# UG85

## Industrial LoRaWAN Gateway User Guide

Xiamen Ursalink Technology Co., Ltd.

# Preface

Thanks for choosing Ursalink UG85 industrial LoRaWAN gateway. The UG85 industrial LoRaWAN gateway delivers tenacious connection over network with full-featured design such as automated failover/failback, extended operating temperature, dual SIM cards, hardware watchdog, VPN, Gigabit Ethernet and beyond.

This guide shows you how to configure and operate the UG85 industrial 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



### Products Covered

This guide explains how to configure the following devices:

• Ursalink UG85 LoRaWAN gateway

### Related Documents

| Document | Description |
|---|---|
| Ursalink UG85 Datasheet | Datasheet for the Ursalink UG85 industrial LoRaWAN Gateway. |
| Ursalink UG85 Quick Start Guide | Quick installation guide for the Ursalink UG85 industrial LoRaWAN Gateway. |

## Declaration of Conformity

UG85 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 |
|---|---|---|
| Jun. 13, 2019 | V.1.1 | Initial version |
| Aug. 6, 2019 | V1.2 | Add New Function:<br>1. Python Development<br>2. Send data to LoRaWAN nodes |
| Sep. 25, 2019 | V1.3 | Add New Function:<br>Modbus RTU Data Transmission (Applicable for UC11-N1 and UC1152) |
| Nov. 22,2019 | V1.4 | Add New Function:<br>1. Packet Forwarder with Multi-Destination<br>2. MQTT TLS certified mode |

# Contents

# Chapter 1 Product Introduction

## 1.1 Overview

Ursalink UG85 is an industrial LoRaWAN gateway with embedded intelligent software features that are designed for multifarious M2M/IoT applications. Options like cellular network or WIFI provide drop-in connectivity for operators and make a giant leap in maximizing uptime.

Adopting high-performance and low-power consumption industrial platform of 64-bit CPU and wireless module, the UG85 is capable of providing wire-speed network. Meanwhile, the UG85 also supports Gigabit Ethernet port, serial port (RS232), digital input and output which enable you to scale up M2M application combining data in limited time and budget.

The UG85 is particularly ideal for smart city, smart agriculture, building automation, digital factory, environment protection, water conservancy and so on.

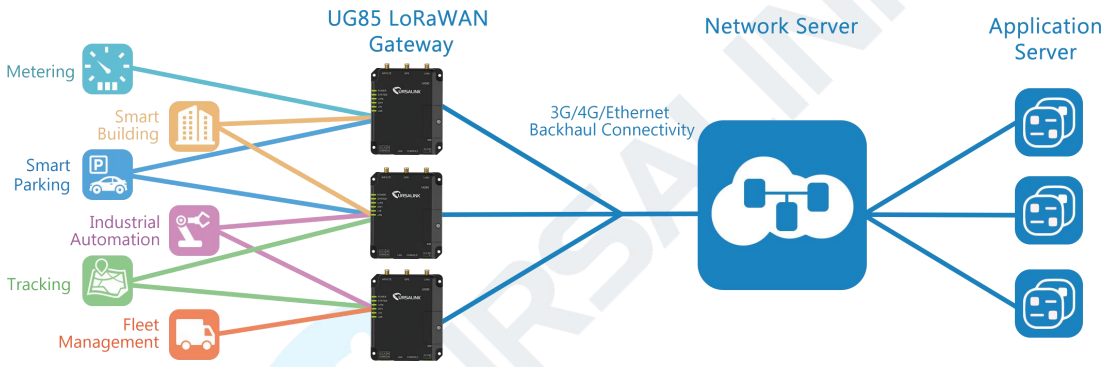



Figure 1-1

## 1.2 Advantages

**Benefits**

- Built-in industrial CPU, big memory;
- Ethernet, 2.4GHz/5GHz Wi-Fi or global 2G/3G/LTE options make it easy to get connected
- Embedded network server and compliance with several third party network servers
- MQTT, HTTP or HTTPS protocol for data transmission to application server
- Flexible modular design provides users with different connection options like Ethernet, serial port
- Rugged enclosure, optimized for DIN rail or shelf mounting
- 3-year warranty included

**Security & Reliability**

- Automated failover/failback between Ethernet and Cellular (dual SIM)

- Enable unit with security frameworks like IPsec/OpenVPN/GRE/L2TP/PPTP/ DMVPN
- Features embedded hardware watchdog to automatically recover from various failure and ensures highest level of availability
- Establishes a secured mechanism on centralized authentication and features authorization of device access by supporting AAA (TACACS+, RADIUS, LDAP, local authentication) and multiple levels of user authority

**Easy Maintenance**

- Ursalink 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
- 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 64-bit ARM Cortex-A53 processor, high-performance operating up to 800MHz with low power consumption, and 512 MB memory 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 | 800MHz, 64-bit ARM Cortex-A53 |
| Memory | 8 GB Flash, 512 MB DDR3 RAM |
| **LoRaWAN** | |
| Connectors | 1 × 50 Ω SMA (Center pin: Female) |
| Channel | 8 |
| Frequency Band | Supports EU 863-870, US 902-928, EU 433, AU 915-928, CN 470-510 IN865 and KR 920-923 Band |
| Sensitivity | -140dBm Sensitivity @292bps |

| | |
|---|---|
| Output Power | 27dBm Max |
| Protocol | V1.0 Class A/Class C and V1.0.2 Class A/Class C |
| **Ethernet** | |
| Ports | 1 × RJ-45 (PoE PD Optional) |
| 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) |
| **Cellular Interfaces (Optional)** | |
| Connectors | 1 × 50 Ω SMA (Center pin: Female) |
| SIM Slots | 2 |
| **Wi-Fi Interfaces (Optional)** | |
| Connectors | 1 × 50 Ω SMA (Center PIN: SMA Male) |
| Standards | IEEE 802.11 b/g/n/ac |
| Tx Power | 802.11b: 16 dBm +/-1.5 dBm (11 Mbps)<br>802.11g: 15 dBm +/-1.5 dBm (54 Mbps)<br>802.11n@2.4 GHz: 14 dBm +/-1.5 dBm (MCS7) 802.11n@5 GHz: 11 dBm +/-2 dBm (MCS7) 802.11ac@5 GHz: 10 dBm +/-2 dBm (MCS9) |
| **GPS (Optional)** | |
| Connectors | 1 × 50 Ω SMA (Center PIN: SMA Female) |
| **Serial Interface** | |
| Ports | 1 × RS232 |
| Connector | Terminal Block |
| Baud Rate | 300bps to 230400bps |
| **IO** | |
| Connector | Terminal Block |
| Digital | 1 × DI + 1 × DO |
| **Console Interface** | |
| Connector | 1 × RJ45 |
| **Software** | |
| Network Protocols | PPP, PPPOE, SNMP v1/v2c/v3, TCP, UDP, DHCP,DDNS, VRRP, HTTP, HTTPS, DNS, SNTP, Telnet, VLAN, SSH, MQTT, etc. |
| VPN Tunnel | DMVPN/IPsec/OpenVPN/PPTP/L2TP/GRE |

| | |
|---|---|
| Access Authentication | CHAP/PAP/MS-CHAP/MS-CHAPV2 |
| Firewall | ACL/DMZ/Port Mapping/MAC Binding |
| Management | Web, CLI, SMS, On-demand dial up |
| Reliability | VRRP, Dual SIM Backup |
| Serial Port | Transparent (TCP Client/Server, UDP), Modbus Gateway (Modbus TCP to Modbus RTU), Modbus Master |
| **Power Supply and Consumption** | |
| Power Input | 2-pin with 5.08 mm terminal block<br>(Optional: 1 × 802.3 af/at PoE PD ) |
| Input Voltage | 9-48 VDC |
| Power Consumption | Typical 2.3W, Max 6.5W |
| **Physical Characteristics** | |
| Ingress Protection | IP30 |
| Dimensions | 108 x 90 x 26 mm (4.25 x 3.54 x 1.02 in) |
| Mounting | Desktop, wall or DIN rail mounting |
| **Others** | |
| Reset Button | 1 × RESET |
| LED Indicators | 1 × POWER, 1 × SYSTEM, 1 x LoRa , 1 × WIFI, 1 × LTE, 1 × LAN |
| Built-in | Watchdog, RTC, Timer |
| Certifications | RoHS, CE, FCC |
| **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)

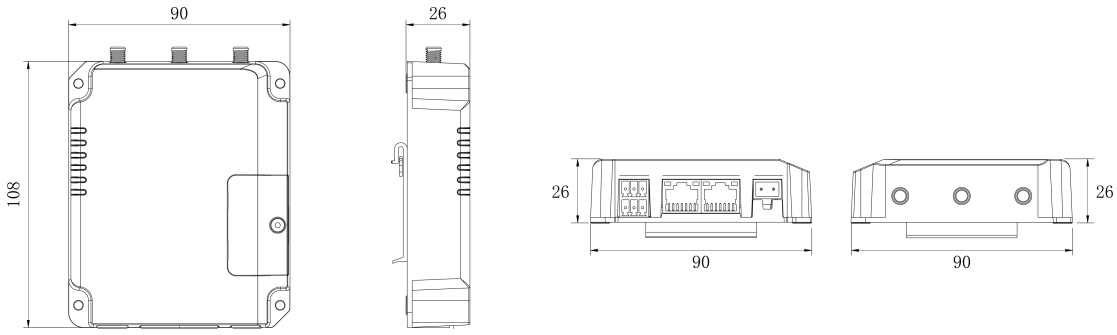



Figure 1-2

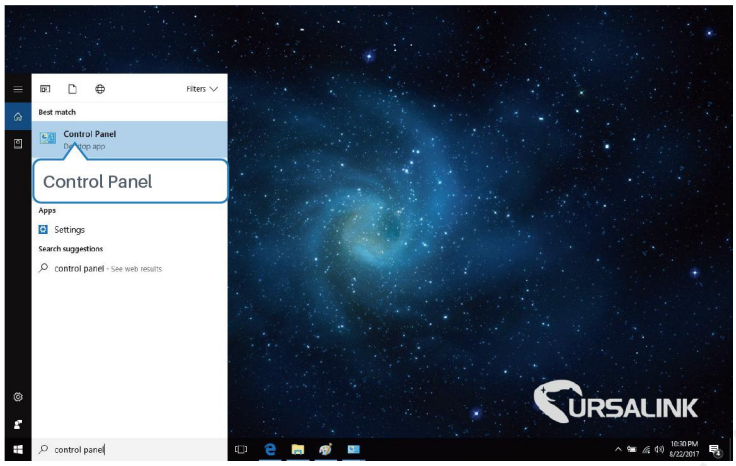
# Chapter 2 Access to Web GUI

This chapter explains how to access to Web GUI of the UG85.

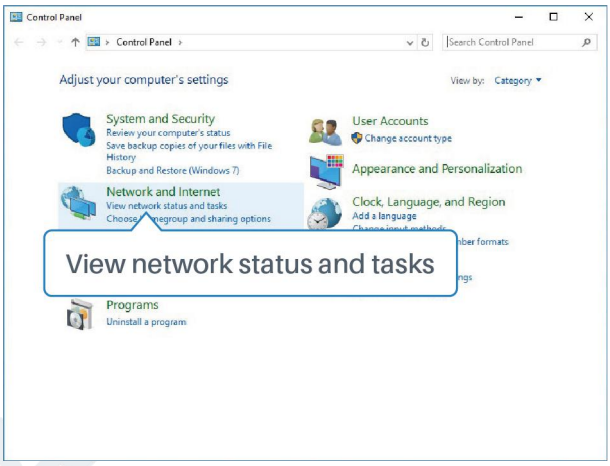
## 2.1 PC Configuration for Web GUI Access to gateway

Please connect PC to GE port of UG85 directly. PC can obtain an IP address, or you can configure a static IP address manually. The following steps are based on Windows 10 operating system for your reference.

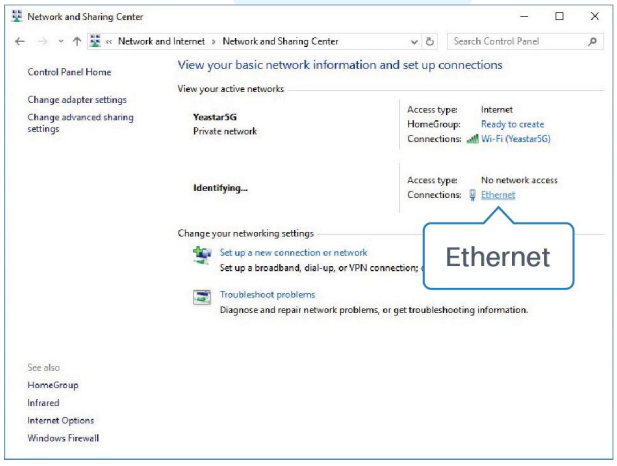
**The following steps are based on Windows 10 operating system for your reference.**



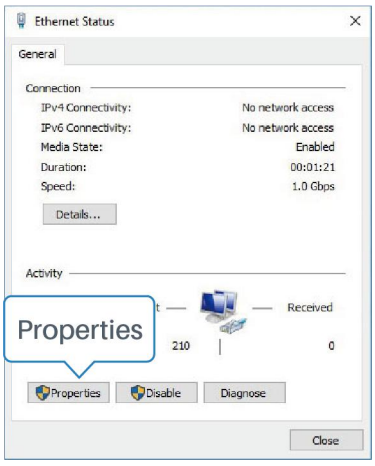

①Click "Search Box" to search "Control Panel" on the Windows 10 taskbar.



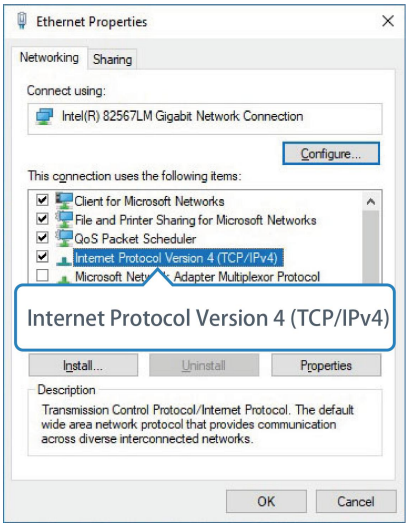

② Click “Control Panel” to open it, and then click “View network status and tasks”.

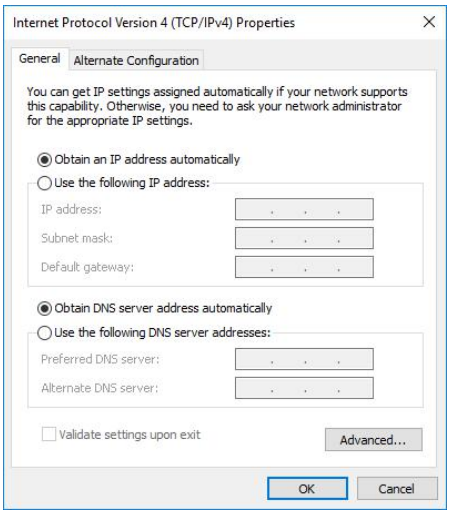


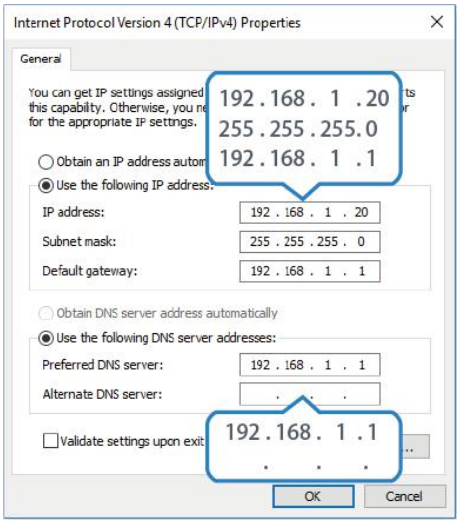

③ Click "Ethernet" (May have different name).




④ Click "Properties".




⑤ Double Click "Internet Protocol Version 4 (TCP/IPv4)" to configure IP address and DNS server.

⑥ Method 1: click "Obtain an IP address automatically";

Method 2: click "Use the following IP address" to assign a static IP manually within the same subnet of the gateway.

(Note: remember to click “OK” to finish configuration.)

### 2.2 Access to Web GUI of gateway

Ursalink gateway provides Web-based configuration interface for management. If this is the first time you configure the gateway, please use the default settings below.

**Username**: admin

**Password**: password

**IP Address**: 192.168.1.1

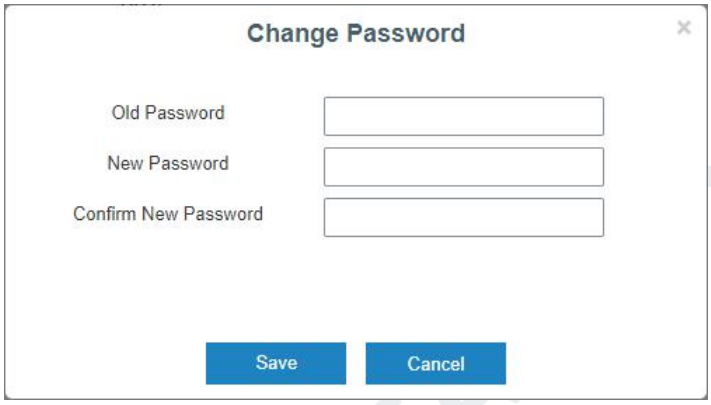
**DHCP Server**: Enabled

1. Start a Web browser on your PC (Chrome and IE are recommended), type in the IP address, and press Enter on your keyboard.
2. Enter the username, password, and click "Login".

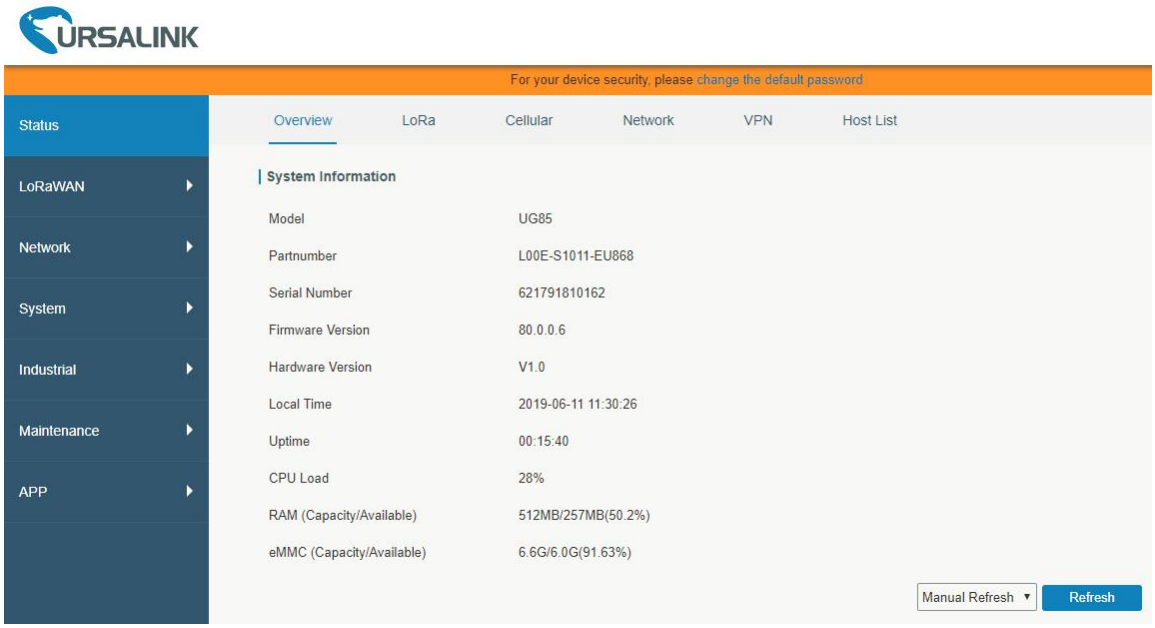
If the SIM card is connected to cellular network with public IP address, you can access WEB GUI remotely via the public IP address when remote access is enabled.

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

3. When you login with the default username and password, you will be asked to modify the password. It's suggested that you change the password for the sake of security. Click "Cancel" button if you want to modify it later.




4. After you login the Web GUI, you can view system information and perform configuration on 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.

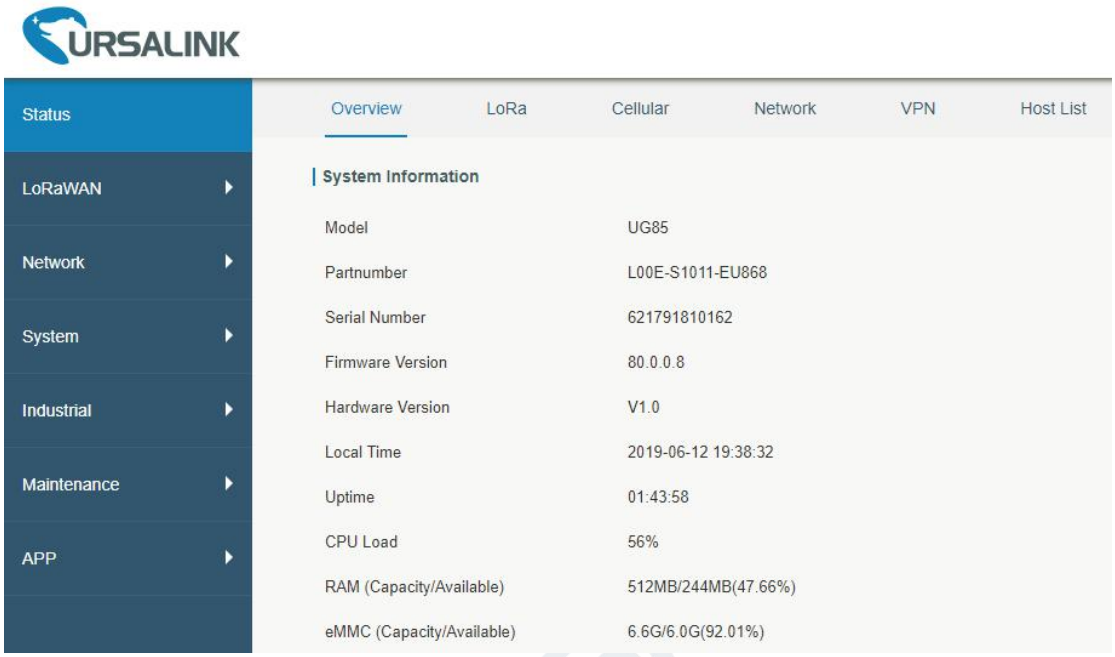



Figure 3-1-1-1

| System Information | |
|---|---|
| **Item** | **Description** |
| Model | Show the model name of gateway. |
| 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

### 3.1.2 Packet Forwarder

You can view the LoRaWAN status of gateway on this page.

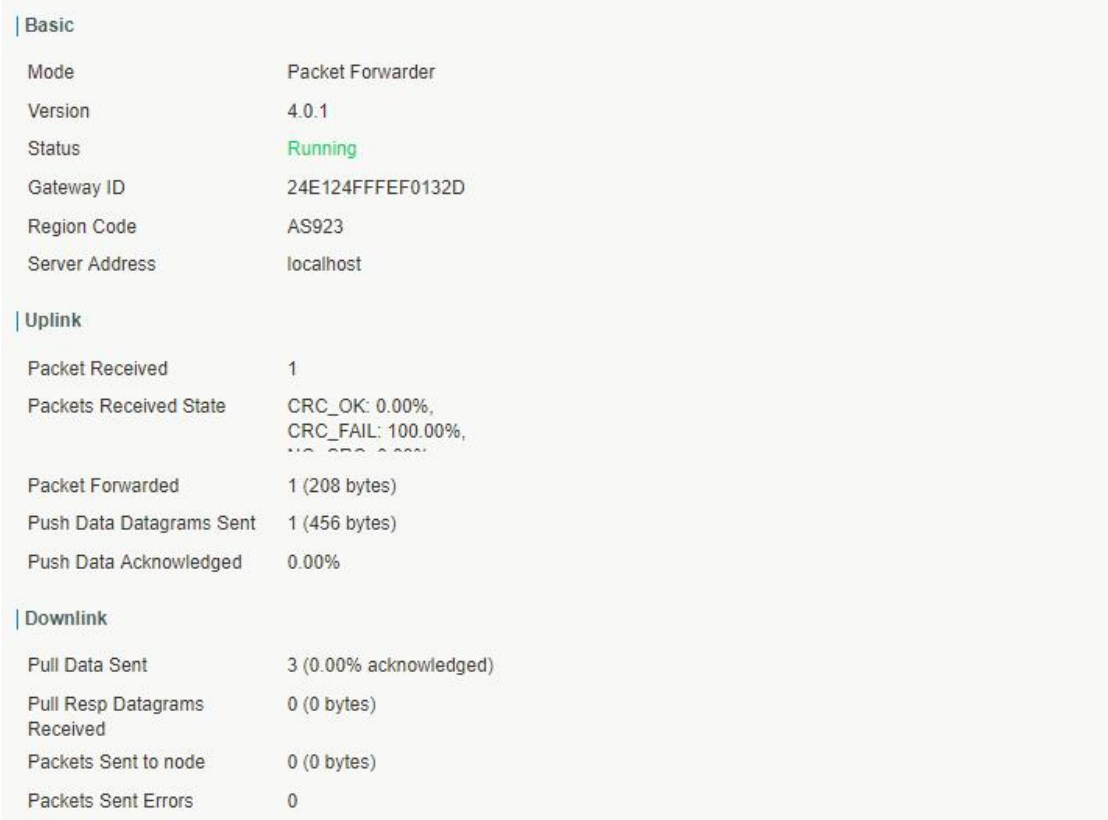



Figure 3-1-2-1

| Packet Forwarder Status | |
|---|---|
| **Item** | **Description** |
| Mode | Show the working mode of LoRaWAN. |
| Version | Show the version of packet forwarder software. |
| Status | Show the status of packet forwarder.<br>Value include Running, Disabled. |
| Gateway ID | Show the ID of the gateway. |
| Region Code | Show the LoRa region code which is based on the gateway's variant.. |
| Server Address | Show the IP address of remote LoRaWAN network server. |
| Packet Received | Show the count of data packet from node to gateway. |
| Packets received State | Show the RF packets receiving state:<br>CRC_OK: Percentage of CRC verification<br>CRC_Fail: Percentage of CRC verification failure<br>NO_CRC: Percentage of abnormal packets without CRC |
| Packets forwarded | Packets that CRC verified are sent from gateway to server. |
| Push Data Datagrams Sent | The total quantity of packets sent from gateway to server, including the RF packets forwarded and statistics packets. |
| Push Data Acknowledged | Percentage of acknowledged packets among Push Data Datagrams Sent. |

| | |
|---|---|
| Pull Data Sent | Show the number of keepalive packets sent to the server, and percentage of acknowledged packet regarding the keepalive packet from the server. |
| Pull Resp Datagrams Received | Show the packet counts and size that will be sent from server to gateway. |
| RF Packets Sent to node | Show the RF packet counts and size that will be sent from gateway to node. |
| RF Packets Sent Errors | Show the RF packet counts that fail to be sent from server to node. |

Table 3-1-2-1 Packet Forwarder Status

### 3.1.3 Cellular (Only Applicable to Cellular Version)

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

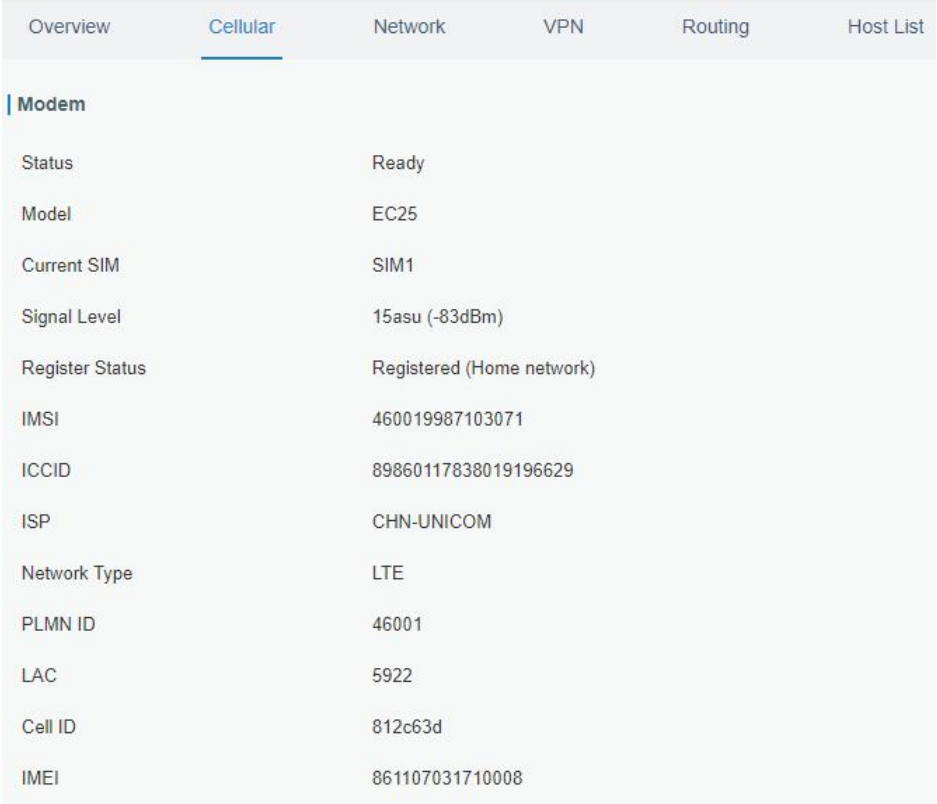



Figure 3-1-3-1

| Modem Information | |
|---|---|
| **Item** | **Description** |
| Status | Show corresponding detection status of module and SIM card. |
| Model | Show the model name of cellular module. |
| Current SIM | Show the current SIM card used. |
| Signal Level | Show the cellular signal level. |
| Register Status | Show the registration status of SIM card. |
| 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. |
| IMEI | Show the IMEI of the module. |

Table 3-1-3-1 Modem Information

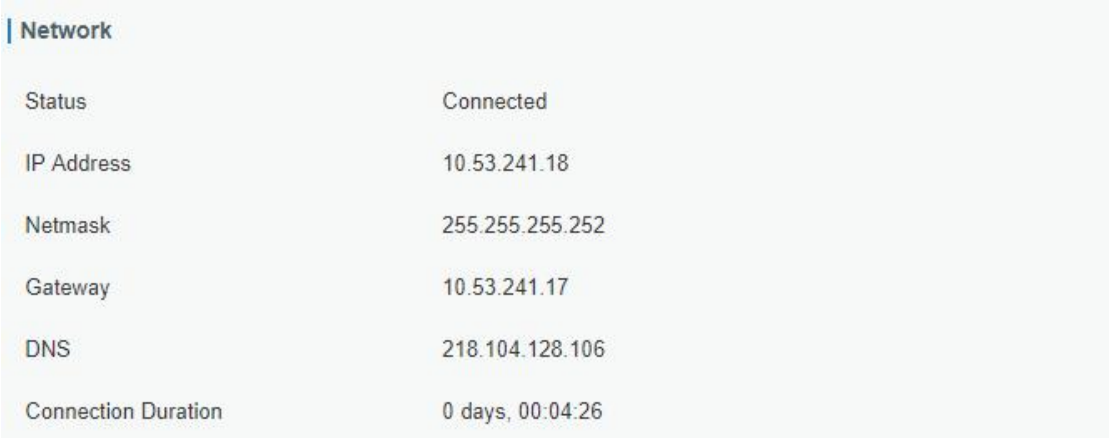



Figure 3-1-3-2

| 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 3-1-3-2 Network Status

### 3.1.4 Network

On this page you can check the LAN status of the gateway.

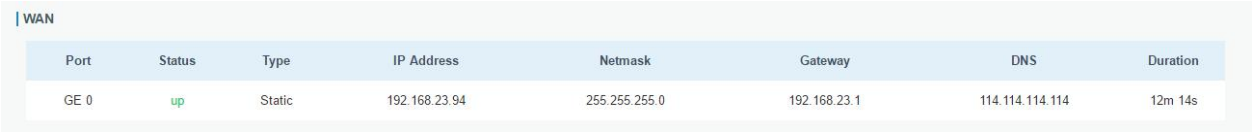



Figure 3-1-4-1

| LAN Status | |
|---|---|
| **Item** | **Description** |
| Port | Show the name of WAN port. |
| Status | Show the status of WAN 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 WAN port. |
| IP Address | Show the IP address of WAN port. |
| Netmask | Show the netmask of WAN port. |
| Gateway | Show the gateway of WAN port. |
| DNS | Show the DNS of WAN port. |
| Duration | Show the information about how long the Ethernet cable has been connected to WAN port when WAN function is enabled. Once WAN function is disabled or Ethernet cable is disconnected, the duration will stop. |

Table 3-1-4-1 LAN Status

### 3.1.5 WLAN (Only Applicable to Wi-Fi Version)

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

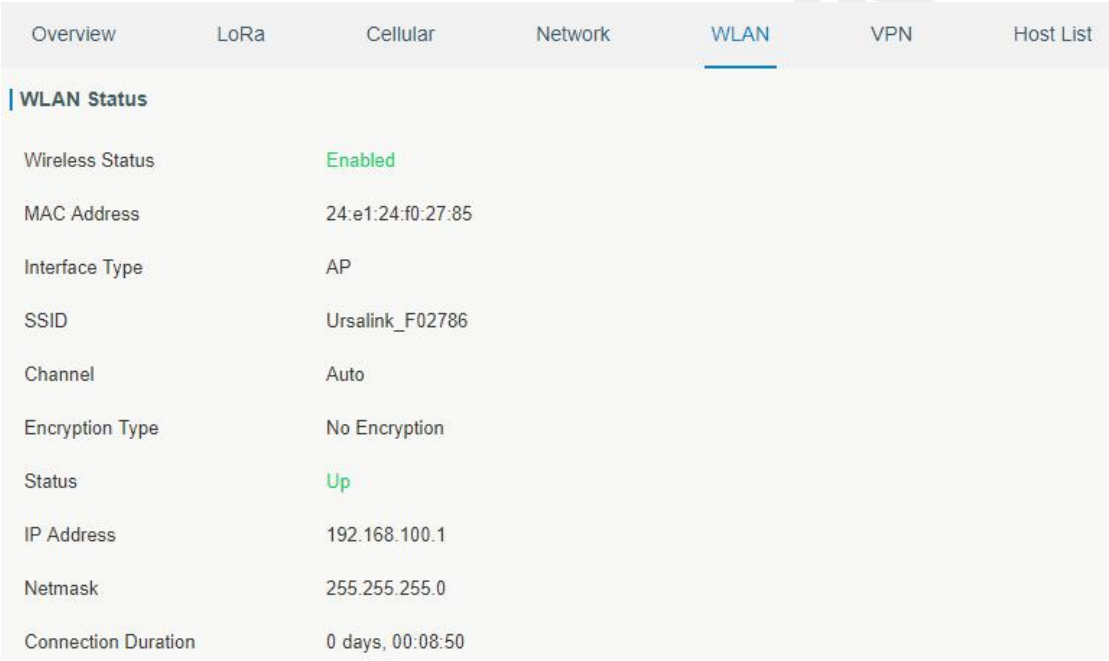



Figure 3-1-5-1

| 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 3-1-5-1 WLAN Status


Figure 3-1-5-2

| 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 3-1-5-2 WLAN Status

### 3.1.6 VPN

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

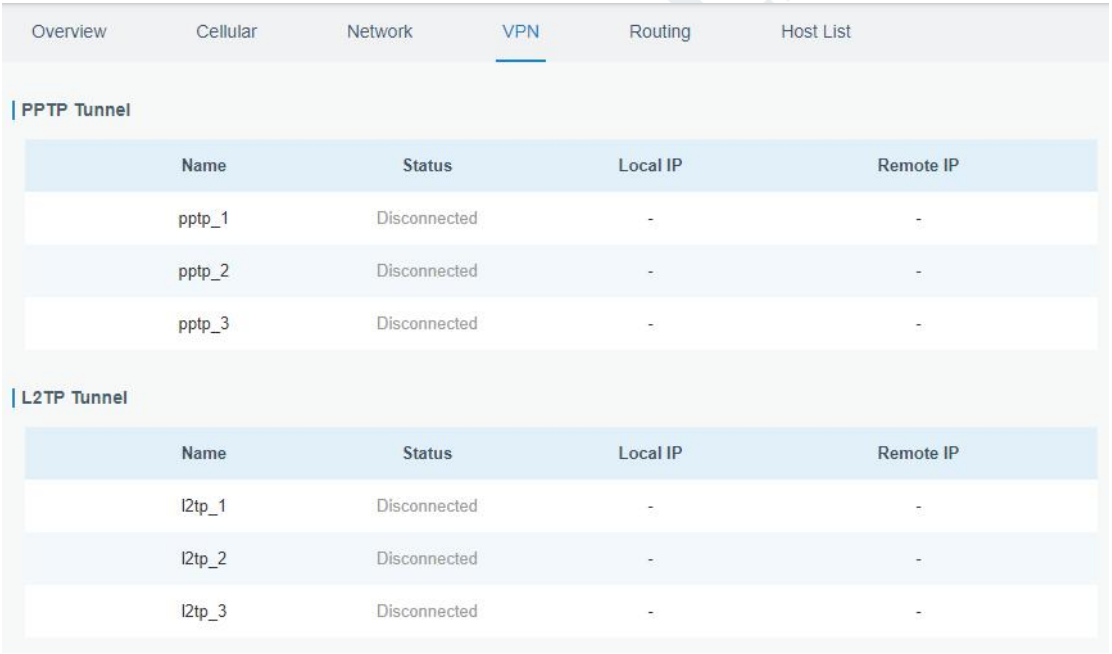



Figure 3-1-6-1

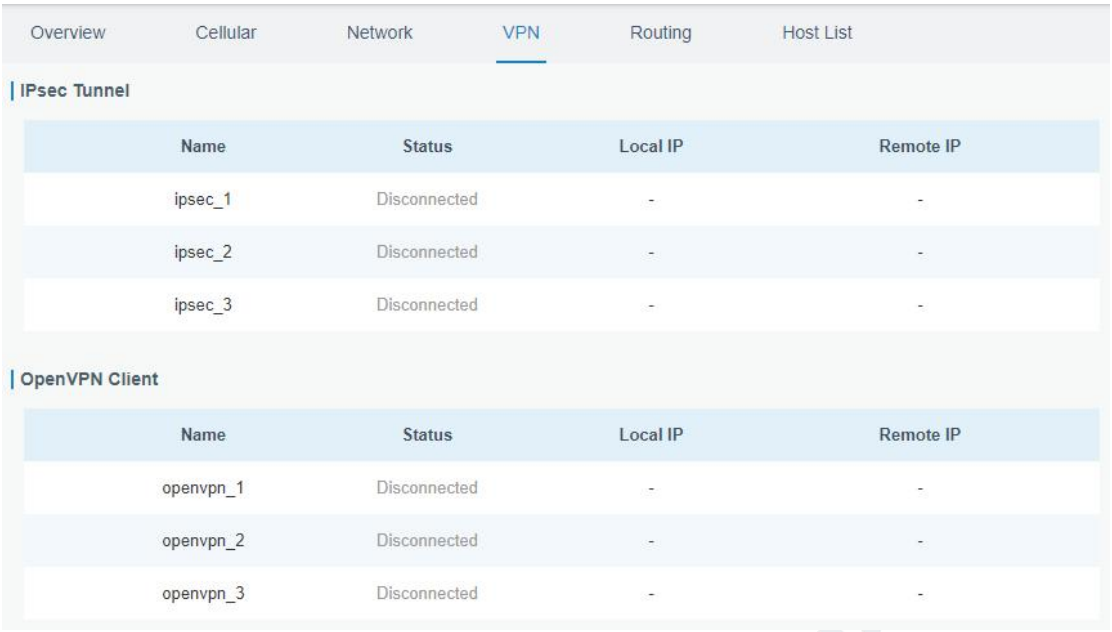



Figure 3-1-6-2


Figure 3-1-6-3

| 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 3-1-6-1 VPN Status

### 3.1.7 Host List

You can view the host information on this page.

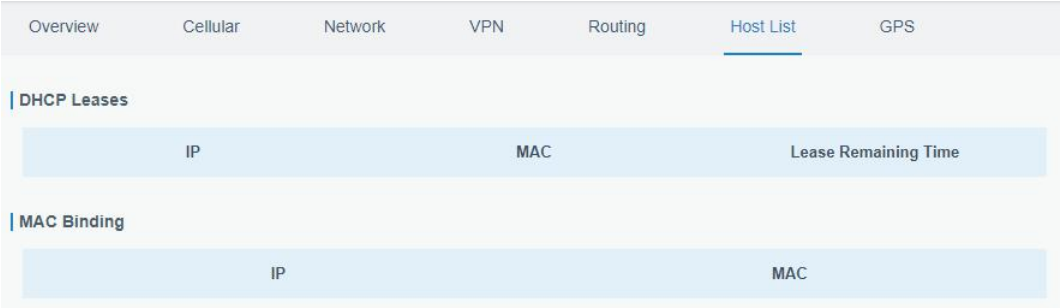



Figure 3-1-7-1

| 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 3-1-7-1 Host List Description

## 3.2 LoRaWAN

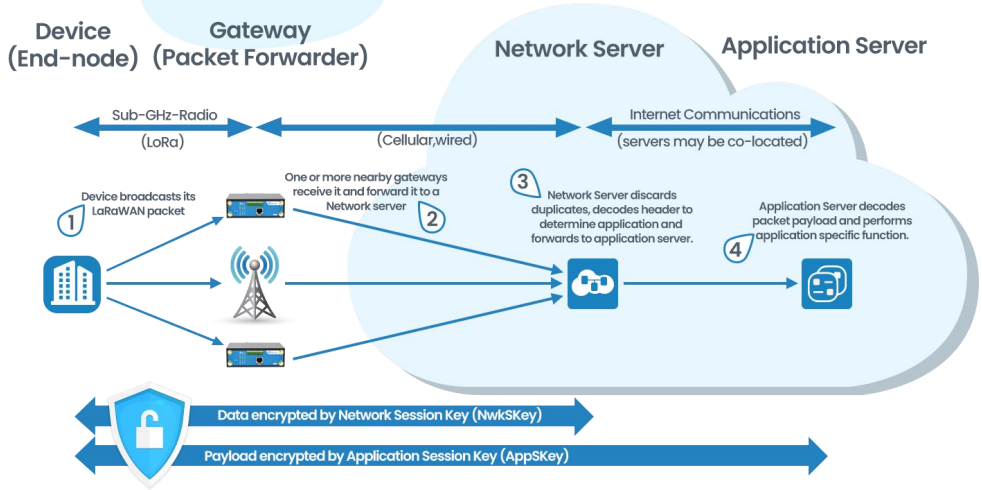



Figure 3-2-1

### 3.2.1 Packet Forwarder

#### 3.2.1.1 General

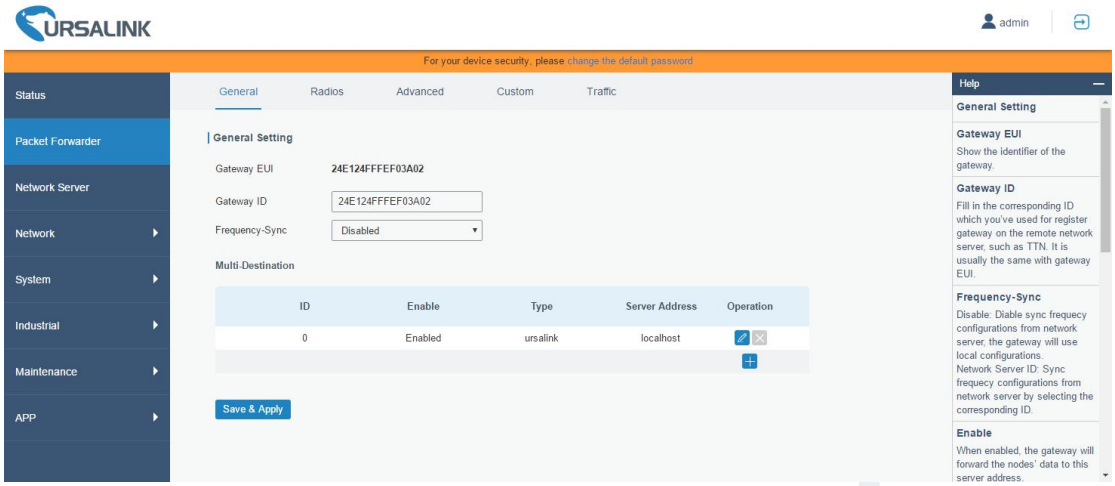



Figure 3-2-1-1

| General Settings | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Gateway EUI | Show the identifier of the gateway. | Generated from MAC address of the gateway and cannot be changed. |
| Gateway ID | Fill in the corresponding ID which you've used for register gateway on the remote network server, such as TTN. It is usually the same as gateway EUI and can be changed. | The default is the same as gateway EUI. |
| Frequency-Sync | Disable: Disable sync frequency configurations from network server, the gateway will use local configurations.<br><br>Network Server ID: Sync frequency configurations from network server by selecting the corresponding ID. | Disable |
| Multi-Destination | The gateway will forward the data to the network server address that was created and enabled in the list. | Local host |

Table 3-2-1-1 General Setting Parameters

**Related Configuration Example**

Packet fowarder configuration

### 3.2.1.2 Radios

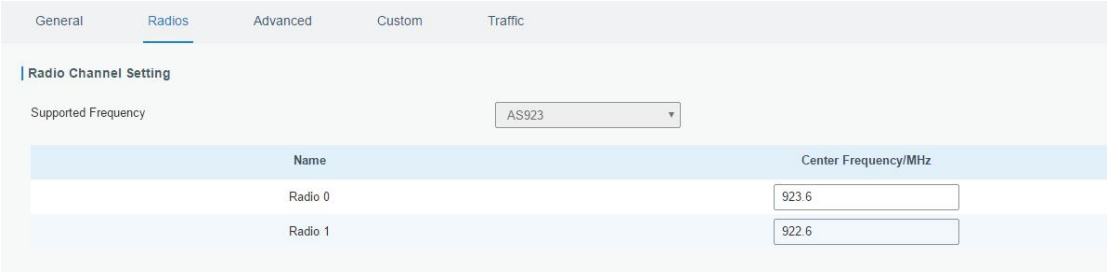



Figure 3-2-1-2

| Radios-Radio Channel Setting | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Supported Frequency | Choose the LoRaWAN frequency plan used for the upstream and downlink frequencies and datarates. Available channel plans depend on the gateway's variant. | The default frequency is set based on the gateway's variant. |
| Name | Show the name of central frequency. | |
| Center Frequency | Enter the central frequency of Radio 0 which supports<br>transmitting and receiving packet.<br>Enter the center frequency of Radio 1 which only supports receiving packet from nodes. | Null |

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


Figure 3-2-1-3

| Radios-Multi Channel Setting | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Click to enable this channel to transmit packets. | Enabled |
| Index | Indicate the ordinal of the list. | |
| Radio | Choose Radio 0 or Radio 1 as center frequency. | Radio 0 |
| Frequency/MHz | Enter the frequency of this channel.<br>Range: center frequency±0.9. | The default frequency is set based on the supported frequency you have selected. |

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

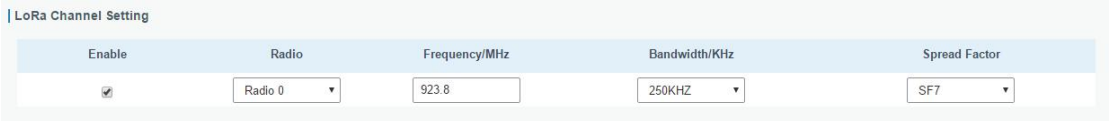



Figure 3-2-1-4

| Radios-LoRa Channel Setting | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Click to enable this channel to transmit packets. | Enabled |
| Radio | Choose Radio 0 or Radio 1 as center frequency. | Radio 0 |
| Frequency/MHz | Enter the frequency of this channel.<br>Range: center frequency±0.9. | The default frequency is set based on the supported frequency you have selected. |
| Bandwidth/MHz | Enter the bandwidth of this channel.<br>Recommended value: 125KHz, 250KHz, 500KHz | 125KHz |
| Spread Factor | Choose the selectable spreading factor. The channel with large spreading<br>Factor corresponds to a low rate, while the small one corresponds to a<br>high rate. | The default is based on what is specified in the LoRaWAN regional parameters document. |

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

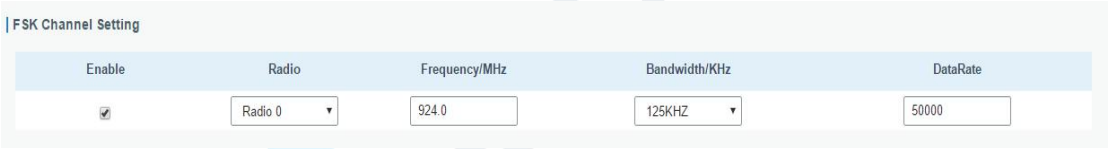



Figure 3-2-1-5

| Radios-FSK Channel Setting | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Click to enable this channel to transmit packets. | Disabled |
| Radio | Choose Radio 0 or Radio 1 as center frequency. | Radio 0 |
| Frequency/MHz | Enter the frequency of this channel.<br>Range: center frequency±0.9. | The default frequency is set based on the supported frequency you have selected. |
| Bandwidth/MHz | Enter the bandwidth of this channel.<br>Recommended value: 125KHz, 250KHz, 500KHz | 500KHz |
| Data Rate | Enter the data rate. Range： 500-25000. | 500 |

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

### 3.2.1.3 Advanced

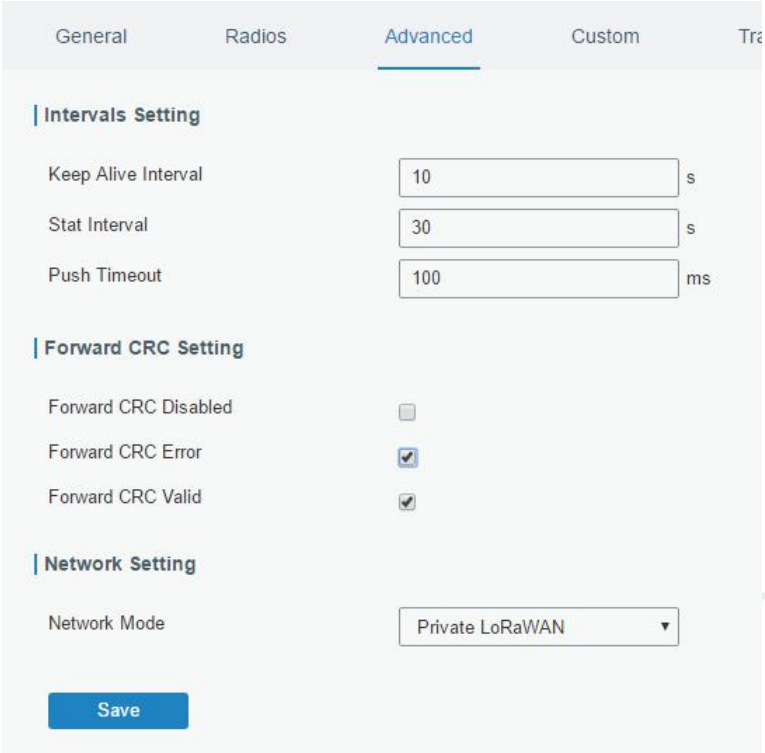



Figure 3-2-1-6

| Advanced | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Keep Alive Interval | Enter the interval of keepalive packet which is sent from gateway to LoRaWAN 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: 1-3600. | 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 |
| Network Mode | select from “Public LoRaWAN”, “Private LoRaWAN”. Public LoRaWAN: telecom/operator managed networks, connect multiple applications (multi-tenant) into a single network. Private LoRaWAN: individually managed networks, | Public LoRaWAN |

| | | |
|---|---|---|
| | Network deployed for single application purpose. | |

Table 3-2-1-6 Advanced Parameters

### 3.2.1.4 Custom

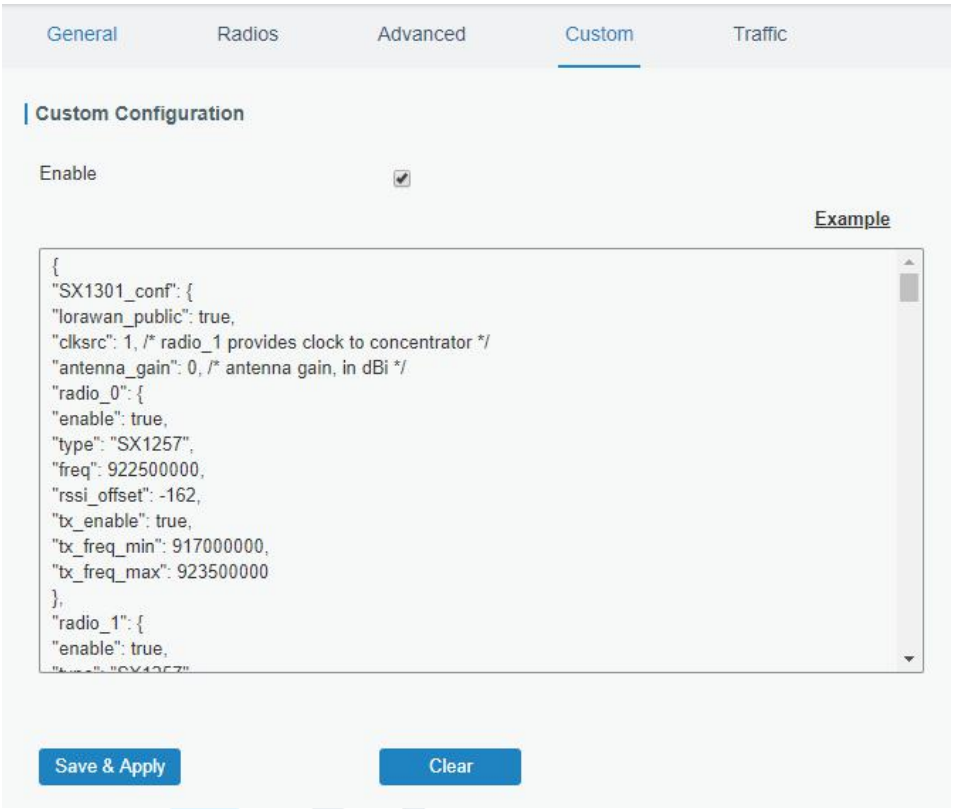
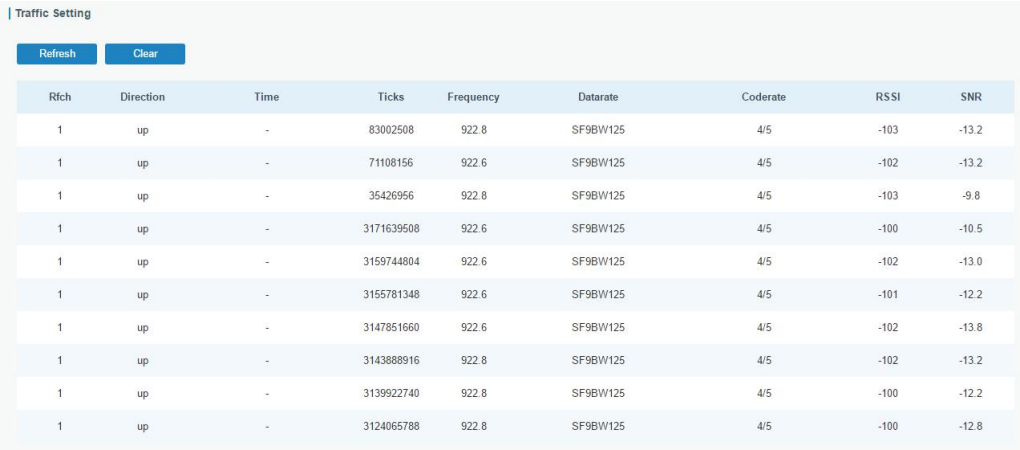



Figure 3-2-1-7

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.

### 3.2.1.5 Traffic

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




| Rfch | Direction | Time | Ticks | Frequency | Datarate | Coderate | RSSI | SNR |
|---|---|---|---|---|---|---|---|---|
| 1 | up | - | 83002508 | 922.8 | SF9BW125 | 4/5 | -103 | -13.2 |
| 1 | up | - | 71108156 | 922.6 | SF9BW125 | 4/5 | -102 | -13.2 |
| 1 | up | - | 35426956 | 922.8 | SF9BW125 | 4/5 | -103 | -9.8 |
| 1 | up | - | 3171639508 | 922.6 | SF9BW125 | 4/5 | -100 | -10.5 |
| 1 | up | - | 3159744804 | 922.6 | SF9BW125 | 4/5 | -102 | -13.0 |
| 1 | up | - | 3155781348 | 922.6 | SF9BW125 | 4/5 | -101 | -12.2 |
| 1 | up | - | 3147851660 | 922.6 | SF9BW125 | 4/5 | -102 | -13.8 |
| 1 | up | - | 3143888916 | 922.8 | SF9BW125 | 4/5 | -102 | -13.2 |
| 1 | up | - | 3139922740 | 922.8 | SF9BW125 | 4/5 | -100 | -12.2 |
| 1 | up | - | 3124065788 | 922.8 | SF9BW125 | 4/5 | -100 | -12.8 |

Figure 3-2-1-8

| 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 3-2-1-7 Traffic Parameters

### 3.2.2 Network Server

#### 3.2.2.1 General

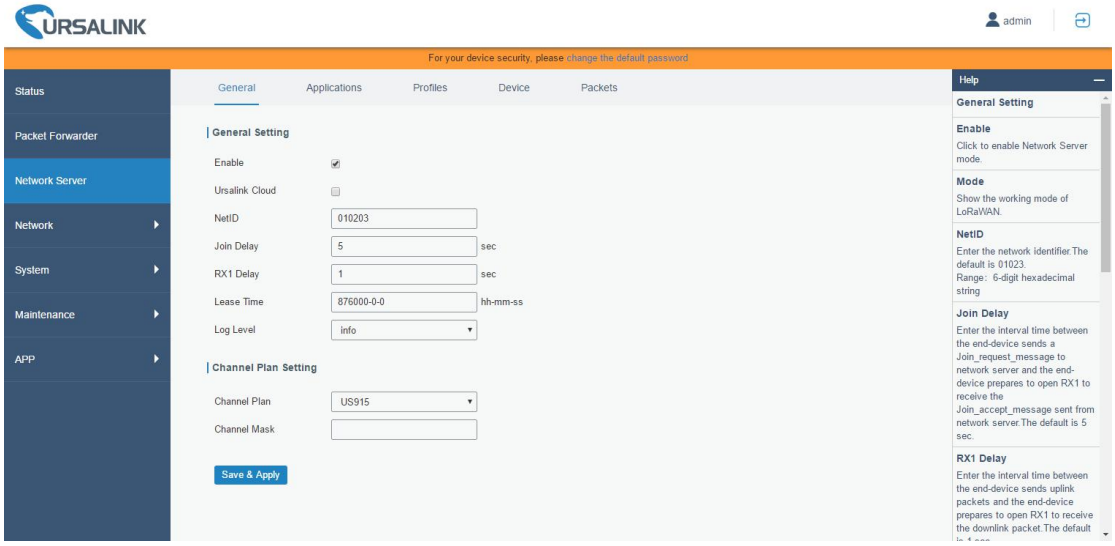


Figure 3-2-2-1

| Item | Description | Default |
|---|---|---|
| **General Setting** | | |
| Enable | Click to enable Network Server mode. | Enable |
| Ursalink Cloud | Enabled to connect gateway to Ursalink Cloud. | Disable |
| NetID | Enter the network identifier. | 01023 |
| 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. | "744-00-00" |
| 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 variant. | Depend on the gateway's variant. |
| Channel Mask | Enabled frequencies are controlled using channel mask.<br>Leave it blank means using the default standard usable channels specified in the LoRaWAN regional parameters document.<br><br>A bit in the ChMask field set to 1 means that the corresponding channel can be used for uplink transmissions if this channel allows the data rate currently used by the end-device.<br><br>A bit set to 0 means the corresponding channels should be avoided.<br><br>US 915 and AU 915 have a 80-bit channel mask for 72 usable channels and EU, AS, IN, KR frequencies have a 16-bit mask for 16 usable | Null.<br>Null means using the default standard usable channels specified in the LoRaWAN regional parameters document. |

| | | |
|---|---|---|
| | channels. | |

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 that are not defined by the LoRaWAN Regional Parameters, like EU868 and KR920, as the following picture shows:

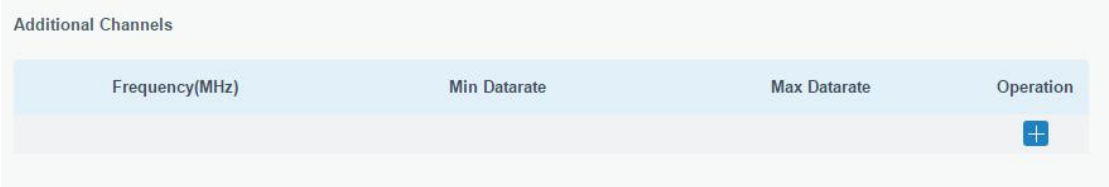



Figure 3-2-2-2

| Additional Channels | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Frequency/MHz | Enter the frequency of the additional plan. | Null. |
| Max Datarate | Enter the max datarate for the end-device. The range is based on what is specified in the LoRaWAN regional parameters document. | DR0(SF12,125kHz) |
| Min Datarate | Enter the min datarate for the end-device. The range is based on what is specified in the LoRaWAN regional parameters document. | DR3(SF9,125kHz) |

Table 3-2-2-2 Additional Plan Parameters

### 3.2.2.2 Application

Devices can communicate with applications that they've been registered. To register a device, you'll first need to create an application (define the method you want to decode the data sent from end-device ) and a device profile (define the join-type and LoRaWAN classes). You don't have to create new application profile and device profile when you add a new device which its "Payload Codec", "Join Type", "Class Type" are the same with existing device. You can just choose the corresponding profiles.

You can see the information about the application you have created in this page.

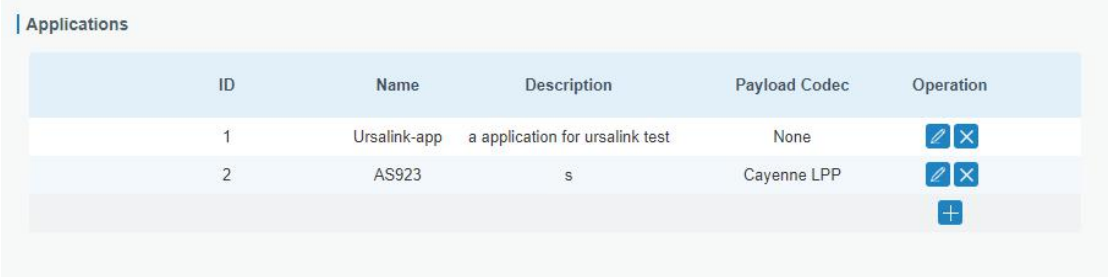



Figure 3-2-2-3

| Item | Description |
|---|---|
| ID | Show the ID of the application profile already created. |
| Name | Show the name of the application profile already created. |
| Description | Show the description of the application profile already |

| | |
|---|---|
| | created. |
| Payload Codec | Show the payload codec of the application profile already created. |

Table 3-2-2-3 Application Parameters

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

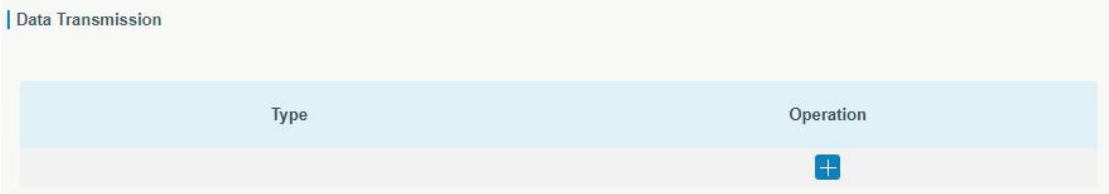



Figure 3-2-2-4

The data will be sent to your custom server address using the MQTT, HTTP or HTTPS protocol.

**Related Configuration Example**

Application configuration

### 3.2.2.3 Profiles

You can view the information about the device profiles which you have created in this page.

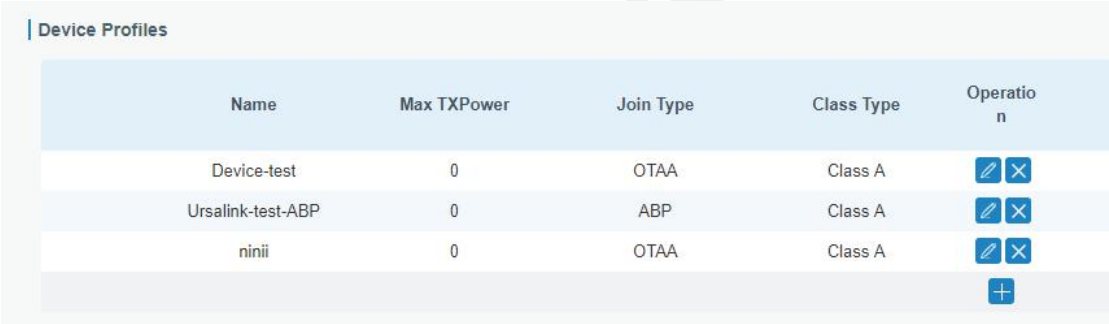



Figure 3-2-2-5

| Item | Description |
|---|---|
| Name | Show the name of the device profile. |
| Max Tx power | Show the Tx power of the device profile. |
| Join Type | Show the join type of the device profile. |
| Class Type | Show the class type of the device profile. |

Table 3-2-2-4 Device profiles setting Parameters

You can edit the device profile by clicking  or create a new device profile by clicking  .

**Related Configuration Example**

Device Profiles Advanced configuraion

### 3.2.2.4 Device

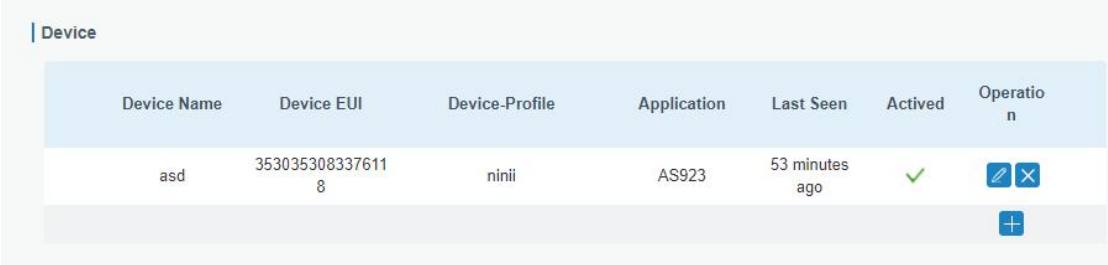



Figure 3-2-2-6

| Item | Description |
|---|---|
| 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. |
| Actived | Show the status of the device . ✓ means that the device has been activated. |

Table 3-2-2-5 Device Parameters

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

**Related Configuration Example**

Device configuration

### 3.2.2.5 Packets

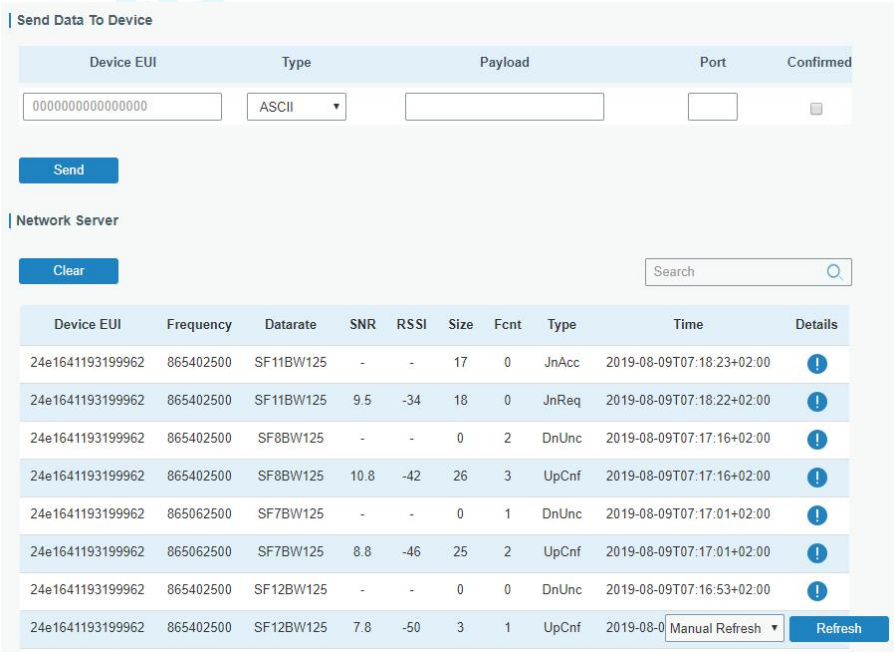



Figure 3-2-2-7

| Send Data To Device | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Device EUI | Enter the EUI of the device to receive the payload. | Null |
| Type | Choose from: “ASCII”, “hex”, “base64”. Choose the payload type to enter in the payload Input box. | ASCII |
| Payload | Enter the message to be sent to this device. | Null |
| Fport | Enter the LoRaWAN frame port for packet transmission between device and Network Server. | Null |
| Confirmed | After enabled, the end device will receive downlink packet and should answer “confirmed” to the network server. | Disabled |

Table 3-2-2-6 Send Data to Device

| Network Server | |
|---|---|
| **Item** | **Description** |
| Device EUI | Show the EUI of the device. |
| 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:<br>JnAcc - Join Accept Packet<br>JnReq - Join Request Packet<br>UpUnc - Uplink Unconfirmed Packet<br>UpCnf - Uplink Confirmed Packet - ACK response from network requested<br>DnUnc - Downlink Unconfirmed Packet<br>DnCnf - Downlink Confirmed Packet- ACK response from end-device requested |
| Time | Show the time of packet was sent or received. |

Table 3-2-2-7 Packet Parameters

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

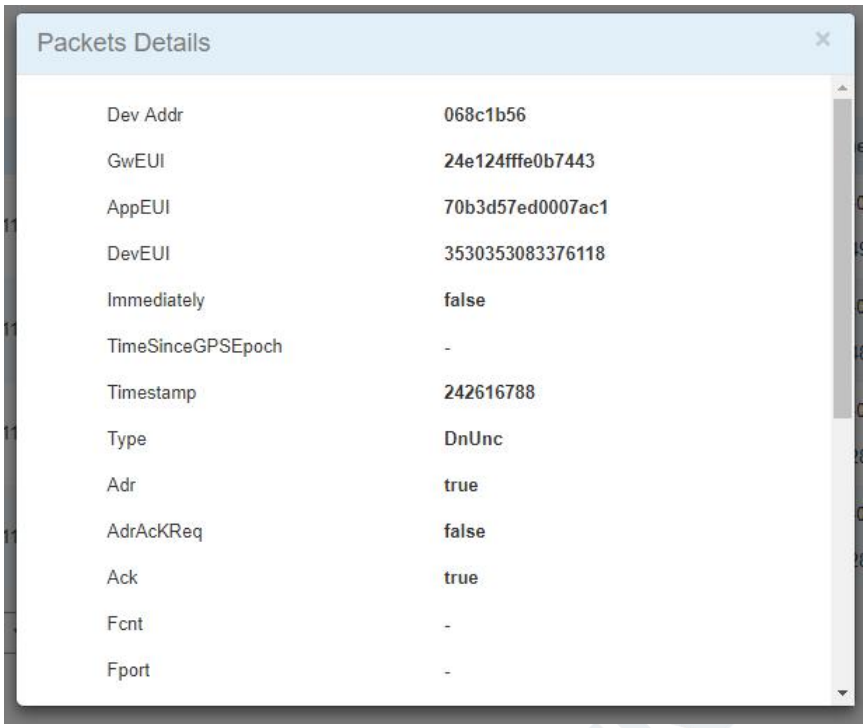



Figure 3-2-2-8

| Item | Description |
|---|---|
| Dev Addr | Show the address of the device. |
| GwEUI | Show the EUI of the gateway. |
| AppEUI | Show the EUI of the application. |
| DevEUI | Show the EUI of the device. |
| Immediately | True: Device may transmit an explicit (possibly empty) acknowledgement data message immediately after the reception of a data message requiring a confirmation. |
| TimeSinceGPS Epoch | Show the GPS time. |
| Timestamp | Show the timestamp of this packet. |
| Frequency | Show the frequency of this channel. |
| Type | Show the type of the packet:<br>JnAcc - Join Accept Packet<br>JnReq - Join Request Packet<br>UpUnc - Uplink Unconfirmed Packet<br>UpCnf - Uplink Confirmed Packet - ACK response from network requested<br>DnUnc - Downlink Unconfirmed Packet<br>DnCnf - Downlink Confirmed Packet- ACK response from end-device requested |
| Adr | True: The end-node has enabled ADR.<br>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.<br>True:Network should respond in ADR_ACK_DELAY time to confirm that it |

| | |
|---|---|
| | is receiving the uplink messages<br>False: Otherwise |
| Ack | True: This frame is ACK.<br>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<br>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<br>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. |
| 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 3-2-2-8 Packets Details Parameters

**Related Topic**

Send Data to Device

## 3.3 Network

### 3.3.1 Interface

#### 3.3.1.1 Port

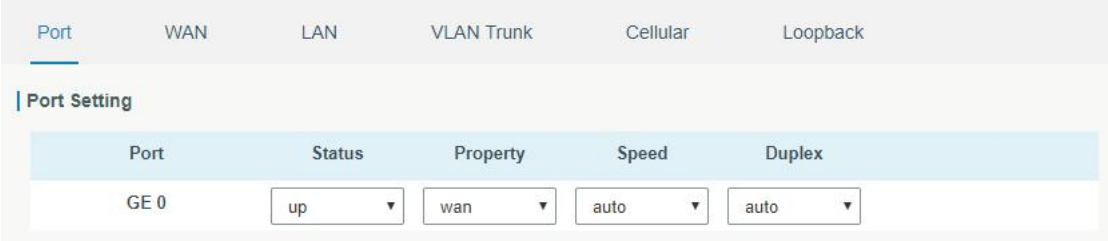



Figure 3-3-1-1

| Port Setting | |
|---|---|
| **Item** | **Description** |
| Port | Users can define the Ethernet ports according to their needs. |
| Status | Set the status of Ethernet port; select "up" to enable and "down" to disable. |
| Property | LAN. User cannot change this setting. |
| Speed | Set the Ethernet port's speed. The options are "auto", "1000 Mbps", "100 Mbps", and "10 Mbps". |
| Duplex | Set the Ethernet port's mode. The options are "auto", "full", and "half". |

Table 3-3-1-1 Port Parameters

### 3.3.1.2 WAN

WAN 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.

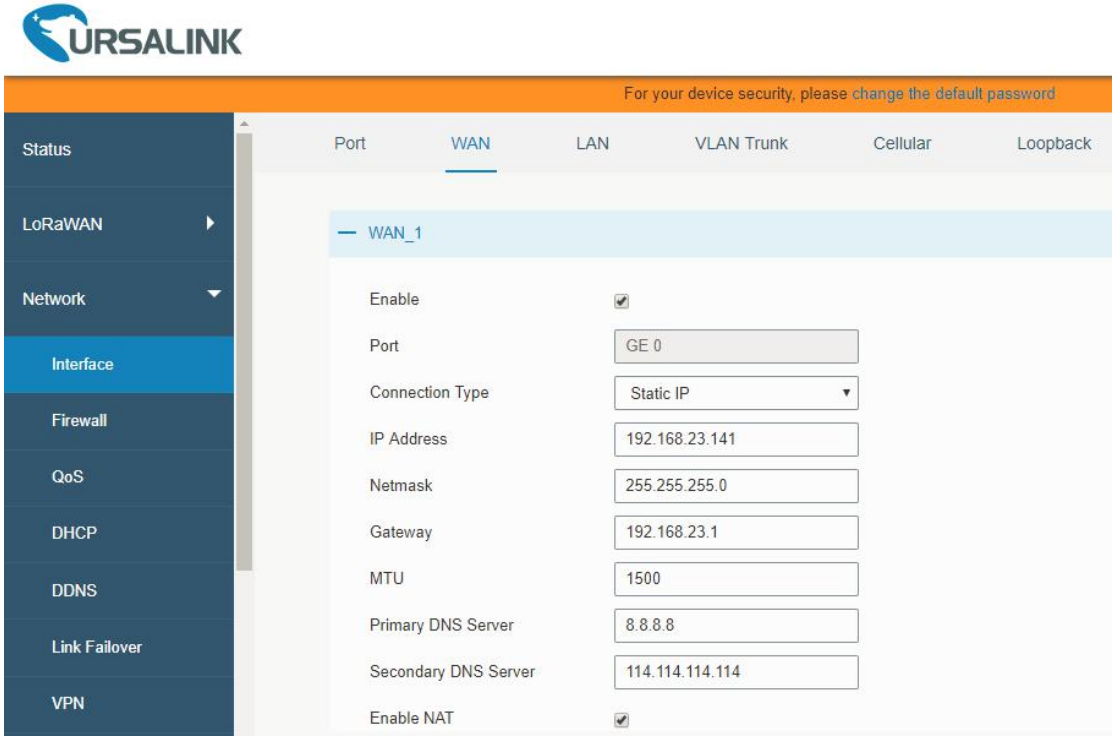



Figure 3-3-1-2

| WAN Setting | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Enable WAN function | Enable |
| Port | The port that is currently set as WAN port. | GE 0 |
| Connection | Select from "Static IP", "DHCP Client" and "PPPoE". | Static IP |

| | | |
|---|---|---|
| Type | | |
| MTU | Set the maximum transmission unit. | 1500 |
| Primary DNS Server | Set the primary DNS. | Null |
| Secondary DNS Server | Set the secondary DNS. | Null |
| Enable NAT | Enable or disable NAT function. When enabled, a private IP can be translated to a public IP. | Enable |

Table 3-3-1-2 WAN Parameters

### 1. Static IP Configuration

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

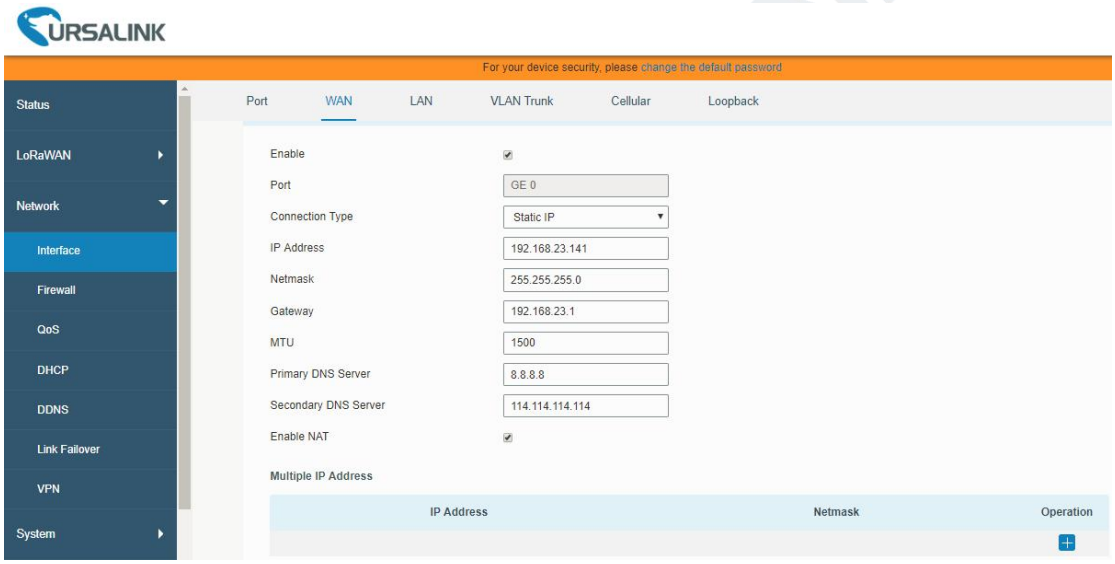



Figure 3-3-1-3

| Static IP | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| IP Address | Set the IP address which can access Internet. E.g. 192.168.1.2. | 192.168.0.1 |
| Netmask | Set the Netmask for WAN port. | 255.255.255.0 |
| Gateway | Set the gateway's IP address for WAN port. | 192.168.0.2 |
| Multiple IP Address | Set the multiple IP addresses for WAN port. | Null |

Table 3-3-1-3 Static 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.

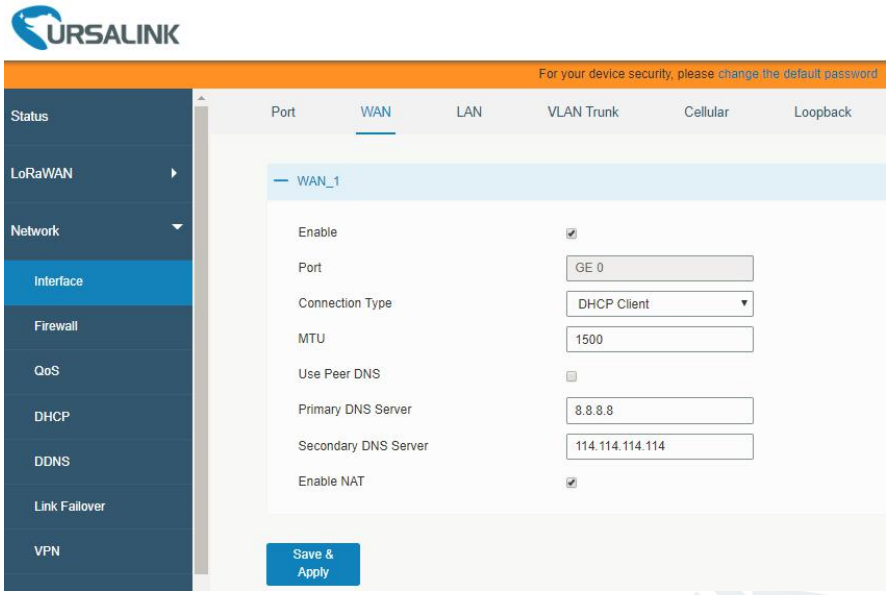



Figure 3-3-1-4

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

Table 3-3-1-4 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.

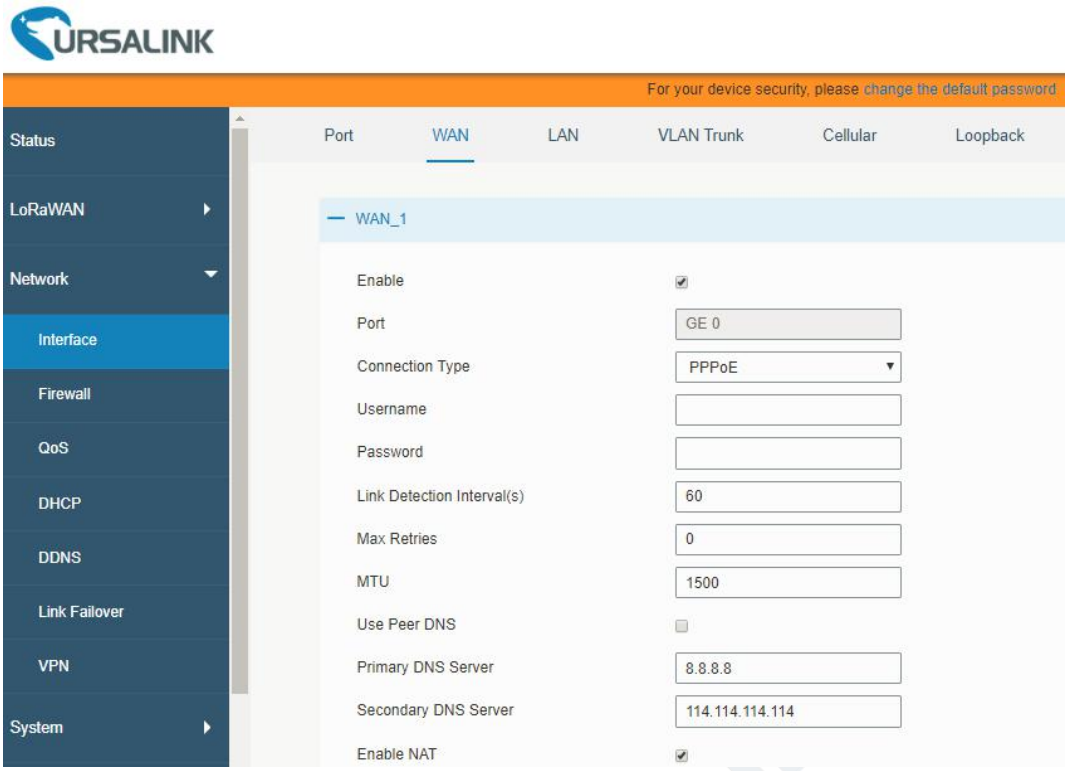



Figure 3-3-1-5

| 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 3-3-1-5 PPOE Parameters

### 3.3.1.3 LAN

LAN setting is used for managing local area network devices connected to LAN port of the UG85, allowing each device to access the Internet.

Click  to delete the existing LAN port setting. Click  to add a new LAN port setting.

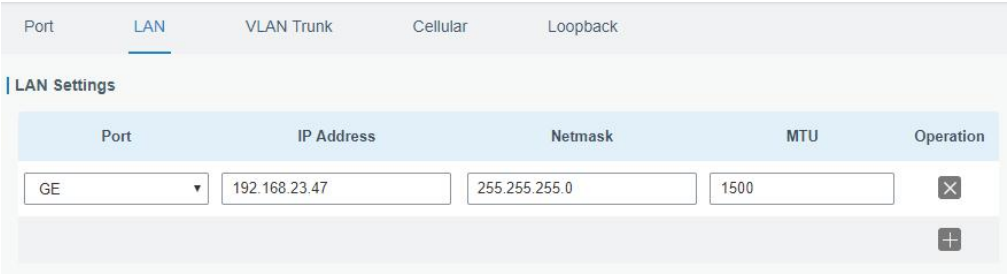


Figure 3-3-1-6

| LAN | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Port | Select LAN port. | GE |
| IP Address | Set IP address of LAN port. | 192.168.1.1 |
| Netmask | Set Netmask of LAN port. | 255.255.255.0 |
| MTU | Set the maximum transmission unit of LAN port. Range: 68-1500. | 1500 |

Table 3-3-1-6

### 3.3.1.4 VLAN Trunk

VLAN is a kind of new data exchange technology that realizes virtual work groups by logically dividing the LAN device into network segments.

Client  to delete the current VLAN setting. Click  to add a new VLAN port.


Figure 3-3-1-7

| VLAN Trunk | |
|---|---|
| **Item** | **Description** |
| Enable | The gateway can encapsulate or decapsulate the virtual LAN tag when this function is enabled. |
| Interface | Select the VLAN interface from the LAN ports. |
| VID | Set the label ID of the VLAN. Range: 1-4094. |
| IP Address | Set VLAN port's IP address. |
| Netmask | Set VLAN port's netmask. |

Table 3-3-1-7 VLAN Trunk Parameters

### 3.3.1.5 WLAN (Only Applicable to Wi-Fi Version)

This section explains how to set the related parameters for Wi-Fi network. UG85 supports 802.11 b/g/n/ac, as AP or client mode.

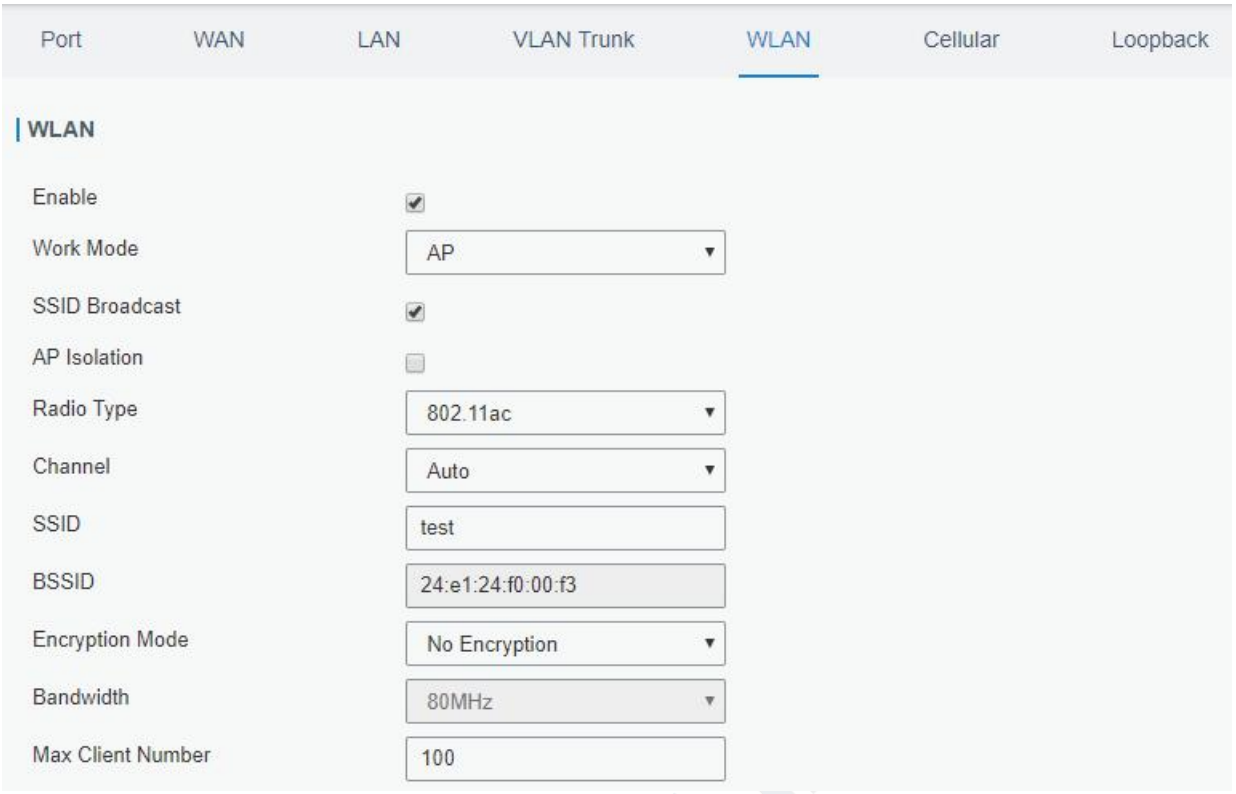



Figure 3-2-1-8


Figure 3-2-1-9

| WLAN Settings | |
|---|---|
| **Item** | **Description** |
| Enable | Enable/disable WLAN. |
| Work Mode | Select gateway's work mode. The options are "Client" or "AP". |
| 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". |
| BSSID | Fill in the MAC address of the access point. Either SSID or BSSID can be filled to joint the network. |
| SSID | Fill in the SSID of the access point. |
| **Client Mode** | |
| Scan | Click "Scan" button to search the nearby access point. |
| 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. |
| **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)”, “802.11 n (5 GHz)” and “802.11 ac (5 GHz)”. |
| Channel | Select wireless channel. The options are "Auto", "1", "2"....."13". |
| Cipher | Select cipher. The options are “Auto", “AES", “TKIP" and “AES/TKIP". |
| Key | Fill the pre-shared key of WPA encryption. |
| 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 IP address 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 3-3-1-8 WLAN Parameters

**Related Topic**

Wi-Fi Application Example

### 3.3.1.6 Cellular (Only Applicable to Cellular Version)

This section explains how to set the related parameters for cellular network. The UG85 LoRaWAN gateway has two cellular interfaces, namely SIM1 and SIM2. Only one cellular interface is active at one time. If both cellular interfaces are enabled, then SIM1 interface takes precedence by default.

A typical use case would be to have SIM1 configured as the primary cellular interface and SIM2 as a backup. If the UG85 cannot connect to the network via SIM1, it will automatically fail over to SIM2.

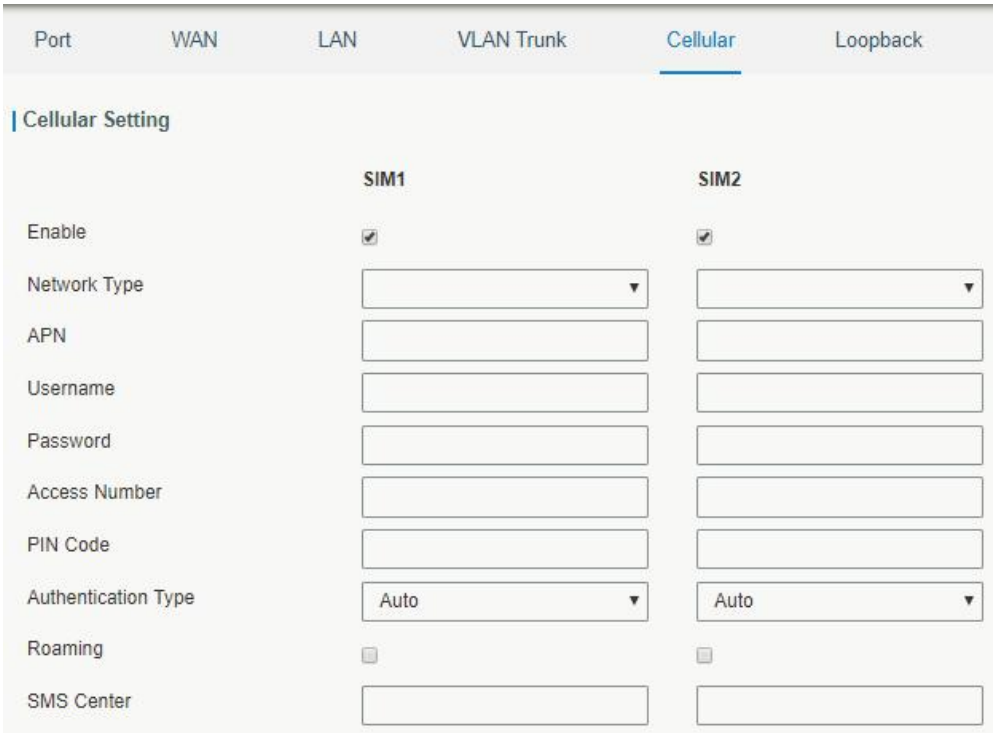



Figure 3-3-1-10

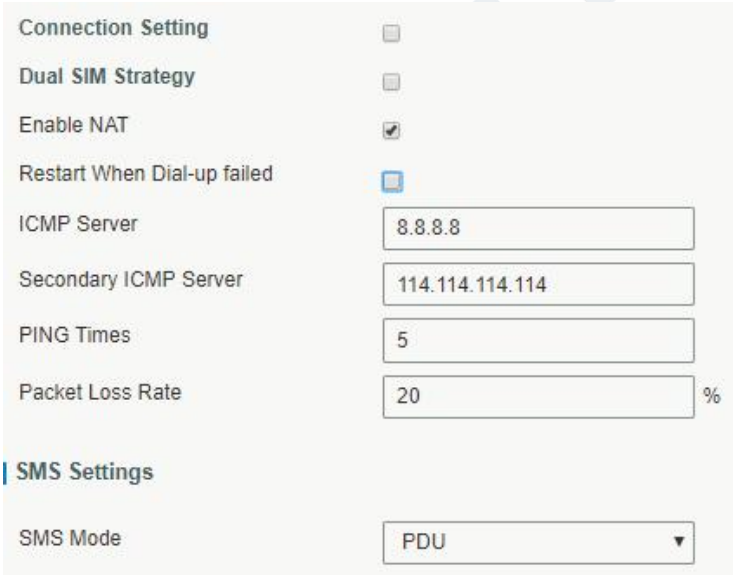



Figure 3-3-1-11

| General Settings | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Check the option to enable the corresponding SIM card. | Enable |
| Network Type | Select from "Auto", "4G First", "4G Only", "3G First", "3G Only", "2G First", and "2G Only".<br>Auto: connect to the network with the strongest signal automatically.<br>4G First: 4G network takes precedence. | Auto |

| | | |
|---|---|---|
| | 4G Only: connect to 4G network only.<br>And so on. | |
| APN | Enter the Access Point Name for cellular dial-up connection provided by local ISP. | Null |
| Username | Enter the username for cellular dial-up connection provided by local ISP. | Null |
| Password | Enter the password for cellular dial-up connection provided by local ISP. | Null |
| Access Number | Enter the dial-up center NO. For cellular dial-up connection provided by local ISP. | Null |
| PIN Code | Enter a 4-8 characters PIN code to unlock the SIM. | Null |
| Authentication Type | Select from "Auto", "PAP", "CHAP", "MS-CHAP", and "MS-CHAPv2". | Auto |
| Roaming | Enable or disable roaming. | Disable |
| SMS Center | Enter the local SMS center number for storing, forwarding, converting and delivering SMS message. | Null |
| Enable NAT | Enable or disable NAT function. | Enable |
| Restart When Dial-up failed | When this function is enabled, the gateway will restart automatically if the dial-up fails several times. | Disabled |
| ICMP Server | Set the ICMP detection server's IP address. | 8.8.8.8 |
| Secondary ICMP Server | Set the secondary ICMP detection server's IP address. | 114.114.114.114 |
| PING Times | Set PING packet numbers in each ICMP detection. | 5 |
| Packet Loss Rate | Set packet loss rate in each ICMP detection. ICMP detection fails when the preset packet loss rate is exceeded. | 20 |

Table 3-3-1-9 Cellular Parameters

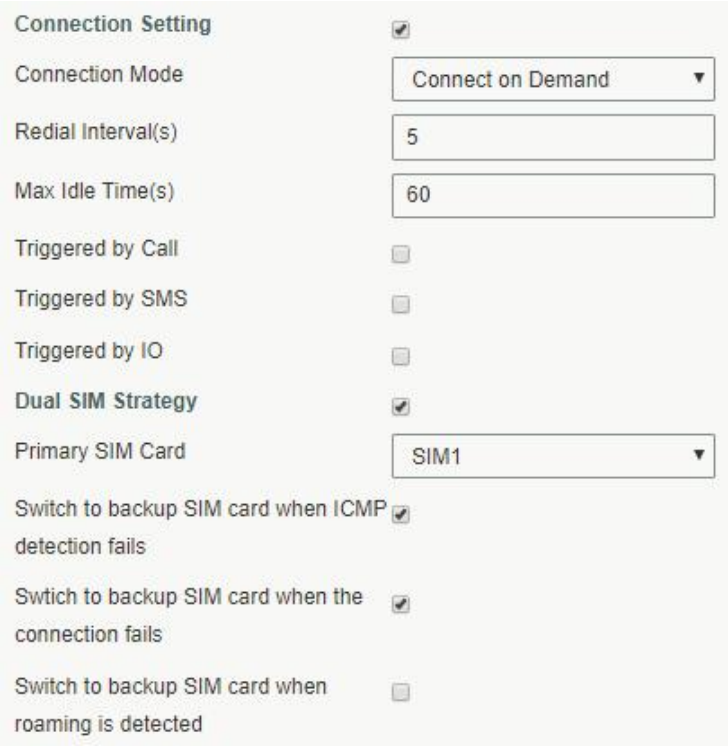



Figure 3-3-1-12

| Item | Description |
|---|---|
| **Connection Mode** | |
| Connection Mode | Select from "Always Online" and "Connect on Demand". |
| Connect on Demand | "Connect on Demand" includes "Triggered by Call", "Triggered by SMS", and "Triggered by IO". |
| 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 > 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 > Phone" to set up SMS group. |
| SMS Text | Fill in the SMS content for triggering. |
| Triggered by IO | The gateway will switch from offline mode to cellular network mode automatically when the DI status is changed. Go to “Industrial > I/O > DI” to configure trigger condition. |
| **Dual SIM Strategy** | |
| Current SIM Card | Select between "SIM1" and "SIM2" as a current SIM card used. |
| Switch to backup SIM card when ICMP detection fails | The gateway will switch to the backup SIM card when packet loss rate in IMCP detection exceeds the preset value. |
| Switch to backup | The gateway will switch to the backup SIM card when the primary |

| | |
|---|---|
| SIM card when the connection fails | one fails to connect with cellular network. |
| Switch to backup SIM card when roaming is detected | The gateway will switch to the backup SIM card when the primary one is roaming. |

Table 3-3-1-10 Cellular Parameters

**Related Topics**

Cellular Connection Application Example

Dual SIM Backup Application Example

Phone Group

### 3.3.1.7 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.

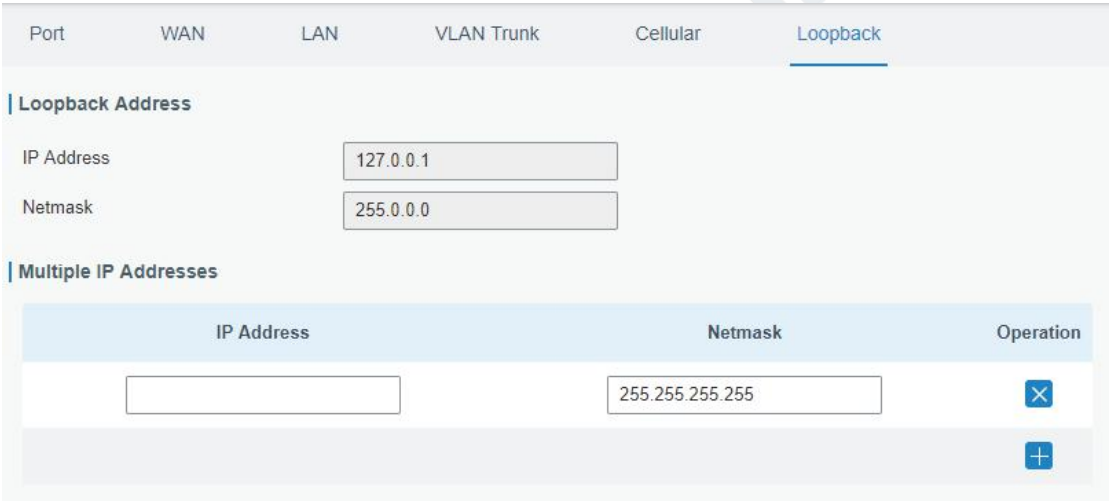



Figure 3-3-1-13

| 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 3-3-1-11 Loopback Parameters

### 3.3.2 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.

#### 3.3.2.1 Security

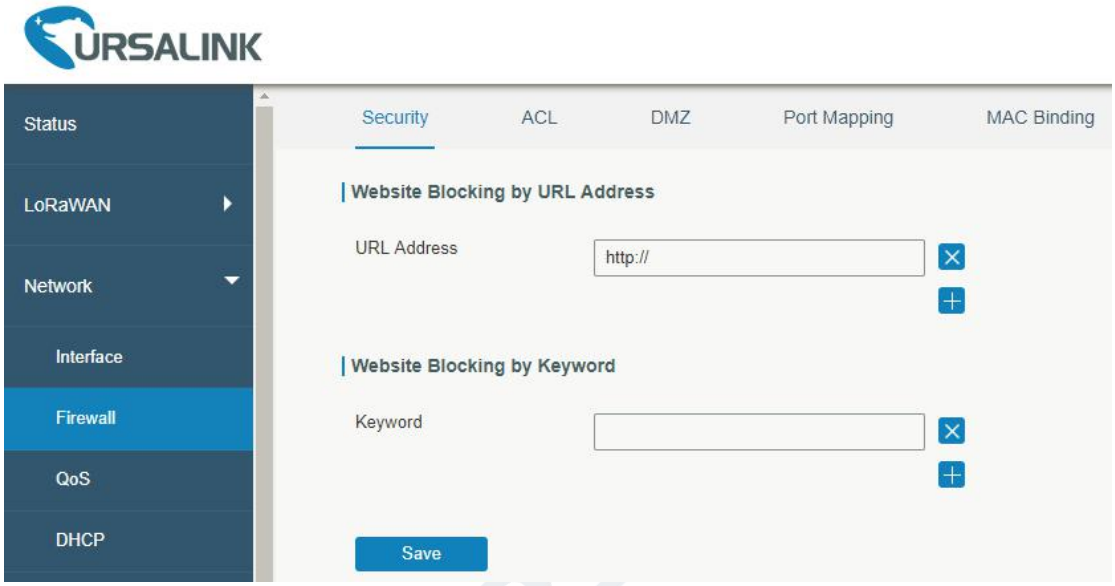



Figure 3-3-2-1

| 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

#### 3.3.2.2 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.

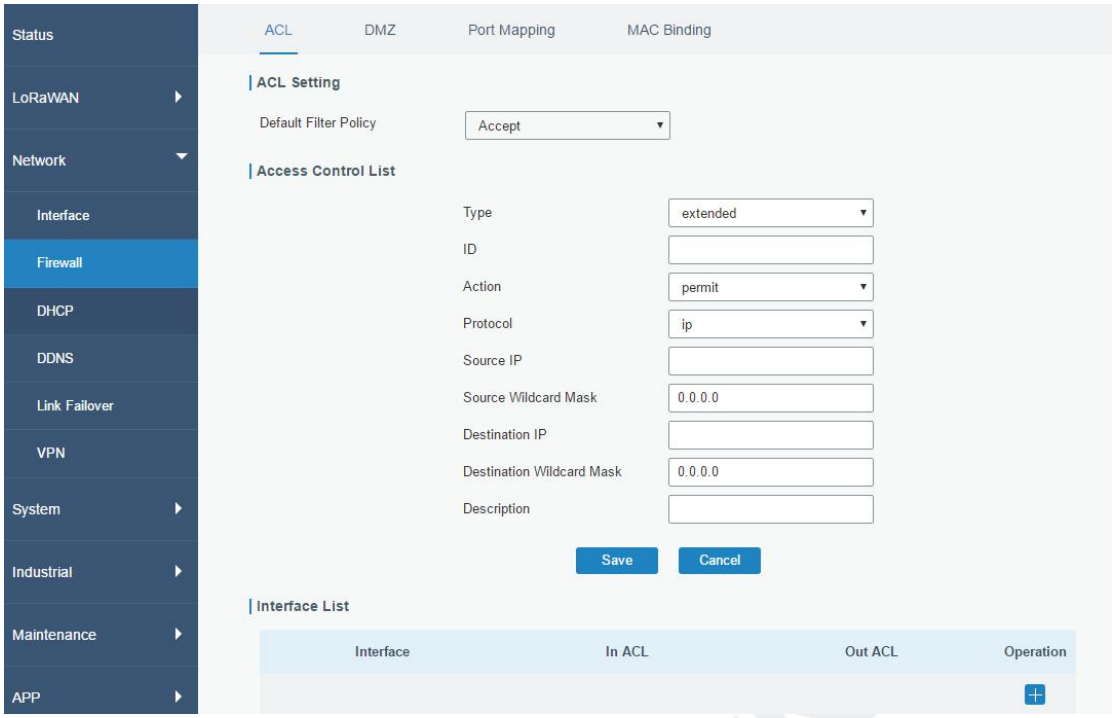



Figure 3-3-2-2

| Item | Description |
|---|---|
| **ACL Setting** | |
| Default Filter Policy | Select from "Accept" and "Deny".<br>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 3-3-2-2 ACL Parameters

### 3.3.2.3 DMZ

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

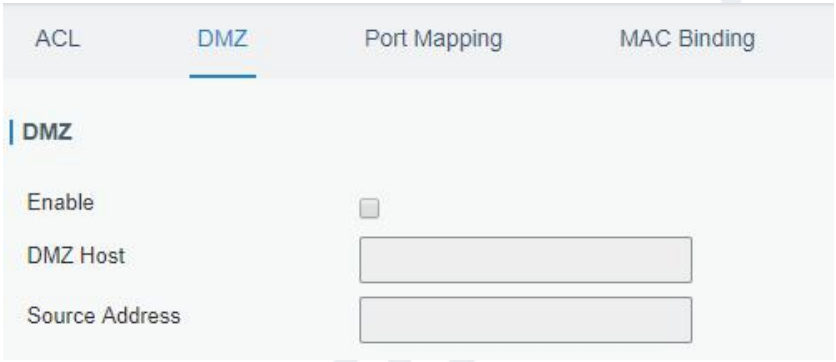



Figure 3-3-2-3

| 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 3-3-2-3 DMZ Parameters

### 3.3.2.4 Port Mapping

Port mapping is an application of network address translation (NAT) that redirects a communication request from the combination of an address and port number to another while the packets are traversing a network gateway such as a gateway or firewall.

Click  to add a new port mapping rules.

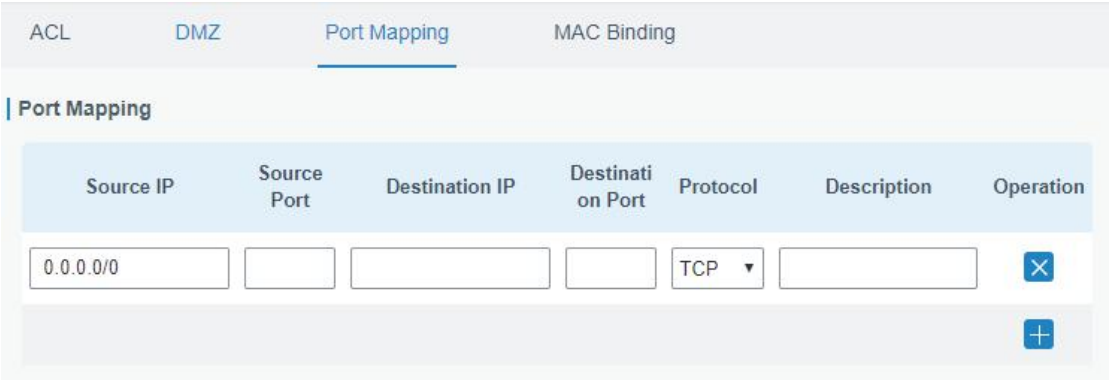



Figure 3-3-2-4

| 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 3-3-2-4 Port Mapping Parameters

**Related Configuration Example**

NAT Application Example

### 3.3.2.5 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.

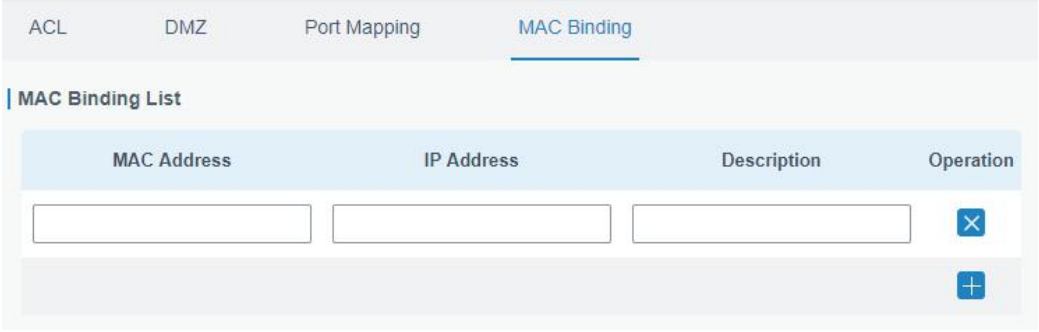



Figure 3-3-2-5

| 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 3-3-2-5 MAC Binding Parameters

### 3.3.3 QoS

Quality of service (QoS) refers to traffic prioritization and resource reservation control mechanisms rather than the achieved service quality. QoS is engineered to provide different priority for different applications, users, data flows, or to guarantee a certain level of performance to a data flow.

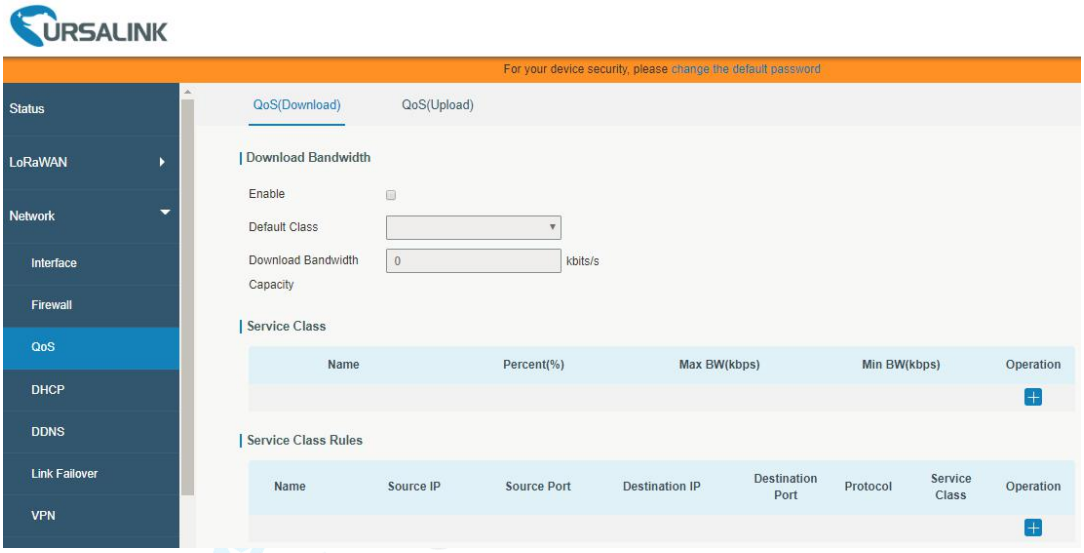



Figure 3-3-3-1

| QoS | |
|---|---|
| **Item** | **Description** |
| **Download/Upload** | |
| Enable | Enable or disable QoS. |
| Default Class | Select default class from Service Class list. |
| Download/Upload Bandwidth Capacity | The download/upload bandwidth capacity of the network that the gateway is connected with, in kbps. Range: 1-8000000. |
| **Service Classes** | |
| Name | Give the service class a descriptive name. |
| Percent (%) | The amount of bandwidth that this class should be guaranteed in percentage. Range: 0-100. |
| Max BW(kbps) | The maximum bandwidth that this class is allowed to consume, in kbps. The value should be less than the "Download/Upload Bandwidth Capacity". |

| | |
|---|---|
| Min BW(kbps) | The minimum bandwidth that can be guaranteed for the class, in kbps. The value should be less than the "MAX BW" value. |
| **Service Class Rules** | |
| **Item** | **Description** |
| Name | Give the rule a descriptive name. |
| Source IP | Source address of flow control (leaving it blank means any). |
| Source Port | Source port of flow control. Range: 0-65535 (leaving it blank means any). |
| Destination IP | Destination address of flow control (leaving it blank means any). |
| Destination Port | Destination port of flow control. Range: 0-65535 (leaving it blank means any). |
| Protocol | Select protocol from "ANY", "TCP", "UDP", "ICMP", and "GRE". |
| Service Class | Set service class for the rule. |

Table 3-3-3-1 QoS (Download/Upload) Parameters

### 3.3.4 DHCP

DHCP adopts Client/Server communication mode. The Client sends configuration request to the Server which feeds back corresponding configuration information and distributes IP address to the Client so as to achieve the dynamic configuration of IP address and other information.

#### 3.3.4.1 DHCP Server

The UG85 can be set as a DHCP server to distribute IP address when a host logs on and ensures each host is supplied with different IP addresses. DHCP Server has simplified some previous network management tasks requiring manual operations to the largest extent.

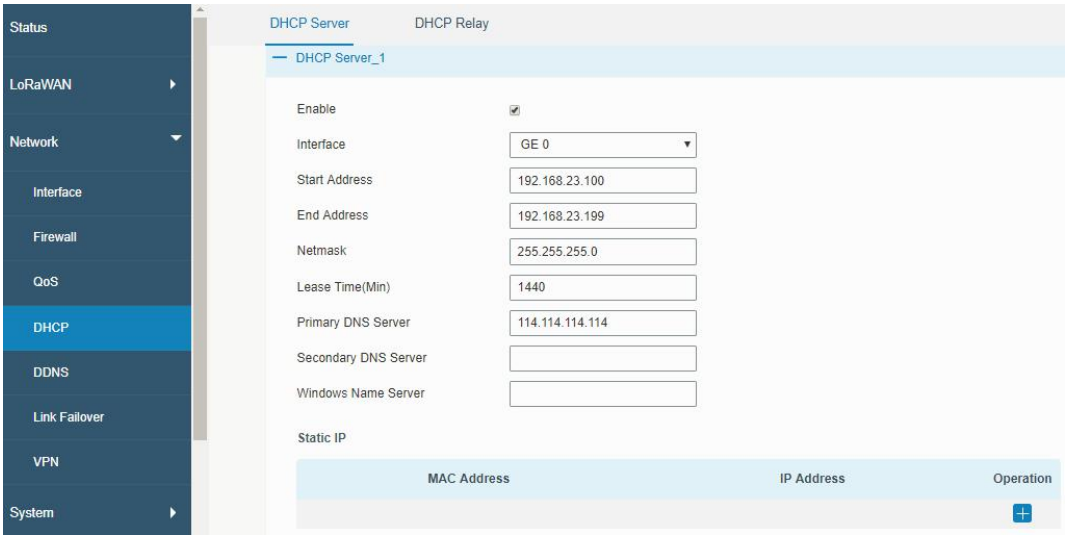



Figure 3-3-4-1

| DHCP Server | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Enable or disable DHCP server. | Enable |
| Interface | Select interface, e.g. GE. | GE |
| 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 (Min) | Set the lease time on which the client can use the IP address obtained from DHCP server. Range: 1-10080. | 1440 |
| Primary DNS Server | Set the primary DNS server. | 114.114.114.114 |
| 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 3-3-4-1 DHCP Server Parameters

### 3.3.4.2 DHCP Relay

The UG85 can be set as DHCP Relay to provide a relay tunnel to solve the problem that DHCP Client and DHCP Server are not in the same subnet.


Figure 3-3-4-2

| DHCP Relay | |
|---|---|
| **Item** | **Description** |
| Enable | Enable or disable DHCP relay. |
| DHCP Server | Set DHCP server, up to 10 servers can be configured; separate them by blank space or ",". |

Table 3-3-4-2 DHCP Relay Parameters

### 3.3.5 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.

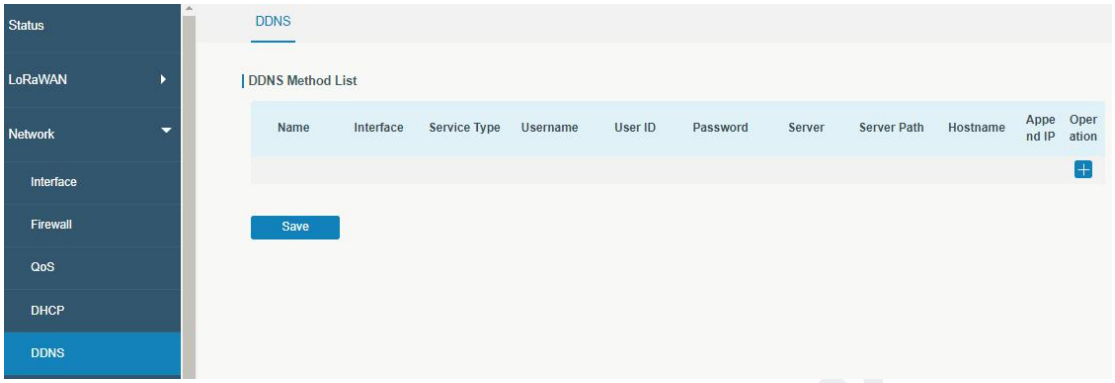



Figure 3-3-5-1

| 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 3-3-5-1 DDNS Parameters

### 3.3.6 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.

### 3.3.6.1 SLA

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


Figure 3-3-6-1

| 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. | 114.114.114.114 |
| Secondary Destination Address | The secondary detected IP address. | 8.8.8.8 |
| 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 |
| PING Times | Define PING packet numbers in each SLA probe. Range: 1-1000. | 5 |
| Packet Loss Rate | Define packet loss rate in each SLA probe. SLA probe fails when the preset packet loss rate is exceeded. | 20 |
| Start Time | Detection start time; select from "Now" and blank character. Blank character means this SLA detection doesn't start. | now |

Table 3-3-6-1 SLA Parameters

### 3.3.6.2 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 3-3-6-2

| 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 switching). | 1 |

Table 3-3-6-2 Track Parameters

### 3.3.6.3 VRRP

The Virtual Router Redundancy Protocol (VRRP) is a computer networking protocol that provides automatic assignment of available Internet Protocol (IP) routers for participating hosts. This increases the availability and reliability of routing paths via automatic default gateway selections in an IP sub-network.

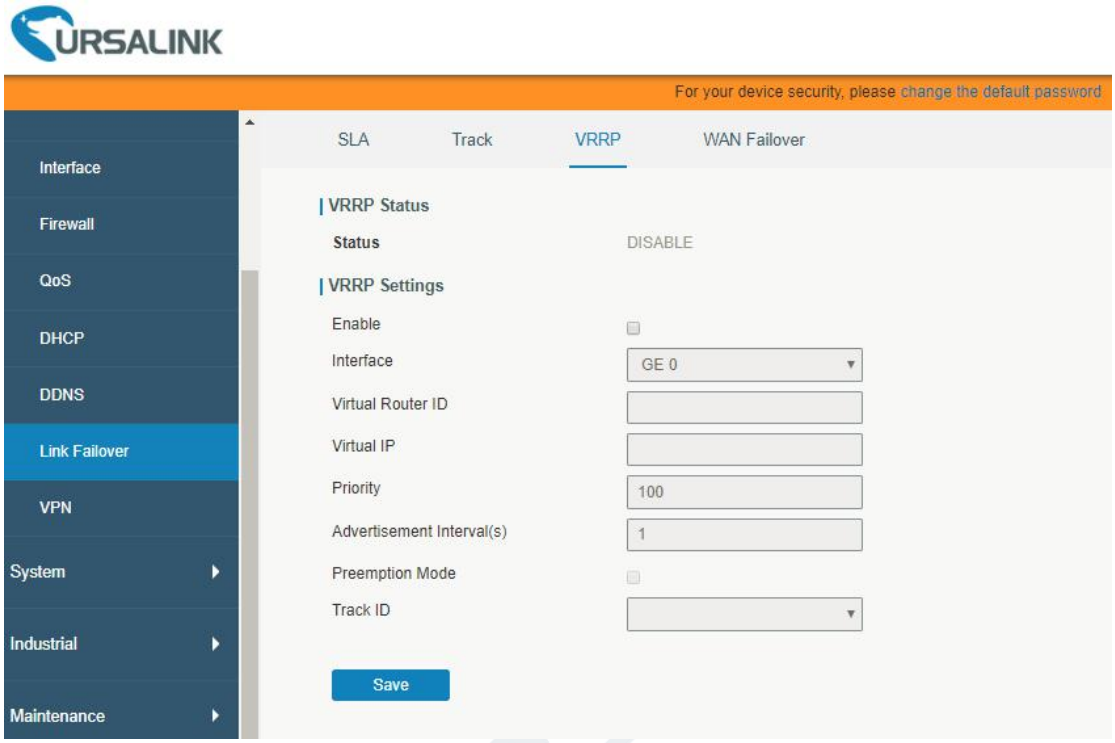



Figure 3-3-6-3

| VRRP | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Enable or disable VRRP. | Disable |
| Interface | Select the interface of Virtual Router. | None |
| Virtual Router ID | User-defined Virtual Router ID. Range: 1-255. | None |
| Virtual IP | Set the IP address of Virtual Router. | None |
| Priority | The VRRP priority range is 1-254 (a bigger number indicates a higher priority). The router with higher priority will be more likely to become the gateway router. | 100 |
| Advertisement Interval (s) | Heartbeat package transmission time interval between routers in the virtual ip group. Range: 1-255. | 1 |
| Preemption Mode | If the gateway works in the preemption mode, once it finds that its own priority is higher than that of the current gateway router, it will send VRRP notification package, resulting in re-election of gateway router and eventually replacing the original gateway router. Accordingly, the original gateway router will become a Backup router. | Disable |
| Track ID | Trace detection, select the defined track ID or blank character. | None |

Table 3-3-6-3 VRRP Parameters

### 3.3.6.4 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.

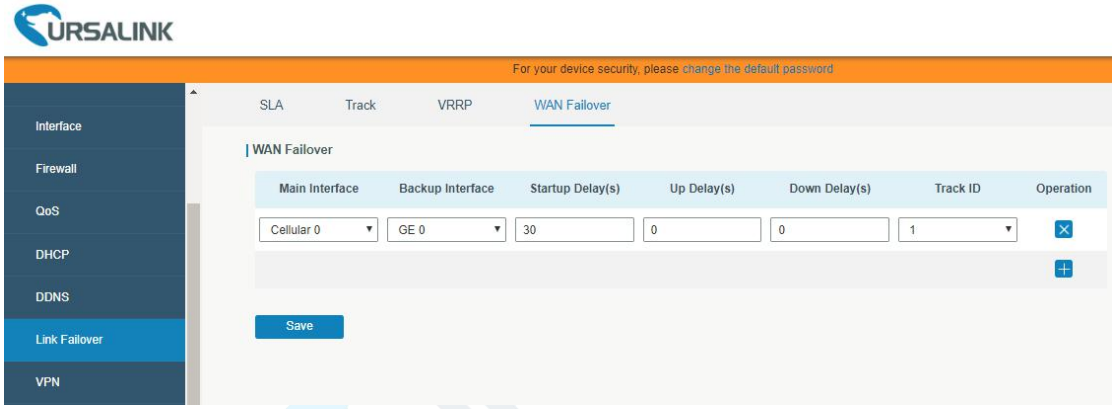



Figure 3-3-6-4

| WAN Failover | | |
|---|---|---|
| **Parameters** | **Description** | **Default** |
| Main Interface | Select a link interface as the main link. | Cellular0 |
| Backup Interface | Select a link interface as the backup link. | GE0 |
| Startup Delay (s) | Set how long to wait for the startup tracking detection policy to take effect. Range: 0-300. | 3 |
| 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. | 1 |

Table 3-3-6-4 WAN Failover Parameters

### 3.3.7 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.

The UG85 supports DMVPN, IPsec, GRE, L2TP, PPTP, OpenVPN, as well as GRE over IPsec and L2TP over IPsec.

#### 3.3.7.1 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 3-3-7-1


Figure 3-3-7-2

| 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 3-3-7-1 DMVPN Parameters

### 3.3.7.2 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.

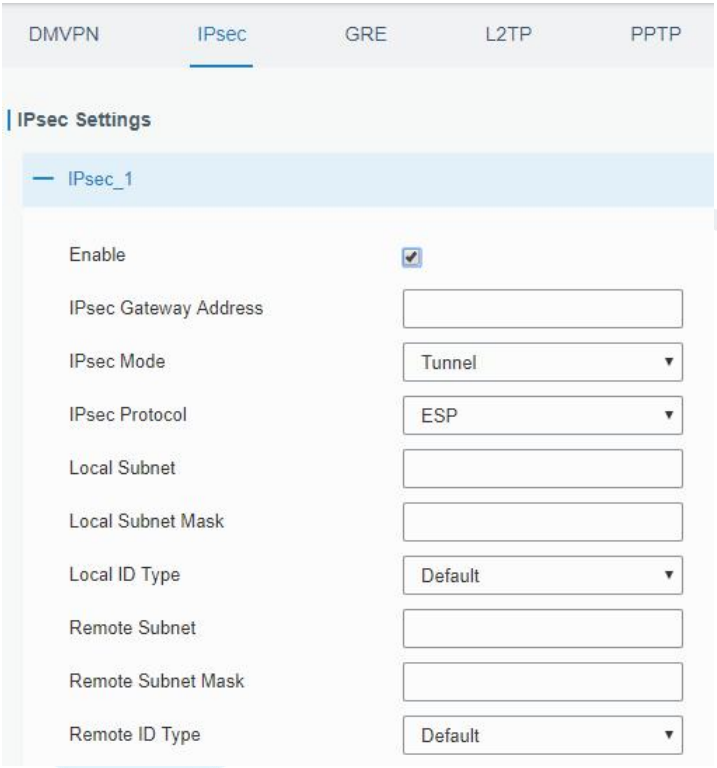



Figure 3-3-7-3

| 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 3-3-7-2 IPsec Parameters

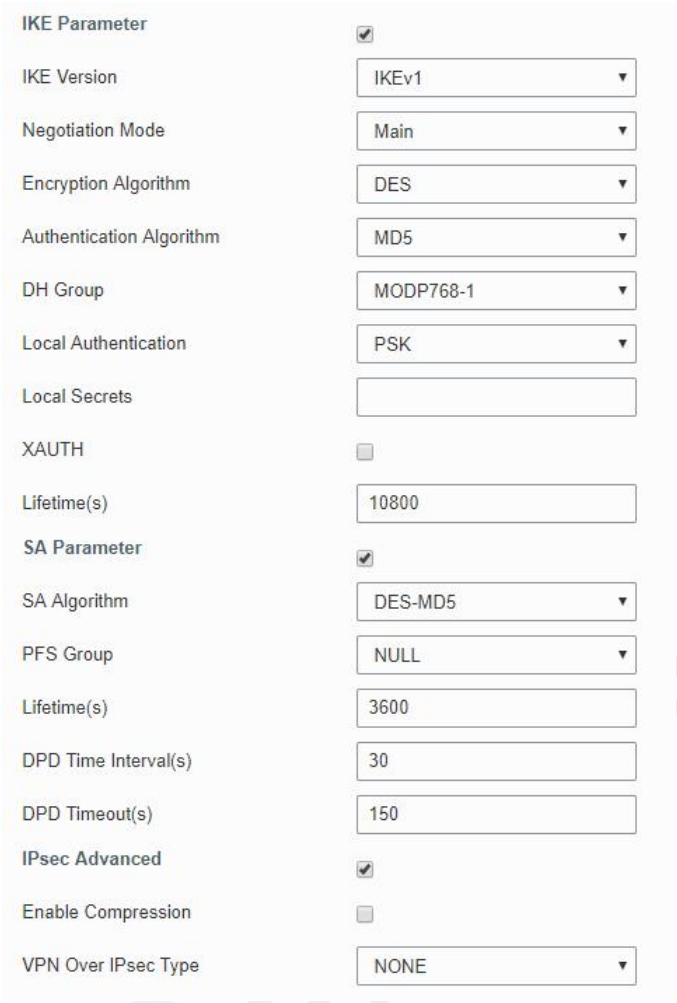



Figure 3-3-7-4

| 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 3-3-7-3 IPsec Parameters

### 3.3.7.3 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.

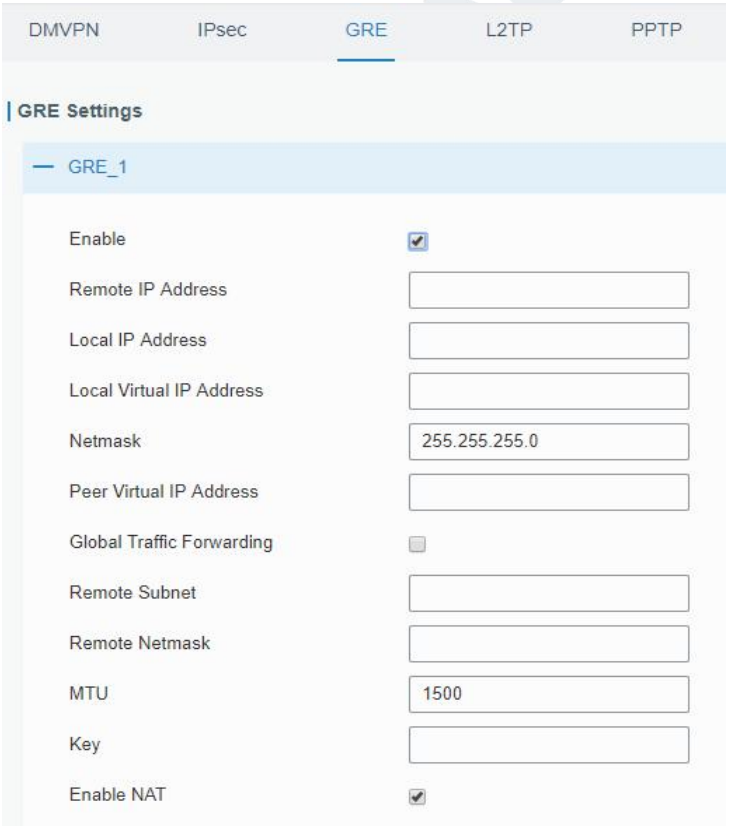



Figure 3-3-7-5

| 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 3-3-7-4 GRE Parameters

### 3.3.7.4 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.

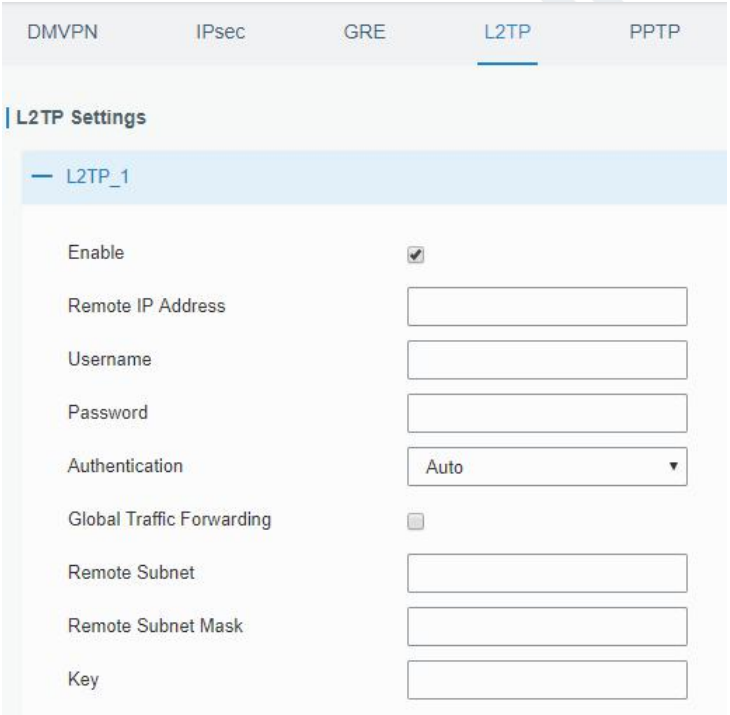



Figure 3-3-7-6

| 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. |

Table 3-3-7-5 L2TP Parameters

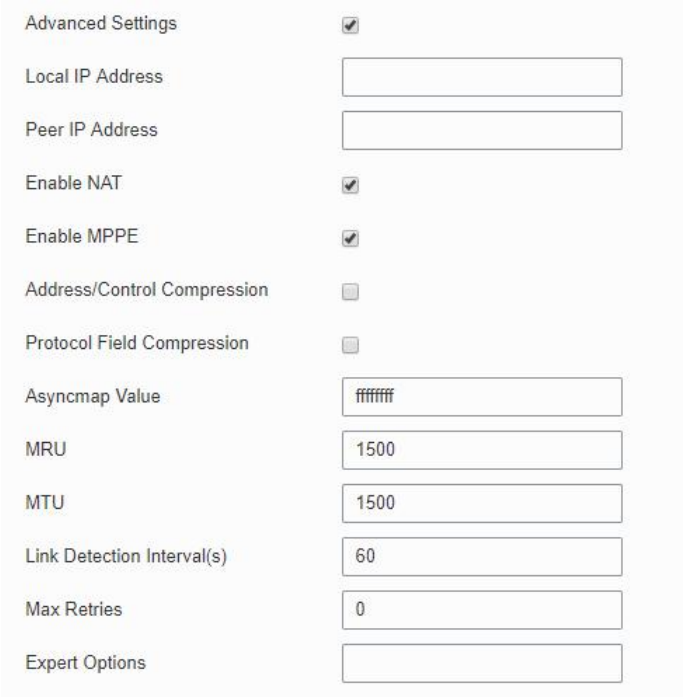



Figure 3-3-7-7

| 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 3-3-7-6 L2TP Parameters

### 3.3.7.5 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.

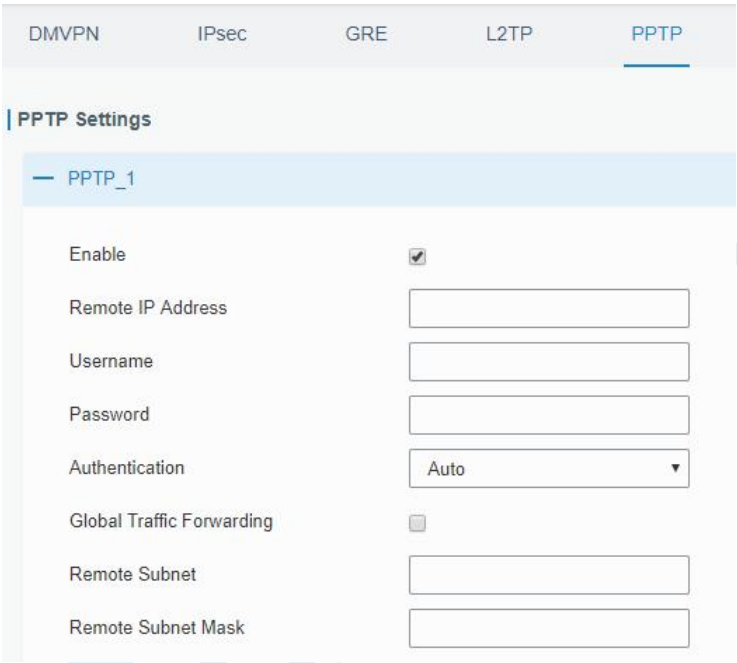



Figure 3-3-7-8

| 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 3-3-7-7 PPTP Parameters

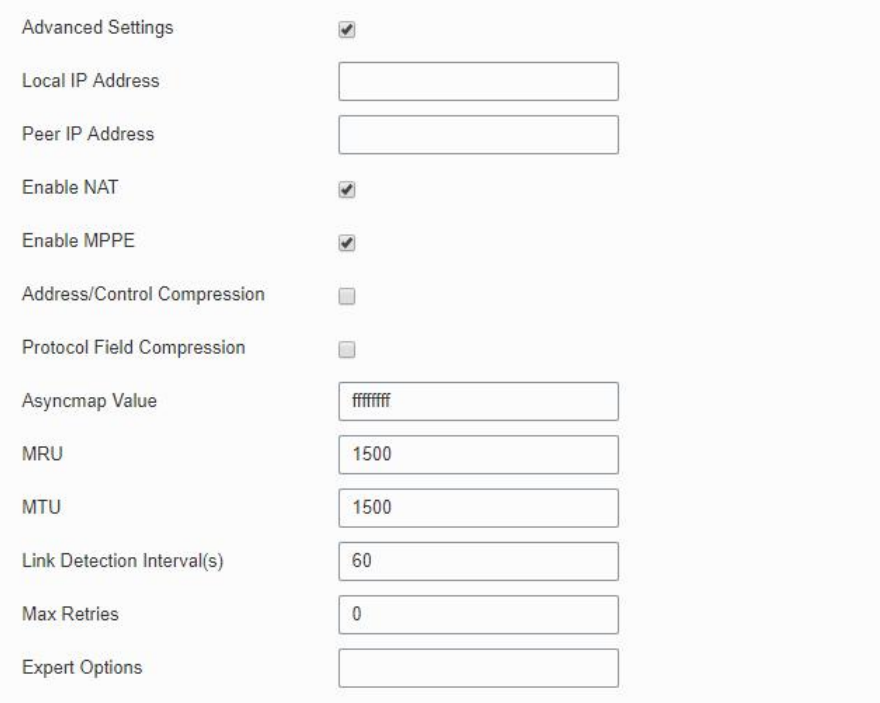



Figure 3-3-7-9

| 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 3-3-7-8 PPTP Parameters

### 3.3.7.6 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.

Advantages of OpenVPN include:

- Security provisions that function against both active and passive attacks.
- Compatibility with all major operating systems.
- High speed (1.4 megabytes per second typically).
- Ability to configure multiple servers to handle numerous connections simultaneously.
- All encryption and authentication features of the OpenSSL library.
- Advanced bandwidth management.
- A variety of tunneling options.
- Compatibility with smart cards that support the Windows Crypt application program interface (API).

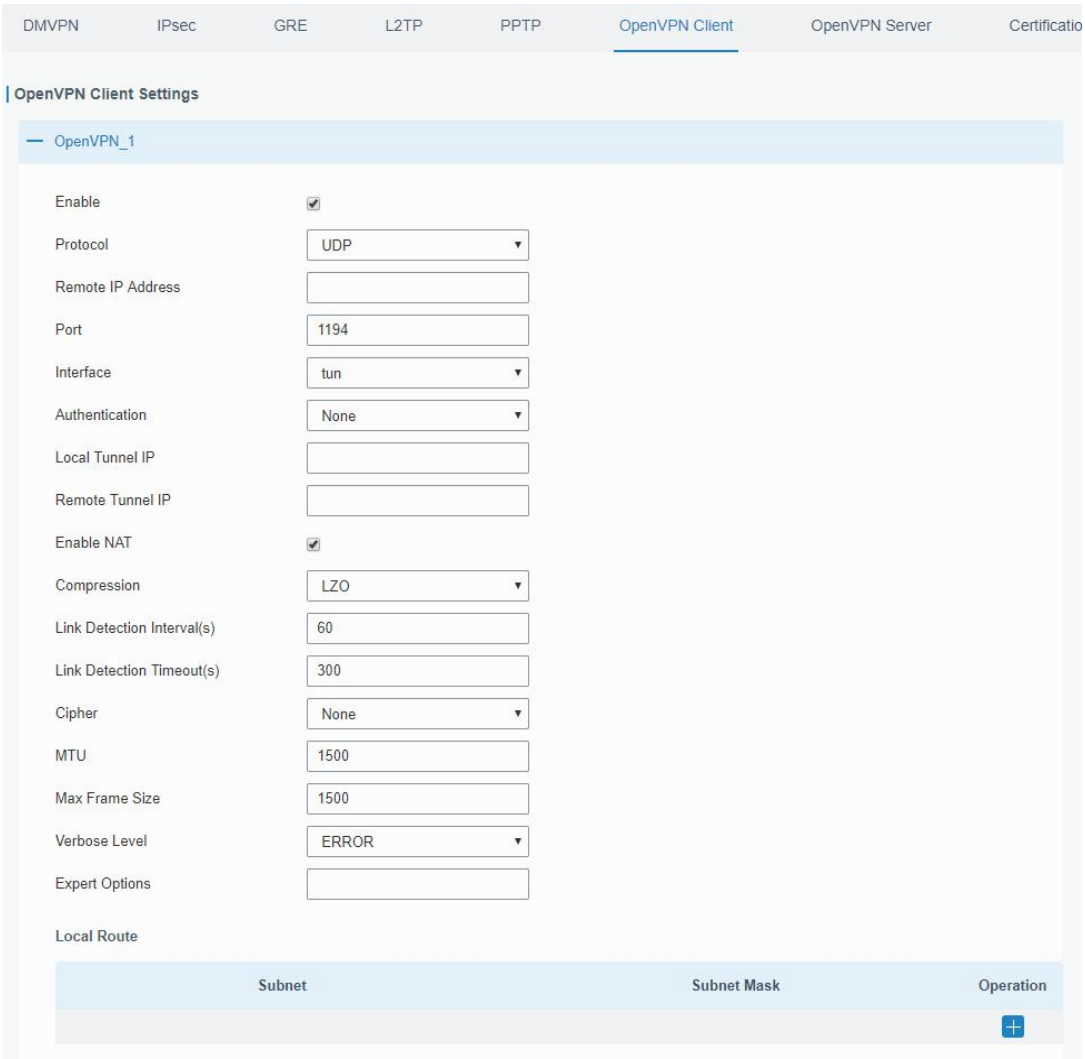



Figure 3-3-7-10

| OpenVPN Client | |
|---|---|
| **Item** | **Description** |
| Enable | Enable OpenVPN client. A maximum of 3 tunnels is allowed. |

| | |
|---|---|
| Protocol | Select from "UDP" and "TCP". |
| Remote IP Address | Enter remote OpenVPN server's IP address or domain name. |
| Port | Enter the listening port number of remote OpenVPN server. Range: 1-65535. |
| Interface | Select from "tun" and "tap". |
| Authentication | Select from "None", "Pre-shared", "Username/Password", "X.509 cert", and "X.509 cert+user". |
| Local Tunnel IP | Set local tunnel address. |
| Remote Tunnel IP | Enter remote tunnel address. |
| Global Traffic Forwarding | All the data traffic will be sent out via OpenVPN tunnel when this function is enabled. |
| Enable TLS Authentication | Check to enable TLS authentication. |
| Username | Enter username provided by OpenVPN server. |
| Password | Enter password provided by OpenVPN server. |
| Enable NAT | Enable NAT traversal function. |
| Compression | Select LZO to compress data. |
| Link Detection Interval (s) | Set link detection interval time to ensure tunnel connection. Range: 10-1800. |
| Link Detection Timeout (s) | Set link detection timeout. OpenVPN will be reestablished after timeout. Range: 60-3600. |
| Cipher | Select from "NONE", "BF-CBC", "DE-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 other PPP initialization strings in this field and separate the strings with blank space. |
| **Local Route** | |
| Subnet | Set the local route's IP address. |
| Subnet Mask | Set the local route's netmask. |

Table 3-3-7-9 OpenVPN Client Parameters

#### 3.3.7.7 OpenVPN Server

The UG85 supports OpenVPN server to create secure point-to-point or site-to-site connections in routed or bridged configurations and remote access facilities.

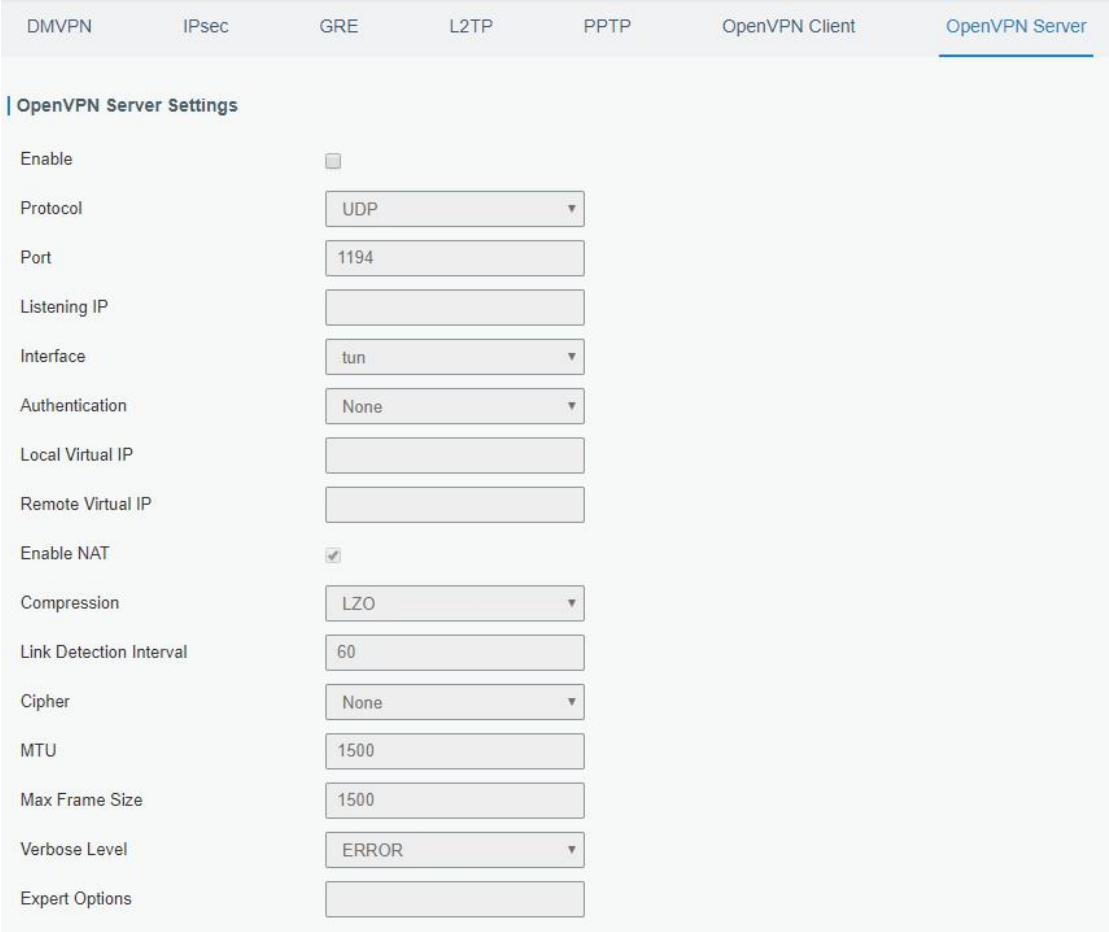



Figure 3-3-7-11

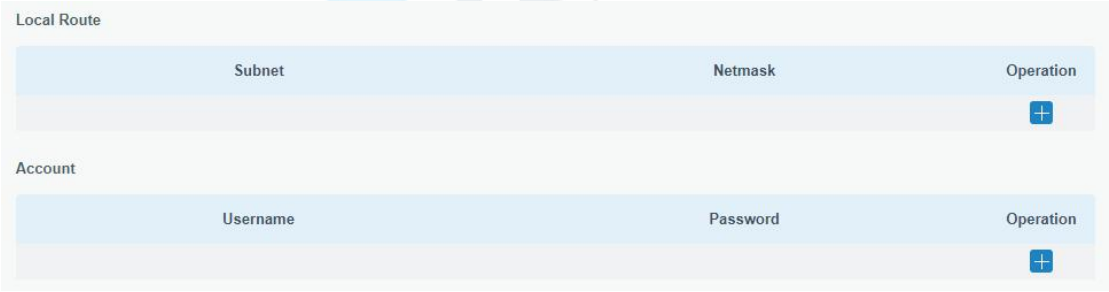



Figure 3-3-7-12

| OpenVPN Server | |
|---|---|
| **Item** | **Description** |
| Enable | Enable/disable OpenVPN server. |
| Protocol | Select from TCP and UDP. |
| Port | Fill in listening port number. Range: 1-65535. |
| Listening IP | Enter WAN IP address or LAN IP address. Leaving it blank refers to all active WAN IP and LAN IP address. |
| Interface | Select from " tun" and "tap". |
| Authentication | Select from "None", "Pre-shared", "Username/Password", "X.509 cert" and "X. 509 cert +user". |
| Local Virtual IP | The local tunnel address of OpenVPN's tunnel. |

| | |
|---|---|
| Remote Virtual IP | The remote tunnel address of OpenVPN's tunnel. |
| Client Subnet | Local subnet IP address of OpenVPN client. |
| Client Netmask | Local netmask of OpenVPN client. |
| Renegotiation Interval(s) | Set interval for renegotiation. Range: 0-86400. |
| Max Clients | Maximum OpenVPN client number. Range: 1-128. |
| Enable CRL | Enable CRL |
| Enable Client to Client | Allow access between different OpenVPN clients. |
| Enable Dup Client | Allow multiple users to use the same certification. |
| Enable NAT | Check to enable the NAT traversal function. |
| Compression | Select "LZO" to compress data. |
| Link Detection Interval | Set link detection interval time to ensure tunnel connection. Range: 10-1800. |
| 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 other PPP initialization strings in this field and separate the strings with blank space. |
| **Local Route** | |
| Subnet | The real local IP address of OpenVPN client. |
| Netmask | The real local netmask of OpenVPN client. |
| **Account** | |
| Username & Password | Set username and password for OpenVPN client. |

Table 3-3-7-10 OpenVPN Server Parameters

### 3.3.7.8 Certifications

User can import/export certificate and key files for OpenVPN and IPsec on this page.

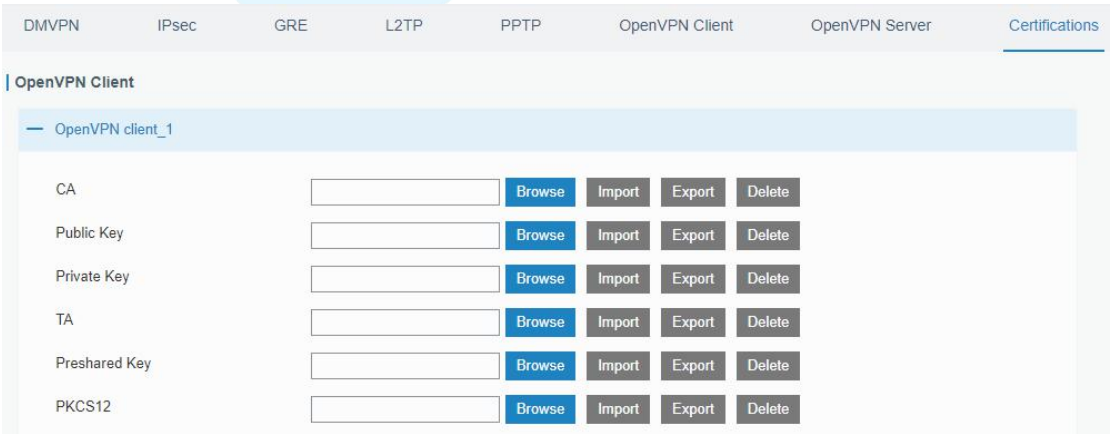



Figure 3-3-7-13

| OpenVPN Client | |
|---|---|
| **Item** | **Description** |
| CA | Import/Export CA certificate file. |

| | |
|---|---|
| Public Key | Import/Export public key file. |
| Private Key | Import/Export private key file. |
| TA | Import/Export TA key file. |
| Preshared Key | Import/Export static key file. |
| PKCS12 | Import/Export PKCS12 certificate file. |

Table 3-3-7-11 OpenVPN Client Certification Parameters

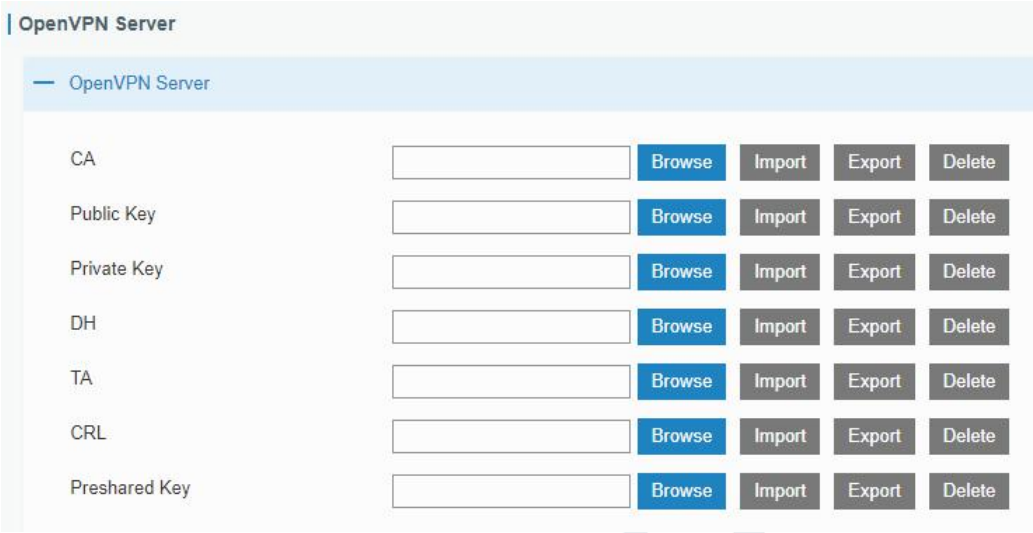



Figure 3-3-7-14

| OpenVPN Server | |
|---|---|
| **Item** | **Description** |
| CA | Import/Export CA certificate file. |
| Public Key | Import/Export public key file. |
| Private Key | Import/Export private key file. |
| DH | Import/Export DH key file. |
| TA | Import/Export TA key file. |
| CRL | Import/Export CRL. |
| Preshared Key | Import/Export static key file. |

Table 3-3-7-12 OpenVPN Server Parameters


Figure 3-3-7-15

| IPsec | |
|---|---|
| **Item** | **Description** |
| CA | Import/Export CA certificate. |
| Client Key | Import/Export client key. |
| Server Key | Import/Export server key. |
| Private Key | Import/Export private key. |
| CRL | Import/Export certificate recovery list. |

Table 3-3-7-13 IPsec Parameters

## 3.4 System

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

### 3.4.1 General Settings

#### 3.4.1.1 General

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

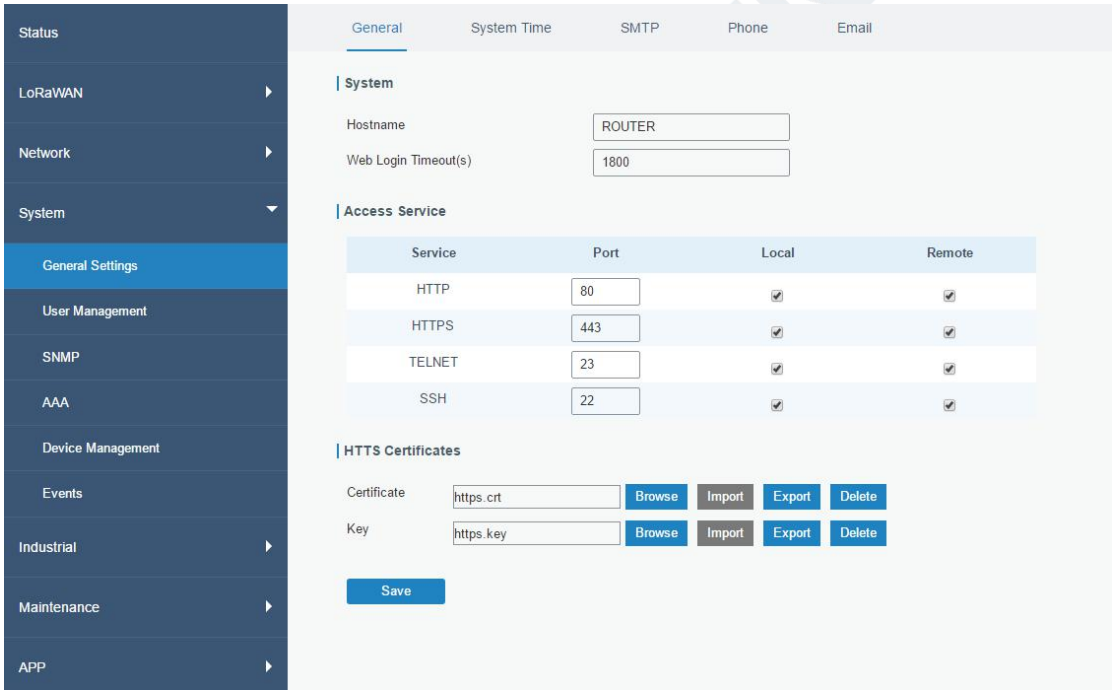



Figure 3-4-1-1

| General | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| **System** | | |
| Hostname | User-defined gateway name, needs to start with a letter. | URSA |
| Web Login Timeout (s) | You need to log in again if it times out. Range: 100-3600. | 1800 |
| **Access Service** | | |
| Local | Access the gateway locally. | Enable |

| | | |
|---|---|---|
| Port | Set port number of the services. Range: 1-65535. | -- |
| Remote | Access the gateway remotely. | Disable |
| 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. | 8088 |
| TELNET | | 8023 |
| SSH | Users can log in the device locally and remotely via SSH after the option is checked. | 8022 |
| **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 3-4-1-1 General Setting Parameters

### 3.4.1.2 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.**

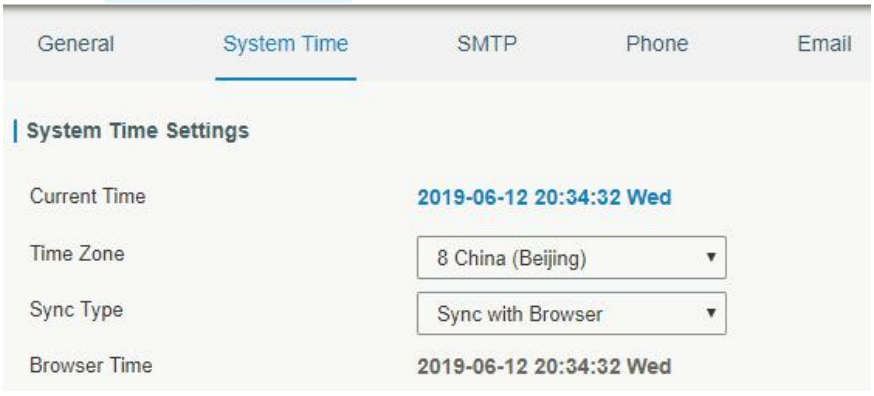



Figure 3-4-1-2

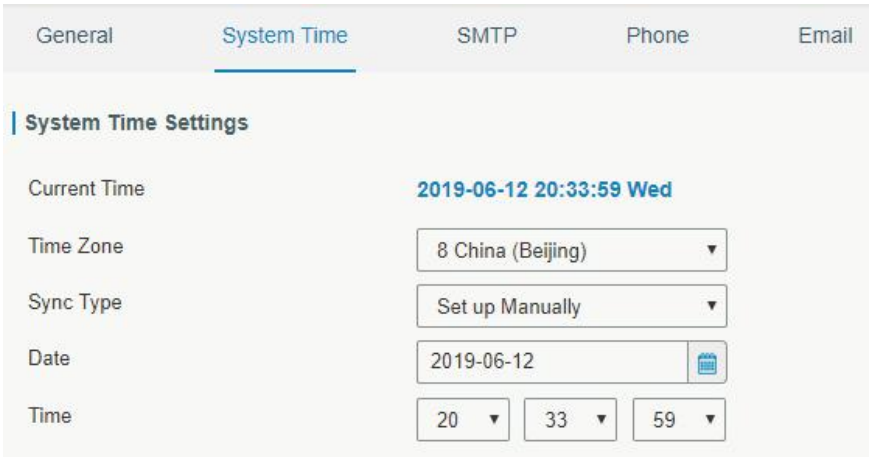



Figure 3-4-1-3

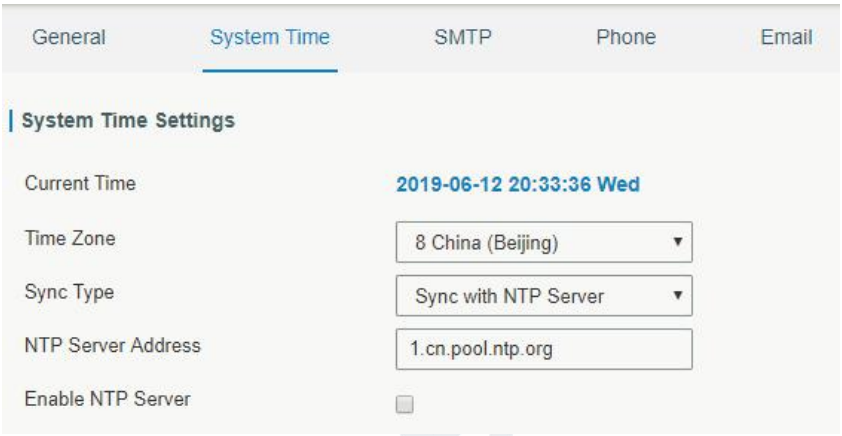



Figure 3-4-1-4

| 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. |
| Browser Time | Show the current time of browser. |
| Set up Manually | Manually configure the system time. |
| Sync with NTP Server | Synchronize time with NTP server so as to achieve time synchronization of all devices equipped with a clock on network. |
| **Sync with NTP Server** | |
| NTP Server Address | Set NTP server address (domain name/IP). |
| Enable NTP Server | NTP client on the network can achieve time synchronization with gateway after "Enable NTP Server" option is checked. |

Table 3-4-1-2 System Time Parameters

### 3.4.1.3 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.

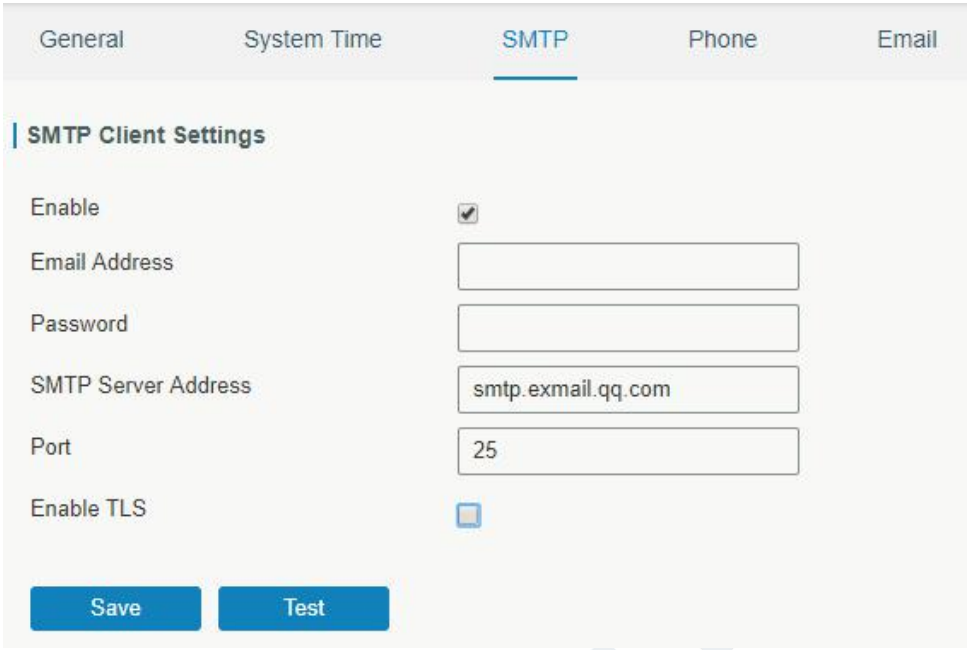



Figure 3-4-1-5

| SMTP | |
|---|---|
| **Item** | **Description** |
| **SMTP Client Settings** | |
| Enable | Enable or disable SMTP client function. |
| Email Address | Enter the sender's email account. |
| 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 3-4-1-3 SMTP Setting

**Related Topics**

Events Setting

### 3.4.1.4 Phone

Phone settings involve in call/SMS trigger and SMS alarm for events.

1. Add phone list.
2. Select phone numbers and add them to the phone group.
3. Go to “Network > Interface > Cellular > Connection Mode > Connect on Demand > Trigger by Call / Trigger by SMS” or go to “System > Events > Event Settings > SMS” and then select the phone group ID.

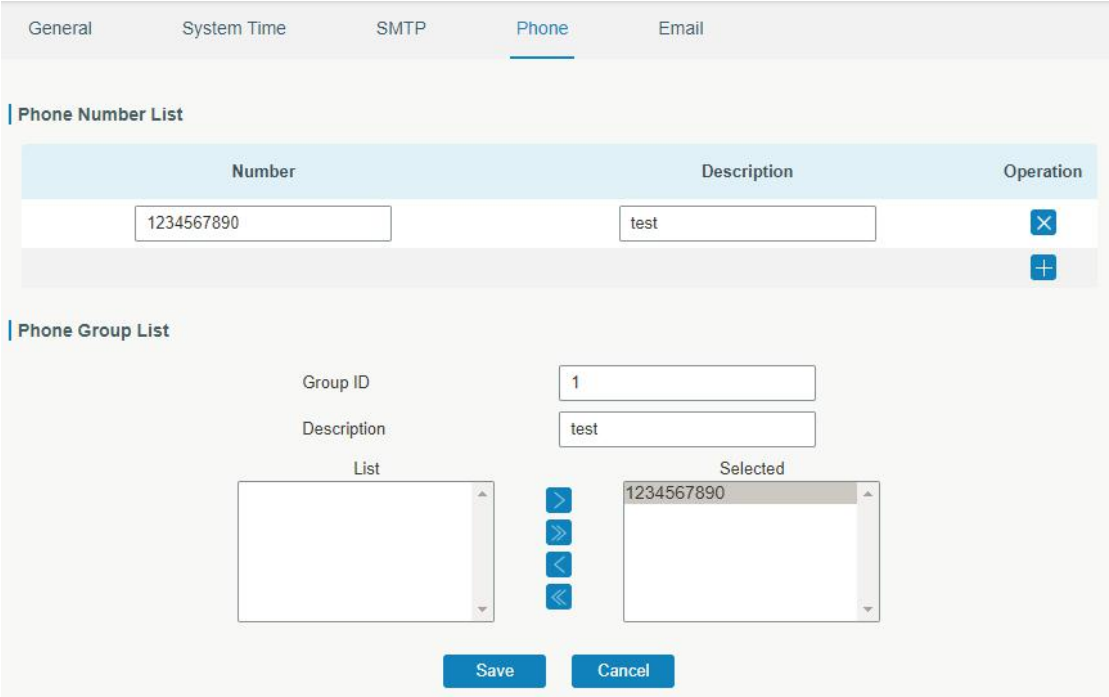



Figure 3-4-1-6

| Phone | |
|---|---|
| **Item** | **Description** |
| **Phone Number List** | |
| Number | Enter the telephone number. Digits, "+" and "-" are allowed. |
| Description | The description of the telephone number. |
| **Phone Group List** | |
| Group ID | Set number for phone group. Range: 1-100. |
| Description | The description of the phone group. |
| List | Show the phone list. |
| Selected | Show the selected phone number. |

Table 3-4-1-4 Phone Settings

**Related Topic**

Connect on Demand

### 3.4.1.5 Email

Email settings involve email alarm for events.

1. Add email list.
2. Select email addresses and add them to the phone group.
3. Go to “System > Events > Event Settings > Email” and then select the email group ID.

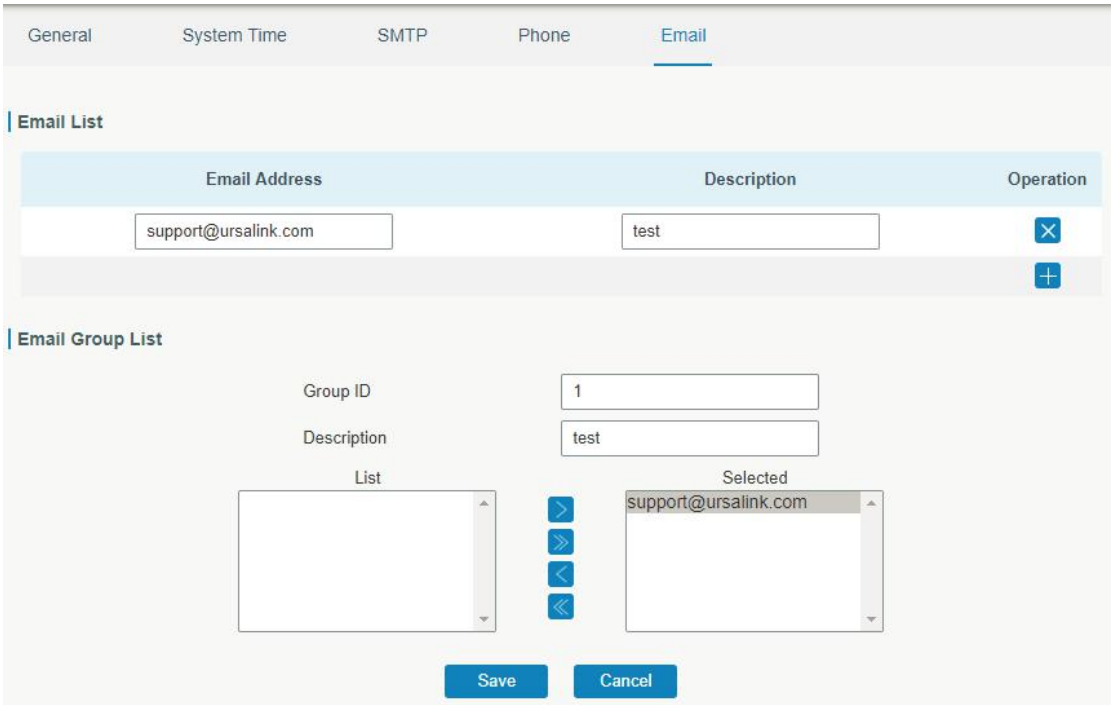



Figure 3-4-1-7

| Email | |
|---|---|
| **Item** | **Description** |
| **Email List** | |
| Email Address | Enter the Email address. |
| Description | The description of the Email address. |
| **Email Group List** | |
| Group ID | Set number for email group. Range: 1-100. |
| Description | The description of the Email group. |
| List | Show the Email address list. |
| Selected | Show the selected Email address. |

Table 3-4-1-5 Email Settings

### 3.4.2 User Management

#### 3.4.2.1 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.**

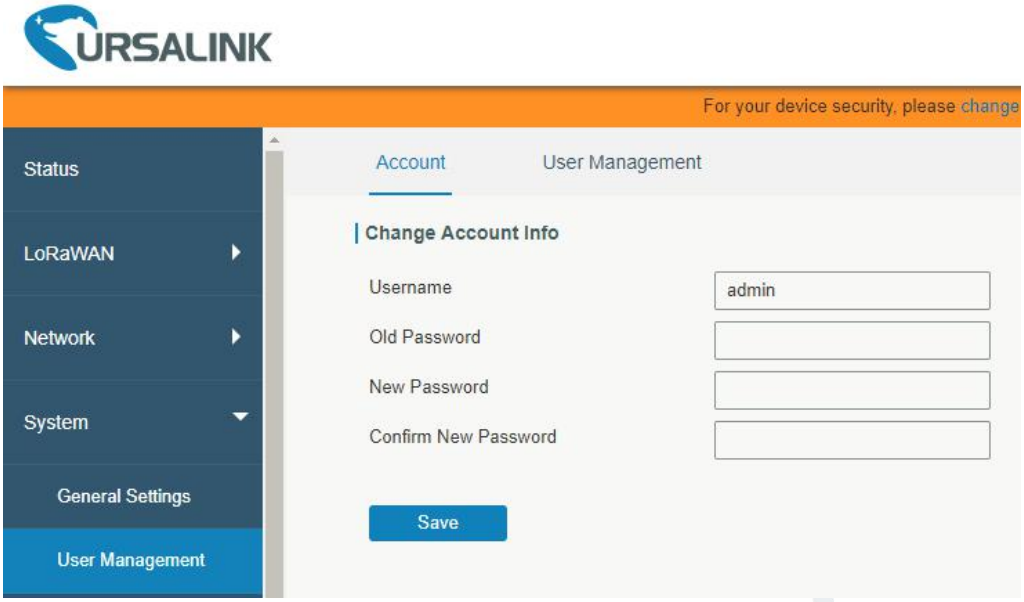



Figure 3-4-2-1

| 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. |
| Confirm New Password | Enter the new password again. |

Table 3-4-2-1 Account Information

### 3.4.2.2 User Management

This section describes how to create common user accounts.

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

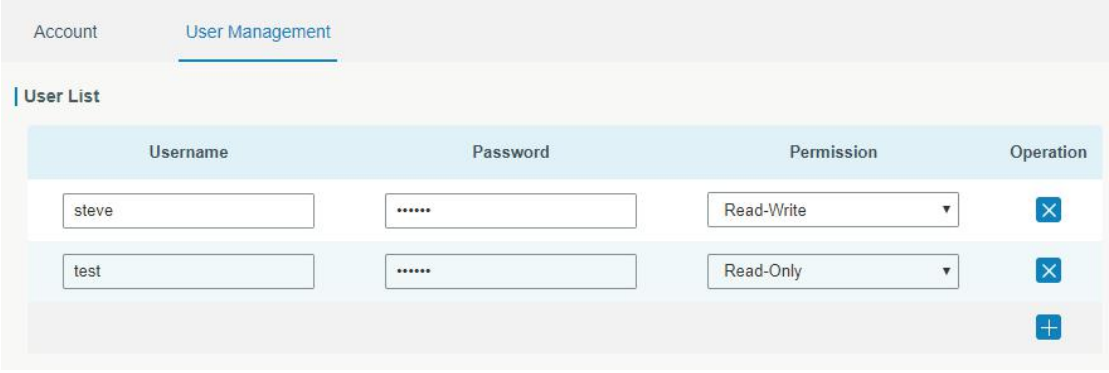



Figure 3-4-2-2

| 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. |
| Permission | Select user permission from “Read-Only” and “Read-Write”. |

| | |
|---|---|
| | - Read-Only: users can only view the configuration of gateway in this level.<br>- Read-Write: users can view and set the configuration of gateway in this level. |

Table 3-4-2-2 User Management

### 3.4.3 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.

#### 3.4.3.1 SNMP

The UG85 supports SNMPv1, SNMPv2c and SNMPv3 version. SNMPv1 and SNMPv2c employ community name authentication. SNMPv3 employs authentication encryption by username and password.

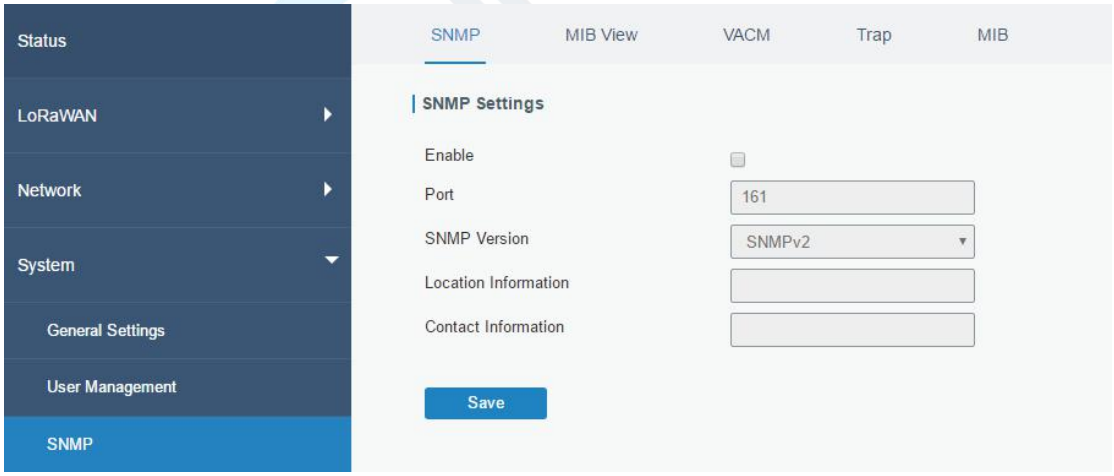



Figure 3-4-3-1

| SNMP Settings | |
|---|---|
| **Item** | **Description** |
| Enable | Enable or disable SNMP function. |
| Port | Set SNMP listened port. Range: 1-65535.<br>The default port is 161. |
| 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 3-4-3-1 SNMP Parameters

### 3.4.3.2 MIB View

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

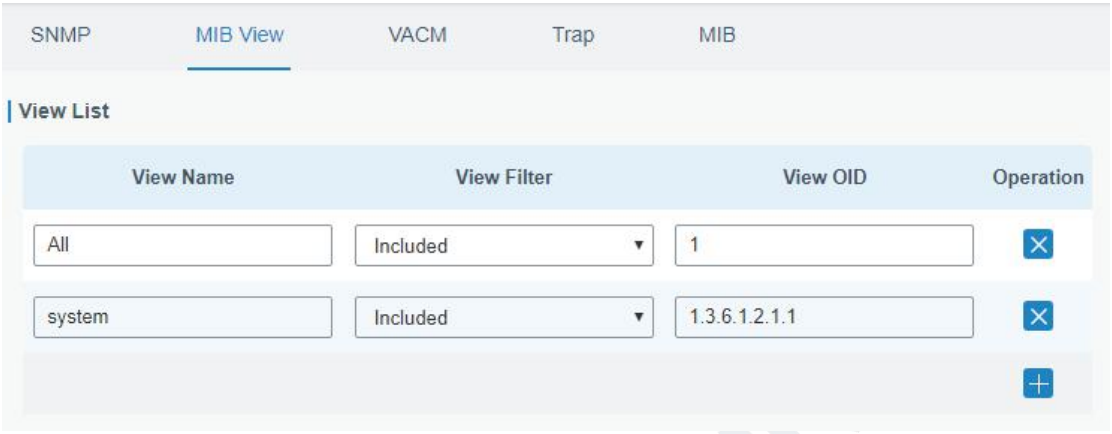



Figure 3-4-3-2

| 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 3-3-3-2 MIB View Parameters

### 3.4.3.3 VACM

This section describes how to configure VCAM parameters.

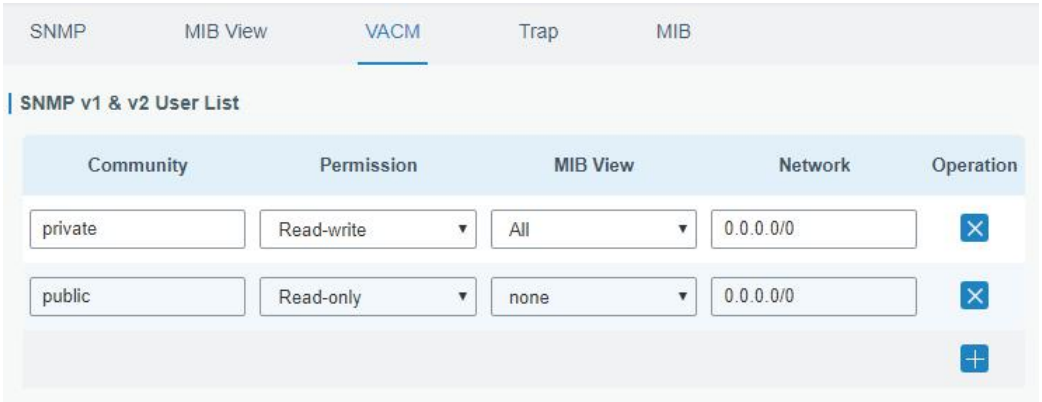



Figure 3-4-3-3

| 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 3-4-3-3 VACM Parameters

### 3.4.3.4 Trap

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


Figure 3-4-3-4

| 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 3-4-3-4 Trap Parameters

#### 3.4.3.5 MIB

This section describes how to download MIB files. The last MIB file “URSA-gateway-MIB.txt” is for the UG85.

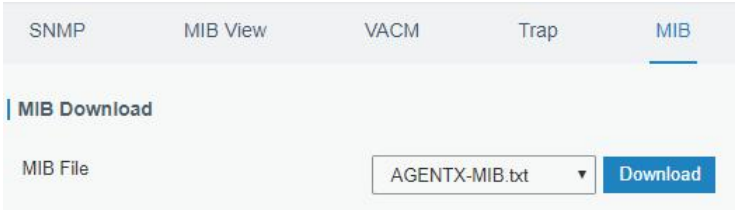



Figure 3-4-3-5

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

Table 3-4-3-5 MIB Download

### 3.4.4 AAA

AAA access control is used for visitors control and the available corresponding services once access is allowed. It adopts the same method to configure three independent safety functions. It provides modularization methods for following services:

- Authentication: verify if the user is qualified to access to the network.
- Authorization: authorize related services available for the user.
- Charging: record the utilization of network resources.

#### 3.4.4.1 RADIUS

Using UDP for its transport, RADIUS is generally applied in various network environments with higher requirements of security and permission of remote user access.

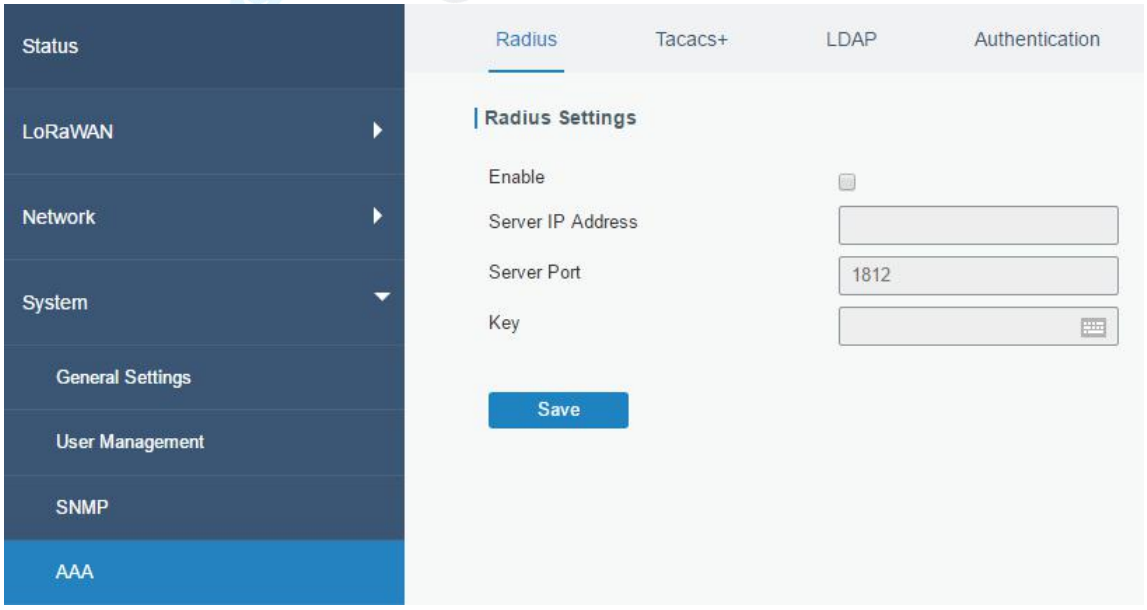



Figure 3-4-4-1

| RADIUS | |
|---|---|
| **Item** | **Description** |
| Enable | Enable or disable RADIUS. |
| Server IP Address | Fill in the RADIUS server IP address/domain name. |
| Server Port | Fill in the RADIUS server port. Range: 1-65535. |
| Key | Fill in the key consistent with that of RADIUS server in order to get connected with RADIUS server. |

Table 3-4-4-1 RADIUS Parameters

### 3.4.4.2 TACACS+

Using TCP for its transport, TACACS+ is mainly used for authentication, authorization and charging of the access users and terminal users by adopting PPP and VPDN.

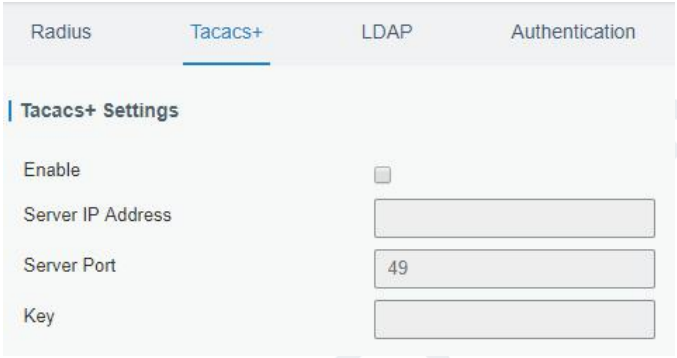



Figure 3-4-4-2

| TACACS+ | |
|---|---|
| **Item** | **Description** |
| Enable | Enable or disable TACACS+. |
| Server IP Address | Fill in the TACACS+ server IP address/domain name. |
| Server Port | Fill in the TACACS+ server port. Range: 1-65535. |
| Key | Fill in the key consistent with that of TACACS+ server in order to get connected with TACACS+ server. |

Table 3-4-4-2 TACACS+ Parameters

### 3.4.4.3 LDAP

A common usage of LDAP is to provide a central place to store usernames and passwords. This allows many different applications and services to connect the LDAP server to validate users.

LDAP is based on a simpler subset of the standards contained within the X.500 standard. Because of this relationship, LDAP is sometimes called X.500-lite as well.

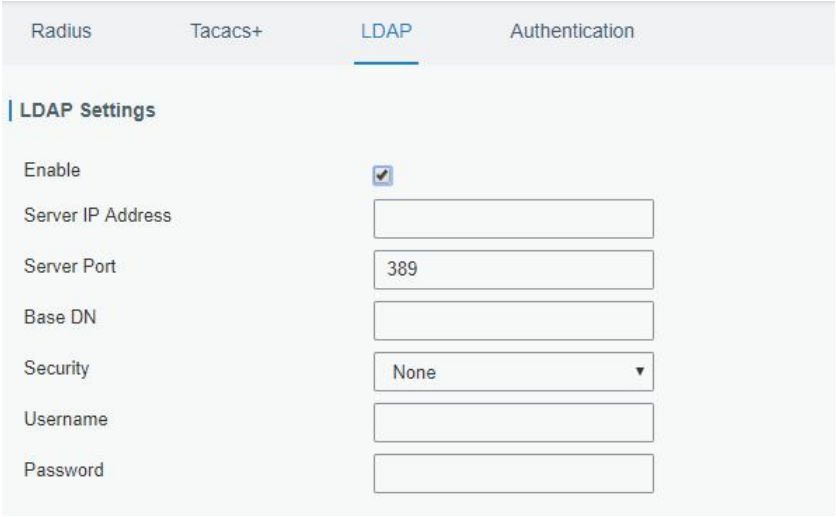



Figure 3-4-4-3

| LDAP | |
|---|---|
| **Item** | **Description** |
| Enable | Enable or Disable LDAP. |
| Server IP Address | Fill in the LDAP server's IP address/domain name. The maximum count is 10. |
| Server Port | Fill in the LDAP server's port. Range: 1-65535 |
| Base DN | The top of LDAP directory tree. |
| Security | Select secure method from "None", "StartTLS" and "SSL". |
| Username | Enter the username to access the server. |
| Password | Enter the password to access the server. |

Table 3-4-4-3 LDAP Parameters

### 3.4.4.4 Authentication

AAA supports the following authentication ways:

- None: uses no authentication, generally not recommended.
- Local: uses the local username database for authentication.
  - Advantages: rapidness, cost reduction.
  - Disadvantages: storage capacity limited by hardware.
- Remote: has user's information stored on authentication server. RADIUS, TACACS+ and LDAP supported for remote authentication.

When RADIUS, TACACS+, and local are configured at the same time, the priority level is: 1 >2 >3.


Figure 3-4-4-4

| Authentication | |
|---|---|
| **Item** | **Description** |
| Console | Select authentication for Console access. |
| Web | Select authentication for Web access. |
| Telnet | Select authentication for Telnet access. |
| SSH | Select authentication for SSH access. |

Table 3-4-4-4 Authentication Parameters

### 3.4.5 Device Management

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

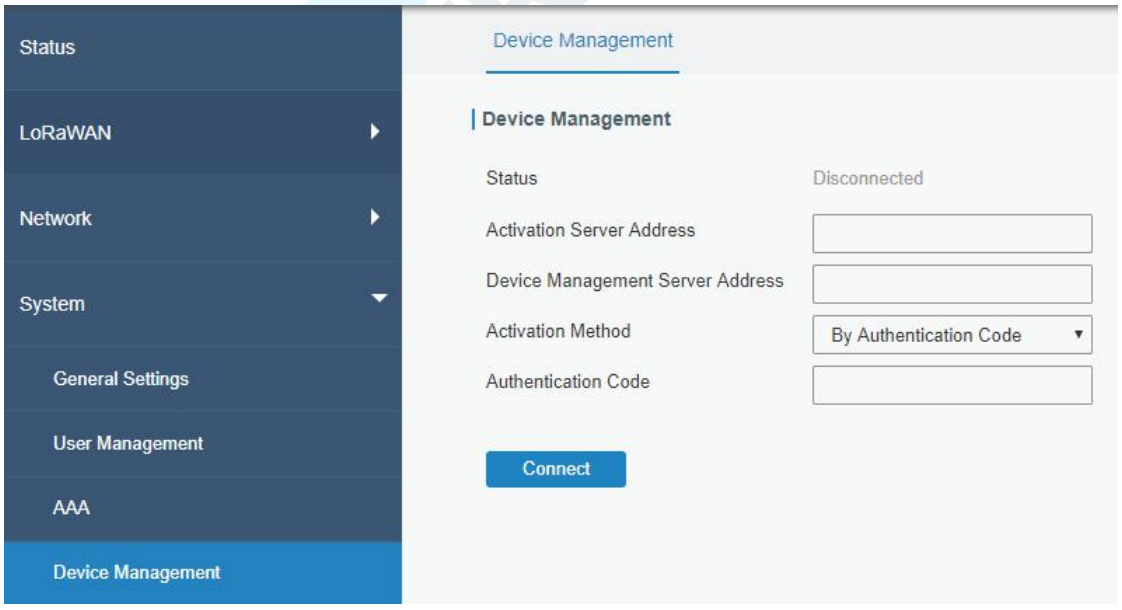



Figure 3-4-5-1

| DeviceHub | |
|---|---|
| **Item** | **Description** |
| Status | Show the connection status between the gateway and the |

| | |
|---|---|
| | DeviceHub. |
| Disconnected | Click this button to disconnect the gateway from the DeviceHub. |
| Activation Server Address | IP address or domain of the DeviceHub. |
| DeviceHub Server 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 3-4-5-1

### 3.4.6 Events

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

#### 3.4.6.1 Events

You can view alarm messages on this page.

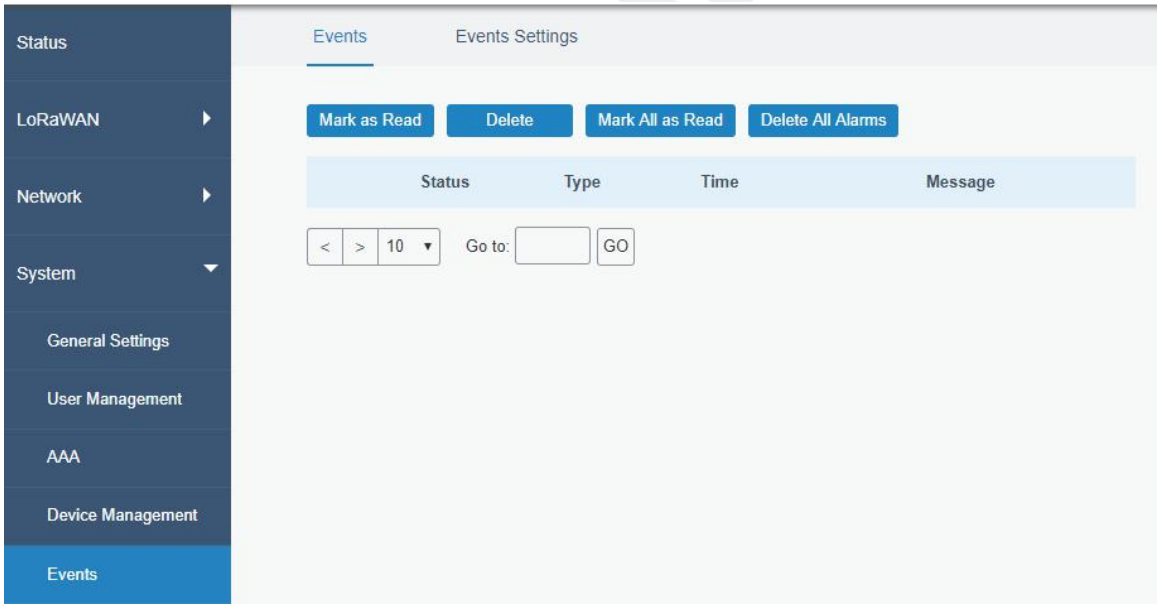



Figure 3-4-6-1

| 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, such as “Read” and |

| | |
|---|---|
| | “Unread”. |
| Type | Show the event type that should be alarmed. |
| Time | Show the alarm time. |
| Message | Show the alarm content. |

Table 3-4-6-1 Events Parameters

### 3.4.6.2 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.

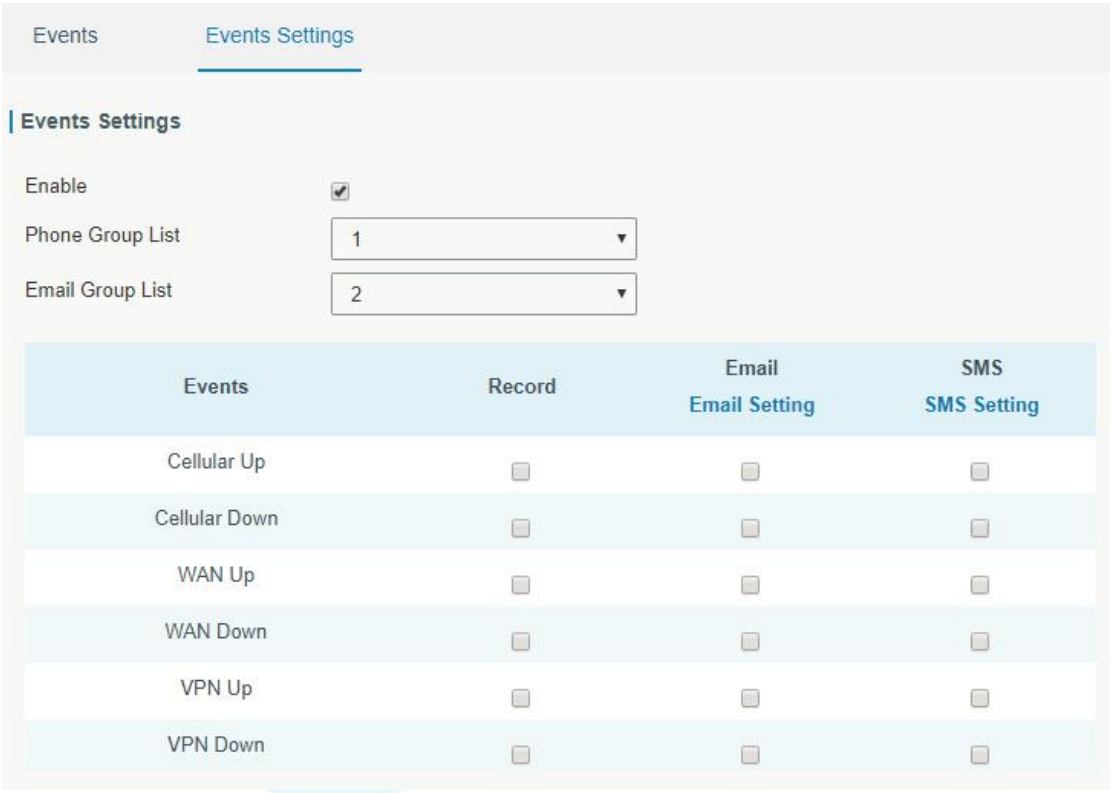



Figure 3-4-6-2

| Event Settings | |
|---|---|
| **Item** | **Description** |
| Enable | Check to enable "Events Settings". |
| Cellular Up | Cellular network is connected. |
| Cellular Down | Cellular network is disconnected. |
| WAN Up | Ethernet cable is connected to WAN port. |
| WAN Down | Ethernet cable is disconnected to WAN port. |
| VPN Up | VPN is connected. |
| VPN Down | VPN is disconnected. |
| 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 3-4-6-2 Events Parameters

**Related Topics**

Email Setting

Phone Setting

## 3.5 Industrial Interface

The UG85 is capable of connecting with terminals through industrial interface so as to realize wireless communication between terminals and remote data center.

There are two types of the gateway's industrial interface: serial port RS232 and I/O(digital input and digital output).

RS232 adopts full-duplex communication. It's generally used for communication within 20 m.

Digital input of I/O interface is a logical variable or switch variable with only two values of 0 and 1. "0" refers to low level and "1" refers to high level .

### 3.5.1 I/O

#### 3.5.1.1 DI

This section explains how to configure monitoring condition on digital input, and take certain actions once the condition is reached.

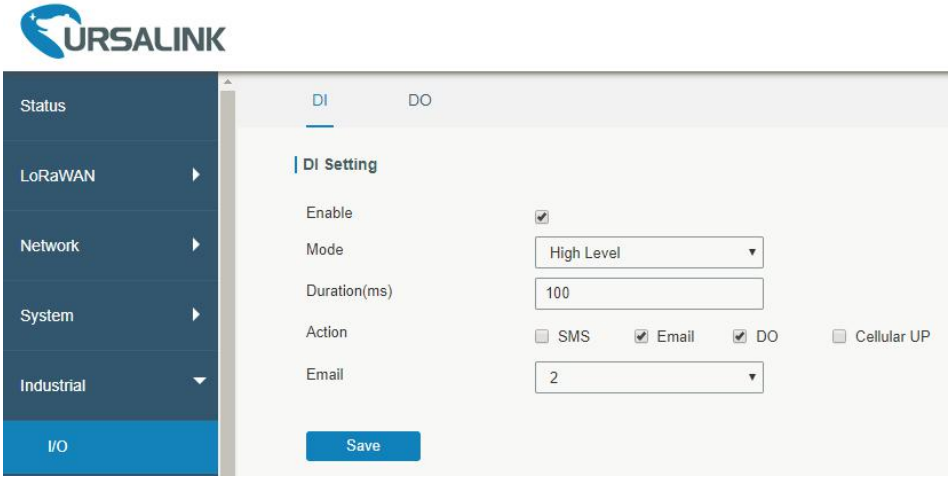



Figure 3-5-1-1

| DI | |
|---|---|
| **Item** | **Description** |
| Enable | Enable or disable DI. |
| Mode | Options are "High Level", "Low Level", and "Counter". |
| Duration (ms) | Set the duration of high/low level in digital input. Range: 1-10000. |
| Condition | Select from "Low->High", and "High-> Low". |
| Low->High | The counter value will increase by 1 if digital input's status changes from low level to high level. |
| High->Low | The counter value will increase by 1 if digital input's status changes from high level to low level. |
| Counter | The system will take actions accordingly when the counter value reach the preset one, and then reset the counter value to 0. Range: 1-100. |
| Action | Select the corresponding actions that the system will take when digital input mode meets the preset condition or duration. |
| SMS | Check to enable SMS alarm. |
| Phone | Set phone number to receive SMS alarm. |
| Content | Set the content of SMS alarm. |
| Email | Check to enable Email alarm. |
| DO | Control output status of DO. |
| Cellular UP | Trigger the gateway to switch from offline mode to cellular network mode. |

Table 3-5-1-1 DI Parameters

**Related Topics**

DO Setting

Email Setting

Connect on Demand

### 3.5.1.2 DO

This section describes how to configure digital output mode.

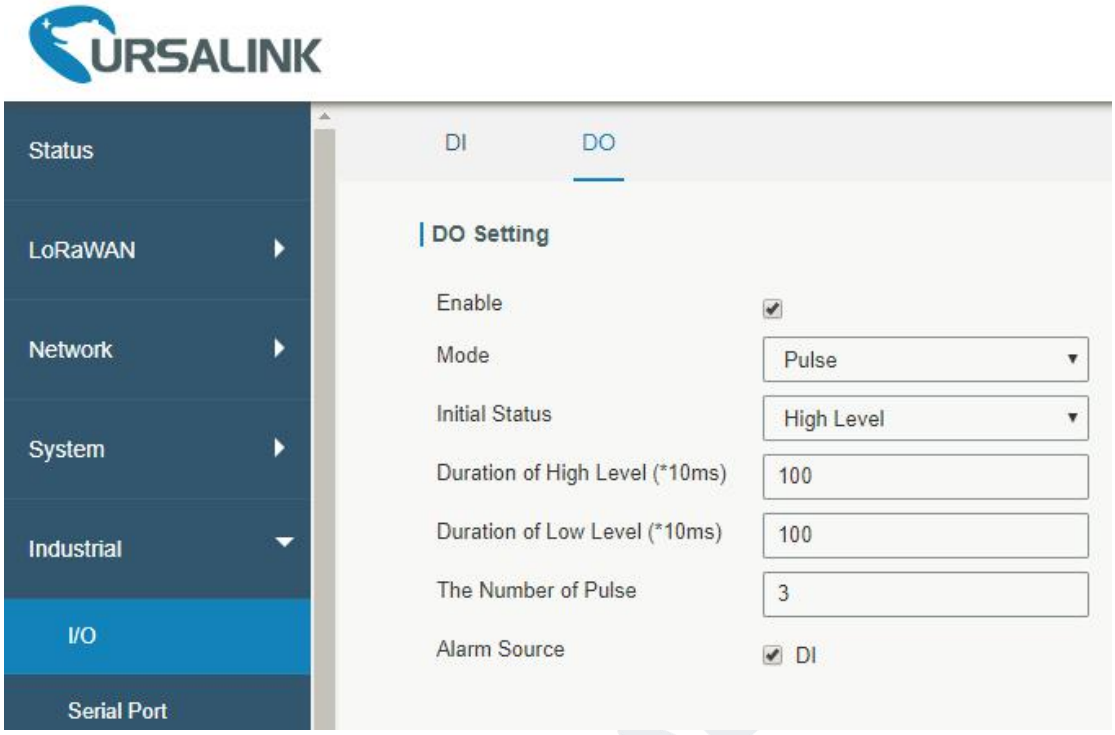



Figure 3-5-1-2

| DO | |
|---|---|
| **Item** | **Description** |
| Enable | Enable or disable DO. |
| Mode | Select from "High Level", "Low Level", "Pulse" and “Custom”. |
| Duration (*10ms) | Set duration of high/low level on digital output. Range: 1-10000. |
| Initial Status | Select high level or low level as the initial status of the pulse. |
| Duration of High Level (*10ms) | Set the duration of pulse's high level. Range: 1-10000. |
| Duration of Low Level (*10ms) | Set the duration of pulse's low level. Range: 1-10000. |
| The Number of Pulse | Set the quantity of pulse. Range: 1-100. |
| Alarm Source | Select alarm source. |
| Phone Group | Select phone group which will be used for I/O configuration. User can click the Phone Group and set phone number. |

Table 3-5-1-2 DO Settings

### 3.5.2 Serial Port

This section explains how to configure serial port parameters to achieve communication with serial terminals, and configure work mode to achieve communication with the remote data center, so as to achieve two-way communication between serial terminals and remote data center.

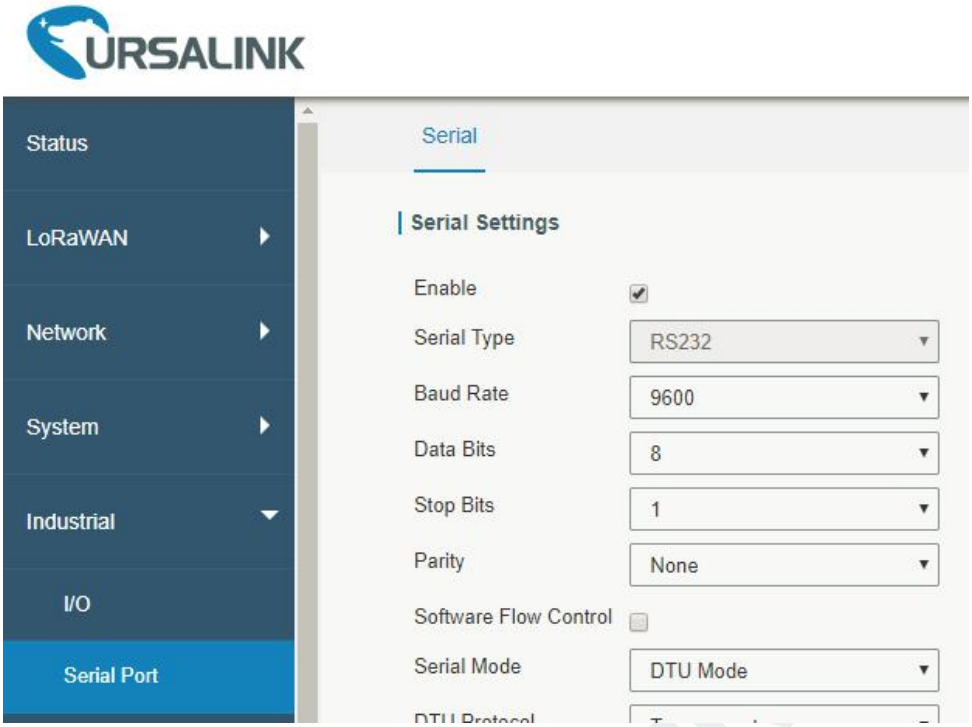



Figure 3-5-2-1

| Serial Settings | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Enable or disable serial port function. | Disable |
| Serial Type | RS232 | -- |
| Baud Rate | Range is 300-230400. Same with the baud rate of the connected terminal device. | 9600 |
| Data Bits | Options are “8” and “7”. Same with the data bits of the connected terminal device. | 8 |
| Stop Bits | Options are “1” and “2”. Same with the stop bits of the connected terminal device. | 1 |
| Parity | Options are “None”, “Odd” and “Even”. Same with the parity of the connected terminal device. | None |
| Software Flow Control | Enable or disable software flow control. | Disable |
| Serial Mode | The option are "DTU Mode" and “Modbus Master”. The serial port can establish communication with the remote server/client. | DTU Mode |
| DTU Mode | In DTU mode, the serial port can establish communication with the remote server/client. | -- |
| Modbus Master | In Modbus Master mode, go to “Industrial > Modbus Master” to configure basic parameters and channels. | -- |

Table 3-5-2-1 Serial Parameters

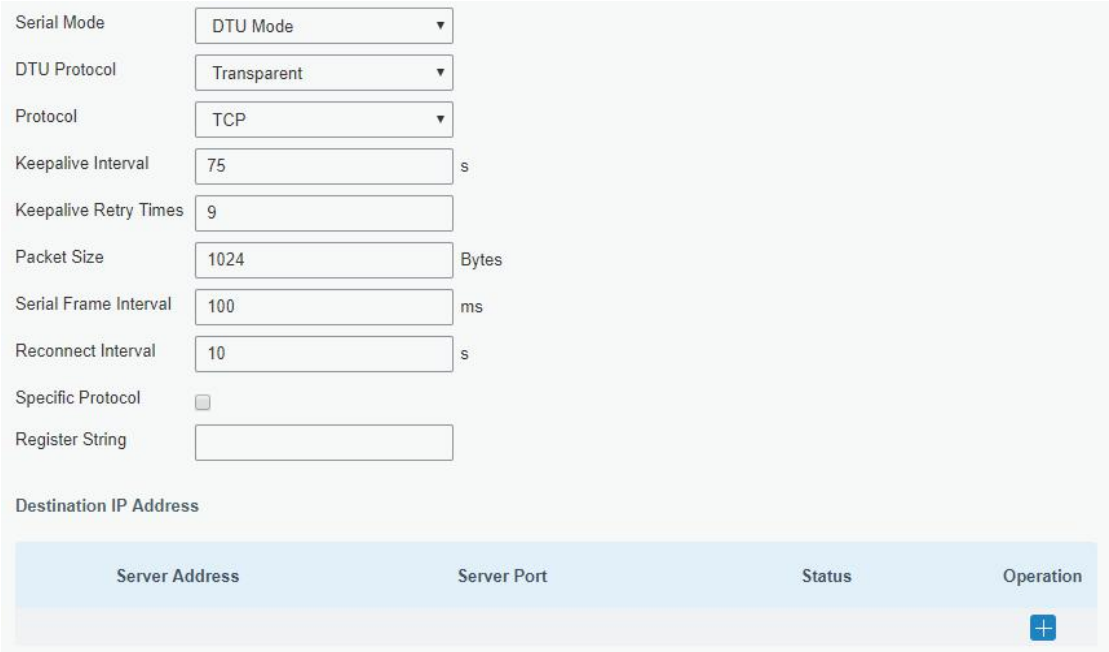



Figure 3-5-2-2

| DTU Mode | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| DTU Protocol | Select from "Transparent", "Modbus", and "TCP server".<br>- Transparent: the routed is used as TCP client/UDP and transmits data transparently.<br>- TCP server: the gateway is used as TCP server and transmits data transparently.<br>- Modbus: the gateway will be used as TCP server with modbus gateway function, which can achieve conversion between Modbus RTU and Modbus TCP. | -- |
| **TCP Server** | | |
| Listening port | Set the gateway listening port. Range: 1-65535. | 502 |
| Keepalive Interval | After TCP connection is established, gateway will send heartbeat packet to the client regularly by TCP to keep alive. The interval range is 1-3600 in seconds. | 75 |
| Keepalive Retry Times | When TCP heartbeat times out, gateway will resend heartbeat. After it reaches the preset retry times, TCP connection will be reestablished. The retry times range is 1-16. | 9 |
| Packet Size | Set the size of the serial data frame. Packet will be sent out when preset frame size is reached. The size range is 1-1024. The unit is byte. | 1024 |
| Serial Frame Interval | The interval that the gateway sends out real serial data stored in the buffer area to public network. The range is 10-65535, in milliseconds.<br>Note: data will be sent out to public network when real serial data size reaches the preset packet size, even though it's within | 100 |

| | | |
|---|---|---|
| | the serial frame interval. | |

Table 3-5-2-2 DTU Parameters

| Item | Description | Default |
|---|---|---|
| **Transparent** | | |
| Protocol | Select "TCP" or "UDP" protocol. | TCP |
| Keepalive Interval (s) | After TCP client is connected with TCP server, the client will send heartbeat packet by TCP regularly to keep alive. The interval range is 1-3600, in seconds. | 75 |
| Keepalive Retry Times | When TCP heartbeat times out, the gateway will resend heartbeat. After it reaches the preset retry times, gateway will reconnect to TCP server. The range is 1-16. | 9 |
| Packet Size | Set the size of the serial data frame. Packet will be sent out when preset frame size is reached. The range is 1-1024. The unit is byte. | 1024 |
| Serial Frame Interval | The interval that the gateway sends out real serial data stored in the buffer area to public network. The range is 10-65535, in milliseconds.<br>Note: data will be sent out to public network when real serial data size reaches the preset packet size, even though it's within the serial frame interval. | 100 |
| Reconnect Interval | After connection failure, gateway will reconnect to the server at the preset interval, in seconds. The range is 10-60. | 10 |
| Specific Protocol | By Specific Protocol, the gateway will be able to connect to the TCP2COM software. | -- |
| Heartbeat Interval | By Specific Protocol, the gateway will send heartbeat packet to the server regularly to keep alive. The interval range is 1-3600, in seconds. | 30 |
| ID | Define unique ID of each gateway. No longer than 63 characters without space character. | -- |
| Register String | Define register string for connection with the server. | Null |
| Server Address | Fill in the TCP or UDP server address (IP/domain name). | Null |
| Server Port | Fill in the TCP or UDP server port. Range: 1-65535. | Null |
| Status | Show the connection status between the gateway and the server. | -- |
| **Modbus** | | |
| Local Port | Set the gateway listening port. Range: 1-65535. | 502 |

Table 3-5-2-3 DTU Parameters

**Related Configuration Example**

DTU Application Example

### 3.5.3 Modbus Master

UG85 can be set as Modbus Master to poll the remote Modbus Slave and send alarm according to the response.

#### 3.5.3.1 Modbus Master

You can configure Modbus Master's parameters on this page.

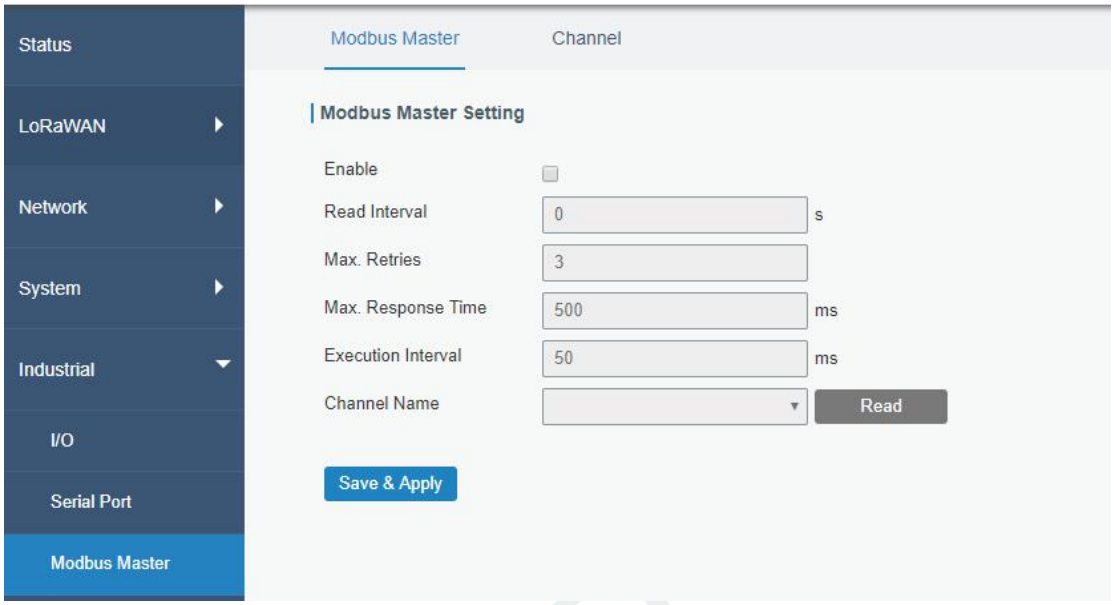



Figure 3-5-3-1

| Modbus Master | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Enable | Enable/disable Modbus master. | -- |
| Read Interval/s | Set the interval for reading remote channels. When the read cycle ends, the commands which haven't been sent out will be discard, and the new read cycle begins. If it is set to 0, the device will restart the new read cycle after all channels have been read. Range: 0-600. | 0 |
| Max. Retries | Set the maximum retry times after it fails to read, range: 0-5. | 3 |
| Max. Response Time/ms | Set the maximum response time that the gateway waits for the response to the command. If the device does not get a response after the maximum response time, it's determined that the command has timed out. Range: 10-1000. | 500 |
| Execution Interval/ms | The execution interval between each command. Range: 10-1000. | 50 |

Table 3-5-3-1

#### 3.5.3.2 Channel

You can add the channels and configure alarm setting on this page, so as to connect the gateway to the remote Modbus Slave to poll the address on this page and receive alarms

from the gateway in different conditions.

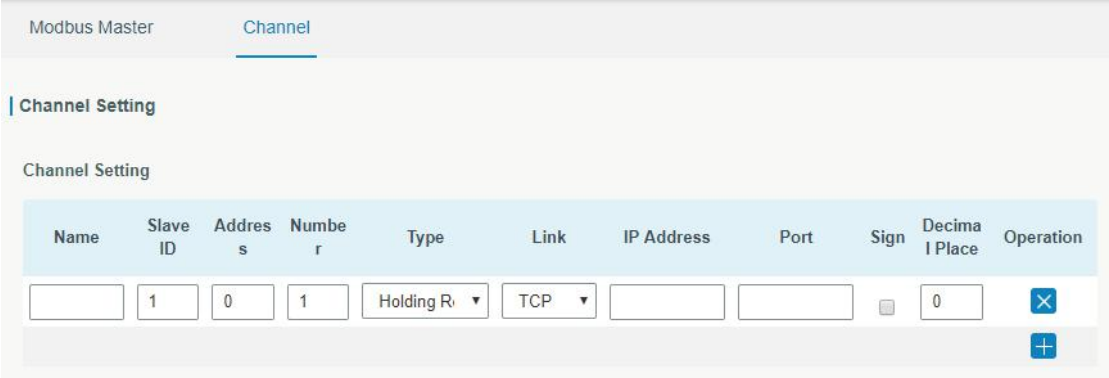



Figure 3-5-3-2

| Channel Setting | |
|---|---|
| **Item** | **Description** |
| Name | Set the name to identify the remote channel. It cannot be blank. |
| Slave ID | Set Modbus slave ID. |
| Address | The starting address for reading. |
| Number | The address number for reading. |
| Type | Read command, options are "Coil", "Discrete", "Holding Register (INT16)", "Input Register (INT16)", "Holding Register (INT32)" and "Holding Register (Float)". |
| Link | Select TCP for transportation. |
| IP address | Fill in the IP address of the remote Modbus device. |
| Port | Fill in the port of the remote Modbus device. |
| Sign | To identify whether this channel is signed. Default: Unsigned. |
| Decimal Place | Used to indicate a dot in the read into the position of the channel. For example: the channel value is 1234, and a Decimal Place is equal to 2, then the actual value is 12.34. |

Table 3-5-3-2

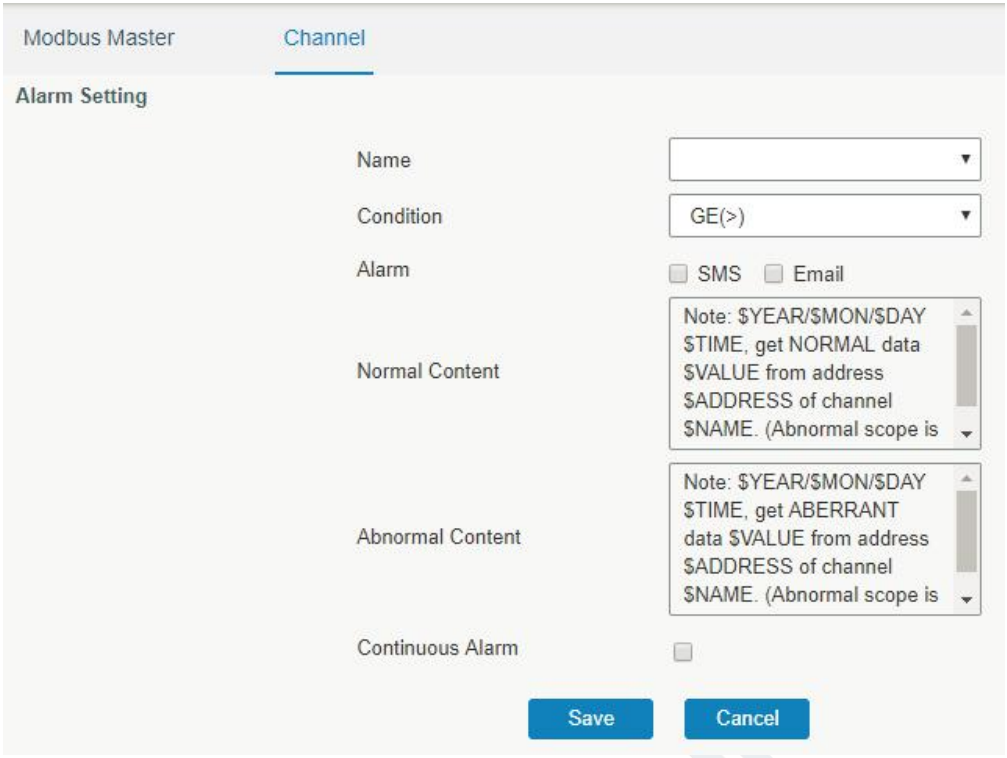



Figure 3-5-3-3

| Alarm Setting | |
|---|---|
| **Item** | **Description** |
| Name | Set the same name with the channel name to identify the remote channel. |
| Condition | The condition that triggers alert. |
| Min. Threshold | Set the min. value to trigger the alert. When the actual value is less than this value, the alarm will be triggered. |
| Max. Threshold | Set the max. value to trigger the alert. When the actual value is more than this value, the alarm will be triggered. |
| Alarm | Select the alarm method, e.g SMS. |
| SMS | The preset alarm content will be sent to the specified phone number. |
| Phone Group | Select the phone group to receive the alarm SMS. |
| Email | The preset alarm content will be sent to the specified Email address. |
| Email Group | Select the Email group to receive the alarm Email. |
| Normal Content | When the actual value is restored to the normal value from exceeding the threshold value, the gateway will automatically cancel the abnormal alarm and send the preset normal content to the specified phone group. |
| Abnormal Content | When the actual value exceeds the preset threshold, the gateway will automatically trigger the alarm and send the preset abnormal content to the specified phone group. |
| Continuous Alarm | Once it is enabled, the same alarm will be continuously reported. Otherwise, the same alarm will be reported only one time. |

Table 3-5-3-3

## 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.

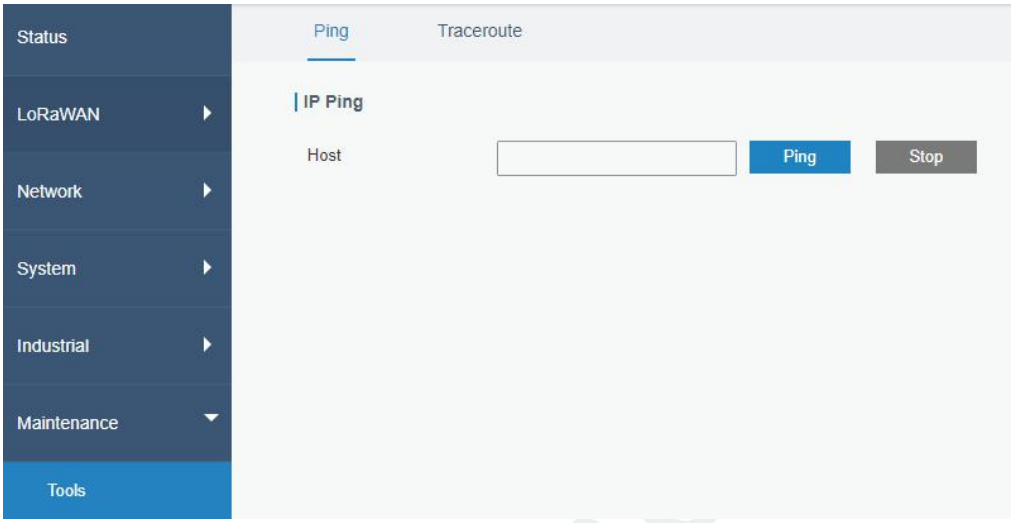



Figure 3-6-1-1

| 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.

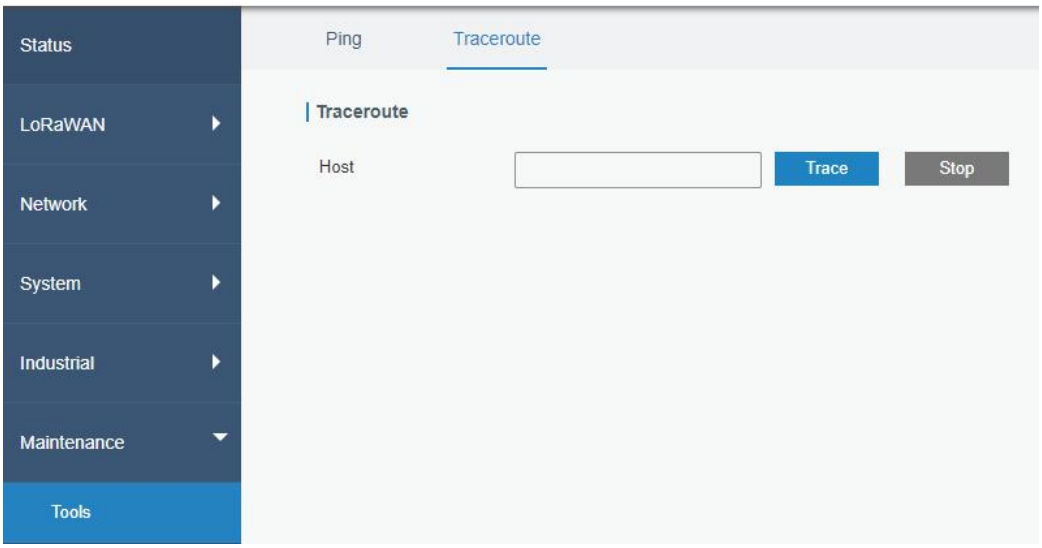



Figure 3-6-1-2

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

Table 3-6-1-2 Traceroute Parameters

### 3.6.2 Schedule

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

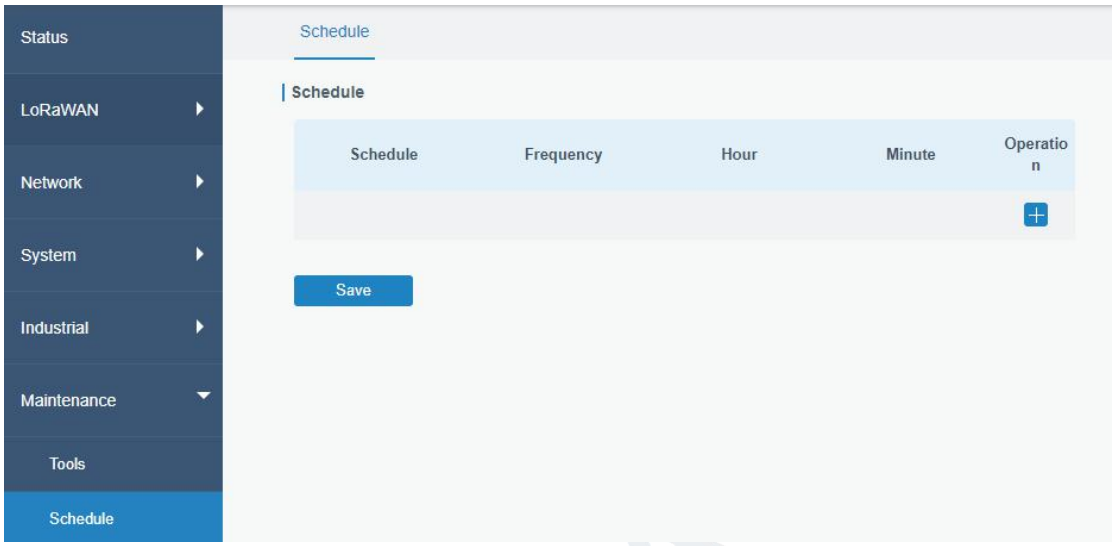



Figure 3-6-2-1

| Schedule | |
|---|---|
| **Item** | **Description** |
| Schedule | Select schedule type. |
| 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.

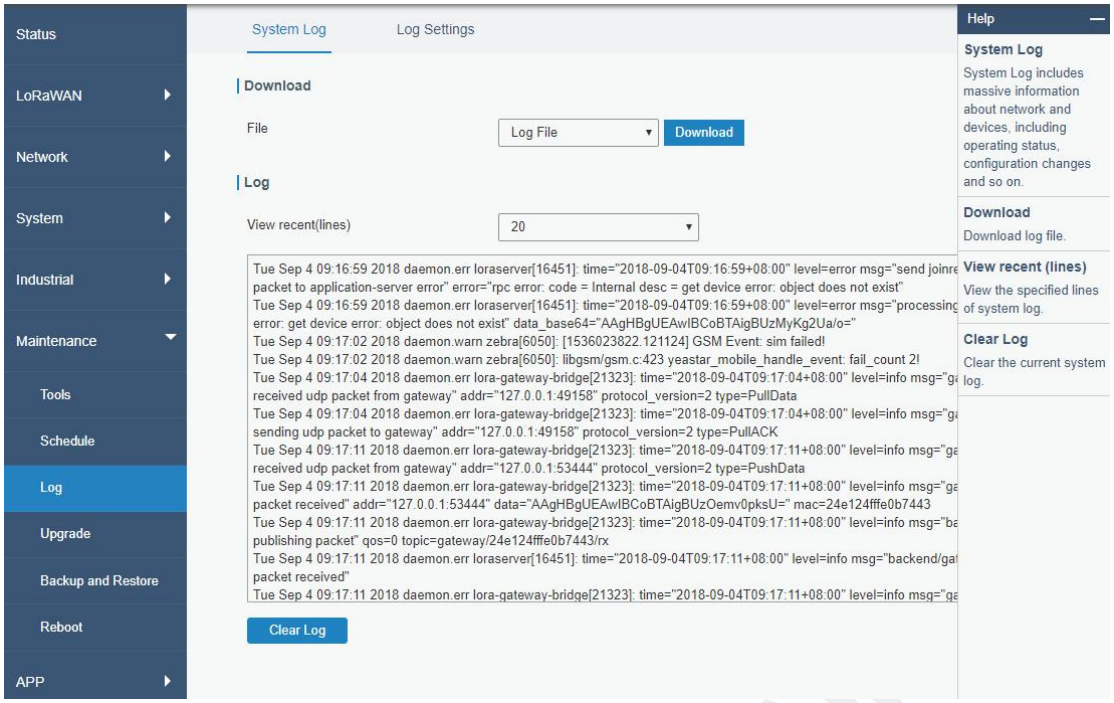



Figure 3-6-3-1

| 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.

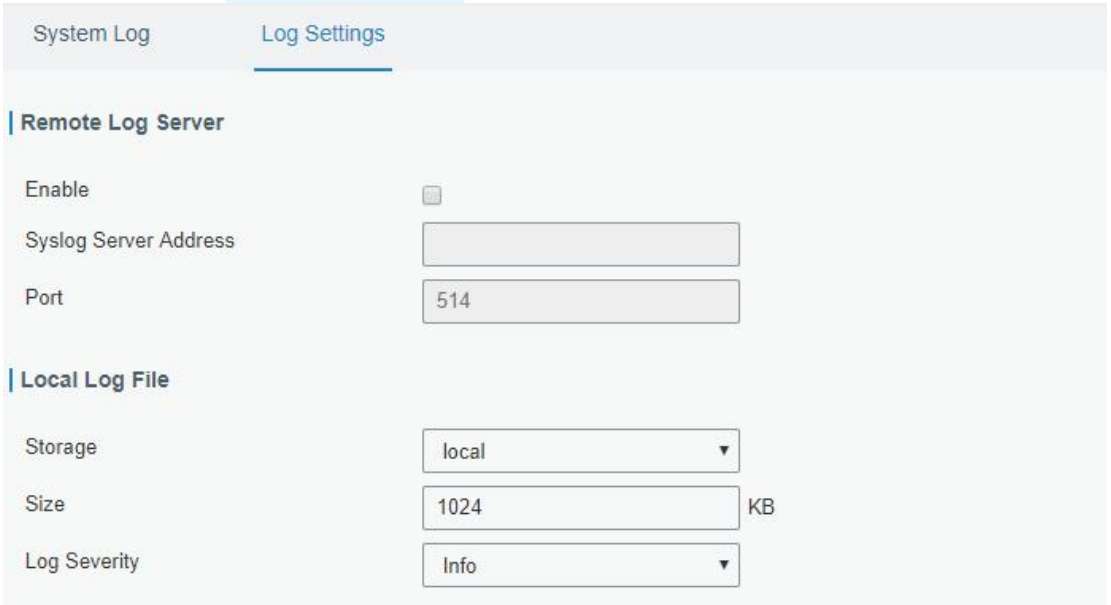



Figure 3-6-3-2

| 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 or TF card. |
| 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.

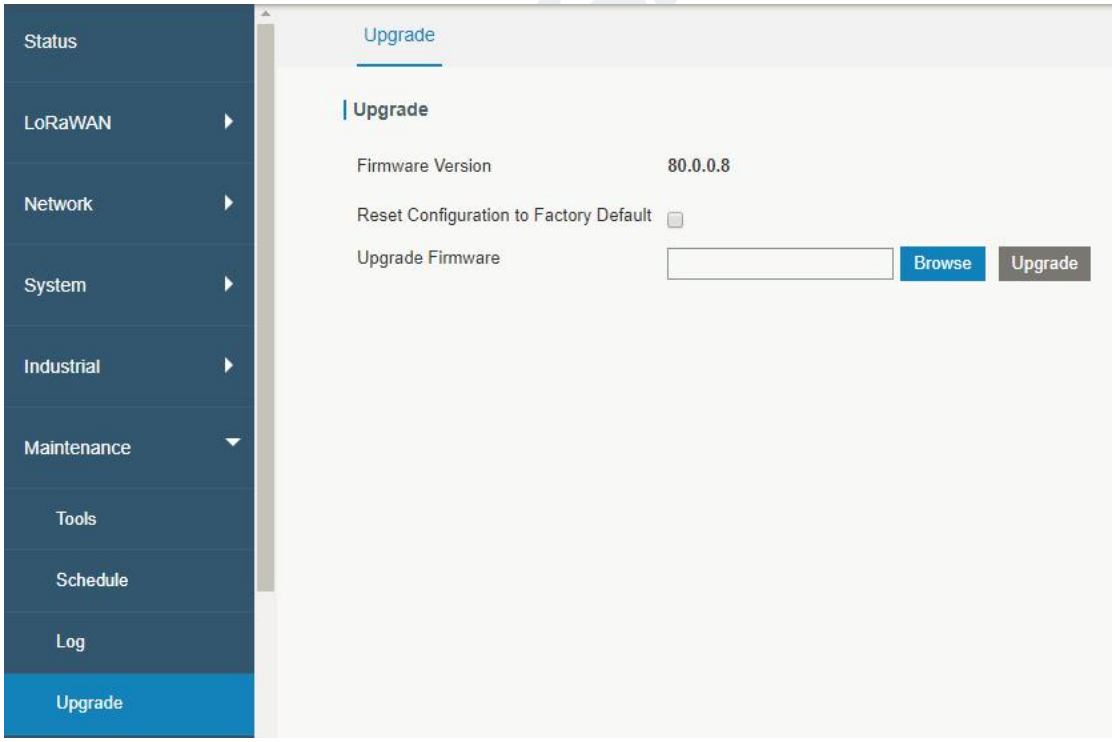



Figure 3-6-4-1

| 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 complete backup of the system configurations to a file, restore the config file to the gateway and reset to factory defaults.

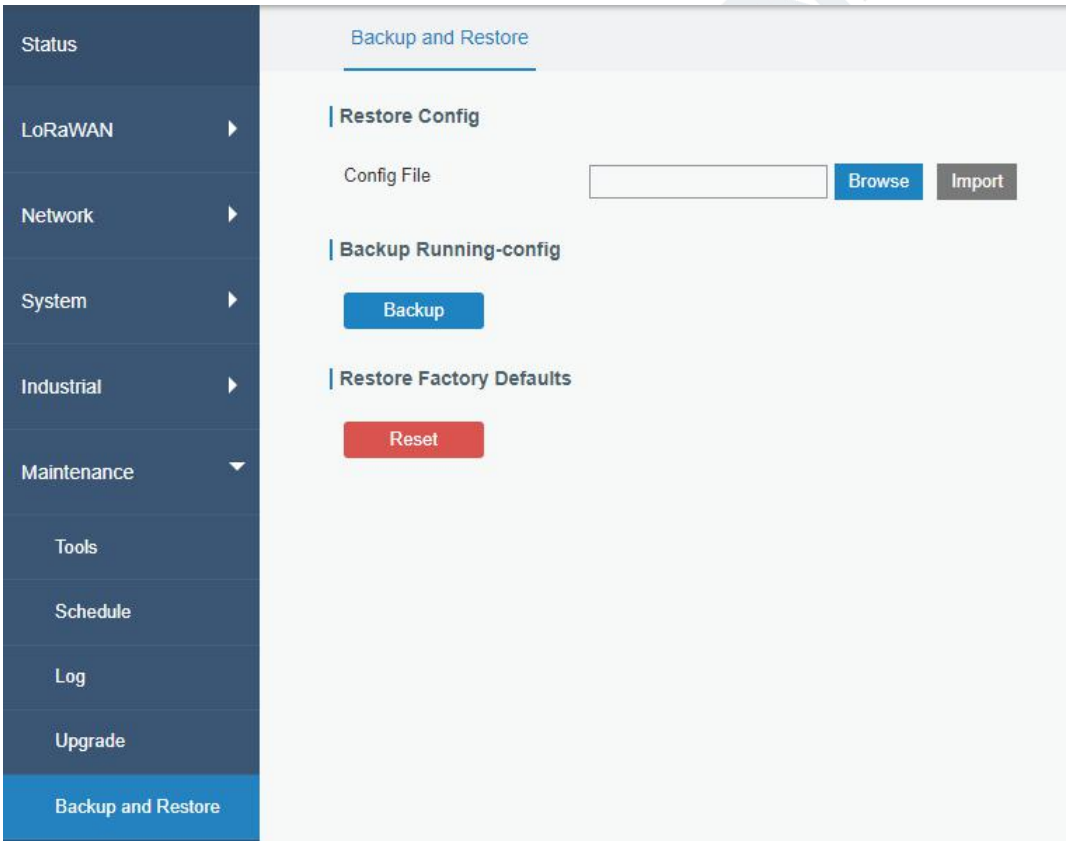



Figure 3-6-5-1

| 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. |
| Backup | Click "Backup" to export the current configuration file to the PC. |

| | |
|---|---|
| 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.

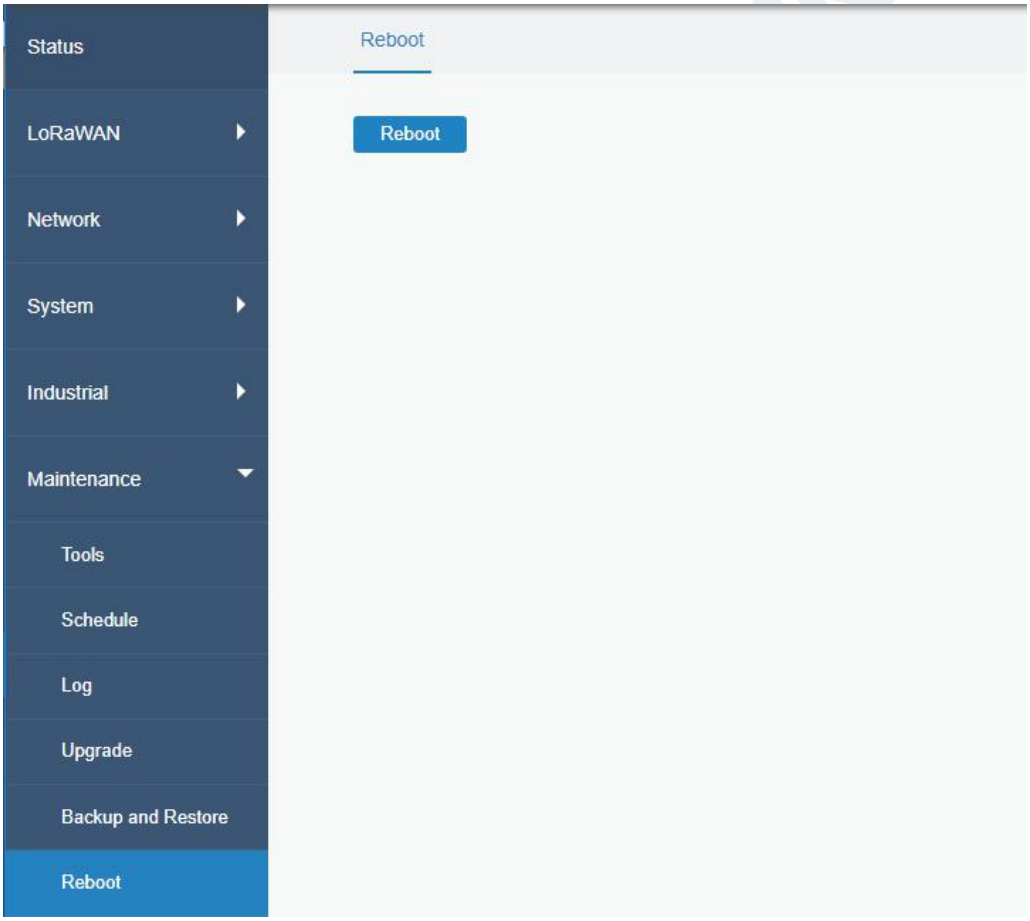



Figure 3-6-6-1

## 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

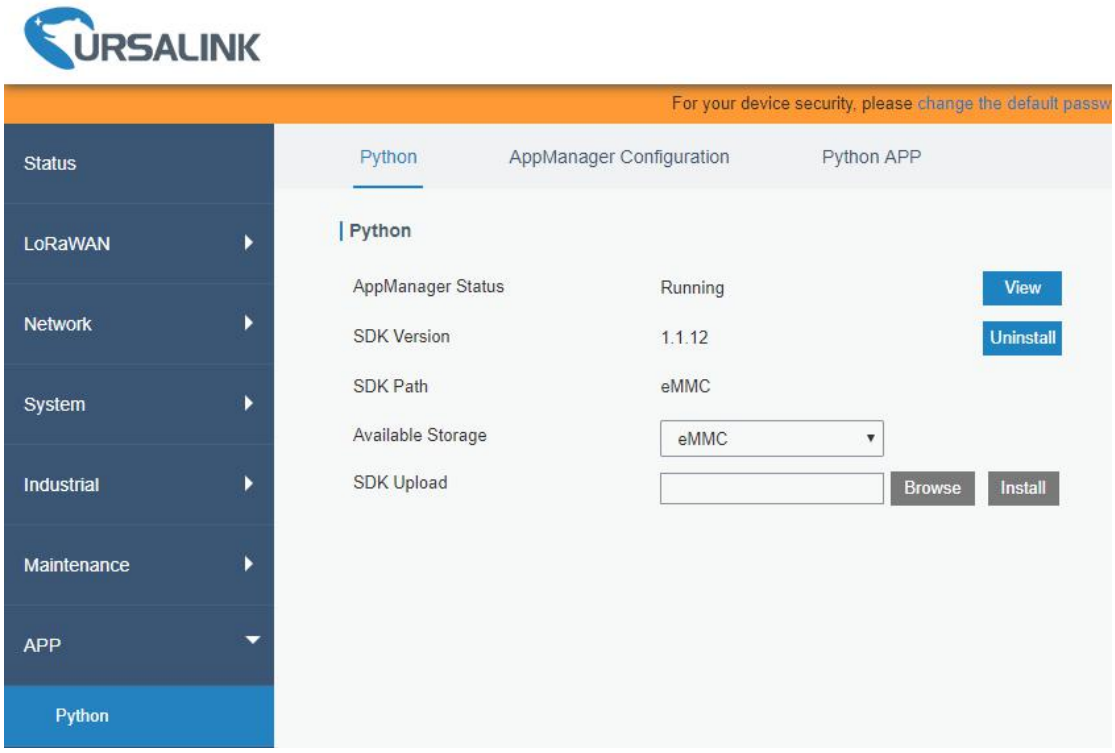



Figure 3-7-1-1

| 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

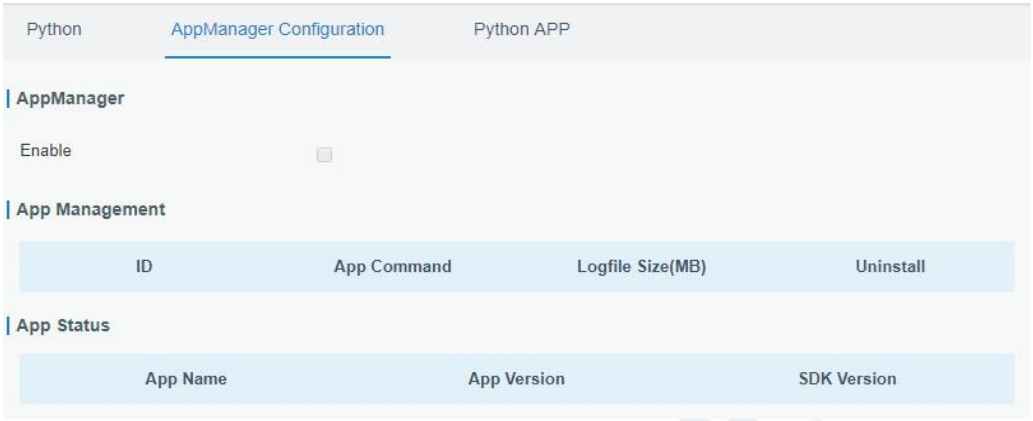



Figure 3-7-1-2

| 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

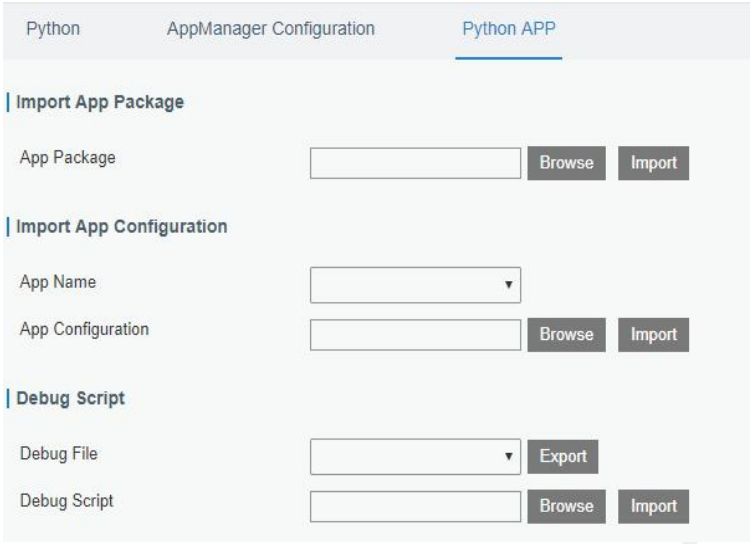



Figure 3-7-1-3

| 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

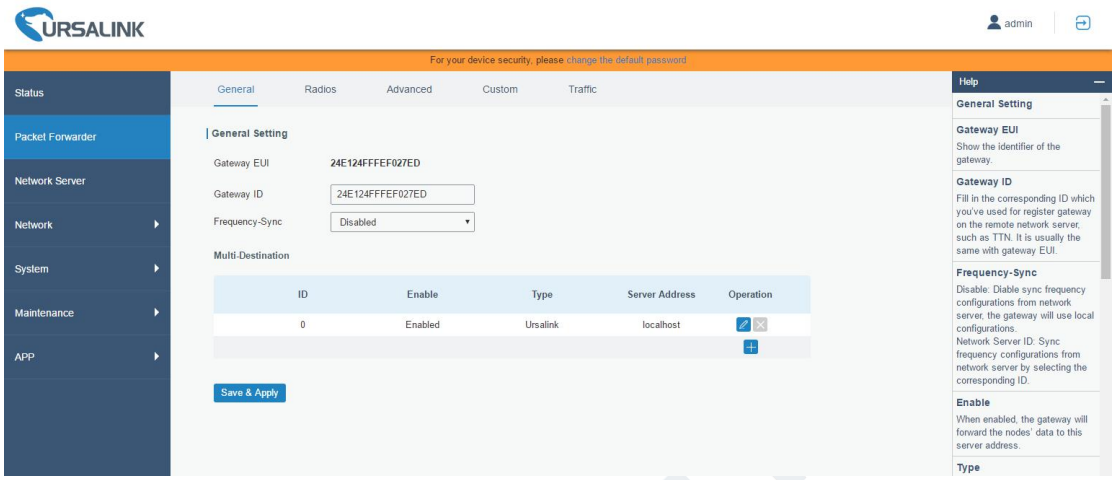
# Chapter 4 Application Examples

## 4.1 Packet Forwarder Configuration

You can create multi-destination on this page and gateway will forward the data to multiple network server addresses in the list.

The configuration procedures are listed as below.

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




2. Click  to add a new network server address, displayed as the following picture：

| Multi-Destination Configuration | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Type | Select “Ursalink” if you need to forward data to the Ursalink gateway Network Server.<br>Select "Semtech” if you need to forward data by Semtech packet forwarder.<br>Select "TTN” if you need to forward data to The Things Network.<br>Select "Loriot” if you need to forward data to Loriot.<br>Select “ChirpStack-Generic” if you need to forward data to ChirpStack with Generic MQTT broker.<br><br>Note: When the packet forwarder is enabled as Loriot , TTN and ChirpStack-Generic type, data will not be forwarded to other server addresses. | Semtech |
| Server Address | Select or enter a server address of the LoRaWAN network server. | ttn.thingsconnected.net |
| Port Up | Enter the port of LoRaWAN network server for uploading data. Range: 1-65535. | Ursalink: 1883<br>Semtech: 1700 |

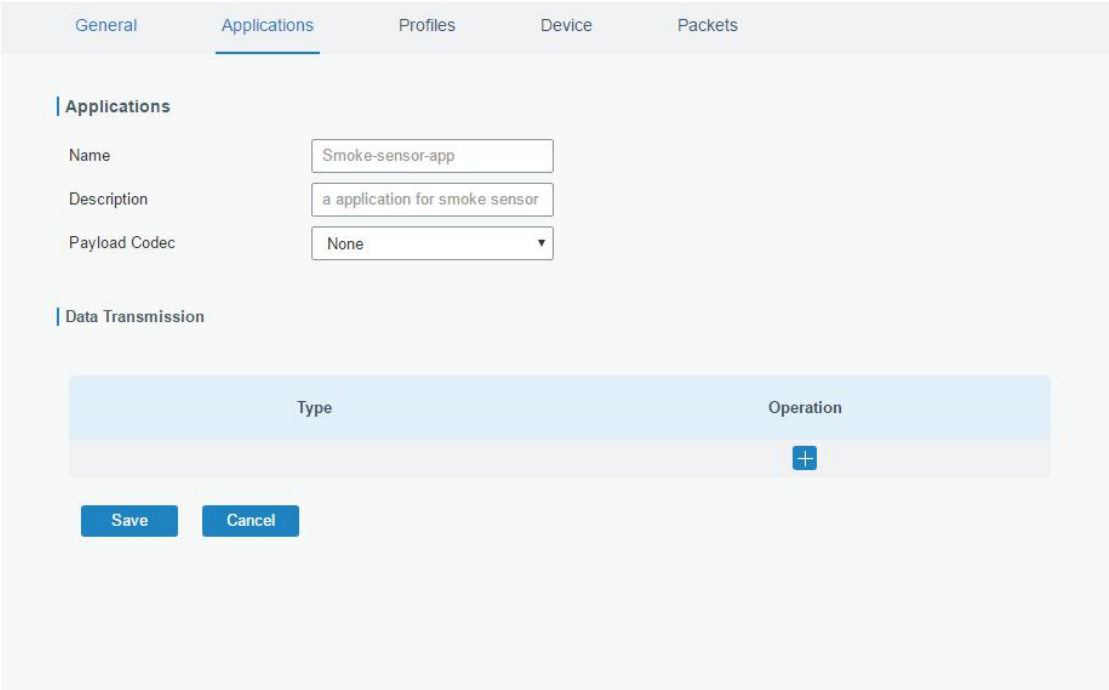
| | | |
|---|---|---|
| | | Loriot: 1780 |
| Port Down | Enter the port of LoRaWAN network server for sending data to your gateway. Range: 1-65535. | Ursalink: 1883<br>Semtech: 1700<br>Loriot: 1780 |
| Gateway Key | If the type is “TTN”, you need to enter the gateway key for authentication. | Null |
| User Credentials | When you select user credentials for authentication, you need to enter the username and password required for authentication. | Null |
| TLS Authentication | Select from “CA signed server certificate” and “Self signed certificates”.<br><br>CA signed server certificate: Verify with the certificate issued by Certificate Authority (CA) that pre-loaded on device.<br><br>Self signed certificates: In this mode, users have to upload the custom certificate and secret key for verification. | Self signed certificates |

## 4.2 Application Configuration

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

The configuration procedures are listed as below.

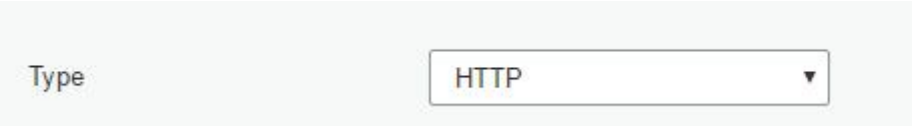
1. Go to “LoRaWAN” > “Network Server” > “Application”.
2. Click  to enter the configuration page, displayed as the following picture：



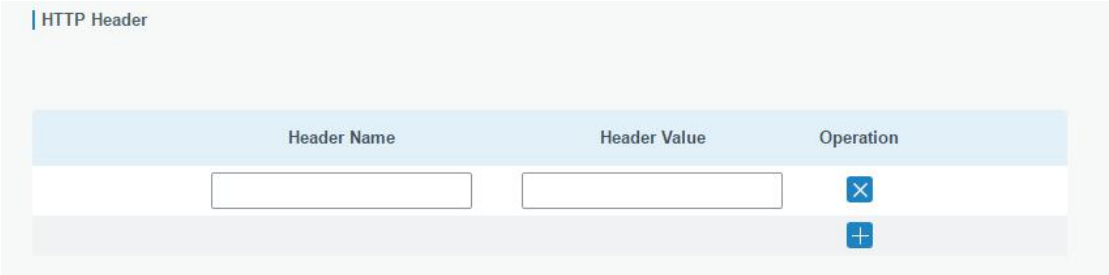

| Application Configuration | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Name | Enter the name of the application profile.<br>E.g Smoker-sensor-app. | |
| Description | Enter the description of this application.<br>E.g a application for smoker sensor. | |
| Payload Codec | Select from: “None”, “Cayenne LPP”, “Custom”.<br>None: This mode enables devices not to encode data.<br>Cayenne LPP: This mode enables devices to encode data with the Cayenne Low Power Payload (LPP).<br>Custom: This mode enables devices to encode data with the decoder function and the encoder function which you have entered the code. | None |

3. Click  to add a data transmission type of HTTP or HTTPS：

Step 1: select HTTP or HTTPS as transmission protocol.




Step 2: Enter the header name and header value as needed.

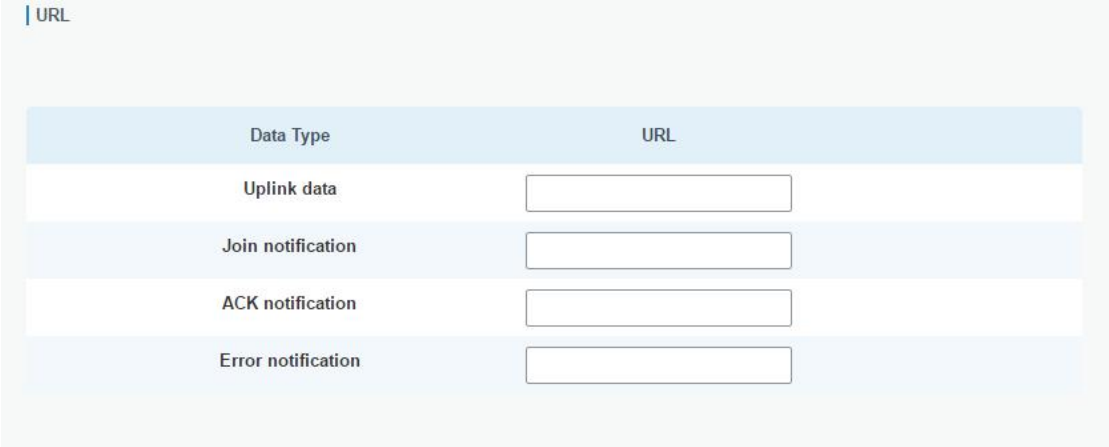



Headers are name/value pairs that appear in both request and response messages. The name of the header is separated from the value by a single colon.

For example, this request message provides a header called User-Agent whose value is Mozilla/5.0 (Windows NT 6.3; WOW64; Trident/7.0; rv:11.0) like Gecko. The purpose of this particular header is to supply the web server with information about the type of browser making the request.

```
User-Agent: Mozilla/5.0 (Windows NT 6.3; WOW64; Trident/7.0; rv:11.0) like Gecko
```

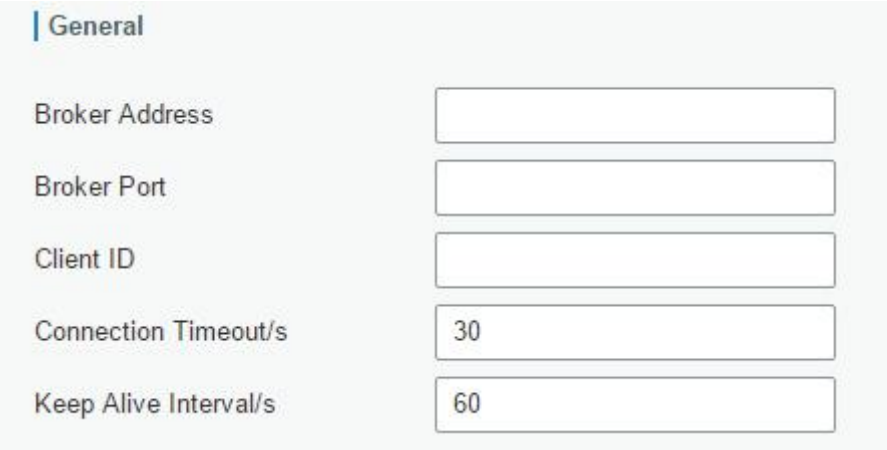
Step 3: Enter the destination URL. Different types of data can be sent to different URLs.




4. Click  to add a data transmission type of MQTT：

Step 1: select the transmission protocol as MQTT.


Step 2: Fill in general settings.

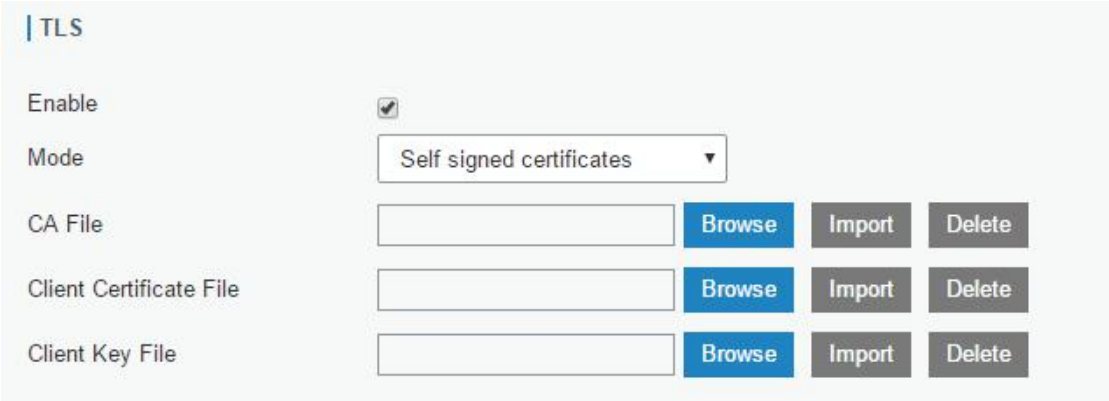



| MQTT General Settings | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Broker Address | Please enter the broker address to receive data. | -- |
| Broker Port | Please enter the broker port to receive data. | -- |
| Client ID | Client ID is the unique identity of the client to the server. It must be unique when all clients are connected to the same server, and it is the key to handle message at QoS 1 and 2. | -- |
| Connection Timeout | Set the maximum response time when the client waits for the response from the server. If the client does not get a response after the maximum response time, the connection will be considered as broken. The interval range is 1-65535 in second. | 30 |
| Keep Alive Interval | After the client is connected with the server, the client will send heartbeat packet to the server regularly to keep alive. The interval range is 1-65535 in second. | 60 |

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 import CA certificate, client certificate and client key file for authentication.




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

QoS 0 – Only Once

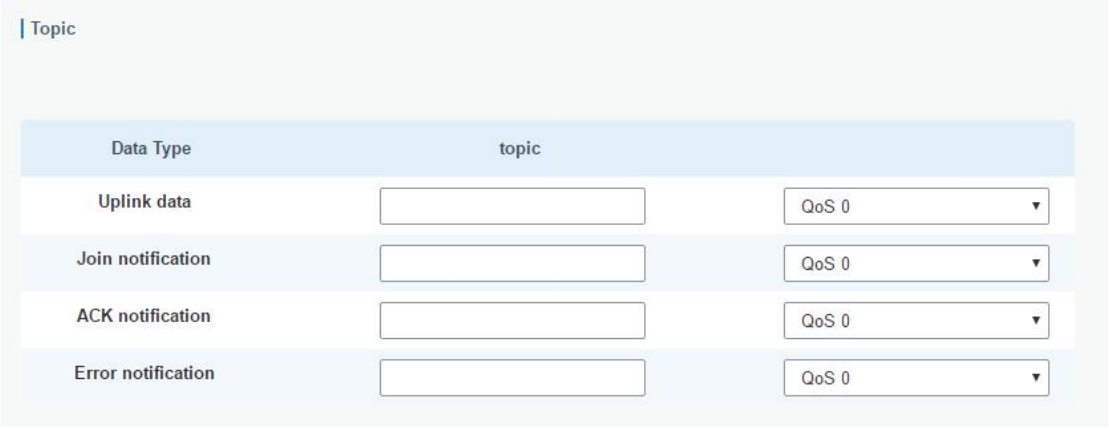
This is the fastest method and requires only 1 message. It is also the most unreliable transfer mode.

QoS 1 – At Least Once

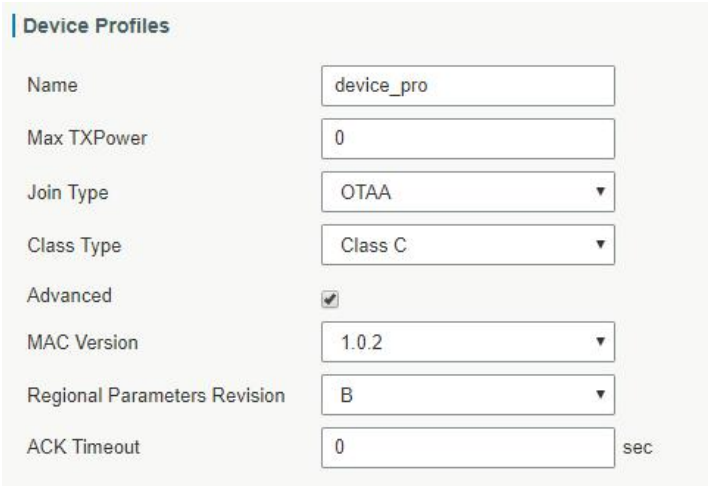
This level guarantees that the message will be delivered at least once, but may be delivered more than once.

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.

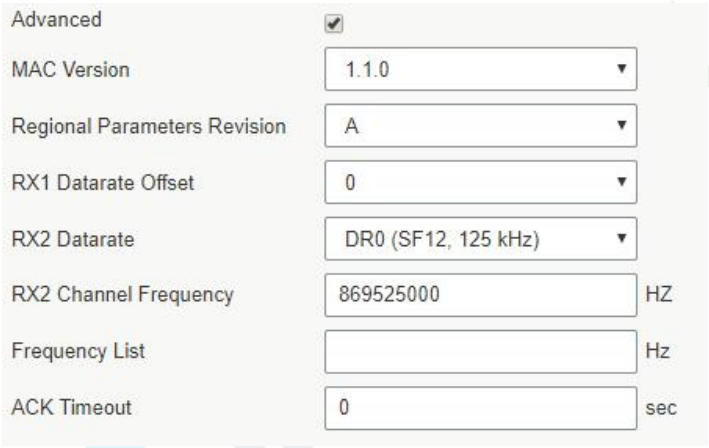


## 4.3 Device Profiles Configuration




| Device Profiles Settings | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Name | Enter the Name of the application profile.<br>E.g. Smoker-sensor-app. | Null |
| Max TXPower | Enter the maximum transmit power.<br>0 means using the max EIRP. | 0.<br>The TXPower indicates power levels relative to the Max EIRP level of the end-device.<br>0 means using the max EIRP. EIRP refers to the Equivalent Isotropically Radiated Power. |
| Join Type | Select from: “OTAA” and “ABP”.<br>OTAA:Over-the-Air Activation.<br>For over-the-air activation, end-devices must follow a join procedure prior to participating in data exchanges with the network server. An end-device has to go through a new join procedure every time as it has lost the session context information.<br><br>ABP: Activation by Personalization.<br>Under certain circumstances, end-devices can be activated by personalization. Activation by personalization directly ties an end-device to a specific network bypassing the join request - join | OTAA |

| | | |
|---|---|---|
| | accept procedure. | |
| Class Type | Select from: “Class A” and “Class C”.<br>A: Class A operation has the lowest power consumption for applications that require downlink communication from the server shortly after the end-device has sent an uplink transmission.<br><br>C: End-device of Class C will continuously open receive windows, only closed when transmitting. Class C end-device will spend more power than Class A or Class B but they offer the lowest latency for server to end-device communication. | A |



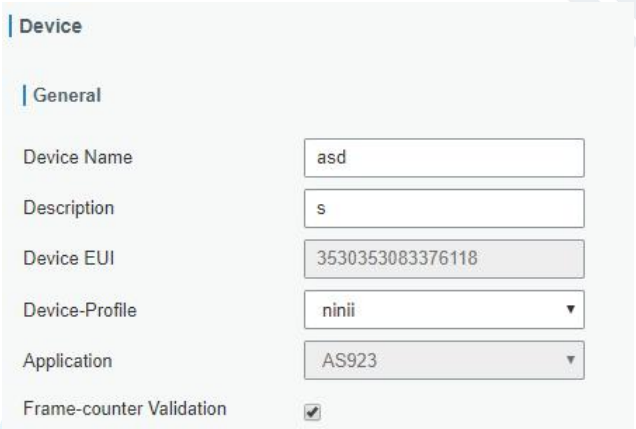

| Device Profile Advanced Settings | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| MAC Version | Choose the version of the LoRaWAN supported by the end-device. | 1.0.2 |
| Regional Parameter Revision | Revision of the Regional Parameters document supported by the end-device. | B |
| RX1 Datarate Offset | Enter the offset which used for calculate the RX1 data-rate, based on the uplink data-rate. The range is based on what is specified in the LoRaWAN regional parameters document. | The default offset is based on what is specified in the LoRaWAN regional parameters document. |
| RX2 Datarate | Enter the RX2 datarate which used for the RX2 receive-window. The range is based on what is specified in the LoRaWAN regional parameters document. | The default offset is based on what is specified in the LoRaWAN regional parameters |

| | | |
|---|---|---|
| | | document. |
| RX2 Channel Frequency | Enter the RX2 channel frequency which used for the RX2 receive-window. The range is based on what is specified in the LoRaWAN regional parameters document. | Null |
| Frequency List | List of factory-preset frequencies. The range is based on what is specified in the LoRaWAN regional parameters document. | Null |
| ACK Timeout | Enter the time for confirmed downlink transmissions. Only applicable to class C. | 5 |

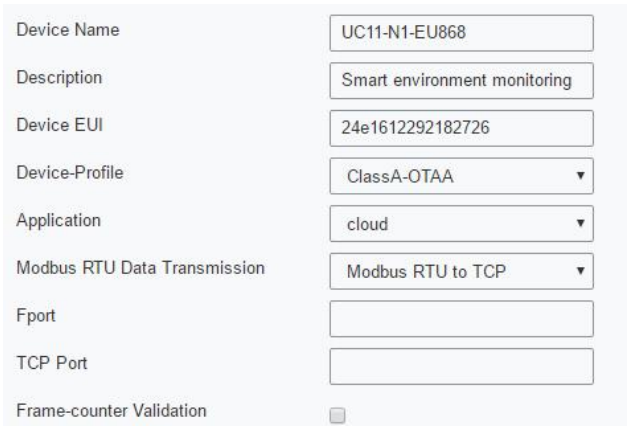
### 4.4 Device Configuration

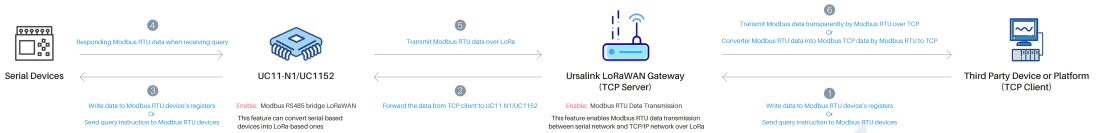
Go to “LoRaWAN” > “Network Server” > “Device”.

You can edit the device configuration by clicking  or create a new device by clicking  .



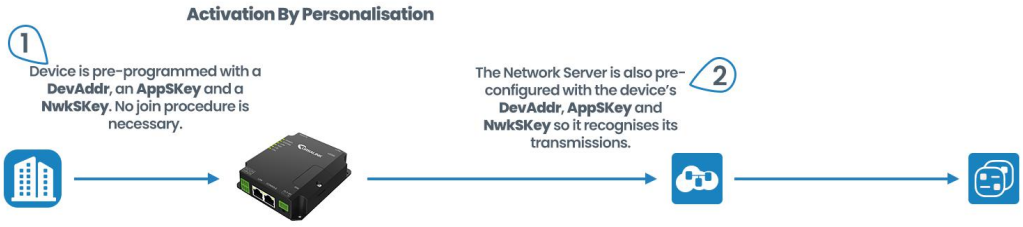

| Device Configuration-General | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Device Name | Enter the name of this device. | Null |
| Description | Enter the description of this device. | Null |
| Device EUI | Enter the EUI of this device. | Null |
| Device-Profile | Choose the device profile from created device profiles. | Null |
| Application | Choose the application profile from created application. | Null |
| Frame-Counter Validation | If disable the frame-counter validation, it will compromise security as it enables people to perform replay-attacks. | Enabled |




| Device Configuration-General（Applicable for UC11-N1 and UC1152） | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Device Name | Enter the name of this device. | Null |
| Description | Enter the description of this device. | Null |
| Device EUI | Enter the EUI of this device. | Null |
| Device-Profile | Choose the device profile. | Null |
| Application | Choose the application profile. | Null |
| Modbus RTU Data Transmission | Choose from: "Disable", "Modbus RTU to TCP", "Modbus RTU over TCP".<br><br>Disable: This feature is not enabled.<br><br>Modbus RTU to TCP: With the this function enabled, you can connect UC11-N1 or UC1152 to TCP networks while converting Modbus message to Modbus TCP Protocol.<br><br>Modbus RTU over TCP: With the this function enabled, you can connect UC11-N1 or UC1152 to TCP networks without actually changing any of the bytes in the Modbus message. | Disable |
| Fport | Enter the LoRaWAN frame port for transparent transmission between UC11-N1 and UG85. Range: 2-84, 86-223.<br><br>Note: this value must be the same as the UC11-N1/UC1152's Fport. | Null |
| TCP Port | Enter the TCP port for data transmission between the TCP Client and UG85 (as TCP | Null |

| | | |
|---|---|---|
| | Server).<br>Range: 1-65535. | |
| Frame-Counter Validation | If disable the frame-counter validation, it will compromise security as it enables people to perform replay-attacks. | Enabled |

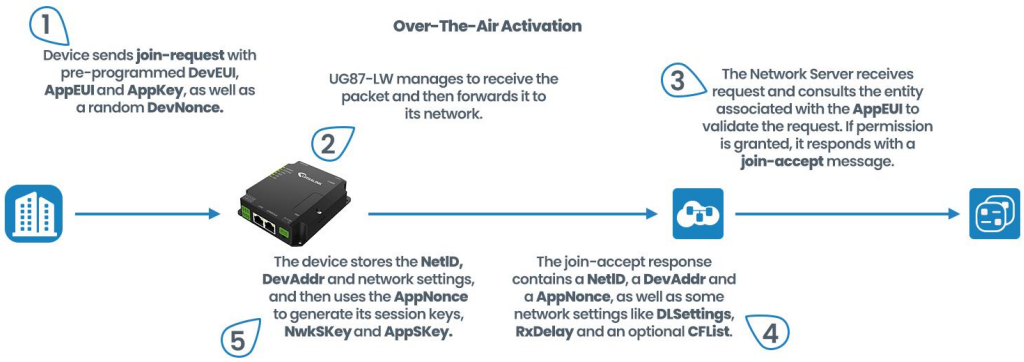




ABP stands for Authentication By Personalisation. It means that the encryption keys are configured manually on the device and can start sending frames to the Gateway without needing a 'handshake' procedure to exchange the keys (such as the one performed during an OTAA join procedure).

With ABP the encryption keys enabling communication with the network are preconfigured in the device. The network will need to provide you with a Device Address, Network Session Key and Application Session Key.

| Device Configuration-Activate Device-ABP | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Device Address | Enter the device address. The device address identifies the end-device within the current network. | Null |
| Network Session Key | Enter the network session key of the device. 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. | Null |
| Application Session Key | Enter the application session key of the device. 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 | Null |

| | | |
|---|---|---|
| | 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.<br>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. | Null |
| 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.<br>Users cloud 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. | Null |


OTAA stands for Over The Air Activation. With this method the end-device sends a Join request to the gateway using the Application Key, Application Key is a shared secret key unique to your

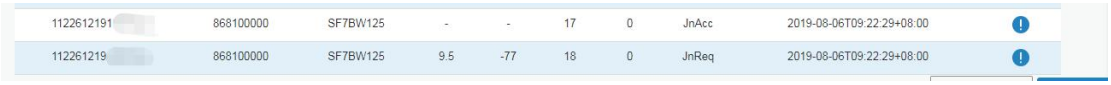
device to generate the session keys that prove its identity to the network. If the keys are correct, the gateway will reply to the end-device with a join accept message, and from that point on the end-device is able to send and receive packets to/from gateway. If the keys are incorrect, no response will be received.

| Device Configuration-Activate Device-OTAA | | |
|---|---|---|
| **Item** | **Description** | **Default** |
| Application Key | Enter the 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. | Null |
| Device Address | Show the device address when the device has been activated. The device address identifies the end-device within the current network.It will be cleared when the node has not been activated yet or device has been inactive for a long time. | Null |
| Network Session Key | Show the network session key of the device when the device has been activated. 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.It will be cleared when the node has not been activated yet or device has been inactive for a long time. | Null |
| Application Session Key | Show the application session key of the device when the device has been activated. 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. It will be cleared when the node has not been activated yet or device has been inactive for a long time. | Null |
| Uplink Frame-counter | The number of data frames which sent uplink to the network server. It will be incremented and received by the end-device.<br>After a JoinReq -JoinAccept message exchange, the frame counters on the end-device and the frame counters on the network server for that end-device will be reset to 0. | Null |
| 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.<br>After a JoinReq -JoinAccept message exchange, the frame counters on the end-device and the frame counters on the network server for that end-device will be reset to 0. | Null |

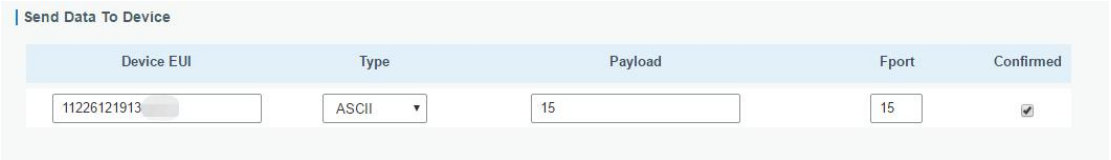
### 4.5 Send Data to Device

Go to “LoRaWAN” > “Network Server” > “Packets”.

Step 1: Please check the packet in the network server list to make sure that the device has joined the network successful.



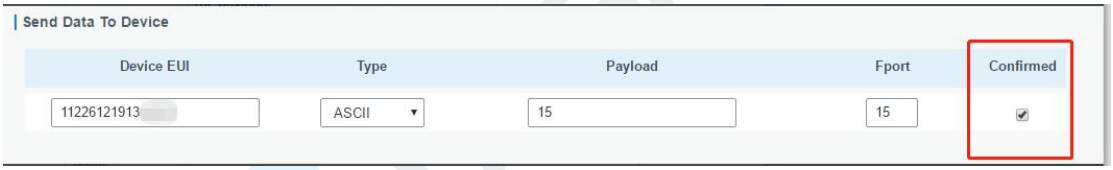

Step 2: Fill these input box.




Step 3: Click “Send”.


Step 4: Check the packet in the network server list to make sure that the device has received this message successful.

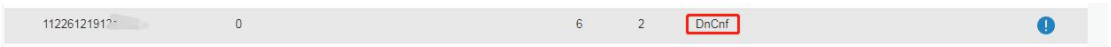
**Note: please enable the “confirmed”.**




You can click “Refresh” to refresh the list or set automatic refreshing frequency for the list.

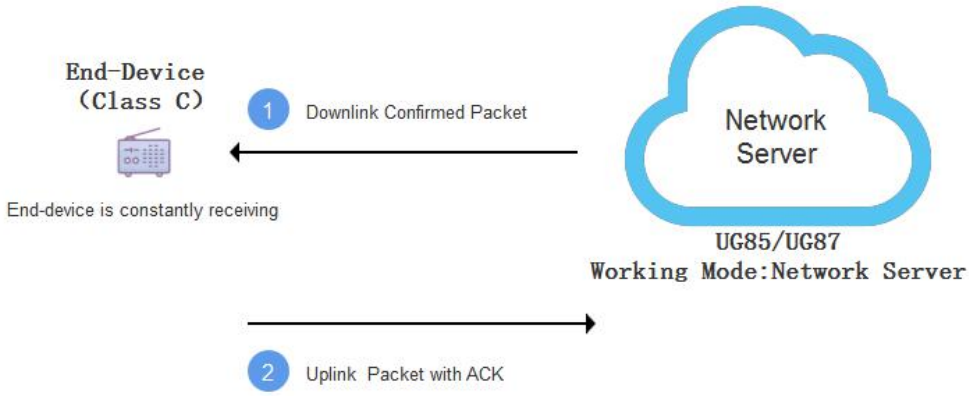
**If the device’s class type is Class C, then the device will be constantly receiving packet.**

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.

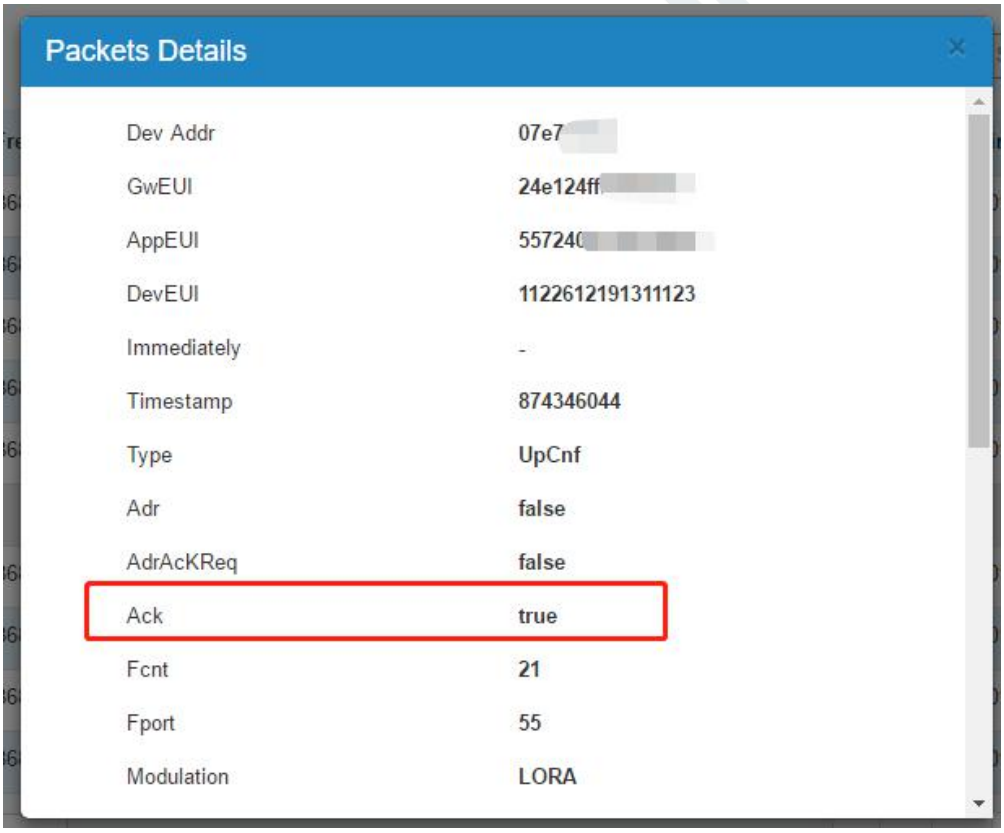



This is the data packet has been delivered successfully.


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



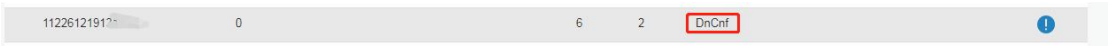

| Device EUI | Frequency | Datarate | SNR | RSSI | Size | Fcnt | Type | Time | Details |
|---|---|---|---|---|---|---|---|---|---|
| 11226121913 | 868300000 | SF10BW125 | - | - | 0 | 3 | DnUnc | 2019-08-06T09:23:44+08:00 | |
| 1122612191 | 868300000 | SF10BW125 | 10.5 | -75 | 64 | 2 | UpCnf | 2019-08-06T09:23:44+08:00 | |
| 112261219 | 869525000 | SF12BW125 | - | - | 6 | 2 | DnCnf | 2019-08-06T09:22:55+08:00 | |
| 112261219 | 0 | | | | 6 | 2 | DnCnf | | |
| 112261219 | 868500000 | SF10BW125 | - | - | 0 | 1 | DnUnc | 2019-08-06T09:22:49+08:00 | |



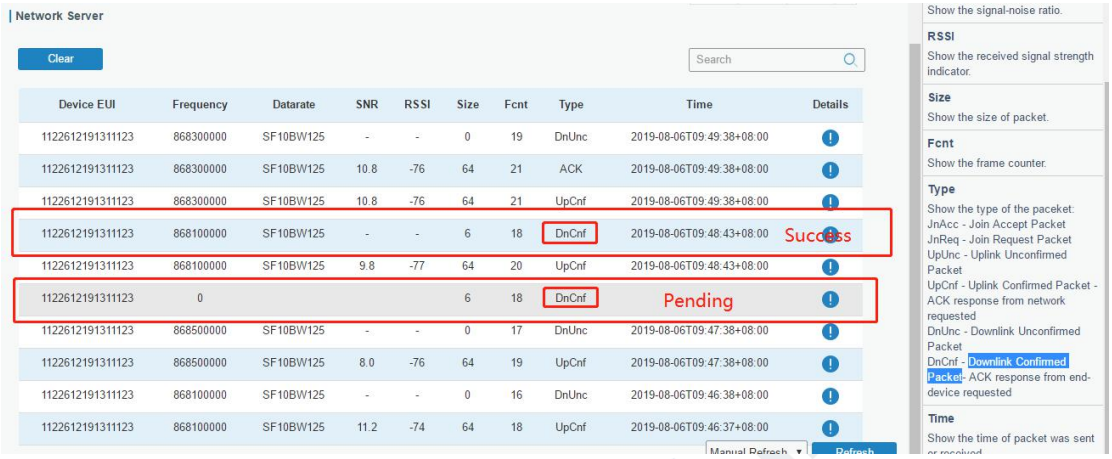

Ack is “true” means that the device has received this packet.

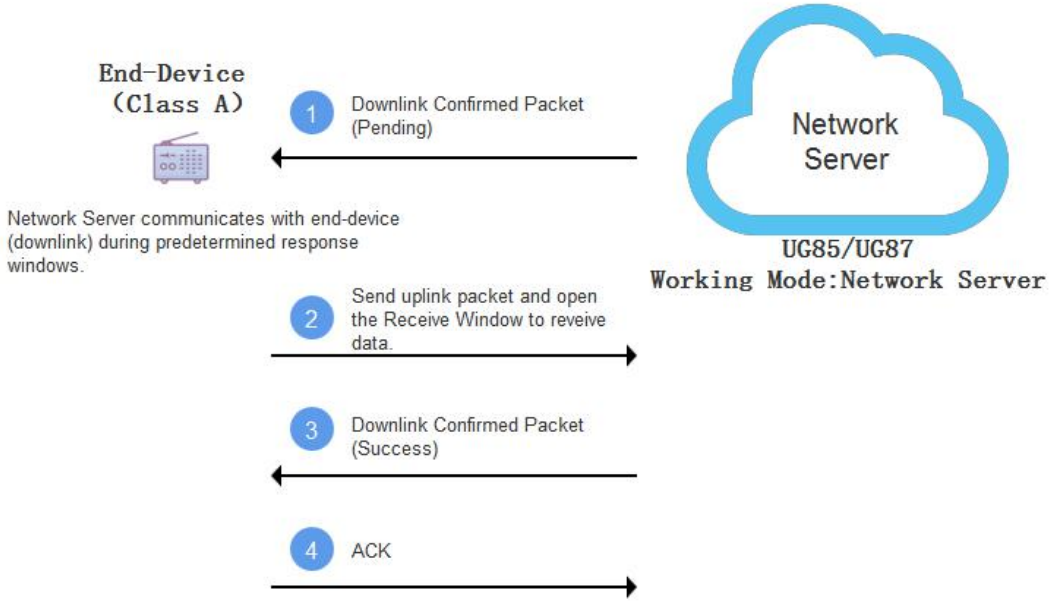
**If the device’s class type is Class A, then the Network Server communicates with end-device (downlink) during predetermined response windows.**

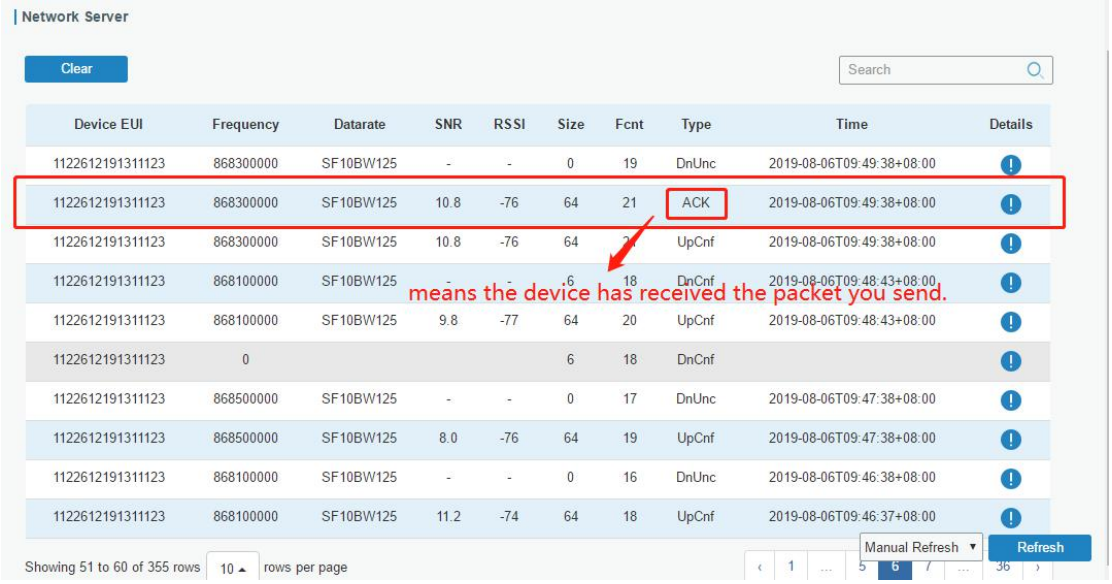
This packet's type is DnCnf (Downlink Confirmed Packet) and if the packet's color is gray, then it means that the packet cannot be transmitted now because at least one message has been in queue.




Only after the device sends out an uplink packet will the network server sends out data to the device.






**Related Topic**

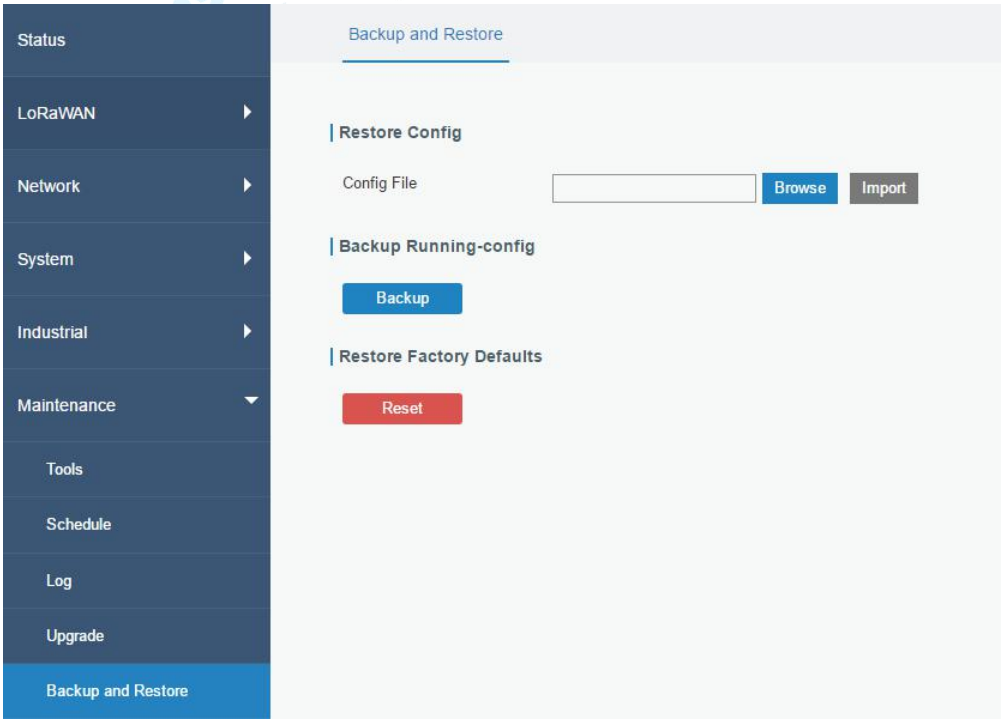
Packets

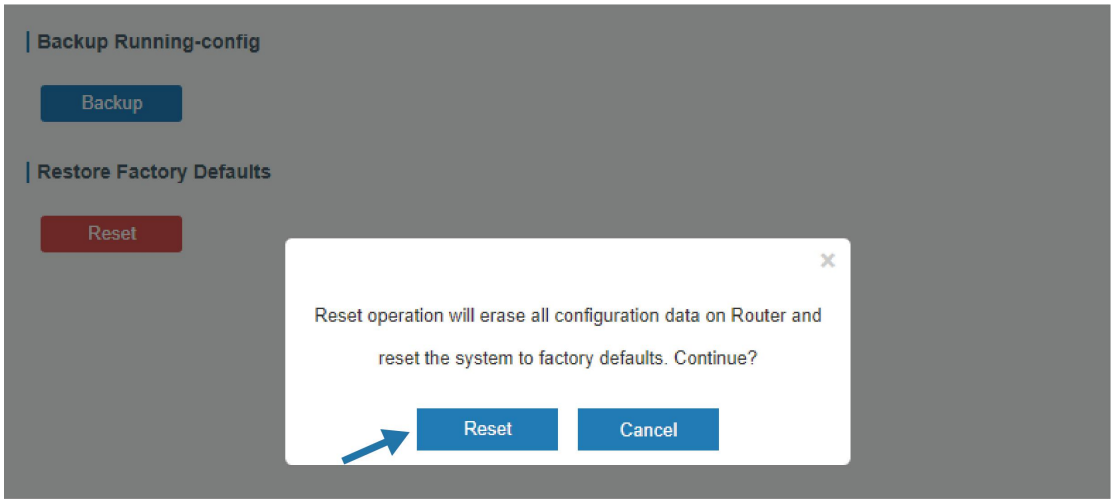
## 4.6 Restore Factory Defaults

### 4.6.1 Via Web Interface

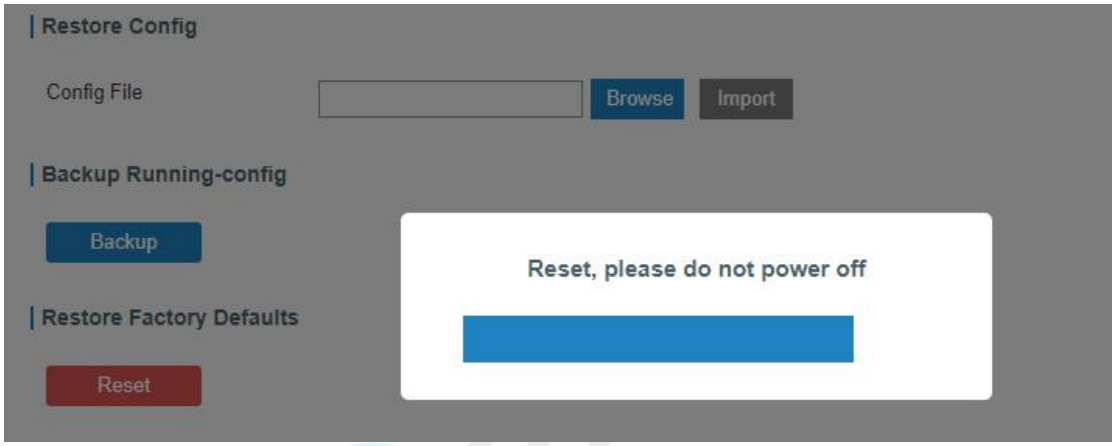
1. Log in web interface, and go to “Maintenance > Backup and Restore”.
2. Click “Reset” button under the “Restore Factory Defaults”.

You will be asked to confirm if you’d like to reset it to factory defaults. Then click “Reset” button.

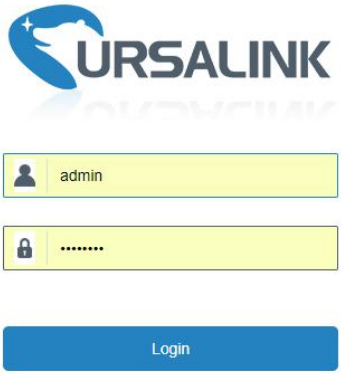





Then the gateway will reboot and restore to factory settings immediately.




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




**Related Topic**

Restore Factory Defaults

### 4.6.2 Via Hardware

Locate the reset button on the gateway, and take corresponding actions based on the status of SYSTEM LED.

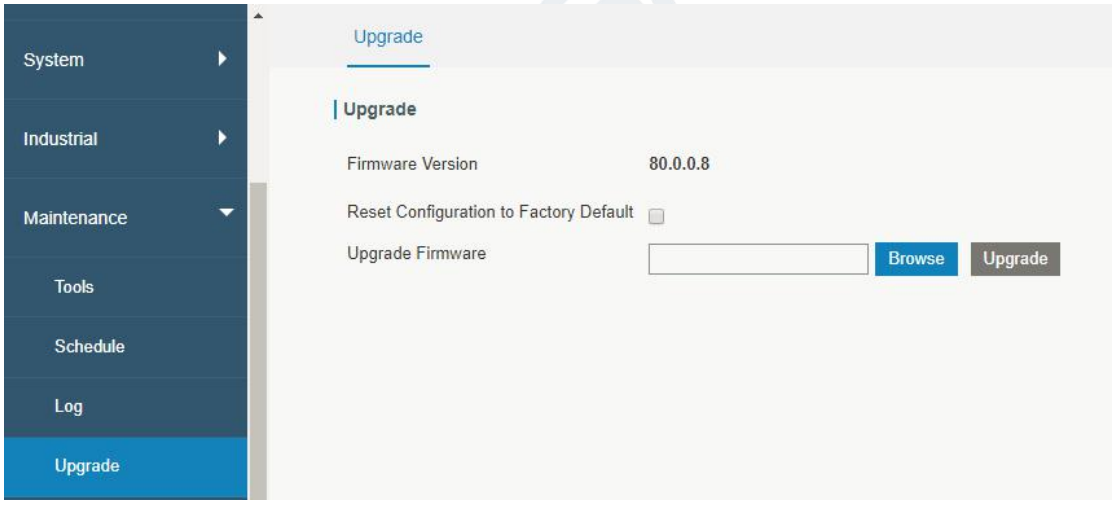
| SYSTEM LED | Action |
|---|---|
| Blinking | Press and hold the reset button for more than 15 seconds. |
| Static Green → Rapidly Blinking | Release the button and wait. |
| Off → Blinking | The gateway is now reset to factory defaults. |

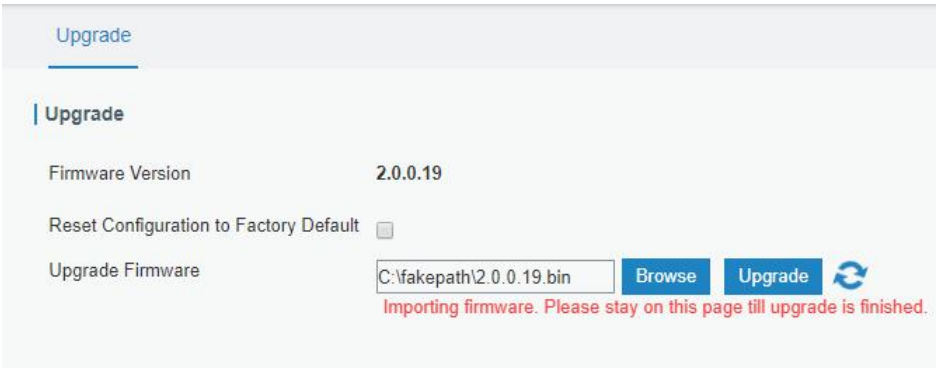
## 4.7 Firmware Upgrade

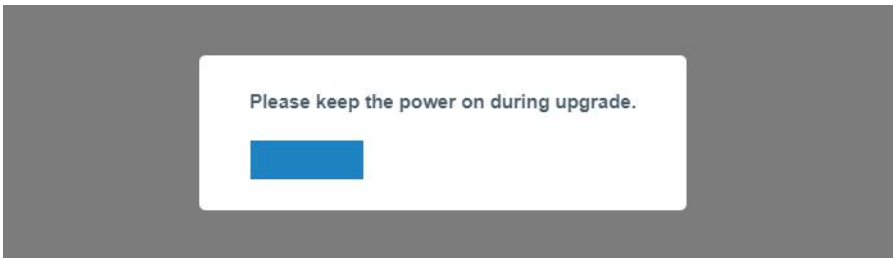
It is suggested that you contact Ursalink technical support first before you upgrade gateway firmware.

After getting firmware file from Ursalink technical support, 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

## 4.8 Cellular Connection

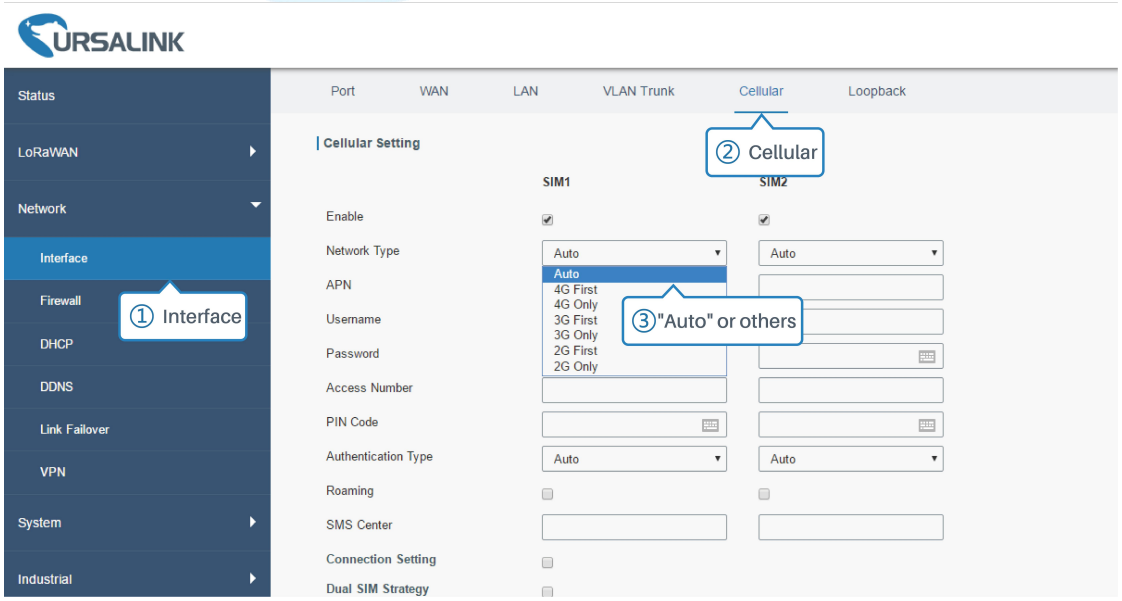
The UG85 have two cellular interfaces, named SIM1 & SIM2. Only one cellular interface is active at one time. If both cellular interfaces are enabled, SIM1 interface takes precedence as default.

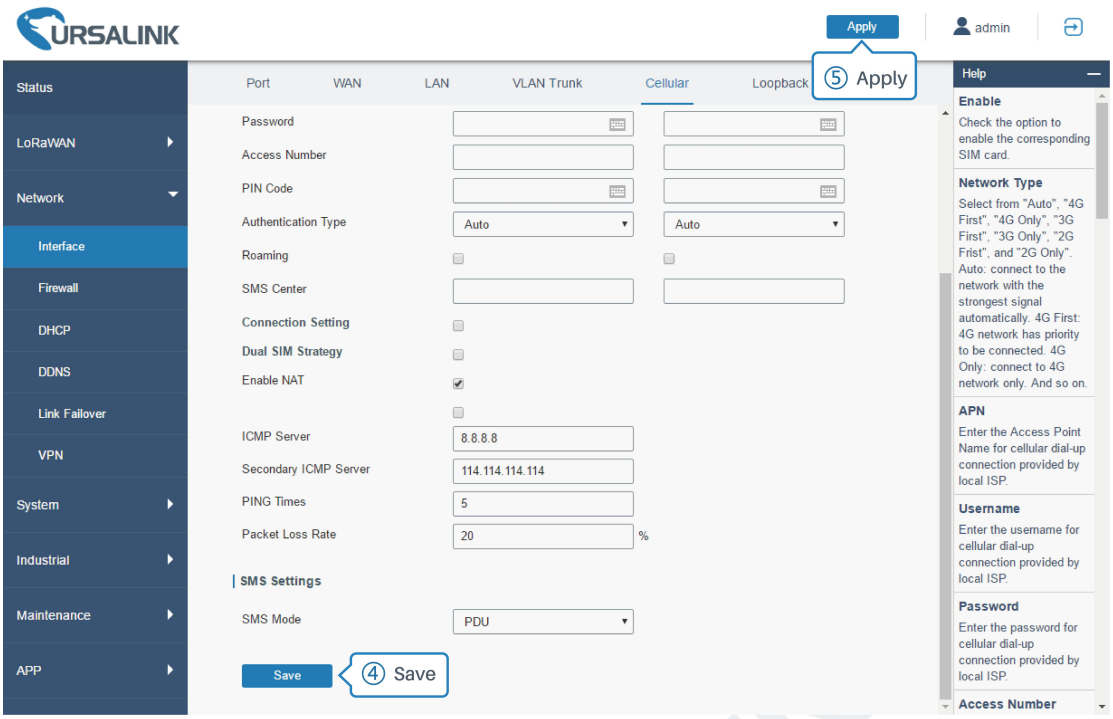
**Example**

We are about to take an example of inserting a SIM card into SIM1 slot of the UG85 and configuring the gateway to get Internet access through cellular.

**Configuration Steps**

1. Go to “Network > Interface > Cellular > Cellular Setting” and configure the cellular info.
2. Enable SIM1.
3. Choose relevant network type. "Auto", "4G First", “4G Only”, "3G First", “3G Only”, “2G First” and "2G only" are optional.






Click “Save” and “Apply” for configuration to take effect.

**Note:**

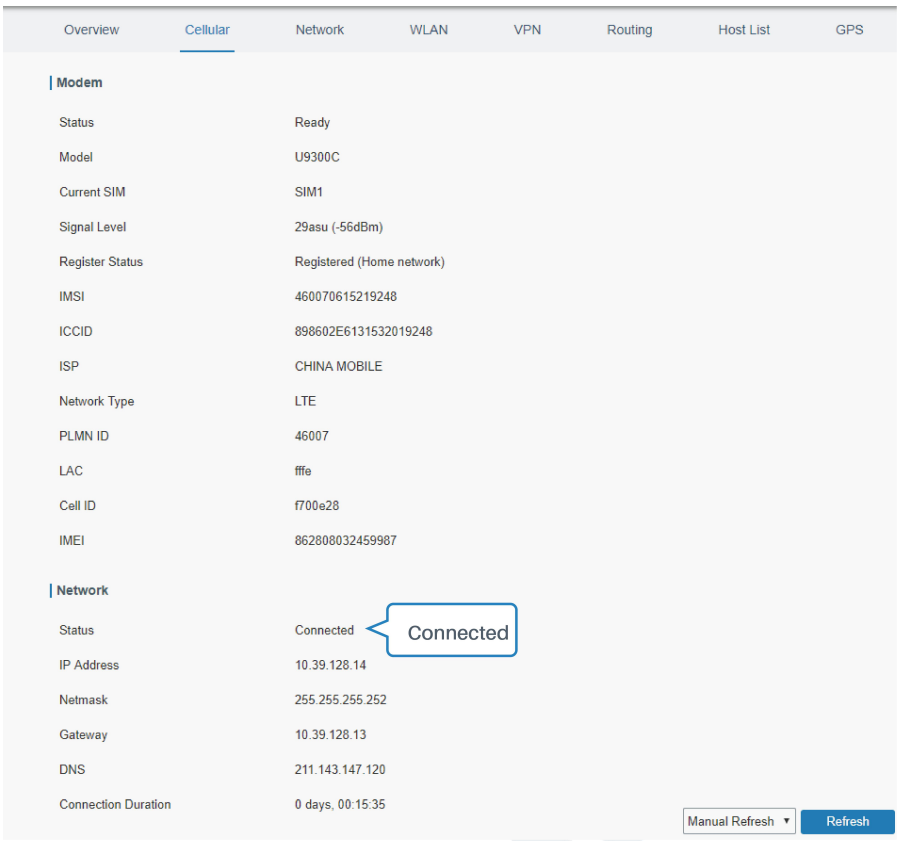
**If you select “Auto”, the gateway will obtain ISP information from SIM card to set APN, Username, and Password automatically. This option will only be taken effect when the SIM card is issued from well-known ISP.**

If you select “4G First” or “4G Only”, **you can click “Save” to finish the configuration directly.**

If you select “3G First”, “3G Only”, “2G First” or “2G Only”, **you should manually configure APN, Username, Password, and Access Number.**

4. Check the cellular connection status by WEB GUI of gateway.

Click “Status > Cellular” to view the status of the cellular connection. If it shows 'Connected', SIM1 has dialed up successfully.




5. Check out if network works properly by browser on PC.

Open your preferred browser on PC, type any available web address into address bar and see if it is able to visit Internet via the UG85.

**Related Topic**

Cellular Setting

Cellular Status

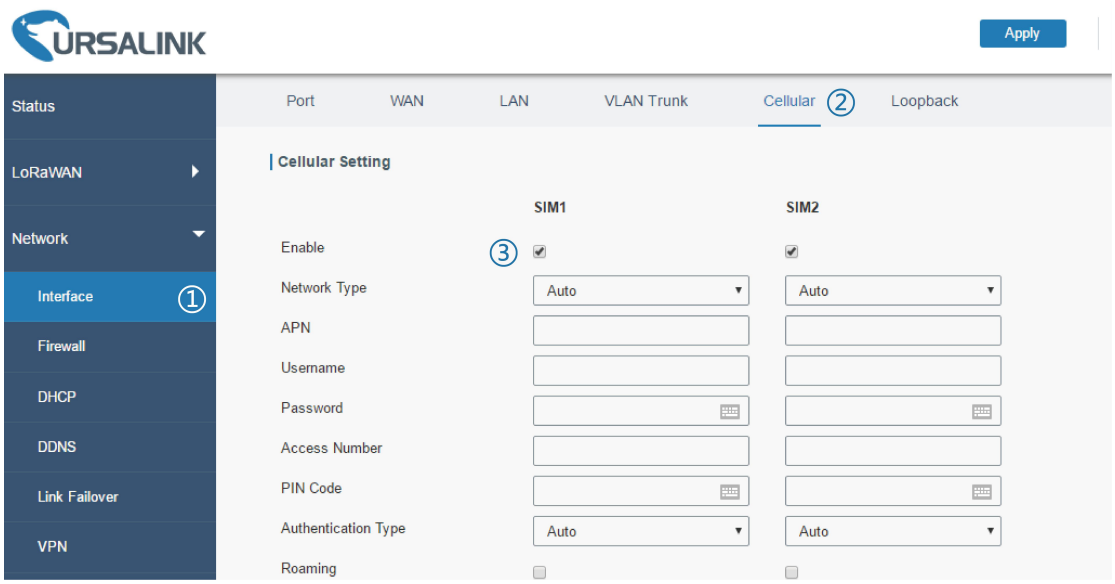
## 4.9 Dual SIM Backup Application Example

**Example**

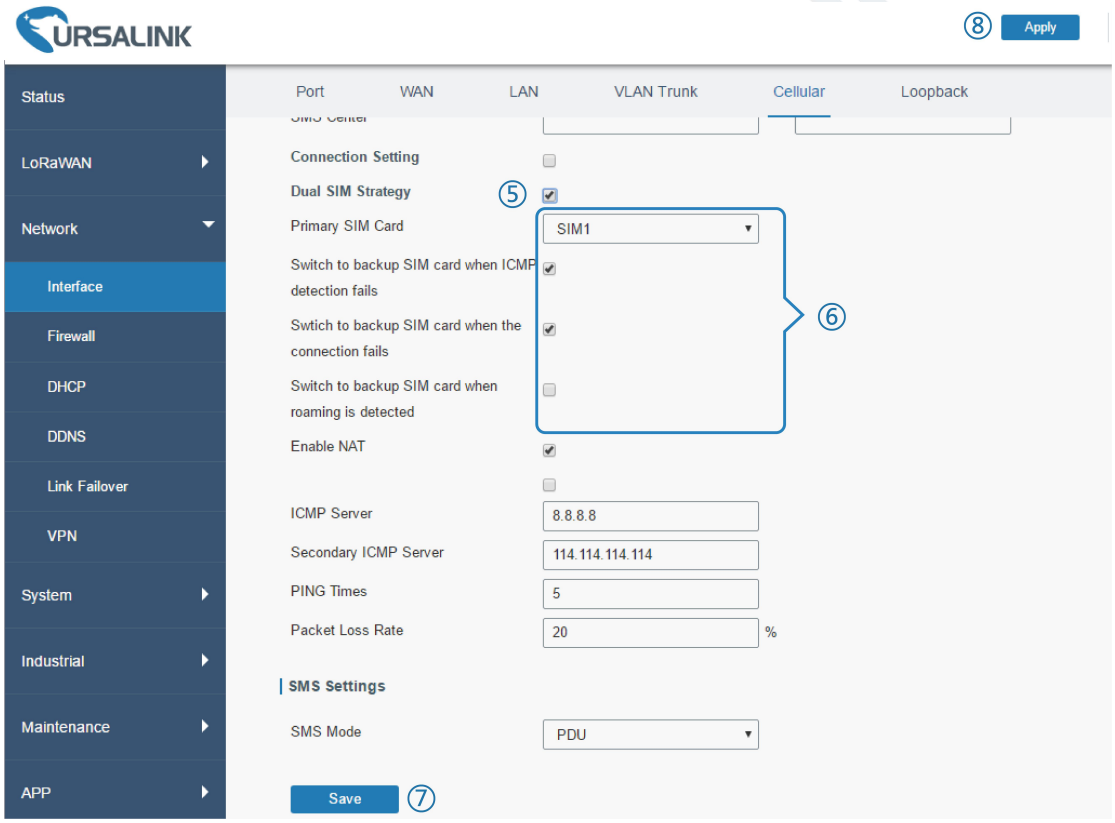
In this section we will take an example of inserting two SIM cards into the UG85. When one SIM fails, gateway will try to connect with the other SIM as backup link.

**Configuration Steps**

1. Go to “Network > Interface > Cellular” to enable SIM1 and SIM2. Leave the network type as “Auto” by default.

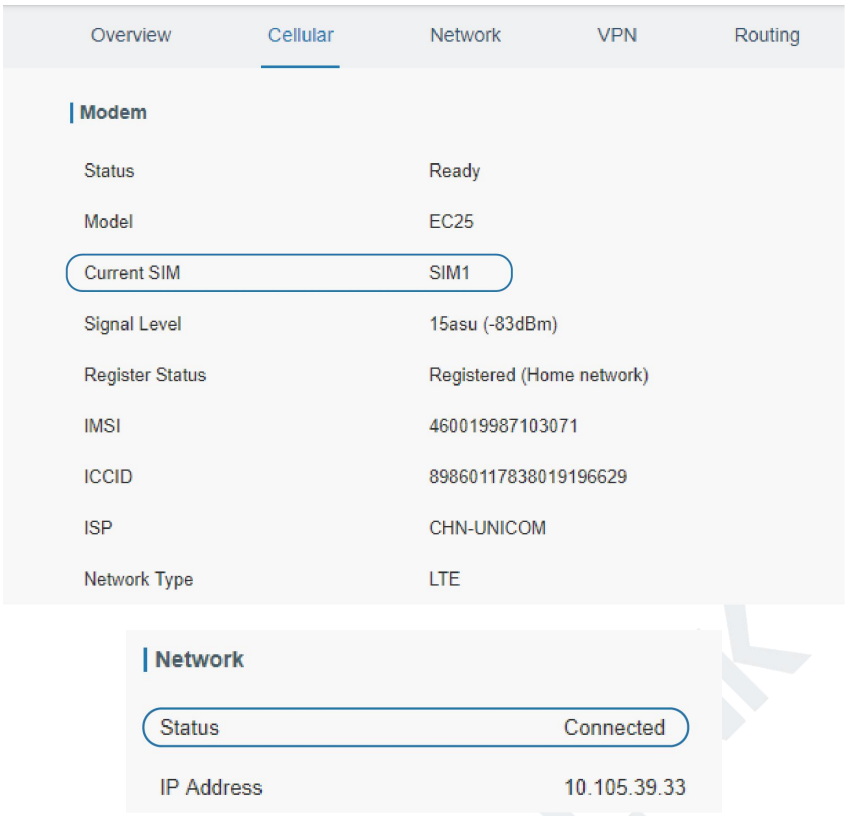



2. Enable “Dual SIM Strategy”, and configure the corresponding options as below. ICMP server can be configured as any reachable IP address.

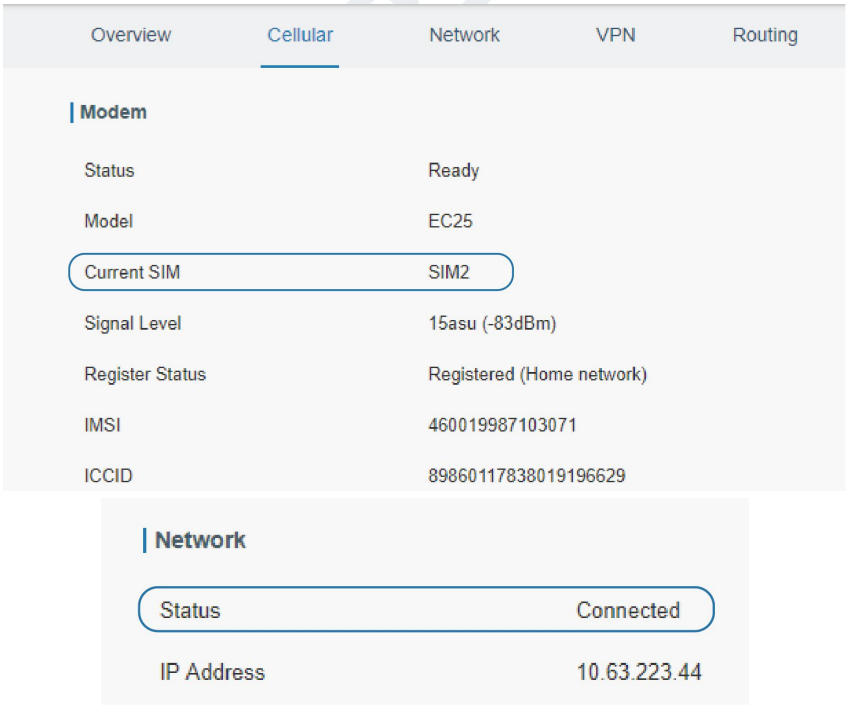



Then click “Save” and “Apply” button.

3. Go to “Status > Cellular”, and you will see the gateway is connected to the network via SIM1.




4. You can remove SIM1 to make the gateway fail to connect to network via it. Go to "Status > Cellular" again, and you will see the gateway is connected to the network through SIM2.




Now SIM2 becomes the main SIM, and SIM1 runs as the backup.

The gateway won't reconnect via SIM1 until SIM2 fails.

**Related Topic**

Cellular Setting

Cellular Status

## 4.10 Wi-Fi Application Example

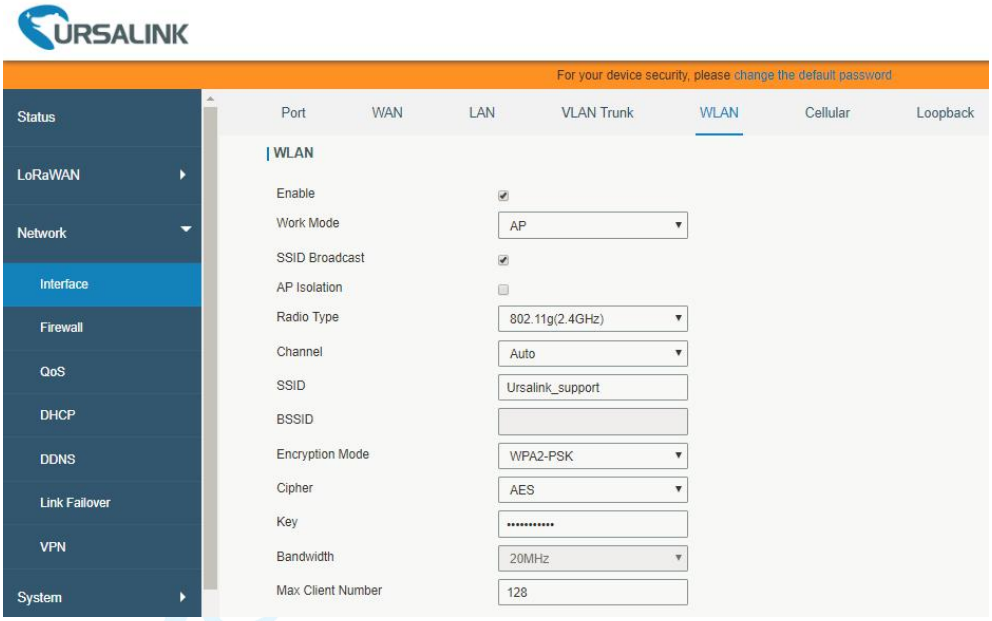
### 4.10.1 AP Mode

**Application Example**

Configure UG85 as AP to allow connection from users or devices.

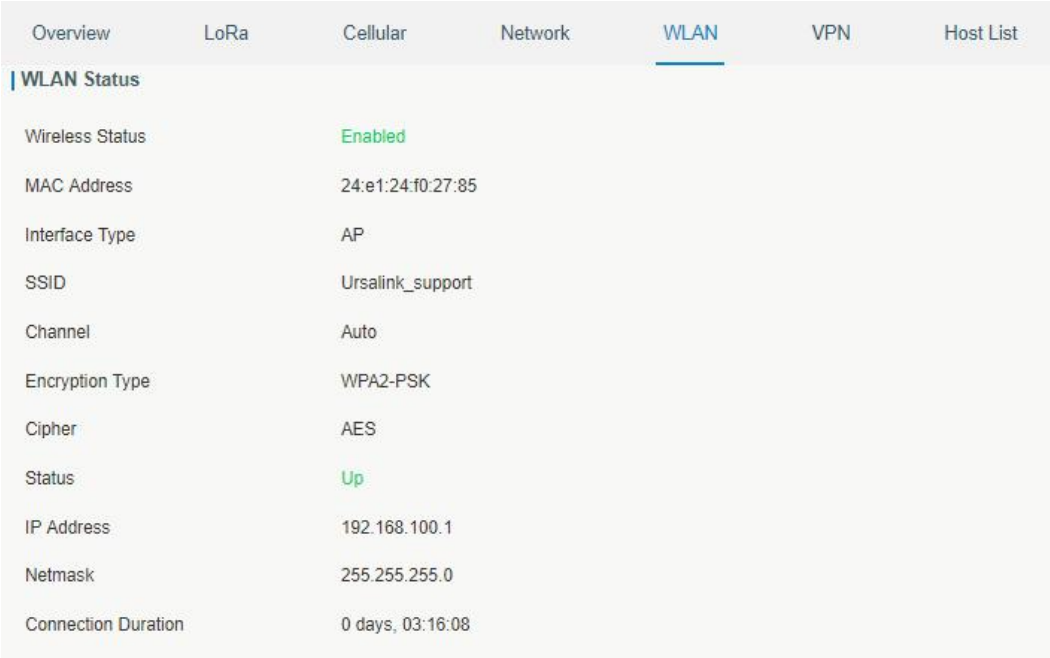
**Configuration Steps**

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




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

2. Use a smart phone to connect by SSID “Ursalink_F0257A”. Go to “Status > WLAN”, and you can check the AP settings and information of the connected client/user.



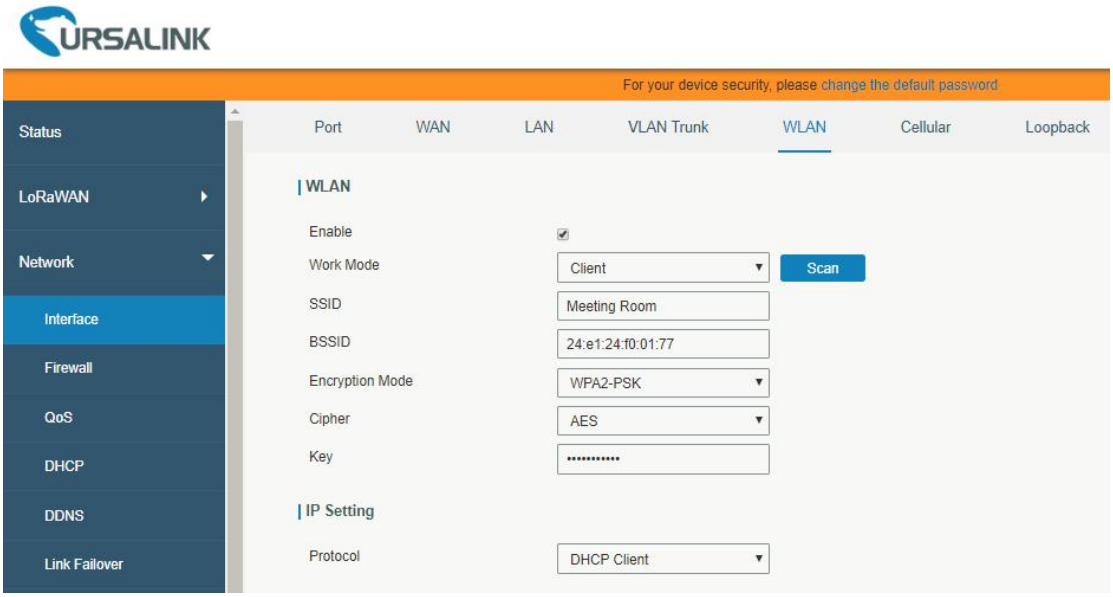

### 4.10.2 Client Mode

**Application Example**

Configure UG85 as Wi-Fi client to connect to an access point to have Internet access.

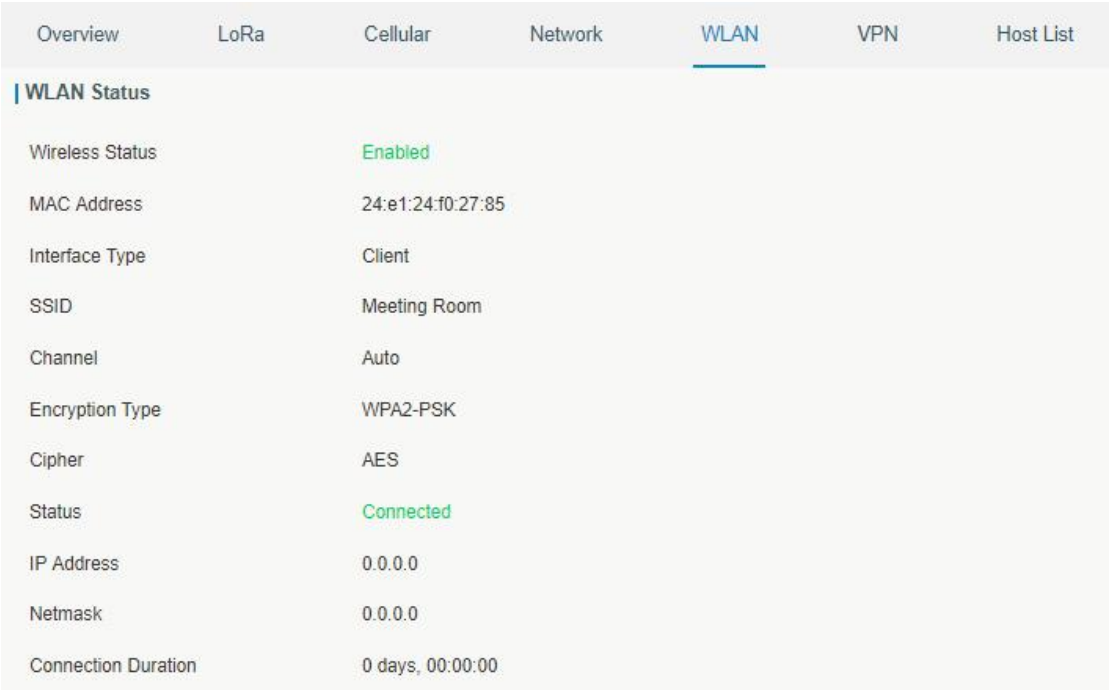
**Configuration Steps**

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




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

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




**Related Topic**

WLAN Setting

WLAN Status

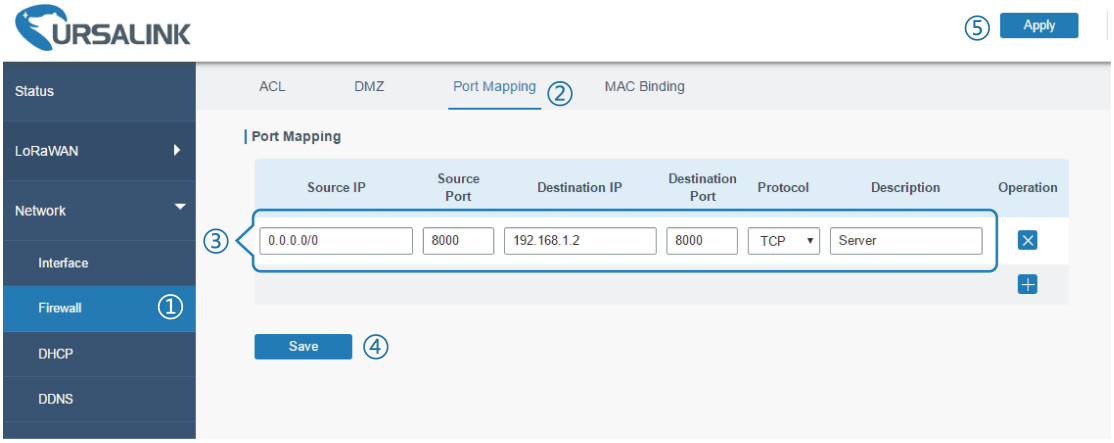
## 4.11 NAT Application Example

**Example**

An UG85 can access Internet via cellular. GE port is connected with a Web server whose IP address is 192.168.1.2 and port is 8000. Configure the gateway to make public network access the server.

**Configuration Steps**

Go to “Firewall > Port Mapping” and configure port mapping parameters.




Click “Save” and “Apply” button.

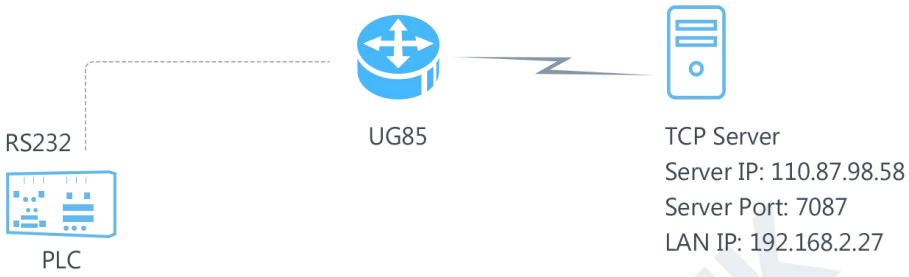
**Related Topic**

Port Mapping

## 4.12 DTU Application Example

**Example**

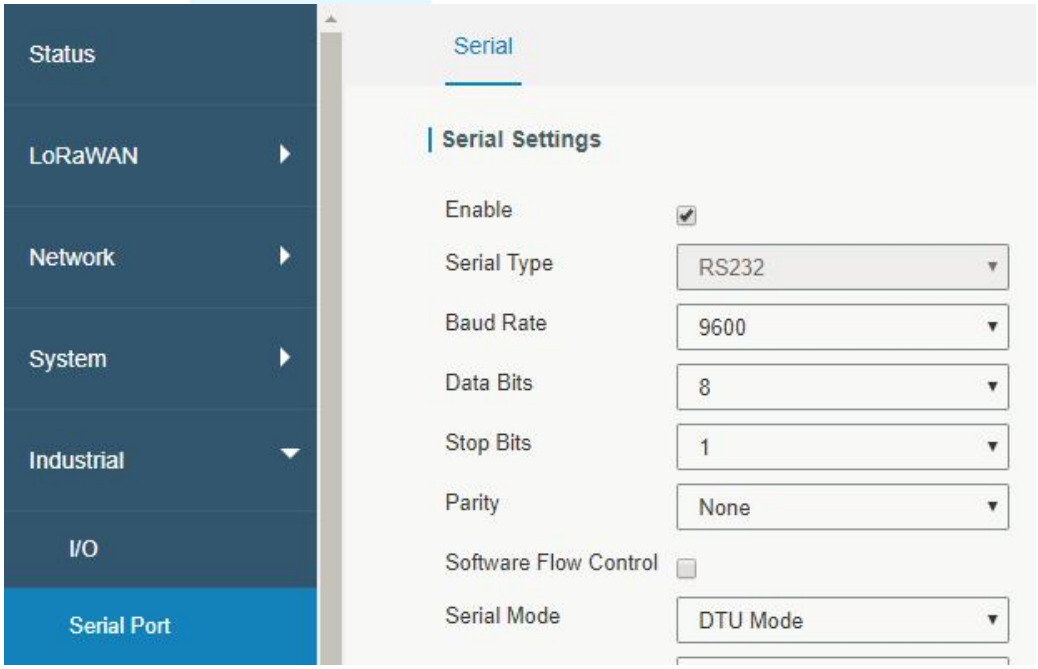
PLC is connected with the UG85 via RS232. Then enable DTU function of the UG85 to make a remote TCP server communicate with PLC. Refer to the following topological graph.



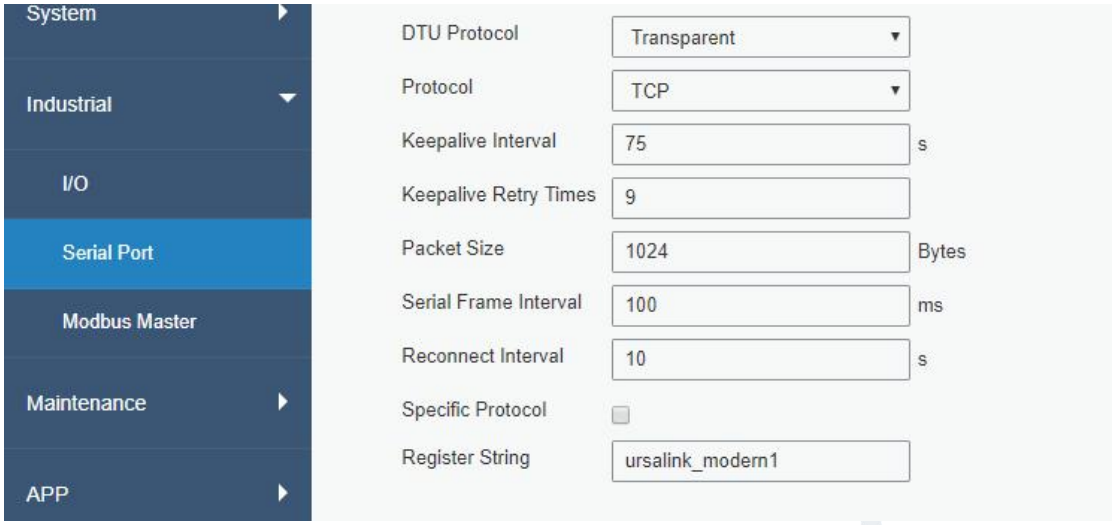

| Serial Parameters of the PLC | |
|---|---|
| Baud Rate | 9600 |
| Data Bit | 8 |
| Stop Bit | 1 |
| Parity | None |

**Configuration Steps**

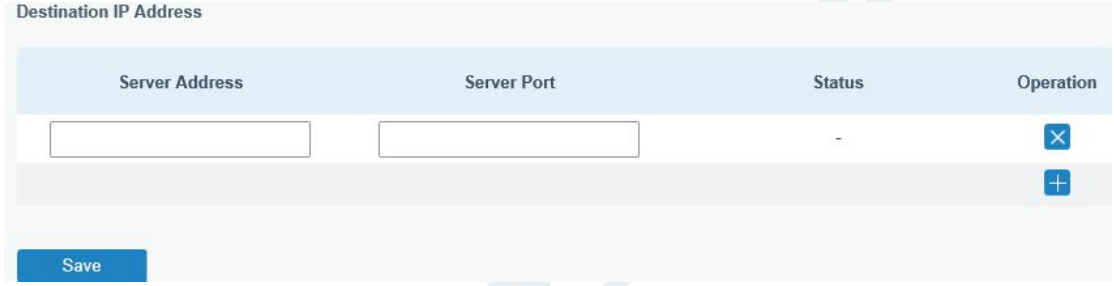
1. Go to “Industrial > Serial Port” and configure serial port parameters. The serial port parameter shall be kept in consistency with those of PLC, as shown in figure below.



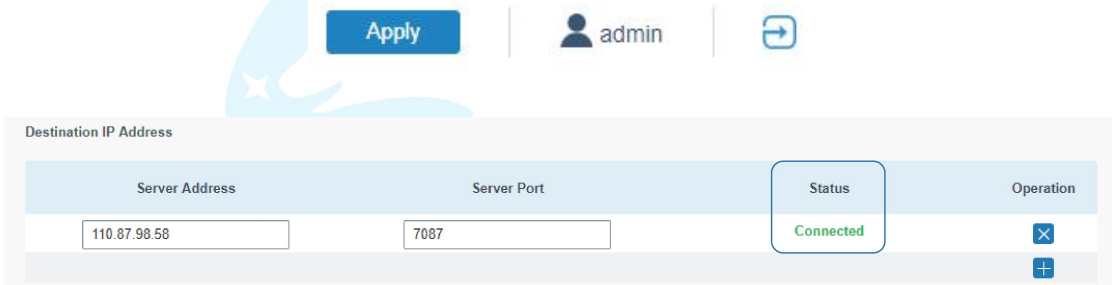
2. Configure Serial Mode as “DTU Mode”. The UG85 is connected as client in “Transparent” protocol.




3. Configure TCP server IP and port.

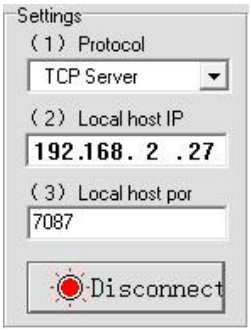



4. Once you complete all configurations, click “Save” and “Apply” button.




5. Start TCP server on PC.

   Take “Netassist” test software as example. Make sure port mapping is already done.

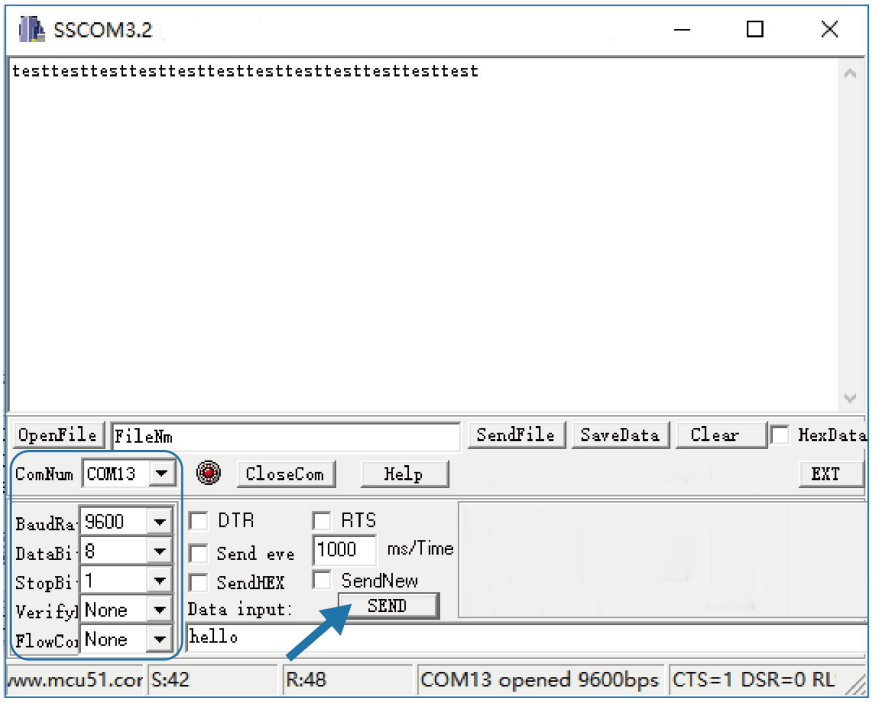



6. Connect the UG85 to PC via RS232 for PLC simulation. Then start “sscom” software on

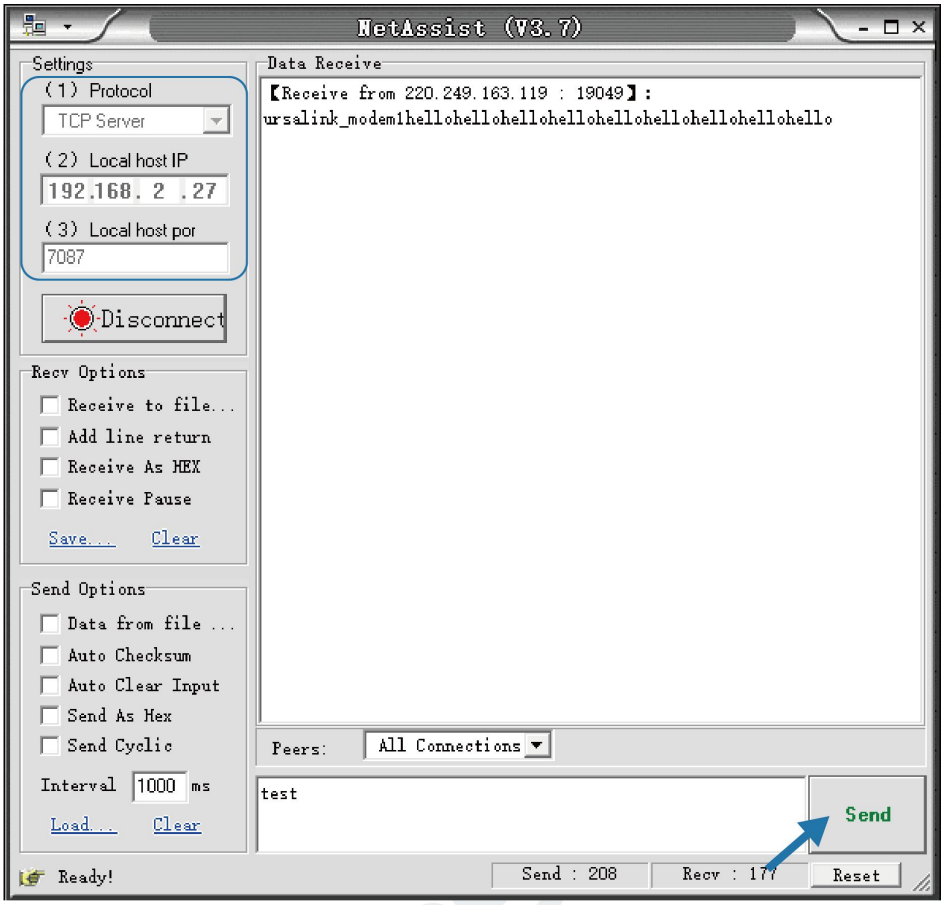
the PC to test communication through serial port.


**7.** After connection is established between the UG85 and the TCP server, you can send data between sscom and NetAssit.

**PC side**



**TCP server side**




8. After serial communication test is done, you can connect PLC to RS232 port of the UG85 for test.

**Related Topic**

Serial Port

**[END]**