GW300 LoRaWAN Gateway User Manual

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Shenzhen Friendcom Technology Co., Ltd.

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About This Document

Scope

Scope of this document is to presents features and application of Friendcom WSL05-A0 LoRaWAN series modules.

Audience

This document is intended for system engineers (SEs), development engineers, and test engineers.

Related Documents

LoRaWAN IoT Industrial Gateway GW300 Product Specification
GW300 LoRaWAN Gateway Installation Manual

Conventions

Symbol	Indication
	This warning symbol means danger. You are in a situation that could cause fatal device damage or even bodily damage.
	Means reader be careful. In this situation, you might perform an action that could result in module or product damages.
	Means note or tips for readers to use the module.

History

Issue	Date	Change
1.0	2019-12	Initial draft
1.1	2021-01	Changes have been made to the content of the gateway into the TTN server

Content

1 Introduction

GW300 is an intelligent gateway for industrial Internet of Things integrating Lora, WiFi, 4G/3G, GPS and POE functions. It can be applied to smart agriculture, smart city, wireless meter remote collection, M2M/LPWAN, fire safety and other fields. It is independently developed by FRIENDCOM (Shenzhen) Co., Ltd.GW300 has the characteristics of simple operation, convenient installation, high reliability, high waterproof rating, etc., which can be easily realized in a variety of complex environment.

The LoRaWAN communication structure block diagram is shown as follows:

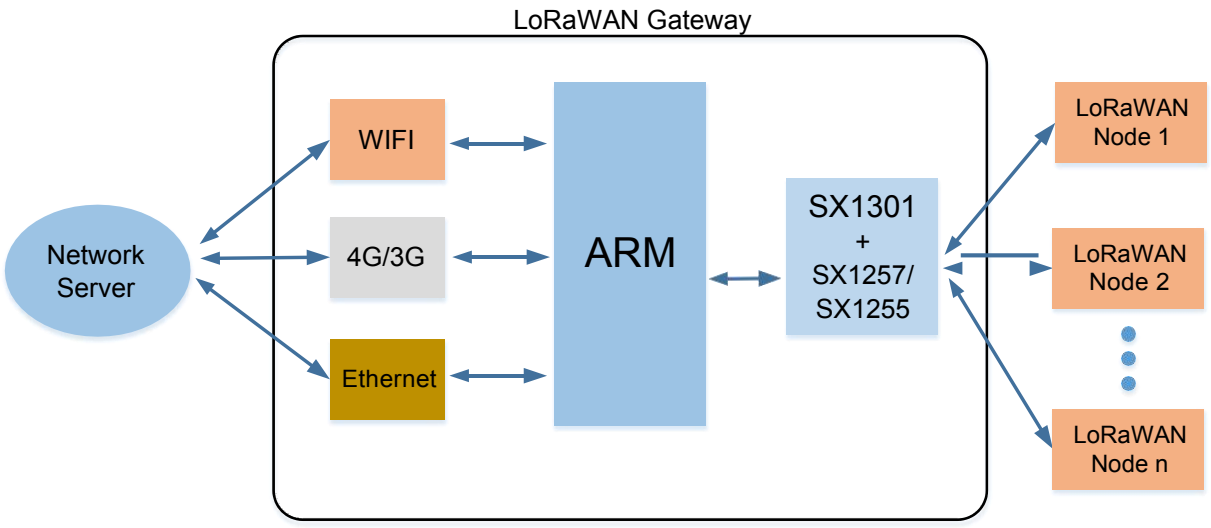


Figure 1-1 LoRaWAN communication structure block diagram

2 Product Overview

2.1 General Description

GW300 Gateway integrates Lorawan, WiFi, 4G/3G, GPRS and POE functions. WiFi supports AP mode and Station mode (not yet open), POE power supply and external DC power supply, and supports 4G wireless or Ethernet connection to Network Server.GW300 supports WIFI wireless function, and supports external devices to be configured through WIFI access gateway. At the same time, the built-in GPS module in the gateway can provide accurate positioning function, which is convenient for users to manage the location information of terminal devices.

The GW300 Industrial Gateway features a high-performance TI Cortex-A8 core and integrates the SX1301+SX1257 LoRa baseband processing chip to support eight multi-SF channels (SF12 to SF7), one single-SF channel and one high-speed GFSK channel. The output power can be up to 26dBm and the sensitivity is -141dBm@SF12. A single gateway can access tens of thousands of nodes under specific transmission periods and data

lengths.

GW300 gateway is divided into several sub-models according to different frequency bands, and the frequency band information of each sub-model is shown in the table below:

Table 2-1 GW300 gateway sub-model frequency band

Model	Frequency range	Support
GW300-470	470MHz~510MHz	CN470
GW300-868	862MHz~870MHz	IN865, EU868
GW300-915	900MHz~930MHz	AU915, US915, AS920, AS923

2.2 Technical Specifications

Technical specifications of GW300 gateway are shown in the following table:

Table 2-2 GW300 Technical specifications

Item	Project name	Functional description
System Configuration	Kernel	TI Cortex-A8
	Main frequency	800MHz
	RAM	256MB DDR3 SDRAM
	Flash	256MB NAND Flash
	Operating system	Linux 3.18.91
Communication mode	WAN Port	10/100/1000Mbps Ethernet with PoE
	LAN Port	10/100Mbps Ethernet
	WiFi	2.4~2.4835GHz, the highest rate is 150Mbps
	GPRS/3G/4G	Support LTE-FDD, LTE-TDD, WCDMA, TDSCDMA, CDMA, GSM
	Wireless transmission	LoRa
Electrical characteristics	Power supply input	PoE +48V input, IEEE 802.3 af/at
		10~56V DC input
	Average power consumption typical	5W
	Maximum power consumption typical	15W (full load operation)
	LoRa output power	Typ. 14dBm@868MHz
	LoRa receiving sensitivity	-141dBm @ SF12, BW=125KHz
User interface (external interface)	4G antenna interface	Wireless network connection network server
	LoRaWAN antenna interface	LoRaWAN wireless data collection
	GPS antenna interface	Connect external GPS antenna to output GPS position information

	WiFi antenna interface	AP mode supports external device connection gateway
	PoE interface	10/100/1000Mbps Ethernet wired connection network server
	External DC power supply interface	10~56V DC input port
Working environment	Operating temperature	-40°C~+85°C (WiFi -10°C~+50°C)
	Storage humidity	-40°C~+85°C (WiFi -40°C~+70°C)
	Operating humidity	10% to 90% RH non-condensing
General characteristics	External dimensions	230(L) x 230(W) x 100(H) mm
	Weight	3.05kg
	Installation mode	Pole mounting

2.3 Technical Specifications

Technical specifications of GW300 gateway are shown in the following table:

Table 2-3 GW300 Software Specification

Item	Functional description
Internet Connectivity	- thru WAN port with fixed IP/ DHCP client/ PPPoE - thru 3G/4G
WiFi Configuration	SSID/ Encryption
Network Configuration	- DHCP server for IP leasing - Diagnostics with Ping, TraceRoute and NSlookup
System Status	- Overview with system, software version, memory usage and wireless configuration - System Log shows system console information - Kernel Log shows kernel information - Processes shows running process information - Real-time graphs shows system load, inbound/outbound traffic and IP connections
LoRa Information	- Current LoRa channel configuration and Gateway ID - Supported spreading factors - External network server configuration and logs
Time Sync	- Support Network Time Protocol (NTP) - Sync up with browser's time
Firmware Upgrade	- Over-the-air (OTA) upgrade - Thru USB port

2.4 LoRa Specifications

The LoRa specifications of GW300 gateway are shown in the following table:

Table 2-4 GW300 LoRa Specifications

Item	Functional description
Protocol Standard	LoRaWAN™ Specification V1.0.2
LoRa Classes	- Class A: supported - Class B: to be supported in later release - Class C: supported
ADR	Adaptive data rate is supported to control the spreading factor of nodes
Activation	- Activation-by-Personalization (ABP) - Over-the-Air Activation (OTAA)
MAC Commands	LoRaWAN™ Specification V1.0.2

3 Hardware Resources

GW300 gateway in order to user easy to use, retain some user interfaces for user debugging, such as a key to restore factory Settings button, USB firmware upgrade interface, LAN interface, etc. At the same time, you can know the working state of the gateway according to the state of the display light on the motherboard.

3.1 Network Interface

The GW300 gateway provides a standard Ethernet interface, as shown below:

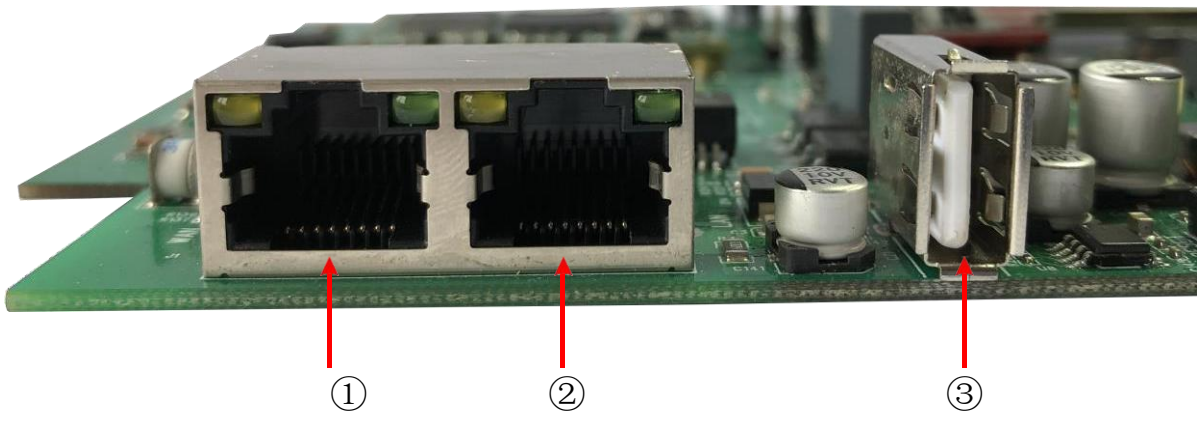


Figure 3-1 GW300 Network Interface

The description is as follows:

Num	Description
①	WAN port, PoE connection port, used to connect to a wide area network
②	LAN port, can be directly connected with the PC end, through access to the Web interface for parameter configuration
③	USB port, available for gateway firmware upgrade

3.2 Power Interface

The GW300 gateway provides POE and direct power supply, and the direct power supply adopts DC power supply. The interface is shown in the figure below:

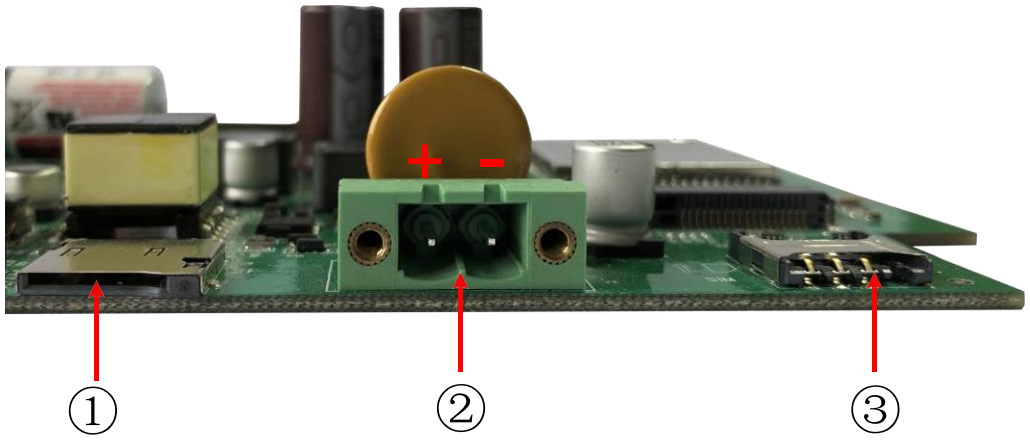


Figure 3-2 GW300 Power interface

The description is as follows:

Num	Description
①	TF card holder, debug port, not open
②	Direct DC power supply interface, power supply range 10~56V
③	SIM card holder, for 4G uplink network, currently supports micro-SIM card

3.3 The Button

GW300 Gateway supports one-key restoration of factory Settings. Two keys are retained on the gateway motherboard, as shown in the figure below:

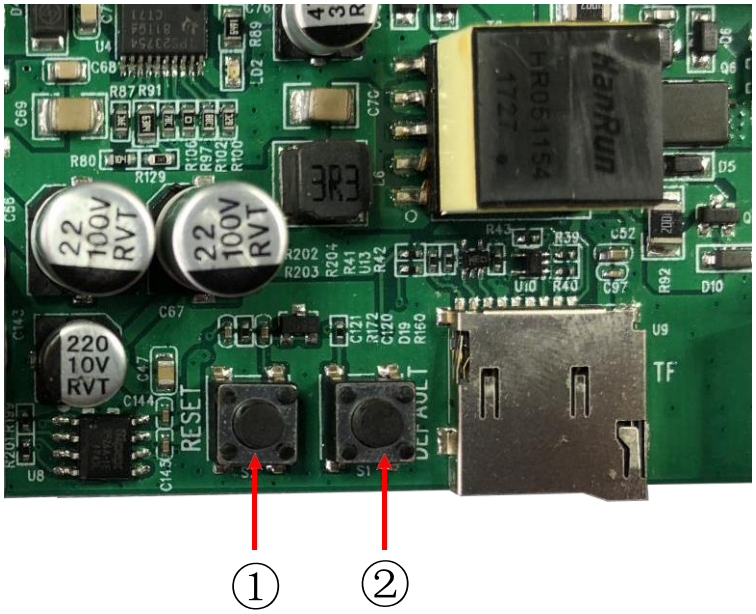


Figure 3-3 GW300 Button

The description is as follows:

Num	Description
①	Processor reset button, press the system reset and restart
②	Restore factory Settings button. After pressing, all parameters will be restored to default configuration. Long press 5s or more is effective

Note

After the factory Settings button is pressed, all parameters will be restored to their default configuration. At this time, all parameters need to be reconfigured.

3.4 Indicator light

GW300 can know the working situation through the status of the indicator light, which is convenient for users to debug, as shown in the figure below:

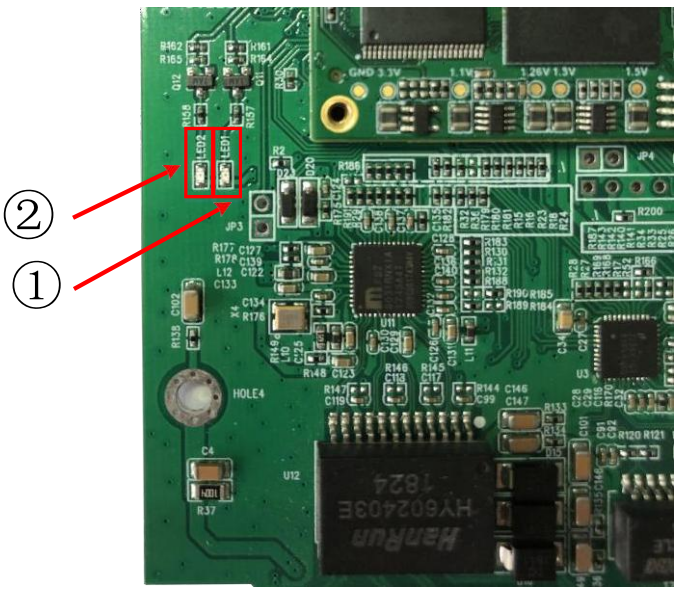


Figure 3-4 GW300 Indicator light

The description is as follows:

Num	Description
①	The red color, which flashes when the factory Settings are restored, indicates that the gateway is performing the factory Settings restoration action
②	Green, always bright indicates that the gateway network connection is normal, can surf the Internet

4 Quick Start

GW300 has two ways to enter the configuration mode through wireless WiFi and wired LAN network port.In the wireless way, the gateway is connected to WiFi to access the hot spots routed from AP mode.In wired mode, the LAN port on the gateway mainboard is directly connected through PC, and the parameters are configured through Web interface.

4.1 Web interface login

GW300 built-in Web interface for users to configure parameters, users can access "192.168.1.1" to enter the Web configuration interface.Default login username: root and password: friendcom.GW300 factory default AP mode, provides two ways to log in the Web interface.

1) Open the wireless scanning device SSID (WiFi name) through the computer, find the wireless network of "Lorawan-GW-Friendcom", click the connection network, enter the default password "Password" to connect to the WiFi hotspot of GW300, and access 192.168.1.1 with the browser to enter the Web configuration page.

2) Connect directly with PC through LAN interface using network cable, access 192.168.1.1 using browser to enter Web configuration page.

The login steps for GW300 are as follows:

Step 1: Enter IP "192.168.1.1" in the browser and open the interface as shown below:

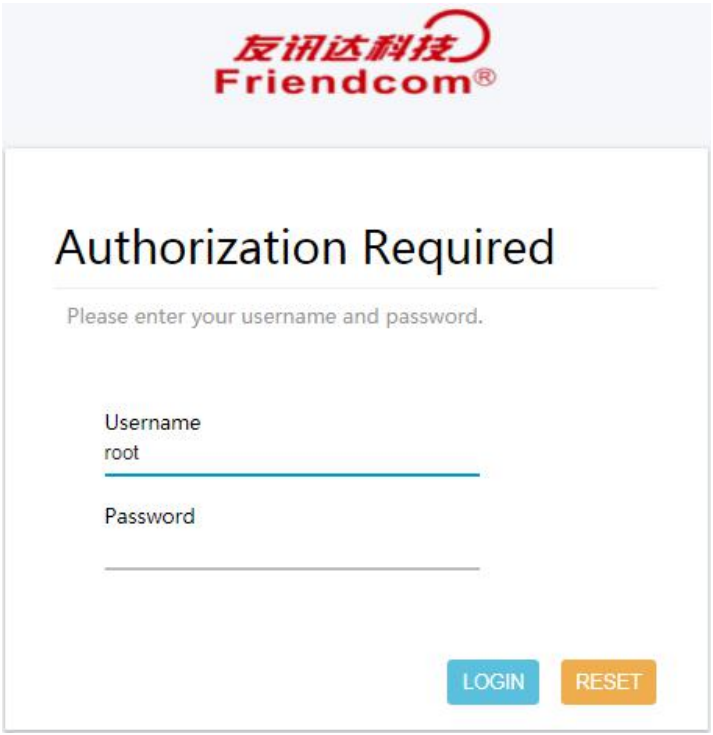


Figure 4-1 GW300 login interface

Step 2: Enter Username and password. Default Username: root;The Password: friendcom, login interface is shown below:

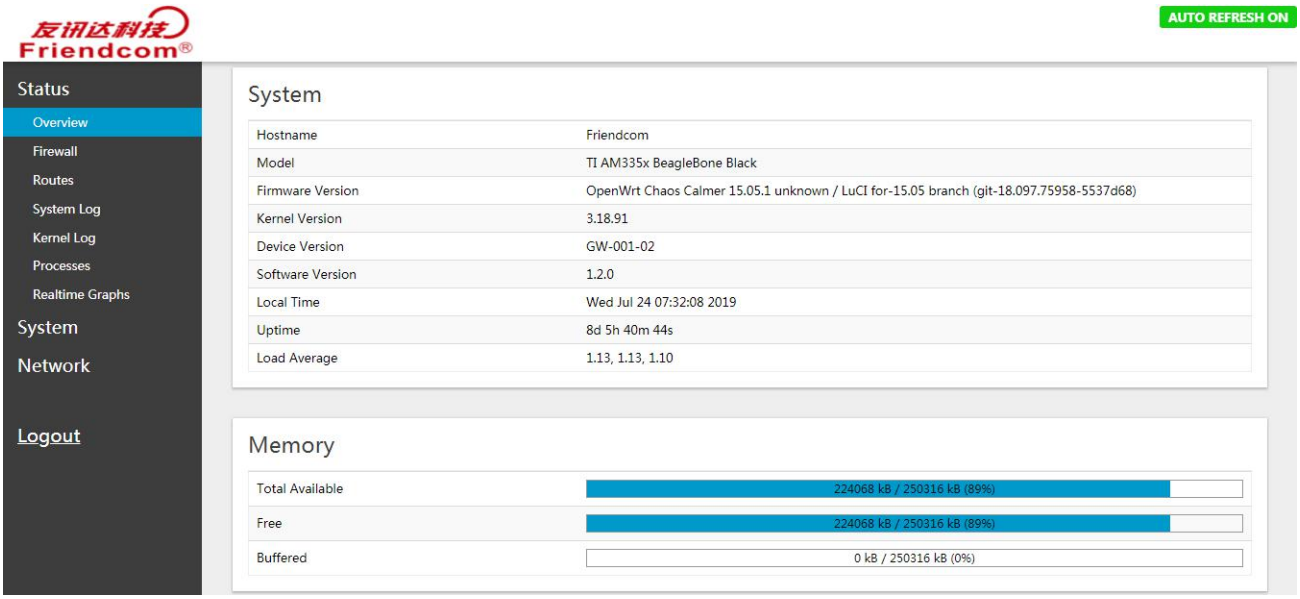


Figure 4-2 GW300 Login interface

GW300 Web The general interface menu is as follows:

一级菜单：

Status：mainly displays the Status of the system

Network：Network related configuration, provides the gateway

Internet mode setting, Network testing and other functions

System：Common System Settings

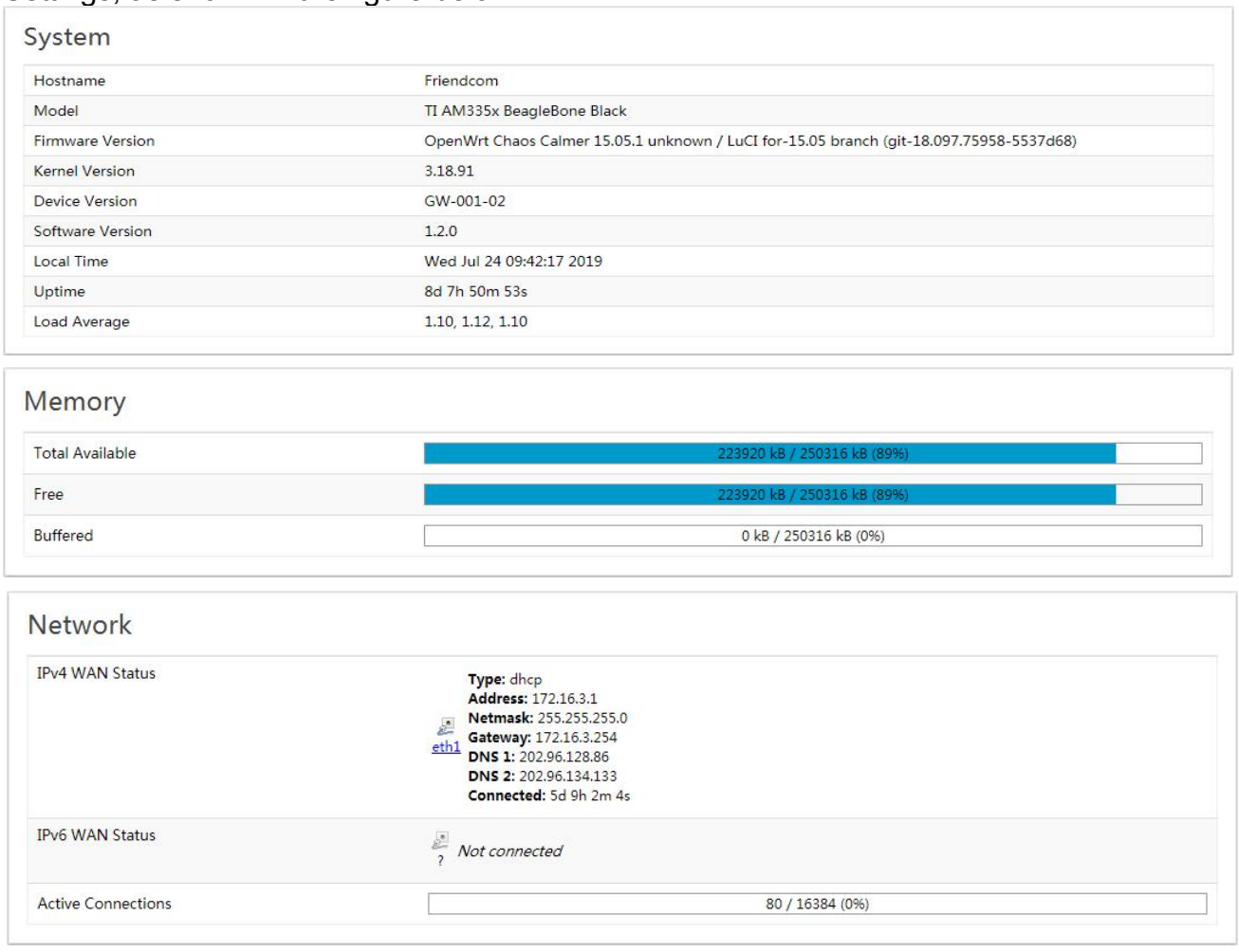
Logout：Exit the configuration

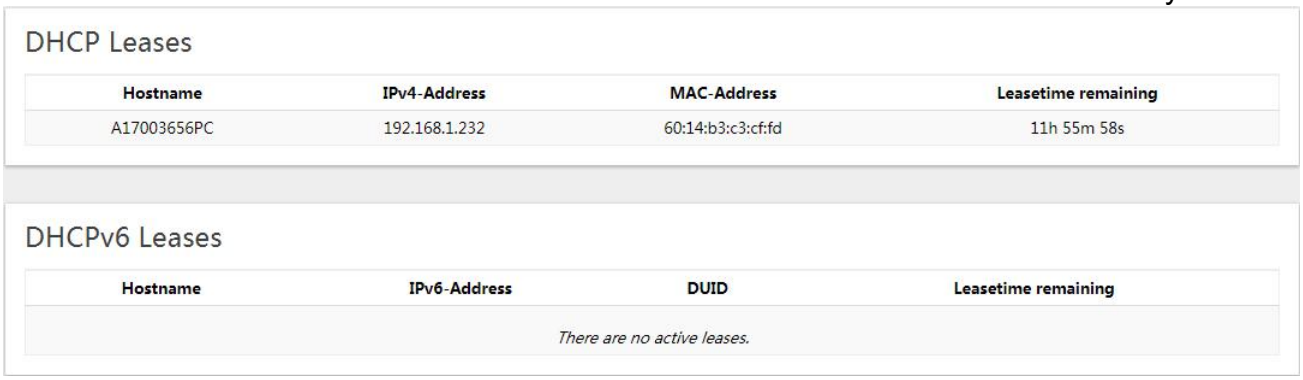
4.2 Status

The Status menu contains the following categories: Overview, Firewall, Routes, System Log, Kernel Log, Processes, and Realtime Graphs, which are described below.

4.2.1 Overview

The Overview category can be used to view system status, memory usage, and network Settings, as shown in the figure below:





DHCP Leases

Hostname	IPv4-Address	MAC-Address	Leasetime remaining
A17003656PC	192.168.1.232	60:14:b3:c3:cf:fd	11h 55m 58s

DHCPv6 Leases

Hostname	IPv6-Address	DUID	Leasetime remaining
There are no active leases.			

Figure 4-3 Overview Interface

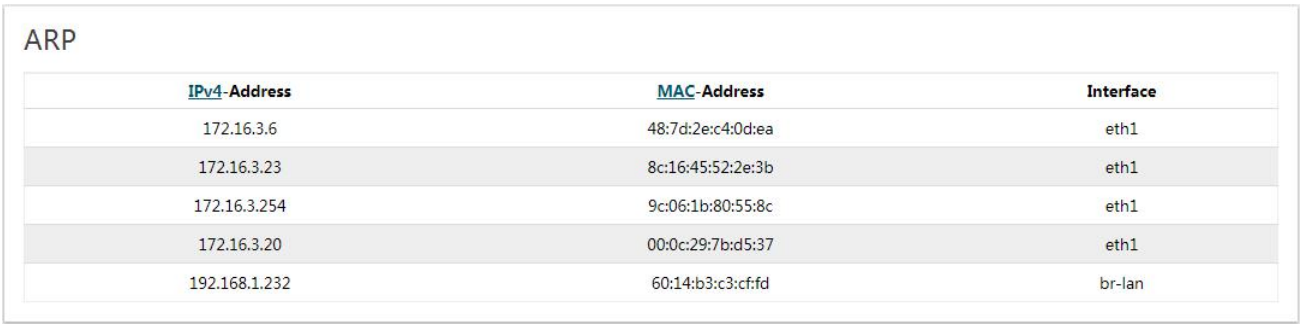
In the upper right corner of the Overview screen, there is an "Auto Refresh On/Off" button in the upper right corner of the panel. This function refreshes the status data every 5 seconds.By default, it is "Auto Refresh On" (green state). Click the Change button to turn this function OFF, that is, "Auto Refresh Off" (gray state).

4.2.2 Firewall

The Firewall is used to view Firewall status information, including IPv4 Firewall and IPv6 Firewall.

4.2.3 Routes

The Routes is used to view the ARP table and IPv4 / IPv6 routing information, as shown below:



ARP

IPv4-Address	MAC-Address	Interface
172.16.3.6	48:7d:2e:c4:0d:ea	eth1
172.16.3.23	8c:16:45:52:2e:3b	eth1
172.16.3.254	9c:06:1b:80:55:8c	eth1
172.16.3.20	00:0c:29:7b:d5:37	eth1
192.168.1.232	60:14:b3:c3:cf:fd	br-lan

Active IPv4-Routes

Network	Target	IPv4-Gateway	Metric	Table
wan	0.0.0.0/0	172.16.3.254	10	main
wan	172.16.3.0/24		10	main
wan	172.16.3.254		10	main
lan	192.168.1.0/24		0	main

Active IPv6-Routes

Network	Target	Source	Metric	Table
lan	fd4d:c39d:6ddd::/64		1024	main
lan	ff02::1		0	local
lan	ff02::2		0	local
wan	ff02::1:2		0	local
lan	ff02::1:2		0	local
wan	ff02::1:3		0	local
lan	ff02::1:ffce:aa29		0	local
lan	ff00::/8		256	local
wan	ff00::/8		256	local
lan	ff00::/8		256	local
4g	ff00::/8		256	local

Figure 4-4 Routes interface

4.2.4 System Log

System Log is used to view System log information, as shown in the figure below:

System Log

```
Thu Jan  1 00:00:00 1970 news.notice rate=0x0
Sun Jan  7 09:04:55 2001 kern.emerg 8188f_c2h_packet_handler: C2H, ID=12 seq=47 len=4
Wed Jul 24 09:46:11 2019 kern.warn kernel: [719662.518473] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:16 2019 kern.warn kernel: [719668.457937] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:17 2019 kern.warn kernel: [719668.608111] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=141 len=4
Wed Jul 24 09:46:17 2019 kern.warn kernel: [719668.707917] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=142 len=4
Wed Jul 24 09:46:17 2019 kern.warn kernel: [719668.817899] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=143 len=4
Wed Jul 24 09:46:18 2019 kern.warn kernel: [719670.448192] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:19 2019 kern.warn kernel: [719671.018271] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:20 2019 kern.warn kernel: [719672.018096] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:21 2019 kern.warn kernel: [719673.448028] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:22 2019 kern.warn kernel: [719674.018056] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:23 2019 kern.warn kernel: [719675.018385] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:27 2019 kern.warn kernel: [719679.447766] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:28 2019 kern.warn kernel: [719680.018093] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:29 2019 kern.warn kernel: [719681.017840] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
Wed Jul 24 09:46:31 2019 kern.warn kernel: [719683.357428] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=144 len=4
Wed Jul 24 09:46:31 2019 kern.warn kernel: [719683.457423] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=145 len=4
Wed Jul 24 09:46:32 2019 kern.warn kernel: [719683.557389] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=146 len=4
```

Figure 4-5 System Log Interface

4.2.5 Kernel Log

Kernel Log is used to view the kernel log information, as shown in the figure below:

Kernel Log

```
[718769.459042] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=182 len=4
[718770.049401] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718776.118778] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718780.488866] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718781.048790] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718782.048900] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718782.878776] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=183 len=4
[718783.188574] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=184 len=4
[718783.488684] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=185 len=4
[718783.496318] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718784.048661] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718785.048845] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718789.488891] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718790.048601] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718791.048502] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718794.648195] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=186 len=4
[718794.758150] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=187 len=4
[718794.858084] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=188 len=4
[718795.268266] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=189 len=4
[718795.368277] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=190 len=4
[718795.468127] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=191 len=4
[718796.158193] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718796.188079] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=192 len=4
[718796.288025] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=193 len=4
[718796.398593] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=194 len=4
[718797.048368] RTL871X: rtl8188f_fill_default_txdesc(wlan0): SP Packet(0x0806) rate=0x0
[718797.927991] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=195 len=4
[718798.028103] RTL871X: rtl8188f_c2h_packet_handler: C2H, ID=12 seq=196 len=4
```

Figure 4-6 Kernel Log Interface

4.2.6 Processes

Processes is used to see the progress of the System processes in which you are running, and can suspend, terminate, and terminate individual process items for each process.

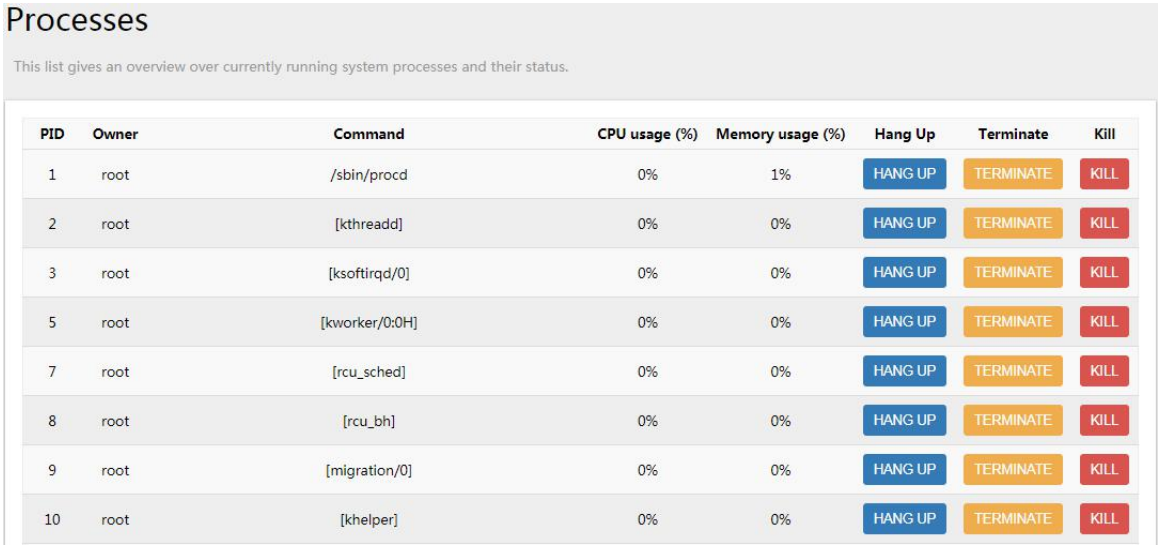


Figure 4-7 Processes Interface

4.2.7 Realtime Graphs

Realtime Graphs is used to view real-time chart information: Realtime LoadRealtime Traffic、Realtime Wireless、Realtime Connections.

1）Realtime Load

Realtime Load is used to view the current load value and the average value of different time intervals, as shown below:

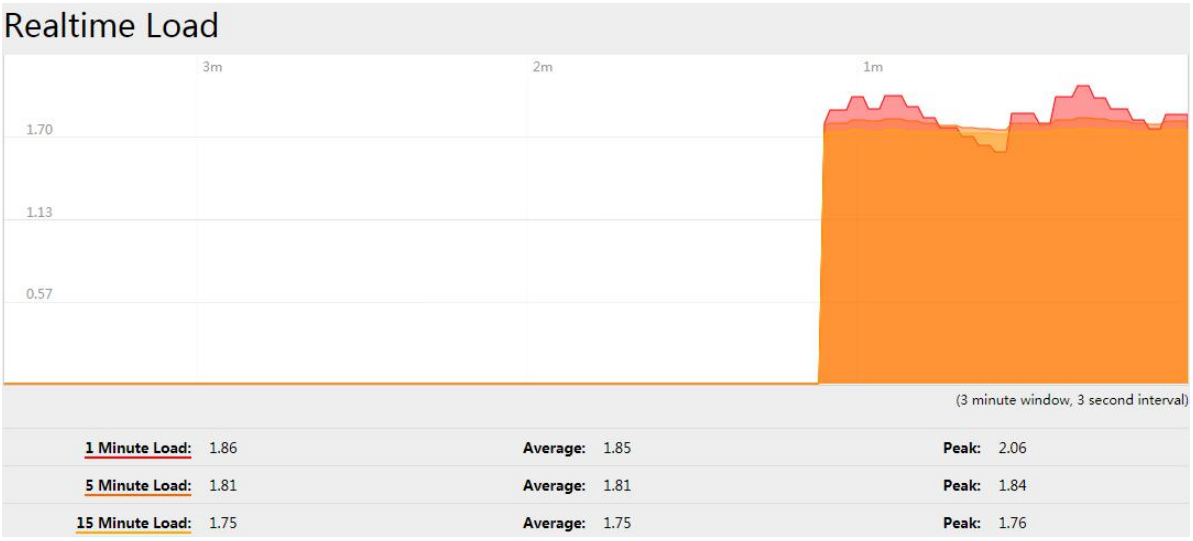


Figure 4-8 Realtime Load Interface

2） Realtime Traffic

Realtime Traffic is used to view real-time data interaction information, as shown below:

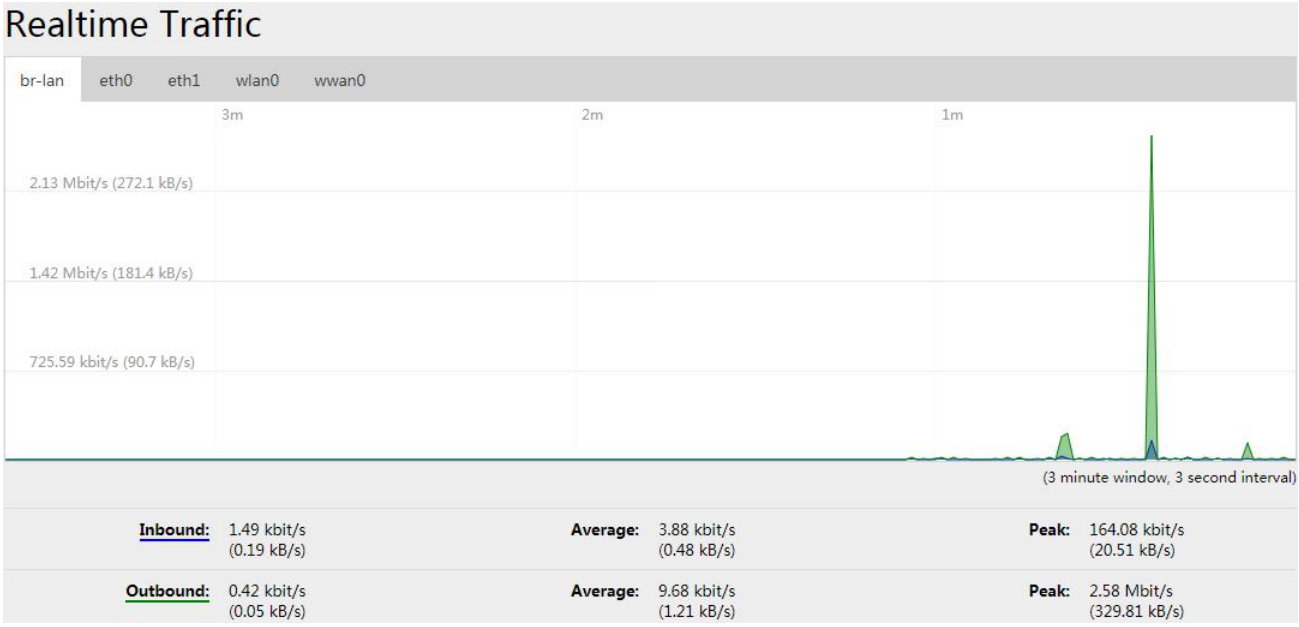


Figure 4-9 Realtime Traffic Interface

3） Realtime Wireless

Realtime Wireless is used to view the current wireless network information, as shown below:

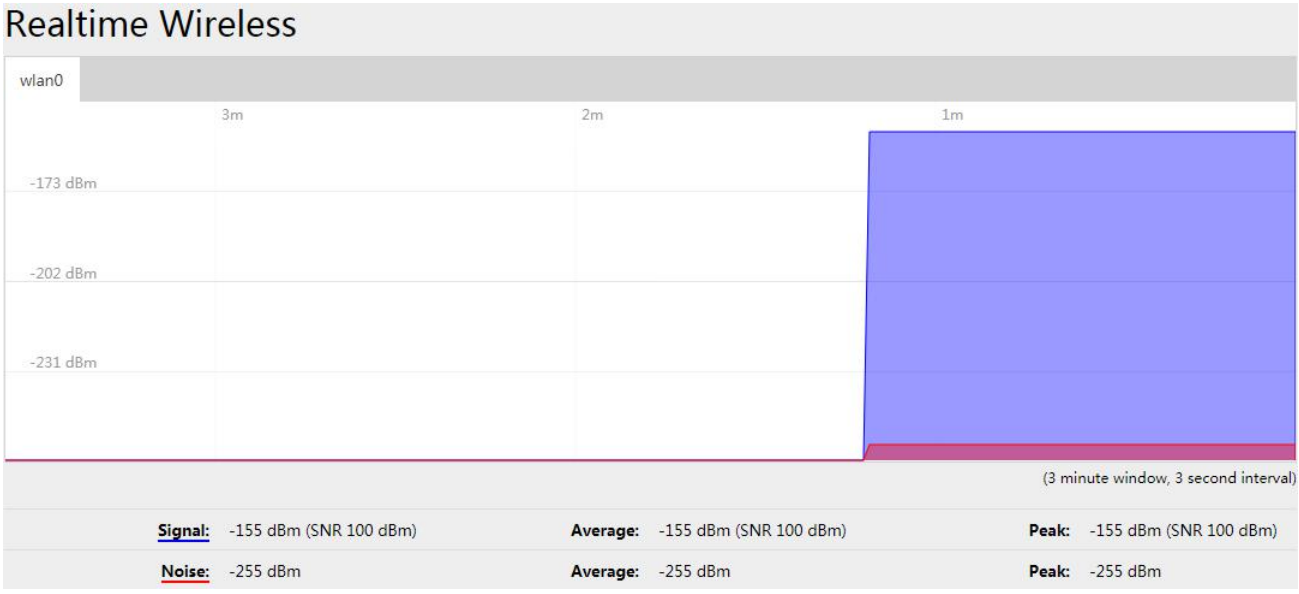


Figure 4-10 Realtime Wireless Interface

4） Realtime Connections

Realtime Connections is used to view the current wireless network information, as shown below:

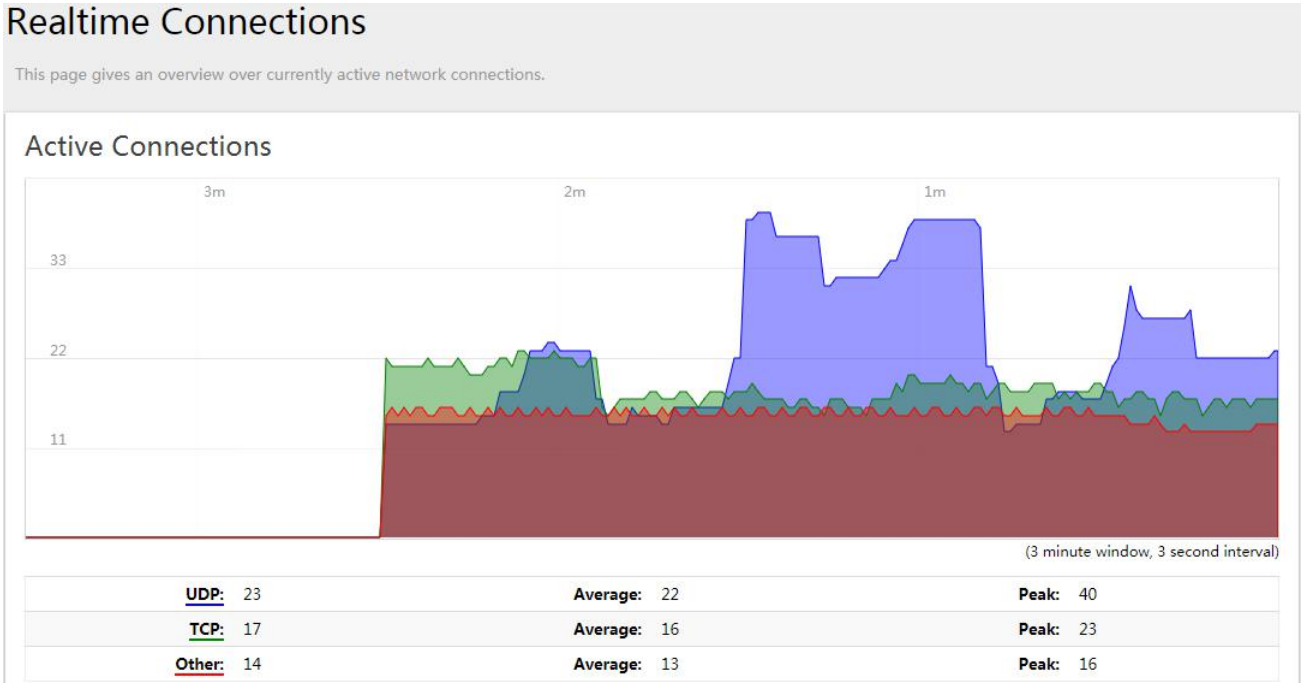


Figure 4-11 Realtime Connections Interface

4.3 System

The System menu contains the following categories: System, Administration, Software, Startup, Schedured Tasks, LED Configuration, Backup/Flash Firmware, and Reboot, which are described below.

4.3.1 System

You can customize the hostname and time zone in the System properties.Click "SYNC WITH BROWSER" (WITH BROWSER synchronization) button to adjust the local time, check the "Enable the NTP client" (check mark next to Enable the NTP client) to synchronize the NTP server time, if you choose to use other NTP server, please check the check mark next to the "dojo.provide NTP server" (NTP server) and fill in "the NTP server candidate" text field.Different languages can be applied according to the purpose (English and simplified Chinese are supported).

Note

After the setting is completed, you need to click the Save&Apply button in the lower right corner to take effect;

Clicking the Save button will SAVE the user configuration information, but it will not take effect;
Click the Reset button to restore the default configuration;

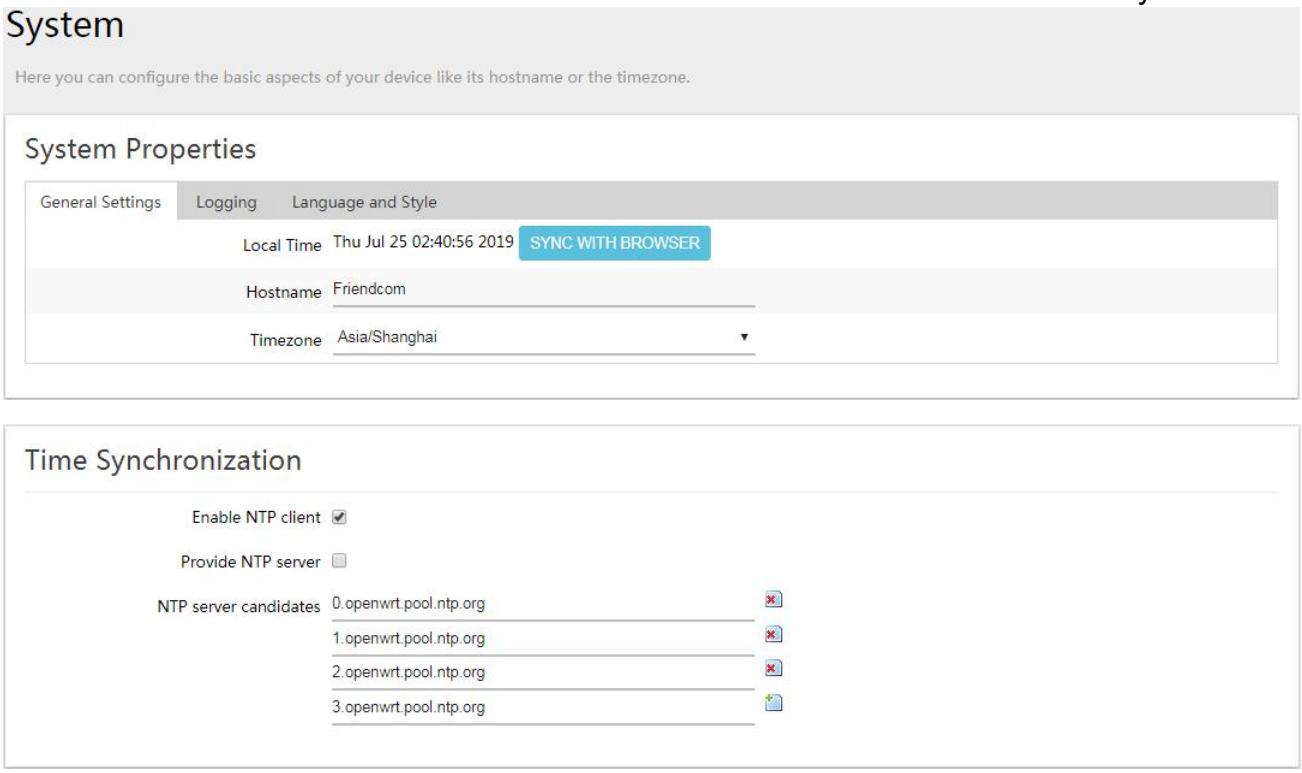


Figure 4-12 System Interface

4.3.2 Administration

Administration can configure the login password and other information of the gateway. Click the symbol on the right to see the plaintext of the password, as shown below:

Figure 4-13 Administration Interface

4.3.3 Backup / Flash Firmware

Backup/ Flash Firmware allows you to Backup or restore the gateway's Settings and update the gateway's Firmware.Click the 'Generate Archive' button in the Backup/ Restore column to Backup the Gateway Settings, and click the 'Upload Archive' button to load the saved Gateway Settings.

Click the "Flash Image" button in the Flash New Firmware Image column to load the new gateway firmware and update the gateway firmware.

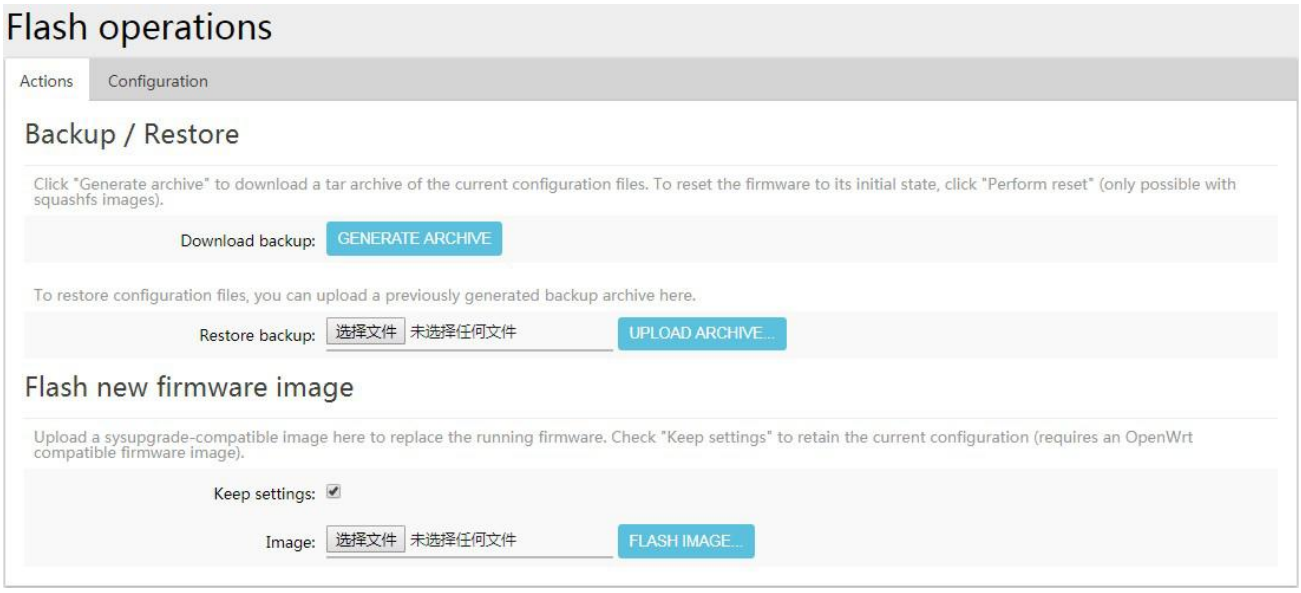


Figure 4-14 Backup/ Flash Firmware Interface

4.3.4 Reboot

In the Reboot, you can restart the gateway device by clicking "Perform Reboot" as shown below:

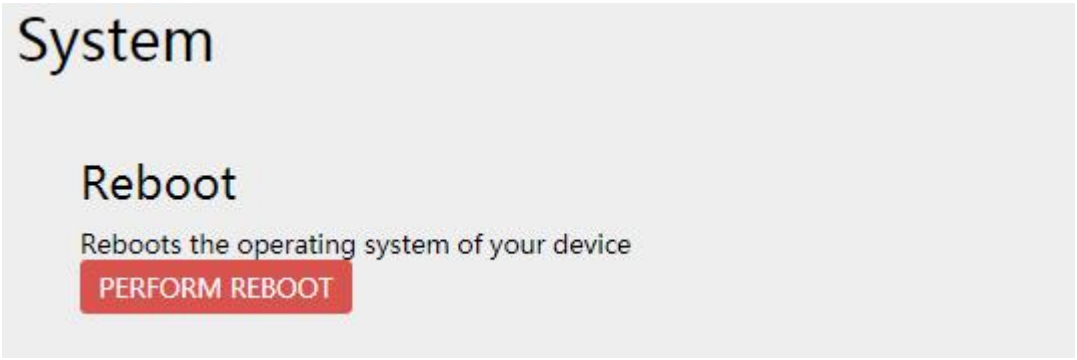


Figure 4-15 Reboot Interface

4.4 Network

The Network menu includes the following: Lora GW, WiFi, Interfaces, DHCP and DNS, HostNames, Static Routes, Firmware, Diagnostics, which are described below.

4.4.1 LoRa GW

The LORA GW is used to view and set the current LORAWAN Settings. The main parameters set are Gateway ID, server information, LORA RF parameters, etc.

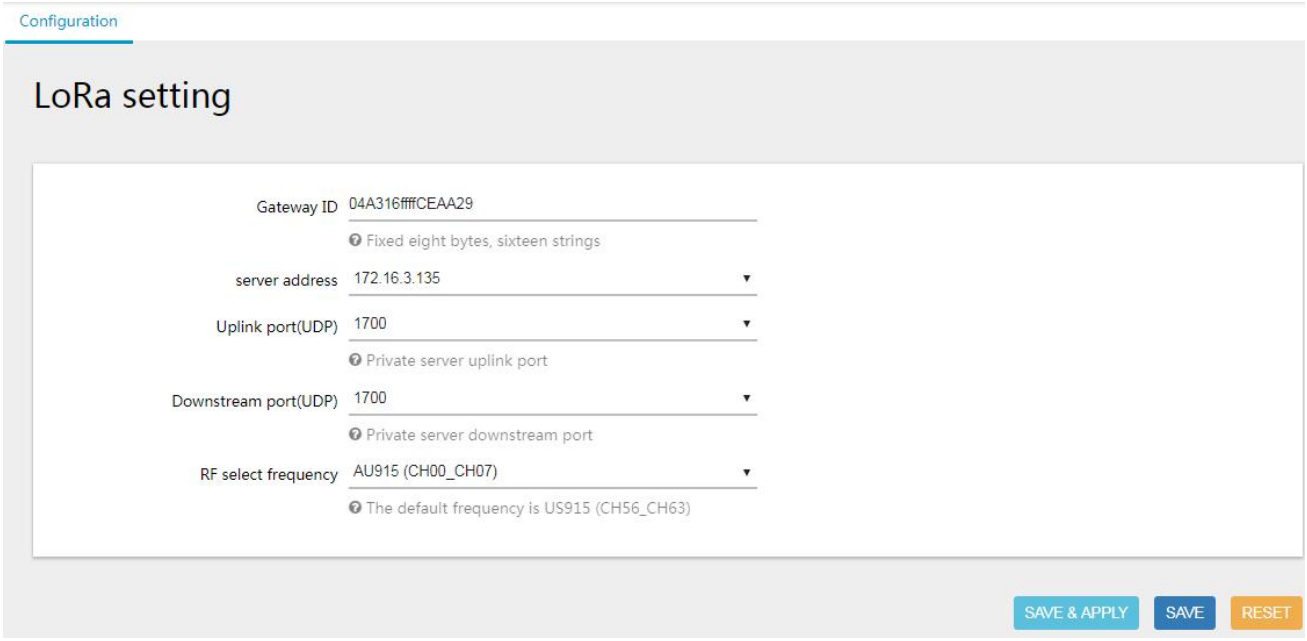


Figure 4-16 LoRa GW Setting Interface

4.4.2 WiFi

The WIFI is used to query and set the SSID and password of WIFI. In the General Setup column, you can set the SSID and working mode of WIFI, and in the Wireless Security column, you can set the encryption mode and password of WIFI.This is as follows:

Figure 4-17 WiFi Setting Interface

4.4.3 Interfaces

Interface can check the status of WAN, LAN, 4G and other network interfaces, set parameters and add and delete network interfaces.

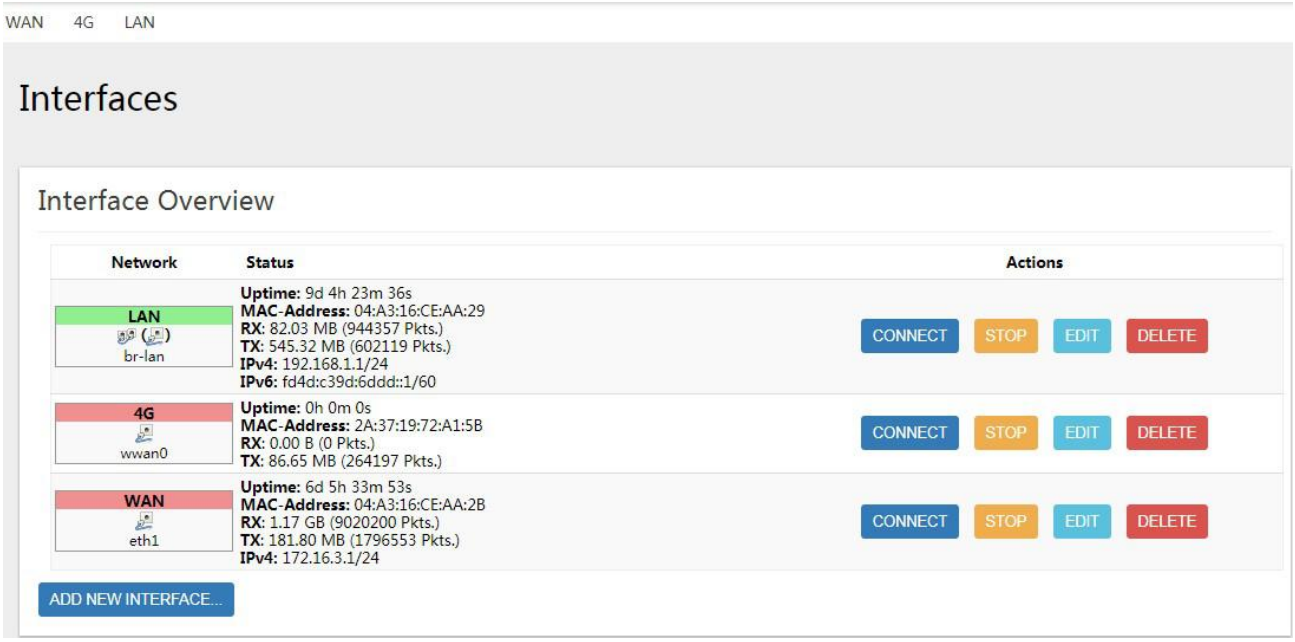


Figure 4-18 Interface Interface

For the different colors of different Network blocks in the column of Network, green represents the downlink Network and red represents the uplink Network.

The Actions section describes the following:

Num	item	Description
1	CONNECT	To connect to the Internet
2	STOP	Stop the interface network connection
3	EDIT	Edit interface parameters
4	DELETE	Delete the interface

4.4.4 DHCP and DNS

The DHCP and DNS provide detailed management of DHCP server setup, including rental addresses, the number of allowed rental addresses, and the duration of rental.

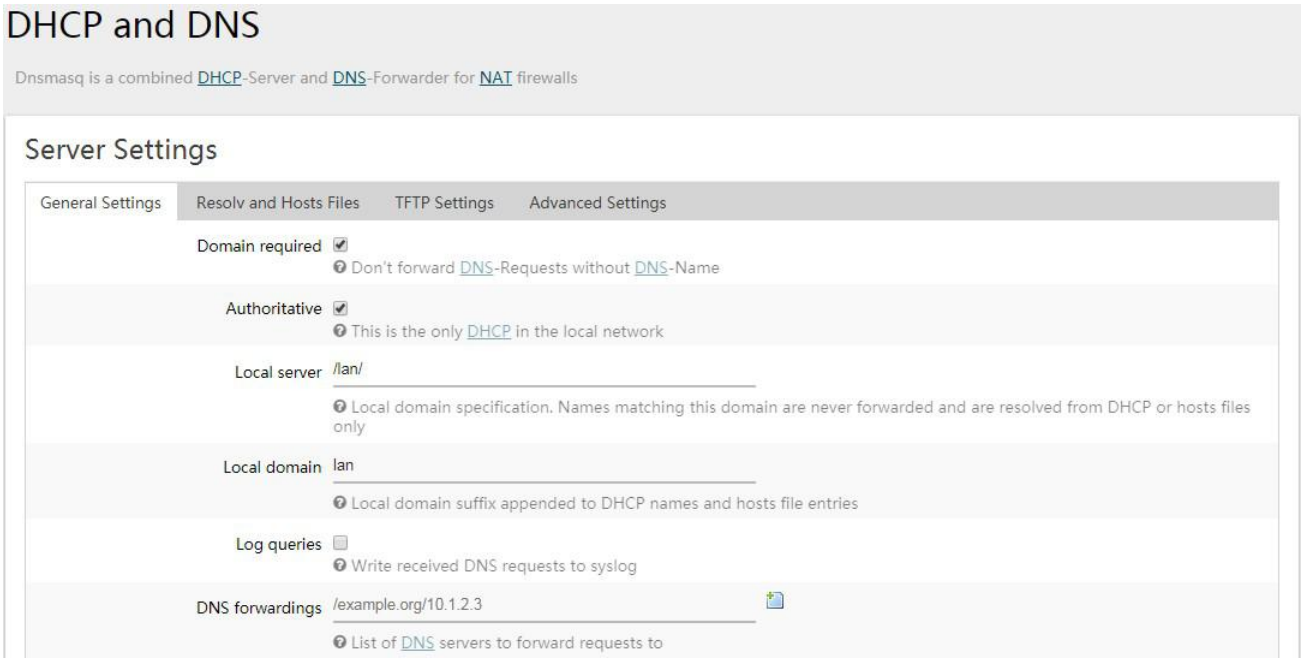


Figure 4-19 DHCP and DNS Interface

4.4.5 Diagnostics

The Diagnostics category is used to view diagnostic information and is divided into Ping, Traceroute, and NSLookup. For input guidance, see the following.

1）PING

Enter a specific IP address in the text field above Ping and click the Ping button to Ping the specified IP.

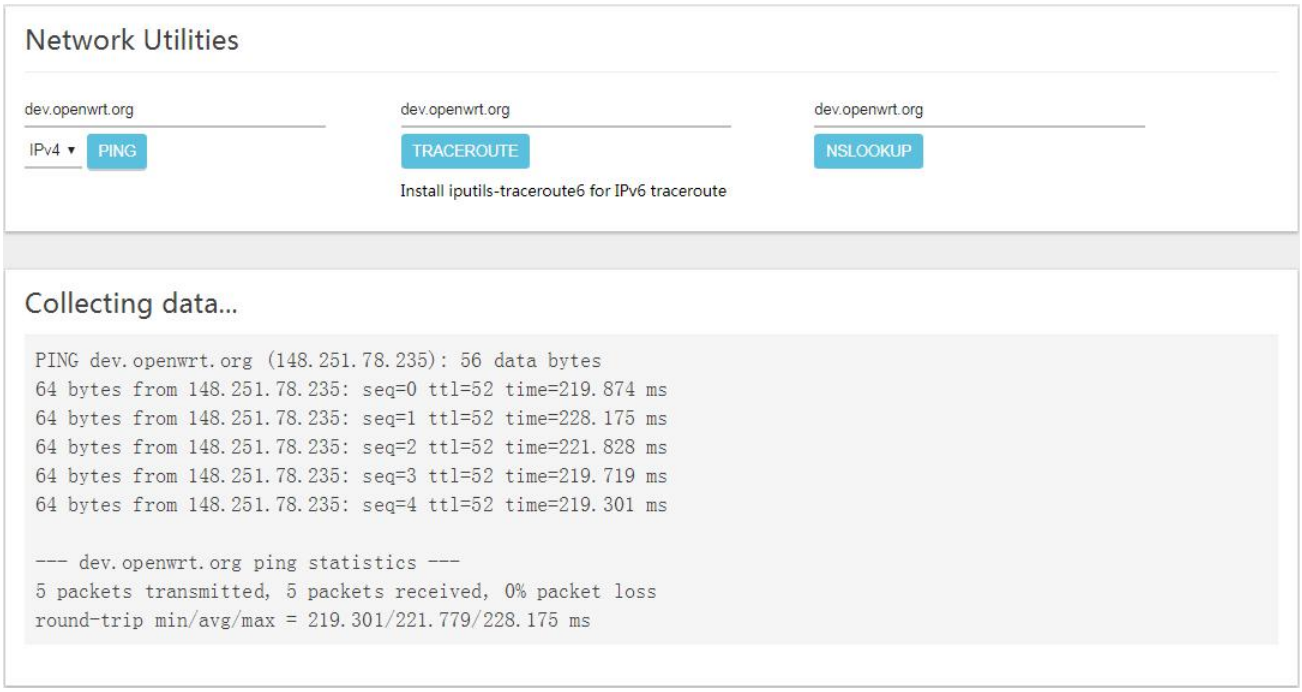


Figure 4-20 PING Interface

2） TRACEROUTE

Enter the specific URL or IP address above "TRACEROUTE" and click the "TRACEROUTE" button to trace the specified URL or IP address.

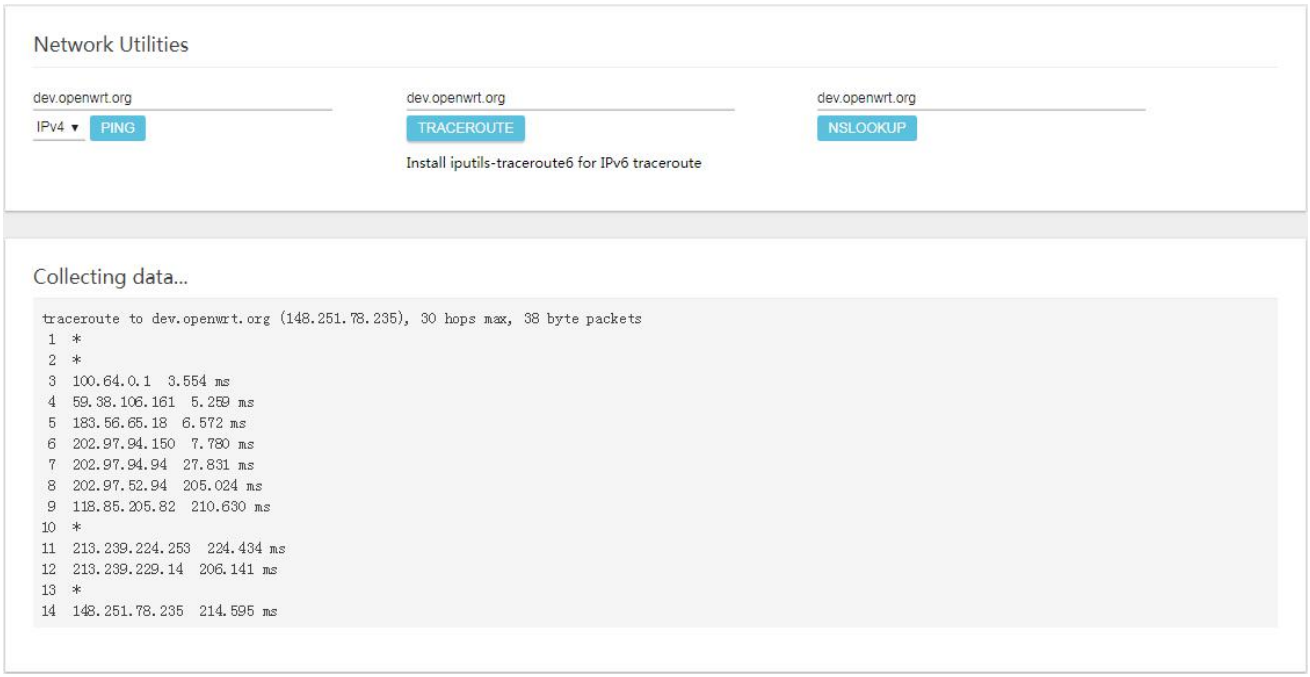


Figure 4-21 TRACEROUTE Interface

3）NSLOOKUP

Enter the specific URL or IP address above "NSLookup" and click the "NSLookup" button to view the DNS server at the specified URL or IP address.

Figure 4-22 NSLOOKUP Interface

Note

For all setting categories in the Network column, click Save&Apply button in the lower right corner to take effect after setting.Clicking the Save button will SAVE the user configuration information, but it will not take effect.

Click the Reset button to restore the default configuration;

5 Connected to the Network Server

GW300 Lorawan Gateway has built-in Semtech Packet Forwarder, TTN Packet Forwarder SDK and localhost. It supports connecting to Loriot Network Server, TTN Network Server and Friendcom Network Server.Loriot Network Server and TTN Network Server are described below.

5.1 Connect to the TTN Server

GW300 Lorawan Gateway built-in TTN SDK, TTN cloud server currently supports 868MHz communication configuration, node default use OTAA mode.TTN cloud server address https://www.thethingsnetwork.org.

The operation steps of connecting TTN Network Server are as follows:

Step 1: In the GW300 gateway Web configuration page, select Lora GW secondary menu option from the first-level menu Network, and configure the corresponding parameters in the Lora Setting.GW300 gateway sets three different TTN server connection domain names according to different regions. Taking European region as an example, the setting parameters are shown in the figure below:

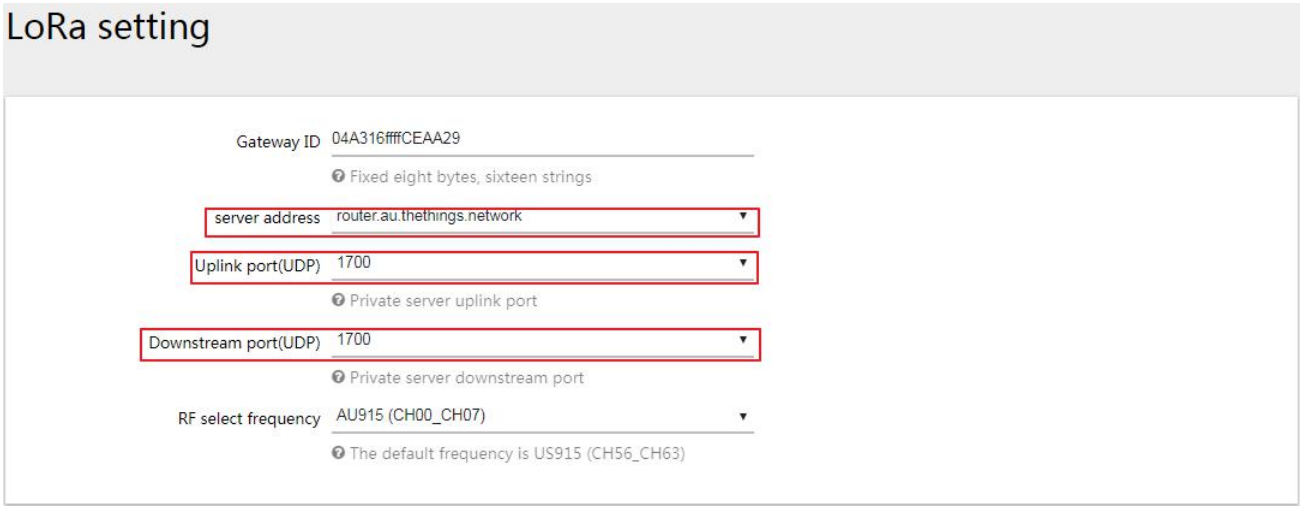
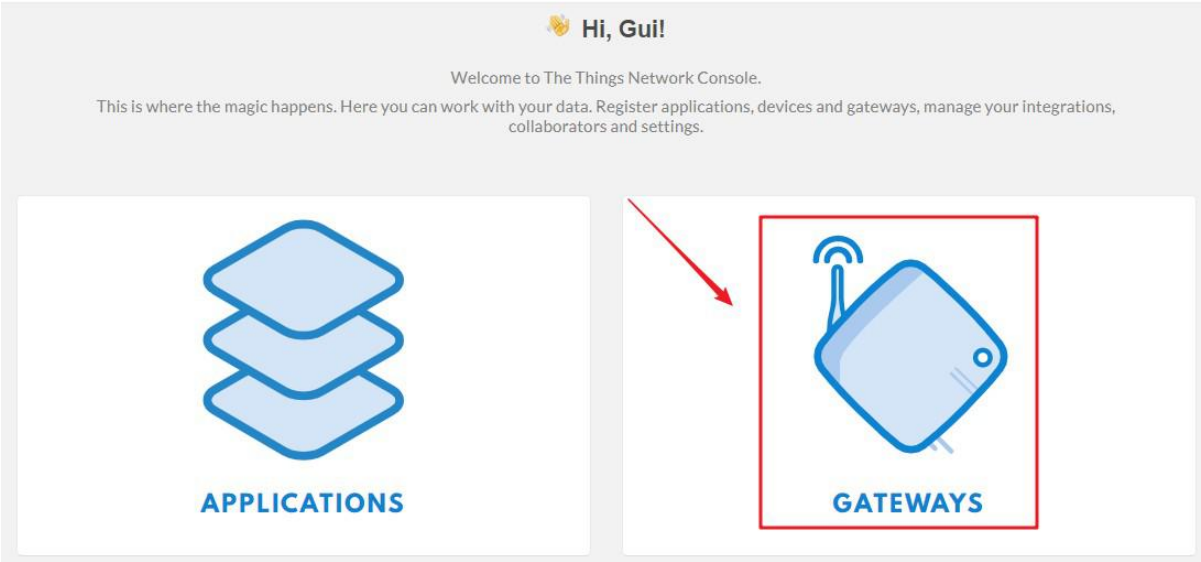


Figure 5-7 Configurate TTN SDK

Step 2: the new user can log on to https://account.thethingsnetwork.org/register to register account, has been registered account user directly login, please skip this Step.

Step 3：Login to TTN cloud server, click the account drop-down box and select the option "Console", select "Gateways" in the Interface that pops up, and then select "Register Gateways" to Register the new gateway.



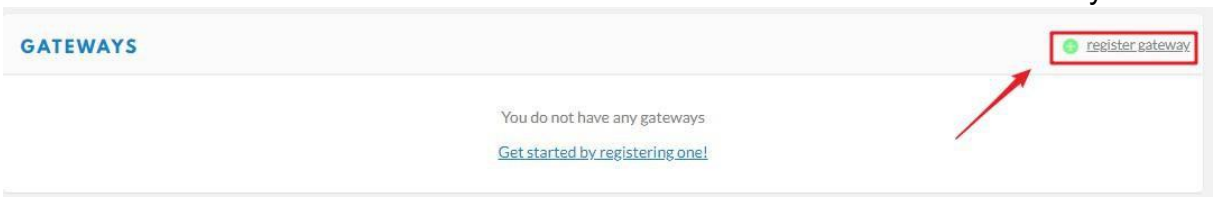


Figure 5-8 TTN Gateway registration Interface

Step 4：Fill in the relevant information in the Interface, check "I'm using the Legacy Packet Forwarder ", and click "Register Gateway" in the lower right corner to complete the Gateway registration.

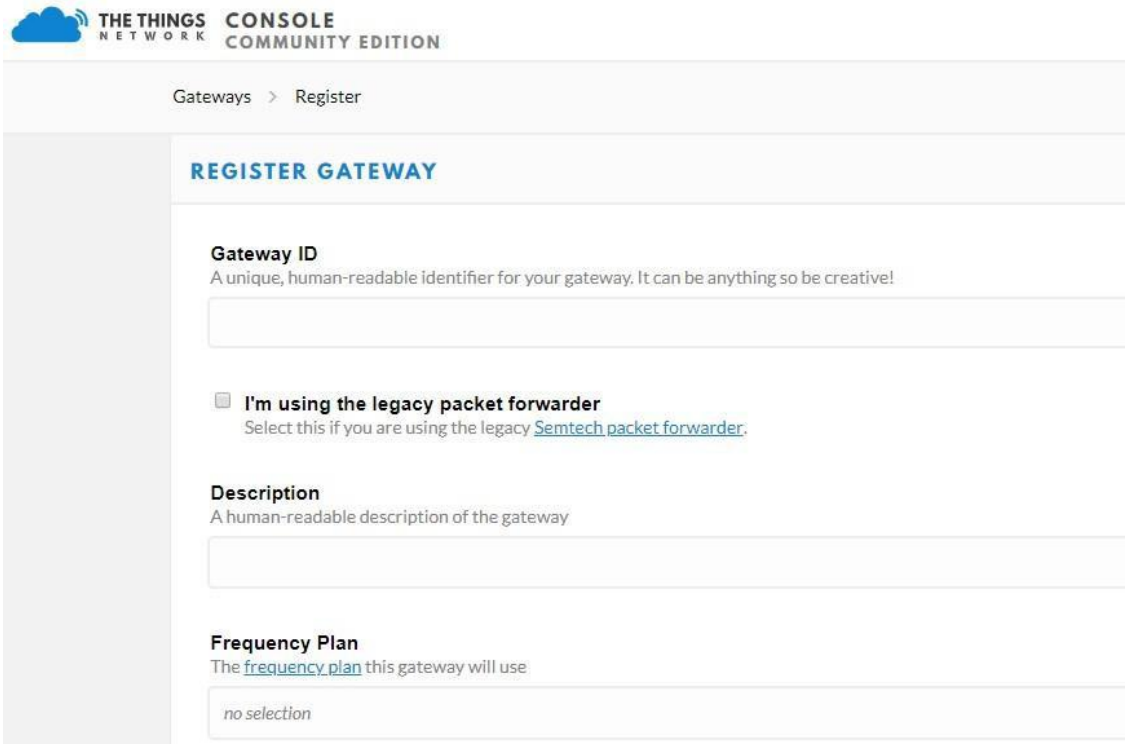


Figure 5-9 TTN platform registration gateway

Step 5：Gateway registration is successful. Gateway registration information can be seen in the Gateways interface. If the Gateway has been connected to the Internet at this time, the Gateway on-line information can be seen in the Gateways interface.

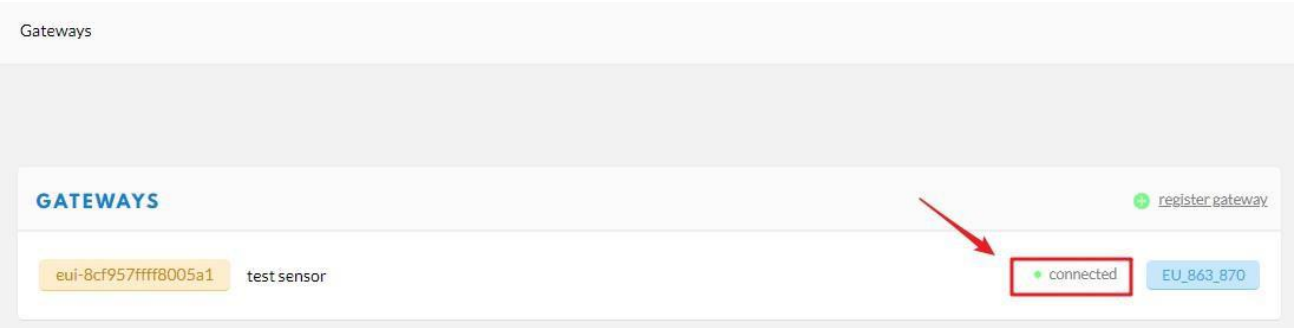


Figure 5-10 TTN platform gateway on-line Interface

6 LoRaWAN Communication Example

The terminal node is connected to the TTN platform through GW300 gateway:

This communication example is based on the WLS02-A0 development suite (Lora Nucleo EVB EV-010-02 version) integrated with the Friendcom AT instruction set as a demonstration.

WSL02-A0 is a LORAWAN module based on SX1276 chip, which supports frequencies of EU868, US915, AU915, AS923, KR920, IN865, etc. This example is based on the frequency plan of EU868MHz Cases.

Figure 6-1 WSL02-A0 Development kit

The terminal node is connected to the Loriot platform through the GW300 gateway

The WSL01-A0 development kit can be connected to the Loriot Network Server via the GW300 Lorawan gateway that has been added to the Loriot platform. The steps are as follows:

Step 1: Install the driver file

WSL02-A0 development kit is connected to the computer through USB communication port, using the driver files that need to be installed before the response.Please refer to the Friendcom WSL02-A0 user manual for driver installation. The driver files can be obtained

by contacting service@friendcom.com or the sales staff of Friendcom.

Step 2: Open the serial port tool, select the corresponding port number, and set the communication baud rate, data bits and other information (WSL02-A0).

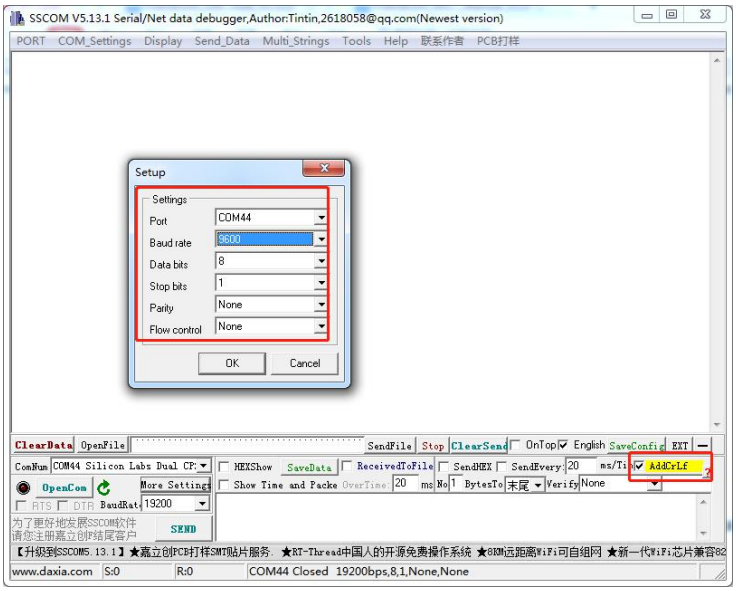


Figure 6-2 Set communication parameters of serial port tool

Step 3： To configure node information, refer to the Friendcom Class A/C At Commands Manual for instructions.

☐ Query or configure the device address

AT+ID // Read all, DevAddr(ABP), DevEui(OTAA), AppEui(OTAA)
AT+ID=DevAddr, "devaddr" // Set new DevAddr
AT+ID=DevEui, "deveui" // Set new DevEui
AT+ID=AppEui, "appeui" // Set new AppEui

☐ The configured frequency band is EU868

AT+DR=EU868 // Set frequency band

☐ Query or configure channels (same as server/gateway side)

AT+CH // Query All Channels
AT+CH=NUM,0-7 // Enable channel 0-7

☐ Query or configure RxWin2 information (same as server/gateway side)

AT+RXWIN2 // Query RX Window2 configuration
AT+RXWIN2=868.1, DR3 // Set RXWIN2 868.1MHz/DR3
AT+RXWIN2=868.1,SF7,500 // Set RXWIN2 868.1MHz/SF7/BW500KHz

☐ Query or configure the initial output power (need to support the transmission power range in the frequency band)

AT+POWER=TABLE **// Query band specific power table**
AT+POWER=14 **// Set LoRaWAN module TX power to 14dBm**

☐ Query or configure access mode (OTAA access mode in the example)

AT+MODE **// Query current network access method**
AT+MODE=LWOTAA **// Set OTAA network access method**

☐ Query or configure the working mode

AT+CLASS **// Query current operating mode**
AT+CLASS=A **// Enable Class A mode**

☐ Configure ADR mode to turn on or off

AT+ADR=ON **// Enable ADR function**

☐ Configure the key APPKEY (server side and node side need to be configured the same)

AT+KEY=APPKEY, "2B7E151628AED2A6ABF7158809CF4F3C

Step 4： Log in to the TTN cloud server, click the account drop-down box and select the option "Console". In the Interface popup, select "Applications" to add application information.

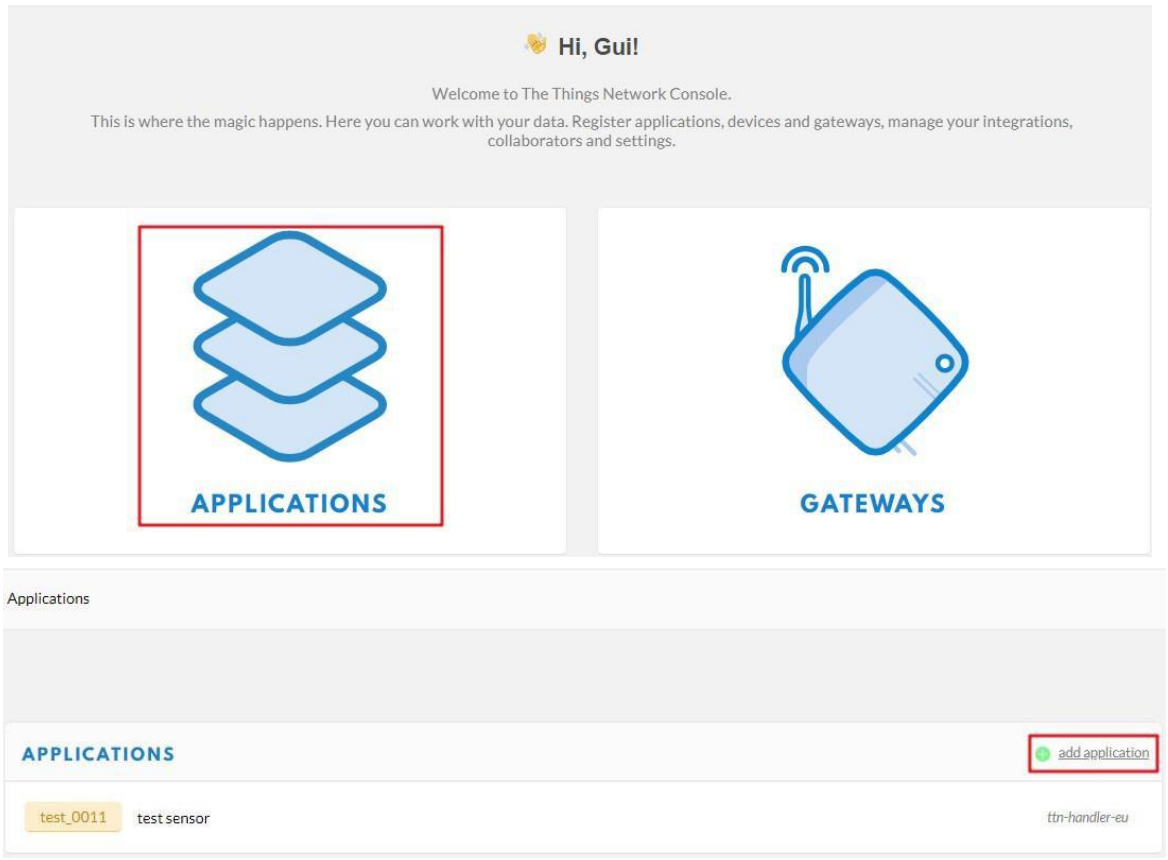


Figure 6-8 TTN platform to add applications

Step 5： Fill in the registration information and click "Add Application" in the lower right corner to complete the addition.

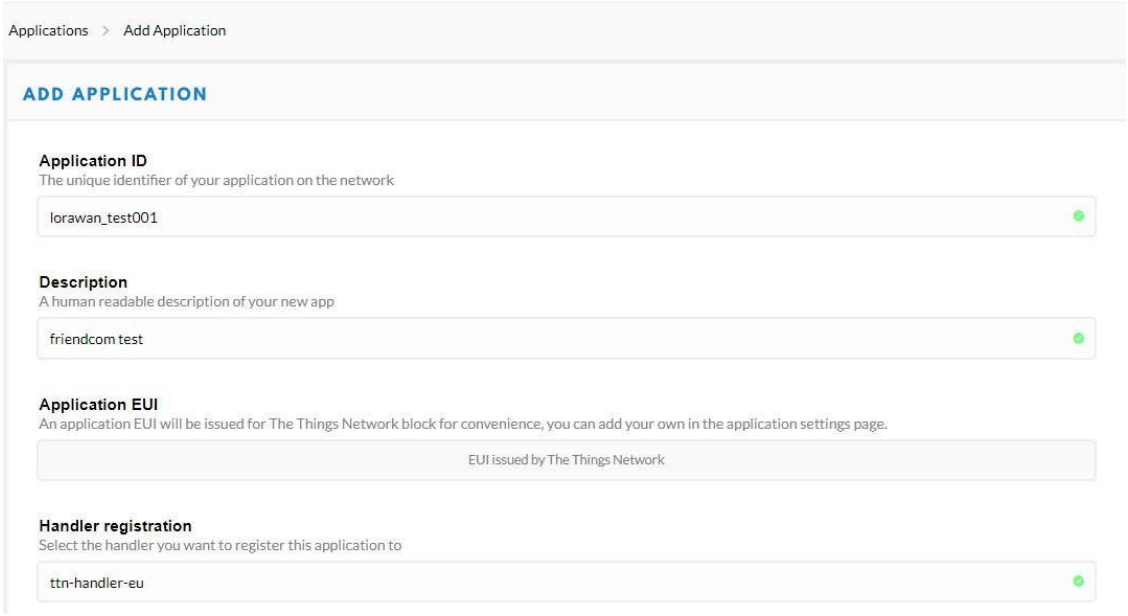


Figure 6-9 TTN platform added application Settings Interface

Step 6： Step 6: Enter the device - >;Register Device, fill in the node DevAddr, DevEui and APPKEY respectively, and click "register" in the lower right corner to complete the registration.

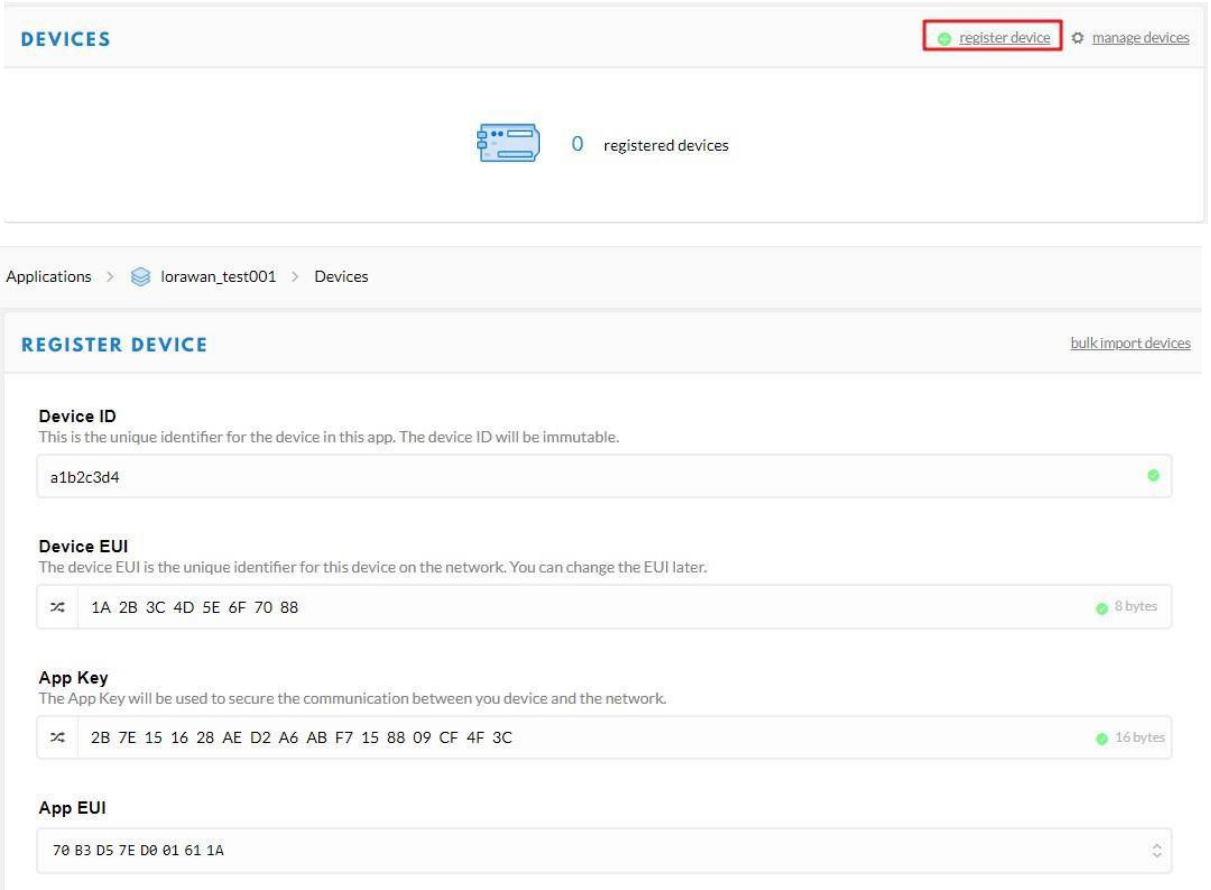


Figure 6-10 TTN platform registration terminal devices

Step 7： Use the App EUI obtained by Step 6, configure the terminal node APPEUI with "AT+ID", and perform the network entry operation.

AT+ID=AppEui,“70B3D57ED001611A” **// Set new AppEui**

AT+MODE=LWOTAA **// Set OTAA network access method**

AT+JOIN=FORCE **// Join network**

When you receive the Network Join message, you are returned indicating that you have joined the Network.

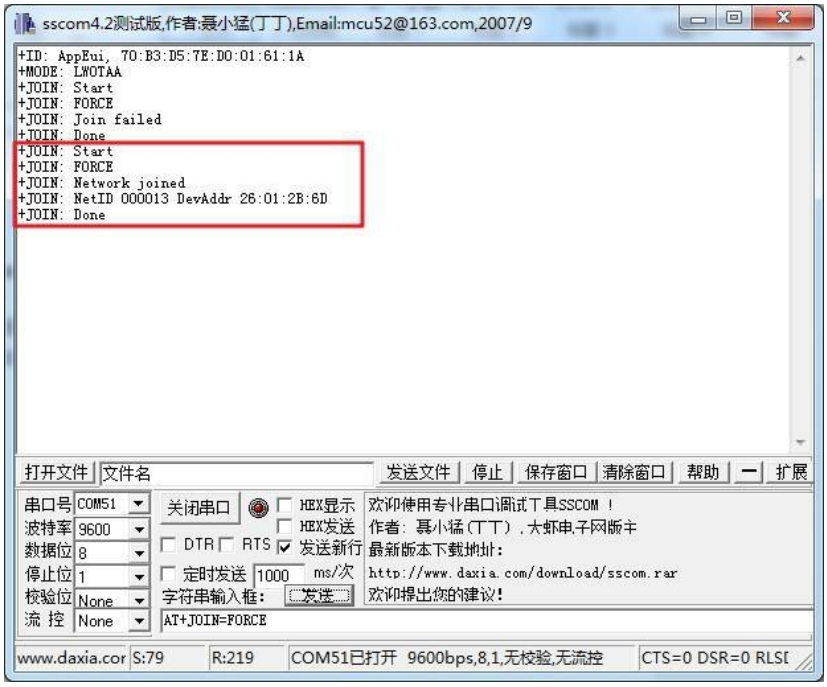


Figure 6-11 TTN platform OTAA network

Step 8： The node sends Data through the command "AT+ MSGHEX" and views the Data in the Data page under the TTN cloud server device list.

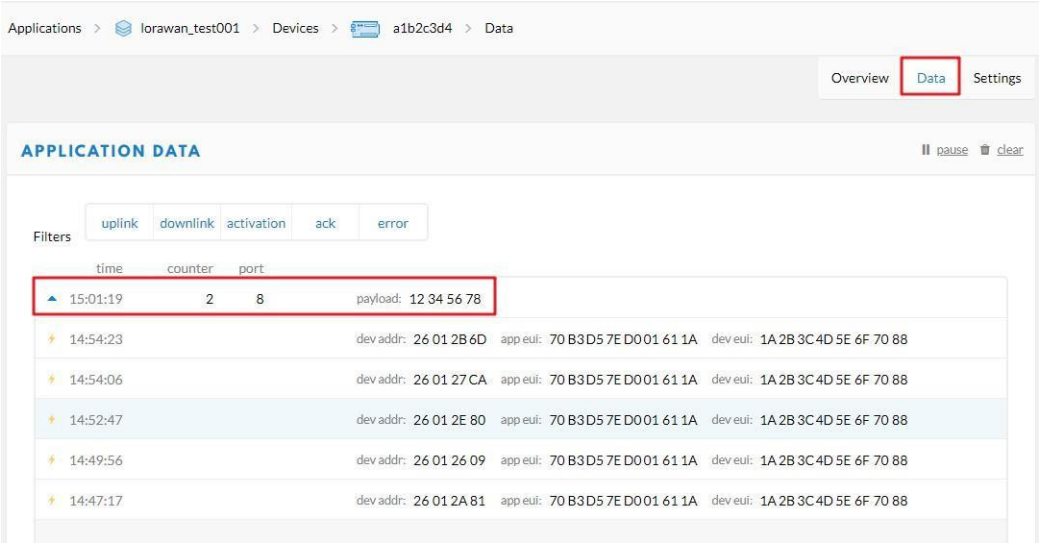


Figure 6-12 TTN platform data view

7 Factory Data Reset

GW300 gateway design has a one-button function of factory Settings restoration. Long press the "factory Settings restoration" button on the motherboard for more than 5 seconds, then release the button. At this time, the status indicator LED1 (red) on the motherboard will flash once, and GW300 will perform the operation of factory Settings restoration.

Caution

After the factory Settings are restored, the user will lose all configuration data.

8 To Upgrade the Firmware

GW300 gateway supports USB port local update gateway firmware and Web configuration Interface remote update firmware two ways, users can update the gateway firmware according to the site situation.

8.1 USB Port Local Update Firmware

The local firmware update of GW300 gateway is carried out using USB port. The detailed operation steps are as follows:

1） Copy the firmware am335x-upgrade-firmware-xxxx.tar.gz from the official firmware to the root directory of the U disk (where XXXX is the version number and the U disk uses FAT32 file format);

2） Power off the gateway device and then power it on again. After the system starts up, insert the U disk containing the upgraded firmware into the USB interface on the motherboard (you can also insert the U disk first and then power it on);

3） After the system detects the U disk containing the updated firmware, the buzzer "drip" will sound, and then the system will be updated automatically;

4） When the update is completed, the buzzer will beep once every second to remind the U disk to be removed;

5） Remove the USB flash disk and the system restarts itself.

Caution

The user cannot change the firmware name, otherwise the device will not be recognized and cannot be upgraded normally.
Please do not power off during Steps 3 and 4, otherwise the upgrade will fail and the system will have to be upgraded again.

8.2 WEB Remote Update Firmware

GW300 Gateway can use Web configuration Interface to update firmware remotely. The operation steps are as follows:

1) In the GW300 Gateway Web configuration page, select Backup/ Flash Firmware secondary menu option in the Level 1 menu of System;

2) Click the "Flash Image" button in the Flash New Firmware Image column to load the official gateway firmware file provided by Youxunda;

3) Operate according to the prompt and wait for the firmware update;

4) After the update is completed, the buzzer will "drip" and the gateway will restart the system.

9 Frequently Asked Questions

Q1: GW300 provides three data uplink modes. How to determine the current data uplink mode used by the gateway?
A1: The GW300 gateway supports Ethernet, 4G and WIFI (not yet open) as data uplink modes, and the priority level is set as Ethernet, WIFI and 4G respectively. That is, when there is a network cable connection at the WAN port, data uplink is carried out through Ethernet first, followed by WIFI (not yet open), and finally, 4G.

Q2: Modified the default WiFi account and password of GW300 gateway. How to access the gateway again if you forget the password?
A2: The PC side connects directly to the gateway's LAN port through the Network cable. By accessing the gateway's DHCP (the default is 192.168.1.1), you can re-enter the configuration Interface. Select the secondary column of WIFI in the Network menu of the configuration Interface, and you can see the modified WIFI SSID and password.

Q3: When switching the mode of Web Interface, why is there no message indicating whether the switch is successful or not, and even the Web Interface cannot be opened

normally?

A3: In the process of switching mode, the gateway will restart WIFI, or even switch LAN/WAN of the network port, resulting in disconnection between the computer and the device. At this time, the computer cannot get the IP of the gateway device, so it cannot prompt the user.

Q4: The gateway could not receive node data?

A4: Check whether the RF Select Frequency selection is the same model with the device and whether the selected channel is consistent with the channel configured by the node through the Lora GW category under the Network in the level menu of the Web configuration page.

Q5: How do I determine if the gateway is connected to the cloud server?

A5: When the gateway is registered to the cloud server, the cloud server will prompt the gateway whether it is connected.

If the gateway has not been connected to the cloud server, follow these steps to check:

1) Check whether the gateway is connected to the Internet, through the Web configuration page level menu Network Diagnostics category, click Ping, to see the specific gateway connection to the Internet ability;

2) If the device is capable of connecting to the Internet, check the cloud server address and upstream and downstream ports as well as the Web page LORA

Is the SDK configuration launched consistent?

Q6: How to resolve firmware upgrade failure?

A6: Power on GW300. If the status indicator LED1 (red) is always on, it means that the firmware upgrade failed last time.

Just repeat the upgrade, refer to Section 8 of this document for details.