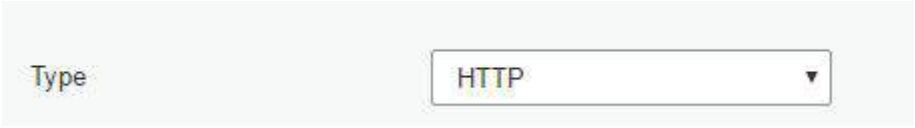
You can create a new application on this page, which is mainly used to define the method of decoding the data sent from end-device and choosing the data transport protocol to send data to another server address. The data will be sent to your custom server address using MQTT, HTTP or HTTPS protocol.

1. Go to “Network Server” > “Application”.
2. Click  to enter the configuration page, displayed as the following picture：

3. Click “Save” to create this application.
4. Click  to add a data transmission type.

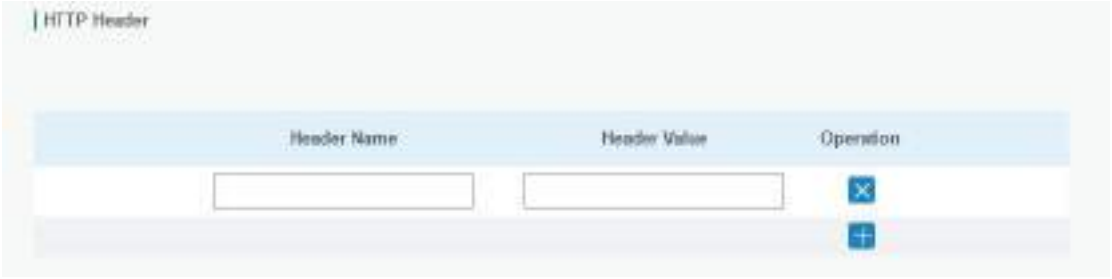
HTTP or HTTPS：

Step 1: select HTTP or HTTPS as transmission protocol.



Step 2: Enter the destination URL. Different types of data can be sent to different URLs.

Enter the header name and header value if there is user credentials when accessing the HTTP(s) server.



MQTT：

Step 1: select the transmission protocol as MQTT.

Step 2: Fill in MQTT broker general settings.

Step 3: Select the authentication method required by the server.

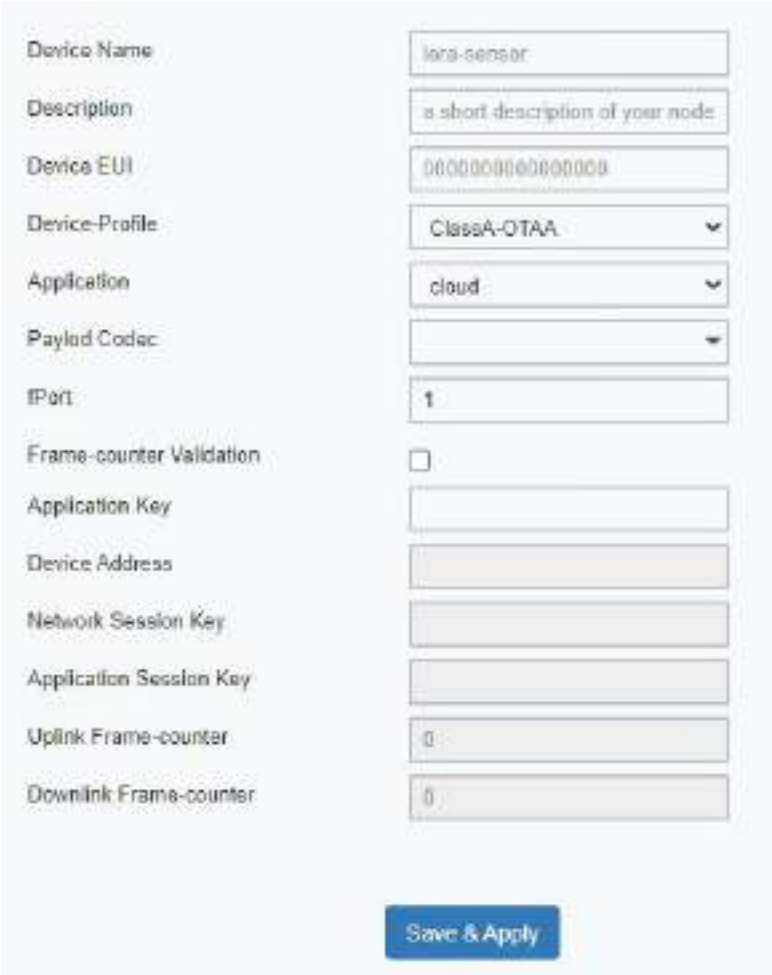
If you select user credentials for authentication, you need to enter the username and password for authentication.

If certificate is necessary for verification, please select mode and import CA certificate, client certificate and client key file for authentication.

Step 4: Enter the topic to receive data and choose the QoS.

4.9 Device Configuration

Go to “Device” page and click “Add” to add LoRaWAN® node devices. Please select correct device profile according to device type.



You can also click “Bulk Import” if you want to add many nodes all at once.

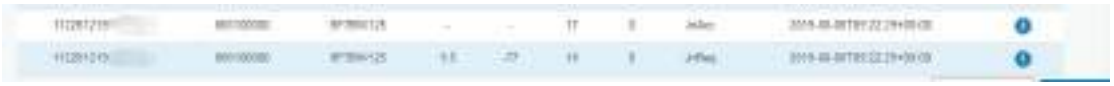
Click “Template Download” to download template file and add device information to this file. Application and device profile should be the same as you created on web page.

	A	B	C	D	E	F	G	H	I
1	name	description	devEui	application	deviceprofile	appKey	devAddr	appSKey	nwkSKey
2	24e124215[illegible]		24e124215[illegible]	cloud	ClassC-OTAA	11223344556677889[illegible]			
3									
4									
5									

Import this file to add bulks of devices.

4.10 Send Data to Device

1. Go to “Network Server” > “Packets”, check the packet in the network server list to make sure that the device has joined the network successful.



2. Fill in the device EUI or select the multicast group which you need to send downlinks. Then fill in the downlink commands, ports.

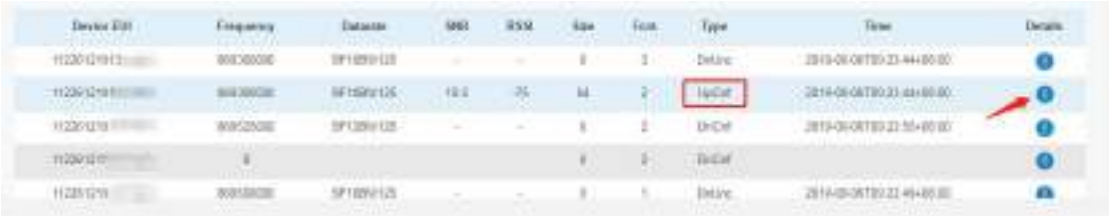
3. Click “Send”.

4. Check the packet in the network server list to make sure that the device has received this message successful. It’s suggested to enable “Confirmed”. Multicast feature does not support confirmed downlinks.

You can click “Refresh” to refresh the list or set automatic refreshing frequency for the list.
If the device’s class type is Class C, then the device will constantly receive packets.

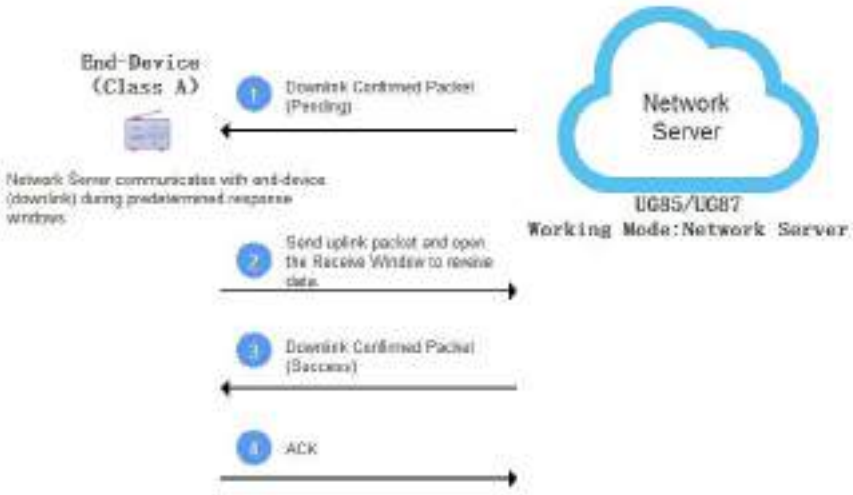
This packet’s type is DnCnf (Downlink Confirmed Packet) and if the packet’s color is gray, then it means the packet cannot be transmitted now because at least one message has been in the queue. If the packet record is white, it means the packet has been delivered successfully.

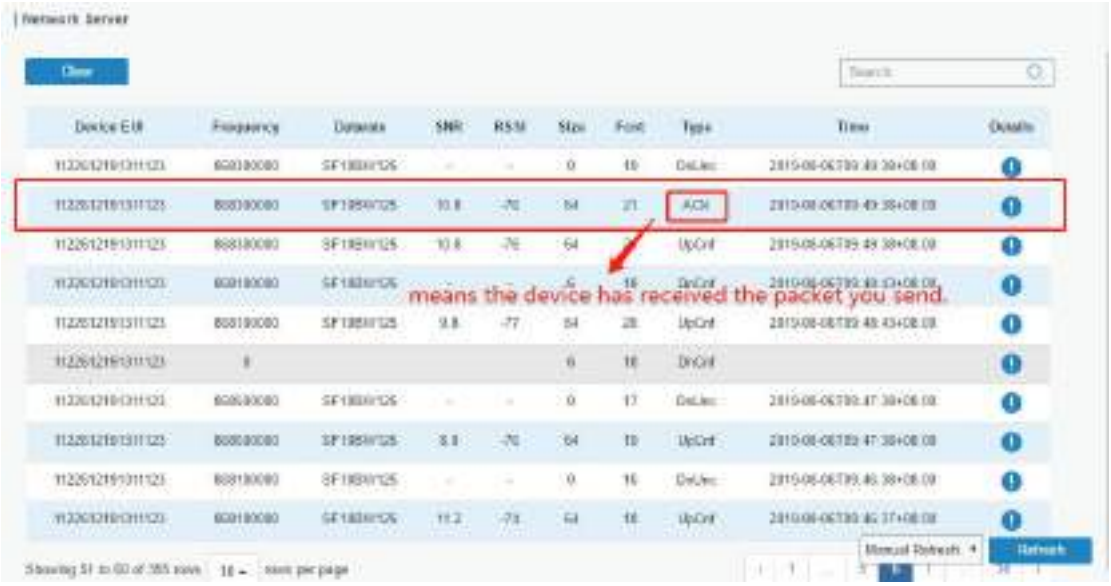
If the device receives this downlink confirmed packet, then the device will reply “ACK” when delivering next.



Ack is “true” means that the device has received this packet.

If the device’s class type is Class A, only after the device sends out an uplink packet will the network server sends out data to the device.





Related Topic

Packets

4.11 Node-RED

4.11.1 Start the Node-RED

1. Go to “App > Node-RED” to enable the Node-RED feature.

2. After enabled, click “Launch” to go to the Node-RED web GUI and to log in with the same username and password as gateway.

4.11.2 Send Data by Email

Application Example

Send AM104 device data by Email.

Configuration Steps

1. Add a “LoRa Input” node. Before adding please ensure network server mode is enabled and LoRaWAN devices have joined the network.
2. If you add many devices and only need one device data, add “Device Filter” node behind the “LoRa Input” and type the device EUI.

3. Add a “Decoder” node to decode the Milesight sensor data.

4. Add an “Email Output” and type the SMTP client settings, destination email address and contents. Example content:

The time is {{time}}

Deveui is {{deveui}}

Humidity is {{payload.humidity}}

Note:

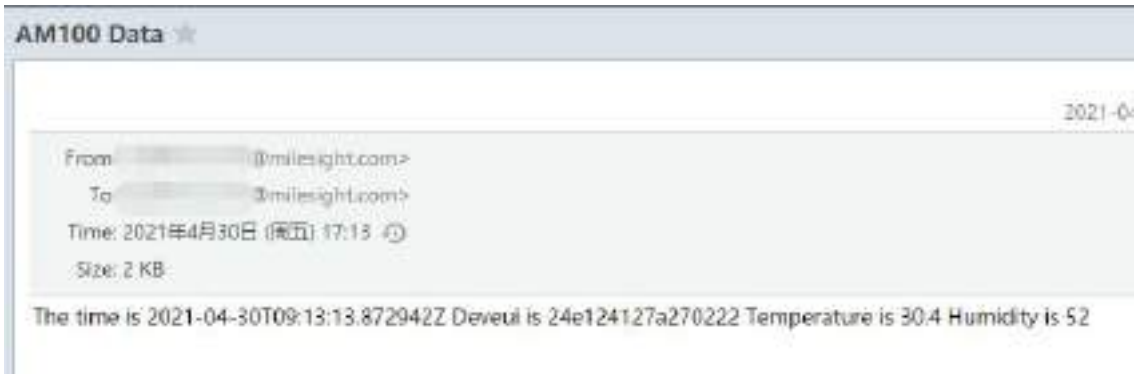
1) When you select SMTP Option as “Same as Gateway”, go to “System -> General Settings -> SMTP” to configure the SMTP clients.

2) Basic format to call LoRaWAN node data is *{{property name}}*, you can click “Help” page for more info about the Email or SMS payload format.

3) If you need to check the output content in every node, please add debug node.

5. After completing the configuration, click “Deploy” to save all your configuration.

6. When AM104 sends data to gateway, gateway will transfer the data to email.



Related Topic

Node-RED

[END]