MOKO LoRaWAN Gateway
(MKGW2-LW)

Configuration Guide

Version 1.1

MOKO TECHNOLOGY LTD.
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1 About This Guide

This document provides a comprehensive guide on how to configure the MKGW2-LW gateways to suit the intended application in detail. It mainly introduces the MKGW2-LW functionality, including Ethernet, Wi-Fi, LoRa configurations, firmware upgrade, system backup and log download etc. It also provides instructions for setting up the gateway on a LoRa network server.

2 Product Introduction

2.1 Product Description

MOKO 8 channels gateway MKGW2 is based on LoRaWAN protocol, which is embedded with Semtech's high performance multi-channel transceiver SX1301/SX1257 and MTK platform. It is for indoor use and easy for installation.
MKGW2-LW includes 2 modes: AP and STA as router, offers 2.4Ghz Wi-Fi and wired Ethernet for connecting internet. The gateway built-in OpenWRT operating system, users can flexibly configure network parameters and LoRaWAN protocol parameters through the Web management platform. The MKGW2-LW Gateway can be connected to LoRaWAN terminals in various application nodes, collects useful information and sends the data to cloud server. And it supports POE, DC, Micro USB to provide power supply.

2.2 Main Specifications

Category	Feature	Specification
Chipset	LoRa®	Semtech SX1301/1257
	Wi-Fi	MTK MT7688 with 128M DDR and 32M flash
Wireless Characteristics	Wi-Fi Frequencies	2.4GHz
	LoRaWAN Regions	863 – 870 MHz (EU), 902 – 928 MHz (US), AU915 – 928 MHz (AU915 + AS923)
Interfaces	Wired	Ethernet - RJ45 Connector
	Wireless	LoRaWAN, Wi-Fi 2.4 GHz
Software	Operating System	Embedded Linux, 3.10 Kernel version
	LoRa	Packet Network Forwarder with default support for

		Semtech UDP Packet forwarder
	Configuration	Web-based interface via Wi-Fi
Wireless coverage	WIFI	130M (Open Space)
	LoRa	3km (City Environment)
Power Supply	DC Jack	DC 12V-1A
	POE	POE (IEEE 802.3af), 42~57VDC
	Micro USB	5V/2A
Electrical Specification	Stand By Power Consumption	Stand By Average Current ≤ 200mA@12V
	Communication Power Consumption	Communication Transmitting current≤220mA@12V Receiving current≤250mA@12V
	2.4G WIFI Transmission Power	Max 20dBm
	2.4G WIFI Reception Sensitivity	270Mbps: -61dBm@10%PER 135Mbps: -65dBm@10%PER 108Mbps: -68dBm@8%PER 54Mbps: -68dBm@10%PER 11Mbps: -85dBm@8%PER 6Mbps: -88dBm@10%PER 1Mbps: -90dBm@8%PER
	LoRa Output Power	Max: 23dBm
	LoRa Sensitivity	-141dBm@SF12,BW=125kHz
LED	Power LED	1.System operating normally: Solid green 2.System operating abnormally: Solid red 3. System upgrade: Blink green
	Network LED	1.No network: Solid yellow 2.ETH connection: Solid blue 3. WIFI connection: Solid green
	Communication LED	1.LoRa COMM √, Server COMM ×: Solid blue 2.LoRa COMM x, Server COMM √: Solid yellow 3.LoRa COMM √, Server COMM √ : Solid green 4.LoRa COMM x, Server COMM x: Solid red
Antenna	WIFI antenna	1.1dBi External antenna
	LoRa antenna	1.6dBi External antenna
Environmental	Operating Temp.	-20° C to 55° C

	Storage Temp.	-40° C to +85℃
Regulatory	Approvals	Under Approval FCC/CE
Dimensions Installation	Dimensions	166*105*28.4mm
	Weight	215g
	Installation	On the desktop or Fixed on the wall
Enclosure	Standard	Moulded plastic housing
Warranty	1-Year warranty	

Table1 MKGW2-LW Main Specifications

2.3 Hardware Interfaces and Indicator

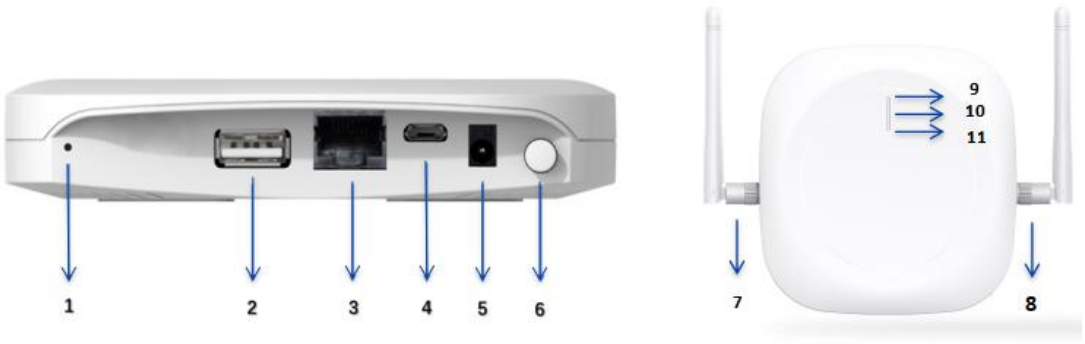

Figure1 MKGW2-LW Interface

No.	Type	Function	Remark
1	Reset button	1.Reset to factory setting 2.Firmware upgrade	1.Reset: Insert and press the button then keep 5s 2.Update: Before firmware upgrade, insert USB Flash Drive and short press the button
2	USB Port	Plug a USB flash drive with upgrade file for firmware upgrade	The name of upgrade file is required to be: MKGW2-LW-Upgrade.bin
3	POE Port	1.POE power supply 2.Ethernet Access	POE (IEEE 802.3af)
4	Micro USB	USB power supply	5V/2A
5	DC Power Port	DC power supply	12V/1A
6	Power Button	ON/OFF	

7	WiFi Antenna	WiFi Antenna	1.1dBi
8	LoRa Antenna	LoRa Antenna	1.6dBi
9	Power LED	Indicate device operating status	1.System operating normally: Solid green 2.System operating abnormally: Solid red 3. System upgrade: Blink green
10	Network LED	Indicate network status	1.No network: Solid yellow 2.ETH connection: Solid blue 3. WIFI connection: Solid green
11	Communication LED	Indicate Lora and server communicate status	1.LoRa COMM √, Server COMM ×: Solid blue 2.LoRa COMM x, Server COMM √: Solid yellow 3.LoRa COMM √, Server COMM √ : Solid green 4.LoRa COMM x, Server COMM x: Solid red

Table2 MKGW2-LW Hardware Interfaces

2.4 Mechanical Size

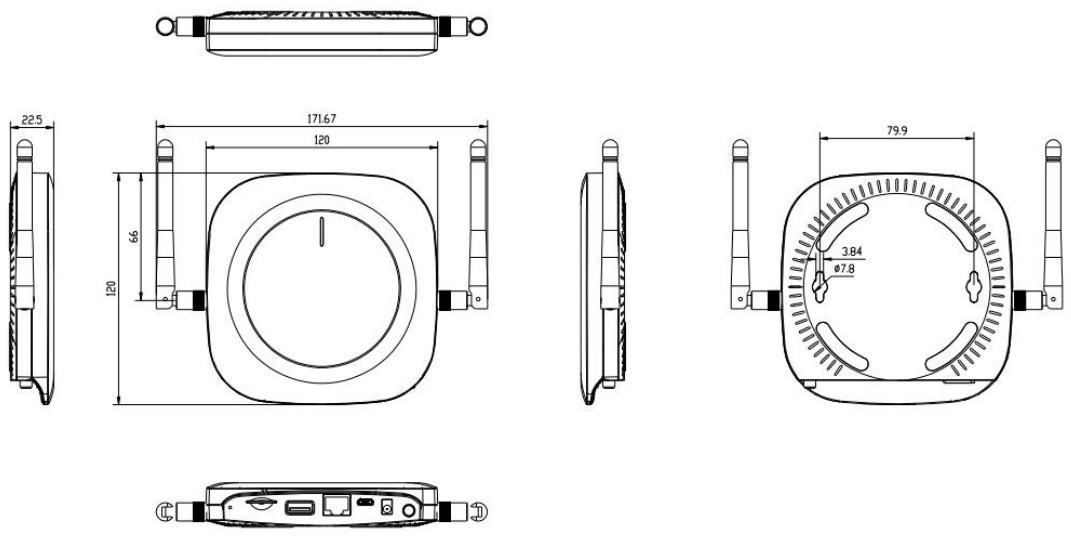

Figure2 MKGW2-LW Mechanical Size

2.5 Package Information

2.5.1 Package List

Item	Qty	Remark
MKGW2-LW	1	Gateway
WiFi Antenna	1	
Lora Antenna	1	
Micro USB cable	1	
Positioning screws	2	Used for fixing on the wall
Expansion rubber plug	2	Used for fixing on the wall
PET localizer	1	

Table3 MKGW2-LW Package List

2.5.2 Package Information

Figure3 MKGW2-LW Package

3 Installation

Step 1: Use 5mm drill head, drill 2 holes on the wall according to the PET localizer following picture and then plug the screw anchors in the wall.

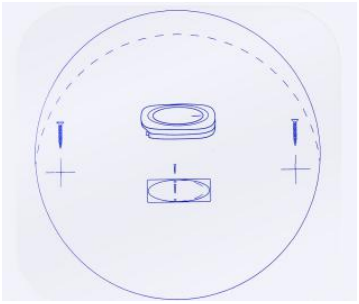

Figure4 MKGW2-LW Installation 1

Step 2: Install the screw into the wall and keep about 3 mm of clearance.

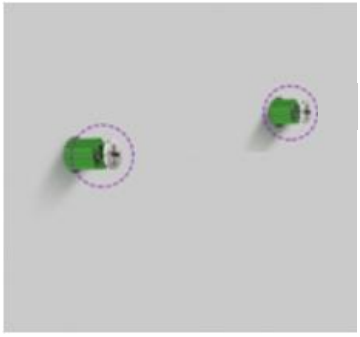

Figure5 MKGW2-LW Installation 2

Step 3: Insert the screw head into the hanging hole behind the equipment, then gently pull down to complete the installation

Figure6 MKGW2-LW Installation 3

4 Connecting the Hardware

4.1 Connect the Gateway

1. Follow the silk screen on the enclosure and connect WiFi and LoRa antennas. Refer to Antenna Configuration for additional information.

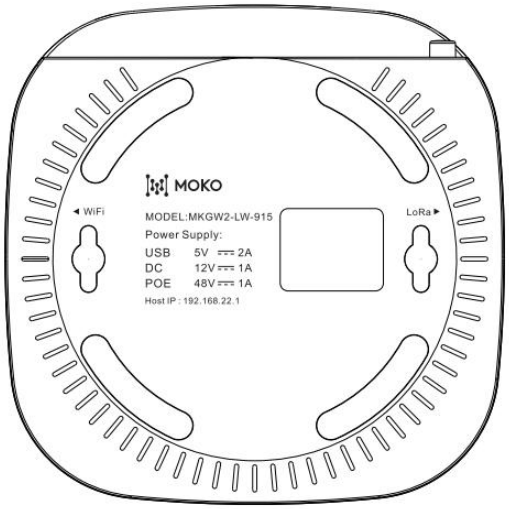

Figure7 MKGW2-LW Botton Silk

2. Connect the power supply (Refer to **Chapter 4.2** Power up and Turn ON/OFF for additional information.).

4.2 Power Up and Turn ON/OFF

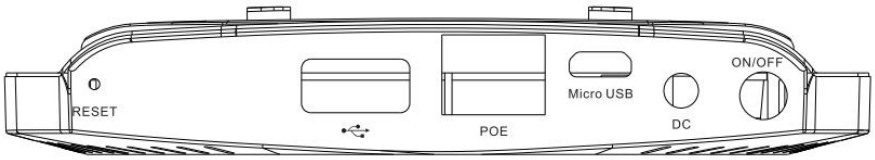

Figure8 MKGW2-LW Side Silk

- Power Up: follow the silk on the enclosure you can select different power solution.
  1. Micro USB:5V/2A
  2. DC Power Port:12V/1A
  3. POE Port:POE (IEEE 802.3af)
- Turn ON/OFF:After power up the gateway, it needs to push-down the power ON/OFF button to start the gateway system.

5 Log into the Gateway

1. Turn On the gateway and waiting for about 60s.
2. Using your PC or phone connect the SSID of the gateway. The default SSID format is "MKGW2-LW-xxxx" such as " MKGW2-LW-91D8 ", "91D8" is the last two bytes of the gateway MAC address. verify the password (Default: Moko4321) and connect to the gateway.

Figure9 Gateway SSID

3. After successful connection, the WEB management platform can be accessed through the IP address 192.168.22.1 of the gateway LAN interface.

Log on using the following default credentials,

Username: Admin

Password: admin

It is recommended that the default password is changed for security reasons. For details on changing the password, please refer to **Chapter 5.2 WiFi settings**.

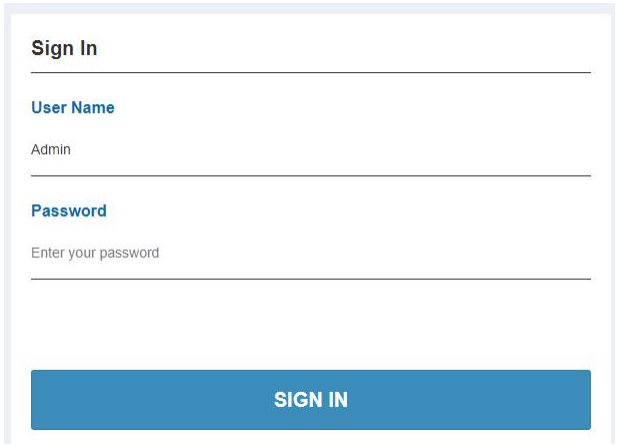

Figure10 Log in WEB

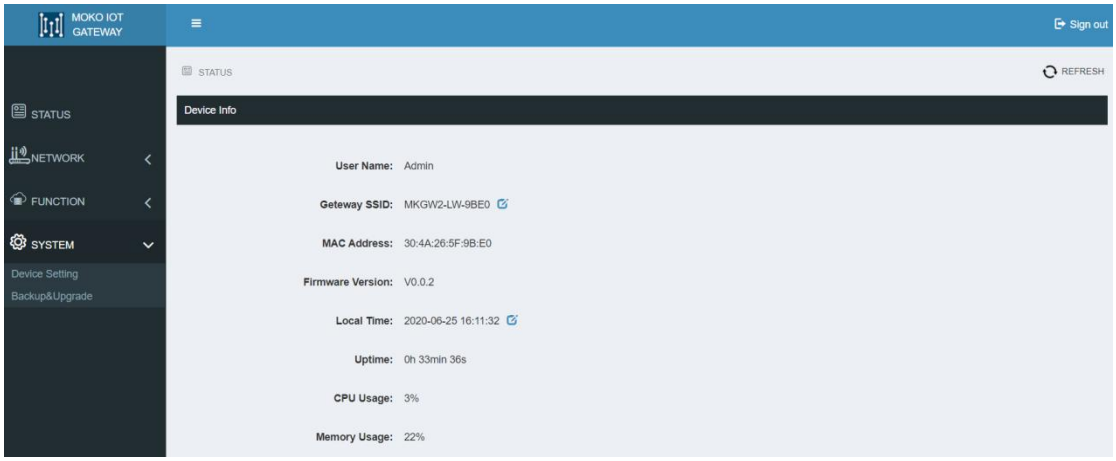

Figure11 Gateway Status

Noted:It is recommended to use the latest version of the mainstream browsers such as IE11, Chrome, Firefox, Safari, etc.

6 Internet setting

The gateway can access the Internet through Ethernet(ETH) or WiFi, and can access the network by Automatic IP or Static IP.

Static IP requires WAN IP, subnet mask, gateway IP, DNS, etc.

After the network configuration is completed, wait for the gateway to access the network. You can check the network status in gateway STATUS web page and also can check the network LED indicator.

- No network: Solid yellow
- ETH connection: Solid blue
- WIFI connection: Solid green

6.1 Ethernet to Internet

Use a network cable to connect to the PoE port of the gateway and connect the gateway to a Network Switch that is connected to the Internet.

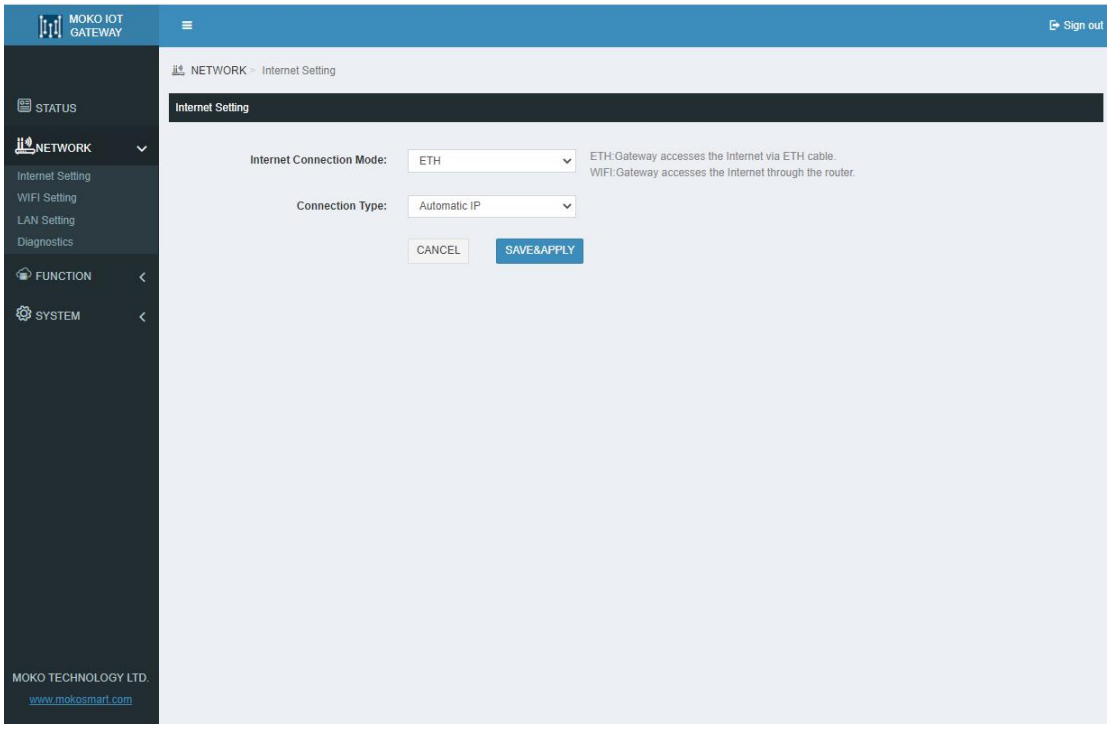

Figure12 Ethernet / Automatic IP

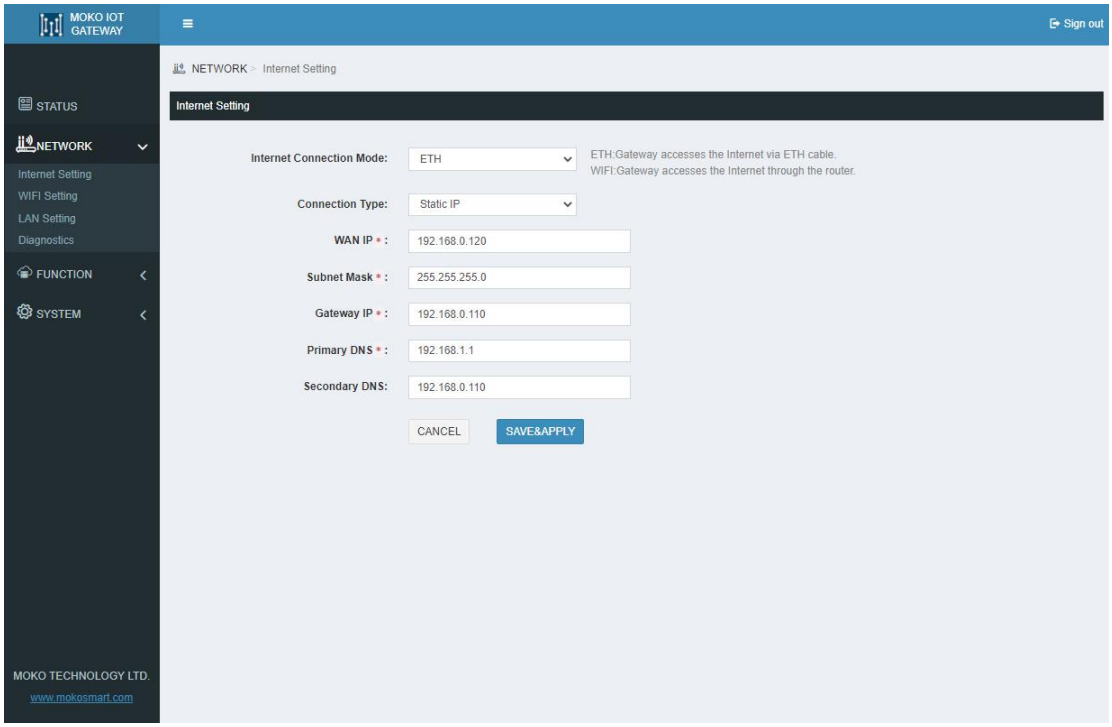

Figure13 Ethernet / Static IP

6.2 WiFi to Internet

Connect to a Wireless Router via WLAN to access the Internet. Select a wireless router and connect to it. After the configuration is complete, the gateway will restart.And the network status can be check in the **STATUS** page

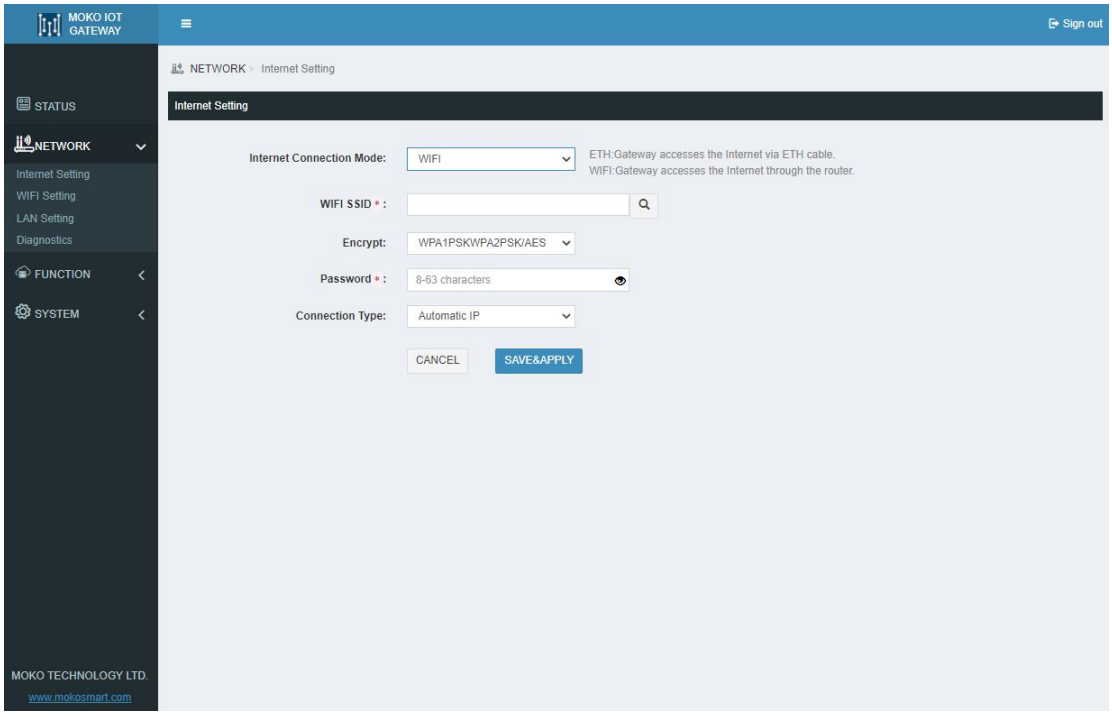

Figure14 WiFi / Automatic IP

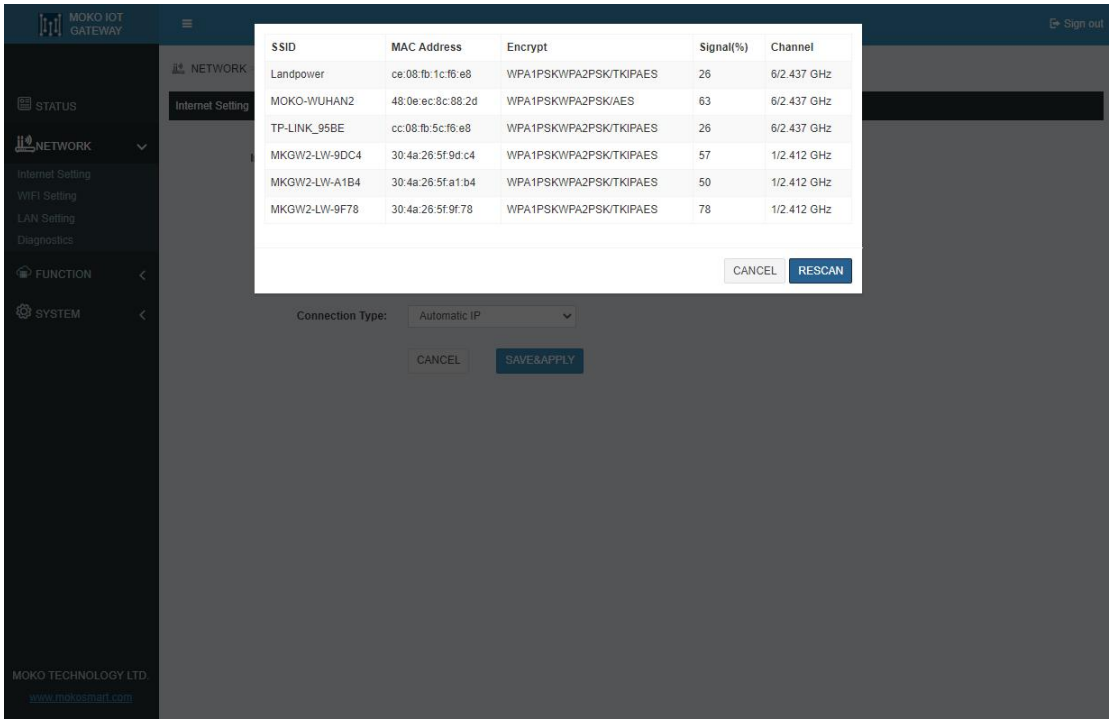

Figure15 WiFi / Automatic IP Select a Wireless Router

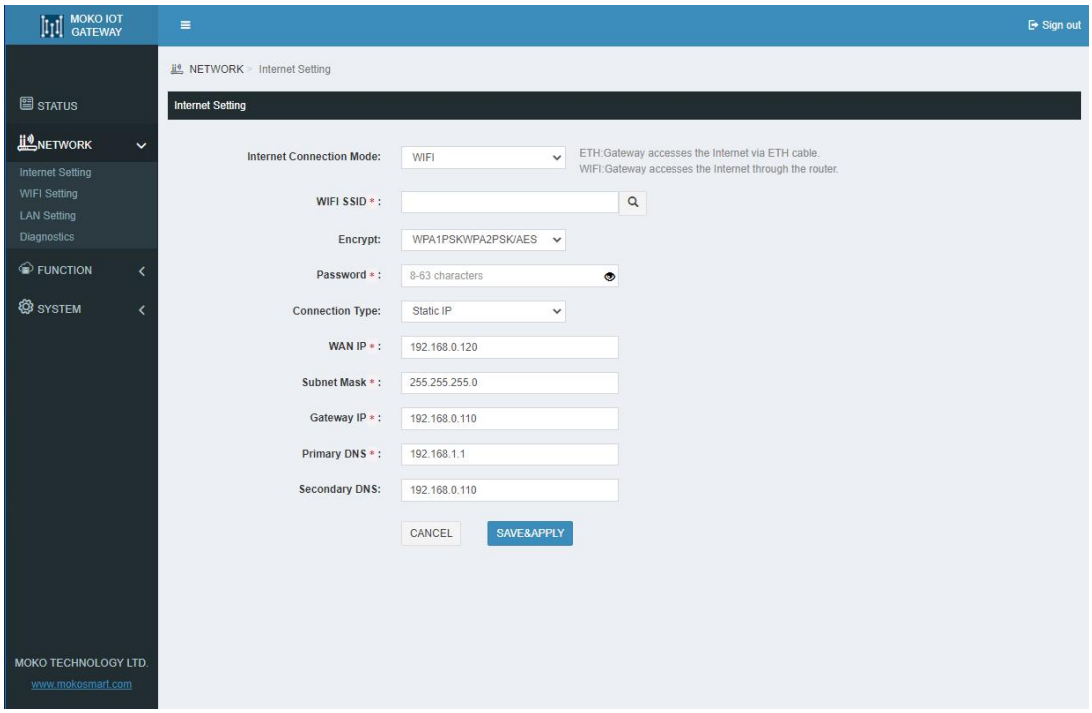

Figure16 WiFi / Static IP

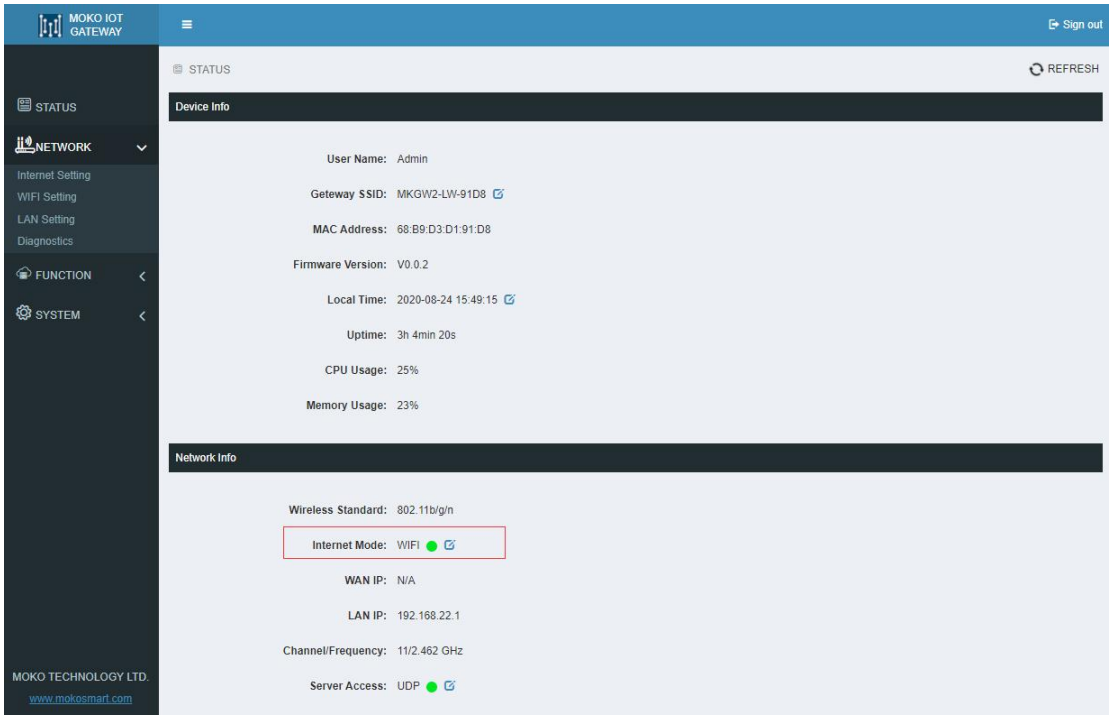

Figure17 Network Status Check

7 WiFi Setting

You can modify the SSID of the gateway, whether to hide the SSID, encryption mode, and password. After the configuration is complete, the gateway will be restarted for the configuration to take effect.

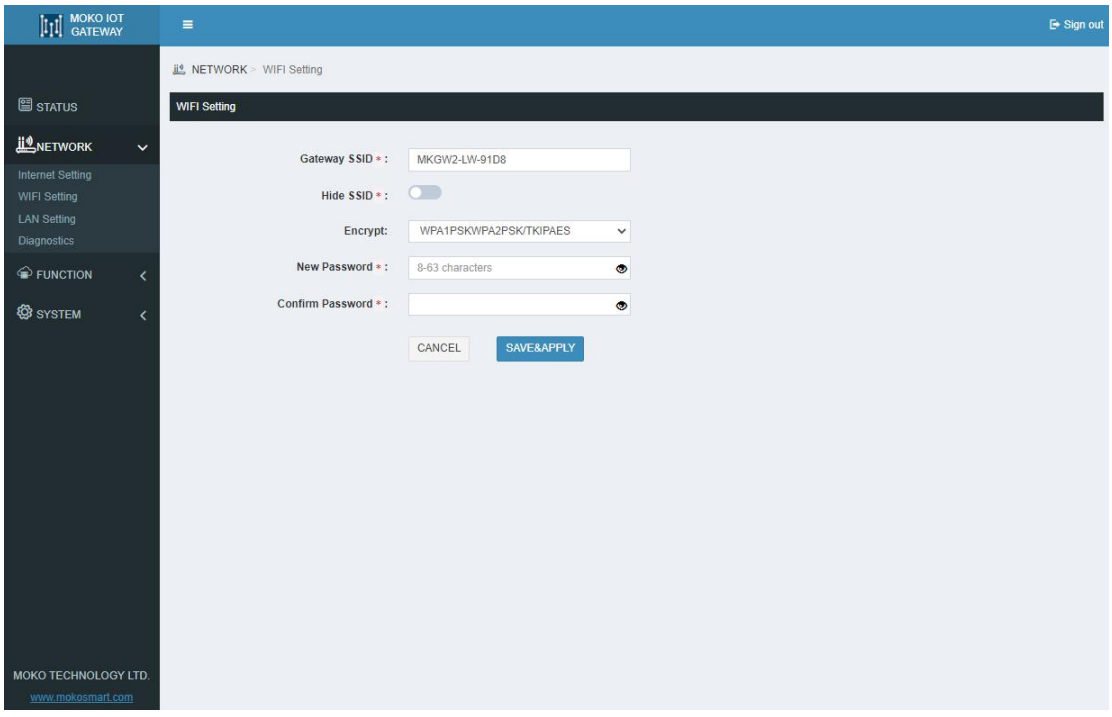

Figure18 Gateway WiFi Setting

Supported encryption **methods**:

- WPA1PSKWPA2PSK/TKIPAES（**Default**）
- WPA1PSKWPA2PSK/AES
- WPA2PSK/TKIPAES
- WPA2PSK/AES
- WPA2PSK/TKIP
- WPAPSK/TKIPAES
- WPAPSK/AES
- WPAPSK/TKIP
- WEP
- NONE(No encryption)

8 LAN Setting

You can modify the gateway LAN IP and subnet mask. After the configuration is complete, the gateway will be restarted for the configuration to take effect.

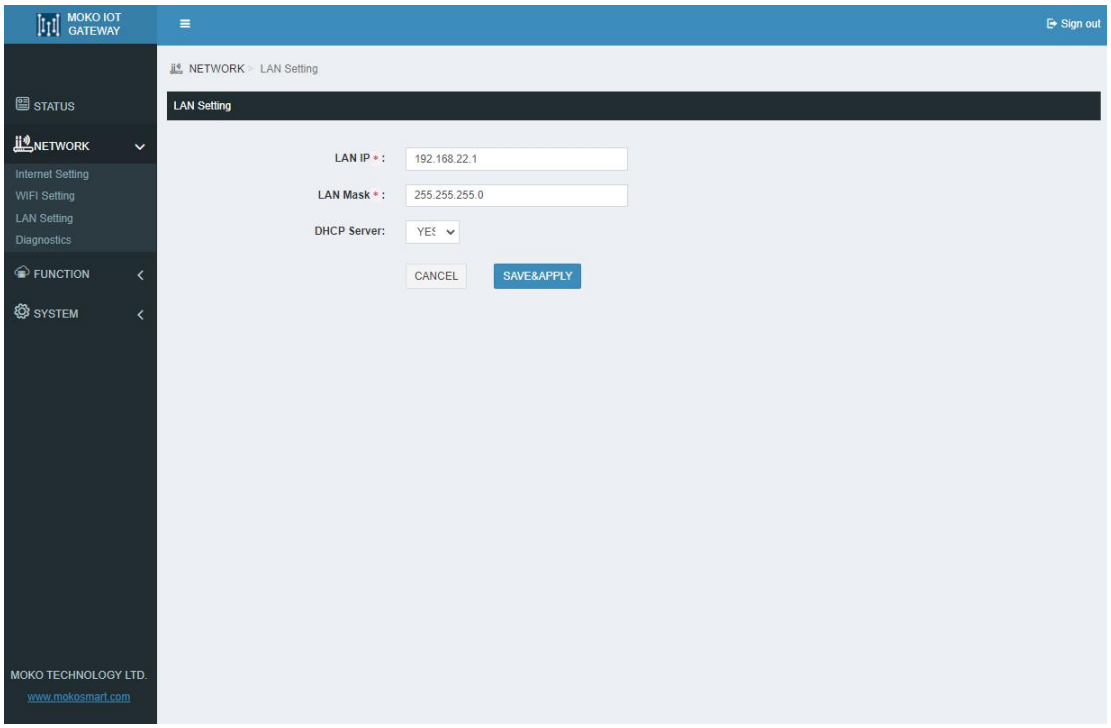

Figure19 Gateway LAN Setting

9 Diagnostics

You can check the current network connection through the Diagnostics.Fill in the IP address and select the network type, and use ping to check the network, it will display ping result.

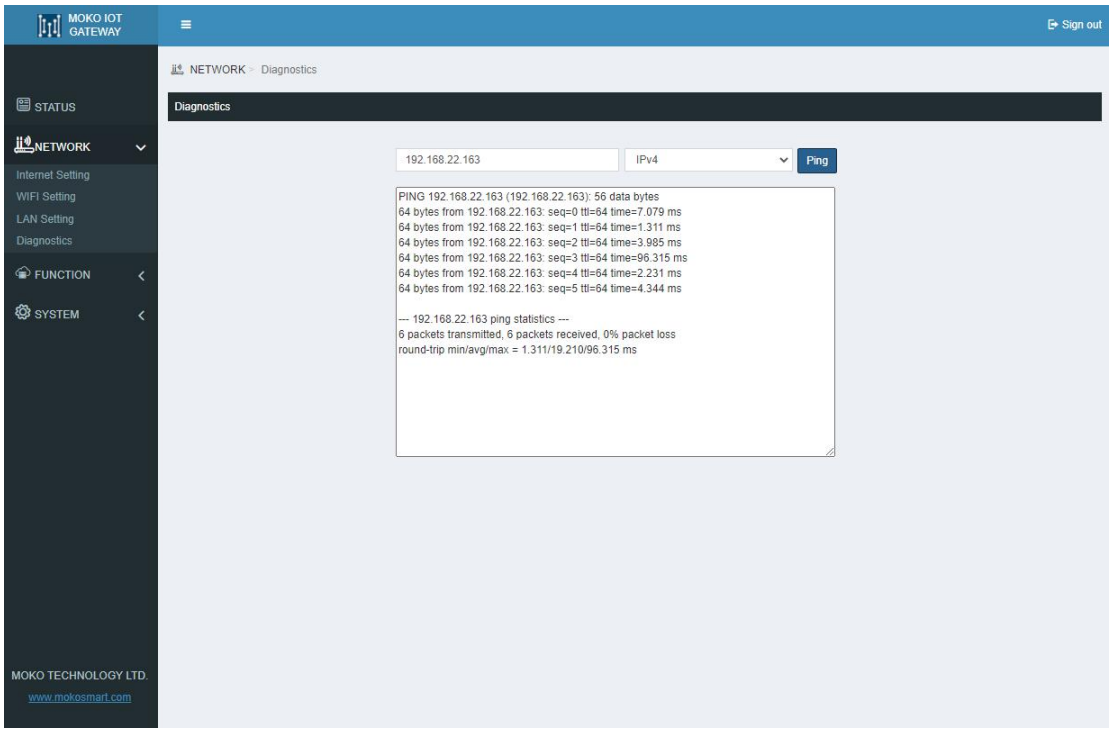

Figure20 Gateway Network Diagnostics

10 Server Access

MKGW2-LW LoRaWAN gateway only support Semtech UDP Packet Forwarder to access the LoRa server now.

You need to fill in the LoRa Server Address,Server Up Port,Server Down Port,and select the Frequency,Channel and HeartBeat.

After the LoRa server connect successfully , you can check the server access status in gateway STATUS web page and also can check the LoRa server communication LED indicator that should be solid green.

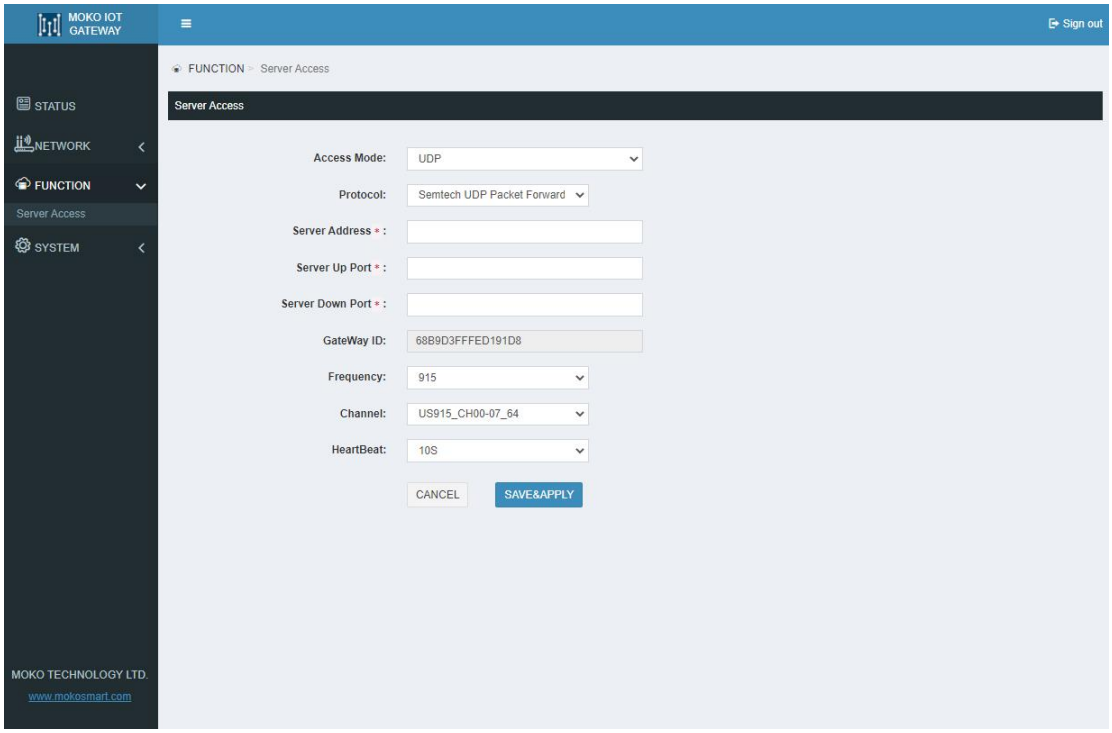

Figure21 Gateway Server configuration

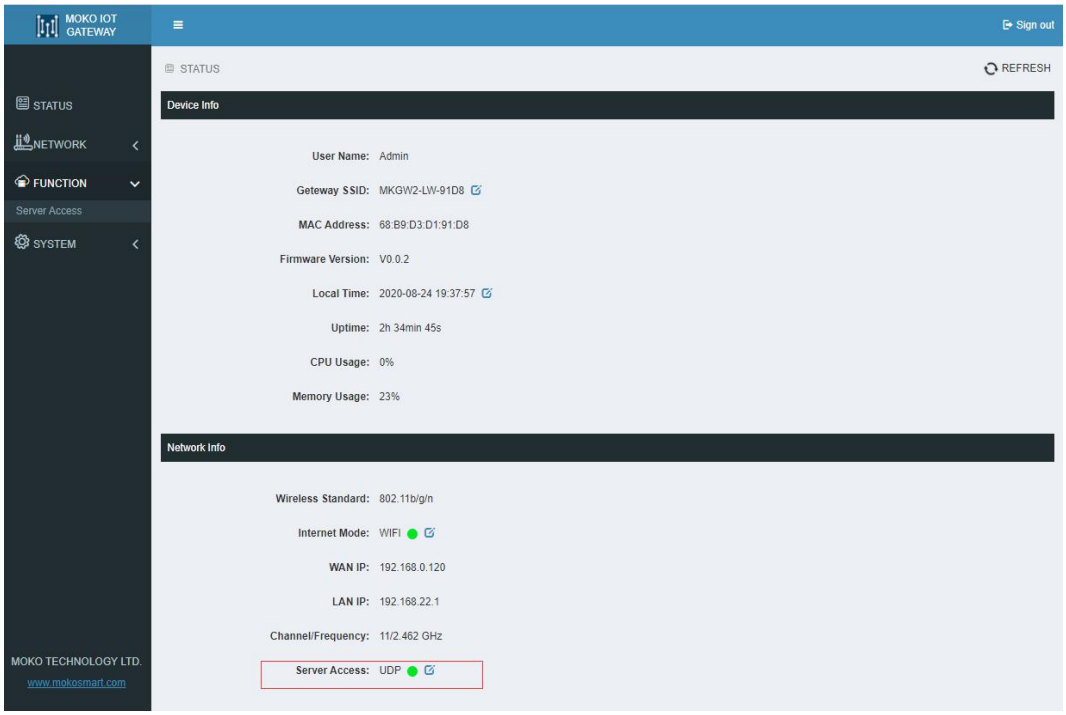

Figure22 Gateway Server Connection Check

11 System setting

11.1 Device setting

11.1.1 Modify Login Password

User can modify the password for logging in configuration web UI;

The login user name is”Admin”(unmodifiable);

The length of password is 1-64 characters and needs to be verified with the old password.

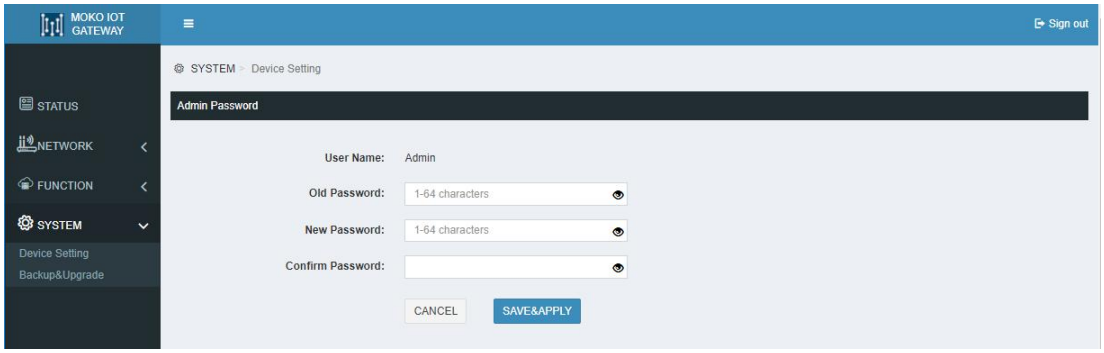

Figure23 Gateway Login Password Modify

11.1.2 Time Configuration

User selects the time zone, and then checks”Set Automatically”. The NTP server follows the default settings and automatically updates to the current time in the time zone；
If the user needs to set the time to match the local browser time, close ”Set Automatically” and click”Sync With Browser”to update to the current browser time.

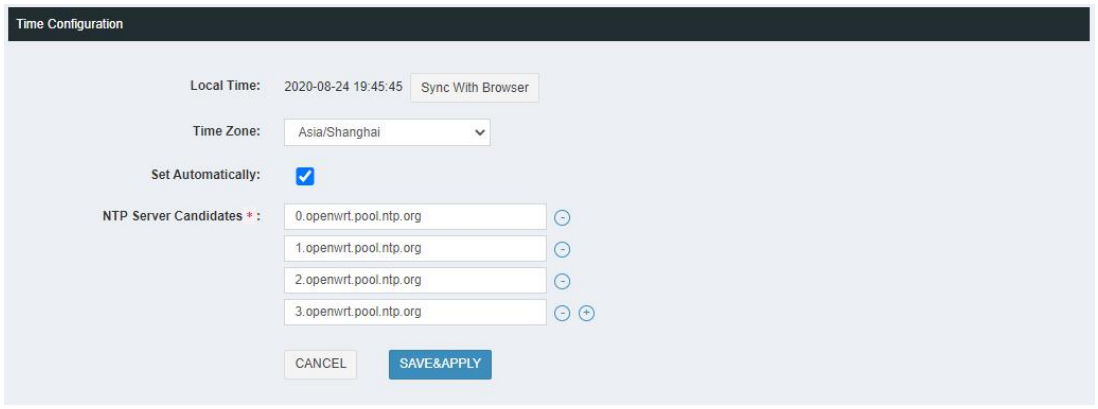

Figure24 Gateway Time Configuration

11.1.3 Restart

Click “Restart” and the gateway will restart immediately;

The user can turn on the “Automatic Restart”function (Closed by default) and set the time for the gateway to automatically restart each day. This operation can free up system RAM and ensures that the system runs smoothly and steadily.

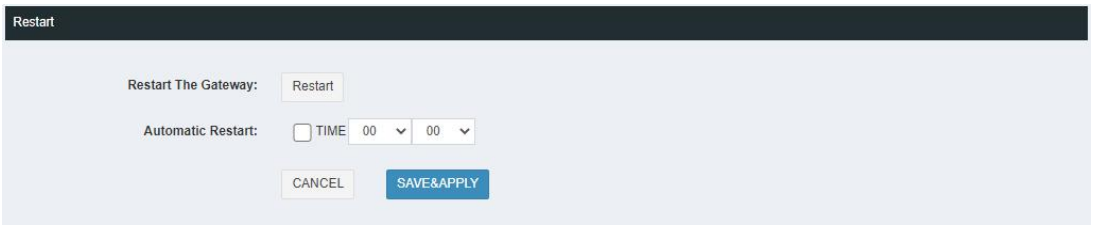

Figure25 Gateway Restart Configuration

11.1.4 Log

Once the user finds the device abnormal during use, the system Log File and LoRa Packet Log file can be downloaded to the local. Please send the log file to MOKO to check the system error.

Figure26 Gateway Log File

11.1.5 LED Configuration

User can turn off the device LED. After saving, the operation takes effect immediately

In the state of turning off the LED, if the system is abnormal or the system is upgraded, the LED will still be enabled.

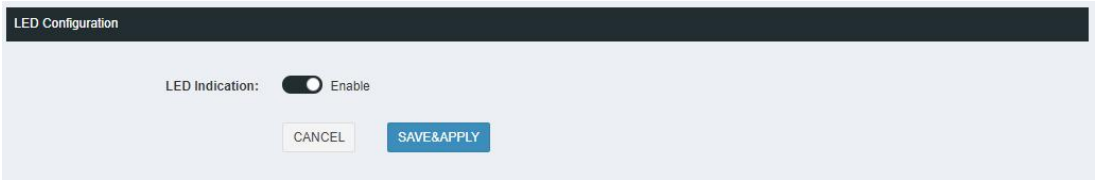

Figure27 Gateway LED Configuration

11.2 Backup & Upgrade

11.2.1 Backup

User can download the configured parameter file of the gateway to the local;

User can directly import the configured file into the current system. After the device is restarted, the configuration will take effect.

Figure28 Gateway Configuration File Download and Upload

11.2.2 Upgrade

User can upgrade the system by uploading Upgrade File in WEB. You can check “Whether to save the configuration” to ensure that the upgraded system parameters are consistent with the current system configuration parameters.

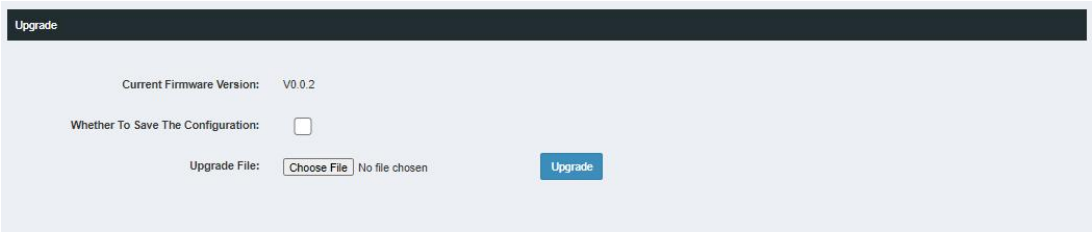

Figure29 Gateway Firmware Upgrade On-line

USB upgrade method：
Step1. Copy the upgrade file named “MKGW2-LW-Upgrade.bin” to the USB flash drive;
Step2. Insert the USB flash drive into the gateway USB Port, short press the RESET button, and power LED will blink green that indicate the device upgrading now. With USB upgrade, the gateway will automatically save the current system configuration parameters.

12 Restore Factory Settings

Press the reset button and hold on 5 seconds, then release, you can see the gateway restart again and all LED turn to yellow.The gateway will restore factory setting and all gateway information

need to be configure again.

13 Configuration with TTN

Before setting up a gateway with TTN server, we need configure Server Address,Server Up Port,Server Down Port in the gateway configuration WEB, and get the gateway ID.We use EU868 as a examples in below instructions.
Other frequency band server address of TTN please refer to TTN website:
https://www.thethingsnetwork.org/docs/gateways/packet-forwarder/semtech-udp.html

Examples gateway ID: 68B9D3FFFED191D8

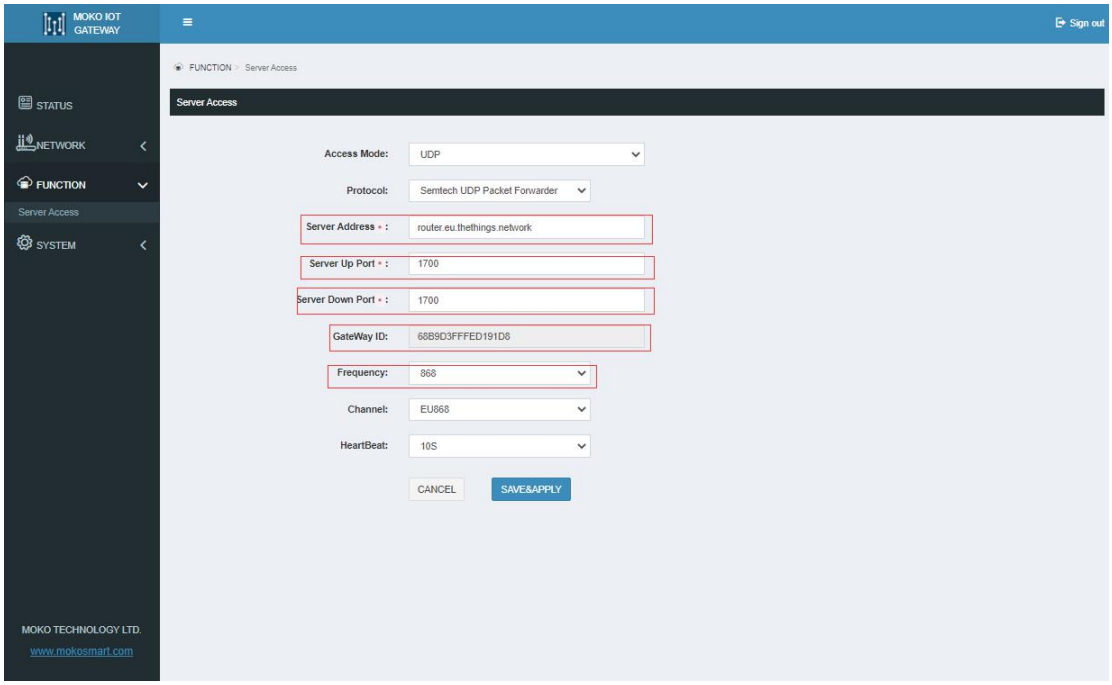

Figure30 Gateway Server Address Configuration

13.1 Set up your account with TTN

TTN web link:https://www.thethingsnetwork.org/
Create an account or log in to your existing TTN account:

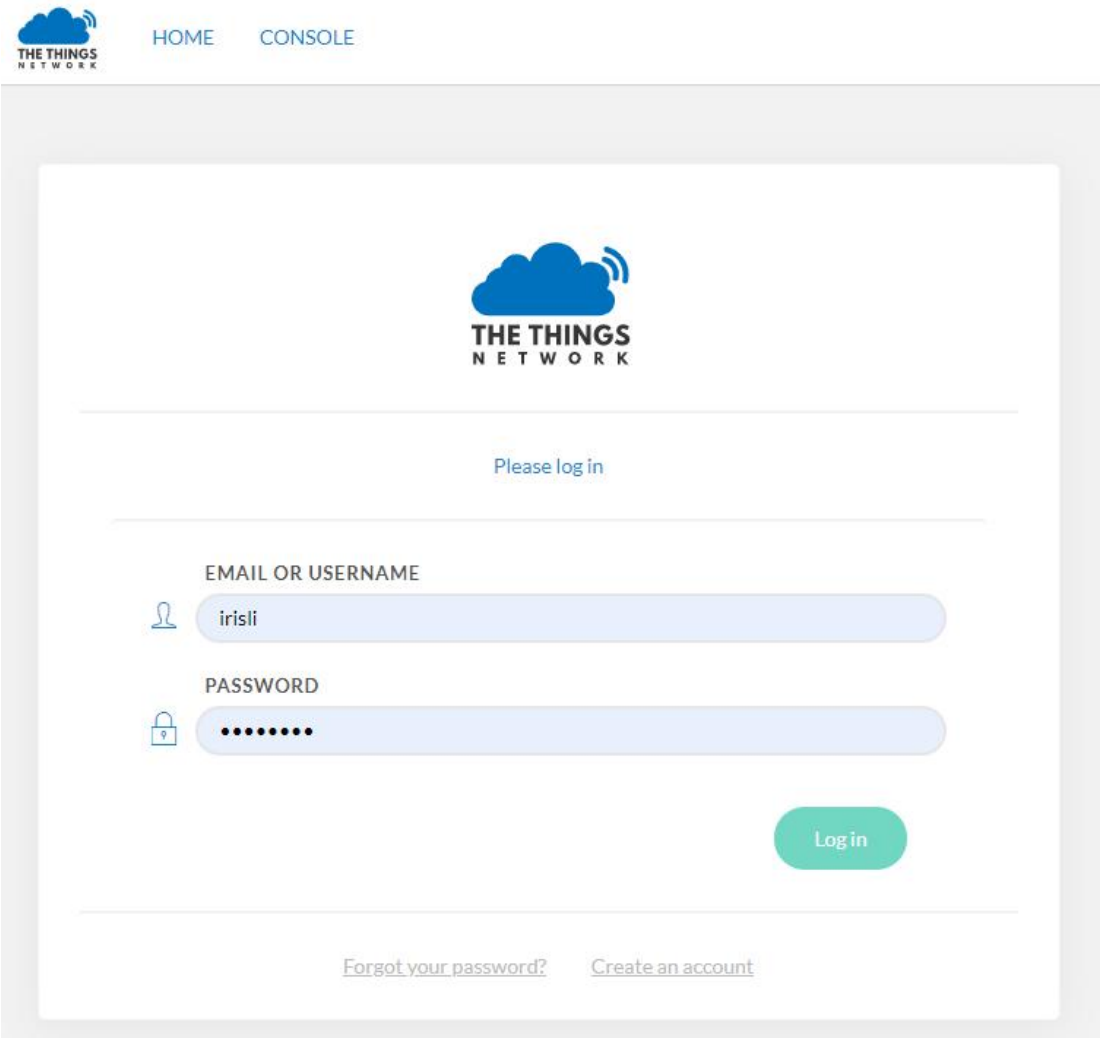

Figure31 TTN Login Page

13.2 Register your gateway with TTN

1. After login your TTN account, go into the CONSOLE page.And click the gateway.

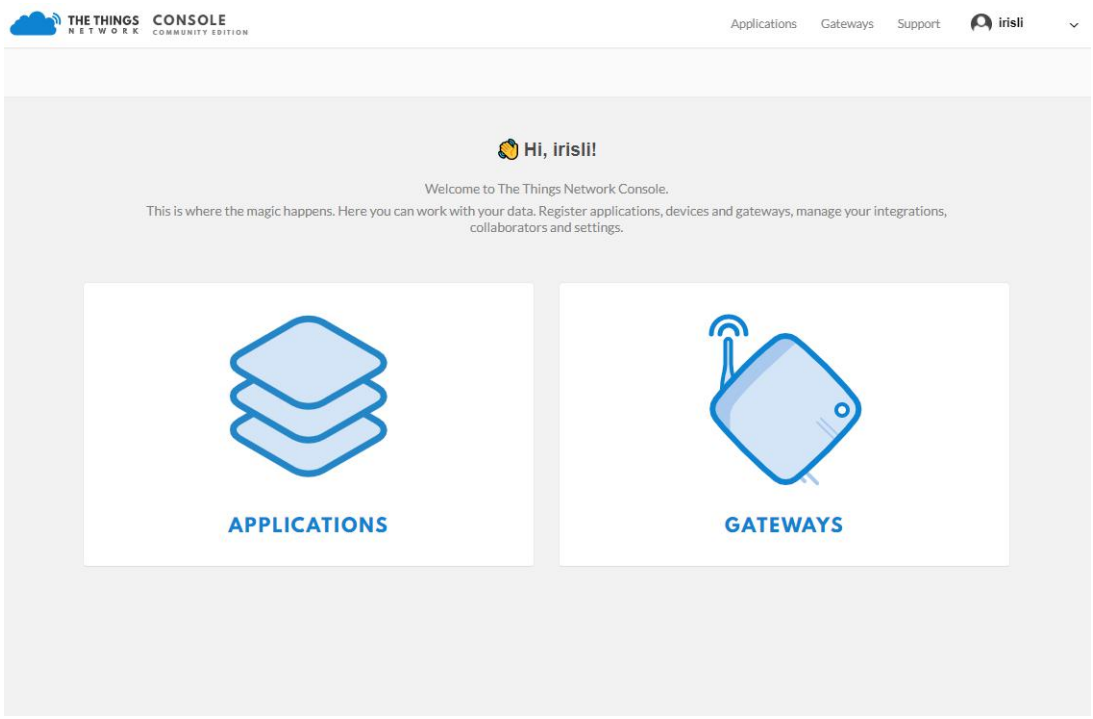

Figure32 TTN Console Page

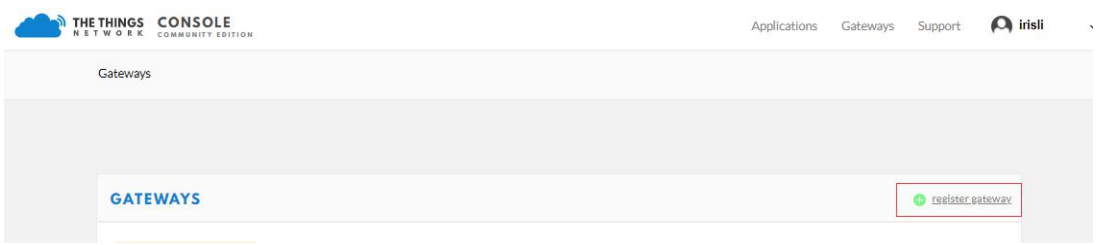

Figure33 Register gateway

2. Fill in the gateway ID obtain from gateway Web(Examples gateway ID: 68B9D3FFFED191D8),forwarder:Semtech packet forwarder,and frequency plan.

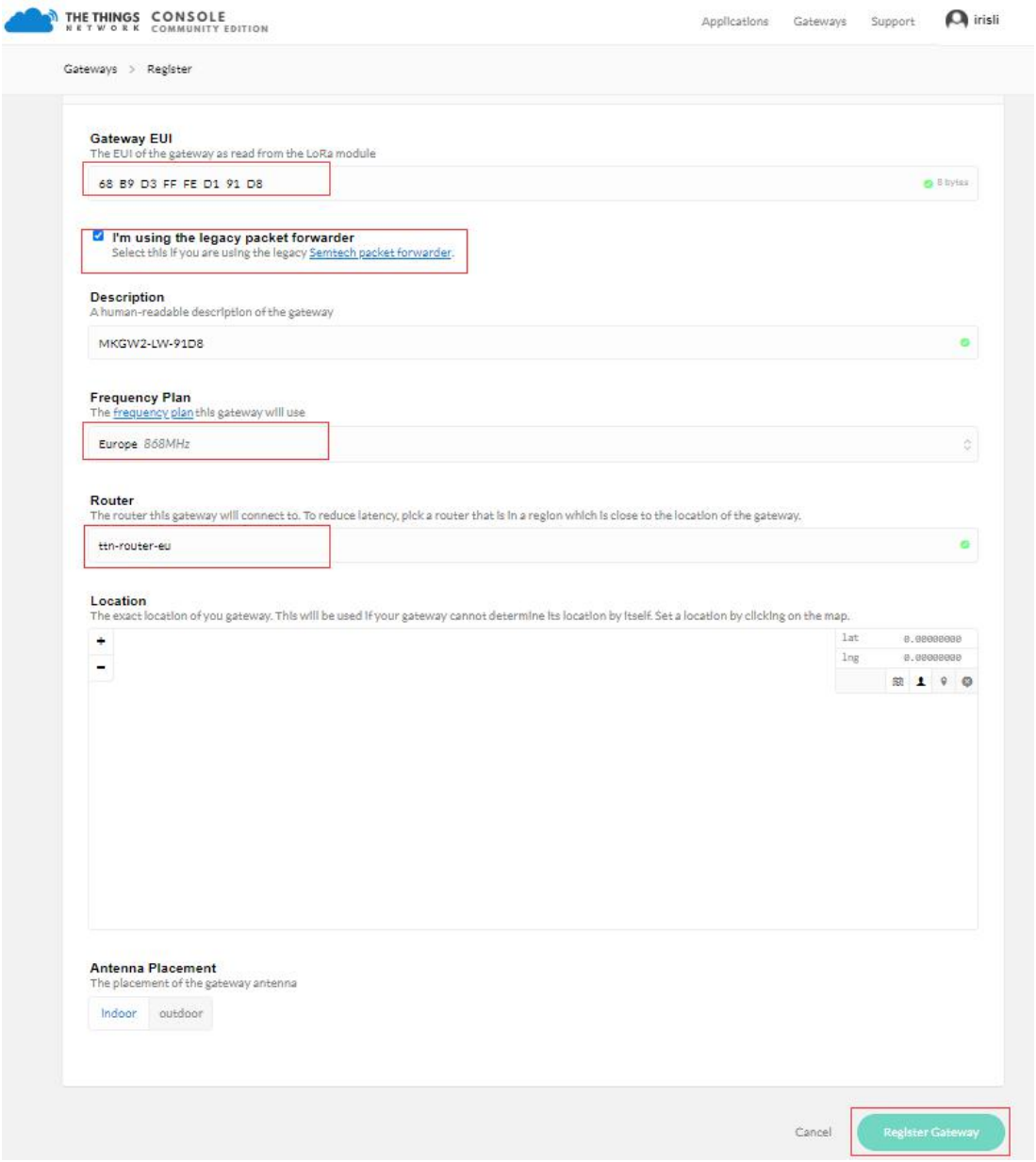

Figure34 Register gateway

3. After the gateway register successfully, you can check the status.

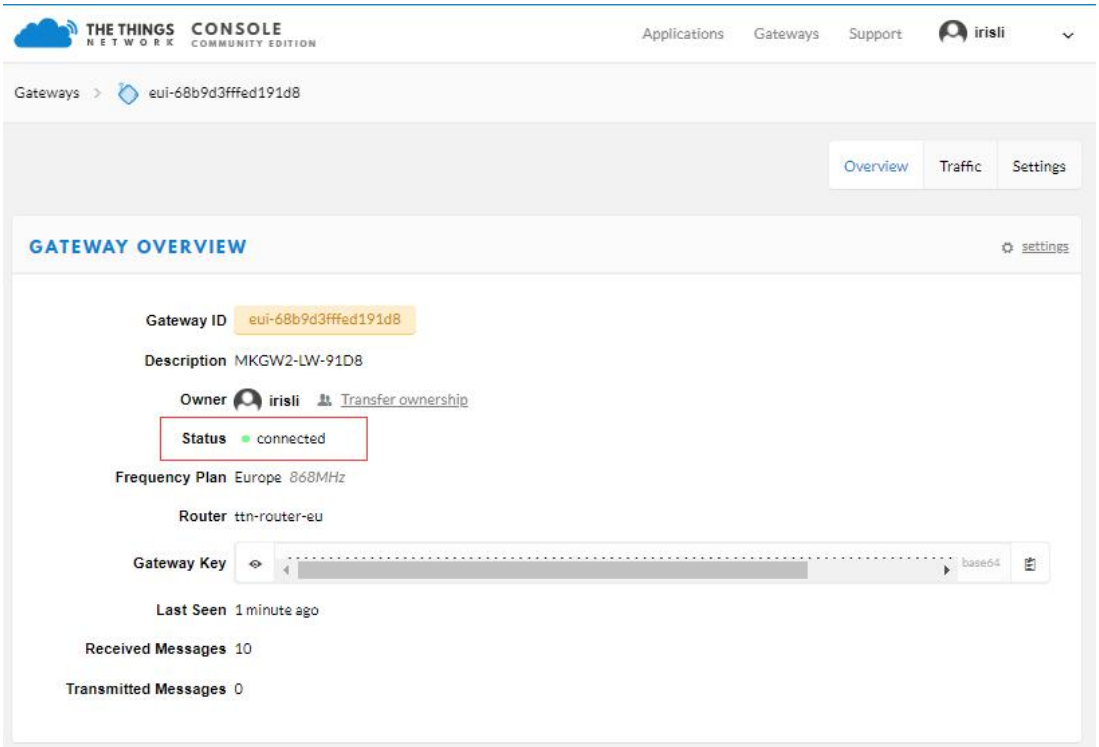

Figure35 Gateway Status Check

13.3 Create an Application with TTN

1. Click **Applications** in the top menu of TTN website and Add Application.
2. Fill in the application information and click **Add application**.

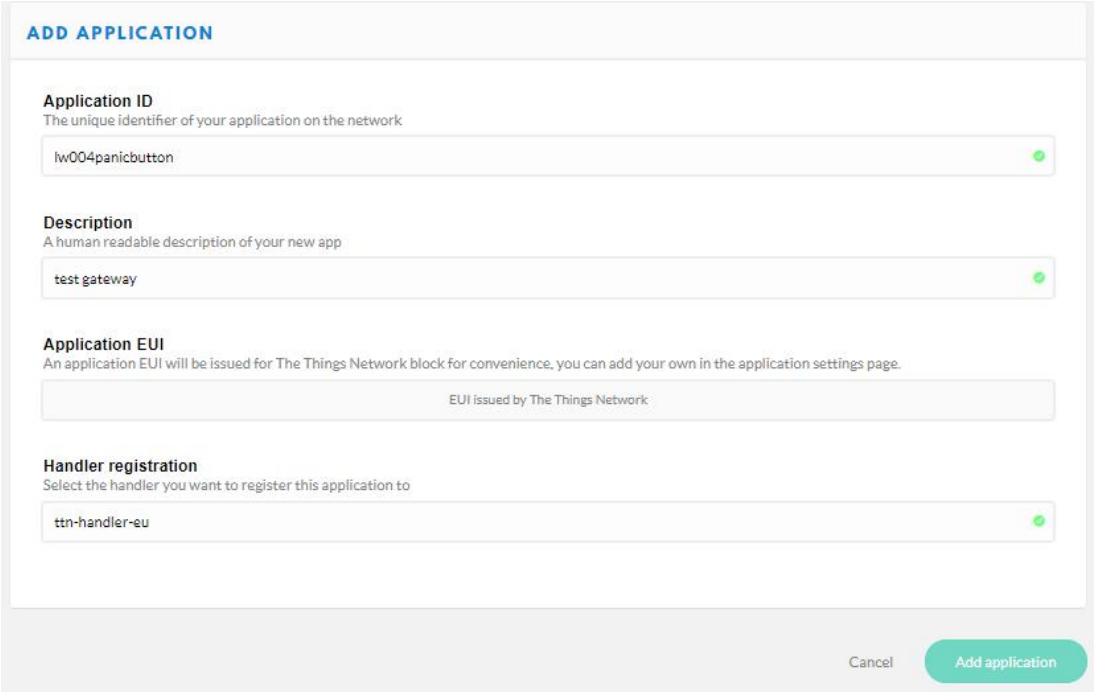

Figure36 Add Application

13.4 Register Your End-device with TTN

1. After create the application,click the **register device** in the application screen.

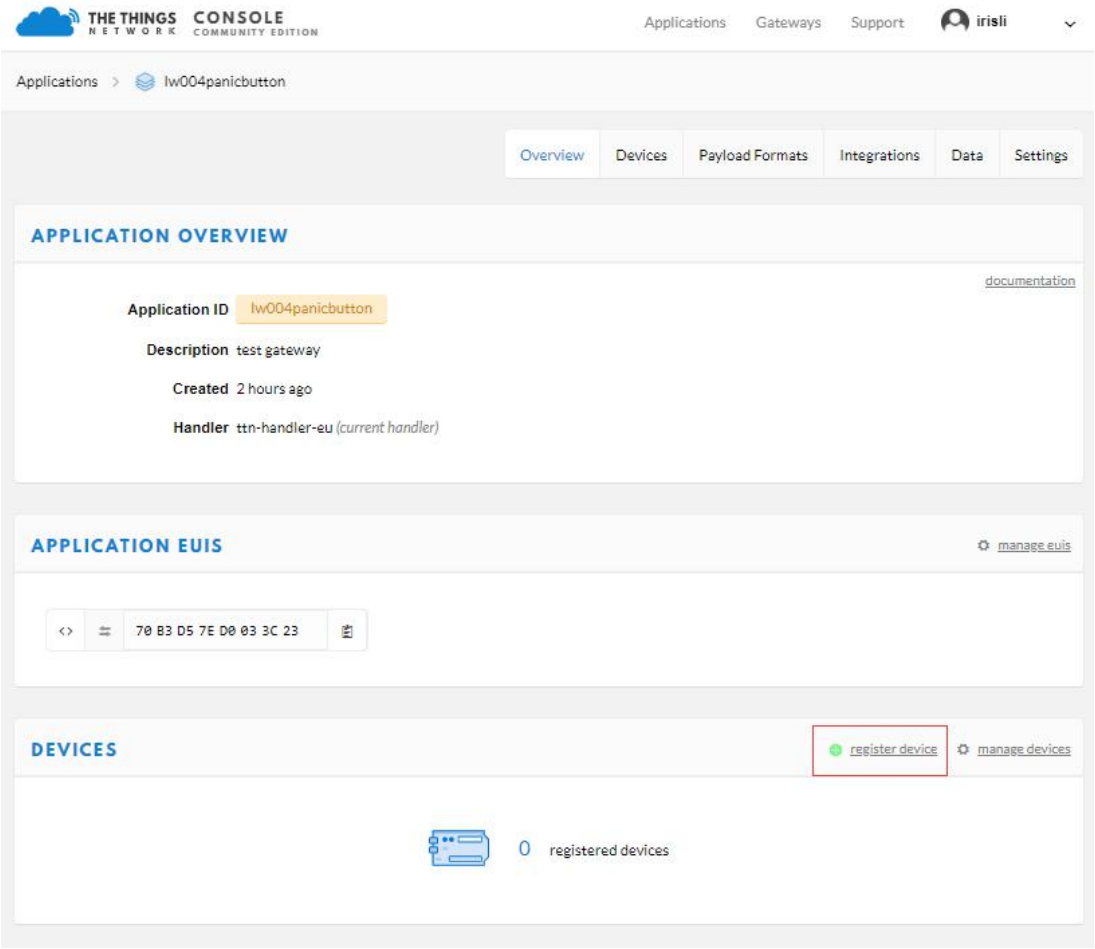

Figure37 Application Screen

2. Fill in the device ID and EUI in the **Register Device** page. We will use our end device LW004-PB as an example in below.

Noted: The end device frequency should be the same as the gateway.

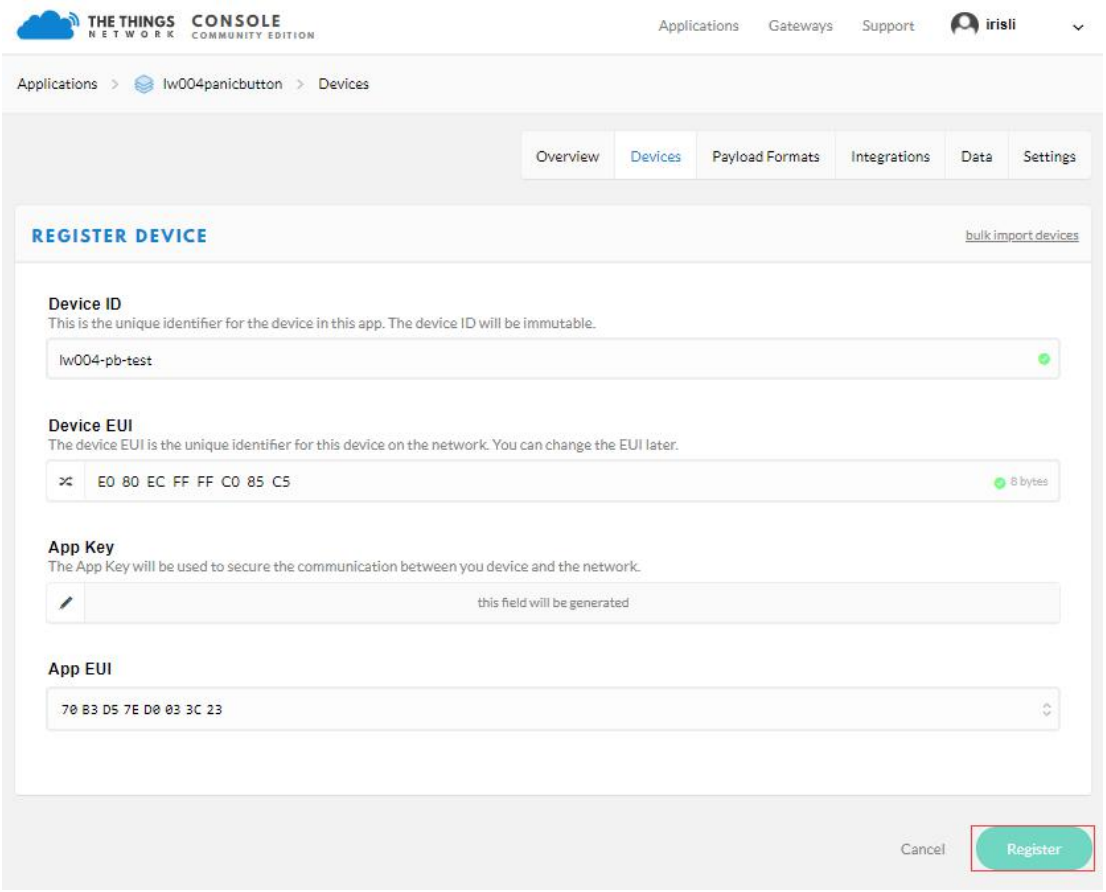

Figure38 Register Device

3. TTN server will generate the Application EUI and App Key after register the device.We need to configure the end device and keep the same the Application EUI and App Key.
For the end device parameter configuration please refer to our actual device user manual.

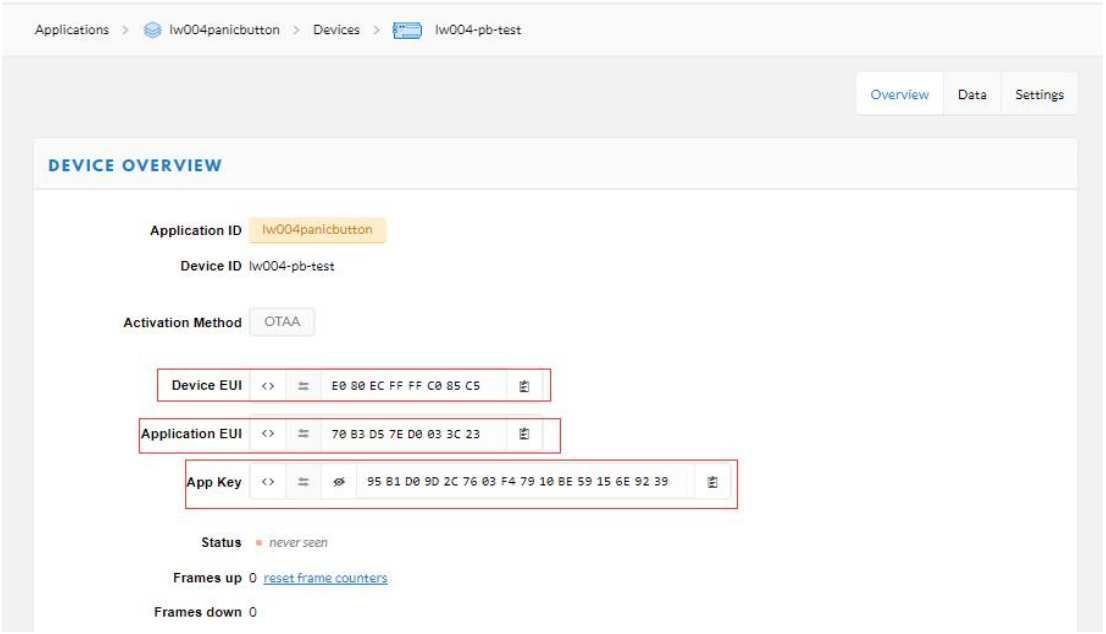

Figure39 TTN Device EUI,Application EUI,App Key

4. After device parameter configure to the same with TTN and connect the TTN server successfully, you can check the device status and data in the TTN device page.

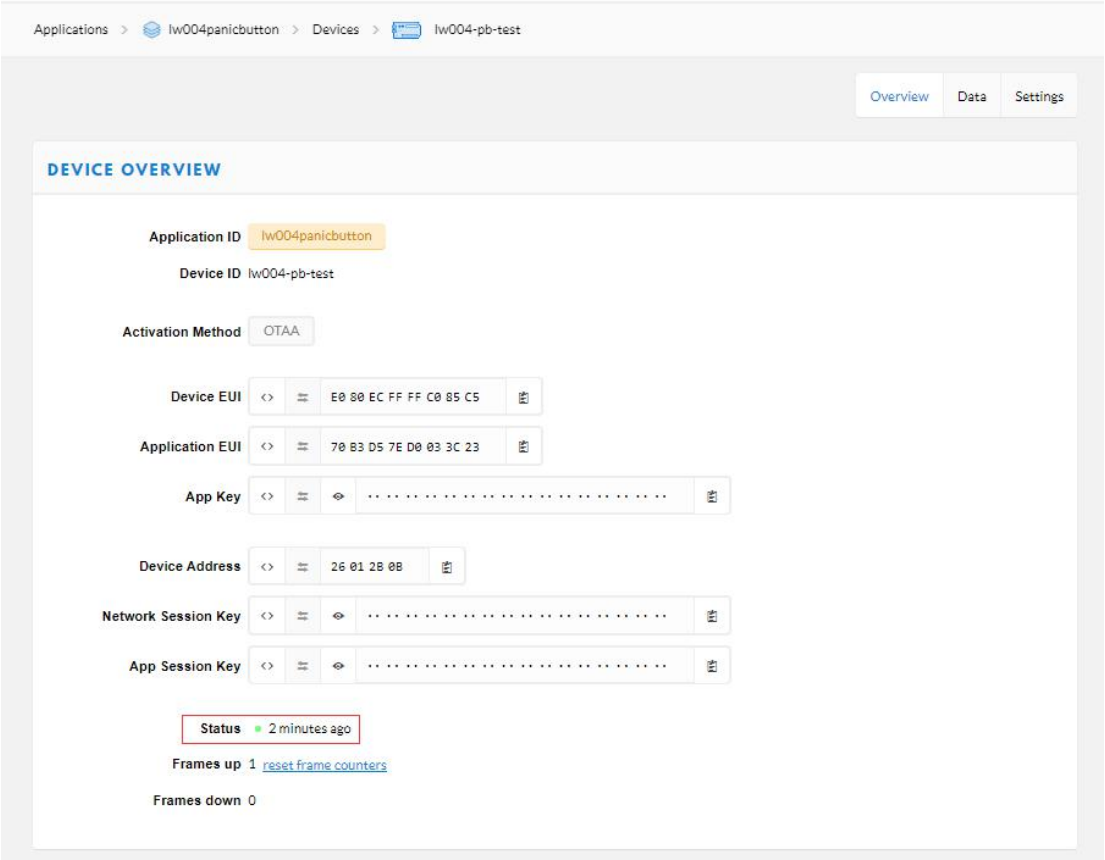

Figure40 TTN Device Status Check

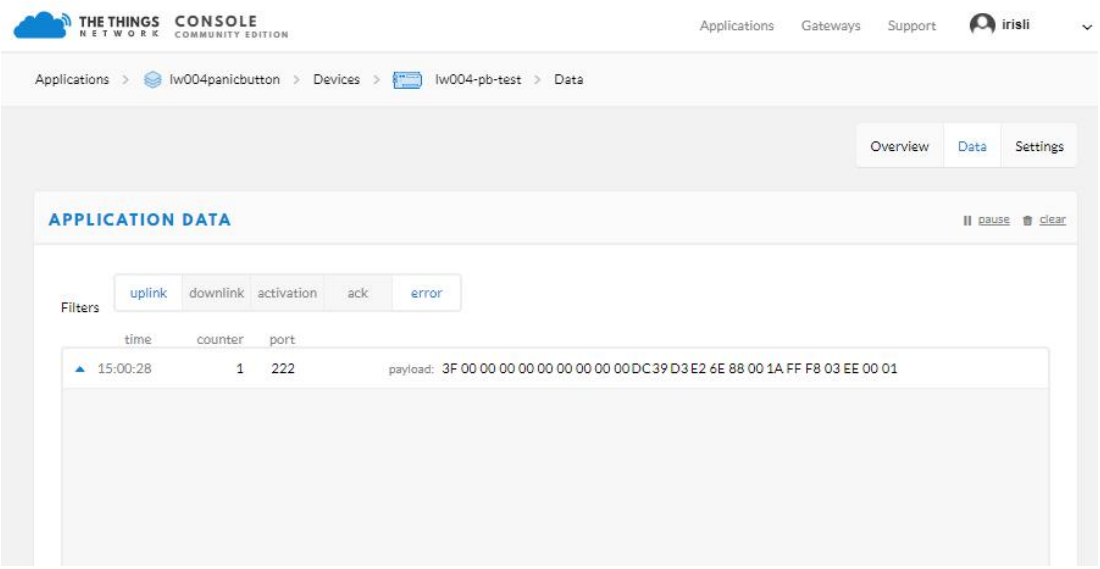

Figure41 TTN Device Uplink Data

14 Gateway Default Frequency

Frequency	Channel NO.	Uplink Frequency(MHZ)
EU868	0-7	868.1, 868.3, 868.5, 867.1, 867.3, 867.5, 867.7, 867.9
IN865	0-7	865.0625, 865.4025, 865.985, 865.2625, 865.6625, 866.185, 866.385, 866.585
US915	0-7,64	902.3, 902.5, 902.7, 902.9, 903.1, 903.3, 903.5, 903.7, 903.0
	8-15,65	903.9, 904.1, 904.3, 904.5, 904.7, 904.9, 905.1, 905.3,904.6
	16-23,66	905.5, 905.7, 905.9, 906.1, 906.3, 906.5, 906.7, 906.9, 906.2,
	24-31,67	907.1, 907.3, 907.5, 907.7, 907.9, 908.1, 908.3, 908.5, 907.8
	32-39,68	908.7, 908.9, 909.1, 909.3, 909.5, 909.7, 909.9, 910.1, 909.4
	40-47,69	910.3, 910.5, 910.7, 910.9, 911.1, 911.3, 911.5, 911.7, 911
	48-55,70	911.9, 912.1, 912.3, 912.5, 912.7, 912.9, 913.1, 913.3, 912.6
	55-63,71	913.5, 913.7, 913.9, 914.1, 914.3, 914.5, 914.7, 914.9, 914.2
AU915	0-7,64	915.2, 915.4, 915.6, 915.8, 916.0, 916.2, 916.4, 916.6, 915.9
	8-15,65	916.8, 917.0, 917.2, 917.4, 917.6, 917.8, 918.0, 918.2, 917.5
	16-23,66	918.4, 918.6, 918.8, 919.0, 919.2, 919.4, 919.6, 919.8, 919.1
	24-31,67	920.0, 920.2, 920.4, 920.6, 920.8, 921.0, 921.2, 921.4, 920.7
	32-39,68	921.6, 921.8, 922.0, 922.2, 922.4, 922.6, 922.8, 923.0, 922.3
	40-47,69	923.2, 923.4, 923.6, 923.8, 924.0, 924.2, 924.4, 924.6, 923.9
	48-55,70	924.8, 925.0, 925.2, 925.4, 925.6, 925.8, 926.0, 926.2, 925.5
	56-63,71	926.4, 926.6, 926.8, 927.0, 927.2, 927.4, 927.6, 927.8, 927.1
AS923	0-7	923.2, 923.4, 923.6, 923.8, 923.8, 924.0, 924.2, 924.4, 924.6,924.5

Table4 Default Frequency

15 Maintenance Instruction

• Do not use or store the device in dusty or dirty areas.
• Do not use or store the device in extremely hot temperatures. High temperatures may damage the device.
• Do not use or store the device in extremely cold temperatures .when the device warms to its

normal temperature, moisture can form inside the device and damage the device.

- Do not drop ,knock, or shake the device. Rough handing would break it.
- Do not use strong chemicals or washing to clean the device.
- Do not paint the device ,paint would cause improper operation
- Do not disassemble the device casually or use the tools for maintenance without permission
- Handle your device, and accessories with care. The suggestions above help you keep your device operational.

16 Revision

Version	Description	Editor	Date
1.0	Initial Version	Iris	2020/8/26
1.1	1. Update document format 2. Add TTN server address link 3. Add gateway default frequency	Iris	2020/12/10

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