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# **LG308N - LoRaWAN Gateway User Manual**

last modified by Xiaoling

on 2022/12/28 16:41

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# 1. Introduction

## 1.1 What is the LG308N

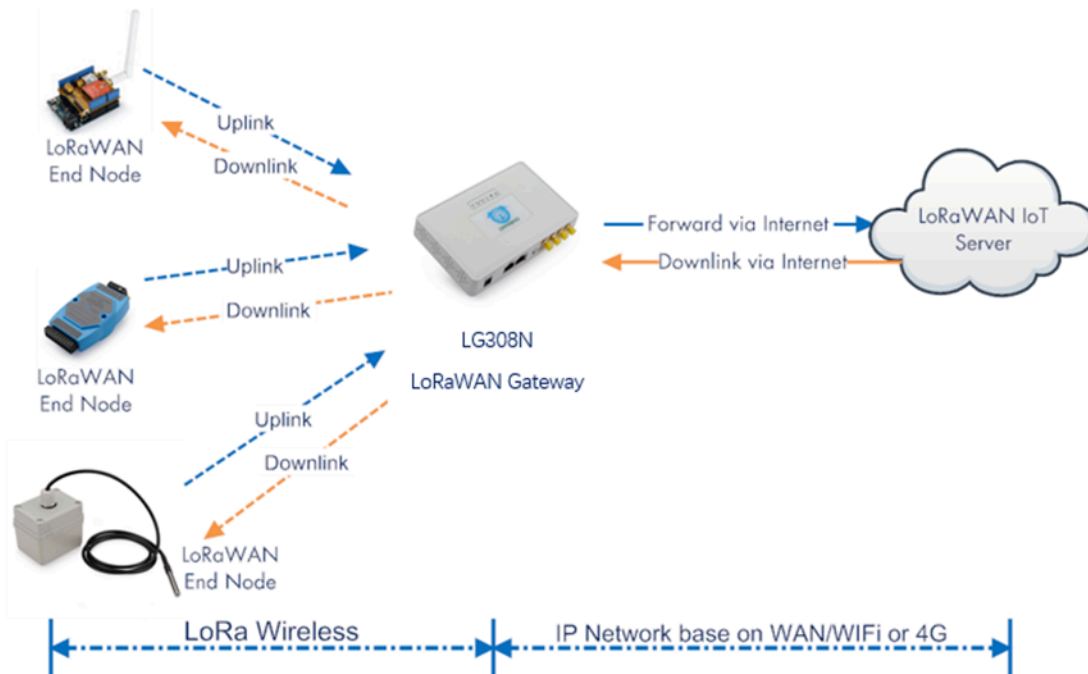
The LG308N is an open source **LoRaWAN Pico Gateway**. It lets you bridge LoRa wireless network to an IP network via WiFi, Ethernet, 3G or 4G cellular network. The LoRa wireless allows users to send data and reach extremely long ranges at low data-rates.

The LG308N uses **Semtech packet forwarder** and fully compatible with LoRaWAN protocol. It includes a **SX1302 LoRa concentrator**, which provides 10 programmable parallel demodulation paths.

LG308N has **pre-configured standard LoRaWAN frequency bands** to use for different countries. User can also **customize the frequency bands** to use in their own LoRa network.

LG308N 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.

### LG308N 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: 12 V DC, 2 A
- IEEE 802.3 af compliant PoE port (DC 37 ~ 57 v)
- USB 2.0 host connector x 1
- Mini-PCI E connector x 1

- SX1302 + 2 x SX1250

#### 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 -142.5 dBm sensitivity with SX1250 Tx/Rx front-end
- 70 dB CW interferer rejection at 1 MHz offset
- Able to operate with negative SNR, CCR up to 9dB
- Emulates 49 x LoRa demodulators and 1 x (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):

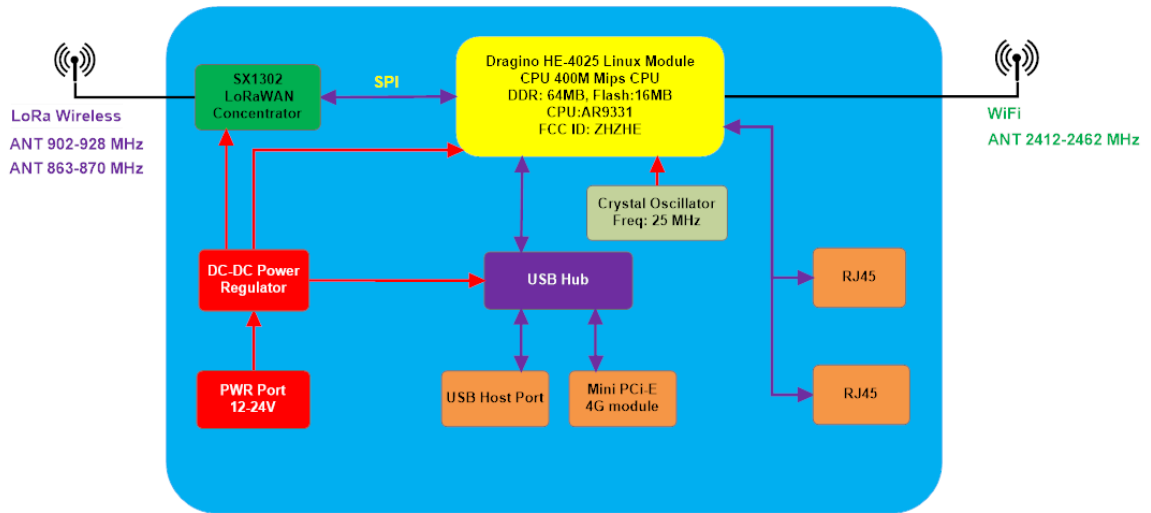
- Quectel: [EC25 LTE module](#)
- Standard Size SIM Slot
- 2 x 4G Sticker Antenna.
- Up to 150Mbps downlink and 50Mbps uplink data rates
- Worldwide LTE,UMTS/HSPA+ and GSM/GPRS/EDGE coverage
- MIMO technology meets demands for data rate and link reliability in modem wireless communication systems

## 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

## LG308N System Overview:









## 1.5 LG308N Applications





## 1.6 LED Indicators

LG308N 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**

## 1.7 Button Instruction

LG308N has a black toggle button, which is:

**# Long press 4-5s:** the gateway will reload the Network and Initialize wifi configuration  
**LED status:** SYS LED will BLINKING RED Until the reload is finished.

**# Long press more than 30s:** the gateway will restart and restore factory settings.  
**LED status:** When the user releases the button, the LED will TURN OFF.

## 2. Access and Configure LG308N

The LG308N is configured as a WiFi Access Point by default. User can access and configure the LG308N after connecting to its WiFi network, or via its Ethernet port.

### 2.1 Find IP address of LG308N

#### 2.1.1 Connect via WiFi



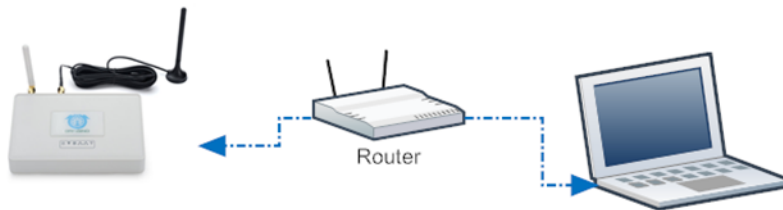
At the first boot of LG308N, it will auto generate a WiFi network called **dragino-xxxxxx** with password:

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



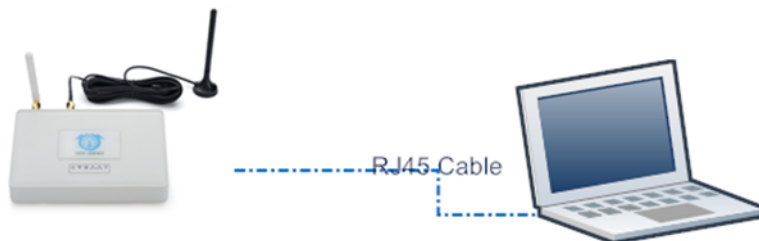
User can use a PC to connect to this WiFi network. The PC will get an IP address 10.130.1.xxx and the LG308N has the default IP **10.130.1.1**

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



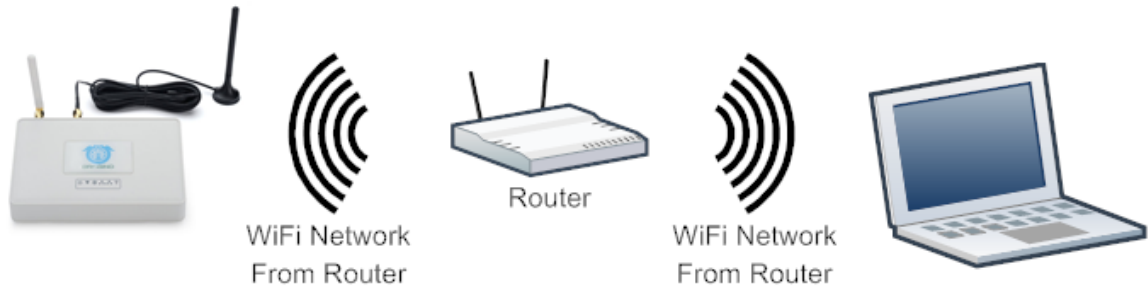
Alternatively, connect the LG308N **WAN port** to your router and LG308N will obtain an IP address from your router. In the router's management portal, you should be able to find what IP address the router has assigned to the LG308N. You can also use this IP to connect.

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



The LG308N **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 WiFi with DHCP IP from router



If the LG308N already connect to the router via WiFi, use can use the WiFi IP to connect to LG308N.

### 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 LG308N ip address (depends on your connect method)

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

or

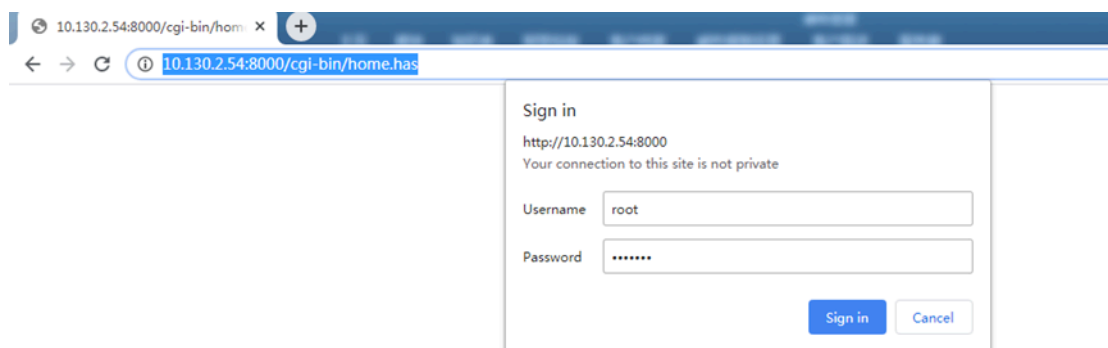
[http://IP\\_ADDRESS](http://IP_ADDRESS) or [http:// IP\\_ADDRESS:8000](http://IP_ADDRESS:8000)

You will see the login interface of DLOS8N as shown below.

The account details for Web Login are:

**User Name:** root

**Password:** dragino



## 3. Typical Network Setup

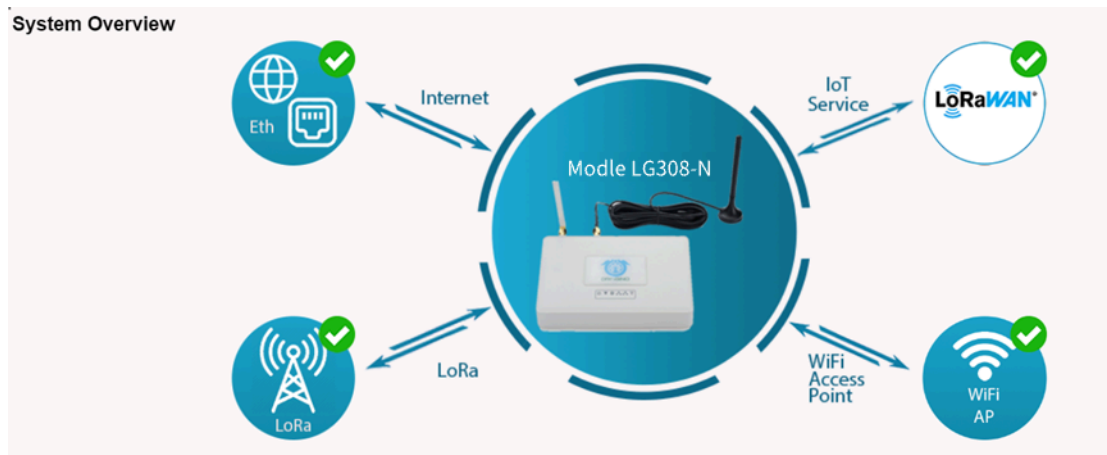
### 3.1 Overview

LG308N supports flexible network set up for different environment. This section describes the typical network topology can be set in LG308N. The typical network set up includes:

- **WAN Port Internet Mode**
- **WiFi Client Mode**
- **WiFi AP Mode**
- **Cellular Mode**

### 3.2 Use WAN port to access Internet

By default, the LG308N is set to use the WAN port to connect to an upstream network. When you connect the LG308N's WAN port to an upstream router, LG308N 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 the Internet as a WiFi Client

In the WiFi Client Mode, LG308N 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](#)

**DRAGINO** LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾ System ▾ LogRead ▾ Home Logout

### WiFi

**Radio Settings**  
 Channel (1-11)  Tx Power (0-18) dBm

**WiFi Access Point Settings**  
 Enable WiFi Access Point   
 WiFi Name SSID   
 Passphrase (8-32 char)  [Show](#) Encryption

**WiFi WAN Client Settings**  
 Enable WiFi WAN Client   
 Host WiFi SSID  WiFi Survey   
 Passphrase  [Show](#) Encryption

WiFi status: OK. Click Refresh to check status.

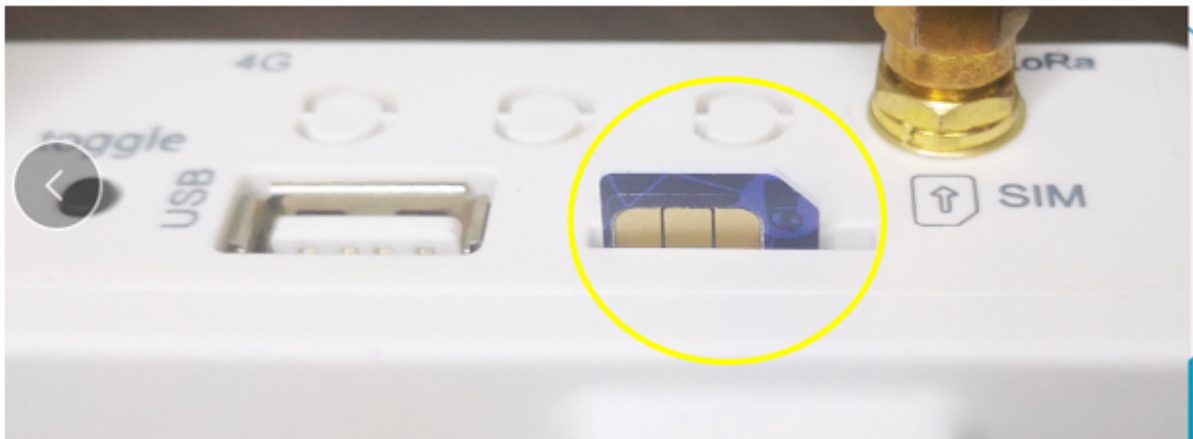
In the WiFi Survey Choose the WiFi AP, and input the Passphrase then click **Save & Apply** to connect.

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

If the LG308N 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 LG308N 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.

**DRAGINO** LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾ System ▾ LogRead ▾ Home Logout

### Cellular Settings

**Cellular device not detected**

APN

Service

Dial Number

Pincode

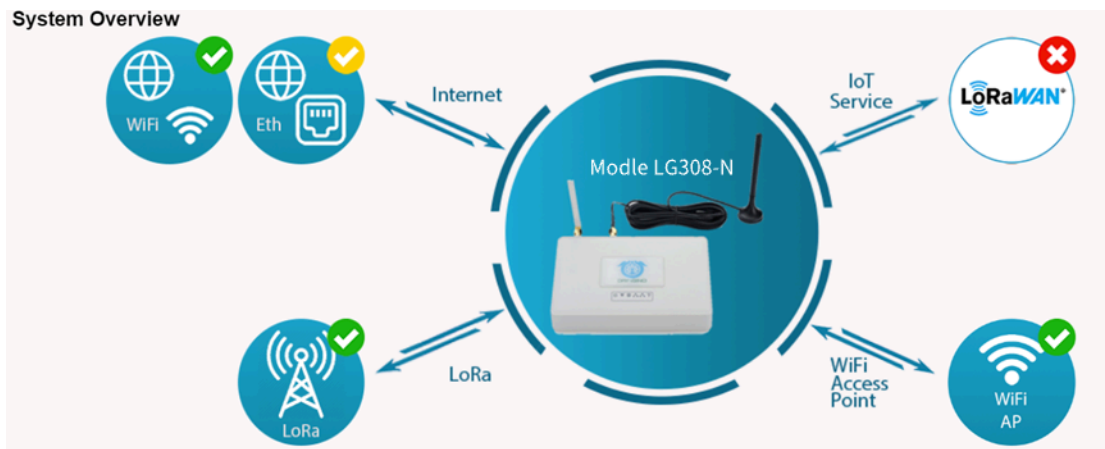
Username

Password  [Show](#)

### 3.5 Check Internet connection

In the [home](#) page, we can check the Internet connection.

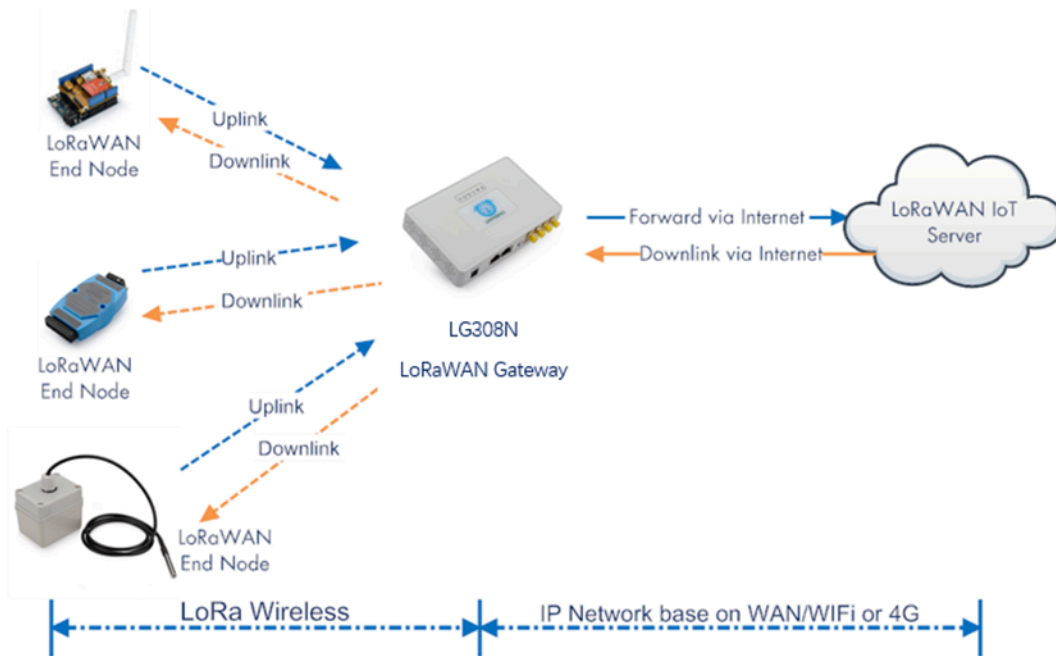
- GREEN Tick : This interface has Internet connection.
- Yellow Tick : This interface has IP address but don't use it for internet connection.
- RED Cross : This interface doesn't connected.



## 4. Example: Configure as a LoRaWAN gateway

LG308N 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.

### LG308N In a LoRaWAN IoT Network:

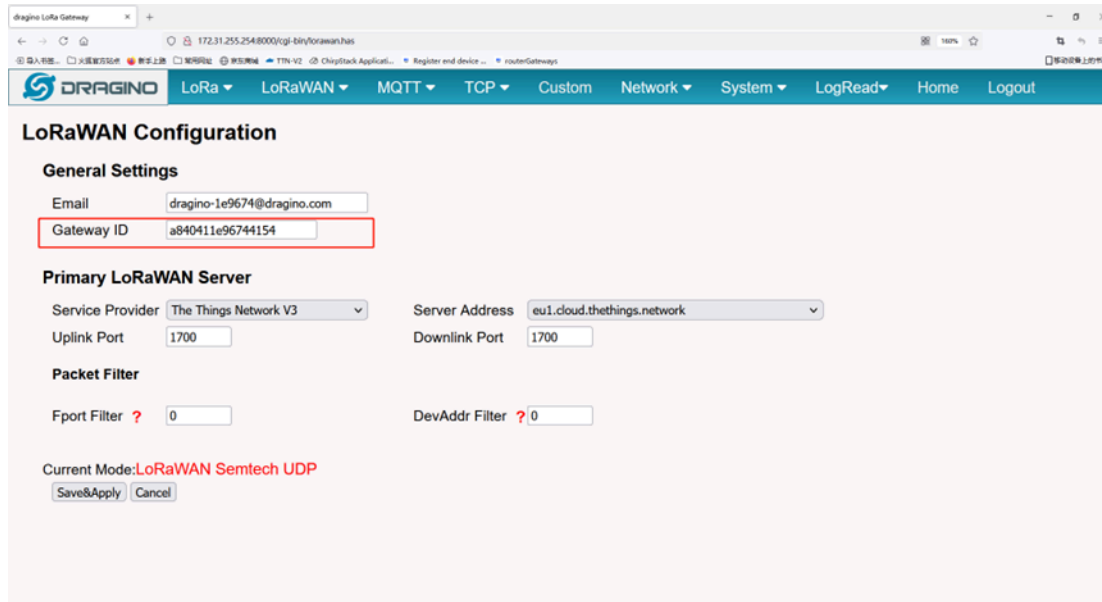


This chapter describes how to use the LG308N to work with (TTN v3) [LoRaWAN Server](http://www.thethingsnetwork.org) ([www.thethingsnetwork.org](http://www.thethingsnetwork.org))

## 4.1 Create a gateway in TTN V3 Server

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

Every LG308N has a unique gateway id. The ID can be found at LoRaWAN page:



The example gateway id is: **a840411e96744154**

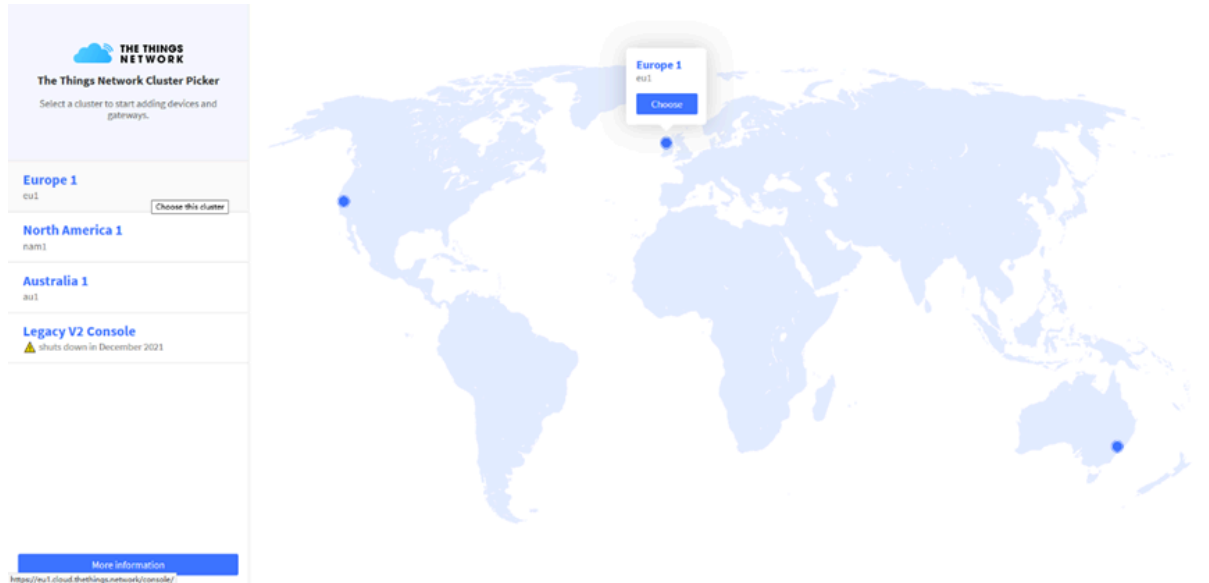
**Step 2: Sign up a user account in TTN server**

<https://account.thethingsnetwork.org/register>



**Step 3: Choose the TTNv3 Cluster Picker**

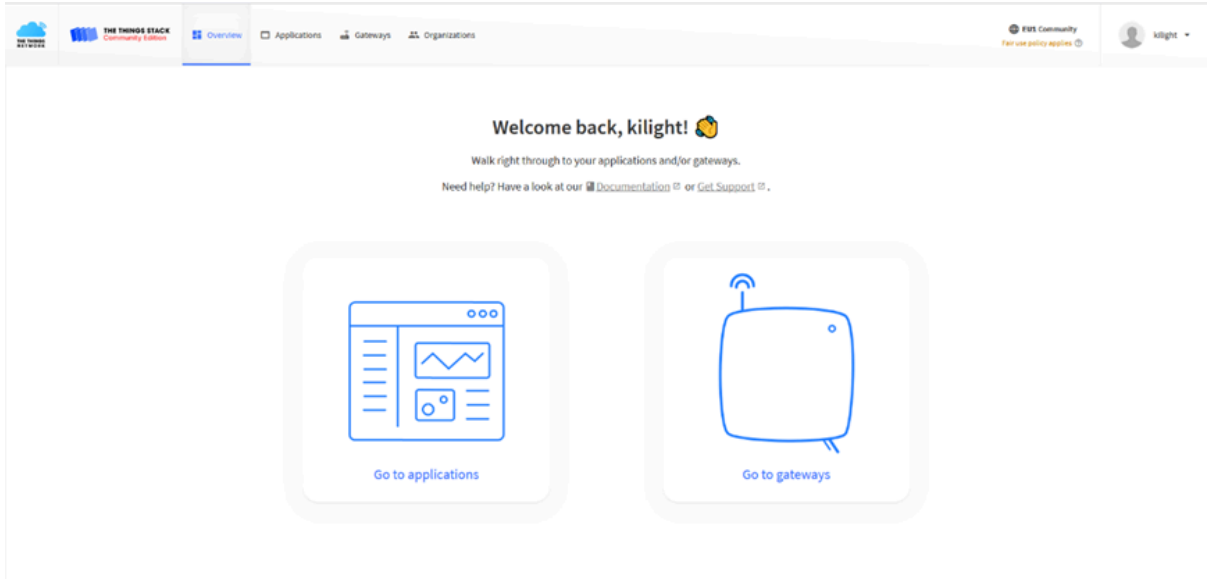




**Note: Choose the cluster corresponds to a specific Gateway server address**

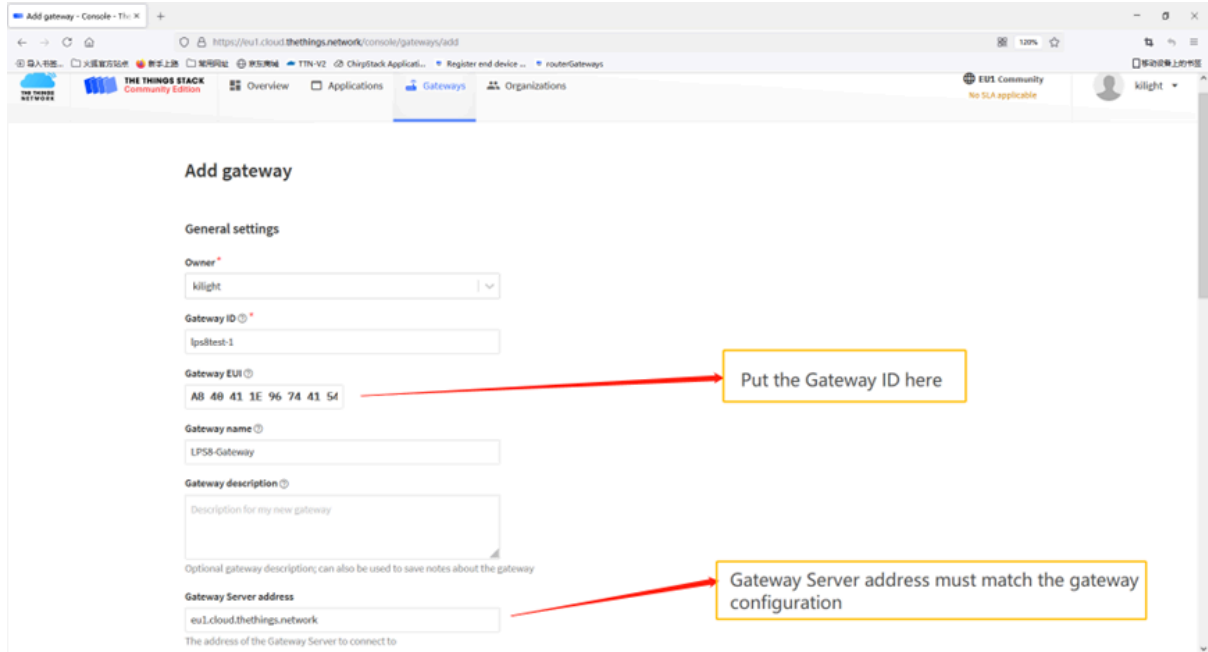
- Europe 1 **corresponding Gateway server address:** eu1.cloud.thethings.network
- North America 1 **corresponding Gateway server address:** nam1.cloud.thethings.network
- Australia 1 **corresponding Gateway server address:** au1.cloud.thethings.network
- Legacy V2 Console : **TTN v2 shuts down in December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

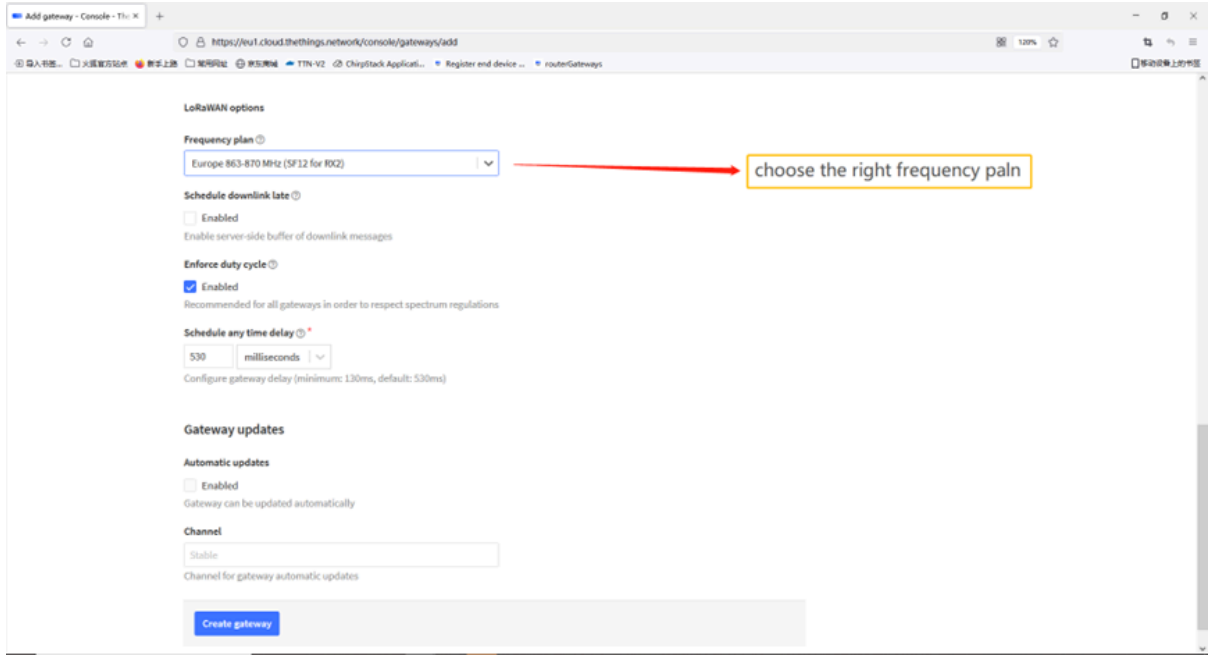
**Step 4: Create a Gateway**



Click the Gateway icon and then click Add gateway.

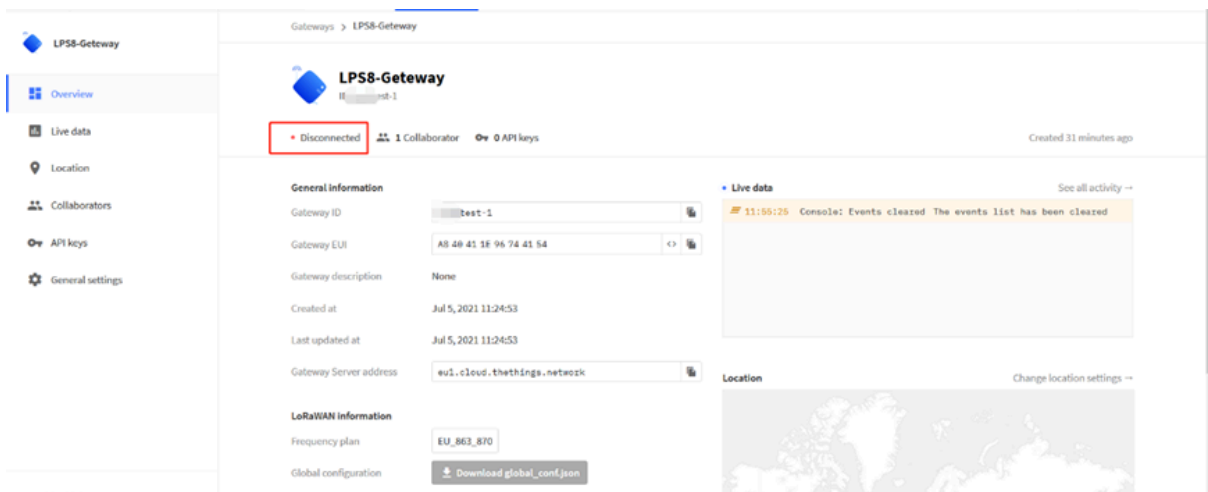
Open the following page:





**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.



## 4.2 Configure LG308N to connect to TTN v3

You can now configure the LG308N to let it connect to TTN network V3.

Make sure your LG308N has a working Internet Connection first.

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

**DRAGINO** LoRa LoRaWAN MQTT TCP Custom Network System LogRead Home Logout

### LoRaWAN Configuration

**General Settings**

Email: dragino-1e9674@dragino.com  
Gateway ID: a840411e96744154

**Primary LoRaWAN Server**

Service Provider: The Things Network V3  
Server Address: eu1.cloud.thethings.network  
Uplink Port: 1700  
Downlink Port: 1700

**Packet Filter**

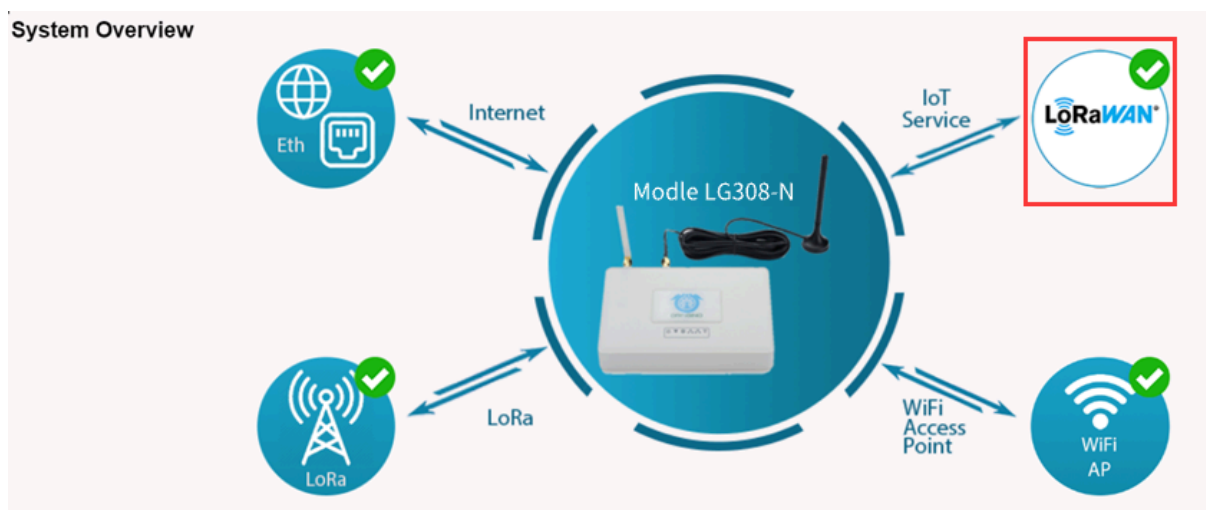
Fport Filter ? 0  
DevAddr Filter ? 0

Current Mode: LoRaWAN Semtech UDP

Save&Apply Cancel

**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.

The screenshot shows the 'LPS8-Getaway' configuration page in The Things Stack. The left sidebar contains navigation options: Overview, Live data, Location, Collaborators, API keys, and General settings. The main content area is divided into 'General information' and 'LoRaWAN information'. The 'General information' section includes fields for Gateway ID, Gateway EUI, Gateway description, Created at, Last updated at, and Gateway Server address. The 'LoRaWAN information' section includes the Frequency plan, which is currently set to 'EU\_863\_870'. A 'Live data' table on the right shows recent gateway status and uplink messages with their respective metrics.

### 4.3 Configure frequency

We also need to set the frequency plan in LG308N to match the end node we use, so to receive the LoRaWAN packets from the LoRaWAN sensor.

The screenshot shows the 'LoRa Configuration' page in the DRAGINO interface. The 'Radio Settings' section is visible, with the 'Frequency Plan' dropdown menu open. The dropdown menu lists several frequency plans, with 'EU868 Europe 868Mhz (863~870)' selected. Other options include CN470 China 470MHz (470~510), US915 United States 915Mhz (902~928), AU915 Australia 915Mhz (915~928), IN865 India 865MHz (865~867), KR920 Korea 920MHz (920~923), AS923 Asia 923MHz (920~923), AS923 Asia 923MHz (923~925), RU864 Russia 864MHz (864~870), and Customized Bands. The 'Keep Alive Period (sec)' is set to 30. Buttons for 'Save&Apply', 'Disable', and 'Cancel' are visible at the bottom of the configuration area.

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

Click to go back, hold to see history

LoRaWAN ▾ MQTT ▾ TCP ▾ HTTP Custom System ▾ LogRead ▾

## LogRead

**FreqINFO:**

SX1301 Channels frequency

-----

chan\_multSF\_0  
Lora MAC, 125kHz, all SF, 868.1 MHz

-----

chan\_multSF\_1  
Lora MAC, 125kHz, all SF, 868.3 MHz

-----

chan\_multSF\_2  
Lora MAC, 125kHz, all SF, 868.5 MHz

-----

chan\_multSF\_3  
Lora MAC, 125kHz, all SF, 867.1 MHz

-----

chan\_multSF\_4  
Lora MAC, 125kHz, all SF, 867.3 MHz

-----

chan\_multSF\_5  
Lora MAC, 125kHz, all SF, 867.5 MHz

-----

chan\_multSF\_6  
Lora MAC, 125kHz, all SF, 867.7 MHz

-----

chan\_multSF\_7  
Lora MAC, 125kHz, all SF, 867.9 MHz

-----

chan\_Lora\_std  
Lora MAC, 250kHz, SF7, 868.3 MHz

-----

## 4.4 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.

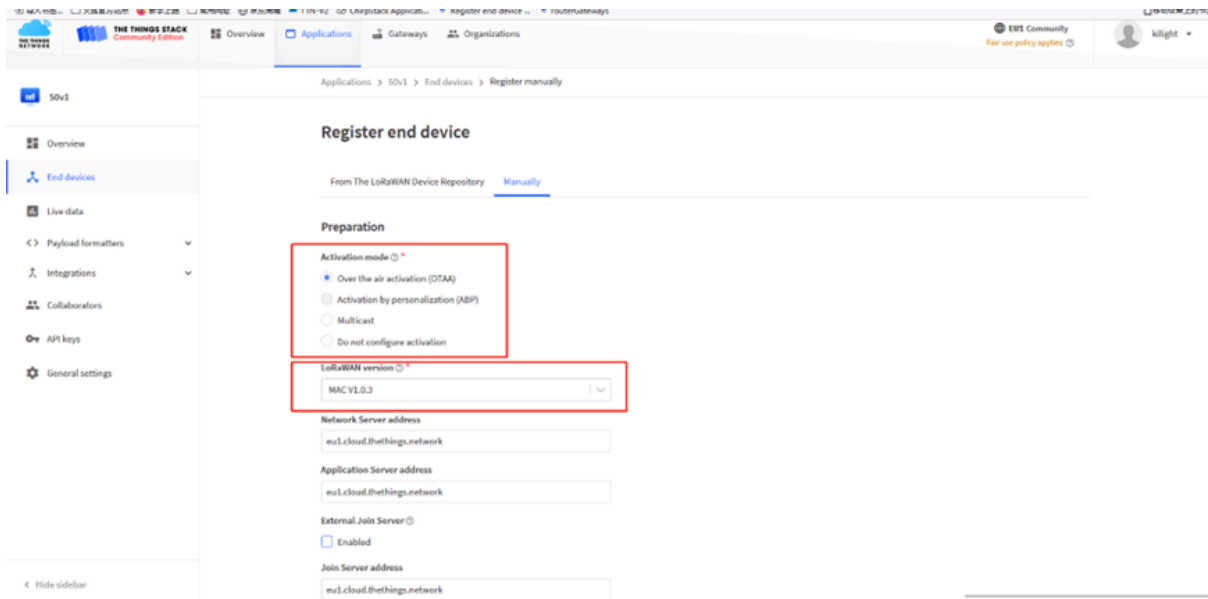
The screenshot shows the 'Add application' page in the TTN v3 web interface. The navigation bar at the top includes 'Overview', 'Applications', 'Gateways', and 'Organizations'. The 'Applications' tab is active. The form contains the following fields:

- Owner:** A dropdown menu with 'kilight' selected.
- Application ID:** A text input field containing 'test'.
- Application name:** A text input field containing 'My new application'.
- Description:** A text area containing 'Description for my new application'.

Below the description field, there is a note: 'Optional application description; can also be used to save notes about the application'. At the bottom of the form is a blue 'Create application' button.

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

Start Register the end device



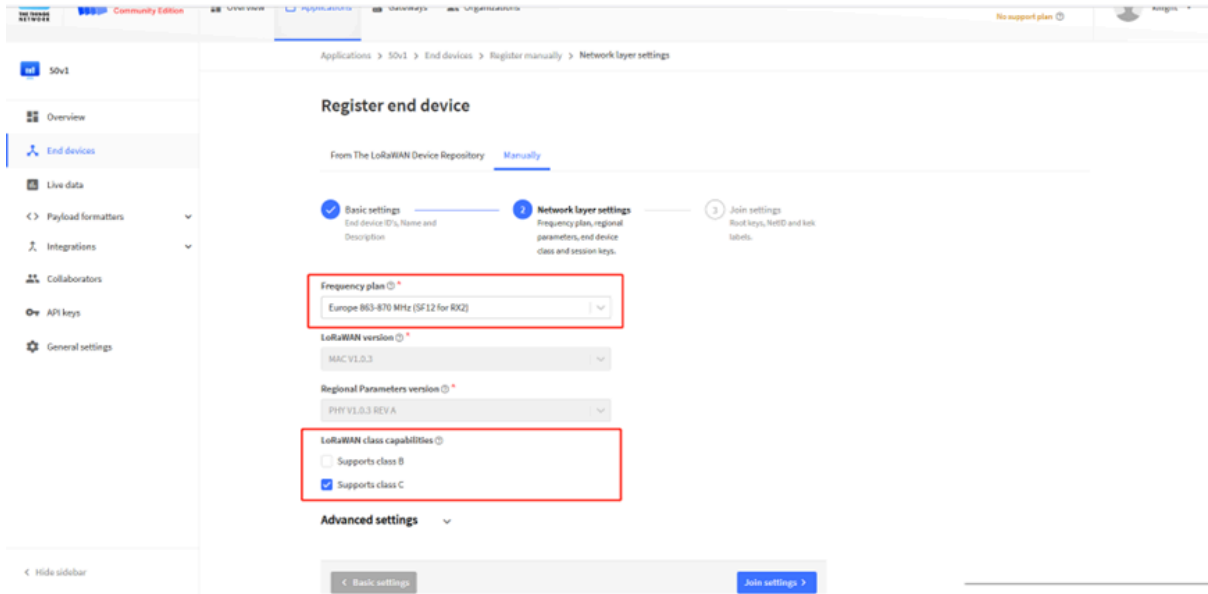
Select OTAA activation mode

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.

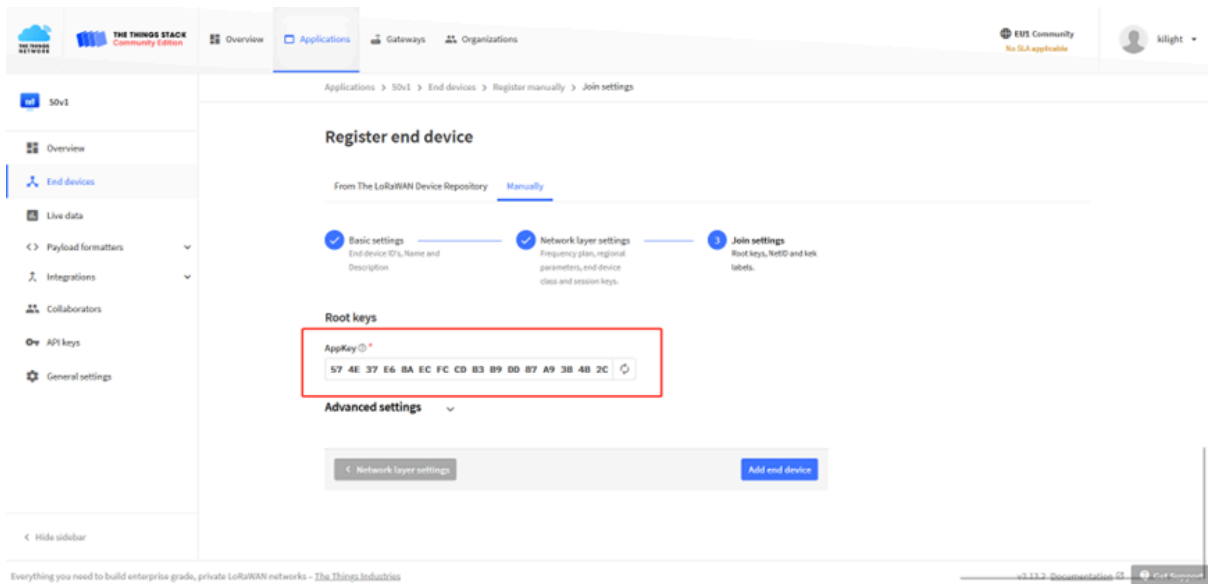


First, input the End device ID, AppEUI and DevEUI.





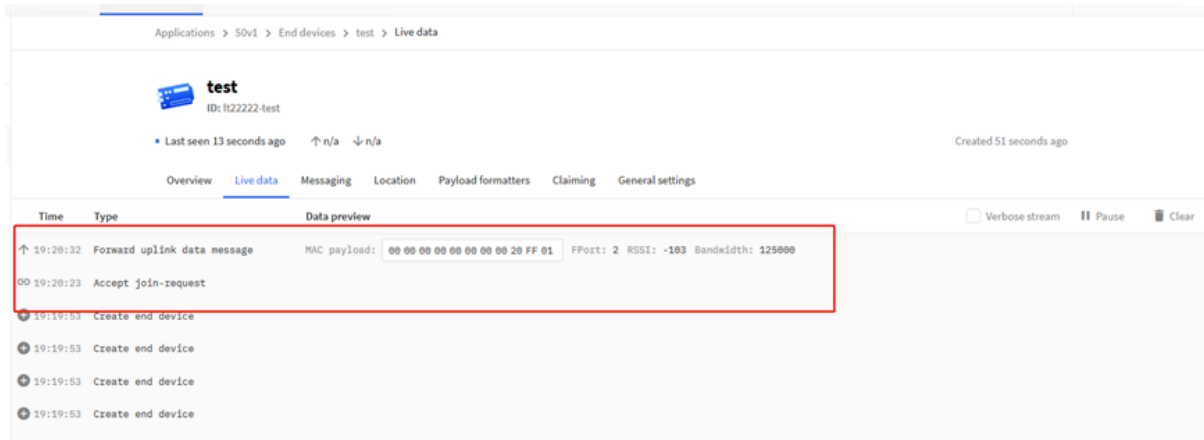
Secondly, choose the corresponding frequency and LoRaWAN class capabilities.



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.

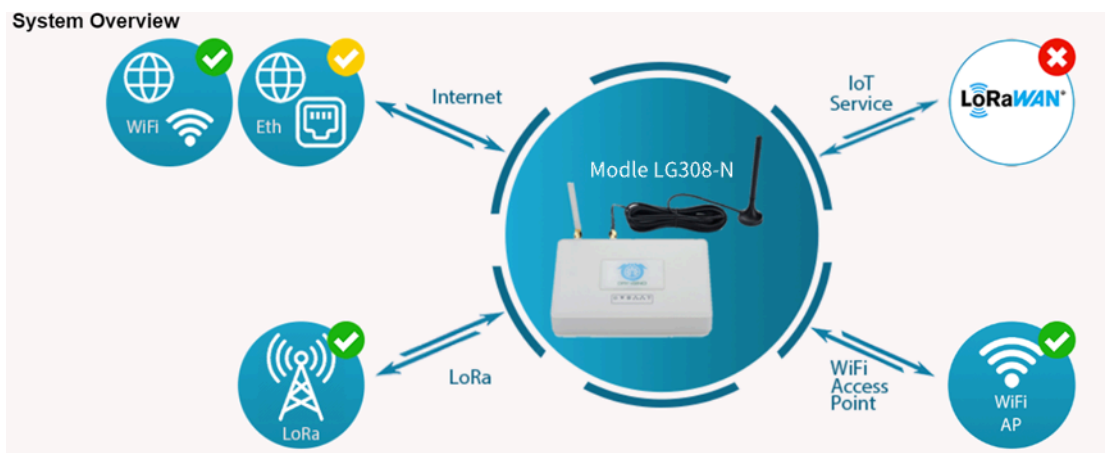
**Note that it may take some time for the device data to appear in the TTN v3 display.**



## 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 LG308N 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](#)

DRAGINO LoRa LoRaWAN MQTT TCP HTTP Custom System

### LoRa Configuration

Debug Level: Low

#### Radio Settings

Keep Alive Period (sec): 30

Frequency Plan: EU868 Europe 868Mhz (863~870)

- EU868 Europe 868Mhz (863~870)
- CN470 China 470MHz (470~510)
- US915 United States 915Mhz (902~928)
- AU915 Australia 915Mhz (915~928)
- IN865 India 865MHz (865~867)
- KR920 Korea 920MHz (920~923)
- AS923 Asia 923MHz (920~923)
- AS923 Asia 923MHz (923~925)
- RU864 Russia 864MHz (864~870)
- Customized Bands

Save&Apply Disable Cancel

**Note \***: [See this instruction for how to customize frequency band](#)

## 5.2.2 LoRa --> ABP Decryption

The LG308N 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: [Communication with ABP End Node](#)

**DRAGINO** LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾ System ▾ LogRead ▾ Home Logout

### Decrypt ABP End Node Packets

Enable ABP Decryption

#### Add Key

Dev ADDR:   
APP Session Key:   
Network Session Key:   
Decoder:  ▾

#### Delete Key

Dev ADDR:  ▾

#### ABP Keys:

Dev ADDR | APP Session Key | Network Session Key | Decoder

## 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.

DRAGINO LoRa LoRaWAN MQTT TCP Custom Network System LogRead Home Logout

## LoRaWAN Configuration

### General Settings

Email

Gateway EUI

### Primary LoRaWAN Server

Service Provider  Server Address

Uplink Port  Downlink Port

### Secondary LoRaWAN Server

Service Provider  Server Address

Uplink Port  Downlink Port

### Packet Filter

Primary server Fport Filter ?  DevAddr Filter ?

Secondary server Fport Filter  DevAddr Filter

### Add Filter

Server Name:  Filter type:  Filter Value

DELET Filter

Current Mode: **LoRaWAN Semtech UDP**

**Note:**

\*: User can ignore the latitude and longitude settings here, LG308N will use the actually value from GPS module.

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

See: [Filter unwanted LoRaWAN packets](#)

## 5.3.2 LoRaWAN --> Amazon AWS-IoT

The screenshot shows the 'Amazon AWS IoT -- LoRaWAN' settings page in the DRAGINO web interface. The navigation bar includes 'LoRa', 'LoRaWAN', 'MQTT', 'TCP', 'Custom', 'Network', 'System', and 'LogRead'. The settings are as follows:

CUPS URI	<input type="text" value="example: https://xxxxxxx.cups.lorawan.us-east-1.amazonaws.com:443"/>
Email	<input type="text" value="dragino-1ec39c@dragino.com"/>
Gateway ID	<input type="text" value="a84041ffff1ec39c"/>
CUPS trust	Not Found <input type="button" value="選擇檔案"/> 未選擇任何檔案 <input type="button" value="Upload_CUPS_Trust"/>
Private key	Not Found <input type="button" value="選擇檔案"/> 未選擇任何檔案 <input type="button" value="Upload_Private_key"/>
Cert pem	Not Found <input type="button" value="選擇檔案"/> 未選擇任何檔案 <input type="button" value="Upload_Cert_pem"/>

Current Mode: **LoRaWAN Semtech UDP** Click Save & Apply will change to mode: **LoRaWAN Station for AWS**

Please see this instruction to know more detail and demo for how to connect to [AWS-IoT LoRaWAN Core](#).

### 5.3.3 LoRaWAN --> LORIoT

Settings to communicate to LORIoT LoRaWAN Network Server: <https://www.loriot.io/>

Instruction: [Notes for LORIoT](#)

The screenshot shows the 'LORIoT Client Configuration' settings page in the DRAGINO web interface. The navigation bar includes 'LoRa', 'LoRaWAN', 'MQTT', 'TCP', 'Custom', 'Network', 'System', 'LogRead', 'Home', and 'Logout'. The settings are as follows:

Server Address	<input type="text" value="Frankfurt - eu1.loriot.io"/>	Server Port	<input type="text" value="1700"/>
Client Certificate	<input type="text"/>	Client Key	<input type="text"/>
CA File	<input type="text"/>		

eth0 MAC Address: A8:40:41:1A:B4:2B

[Certificate Management](#)

Current Mode: **LoRaWAN Semtech UDP** Click Save & Apply will change to mode: **LoRIoT**

### 5.4 MQTT Settings

If end nodes works in ABP mode, user can configure LG308N to transfer the data to MQTT broker,

Instruction: [MQTT Forward Instruction](#)

**MQTT Client Configuration**

MQTT Server Profile: General

Broker Address [-h]: Server URL

User ID [-u]: User ID

Broker Port [-p]: Server Port

Password [-P]: Password [Show](#)

Certificate [--cert]:

CA File [--cafile]:

Client ID [-i]: dragino-1d25dc

Key [--key]:

**Publish**

Enable Publish

Quality of Service [-q]: QoS 0

Topic Format [-t]: CLIENTID/CHANNEL/data

Data Format [-m]: DATA

**Subscribe**

Enable Subscribe

Quality of Service [-q]: QoS 0

Topic Format [-t]: CLIENTID/#

## 5.5 System


### 5.5.1 System --> System Overview


Shows the system info:

**DRAGINO** LoRa LoRaWAN MQTT TCP Custom Network System LogRead Home Logout

### System Overview

**Device Model:** LG308N  
**Hostname:** dragino-1ab428  
**Firmware:** lgw-5.4.1661909863  
**Build Time:** Build Wed 31 Aug 2022 09:37:43 AM CST  
**FWD version:** Release:2022-07-23 02:29:28, Version:2.0.6  
**Cellular :** Not Detected  
**System Time:** Fri Sep 16 03:57:29 UTC 2022  
**Uptime:** 5 days  
**Load Avg:** 29, load average  
**Memory:** Free Memory: 15616 / Total Memory: 60192kB  
**IoT Service:** lorawan  
**ETH0 MAC:** A8:40:41:1A:B4:2B  
**ETH1 MAC:** A8:40:41:1A:B4:2A  
**WIFI MAC:** AA:40:41:1A:B4:28

Internet Connection OK 

LoRaWAN Connection OK 

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



**DRAGINO** LoRa ▼ LoRaWAN ▼ MQTT ▼ TCP ▼ Custom Network ▼ System ▼ LogRead ▼ Home Logout

### System General

**System Password**  
Password    Login: admin

**TimeZone**  
Timezone

**Port Forwarding**  
Enable HTTP Forward   
Enable SSH Forward

**Keepalive\_Script**  
Interval setting

**Logread Level**  
Logread level

#### 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

**DRAGINO** LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾ System ▾ LogRead ▾ Home Logout

### Network

**LAN Settings**

IP Address  Gateway

Netmask  DNS

**WAN Settings**

Enable DHCP

**WiFi WAN Settings**

Enable DHCP

**LAN Settings:** When the LG308N has the AP enable, LAN settings specify the network info for LG308N's own network.

**WAN Settings:** Setting for LG308N WAN port

**WiFi Settings:** Setting for LG308N WiFi IP when use it as WiFi Client

## 5.5.4 System --> WiFi

LG308N WiFi Settings.

**DRAGINO** LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾ System ▾ LogRead ▾ Home Logout

### WiFi

**Radio Settings**

Channel (1-11)  Tx Power (0-18) dBm

**WiFi Access Point Settings**

Enable WiFi Access Point

WiFi Name SSID

Passphrase (8-32 char)  [Show](#) Encryption

**WiFi WAN Client Settings**

Enable WiFi WAN Client

Host WiFi SSID

Passphrase  [Show](#) WiFi Survey

Encryption

WiFi status: OK. Click Refresh to check status.

[Save&Apply](#) [Cancel](#) [Refresh](#)

### 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.

**DRAGINO** LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾ System ▾ LogRead ▾ Home Logout

### Cellular Settings

**Cellular device not detected**

APN

Service

Dial Number

Pincode

Username

Password  [Show](#)

[Save&Apply](#) [Cancel](#)

**Note \*:** For LG308N which doesn't have the cellular module, this page will shows Cellular not detected.

## 5.5.6 System --> Network Status

The screenshot shows the DRAGINO web interface with a navigation menu at the top containing: LoRa, LoRaWAN, MQTT, TCP, Custom, Network, System, LogRead, Home, and Logout. The main content area is titled "System Status" and contains a sub-section "Network / WiFi Status". This section displays a terminal-style output of network configuration and status for various interfaces.

```
Network
-----
Lan IP Address:
  inet addr: 10.130.1.1 Bcast: 10.130.1.255 Mask: 255.255.255.0

Eth WAN IP Address:
  inet addr: 10.130.2.57 Bcast: 10.130.2.255 Mask: 255.255.255.0
  inet addr: 172.31.255.254 Bcast: 172.31.255.255 Mask: 255.255.255.252

WiFi WAN IP Address:
Cellular:

Bridge:
bridge name      bridge id          STP enabled      interfaces
br-lan           7fff.a840411ab42b no                eth0
                                                         wlan0

WiFi
----
wlan0  ESSID: "dragino-1ab428"
      Access Point: AA:40:41:1A:B4:28
      Mode: Master Channel: 13 (2.472 GHz)
      Tx-Power: 17 dBm Link Quality: unknown/70
      Signal: unknown Noise: -90 dBm
      Bit Rate: unknown
      Encryption: WPA2 PSK (CCMP)
      Type: nl80211 HW Mode(s): 802.11bgn

---
wlan0-2 ESSID: unknown
      Access Point: 00:00:00:00:00:00
      Mode: Client Channel: unknown (unknown)
      Tx-Power: 17 dBm Link Quality: unknown/70
      Signal: unknown Noise: -90 dBm
      Bit Rate: unknown
      Encryption: unknown
      Type: nl80211 HW Mode(s): 802.11bgn
```

At the bottom of the terminal output area, there is a "Refresh" button.

## 5.5.7 System --> Remote Mgmt & Auto Provision

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

Local Area Network (LAN)



Gateways



http server with configure files

Case 2:  
Maintain  
gateway  
configure  
from  
cloud

Internet

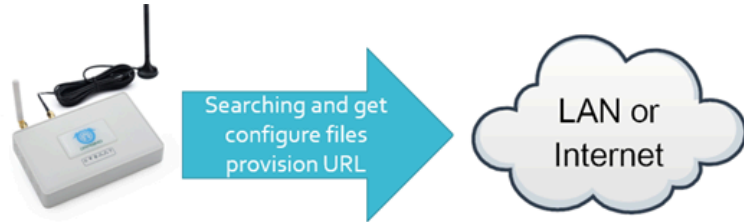


Gateways



maintain server with configure files

## 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/LG308N/Firmware/Application\\_Note/&file=Auto-update-feature.pdf](http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LG308N/Firmware/Application_Note/&file=Auto-update-feature.pdf)

R-SSH is for remote access device and management, introduction for how to use: [Remote Access Gateway](#)

DRAGINO LoRa LoRaWAN MQTT TCP Custom Network System LogRead Home Logout

### Auto Provision

Provision Server:    
Configure Version: 0 Get provision file fail: Failed to allocate uclient context

### R-SSH Host Settings

Connection Type:   
Login ID:   
Host Address:  RSSH ID: a84041ffff1ab428  
Connect at Startup:   
Connection Status: Not connected to RSSH Host

Note: Auto connection after startup may take up to 5 minutes to clear previous connection

### Generate New Keys

Current Key ID: No keyfile present  
 Caution: Generating new keys will break any existing server connections!!  
[Download Public Key](#)

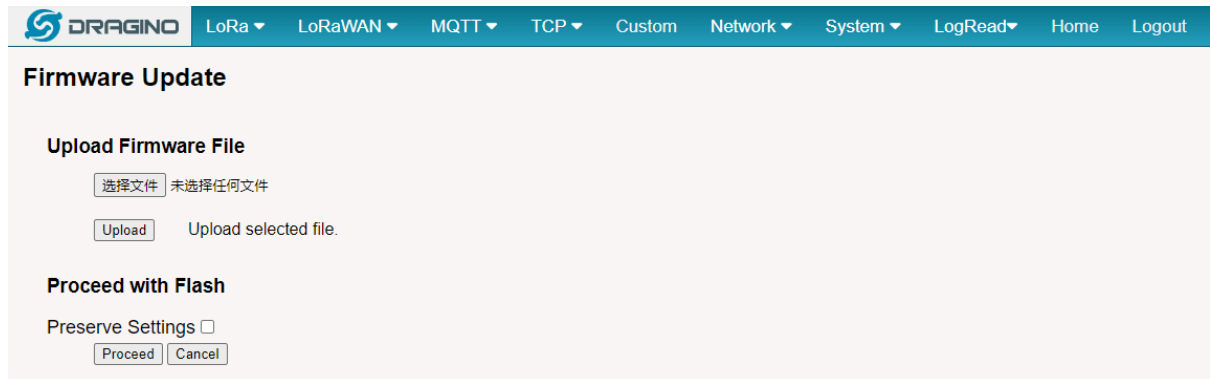
## 5.5.8 System --> Firmware Upgrade

We keep improving the DLOS8N 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](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](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



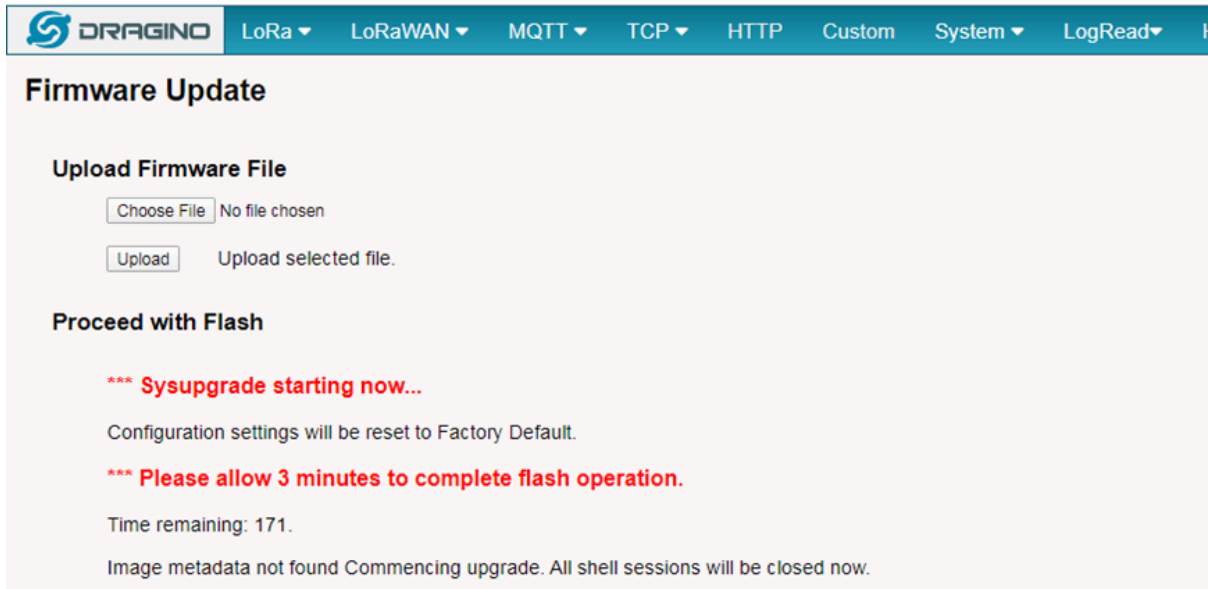
The screenshot shows the 'Firmware Update' page in the DRAGINO web interface. The navigation bar at the top includes the DRAGINO logo and menu items: LoRa, LoRaWAN, MQTT, TCP, Custom, Network, System, LogRead, Home, and Logout. The main content area is titled 'Firmware Update' and contains two sections: 'Upload Firmware File' and 'Proceed with Flash'. In the 'Upload Firmware File' section, there is a file selection button labeled '选择文件' with the text '未选择任何文件' next to it, and an 'Upload' button with the text 'Upload selected file.' below it. In the 'Proceed with Flash' section, there is a 'Preserve Settings' checkbox which is currently unchecked, and two buttons labeled 'Proceed' and 'Cancel' below it.

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.





**Firmware Update**

**Upload Firmware File**

No file chosen

Upload selected file.

**Proceed with Flash**

**\*\*\* Sysupgrade starting now...**

Configuration settings will be reset to Factory Default.

**\*\*\* Please allow 3 minutes to complete flash operation.**

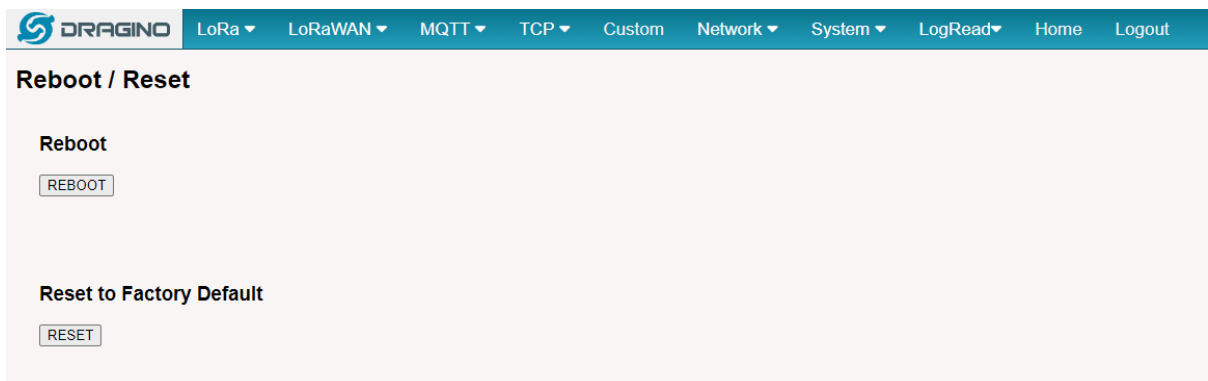
Time remaining: 171.

Image metadata not found Commencing upgrade. All shell sessions will be closed now.

**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



**Reboot / Reset**

**Reboot**

**Reset to Factory Default**

### 5.5.10 System --> Package Maintain

## Package Management

### Package List

Package data is not loaded. Click on Reload to download package data.

Click Reload to download package list. This will take a while.

### Installed Package List

```
stftp - 0.7.1-5
base-files - 190-r18-253b1fc
blkid - 2.32-2
block-mount - 2018-04-16-e2436836-1
busybox - 1.28.3-4
ca-bundle - 20210119-1
ca-certificates - 20210119-1
chat - 2.4.7-12
comgt - 0.32-30
.....
```

### Install Package

Package Name:

### Core Packages

PACKAGE	Cur Version	Remote version	Action
lg02_pkt_fwd :	1.2.1-1		<input type="button" value="Upgrade_lg02_pkt_fwd"/>
lora-gateway :	1.2.7-3		<input type="button" value="Upgrade_lora-gateway"/>
haserl-ui :	1.2.1-2		<input type="button" value="Upgrade_haserl-ui"/>
dragino_gw_fwd :	2.6.0-1		<input type="button" value="Upgrade_dragino_gw_fwd"/>

### Installation Progress

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.

## LogRead

### FreqINFO:

---

#### Gateway Channels frequency

chan\_multSF\_0

Lora MAC, 125kHz, all SF, 903.9 MHz

chan\_multSF\_1

Lora MAC, 125kHz, all SF, 904.1 MHz

chan\_multSF\_2

Lora MAC, 125kHz, all SF, 904.3 MHz

chan\_multSF\_3

Lora MAC, 125kHz, all SF, 904.5 MHz

chan\_multSF\_4

Lora MAC, 125kHz, all SF, 904.7 MHz

chan\_multSF\_5

Lora MAC, 125kHz, all SF, 904.9 MHz

chan\_multSF\_6

Lora MAC, 125kHz, all SF, 905.1 MHz

chan\_multSF\_7

Lora MAC, 125kHz, all SF, 905.3 MHz

chan\_Lora\_std

Lora MAC, 500kHz, SF8, 904.6 MHz

chan\_FSK

---

### IoT Server Connection Cstate:

---

Sat Sep 10 09:30:52 UTC 2022: switch to online

Tue Sep 13 02:43:23 UTC 2022: switch to offline

Tue Sep 13 02:43:39 UTC 2022: switch to online

Fri Sep 16 02:18:58 UTC 2022: switch to offline

## 5.6.2 LogRead --> System Log

Show the system log

## System Log

### USB Devices:

```
Bus 001 Device 002: ID 1a40:0101 Terminus Technology Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

### Boot Info:

```
br-lan: port 2(wlan0) entered disabled state
br-lan: port 2(wlan0) entered blocking state
br-lan: port 2(wlan0) entered forwarding state
wlan0-2: authenticate with 20:76:93:26:45:20
br-lan: port 2(wlan0) entered disabled state
br-lan: port 2(wlan0) entered blocking state
br-lan: port 2(wlan0) entered forwarding state
wlan0-2: authenticate with 20:76:93:26:45:20
br-lan: port 2(wlan0) entered disabled state
br-lan: port 2(wlan0) entered blocking state
```

### Previous Log: lorawan

```
Fri Sep 16 05:56:41 2022 daemon.info fwd[4849]: JOIN_REQ: {"Size":23, "Rssi":-87, "snr":9, "AppEUI":"A000000000000100", "DevEUI":"A84041234181BA7D"}
Fri Sep 16 05:56:41 2022 daemon.info helium_gateway[2634]: WARN ignoring failed uplink Service(Rpc(Status { code: Unknown, message: "unmapped_eui",
metadata: MetadataMap { headers: { "user-agent": "grpc-erlang/0.1.0", "content-type": "application/grpcproto", "grpc-encoding": "identity" }, source: None
})), oui: 9, uri: http://44.238.156.97:8080/, pubkey: 11w77YQLhgUt8HUJrMtntGGr97RyXmotIofs5Ct2ELmbFoYsQa, module: router
Fri Sep 16 05:56:41 2022 daemon.info helium_gateway[2634]: WARN ignoring failed uplink Service(Rpc(Status { code: Unknown, message: "unmapped_eui",
metadata: MetadataMap { headers: { "user-agent": "grpc-erlang/0.1.0", "content-type": "application/grpcproto", "grpc-encoding": "identity" }, source: None
})), oui: 16, uri: http://13.37.13.24:8080/, pubkey: 11afuQsrnk52mgxLu91AdtDXbJ9wmaqWBuXC3hvjejoXkxEZFPVY, module: router
Fri Sep 16 05:56:42 2022 daemon.info fwd[4849]: INFO [server-down] PULL_ACK received in 0 ms
Fri Sep 16 05:56:44 2022 daemon.info fwd[4849]: lgw_receive:1310: INFO: RSSI temperature offset applied: 1.746 dB (current temperature 38.8 C)
Fri Sep 16 05:56:44 2022 daemon.info fwd[4849]: lgw_receive:1313: INFO: nb pkt found:1 left:0
Fri Sep 16 05:56:44 2022 daemon.info fwd[4849]: INFO [server-up] received packages from mote: 26012563 (fcnt=43174)
Fri Sep 16 05:56:44 2022 daemon.info fwd[4849]: PKTUP [server1] JSON: [{"rxpk":{"jver":1,"tmst":168015229,"time":"2022-09-16T05:56:44.072916Z","chan":6,"rfch":1,"freq":905.100000,"aid":8,"stat":1,"modu":"LORA","datr":"SF10BW125","codr":"4/5","rssi":-118,"lsnr":-10.5,"foff":-2659,"rssi":-108,"size":24,"data":"QGM1ASaAppgCPisitOiI3StRqXdzgEmh"}]}]
Fri Sep 16 05:56:44 2022 daemon.info fwd[4849]: INFO [server-up] PUSH_ACK received in 0 ms
Fri Sep 16 05:56:44 2022 daemon.info helium_gateway[2634]: INFO uplink @168015229 us, 905.10 MHz, 0k(DataRate(SF10, BW125)), snr: -10.5, rssi: -118, len: 24 from A8:40:41:FF:FF:1A:B4:28, module: gateway
Fri Sep 16 05:56:44 2022 daemon.info fwd[4849]: INFO [server2-up] received packages from mote: 26012563 (fcnt=43174)
Fri Sep 16 05:56:44 2022 daemon.info fwd[4849]: PKTUP [server2] JSON: [{"rxpk":{"jver":1,"tmst":168015229,"time":"2022-09-
```

### Network State:

## 6. More features

### 6.1 More instructions

[LoRaWAN Gateway Instruction](#)(LoRaWAN Gateway)

## 7. Linux System

The LG308N is based on the OpenWrt Linux system. It is open source, and users are free to configure and modify the Linux settings.

### 7.1 SSH Access for Linux console

User can access the Linux console via the SSH protocol. Make sure your PC and the LG308N are connected to the same network, then use a SSH tool (such as [putty](#) in Windows) to access it.

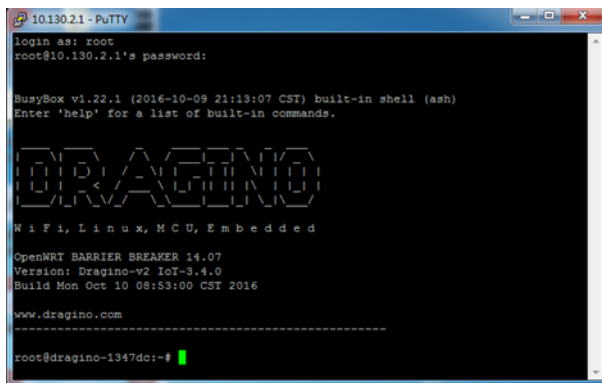
IP address: IP address of LG308N

Port: 22 (via WiFi AP mode) or 2222 (via WAN Interface)

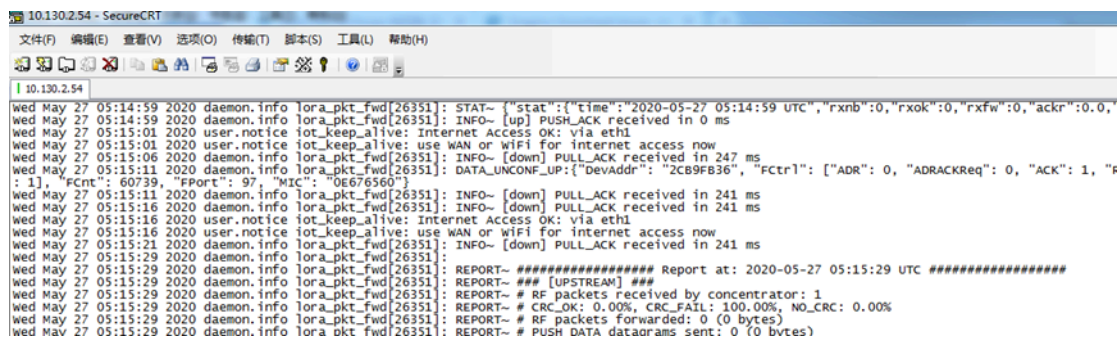
User Name: **root**

Password: **dragino** (default)

After logging in, you will be in the Linux console and can enter commands as shown below.



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



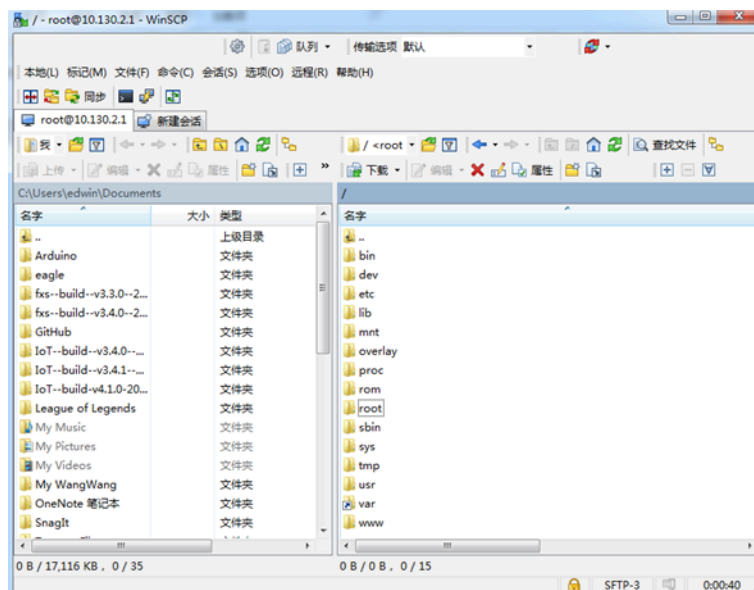
### 7.2 Edit and Transfer files

The LG308N supports the **SCP protocol** and has a built-in **SFTP server**. There are many ways to edit and transfer files using these protocols.

In Windows, one of the easiest methods is using the [WinSCP](#) utility.

After establishing access via WinSCP to the device, you can use an FTP style window to drag / drop files to the LG308N, or edit the files directly in the windows.

Screenshot is as below:



## 7.3 File System

The LG308N 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 LG308N flash. User can use an external USB flash to extend the size for storage.

## 7.4 Package maintenance system

LG308N uses the OpenWrt [OPKG package maintenance system](#). There are more than 3000+ packages available in our package server for users to install for their applications. For example, if you want to add the *iperf* tool, you can install the related packages and configure LG308N to use *iperf*.

Below are some example *opkg* commands. For more information please refer to the [OPKG package maintain system](https://oldwiki.archive.openwrt.org/doc/techref/opkg) (<https://oldwiki.archive.openwrt.org/doc/techref/opkg>)

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
```

The system will automatically install the required packages as shown below.

```
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](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. OTA System Update

LG308N supports system auto update via OTA, please see [this URL](#) for the detail of this feature.

## 10. FAQ

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

See below link for how to customize frequency band: [How to customized LoRaWAN frequency band](#)

### 10.2 Can I connect LG308N to LORIIOT?

Yes, the set up instruction is here: [Notes for LORIIOT](#)

### 10.3 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 LG308N 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](https://github.com/dragino/openwrt_lede-18.06)

### 10.4 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.

### 10.5 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
```

## 11. Trouble Shooting

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

In some cases, when installing a package with **opkg**, it will generate a kernel error such as below due to a mismatch in the kernel ID:

```
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.
```

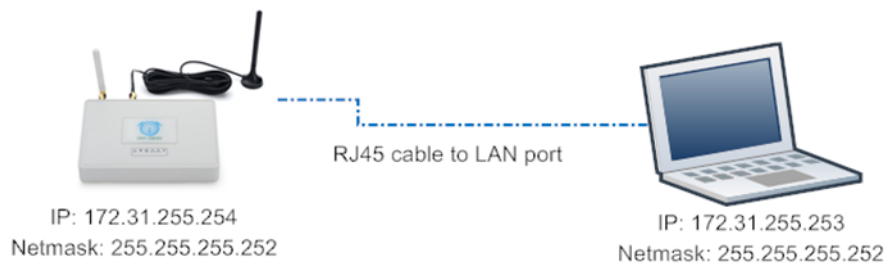
In this case, you can use the `-force-depends` option to install such package as long as the actual kernel version is the same.

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

### 11.2 How to recover the LG308N if the firmware crashes

Please follow this instruction to recover your gateway: [Recover Gateway](#)

### 11.3 I configured LG308N for WiFi access and lost its IP. What to do now?



The LG308N has a fall-back IP address on its WAN port. This IP is always enabled so you can use the fall-back IP to access LG308N no matter what the WiFi IP is. The fall back IP is useful for connecting and debug the unit.

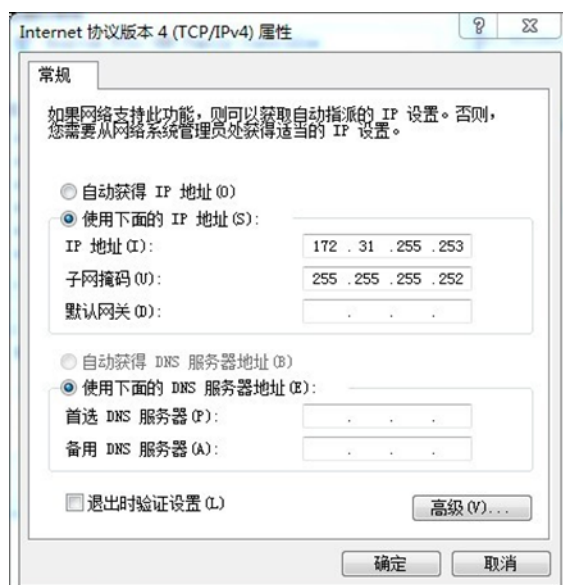
**Note: fallback IP can be disabled in the WAN and DHCP page.**

**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 LG308N via Web or Console.

## 12. Order Info

**PART:** *DLOS8N-XXX-YYY*:

**XXX:** *Frequency Band*

- **868** : valid frequency: 863Mhz ~ 870Mhz. for bands EU868, RU864, IN865 or KZ865.
- **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](#).

## 13. Packing Info

**Package Includes:**

- LG308N 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: 26 x 9 x 8.5 cm
- Weight: 450g
- Package Size: 49 x 19.5 x x 19Package Size: 4912 cm
- Weight: 2.5kg

## 14. 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](mailto:support@dragino.com)

## 15. Reference

- Source code for LG08 LoRa Gateway: [https://github.com/dragino/openwrt\\_lede-18.06](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/LG308N-OLG308N/Firmware/](http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LG308N-OLG308N/Firmware/)
- Hardware Source code: <https://github.com/dragino/motherboard-hardware/tree/master/LG308N>