LG308-AS923-TH-EC25 LoRaWAN Gateway User Manual

Document Version: 1.1.3.TH

Version	Description	Date
1.0	Release	2018-Nov-17
1.1	Add notice for recover mode. Add hardware source code Add FAQ for customized frequency.	2019-Jan-10
1.1.1	Add how to control LED. Add	
1.1.2	Remove SX1276 description and GPS.	
1.1.3	Change the HTTP Port and SSH port for firmware version > v5.3	2019-Nov-26

Dragino Technology Co., Limited
Room 202, Block B, BCT Incubation Bases (BaoChengTai), No.8 CaiYunRoad
LongCheng Street, LongGang District ; Shenzhen 518116,China
Direct: +86 755 86610829 |Fax: +86 755 86647123

M2M
16/294 Moo 4, Lantakfa-Salaya road
Tambon Mahasawat, Amphoe Phutthamonthon
Nakhonpathom, 73170 Thailand
Tel.062-1982256 m2mlorawan@gmail.com

1. Introduction

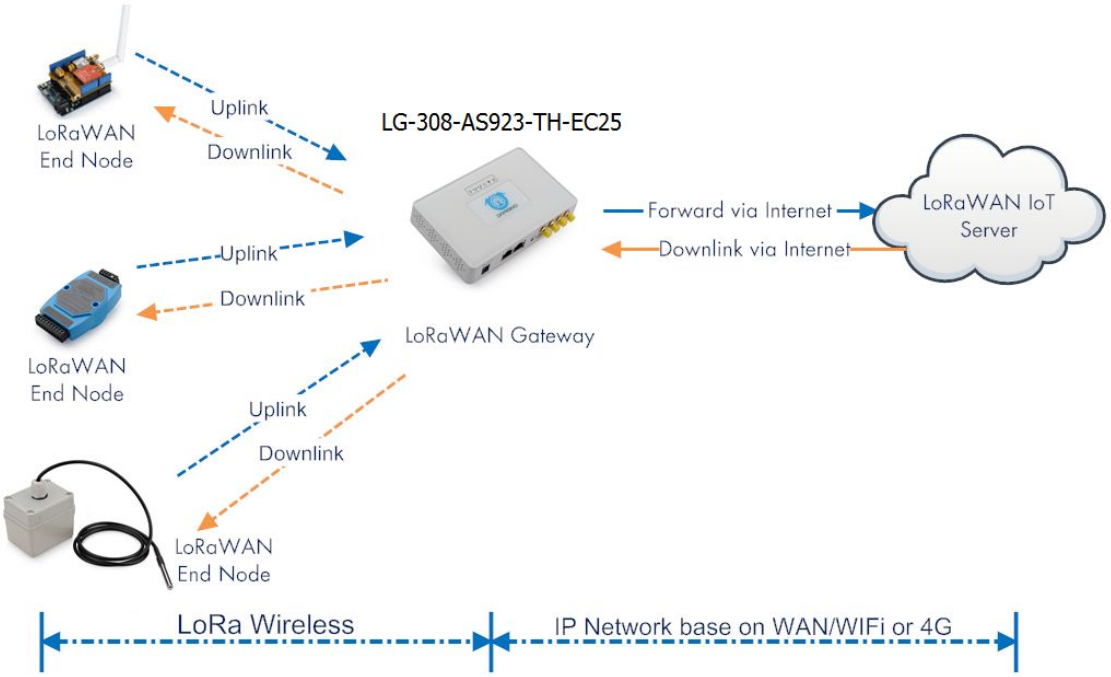
1.1 What is LG308-AS923-TH-EC25

The LG308-AS923-TH-EC25 is a LoRaWAN Gateway. It lets you bridge LoRa wireless network to an IP network via WiFi, Ethernet, 3G or 4G cellular network. The LoRa wireless allows users to send data and reach extremely long ranges at low data-rates.

The LG308 uses Semtech packet forwarder and fully compatible with LoRaWAN protocol. It includes a SX1301 LoRa concentrator, which provides 10 programmable parallel demodulation paths.

LG308-AS923-TH-EC25 has pre-configured Thailand standard LoRaWAN frequency bands, AS1 and AS2. The Frequescy is from 920-925Mhz.

LG308-AS923-TH-EC25 In a LoRaWAN IoT Network:



1.2 Specifications

Hardware System:

Linux Part:

- 400Mhz ar9331 processor
- 64MB RAM
- 16MB Flash

Interface:

- 10M/100M RJ45 Ports x 2
- WiFi : 802.11 b/g/n
- LoRaWAN Wireless
- Power Input: 12V DC, 1 A
- USB 2.0 host connector x 1
- Mini-PCI E connector x 1
- SX1301 + 2 x SX1257

WiFi Spec:

- IEEE 802.11 b/g/n
- Frenquency Band: 2.4 ~ 2.462GHz
- Tx power:
  - ✓ 11n tx power : mcs7/15: 11db mcs0 : 17db
  - ✓ 11b tx power: 18db
  - ✓ 11g 54M tx power: 12db
  - ✓ 11g 6M tx power: 18db
- Wifi Sensitivity
  - ✓ 11g 54M : -71dbm
  - ✓ 11n 20M : -67dbm

LoRa Spec:

- Up to -142.5dBm sensitivity with SX1257 Tx/Rx front-end
- 70 dB CW interferer rejection at 1 MHz offset
- Able to operate with negative SNR, CCR up to 9dB
- Emulates 49x LoRa demodulators and 1x (G)FSK demodulator
- Dual digital TX&RX radio front-end interfaces
- 10 programmable parallel demodulation paths
- Dynamic data-rate (DDR) adaptation
- True antenna diversity or simultaneous dual-band operation

Cellular 4G LTE (optional):

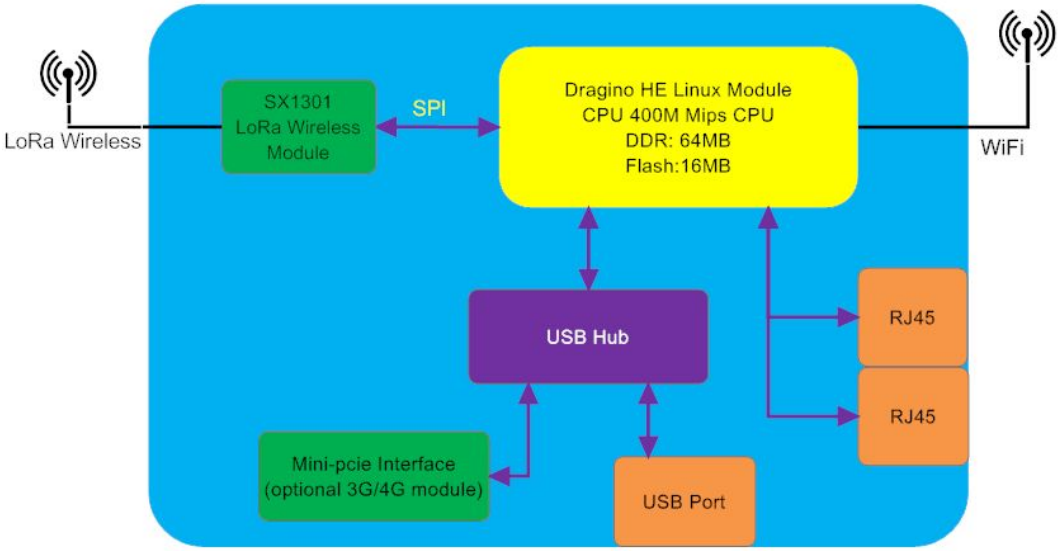
- Quectel **EC25 LTE module**
- Micro SIM Slot
- External 4G Sticker Antenna.
- Up to 150Mbps downlink and 50Mbps uplink data rates
- Worldwide LTE,UMTS/HSPA+ and GSM/GPRS/EDGE coverage
- MIMO technology meets demands for data rate and link reliability in modem wireless communication systems

1.3 Features

- ✓ Open Source OpenWrt system
- ✓ Managed by Web GUI via LAN or WiFi
- ✓ Emulates 49x LoRa demodulators
- ✓ LoRaWAN Gateway
- ✓ 10 programmable parallel demodulation paths

1.4 Hardware System Structure

LG308-AS923-TH-EC25 System Overview:



1.5 LG308-AS923-TH-EC25 Applications

2. Access LG308-AS923-TH-EC25

2.1 Access and configure LG308-AS923-TH-EC25

The LG308 is configured as a WiFi AP by factory default. User can access and configure the LG308 after connect to its WiFi network.

At the first boot of LG308-AS923-TH-EC25, it will auto generate an unsecure WiFi network call ***dragino-xxxxxx***

User can use the laptop to connect to this WiFi network. The laptop will get an IP address 10.130.1.xxx and the LG308 has the default IP 10.130.1.1

Open a browser in the laptop and type

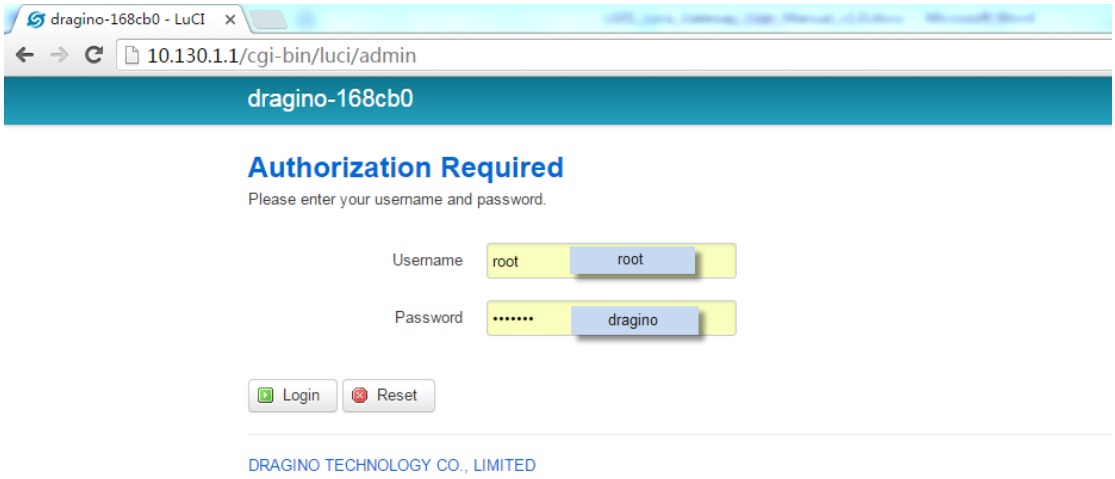
http://10.130.1.1/

User will see the login interface of LG308-AS923-TH-EC25

The account for Web Login is:

User Name: **root**

Password: **dragino**



Notice: In case the WiFi network is disabled, user can connect PC to LG308's LAN port, the PC will get DHCP from LG308, and be able to access it.

Note: the LG308 can also be accessed via WAN interface (WAN port or WiFi when device acts as WiFi Client). But for security reason, for firmware version >5.3, the http access on WAN interface has been set to 8000.

3. Typical Network Setup

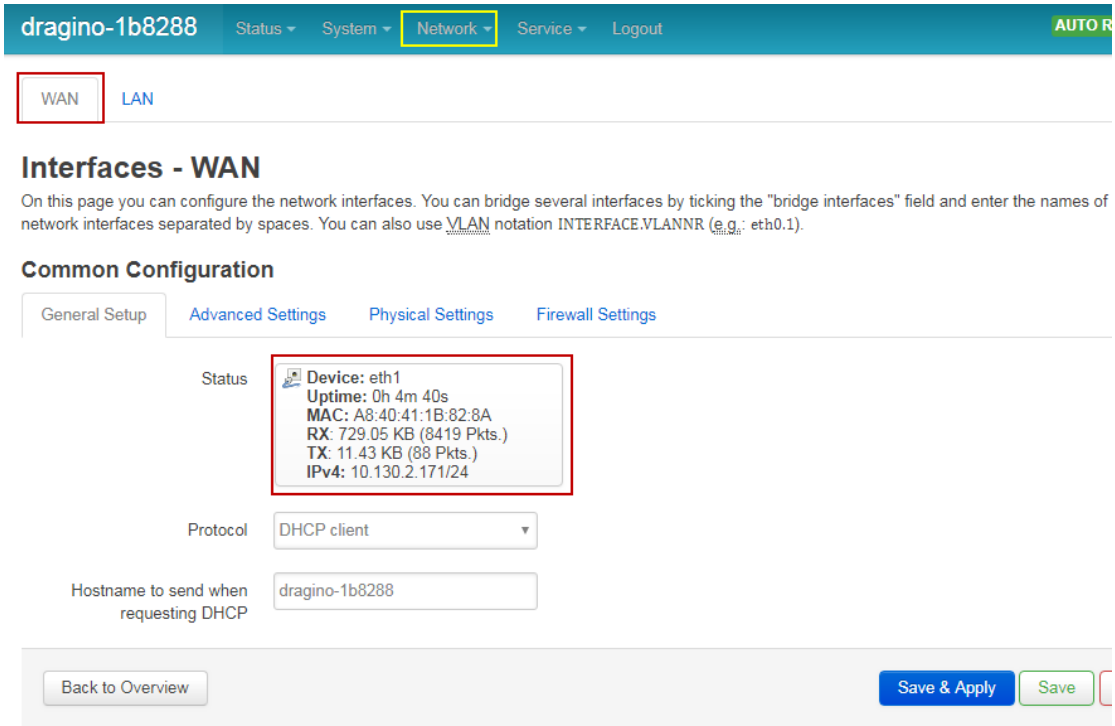
3.1 Overview

LG308 supports flexible network set up for different environment. This section describes the typical network topology can be set in LG308. The typical network set up includes:

- ✓ **WAN Port Internet Mode**
- ✓ **WiFi Client Mode**
- ✓ **WiFi AP Mode**
- ✓ **USB Dial Up Mode**

3.2 Use WAN port to access Internet

By default, the LG308 set to use WAN port as network connection. When connect LG308's WAN port to router, LG308 will get IP from router and have internet access. The network status can be checked as below:

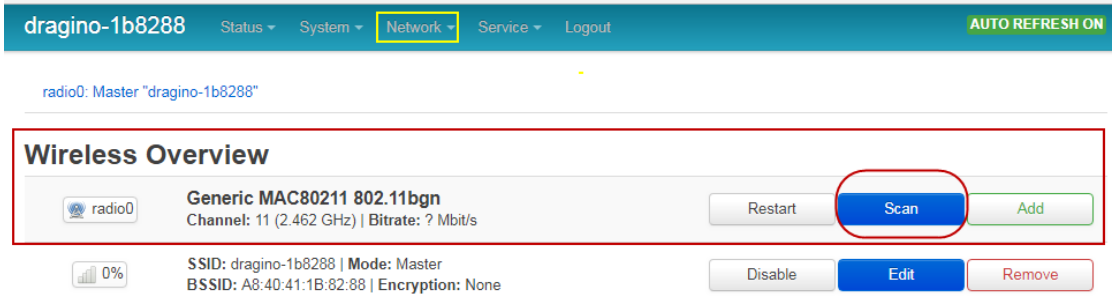


3.3 Access Internet as a WiFi Client.

In the WiFi Client Mode, Dragino acts as a WiFi client and gets DHCP from uplink router via WiFi. The step to set is as below:

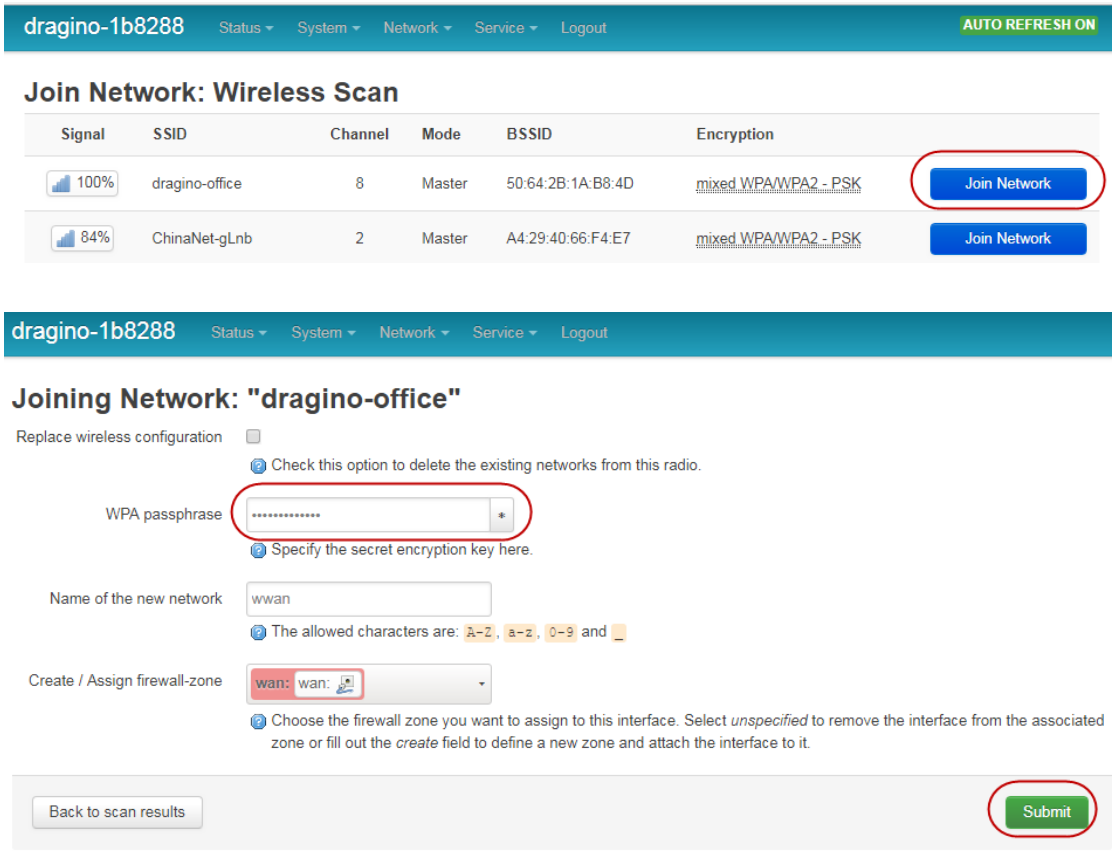
Step1:

In network -> Wireless, select Radio0 interface and scan.



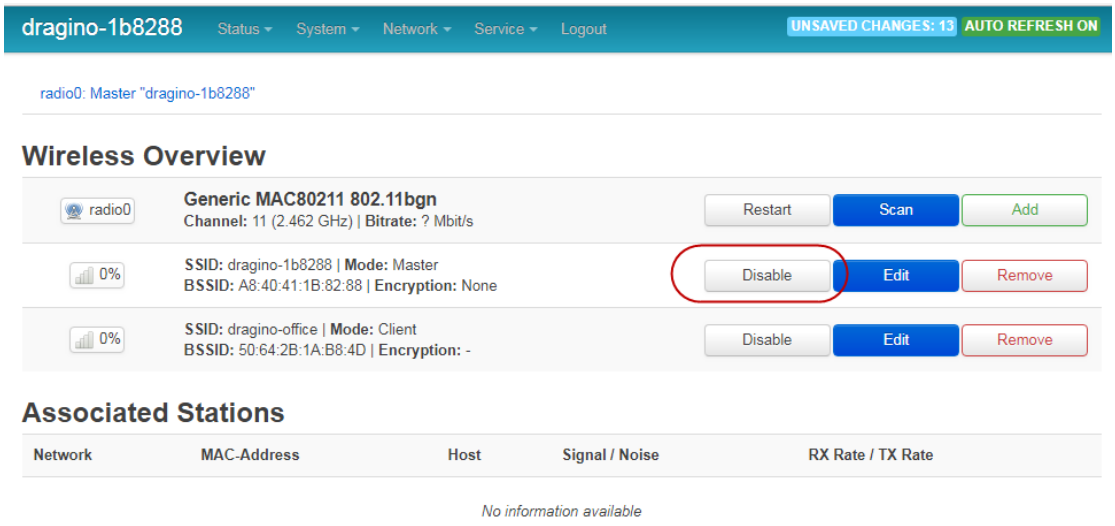
Step2:

Select the wireless AP and join:

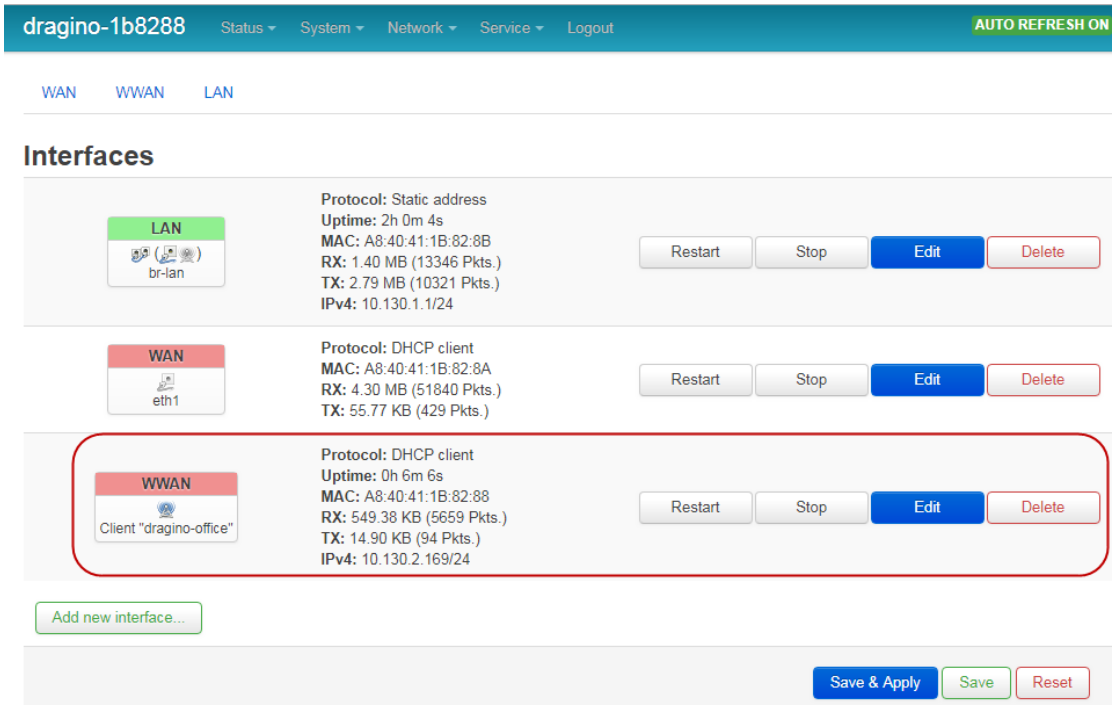


Step3:

In network->wireless page, disable WiFi AP network. Notice: After doing that, you will lose connection if your computer connects to the LG308 via LG308's wifi network.



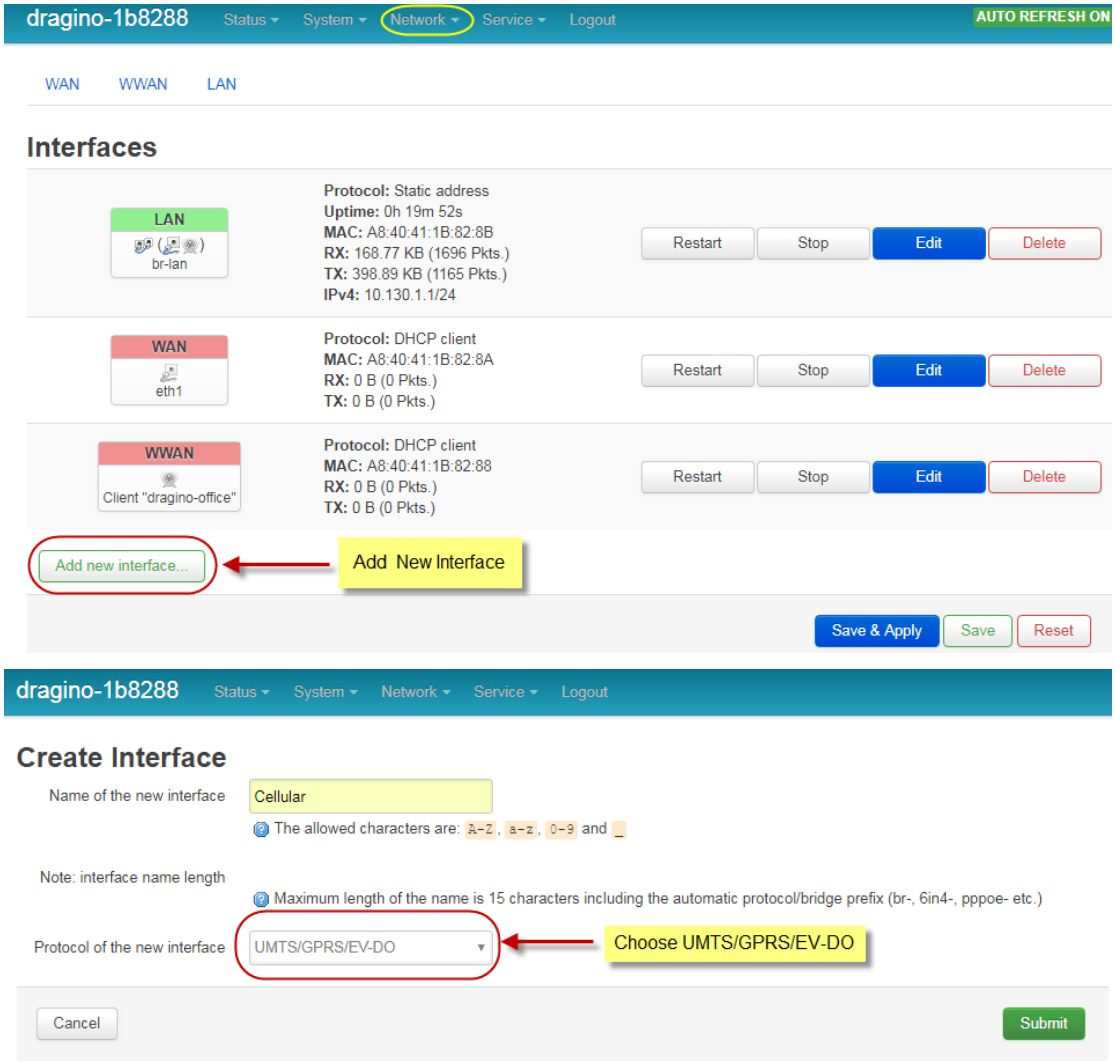
After successful associate, the WiFi network interface can be seen in the same page:



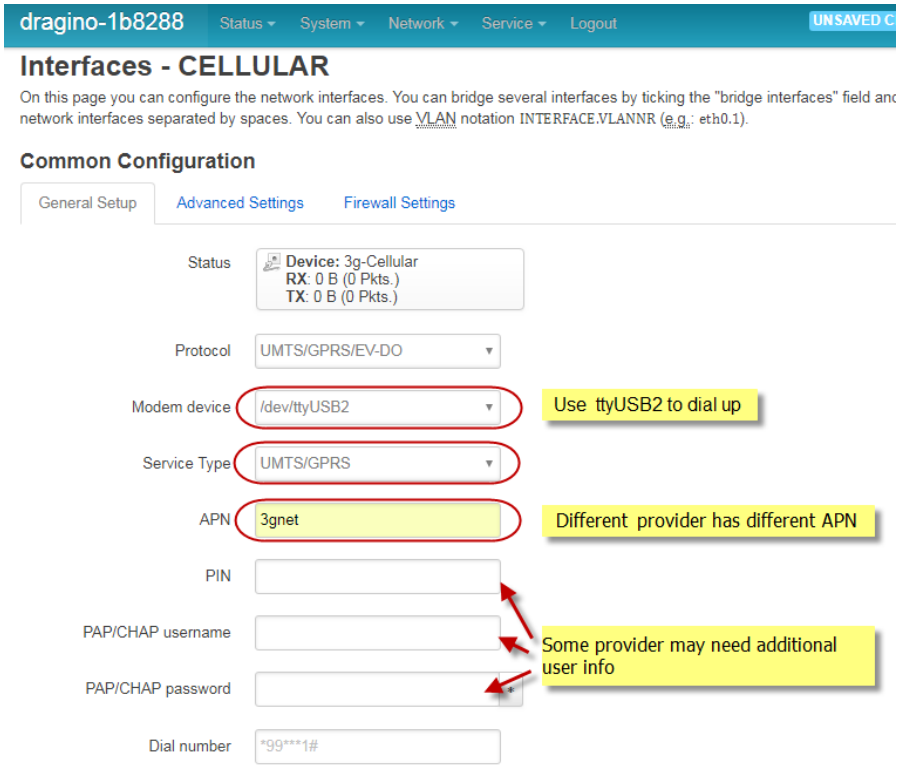
3.4 Use built-in 4G modem for internet access

For the LG308 model with 4G version, user can configure the modem for internet access.

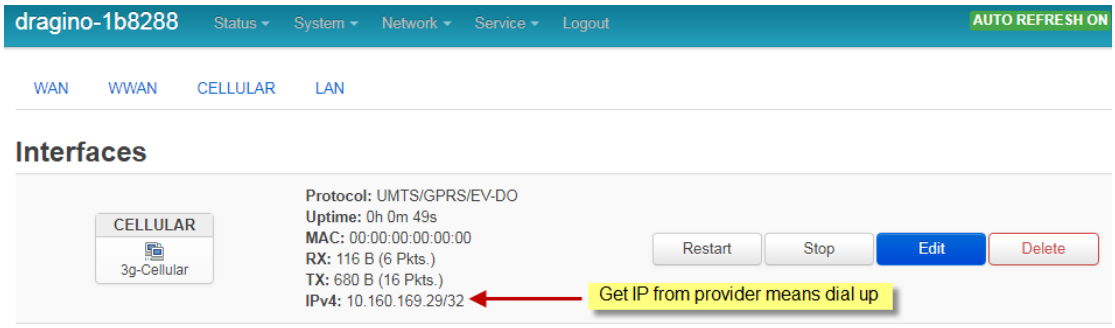
Step 1: Add New Interface



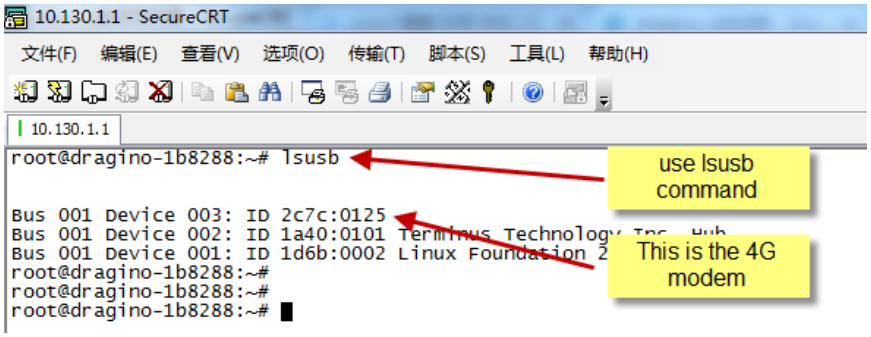
Step 2: Configure cellular interface



Step 3: Check Result

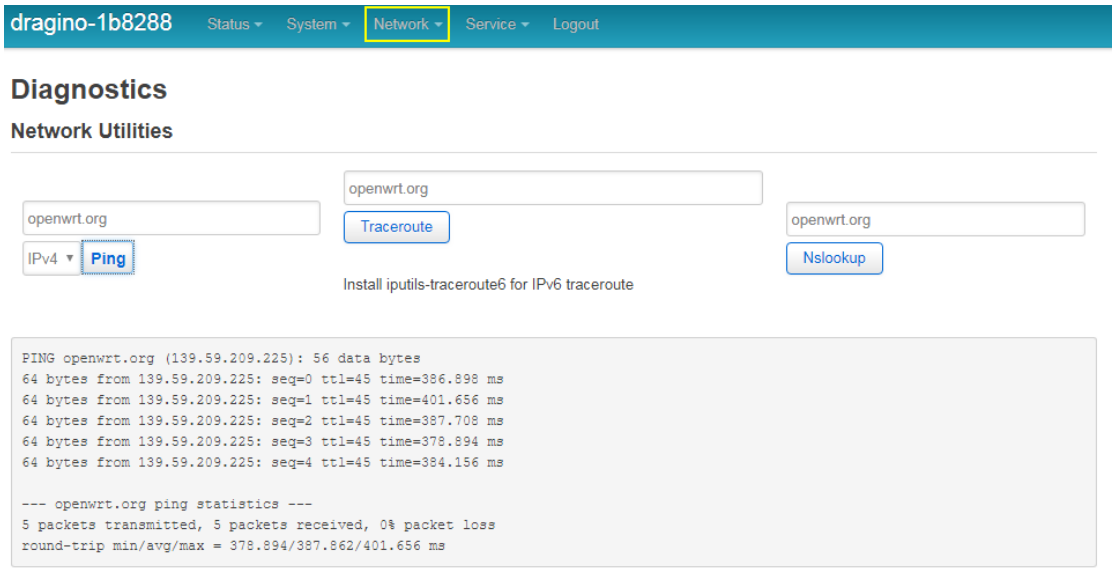


Note: In case you don't know whether your device has 4G modem, you can run lsusb command in SSH access to check, as below:



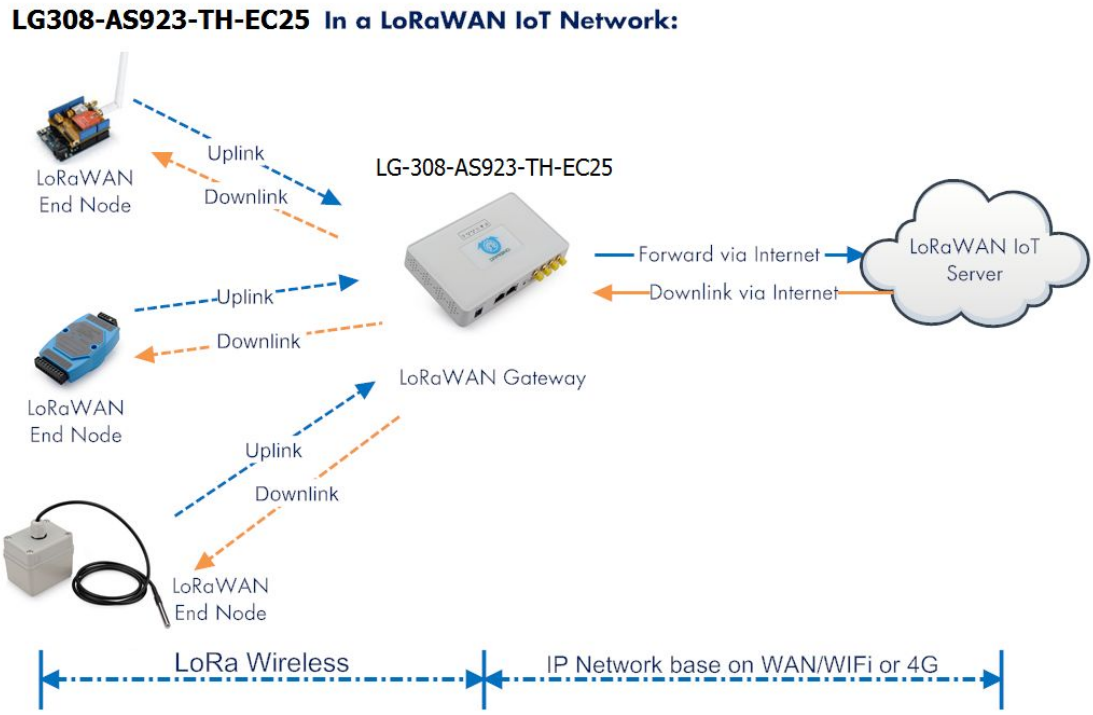
3.5 Check Internet connection

User can use the diagnostics page to check and analyze Internet connection.



4. Example : Configure as a LoRaWAN gateway

LG308 is fully compatible with LoRaWAN protocol. It use the legacy Semtech Packet forwarder to forward the LoRaWAN packets to server, the structure is as below.

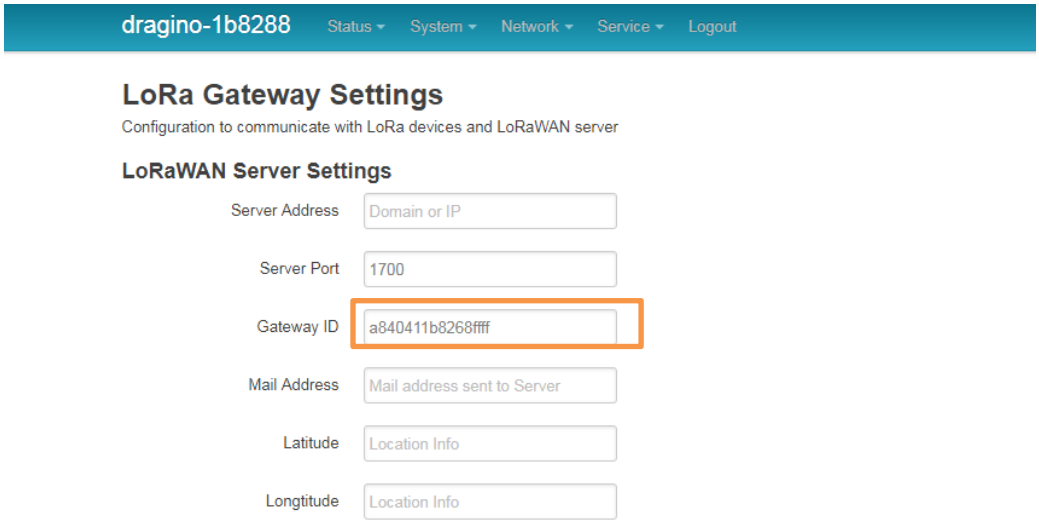


This chapter describes how to use LG308 to work with TTN LoRaWAN Server. The method to work with other LoRaWAN server is similar.

4.1 Create a gateway in TTN Server

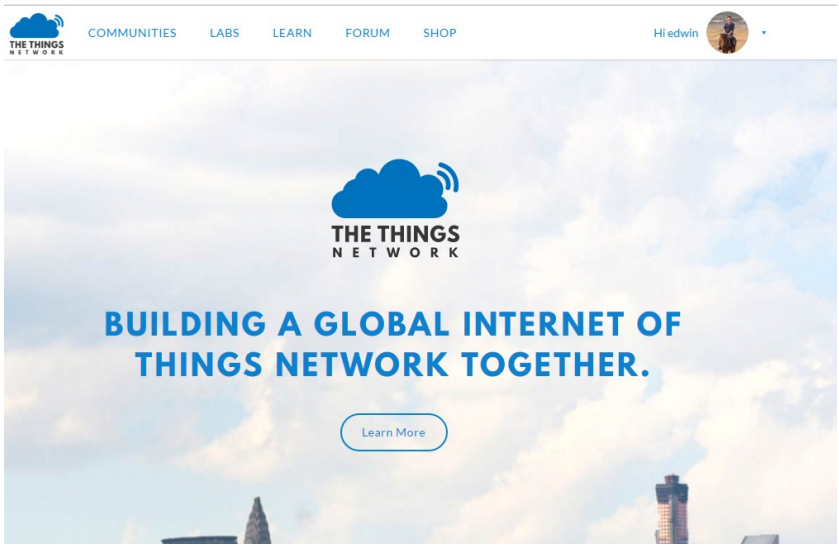
Step 1: Get a Unique gateway ID.

Every LG308 has a unique gateway id. The id can be found at LoRaWAN page:

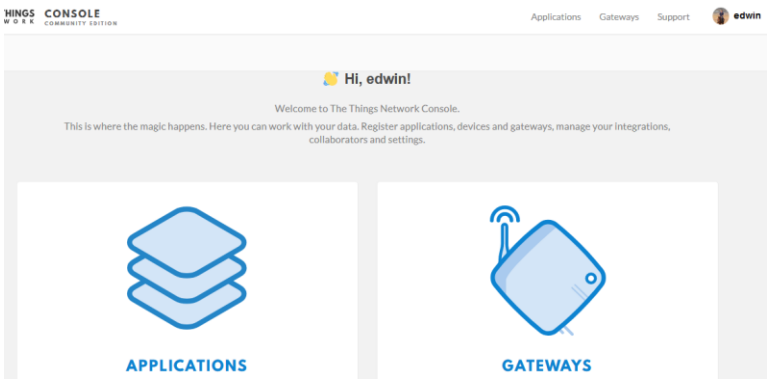


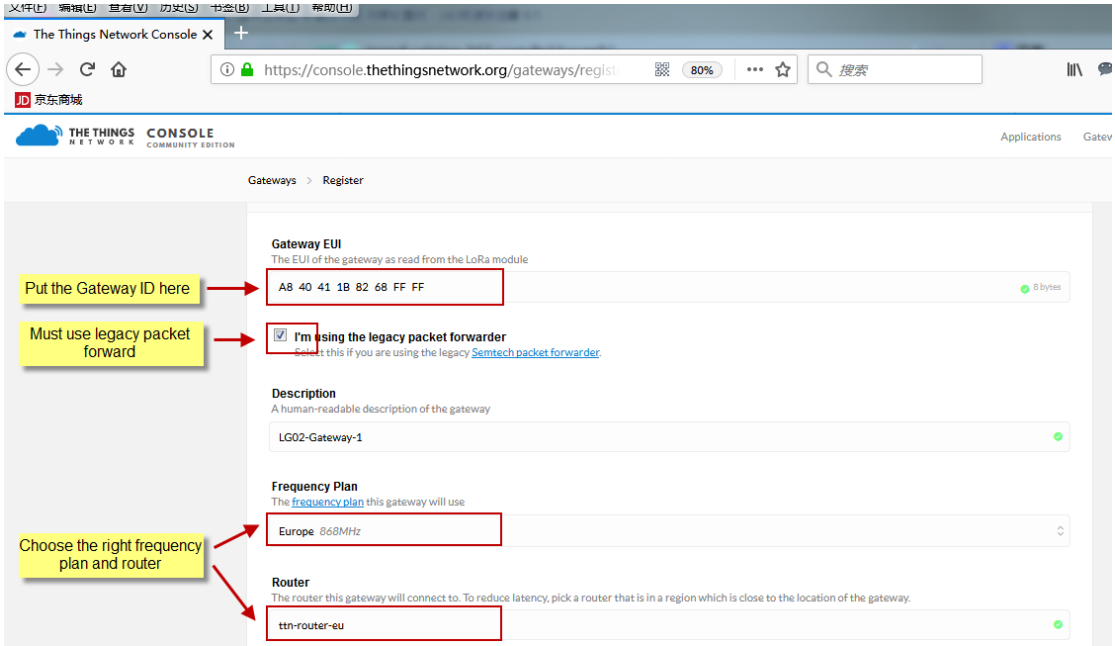
The gateway id is: **a840411b8268ffff**

Step 2: Sign up a user account in TTN server



Step 3: Create a Gateway



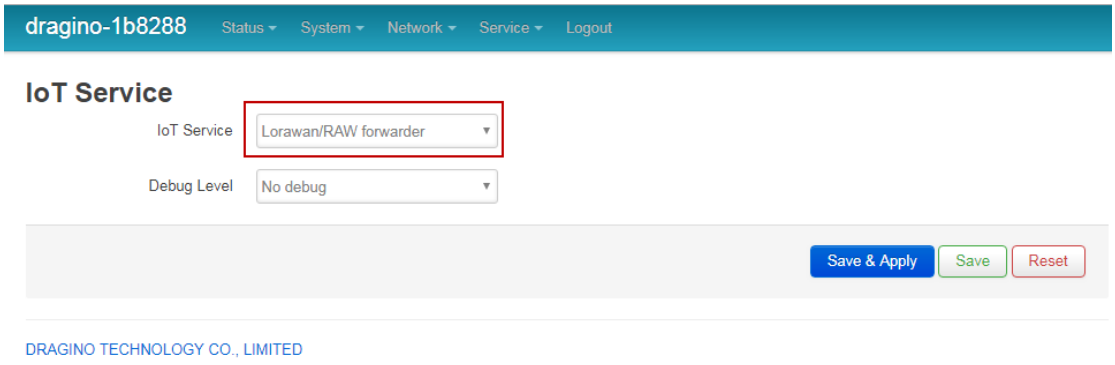


After create the gateway, we can see the gateway info, as below

4.2 Configure LG308-AS923-TH-EC25 to connect to TTN

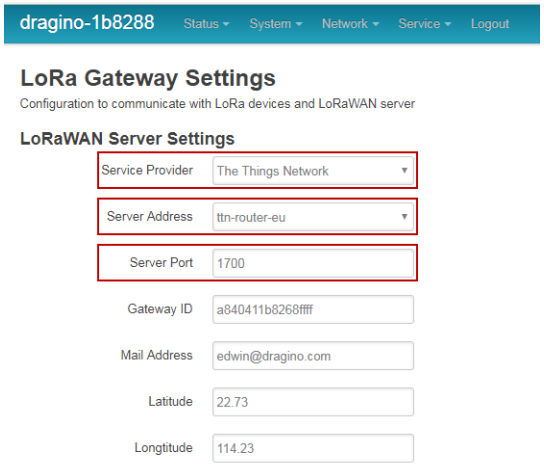
We should configure the LG308 now to let it connect to TTN network. Make sure your LG308 has Internet Connection first.

Step1: Configure LG308-AS923-TH-EC25 to act as raw forwarder



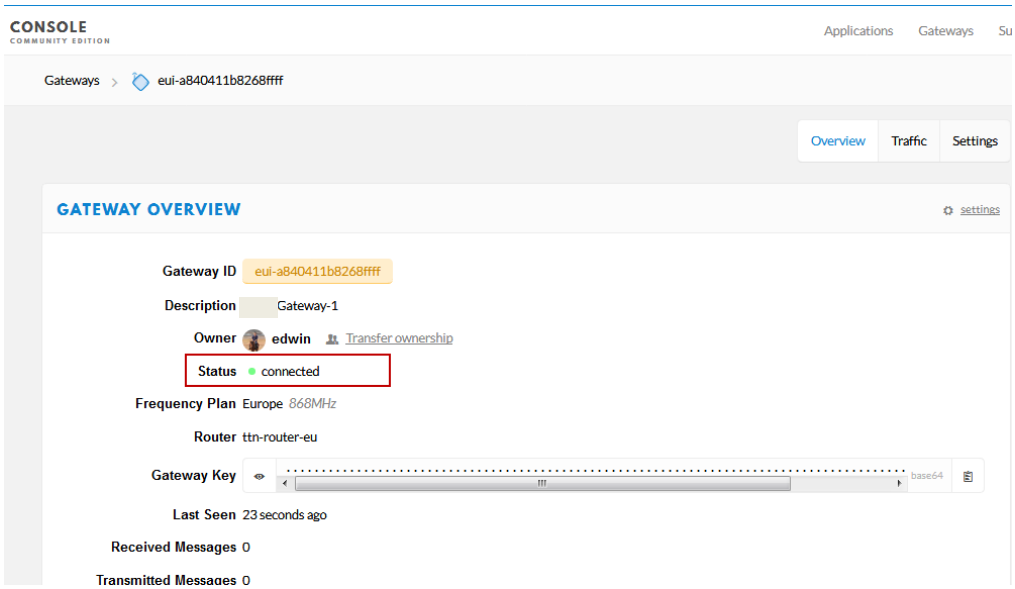
Step2: Input server info and gateway id

Choose the correct the server address and gateway ID.

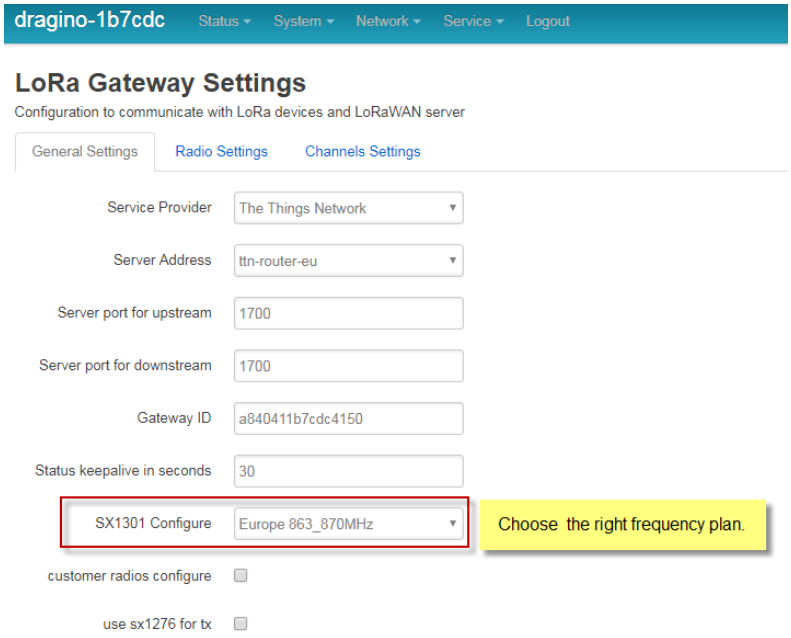


Check Result

After above settings, the LG308 should be able to connect to TTN, below is the result seen from TTN:



4.3 Configure frequency



After doing above LG308 will be able to act as LoRaWAN. Below section shows how to add a LoRaWAN End device in this LoRaWAN network and see the data from TTN.

We use LT-33222-L as a reference below, for other LoRaWAN devices will be more or less the same.

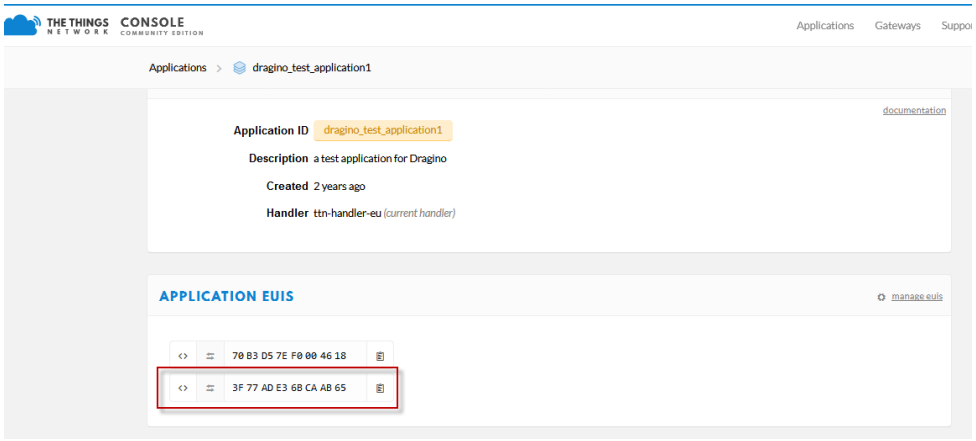
4.4 Add a LoRaWAN End Device

Step 1: Create a device in TTN with the OTAA keys from LT IO controller.

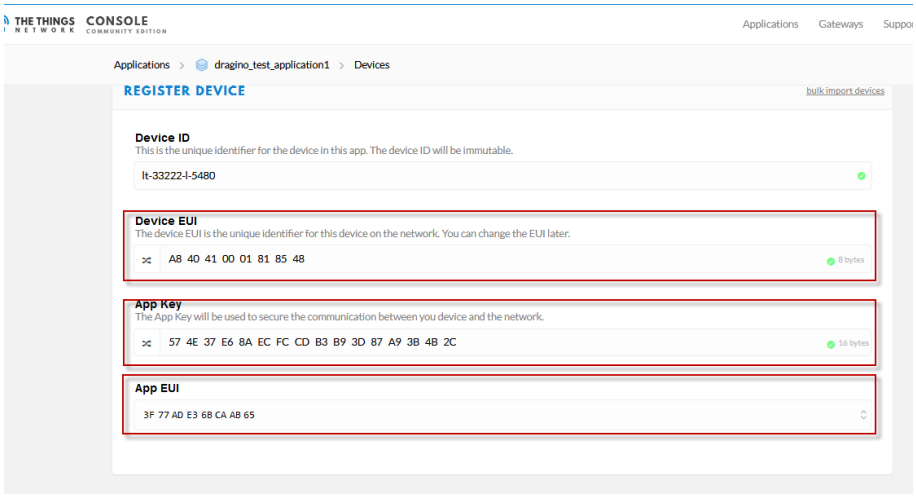
Each LT is shipped with a sticker with the default device EUI as below:

User can enter this key in their LoRaWAN Server portal. Below is TTN screen shot:

Add APP EUI in the application.



Add APP KEY and DEV EUI



Step 2: Power on LT and it will auto join to the TTN network. After join success, it will start to upload message to TTN and user can see in the panel and analyze the data