# LG308 LoRaWAN Gateway User Manual

## Document Version: 1.4.2

Firmware Version: lgw--build-v5.4.1615882321-20210316-1613

| Version | Description | Date |
|---|---|---|
| 1.0 | Release | 2018-Nov-17 |
| 1.1 | Add notice for recover mode. Add hardware source code<br>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 |
| 1.2.0 | Add more features such packet filter, remote access | 2020-Mar-02 |
| 1.2.1 | Add contents for access to the device | 2020-Mar-16 |
| 1.3.0 | Update manual to the new version of UI | |
| 1.4.0 | Add Auto – Provision Feature | 2021-Jan-3 |

| | | |
|---|---|---|
| 1.4.1 | Add AWS-IoT Support | 2021-Mar-27 |
| 1.4.2 | Change to use TTNv3 as LoRaWAN server. | 2021-Jul-16 |

# 1. Introduction

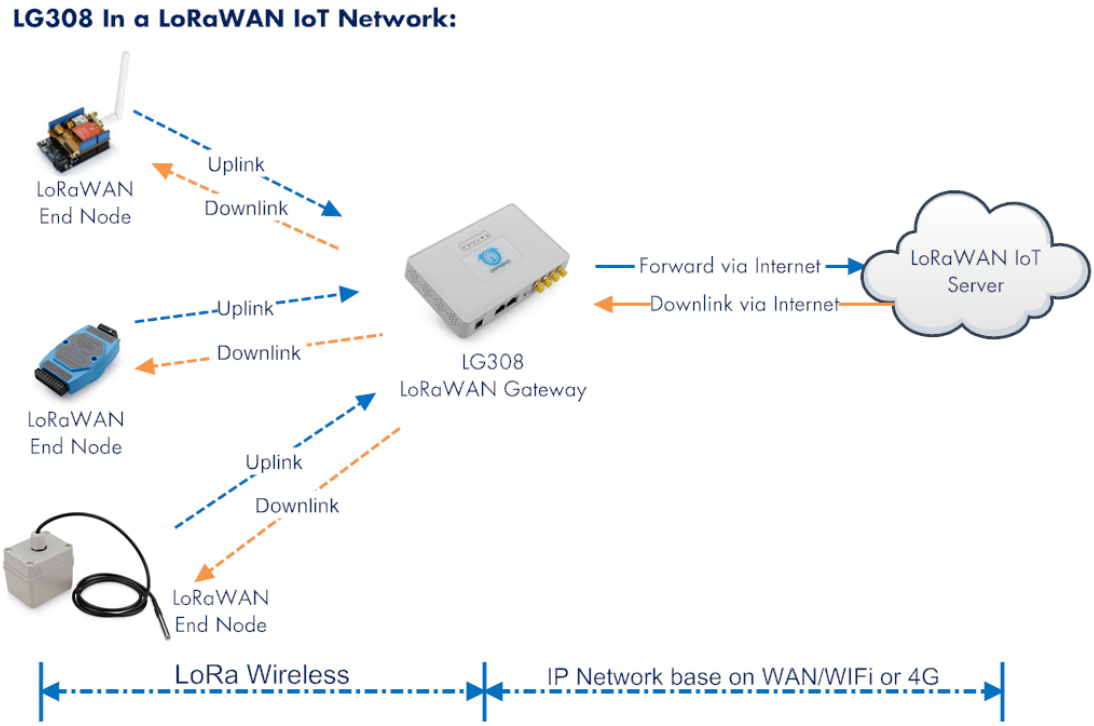
## 1.1 What is LG308

The LG308 is an open source **LoRaWAN Pico 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 has pre-configured standard LoRaWAN frequency bands to use for different countries. User can also customized the frequency bands to use in their own LoRa network.

LG308 can communicate with ABP LoRaWAN end node without LoRaWAN server. System integrator can use it to integrate with their existing IoT Service without set up own LoRaWAN server or use 3rd party LoRaWAN service.



## 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
- Frequency 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.

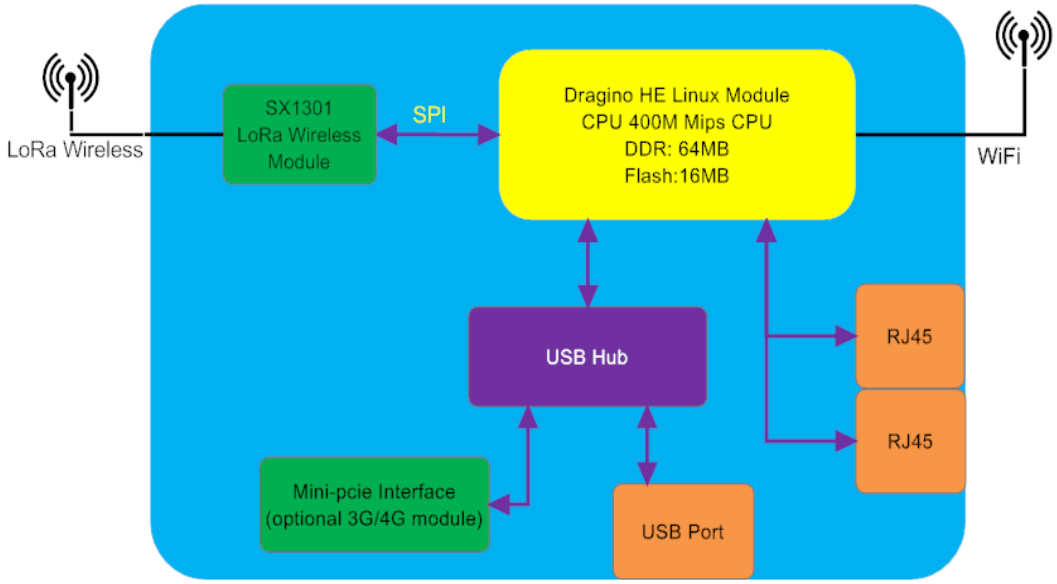
- Up to 150Mbps downlink and 50Mbps uplink data rates
- Worldwide LTE,UMTS/HSPA+ and GSM/GPRS/EDGE coverage
- MIMO technology meets demands for data rate and link reliability in modem wireless communication systems

### 1.3 Features

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

### 1.4 Hardware System Structure

LG308 System Overview:



## 1.5 LG308 Applications


## 1.6 LED Indicators

LG308 has totally 6 LEDs, They are:

- **Power LED** : This **LED** will be **solid on** if the device is properly powered.
- **HEART LED** : No function yet.
- **SYS LED** :This **LED** will shows different colors on different state:
  - ✓ **SOLID**: Device is alive with LoRaWAN server connection.
  - ✓ **BLINKING:** a) Device has internet connection but no LoRaWAN Connection. or b) Device is in booting stage, in this stage, it will **BLINKING** for several seconds.
  - ✓ **OFF**: Device doesn't have Internet connection.
- **ETH LED** : These two LEDs show the ETH interfaces connection status.
- **WiFi LED** : This LED shows the WiFi interface connection status.

**Note: Above LED indication are for firmware version >**
**LG02_LG08--build-v5.3.1584002217-20200312-1639**

## 2. Access and configure LG308

The LG308 is configured as a WiFi Access Point by default. User can access and configure the LG308 after connecting to its WiFi network, or via its Ethernet ports.

### 2.1 Find IP address of LG308

#### 2.1.1 Connect via WiFi

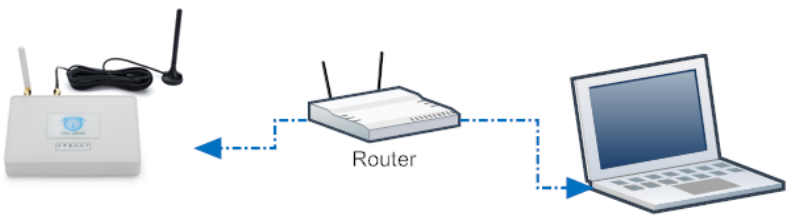

At the first boot of LG308, it will auto generate an unsecure WiFi network call ***dragino-xxxxxx***

Note: In latest version firmware, it has been password protected and the password is:

dragino+dragino

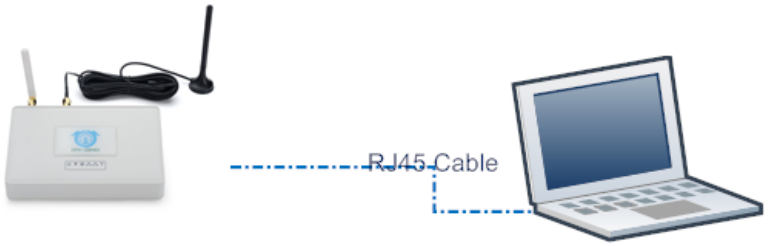

User can use the laptop to connect to this WiFi network. The laptop will get an IP address 10.130.1.xxx and the LG308 has the default IP 10.130.1.1

#### 2.1.2 Connect via WAN port with DHCP IP from router



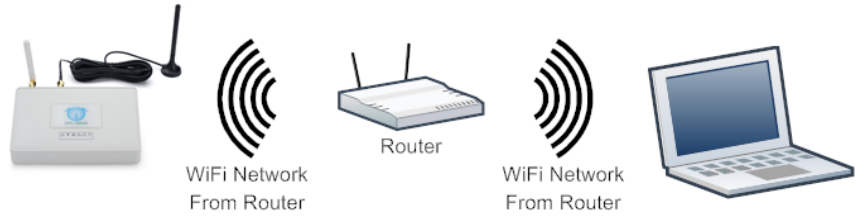

Alternatively, connect the LG308 **WAN port** to your router and LG308 will obtain an IP address from your router. In the router's management portal, you should be able to find what IP address the router has assigned to the LG308. You can also use this IP to connect.

### 2.1.3 Connect via LAN port with direct connection from PC




The LG308 **LAN port** is configured as DHCP router by default, user can connect the PC to LAN port and set PC to DHCP mode, it will get IP from LAN port and be able to access to the device. The default IP in LAN port is 10.130.1.1

### 2.1.4 Connect via WiFi with DHCP IP from router




If the LG308 already connect to the router via WiFi, use can use the WiFi IP to connect to LG308.

### 2.1.5 Connect via LAN port by fall back ip

The **LAN port** also has a fall back ip address for access if user doesn't connect to uplink router.

## 2.2 Access Configure Web UI

**Web Interface**

Open a browser on the PC and type the LG308 ip address (depends on your connect method)

http://10.130.1.1/ (Access via WiFi AP network)

or

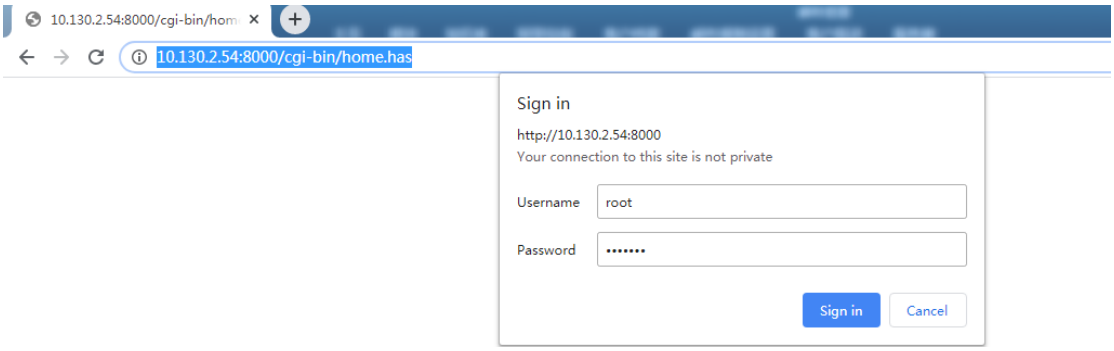
http://IP_ADDRESS or http:// IP_ADDRESS:8000 (If the IP is assigned by uplink router)

You will see the login interface of LG308 as shown below.

The account details for Web Login are:

**User Name: root**

**Password: dragino**



# 3. Typical Network Setup

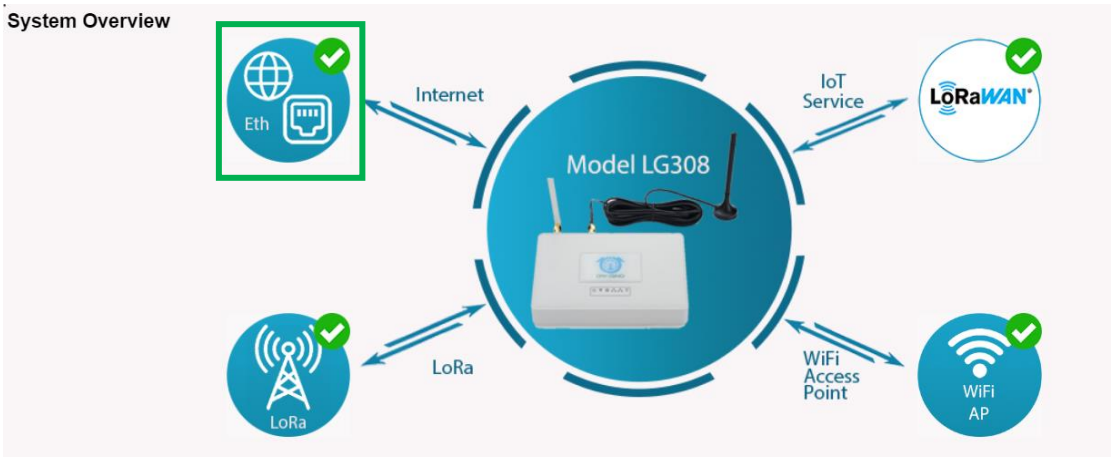
## 3.1 Overview

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

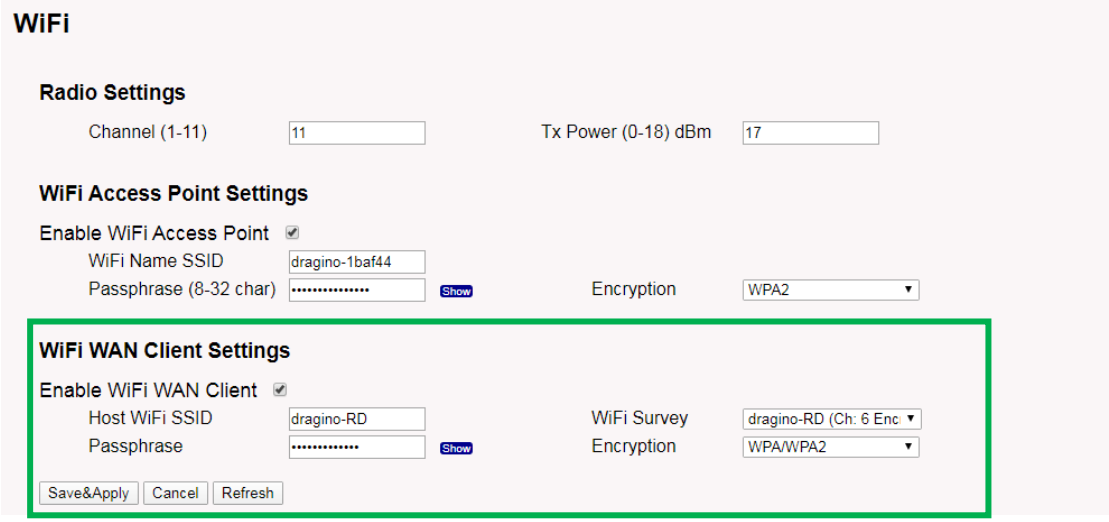
By default, LG308 is set to use the WAN port to connect to an upstream network. When you connect the LG308's WAN port to an upstream router, LG308 will get an IP address from the router and have Internet access via the upstream router. The network status can be checked in the **home page**:



### 3.3 Access Internet as a WiFi Client.

In the WiFi Client Mode, LG308 acts as a WiFi client and gets DHCP from an upstream router via WiFi.

The settings for WiFi Client is under page **System → WiFi → WiFi WAN Client Settings**

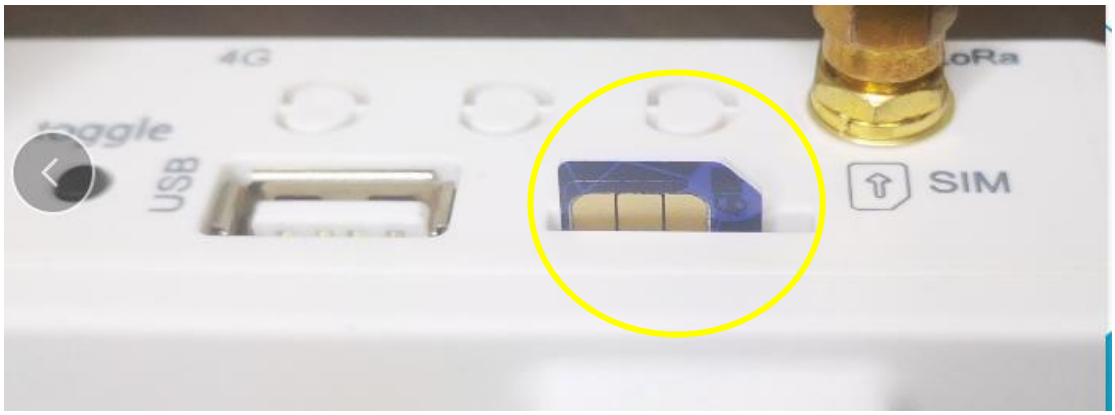



In the WiFi Survey Choose the WiFi AP, and input the Passphrase then click Save & Apply to connect.

### 3.4 Use built-in 4G modem for internet access

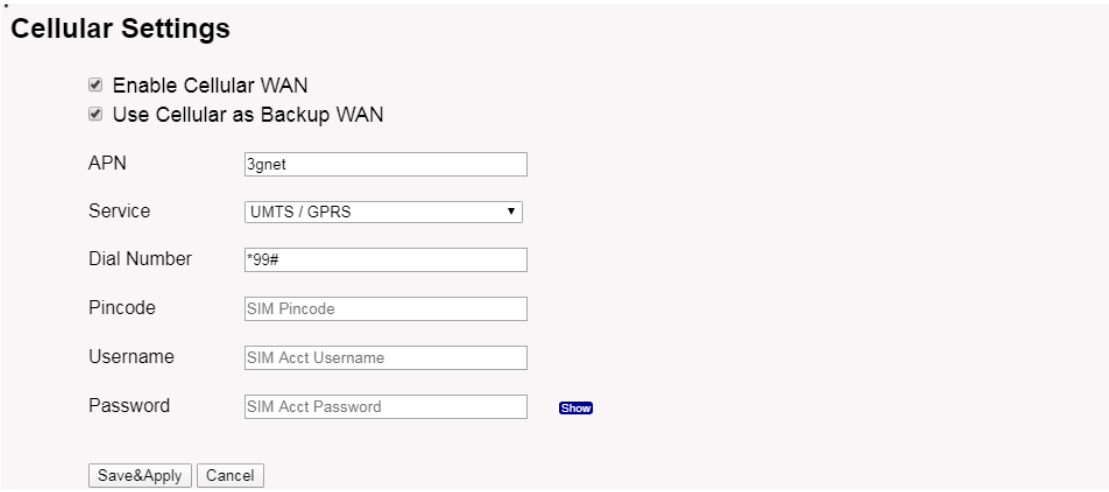
If the LG308 has 3G/4G Cellular modem, user can use it as main internet connection or back up.

First, install the Micro SIM card as below direction
Second, Power off/ ON LG308 to let it detect the SIM card.




The set up page is **System → Cellular**

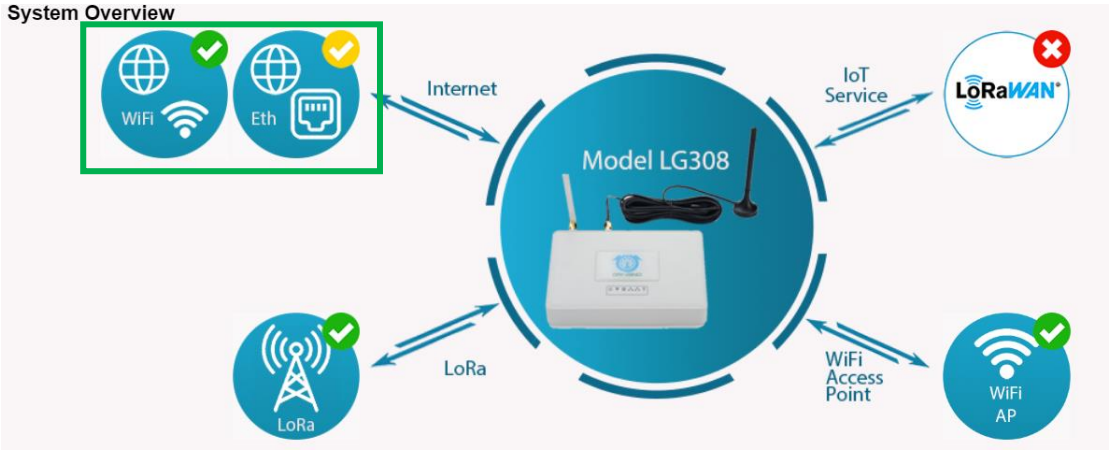
While use the cellular as Backup WAN, device will use Cellular for internet connection while WAN port or WiFi is not valid and switch back to WAN port or WiFi after they recover.



### 3.5 Check Internet connection

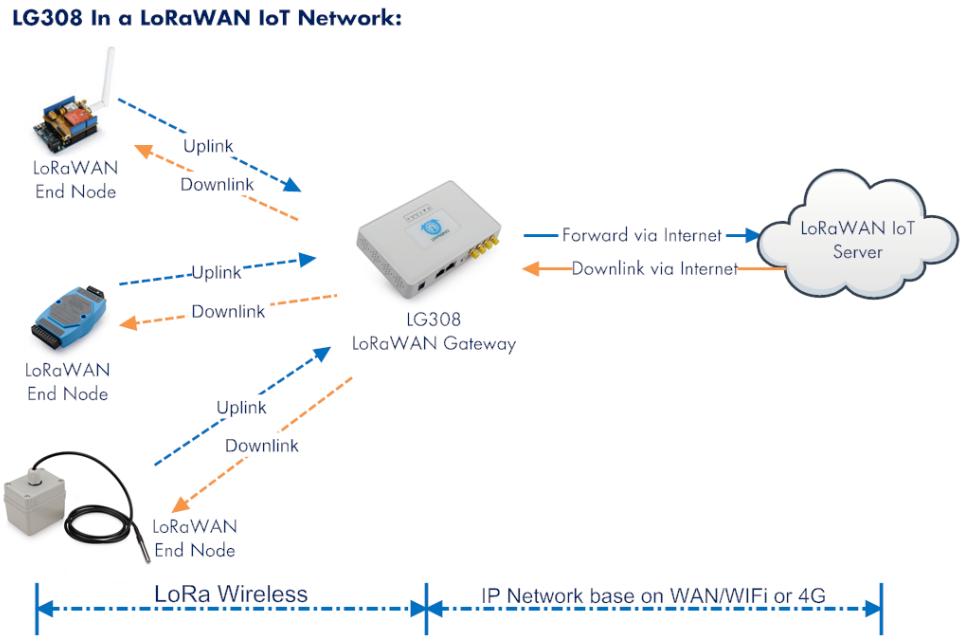
In the **Home** page, we can check the Internet connection.

- GREEN Tick : This interface has Internet connection.
- Yellow Tick : This interface has IP address but don't use it for internet connection.
- RED Cross : This interface doesn't connected.



## 4. Example: Configure as a LoRaWAN gateway

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

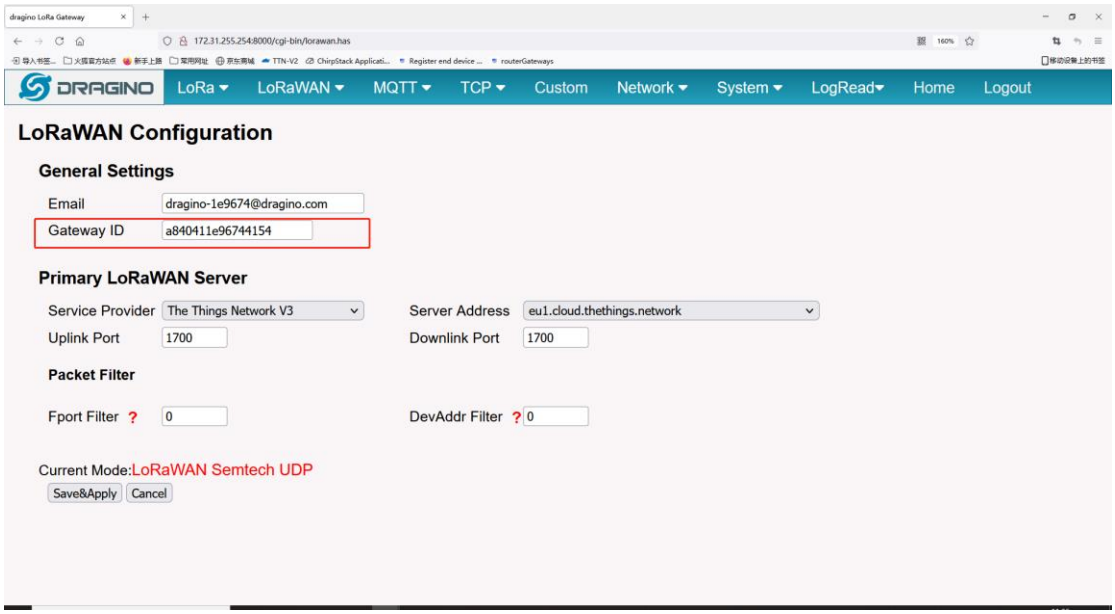



This chapter describes how to use the LG308 to work with TheThingsNetwork v3(TTN v3) LoRaWAN Server (www.thethingsnetwork.org)

## 4.2 Create a gateway in TTN V3 Server

### Step 1: Get a Unique gateway ID.

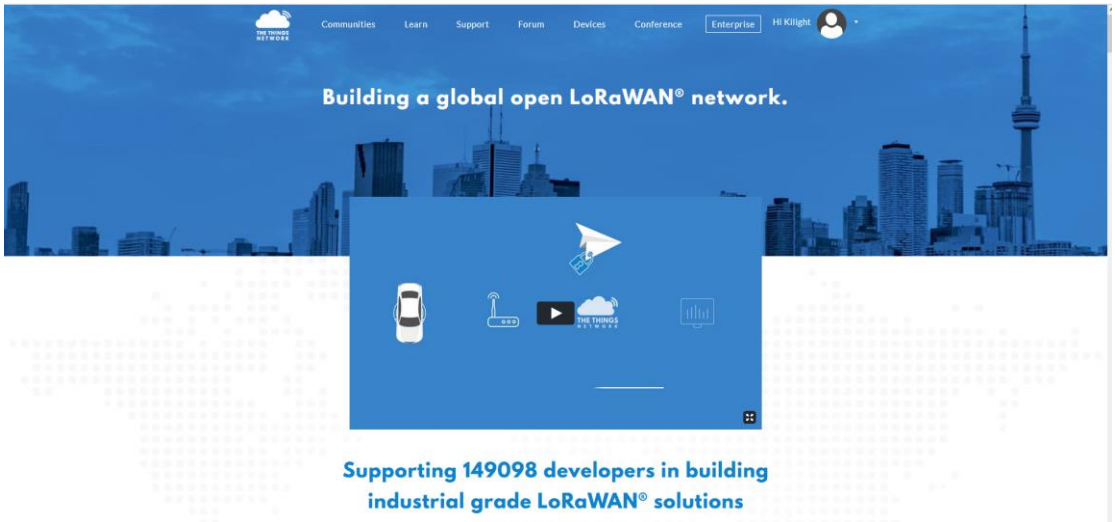
Every LG308 has a unique gateway id. The ID can be found at LoRaWAN page:



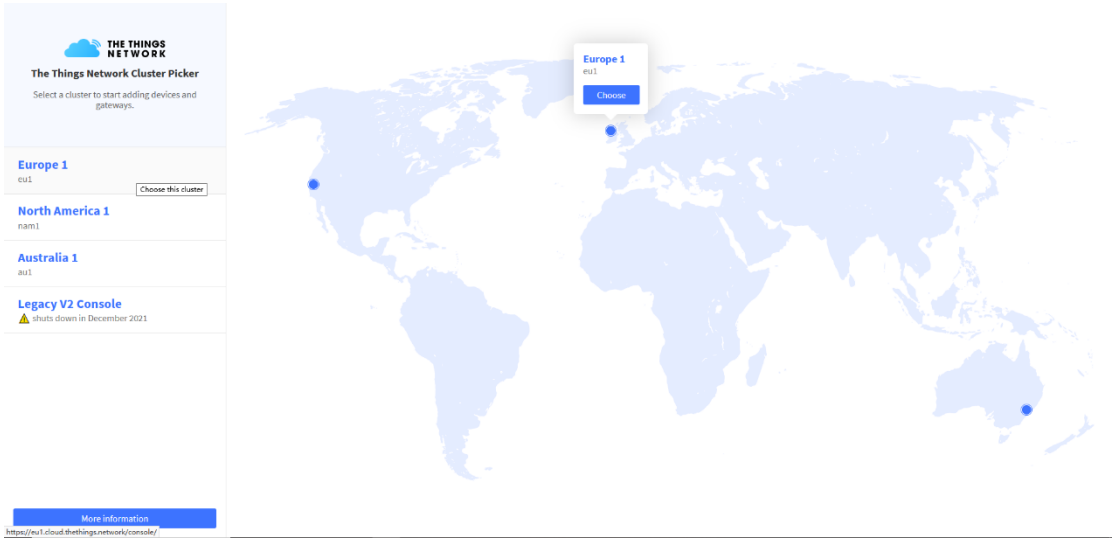

The example gateway id is: **a840411e96744154**

### Step 2: Sign up a user account in TTN server

https://account.thethingsnetwork.org/register



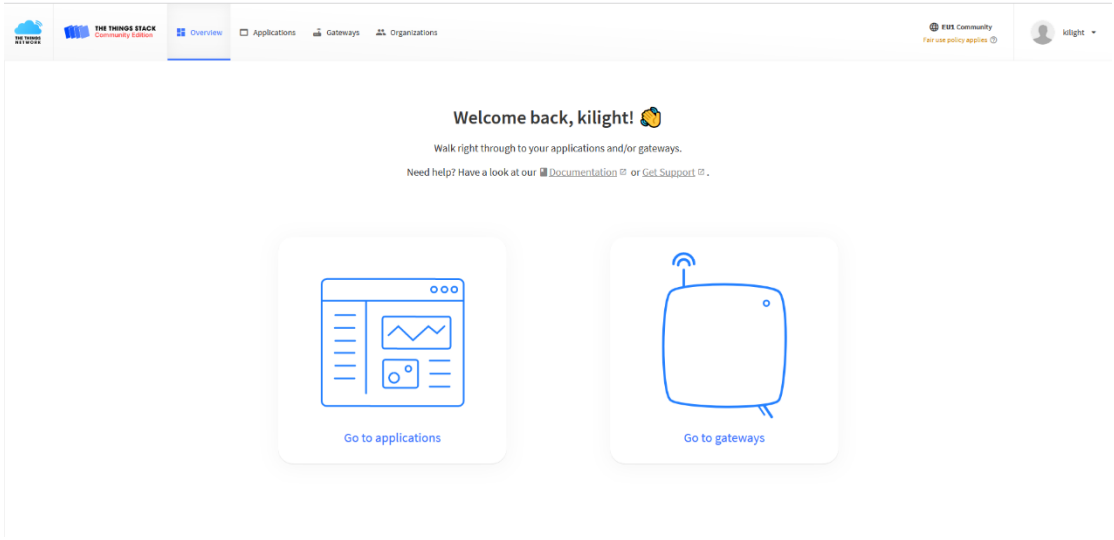
## Step 3: Choose the TTNv3 Cluster Picker




**Note: Choose the cluster corresponds to a specific Gateway server address**

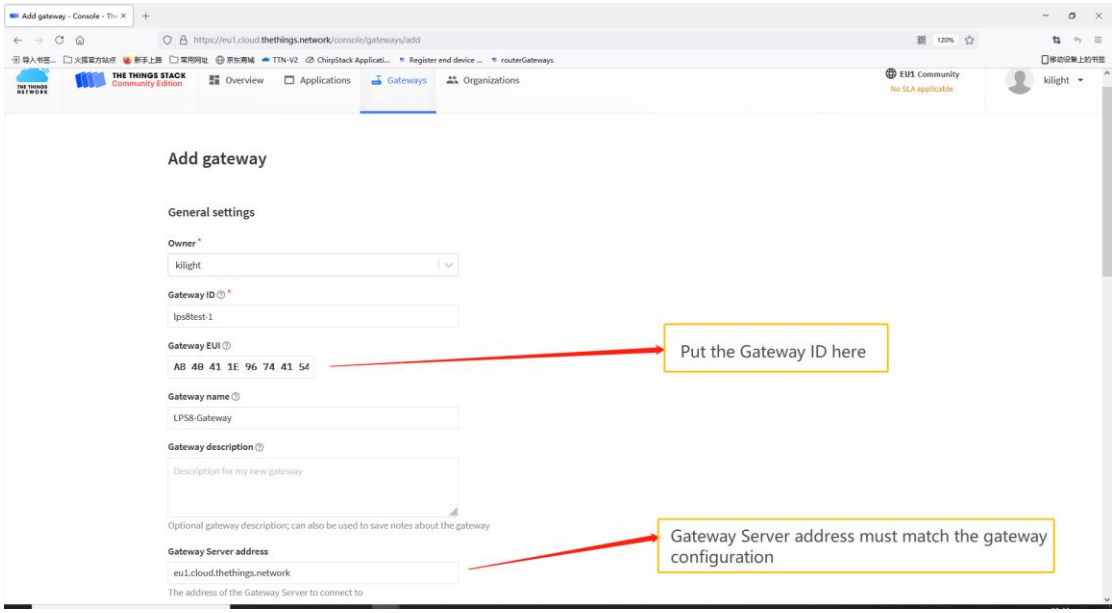
- Europe 1 **corresponding Gateway server address:** eu1.cloud.thethings.network
- North America 1 **corresponding Gateway server address:** nam1.cloud.thethings.network
- Australia 1 **corresponding Gateway server address:** au1.cloud.thethings.network
- Legacy V2 Console : **TTN v2 shuts down in December 2021**

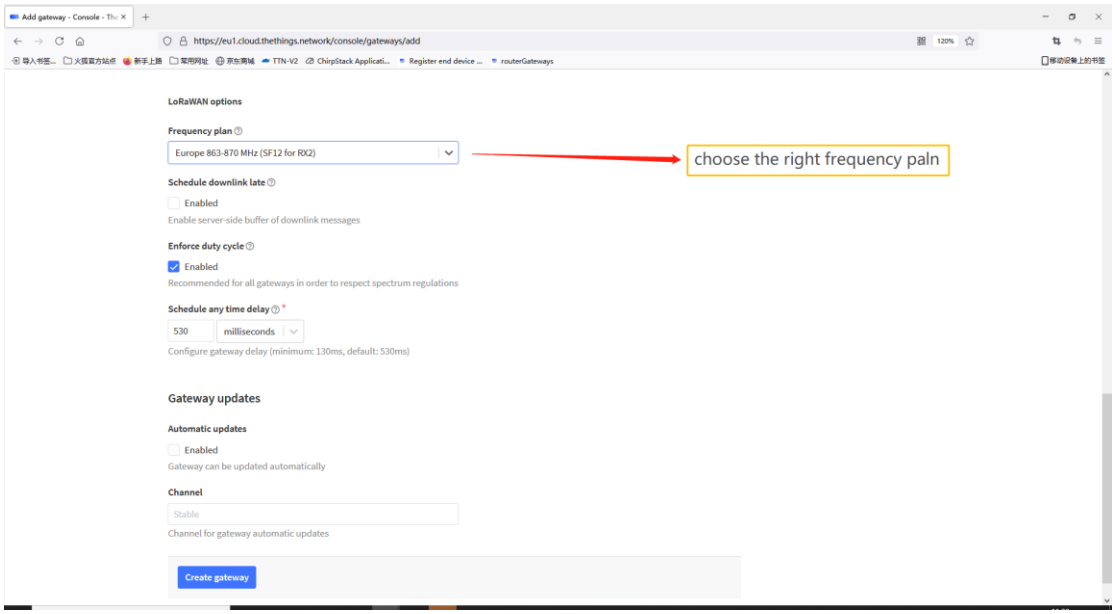
## Step 4: Create a Gateway




Click the Gateway icon and then click Add gateway.

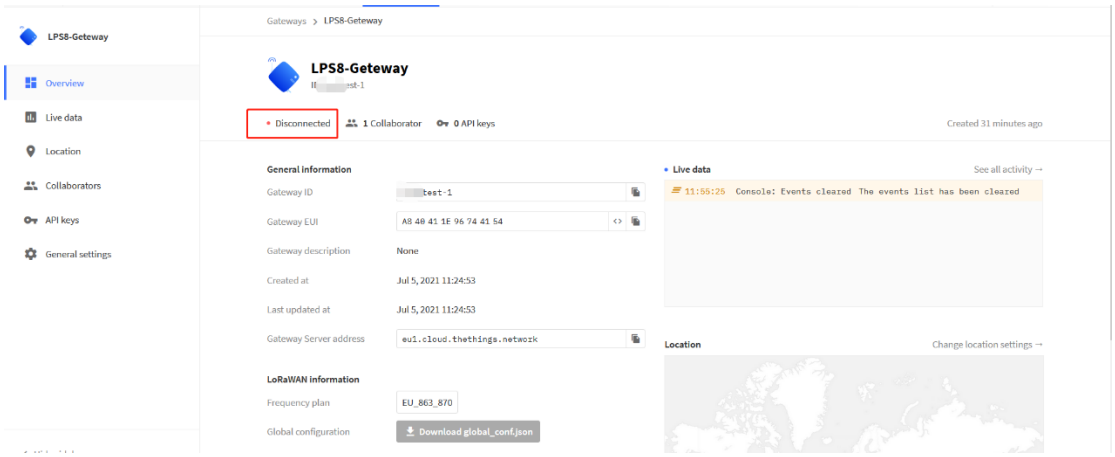
Open the following page:




**Notice:** Gateway Server address must match the gateway configuration, otherwise you will have problem for End Node to join the network.

After creating the gateway, you can see the gateway info, as below.

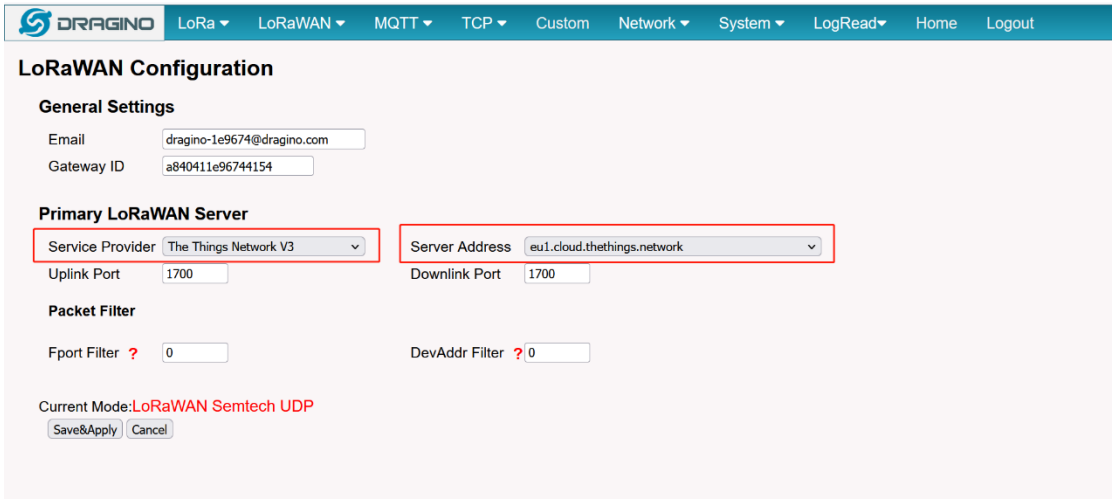



## 4.3 Configure LG308 to connect to TTN v3

You can now configure the LG308 to let it connect to TTN network V3.

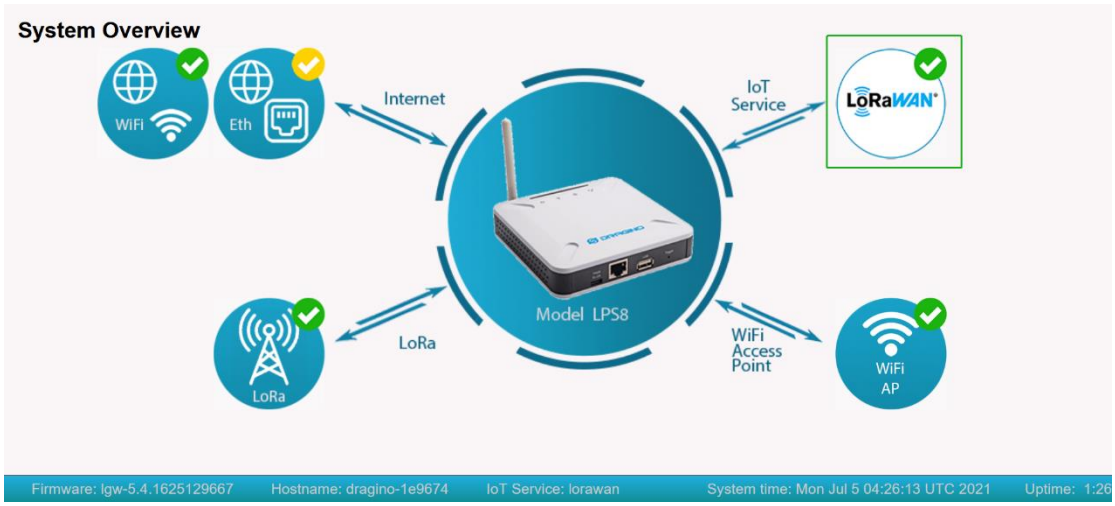
Make sure your LG308 has a working Internet Connection first.

Choose the right server provider and click **Save&Apply**

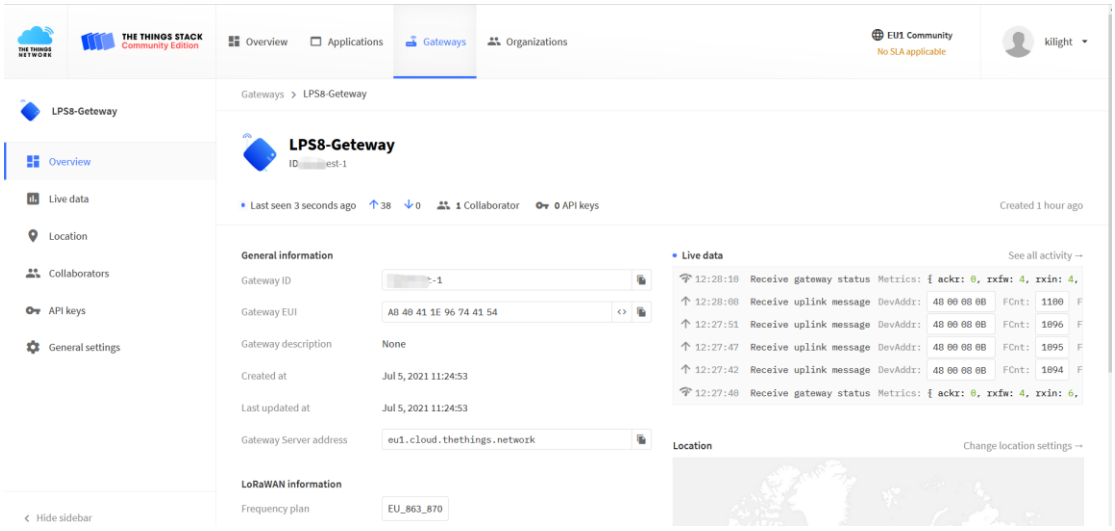



**Note:** The server address must match the Gateway server address you choose in TTN V3.

In the home page, we can see the LoRaWAN connection is ready now.

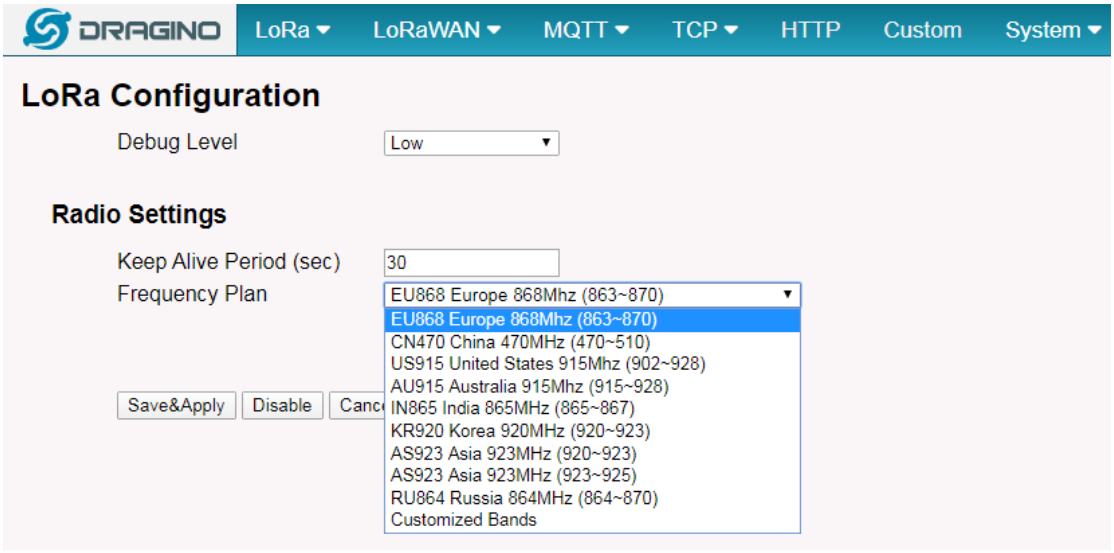



In TTN v3 portal, we can also see the gateway is connected.

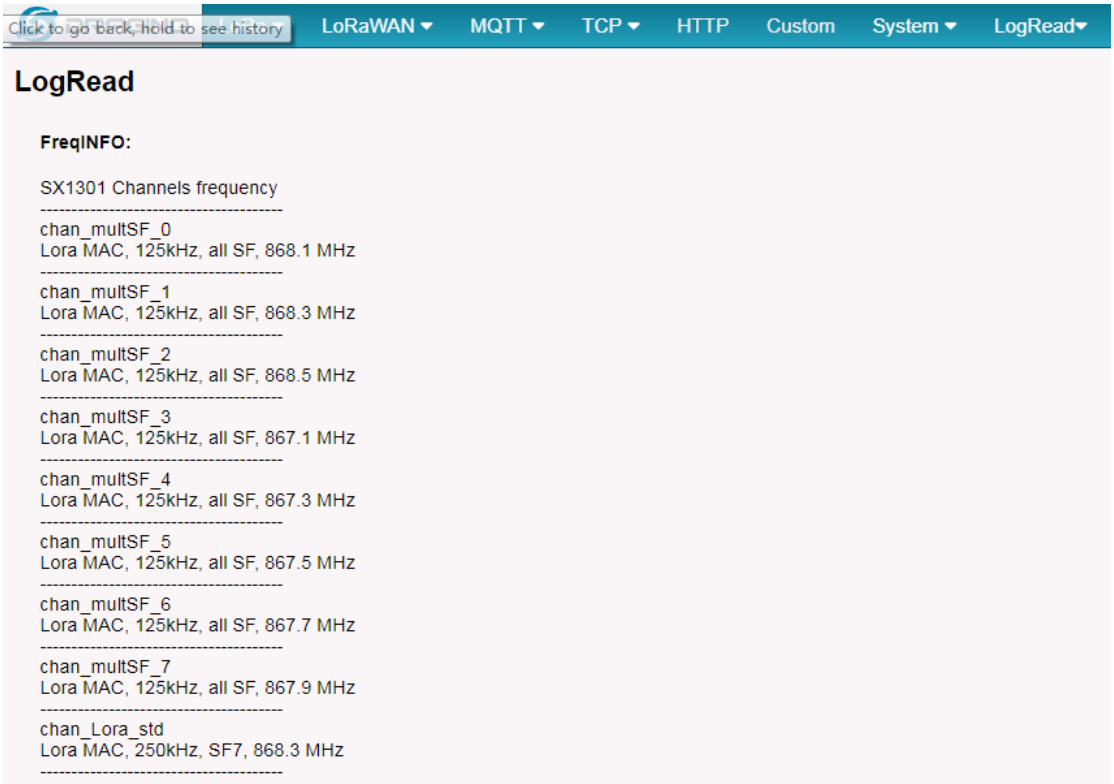


## 4.4 Configure frequency

We also need to set the frequency plan in LG308 to match the end node we use, so to receive the LoRaWAN packets from the LoRaWAN sensor.




In logread page, user can check the frequency actually used.



## 4.6 Add a LoRaWAN End Device

This section shows how to add a LoRaWAN End device to a LoRaWAN network and see the data from TTN web site.

We use LT-22222-L IO Controller as a reference device - the setup for other LoRaWAN devices will be similar.

**Step 1**: Create a Device definition in TTN v3 with the OTAA keys from the example LT-22222-L IO Controller device.

Three codes are required to define the device in TTN v3:

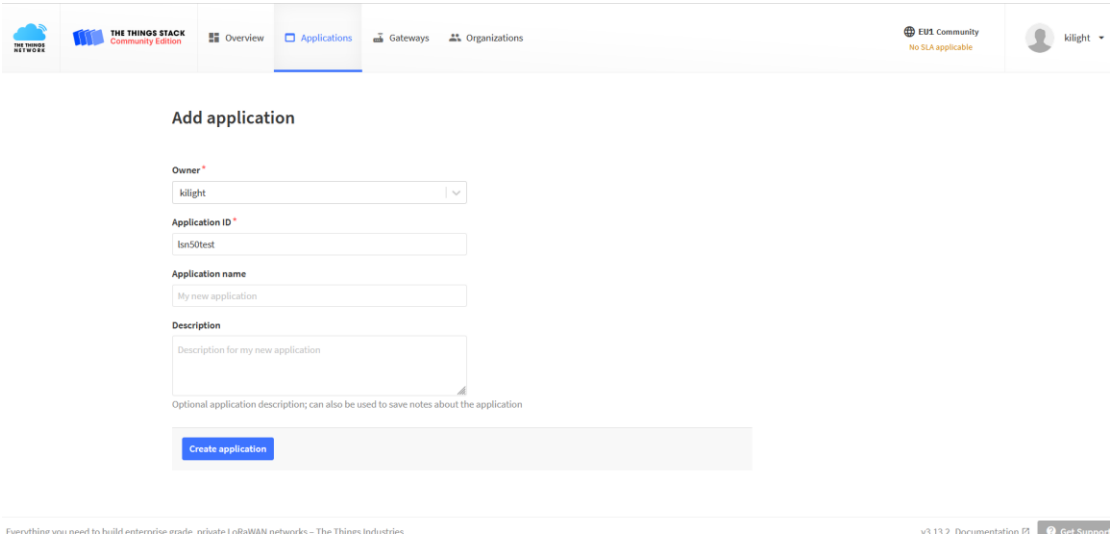
- ✓ DEV EUI - Unique ID code for a particular device.
- ✓ APP EUI - ID code for an Application defined in TTN v3.
- ✓ APP Key - Unique key to secure communications with a particular device.

A set of these codes are stored in each device by the manufacturer as the default codes for that particular device. Each device is shipped with a sticker with the default Device EUI as shown below.


Note: You may be able to change these codes in a device by using a configuration facility on the device e.g. the LT-22222 uses a serial port access and a series of AT commands. Changing the codes may be necessary in the case where you have to use codes assigned by a LoRa WAN server.

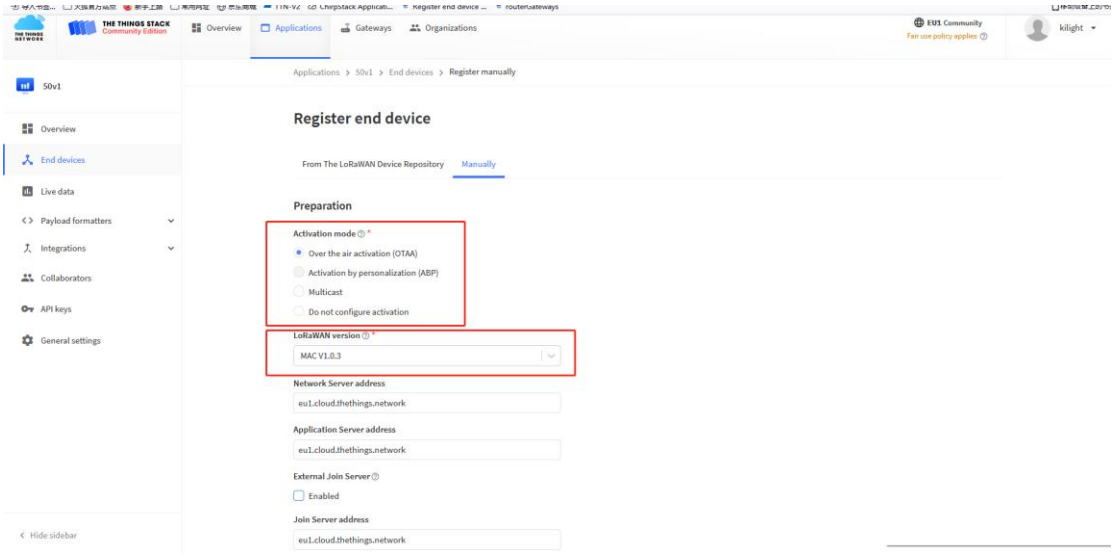
For the TTN v3 server, you can use the codes set in the device as in the following example.

Select **Add Application** to open the screen below.



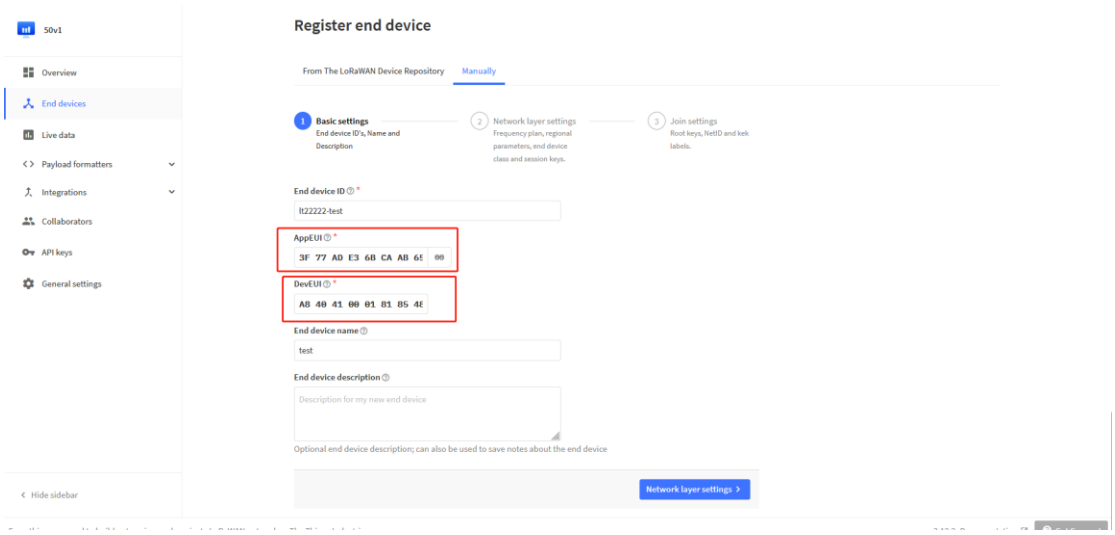

Open the **Application** select **Add end device**

Start Register the end device

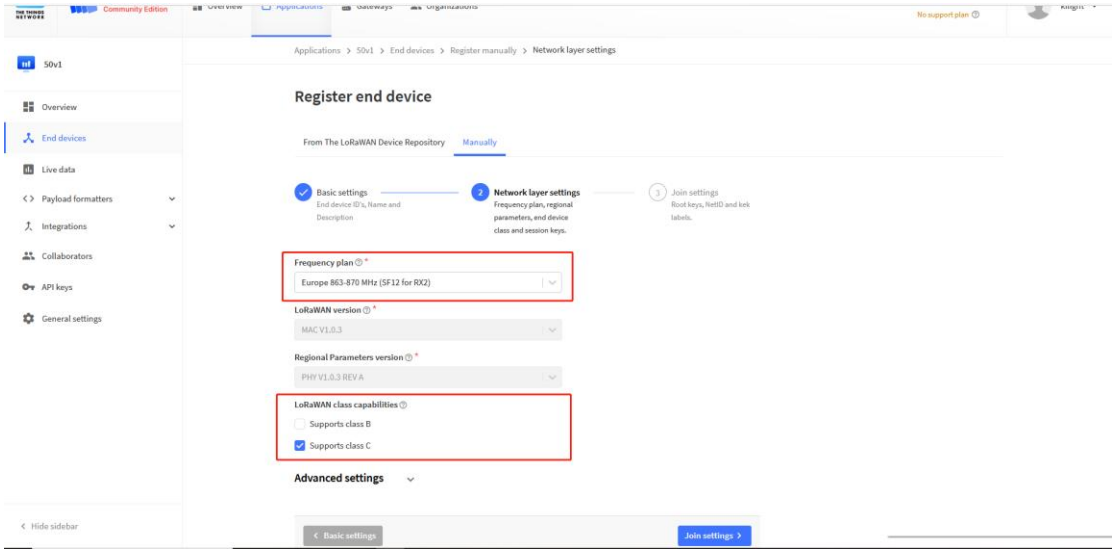



Select OTAA activation mode

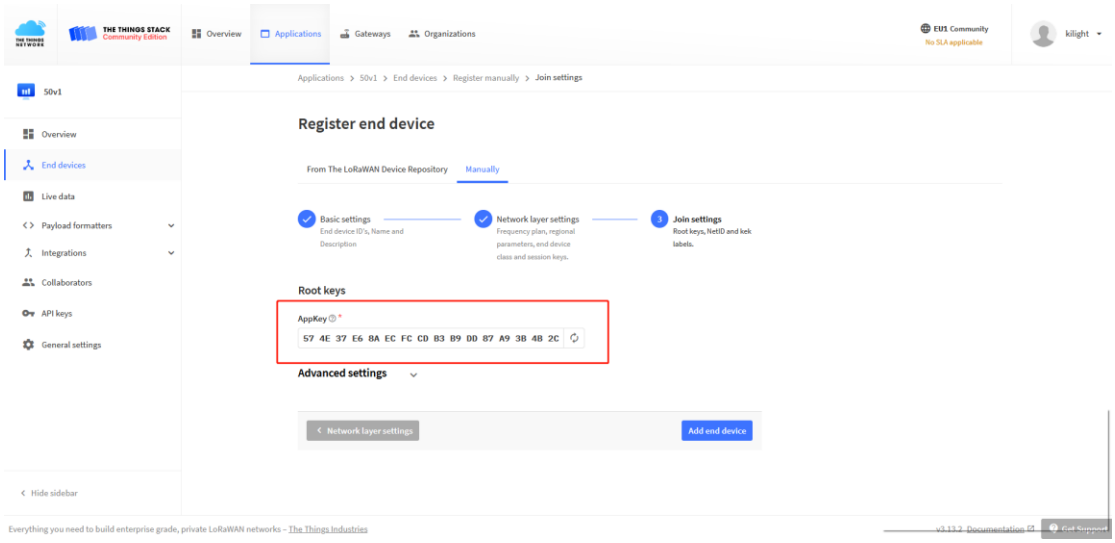
The LoRaWAN version for your device should be provided by the manufacturer in a datasheet as LoRaWAN version or LoRaWAN specification. The most commonly used LoRaWAN versions are v1.0.2 and v1.0.3.




First, input the End device ID, AppEUI and DevEUI.



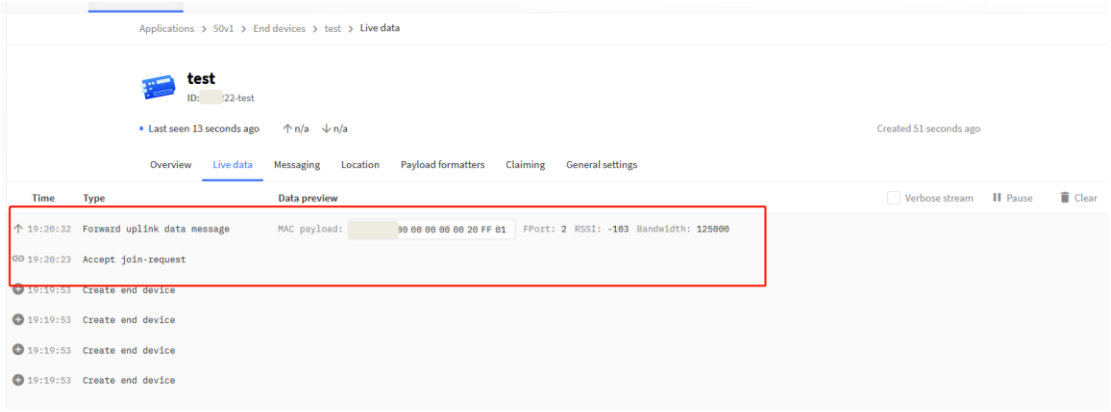

Secondly, choose the corresponding frequency and LoRaWAN class capabilities.



Finally, Application layer settings input the corresponding AppKey. Before saving the configuration, check that the data matches the device.

**Step 2**: Power on LT-22222-L device and it will automatically join the TTN network. After joining successfully, it will start to upload messages to the TTN v3. Select the Live data tab and you will see the data appearing in the panel.

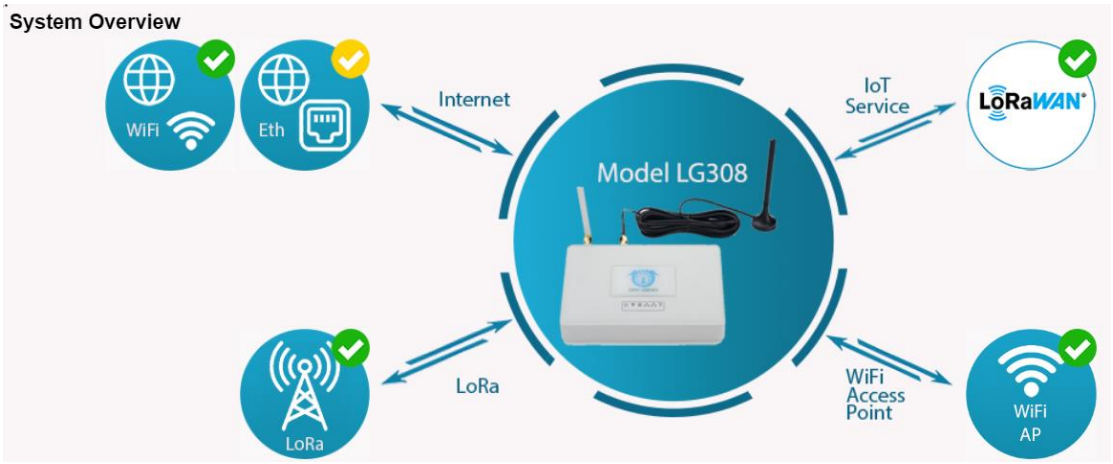
Note that it may take some time for the device data to appear in the TTN v3 display.



# 5. Web Configure Pages

## 5.1 Home

Shows the system running status:



## 5.2 LoRa Settings

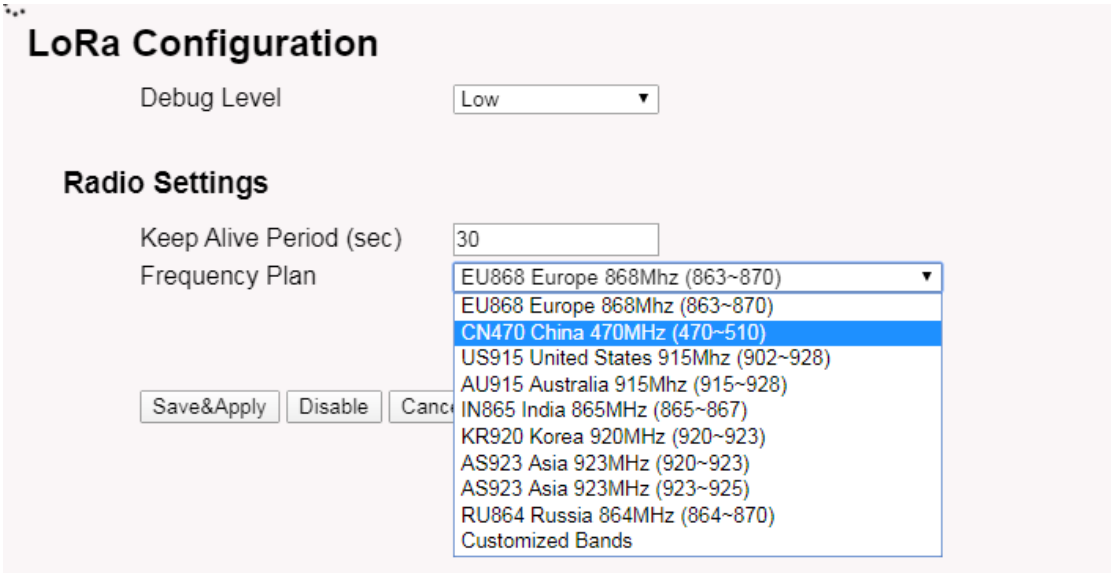
### 5.2.1 LoRa --> LoRa

This page shows the LoRa Radio Settings. There are a set of default frequency band according to LoRaWAN protocol, and user can customized the band* as well.

Different LG308 hardware version can support different frequency range:

- **868**: valid frequency: 863Mhz ~ 870Mhz. for bands EU868, RU864, IN865 or KZ865.
- **915**: valid frequency: 902Mhz ~ 928Mhz. for bands US915, AU915, AS923 or KR920

After user choose the frequency plan, he can see the actually frequency in used by checking the page **LogRead --> LoRa Log**



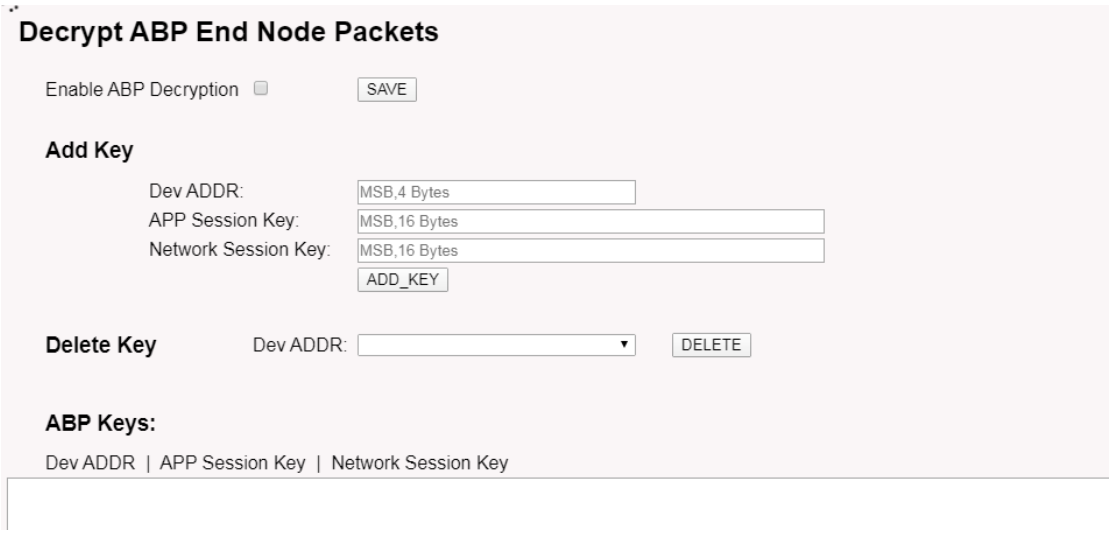

Note *: See this instruction for how to customize frequency band:
http://wiki.dragino.com/index.php?title=Customized_Frequency_Band_for_Gateway

### 5.2.2 LoRa --> ABP Decryption

The LG308 can communicate with LoRaWAN ABP End Node without the need of LoRaWAN server. It can be used in some cases such as:

- No internet connection.
- User wants to get data forward in gateway and forward to their server based on MQTT/HTTP, etc. (Combine ABP communication method and MQTT forward together).

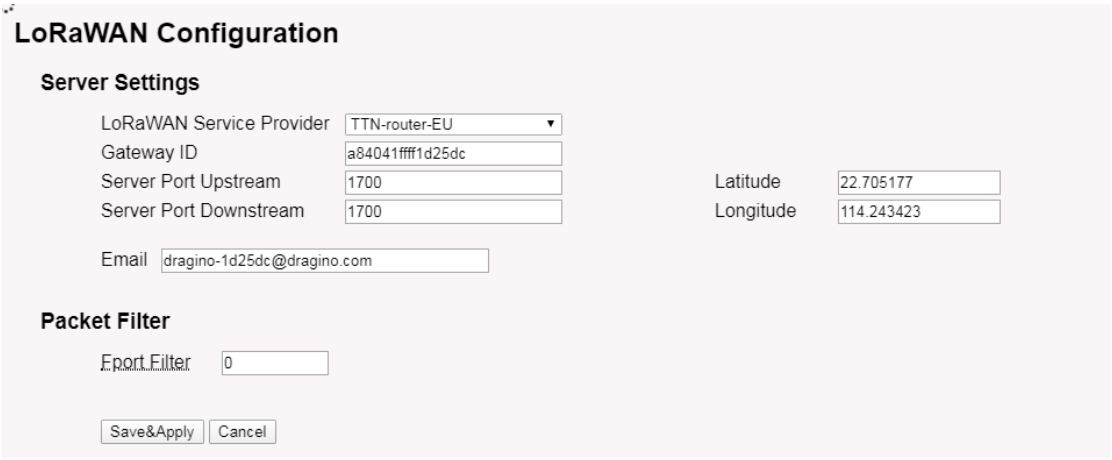
Detail of this feature:
http://wiki.dragino.com/index.php?title=Communication_with_ABP_End_Node



## 5.3 LoRaWAN Settings

### 5.3.1 LoRaWAN --> LoRaWAN

This page is for the connection set up to a general LoRaWAN Network server such as: TTN, ChirpStack etc

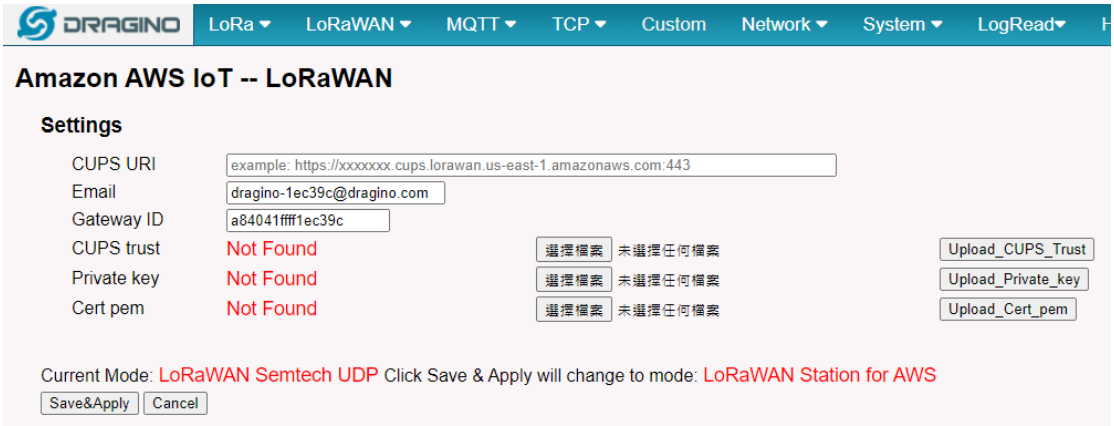



Note

**: Packet filter is to drop the unwanted LoRaWAN packet, instruction see here:

See http://wiki.dragino.com/index.php?title=Main_Page#Filter_unwanted_LoRaWAN_packets

### 5.3.2 LoRaWAN --> Amazon AWS-IoT

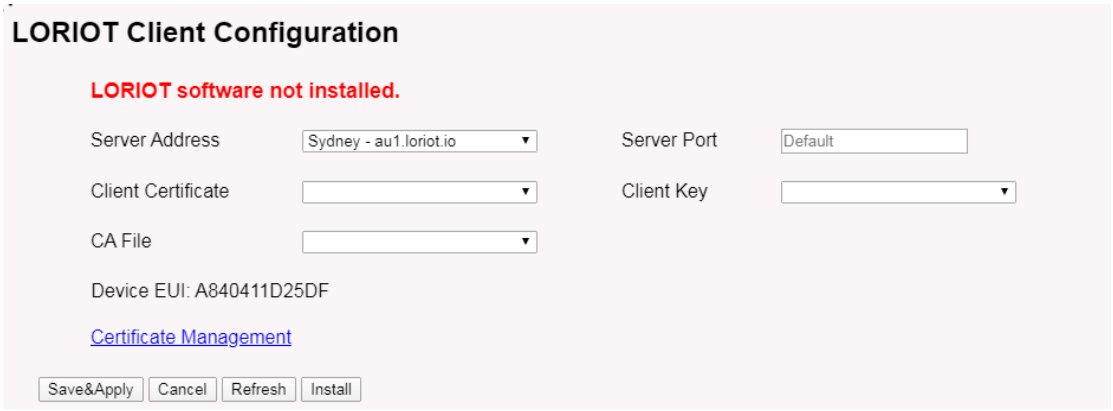



Please see this instruction to know more detail and demo for how to connect to AWS-IoT LoRaWAN Core: http://wiki.dragino.com/index.php?title=Notes_for_AWS-IoT-Core

### 5.3.3 LoRaWAN --> LORIOT

Settings to communicate to LORIOT LoRaWAN Network Server: https://www.loriot.io/

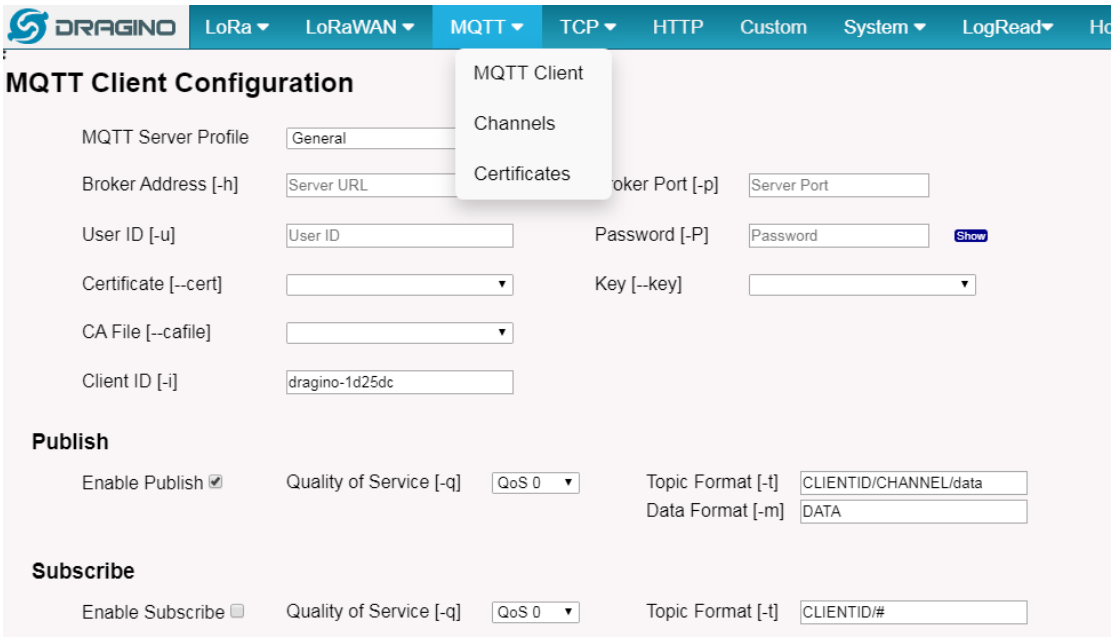
Instruction: http://wiki.dragino.com/index.php?title=Notes_for_LORIOT


LORIOT Client Configuration
LORIOT software not installed.
Server Address
Sydney - au1.loriot.io
Server Port
Default
Client Certificate
Client Key
CA File
Device EUI: A840411D25DF
Certificate Management
Save&Apply
Cancel
Refresh
Install

## 5.4 MQTT Settings

If end nodes works in ABP mode, user can configure LG308 to transfer the data to MQTT broker, Instruction:

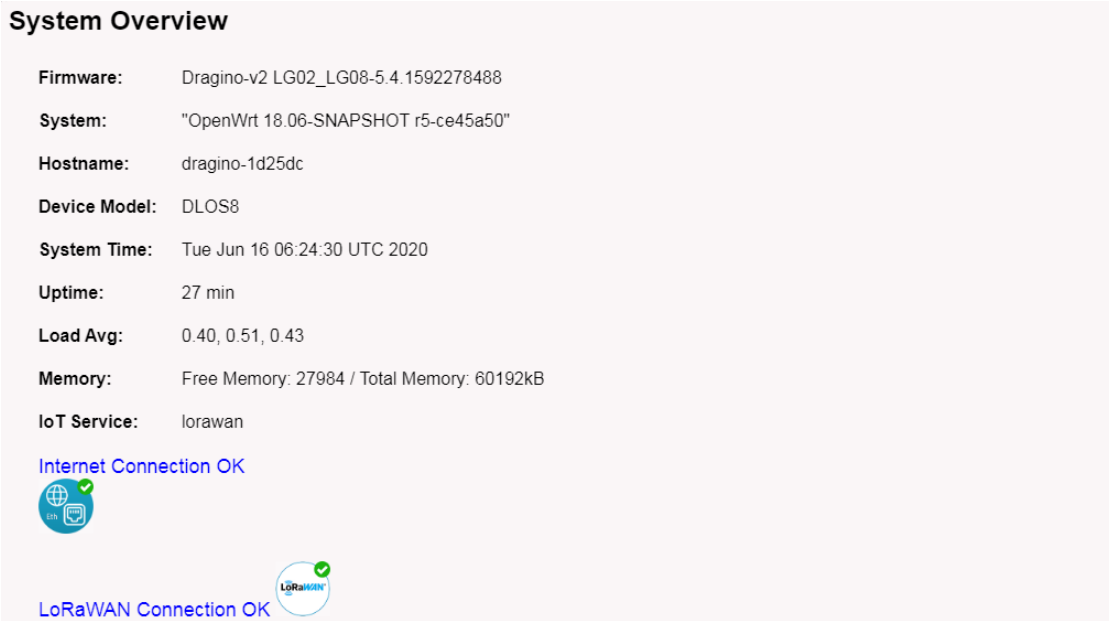
http://wiki.dragino.com/index.php?title=Main_Page#MQTT_Forward_Instruction



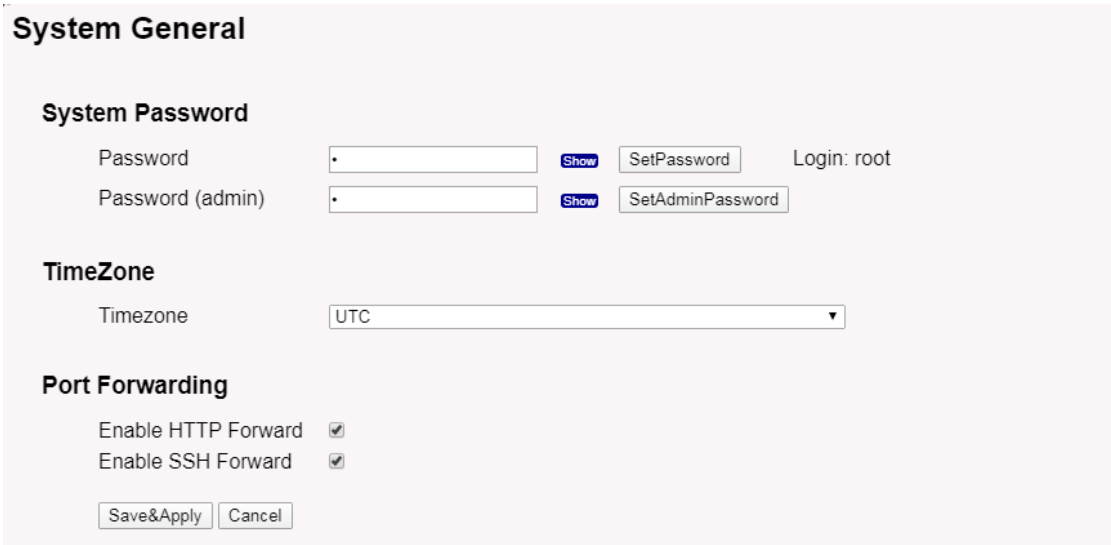
## 5.5 System

### 5.5.1 System --> System Overview

Shows the system info:




### 5.5.2 System --> General ( login settings)




**System Password**:

There are two login for DLOS8: **root /dragino** or **admin /dragino**. Both root and admin has the same right for WEB access. But root user has also the right to access via SSH to Linux system. admin only able to access WEB interface.

This page can be used to set the password for them.

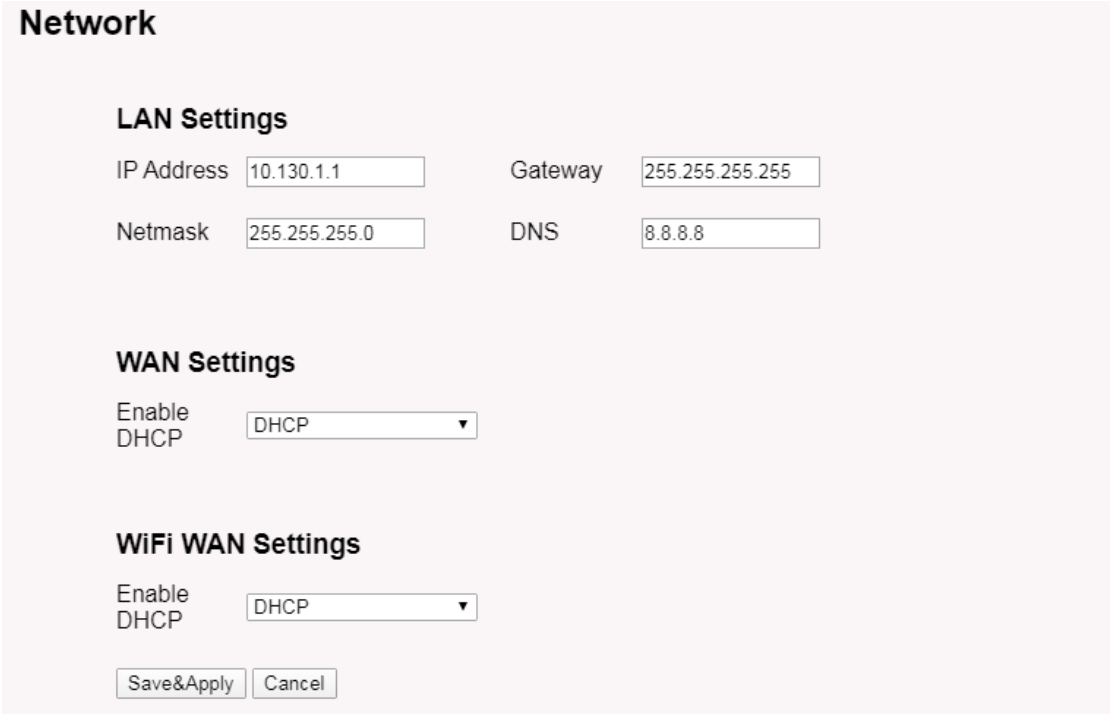
**Timezone:**

Set device timezone.

**Port forwarding:**

Enable/Disable the HTTP and SSH access via WAN interface.

### 5.5.3 System --> Network




**LAN Settings:**

When the LG308 has the AP enable, LAN settings specify the network info for LG308's own network.

**WAN Settings:**

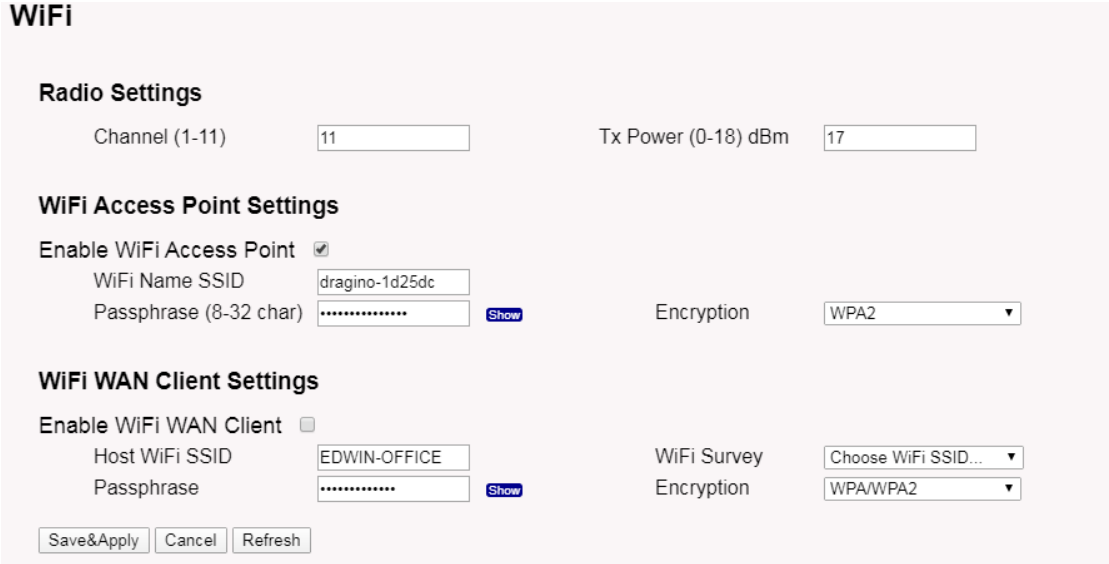
Setting for LG308 WAN port

**WiFi Settings:**

Setting for LG308 WiFi IP when use it as WiFi Client

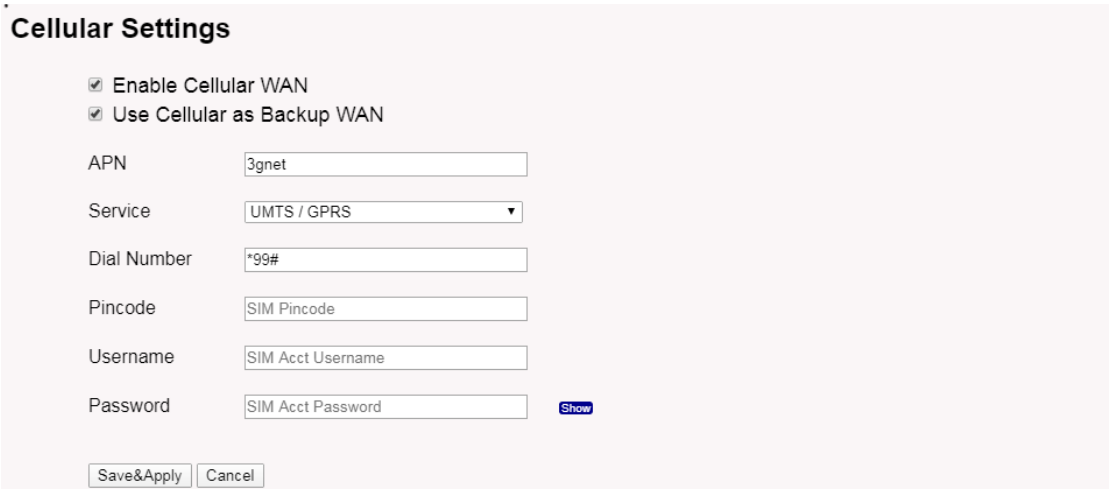
### 5.5.4 System --> WiFi

LG308 WiFi Settings.



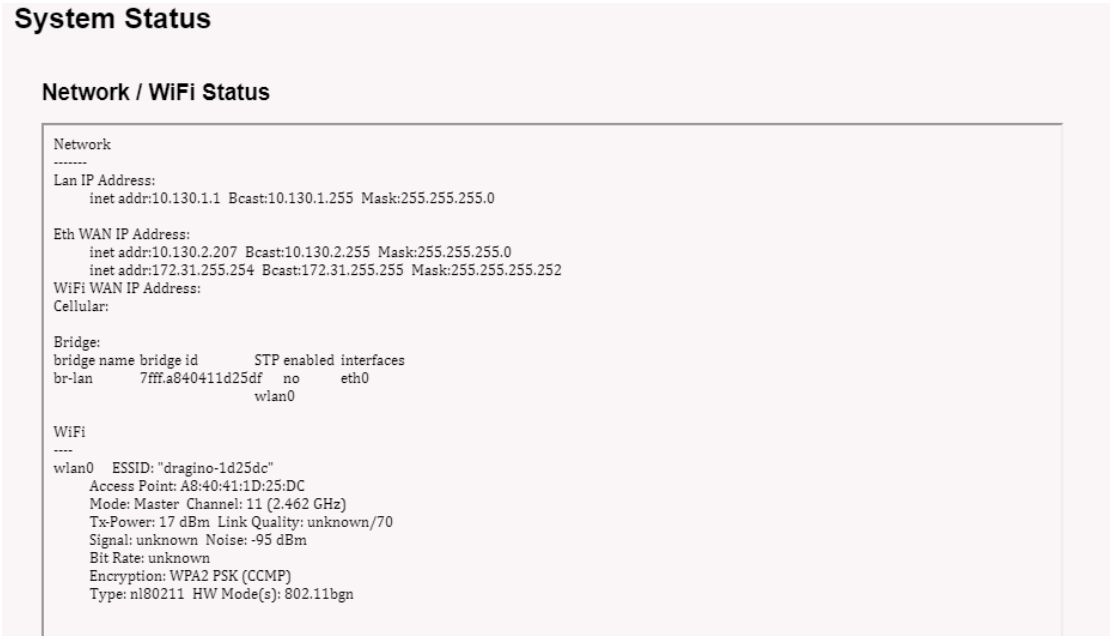

### 5.5.5 System --> Cellular

While use the cellular as Backup WAN, device will use Cellular for internet connection while WAN port or WiFi is not valid and switch back to WAN port or WiFi after they recover.




Note *: For LG308 which doesn't have the cellular module, this page will shows Cellular not detected.

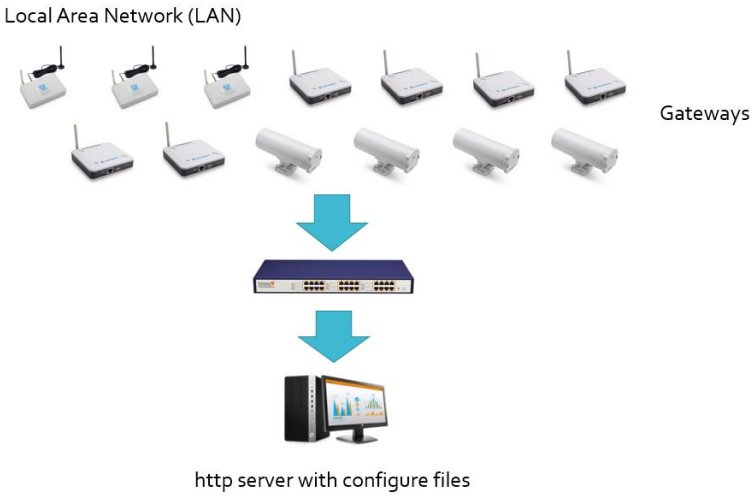
### 5.5.6 System --> Network Status



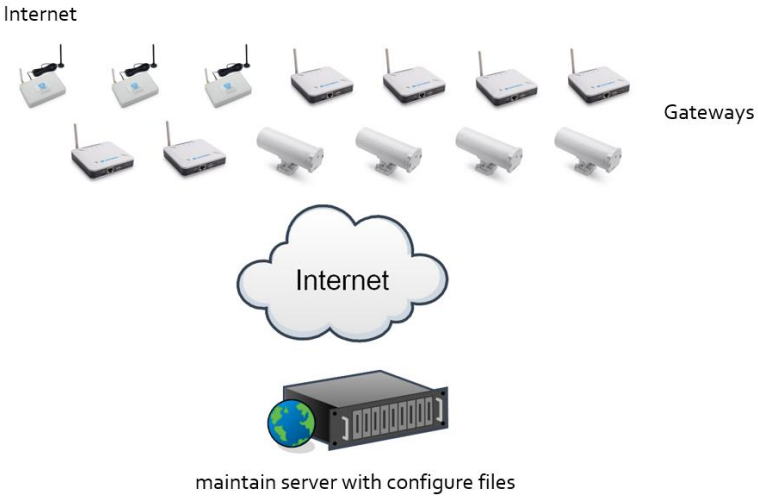
### 5.5.7 System --> Remote Mgnt & Auto Update

Auto Provision is the feature for batch configure and remote management. It can be used in below two cases:

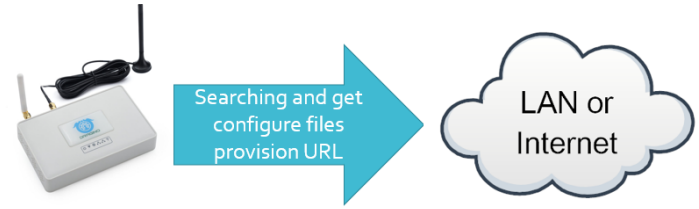
Case 1: Batch configure gateways before deploy




Case 2: Maintain gateway configure from cloud




How it works



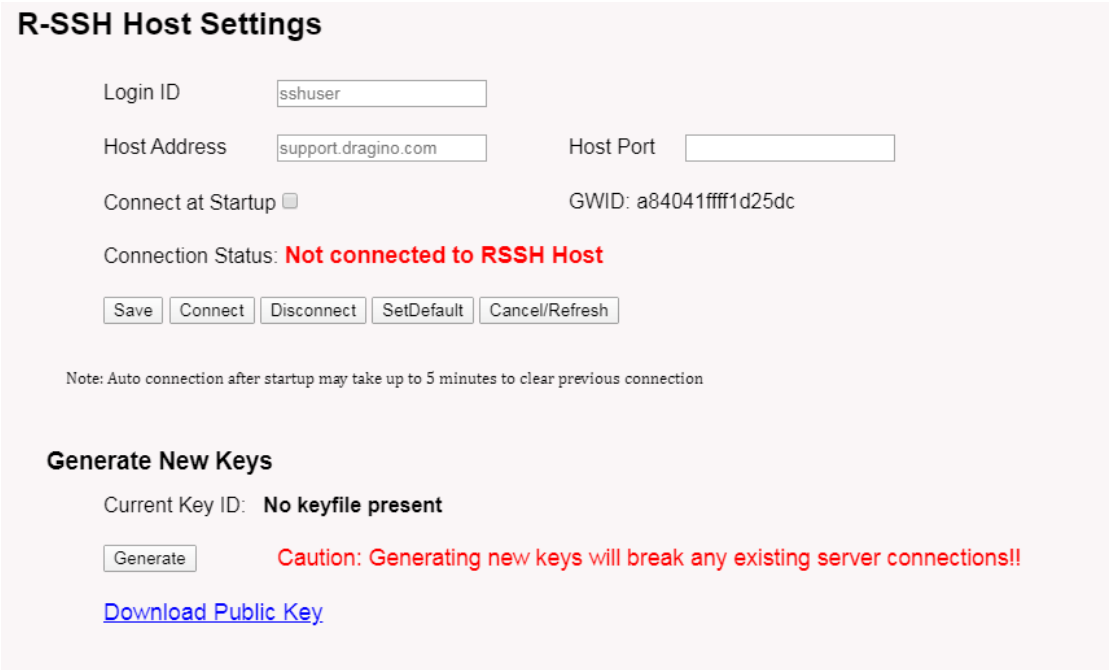

1. Gateways search (on every boot or 23:00 every day) the provision URL to get configure files or script files.
2. Gateways compare version number of the configure file, and process update if configure files has higher version.


Please see this document for detail:

http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LG308/Firmware/Application_Note/&file=Auto-update-feature.pdf

R-SSH is for remote access device and management, introduction for how to use:

http://wiki.dragino.com/index.php?title=Main_Page#Remote_Access_Gateway_via_Reverse_SSH



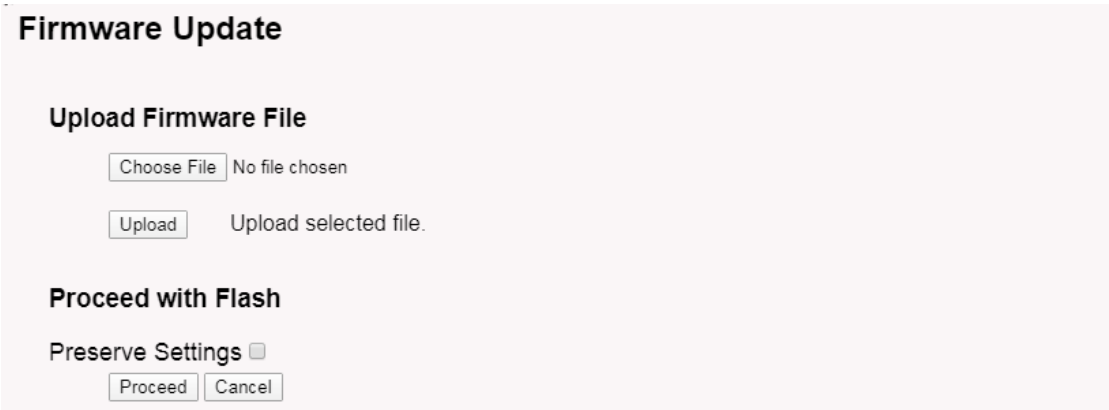
### 5.5.8 System --> Firmware Upgrade

We keep improving the LG308 Linux side firmware for new features and bug fixes. Below are the links for reference.

- **Latest firmware**: LoRa Gateway Firmware, ( http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LG02-OLG02/Firmware )
- **Change Log**: Firmware Change Log. ( http://www.dragino.com/downloads/downloads/LoRa_Gateway/LG02-OLG02/Firmware/ChangeLog )

The file named as **xxxxx–xxxxx-squashfs-sysupgrade.bin** is the upgrade Image. There are different methods to upgrade, as below.

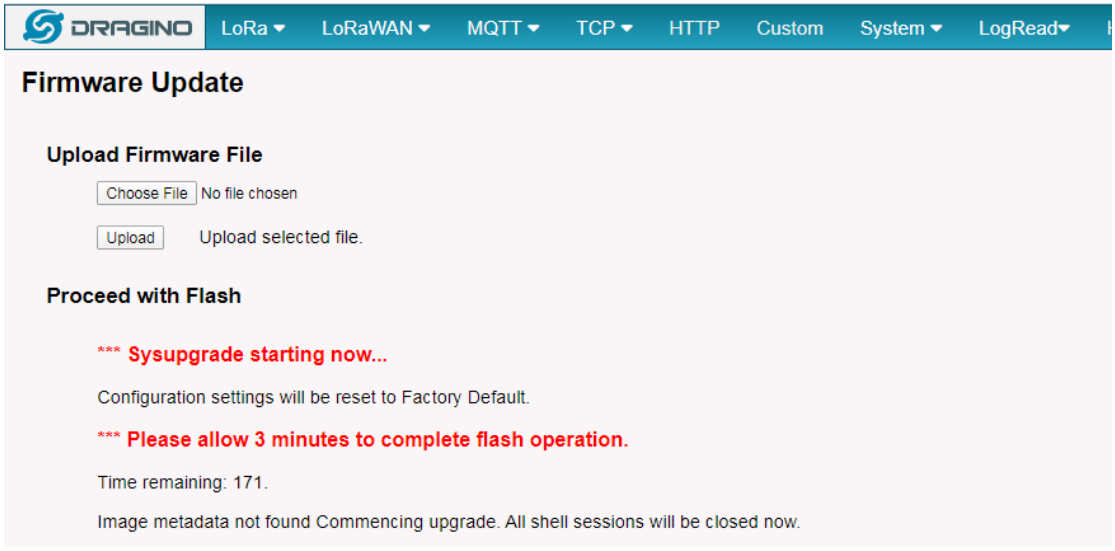
**Web → System → Firmware Upgrade**




Select the required image and click **Flash Image.** The image will be uploaded to the device, and then click **Process Update** to upgrade.

**NOTE**: You normally need to ***uncheck*** the **Preserve Settings** checkbox when doing an upgrade to ensure that there is no conflict between the old settings and the new firmware. The new firmware will start up with its default settings.

The system will automatically boot into the new firmware after upgrade.

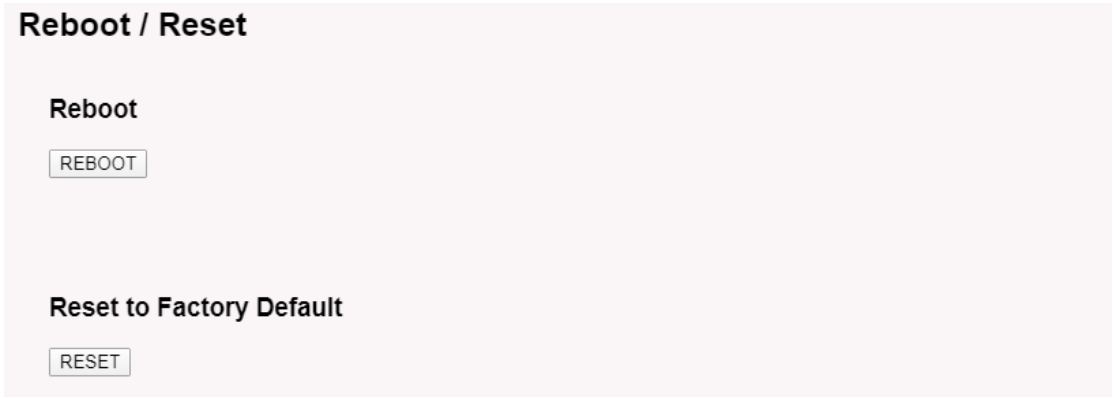



Note *: User can also upgrade firmware via Linux console
SCP the firmware to the system **/var** directory and then run

***root@OpenWrt:~# /sbin/sysupgrade –n /var/Your_Image***

**NOTE**: it is important to transfer the image in the /var directory, otherwise it may exceed the available flash size.

### 5.5.9 System --> Reboot/Reset



### 5.5.10 System --> Package Maintain


Place to show what package has installed and possible to upgrade packages.

## 5.6 LogRead

### 5.6.1 LogRead --> LoRa Log


Show the frequency for LoRa Radio and traffics.

### 5.6.2 LogRead --> System Log

Show the system log

# 6. More features

## 6.1 More instructions

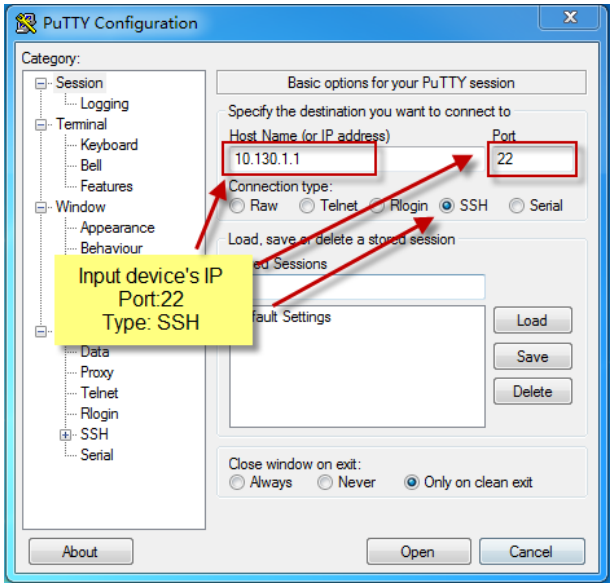
http://wiki.dragino.com/index.php?title=Main_Page#LoRa.2FLoRaWAN_Gateway_Instruction

## 7. Linux System

The LG308 bases on OpenWrt Linux System. It is open source, and user are free to configure and modify the inside Linux settings.

### 7.1 SSH Access for Linux console

User can access to the Linux console via SSH protocol. Make sure your PC and the LG308 is in the same network, then use a SSH tool (such as putty) to access it. Below are screenshots:



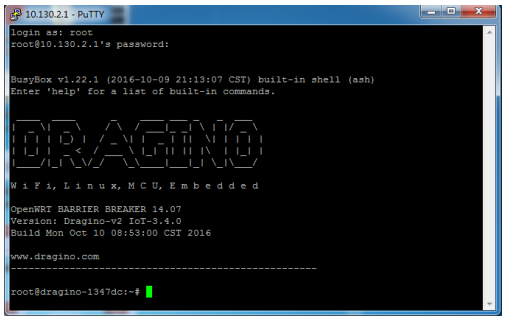

IP address: IP address of LG308

Port: 22 or 2222

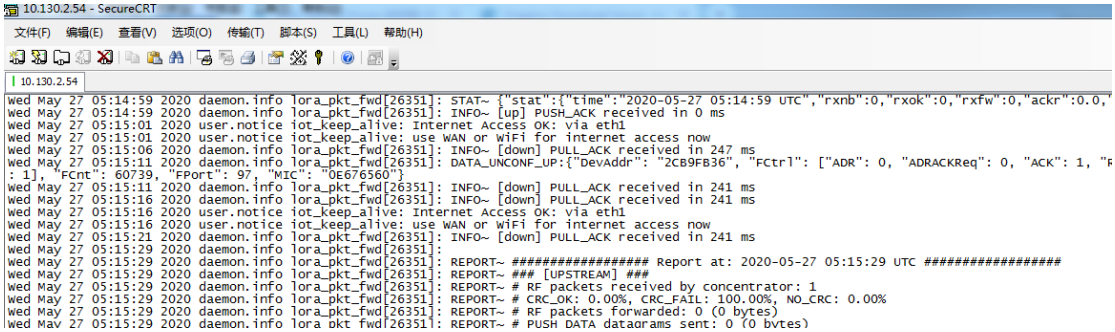
User Name: **root**

Password: **dragino** (default)

After log in, you will be in the Linux console and type command here.

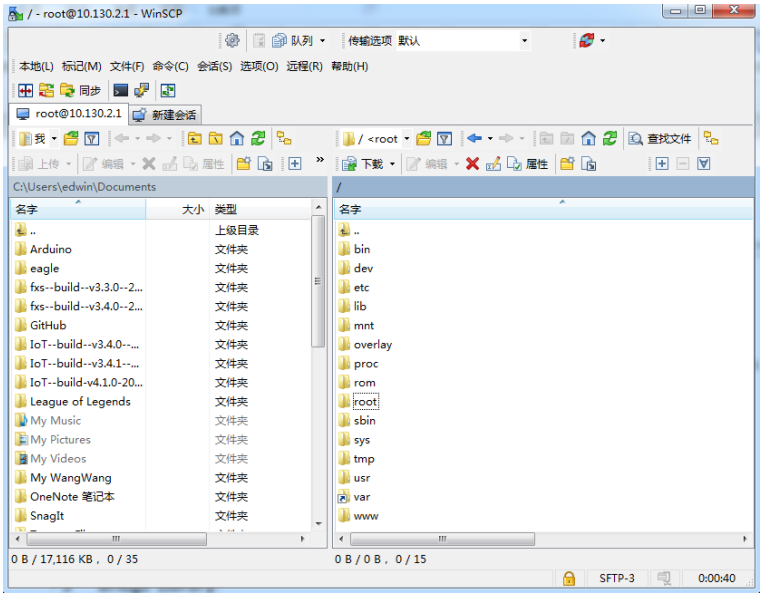



The “logread -f” command can be used to debug how system runs.



## 7.2 Edit and Transfer files

The LG308 support **SCP protocol** and has a built **SFTP server**. There are many ways to edit and transfer files using these two protocols. One of the easiest is through WinSCP utility. After access via WinSCP to the device, use can use a FTP alike window to drag / drop files to the LG308 or Edit the files directly in the windows. Screenshot is as below:




## 7.3 File System

The LG308 has a 16MB flash and a 64MB RAM. The /var and /tmp directory are in the RAM, contents stored in /tmp and /var will be erased after reboot the device. Other directories are in the flash and will keep after reboot.

The Linux system use around 8MB ~10MB flash size which means there is not much room for user to store data in the LG308 flash. User can use an external USB flash to extend the size for storage.

### 7.4 Package maintain system

LG308 uses **OPKG package maintain system**. There are more than 3000+ packages available in our package server for user to install for their applications. For example, if user wants to add iperf tool, they can install the related packages and configure LG308 to use iperf

Below is some examples opkgs command, more please refer **OPKG package maintain system**

In Linux Console run:

**root@dragino-169d30:~# opkg update** // to get the latest packages list

**root@dragino-169d30:~# opkg list** //shows the available packages

**root@dragino-169d30:~# opkg install iperf** // install iperf, it will auto install the required packages.

*root@dragino-169d30:/etc/opkg# opkg install iperf*

*Installing iperf (2.0.12-1) to root...*

*Downloading http://downloads.openwrt.org/snapshots/packages/mips_24kc/base/iperf_2.0.12-1_mips_24kc.ipk*

*Installing uclibcxx (0.2.4-3) to root...*

*Downloading*

*http://downloads.openwrt.org/snapshots/packages/mips_24kc/base/uclibcxx_0.2.4-3_mips_24kc.ipk*

*Configuring uclibcxx.*

*Configuring iperf.*

## 8. Upgrade Linux Firmware

# 9. FAQ

## 9.1 How can I configure for a customized frequency band?

See below link for how to customize frequency band:
http://wiki.dragino.com/index.php?title=Customized_Frequency_Band_for_Gateway

## 9.2 Can I connect DLOS8 to LORIOT?

Yes, the set up instruction is here:
http://wiki.dragino.com/index.php?title=Notes_for_LORIOT

## 9.3 Can I make my own firmware for the gateway, where can I find the source code?

Yes, You can make your own firmware for the DLOS8 for branding purposes or to add customized applications.
The source code and compile instructions can be found at:
https://github.com/dragino/openwrt_lede-18.06

## 9.4 Can I use 868Mhz version for 915Mhz bands?

It is possible but the distance will be very short, you can select US915 frequency band in 868Mhz version hardware. It will work but you will see the performance is greatly decreased because the 868Mhz version has an RF filter for band 863~870Mhz, all other frequencies will have high attenuation.

## 9.5 Can I control the LEDs?

Except the PWR LED is controlled by +3v3 power directly. All other LEDs can be controlled by developer.

**Control Globe LED:**
ON: echo 1 > /sys/class/leds/dragino2\:red\:wlan/brightness
OFF: echo 0 > /sys/class/leds/dragino2\:red\:wlan/brightness

**Control HEART LED:**
First export the gpio27 and set to out
echo 27 > /sys/class/gpio/export
echo out > /sys/class/gpio/gpio27/direction
ON: echo 0 > /sys/class/gpio/gpio27/value
OFF: echo 1 > /sys/class/gpio/gpio27/value

# 10. Trouble Shooting

## 10.1 I get kernel error when install new package, how to fix?

In some case, when install package, it will generate kernel error such as below:

root@dragino-16c538:~# opkg install kmod-dragino2-si3217x_3.10.49+0.2-1_ar71xx.ipk
Installing kmod-dragino2-si3217x (3.10.49+0.2-1) to root...
Collected errors:
* satisfy_dependencies_for: Cannot satisfy the following dependencies for kmod-dragino2-si3217x:
*  kernel (= 3.10.49-1-4917516478a753314254643facdf360a) *
 * opkg_install_cmd: Cannot install package kmod-dragino2-si3217x.

In this case, user can use the –force-depends option to install such package.

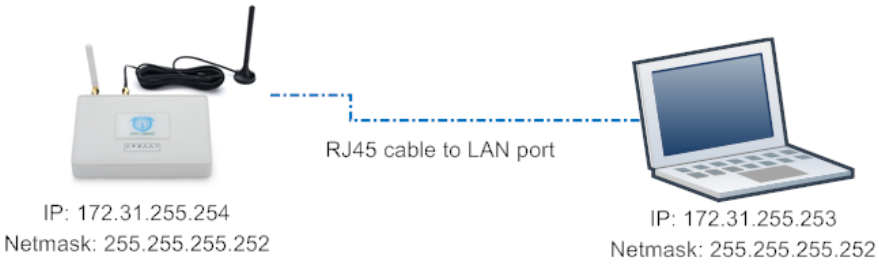
opkg install kmod-dragino2-si3217x_3.10.49+0.2-1_ar71xx.ipk --force-depends

## 10.2 How to recover the LG308 if firmware crash

Please follow this instruction to recover your gateway:

http://wiki.dragino.com/index.php?title=Recover_Gateway

## 10.3 I configured LG308 for WiFi access and lost its IP. What to do now?

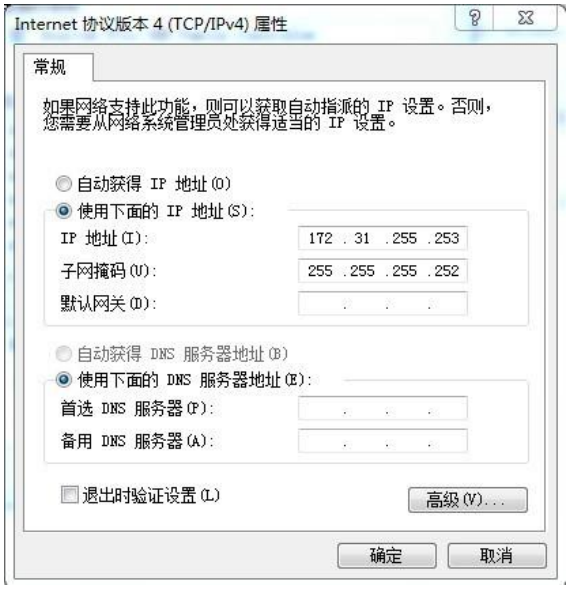



The LG308 has a fall-back ip in its LAN port. This IP is always enabled so user can use fall back ip to access LG308 no matter what the WiFi IP is. The fall back ip is useful for connect and debug the unit.

(Note: fallback ip can be disabled in the LAN and DHCP page)

Steps to connect via fall back IP:

1. Connect PC's Ethernet port to LG01's LAN port
2. Configure PC's Ethernet port has IP: 172.31.255.253 and netmask: 255.255.255.252
   As below photo:




3. In PC, use 172.31.255.254 to access LG308 via Web or Console.

## 11. Order Info

***PART: LG308-XXX-YYY*:**

***XXX: Frequency Band***

- **868**: valid frequency: 863Mhz ~ 870Mhz. for band EU868 or IN865.
- **915**: valid frequency: 902Mhz ~ 928Mhz. for bands US915, AU915, AS923 or KR920

***YYY: 4G Cellular Option***

- **EC25-E**: EMEA, Korea, Thailand, India.
- **EC25-A**: North America/ Rogers/AT&T/T-Mobile.
- **EC25-AU**: Latin America, New Zeland, Taiwan
- **EC25-J**: Japan, DOCOMO/SoftBank/ KDDI

More info about valid bands, please see EC25-E product page.

## 12. Packing Info

**Package Includes**:

- ✓ LG308 or LG08 LoRa Gateway x 1
- ✓ Stick Antenna for LoRa RF part. Frequency is one of 433 or 868 or 915Mhz depends the model ordered
- ✓ Power Adapter: EU/AU/US type power adapter depends on country to be used
- ✓ Packaging with environmental protection paper box

**Dimension and weight**:

- ✓ Device Size: 12 x 8.5 x 3 cm
- ✓ Device Weight: 150g
- ✓ Package Size / pcs : 21.5 x 10 x 5 cm
- ✓ Weight / pcs : 360g
- ✓ Carton dimension: 45 x 31 x 34 cm. 36pcs per carton
- ✓ Weight / carton : 12.5 kg

## 13. Support

- Try to see if your questions already answered in the wiki.
- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to

support@dragino.com

## 14. Reference

- Source code for LG08 LoRa Gateway
  https://github.com/dragino/openwrt_lede-18.06

- OpenWrt official Wiki
  http://www.openwrt.org/

- Firmware
  http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LG308-OLG308/Firmware/

- Hardware Source code:
  https://github.com/dragino/motherboard-hardware/tree/master/LG308