
DLOS8N - Outdoor LoRaWAN Gateway User Manual

last modified by Xiaoling

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1. Introduction

1.1 What is the DLOS8N

The DLOS8N is an **open source outdoor LoRaWAN Gateway**. It lets you bridge LoRa wireless network to an IP network via WiFi, Ethernet, 3G or 4G cellular. The LoRa wireless allows users to send data and reach extremely long ranges at low data-rates.

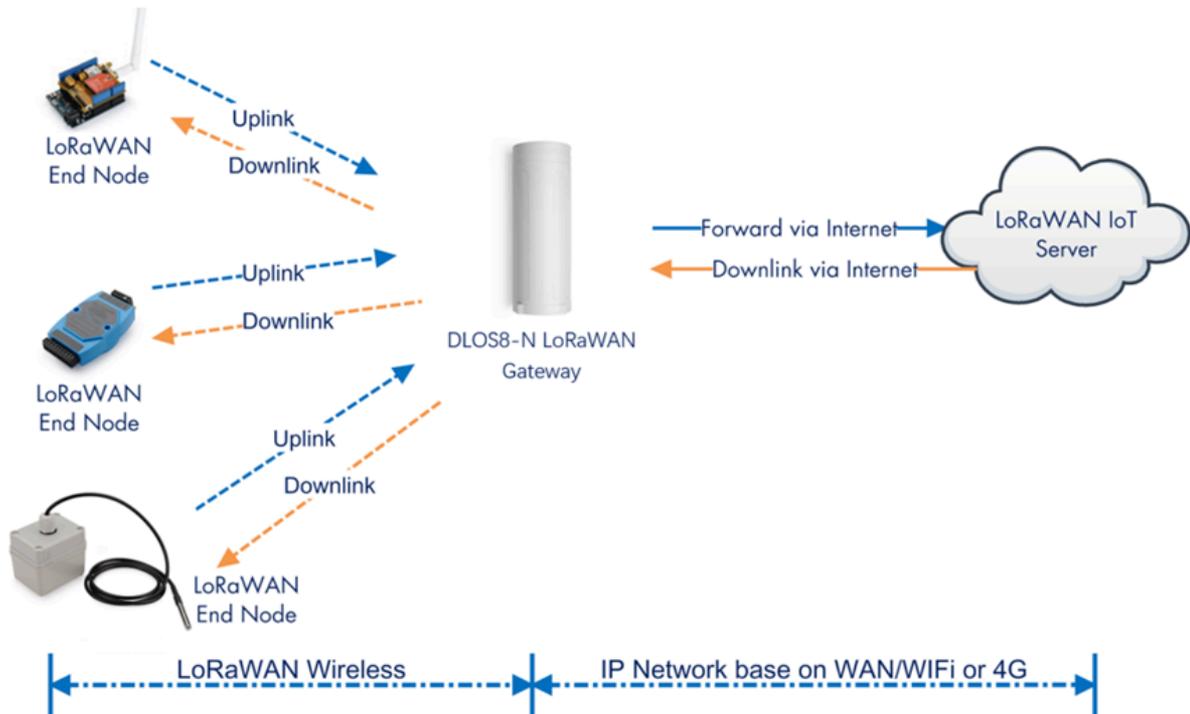
DLOS8N supports **Semtech packet forwarder** and **LoRaWAN Station connection**, it is fully compatible with LoRaWAN protocol. DLOS8N includes a **SX1302 LoRaWAN concentrator**.

DLOS8N has **pre-configured standard LoRaWAN frequency bands** to use for different countries. User can also customize the frequency bands to use in their own LoRaWAN network.

DLOS8N 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.

DLOS8N supports **auto-provision** for mass deployment and long term maintain. System integrator can easily change the settings.

DLOS8-N 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 1
- WiFi : 802.11 b/g/n

- LoRaWAN Wireless
- Power Input: 12 ~ 24 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 -140 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 modern wireless communication systems

Power over Ethernet:

- IEEE 802.3af compliant.
- Support wide input voltage range 37Vdc to 57Vdc.
- Thermal cut off.
- Short circuit protection.
- Over current protection
- Isolation level 4 KVrms.
- Enhanced surge protection

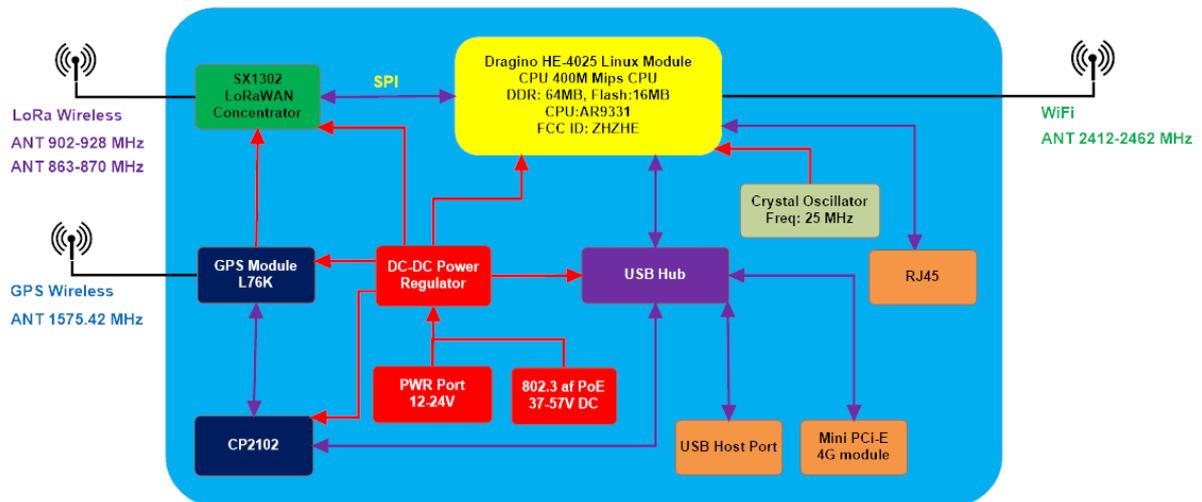
1.3 Features

- Open Source Embedded Linux system
- Managed by Web GUI, SSH via LAN or WiFi
- Support Semtech UDP packet forwarder
- Support LoRaWAN Station Connection
- Support MQTTS
- Cellular Failover connection(option)
- Direct Communication to LoRaWAN ABP Node
- LoRaWAN packet filtering
- Far seeing LED indicator
- Built-in GPS module for location & timing

- External fiber glass antenna
- Auto-Provision
- Remote Monitoring
- 802.3af PoE
- IP65
- Lighting Protection
- Power Consumption: 12v ,300-500mA
- Operating Temperature: -20~85°C

1.4 Hardware System Structure

DLOS8N System Overview:



1.5 DLOS8N Applications



1.6 LED Indicators



There is a waterproof triple color LED on DLOS8N enclosure, the meaning of the LED is:

- **SOLID GREEN:** DLOS8N is alive with LoRaWAN server connection.

- **BLINKING GREEN:** a) Device has internet connection but no LoRaWAN Connection. or b) Device is in booting stage, in this stage, it will **BLINKING GREEN** for several seconds and then **RED** and **YELLOW** will blink together.
- **SOLID RED:** Device doesn't have Internet connection.

1.7 Button Instruction

DLOS8N has a black toggle button, which is:

Long press 4-5s: the gateway will reload the Network and Initialize wifi configuration

LED status: LED will BLINKING GREEN 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.

1.8 WiFi Direction

DLOS8N use directional WiFi Antenna. The best direction is as below:



2. Access and Configure DLOS8N

The DLOS8N is configured as a WiFi Access Point by default. User can access and configure the DLOS8N after connecting to its WiFi network, or via its Ethernet port.

2.1 Find IP address of DLOS8N

2.1.1 Connect via WiFi



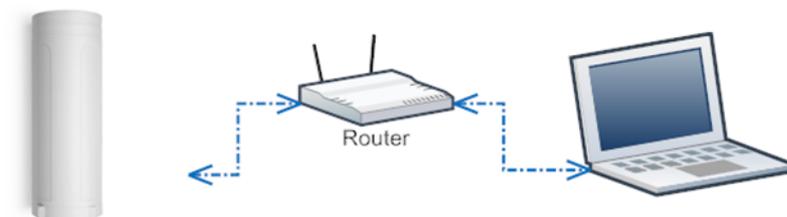
At the first boot of DLOS8N, it will auto generate a WiFi network called **dragino-xxxxxx** with password:



dragino+dragino

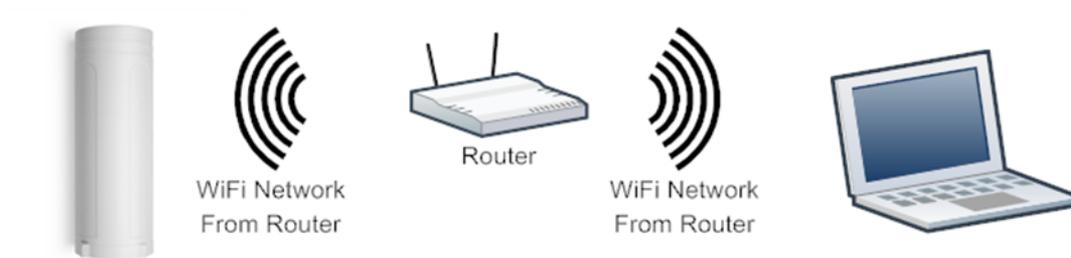
User can use a PC to connect to this WiFi network. The PC will get an IP address 10.130.1.xxx and the DLOS8N has the default IP **10.130.1.1**

2.1.2 Connect via Ethernet with DHCP IP from router



Alternatively, connect the DLOS8N Ethernet port to your router and DLOS8N 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 DLOS8N. You can also use this IP to connect.

2.1.3 Connect via WiFi with DHCP IP from router



If the DLOS8N already connect to the router via WiFi, use can use the WiFi IP to connect to DLOS8N.

2.1.4 Connect via Ethernet with fall back ip

The WAN port also has a [fall back ip address](#) for access if user doesn't connect to uplink router. Click [here](#) to see how to configure.

2.2 Access Configure Web UI

Web Interface

Open a browser on the PC and type the DLOS8N ip address (depends on your connect method)

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

or

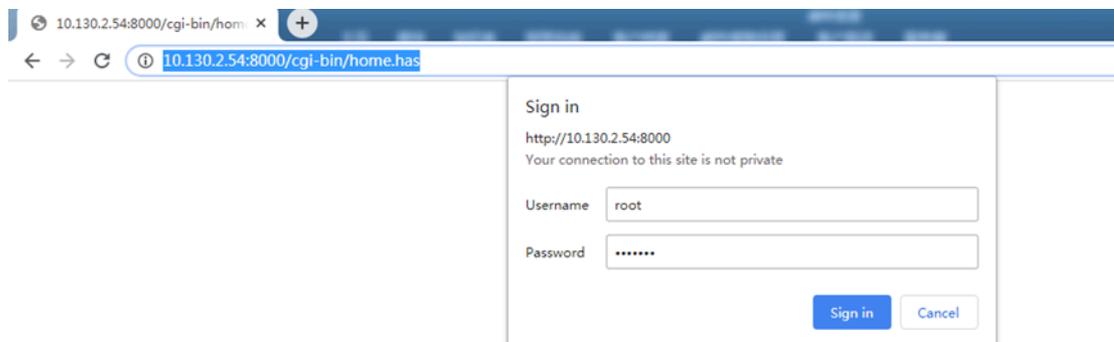
http://IP_ADDRESS or [http:// IP_ADDRESS:8000](http://IP_ADDRESS:8000)

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

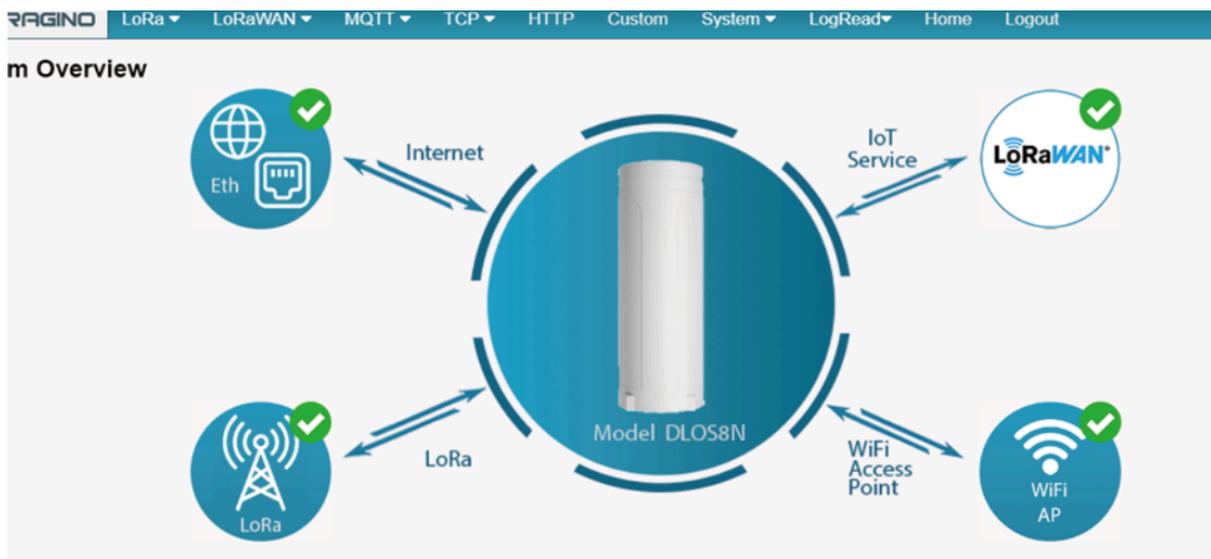
3.1 Overview

The DLOS8N supports flexible network set up for different environments. This section describes the typical network topology. The 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 DLOS8N is set to use the WAN port to connect to an upstream network. When you connect the DLOS8N's WAN port to an upstream router, DLOS8N 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, DLOS8N 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.

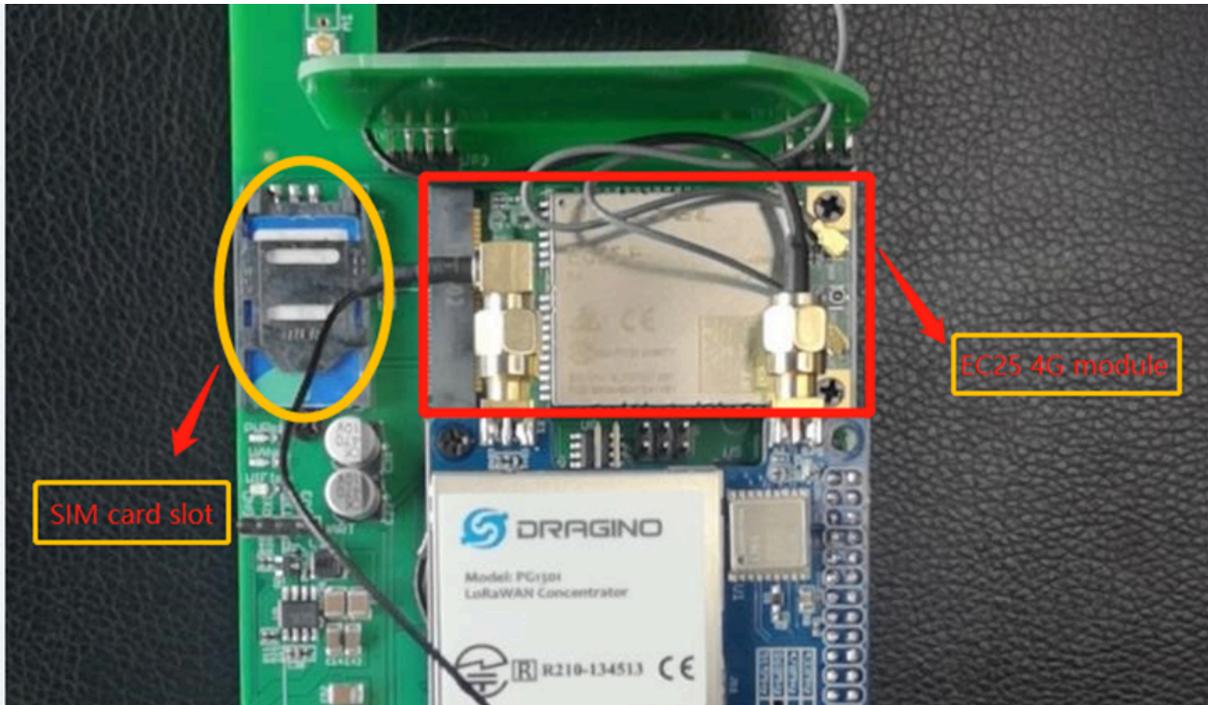
In the WiFi Survey Choose the WiFi AP, and input the Passphrase then click Save & Apply to connect.

3.4 Access the Internet via Cellular

If the DLOS8N support 3G/4G Cellular modem option, When the label on the shell is displayed as Model : DLOS8N-EC25, it indicates that DLOS8 already has EC25 3G/4G modules,user can use it as main internet connection or back up.

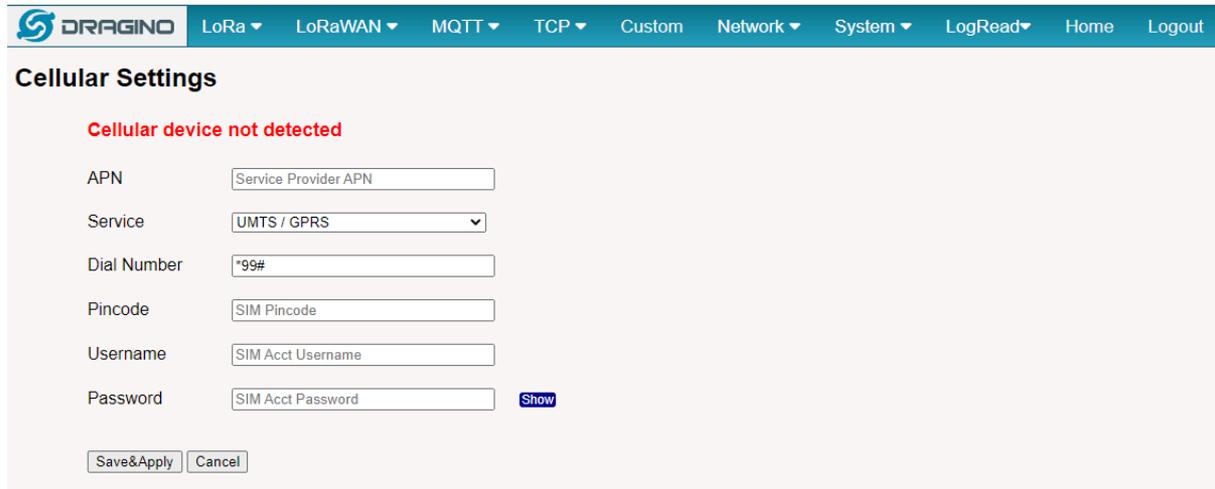
First, release the four screws of DLOS8N, pull out PCB and install SIM card as below:





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.



Cellular Settings

Cellular device not detected

APN

Service

Dial Number

Pincode

Username

Password [Show](#)

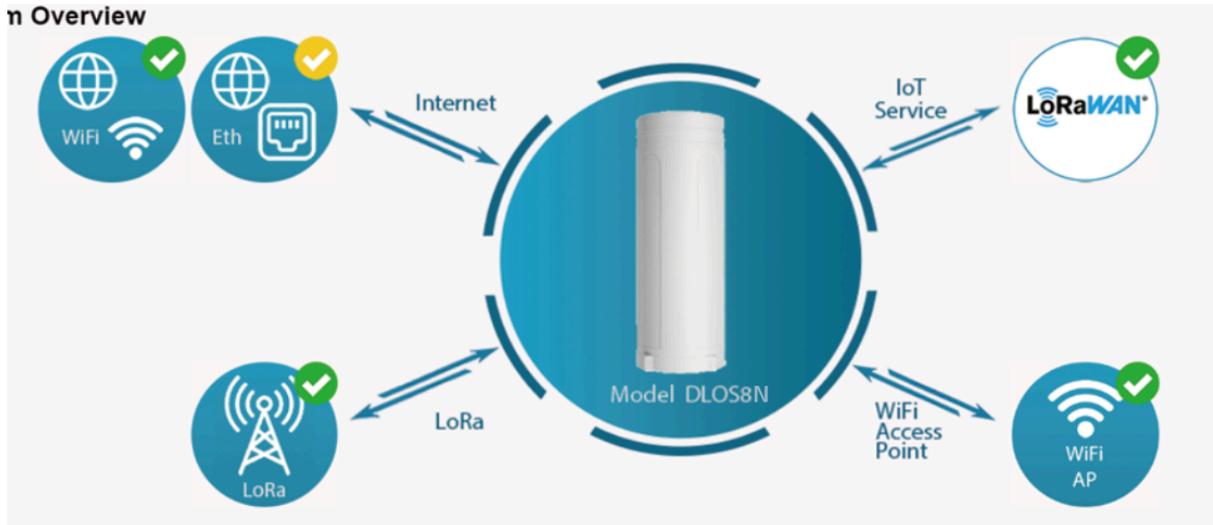
Note *: For DLOS8N which doesn't have the cellular module, this page will show Cellular not detected.

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.

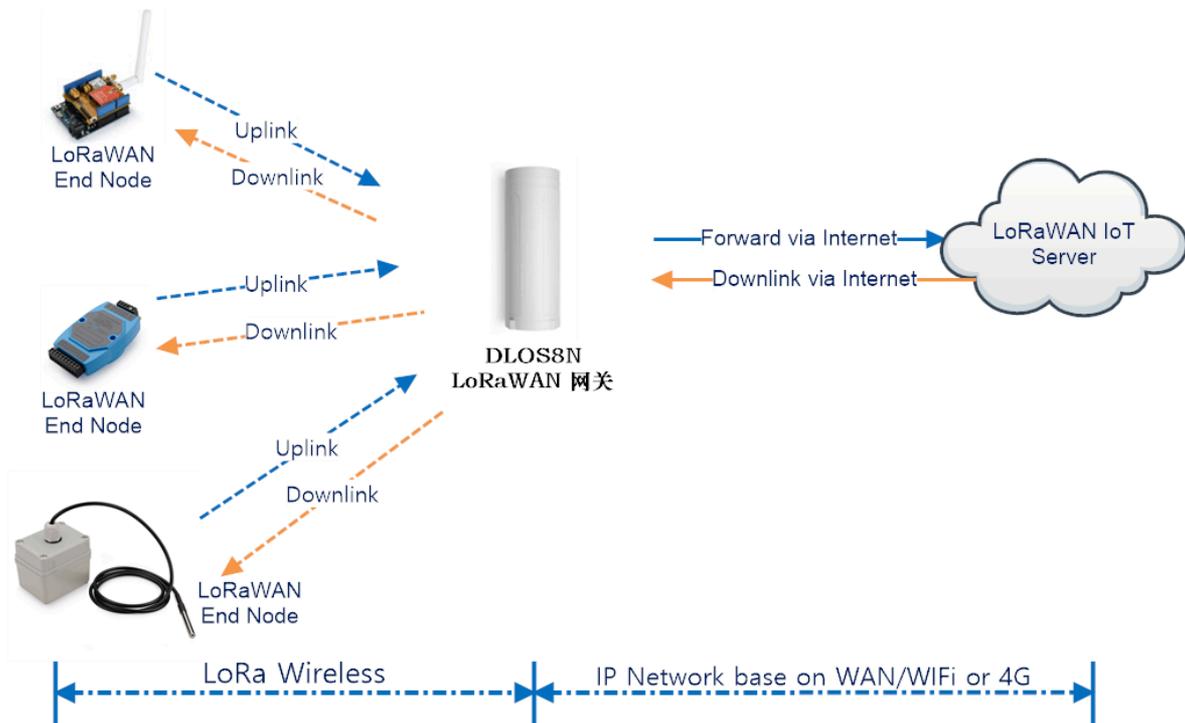
n Overview



4. Example: Configure as a LoRaWAN gateway

DLOS8N 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.

DLOS8N In a LoRaWAN IoT Network:



This chapter describes how to use the DLOS8N to work with

TheThingsNetwork v3 (TTN v3) [LoRaWAN Server \(www.thethingsnetwork.org\)](http://www.thethingsnetwork.org)

4.1 Create a gateway in TTN V3 Server

Step 1: Get a Unique gateway ID.

Every DLOS8N has a unique gateway id. The ID can be found at LoRaWAN page:

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

Packet Filter

Primary server Fport Filter ? DevAddr Filter ?

Secondary server Fport Filter DevAddr Filter

Add Filter

Server Name: Filter type: Filter Value

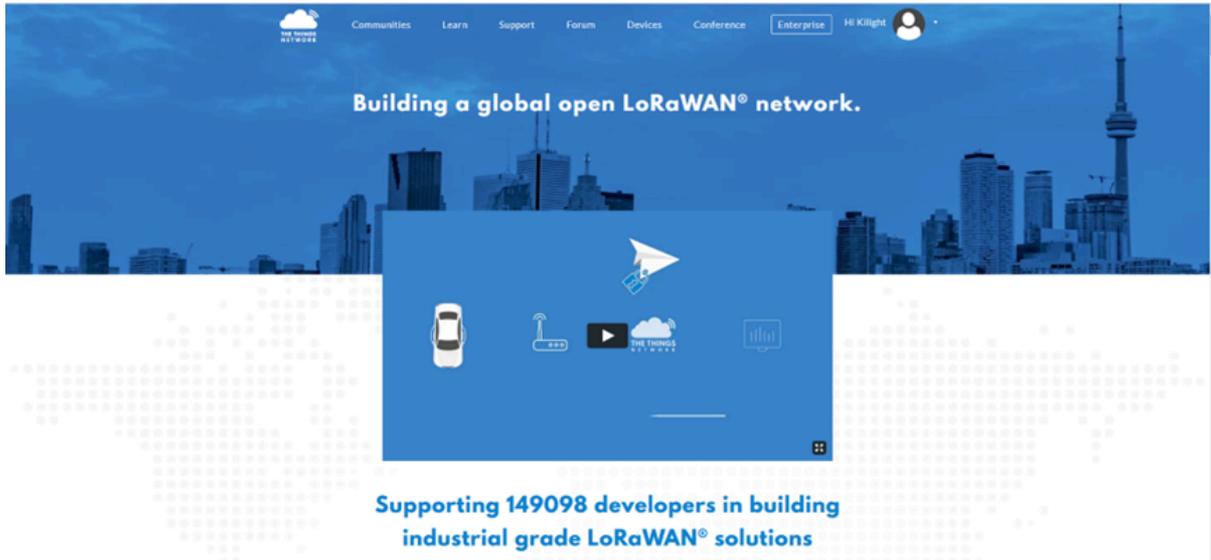
DELET Filter

Current Mode: **LoRaWAN Semtech UDP**

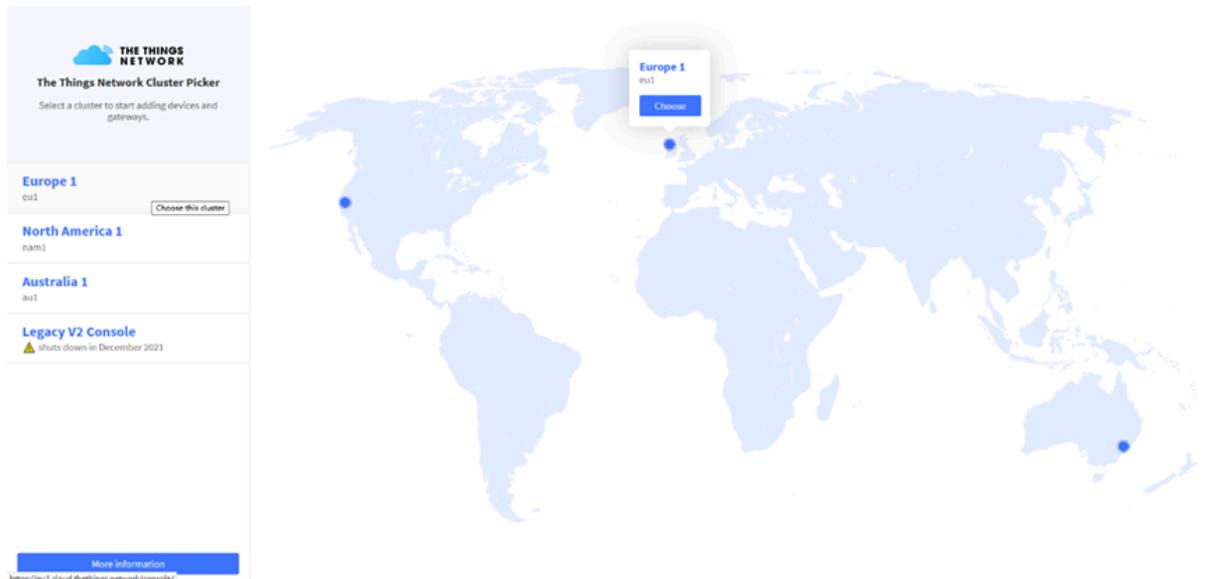
The example gateway id is: **a840411e96744154**

Step 2: Sign up a user account in TTN server

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



Step 3: Choose the TTNv3 Cluster Picker

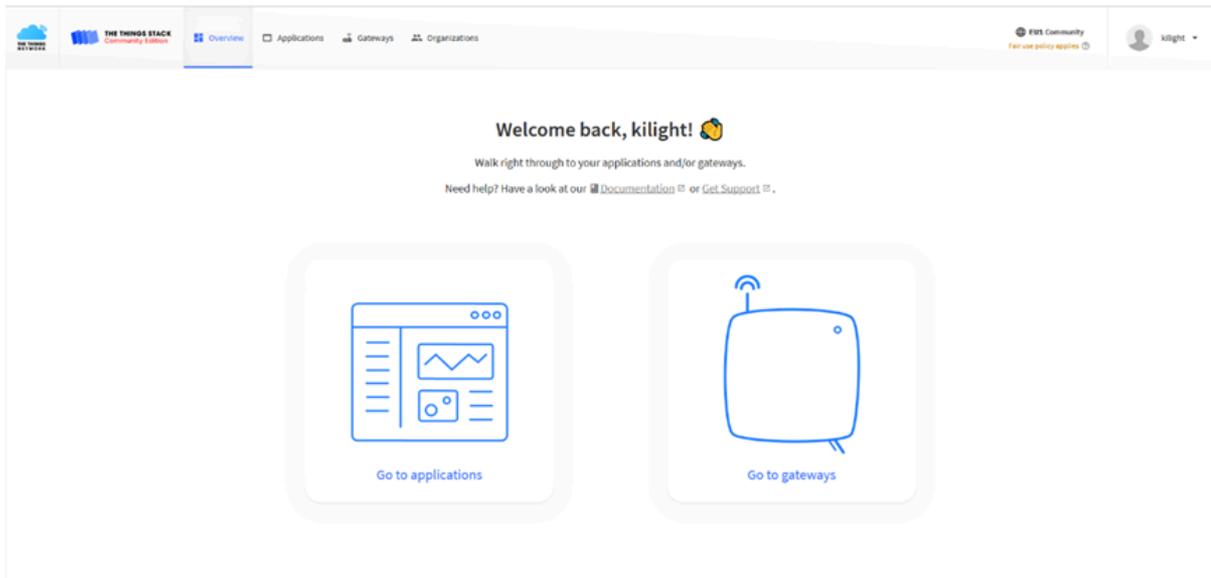


Note: Choose the cluster corresponds to a specific Gateway server address

- Europe 1 corresponding Gateway server address: eu1.cloud.thethings.network
- North America 1 corresponding Gateway server address: nam1.cloud.thethings.network

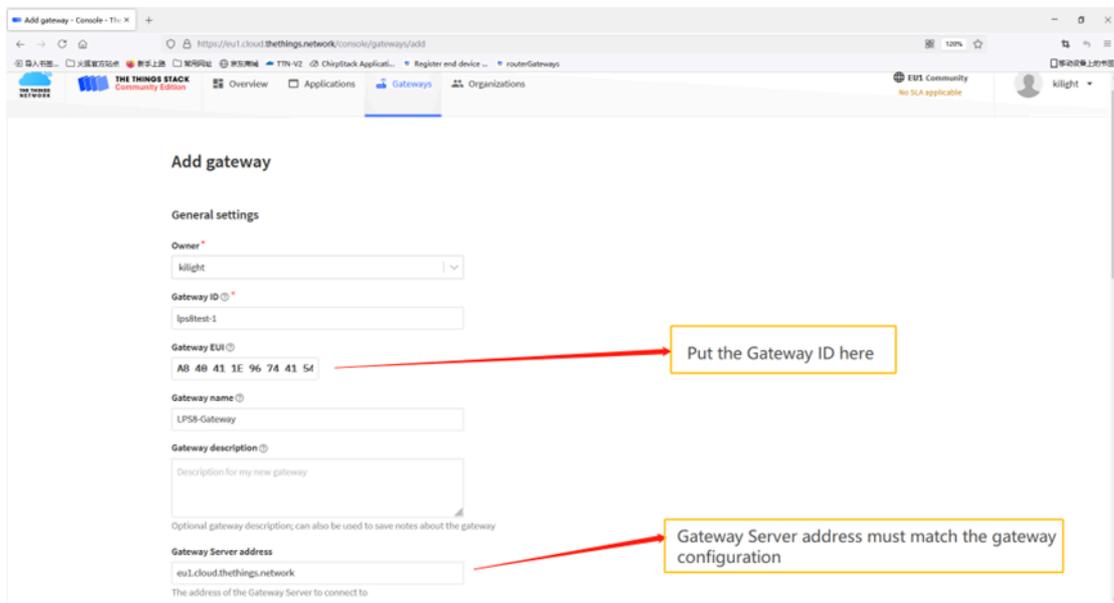
- Australia 1 corresponding Gateway server address: au1.cloud.thethings.network
- Legacy V2 Console : TTN v2 shuts down in December 2021

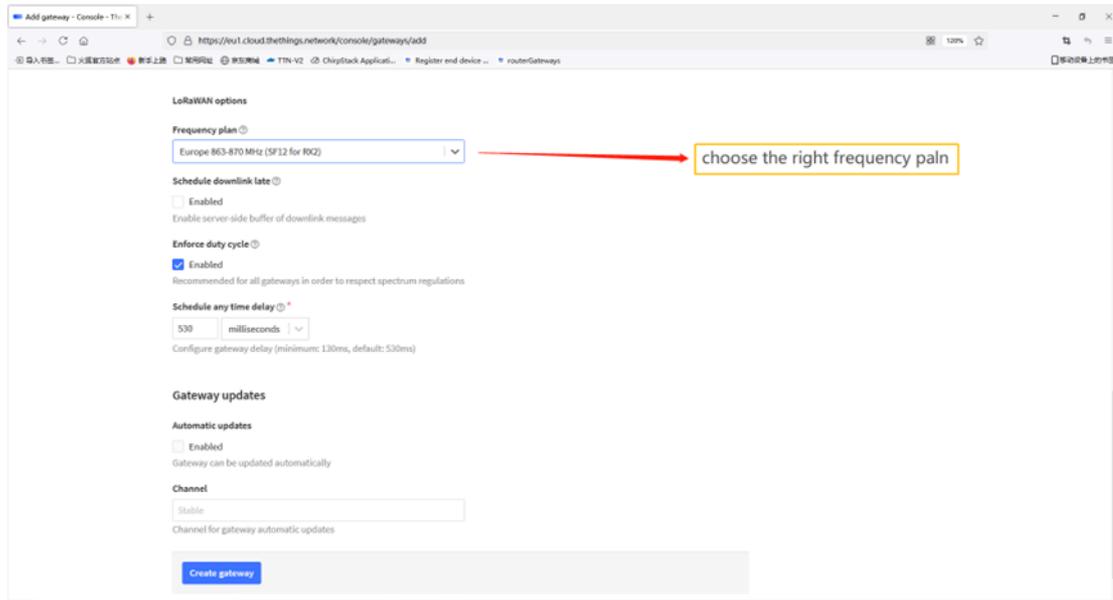
Step 4: Create a Gateway



Click the Gateway icon and then click Add gateway.

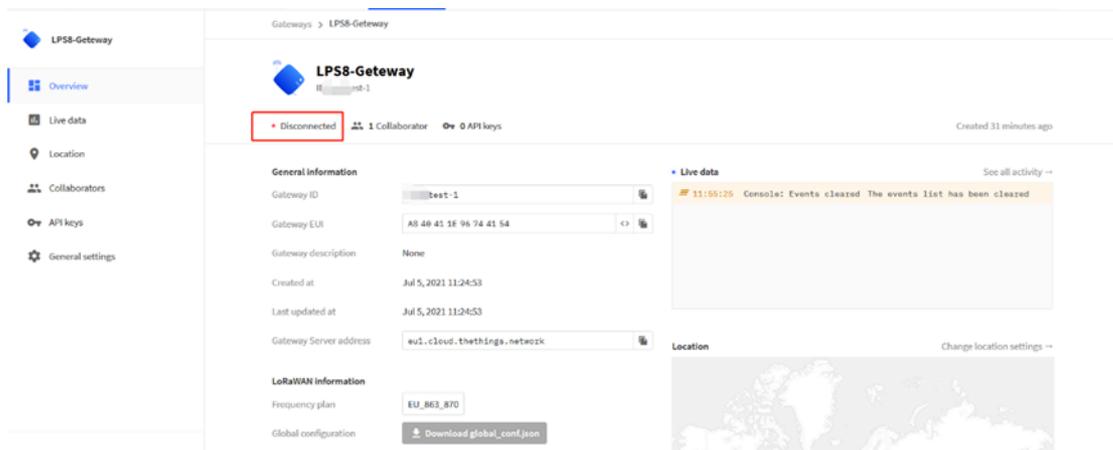
Open the following page:





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 DLOS8N to connect to TTN v3

You can now configure the DLOS8N to let it connect to TTN network V3.

Make sure your DLOS8N has a working Internet Connection first.

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

LoRaWAN Configuration

General Settings

Email:

Gateway ID:

Primary LoRaWAN Server

Service Provider: Server Address:

Uplink Port: Downlink Port:

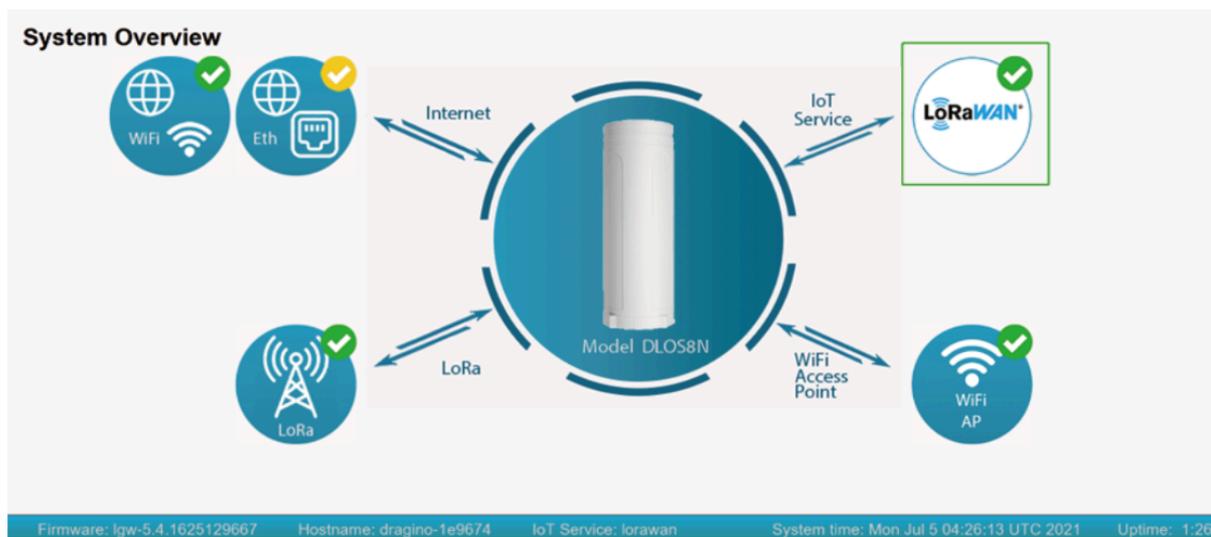
Packet Filter

Fport Filter ? DevAddr Filter ?

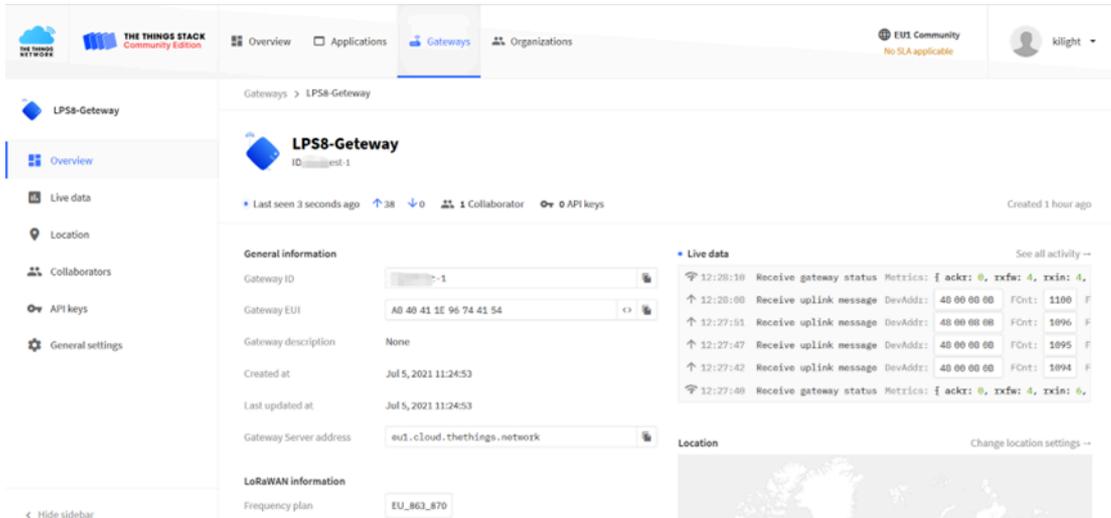
Current Mode: **LoRaWAN Semtech UDP**

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.

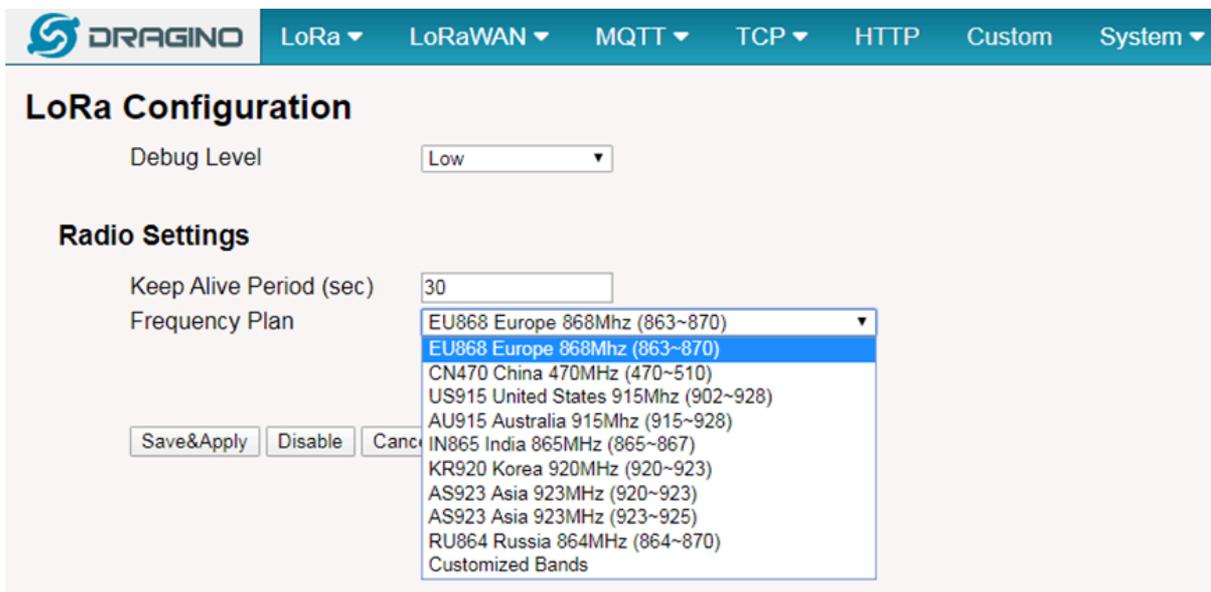


In TTN v3 portal, we can also see the gateway is connected.

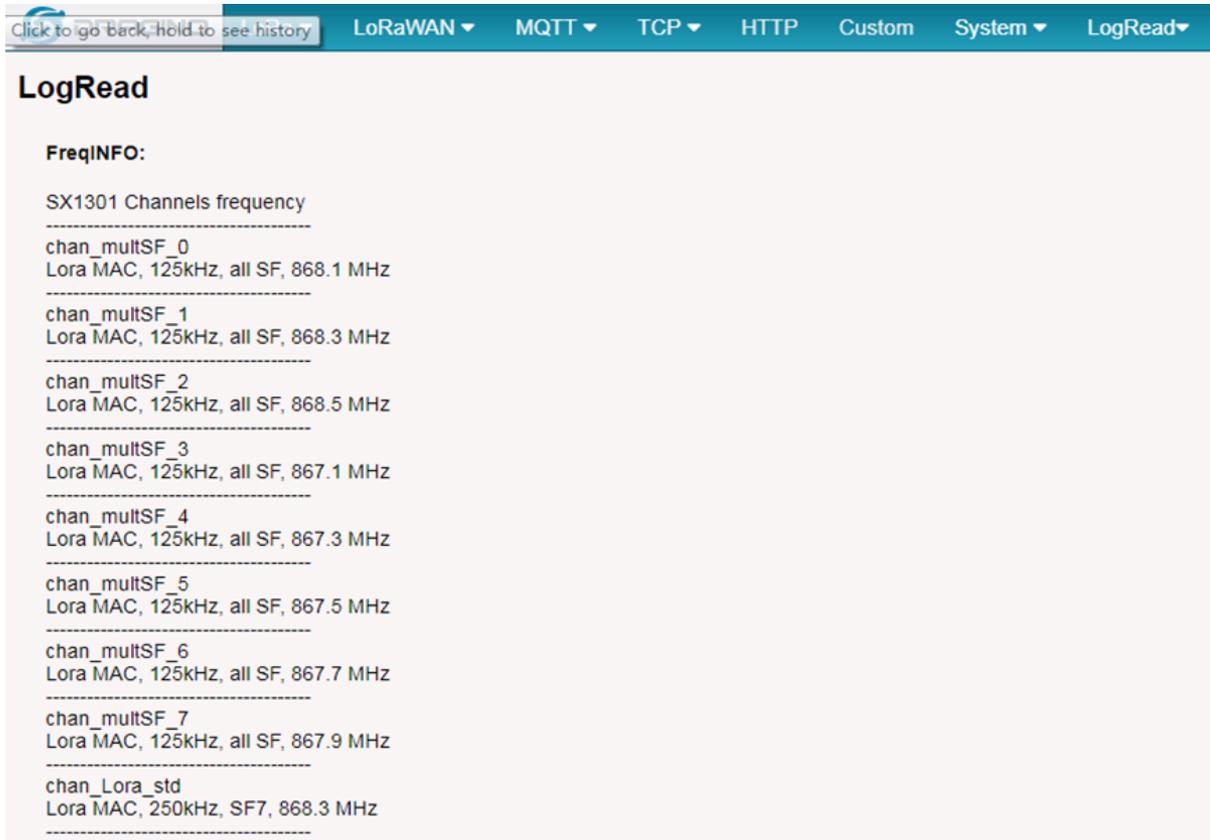


4.3 Configure frequency

We also need to set the frequency plan in DLOS8N 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.



The screenshot shows a web browser interface with a navigation bar at the top containing links for LoRaWAN, MQTT, TCP, HTTP, Custom, System, and LogRead. The main content area is titled "LogRead" and displays "FreqINFO:" data. The data lists "SX1301 Channels frequency" with a list of channels (chan_multSF_0 through chan_multSF_7) and a "chan_Lora_std" entry. Each channel entry includes "Lora MAC, 125kHz, all SF" and a specific frequency in MHz.

```
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.



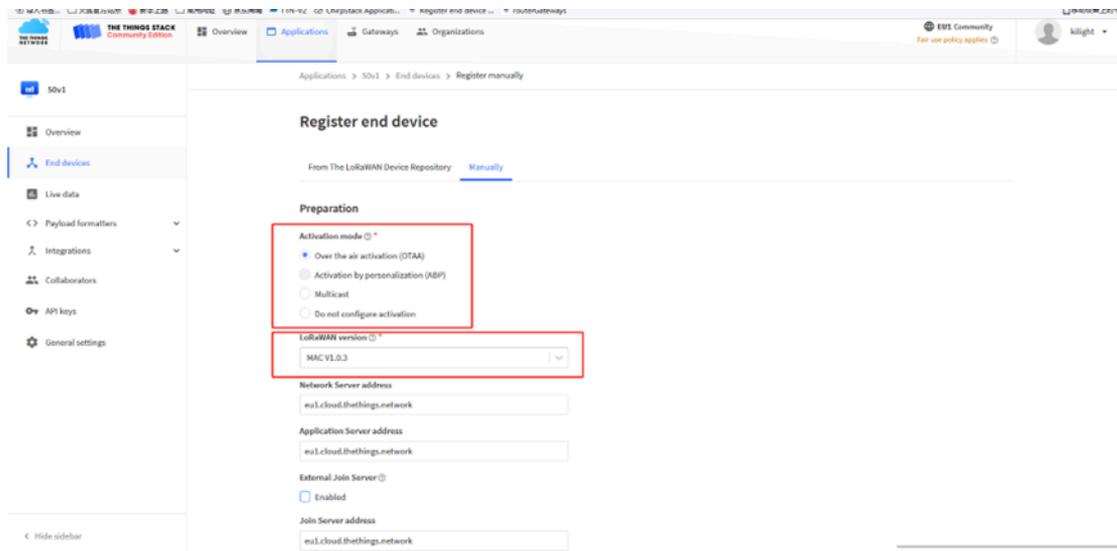
Note: You may be able to change these codes in a device by using a configuration facility on the device e.g. the LT-22222 uses a serial port access and a series of AT commands. Changing the codes may be necessary in the case where you have to use codes assigned by a LoRa WAN server.

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.

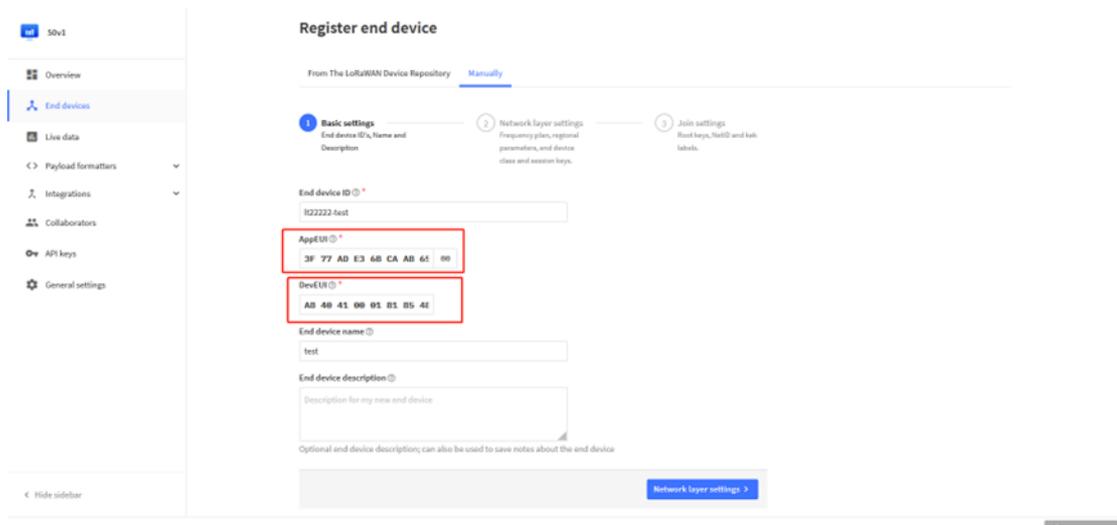
Open the **Application** select **Add end device**

Start Register the end device

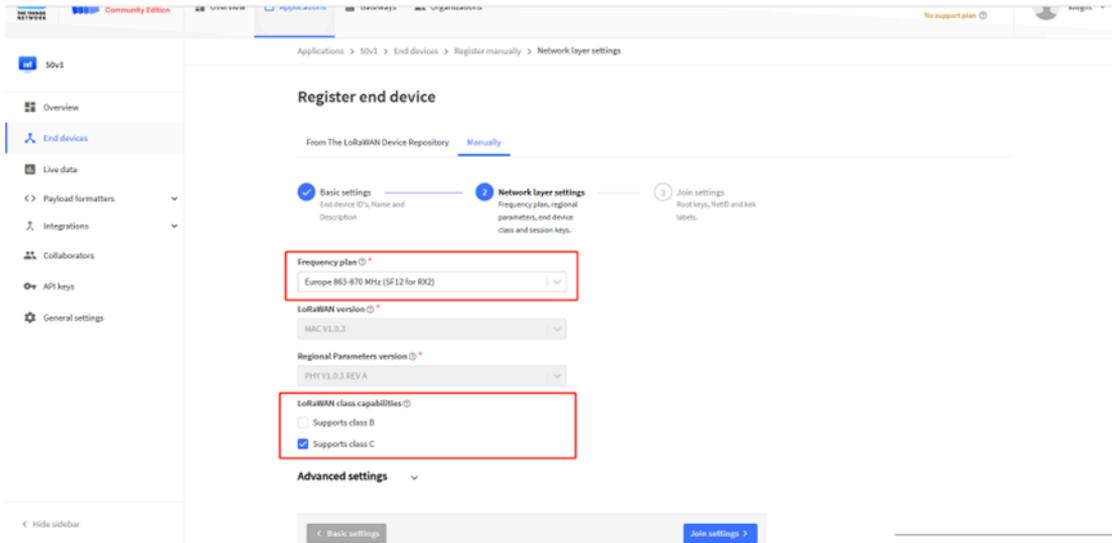


Select OTAA activation mode

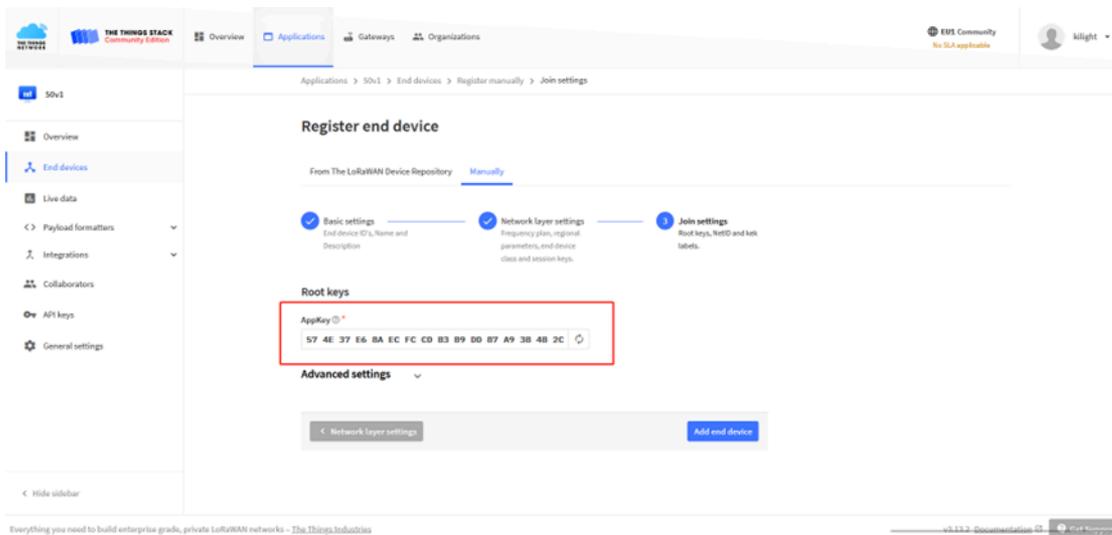
The LoRaWAN version for your device should be provided by the manufacturer in a datasheet as LoRaWAN version or LoRaWAN specification. The most commonly used LoRaWAN versions are v1.0.2 and v1.0.3.



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



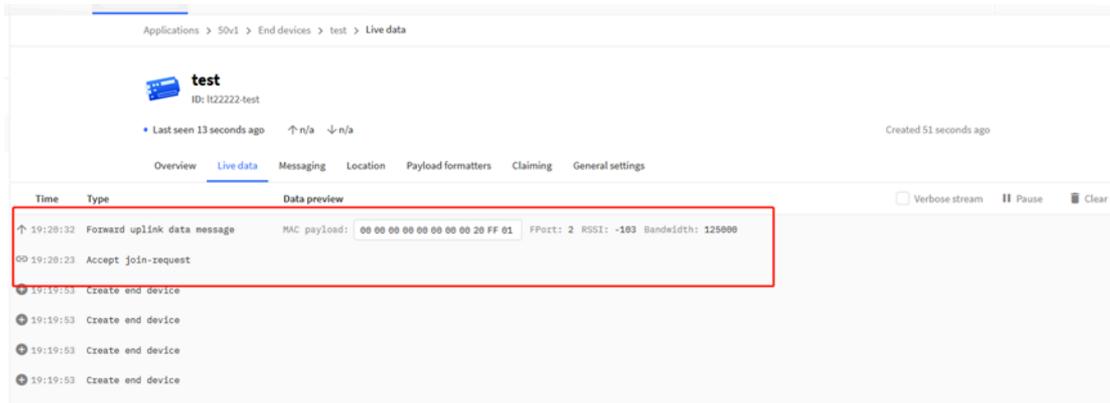
Secondly, choose the corresponding frequency and LoRaWAN class capabilities.



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.

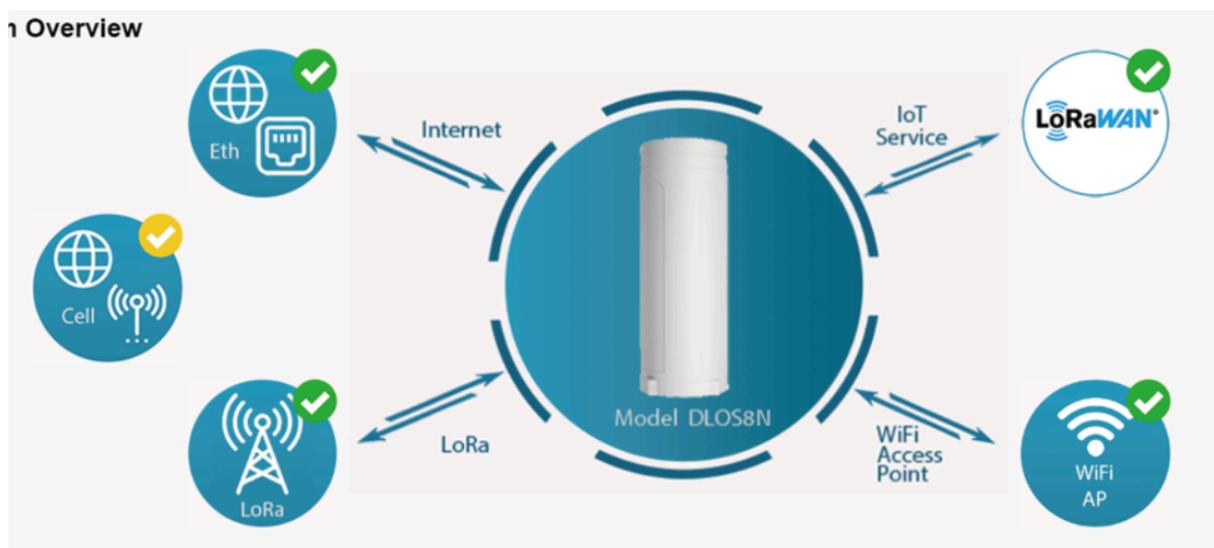
Note that it may take some time for the device data to appear in the TTN v3 display.



5. Web Configure Pages

5.1 Home

Shows the system running status.



5.2 LoRa Settings

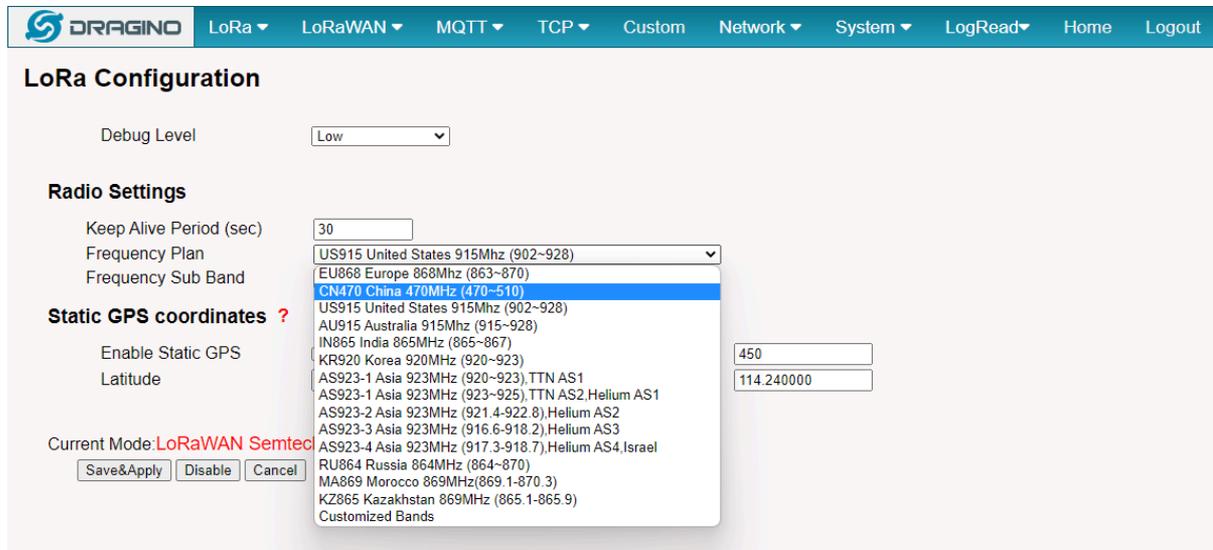
5.2.1 LoRa --> LoRa

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 DLOS8N 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](#)

5.2.2 LoRa --> ABP Decryption

The DLOS8N 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](#)

The screenshot shows the 'Decrypt ABP End Node Packets' configuration page. At the top, there is a navigation bar with the DRAGINO logo and menu items: LoRa, LoRaWAN, MQTT, TCP, Custom, Network, System, LogRead, Home, and Logout. The main content area has a title 'Decrypt ABP End Node Packets'. Below the title, there is a checkbox for 'Enable ABP Decryption' which is checked, and a 'SAVE' button. The 'Add Key' section contains four input fields: 'Dev ADDR' (MSB, 4 Bytes), 'APP Session Key' (MSB, 16 Bytes), 'Network Session Key' (MSB, 16 Bytes), and 'Decoder' (ASCII String). There is an 'ADD_KEY' button below these fields. The 'Delete Key' section has a 'Dev ADDR' dropdown menu and a 'DELETE' button. At the bottom, there is a section for 'ABP Keys:' with a table header: '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, DLOS8N 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. The top navigation bar includes 'LoRa', 'LoRaWAN', 'MQTT', 'TCP', 'Custom', 'Network', 'System', and 'LogRead'. The main content area is titled 'Settings' and contains the following fields:

- CUPS URI:
- Email:
- Gateway ID:
- CUPS trust: **Not Found** (with a '選擇檔案' button and '未選擇任何檔案' text) and an 'Upload_CUPS_Trust' button.
- Private key: **Not Found** (with a '選擇檔案' button and '未選擇任何檔案' text) and an 'Upload_Private_key' button.
- Cert pem: **Not Found** (with a '選擇檔案' button and '未選擇任何檔案' text) and an 'Upload_Cert_pem' button.

At the bottom, it states: 'Current Mode: **LoRaWAN Semtech UDP** Click Save & Apply will change to mode: **LoRaWAN Station for AWS**'. There are 'Save&Apply' and 'Cancel' buttons.

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' page. The top navigation bar includes 'LoRa', 'LoRaWAN', 'MQTT', 'TCP', 'Custom', 'Network', 'System', 'LogRead', 'Home', and 'Logout'. The main content area contains the following fields:

- Server Address:
- Server Port:
- Client Certificate:
- Client Key:
- CA File:
- eth0 MAC Address: A8:40:41:1A:B4:2B

There is a link for [Certificate Management](#). At the bottom, it states: 'Current Mode: **LoRaWAN Semtech UDP** Click Save & Apply will change to mode: **:LoRIOT**'. There are 'Save&Apply' and 'Cancel' buttons.

5.4 MQTT Settings

If end nodes works in ABP mode, user can configure DLOS8N 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

Certificate [--cert]:

CA File [--cafile]:

Client ID [-i]: dragino-1d25dc

Broker Port [-p]: Server Port

Password [-P]: Password

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: DLOS8N
Hostname: dragino-1ab428
Firmware: Igw-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)

System General

System Password

Password [Show](#) [SetPassword](#) Login: admin

TimeZone

Timezone

Port Forwarding

Enable HTTP Forward

Enable SSH Forward

Keepalive_Script

Interval setting

Logread Level

Logread level [Change_Level](#)

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

System Password:

There are two login for DLOS8N: [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 DLOS8N has the AP enable, LAN settings specify the network info for DLOS8N's own network.

WAN Settings: Setting for DLOS8N WAN port

WiFi Settings: Setting for DLOS8N WiFi IP when use it as WiFi Client

5.5.4 System --> WiFi

DLOS8N WiFi Settings.

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.

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.

The screenshot shows the 'Cellular Settings' page in the DRAGINO web interface. The top navigation bar includes the DRAGINO logo and several menu items: LoRa, LoRaWAN, MQTT, TCP, Custom, Network, System, LogRead, Home, and Logout. The main content area is titled 'Cellular Settings' and features a red message: 'Cellular device not detected'. Below this message are several input fields: APN (with placeholder 'Service Provider APN'), Service (a dropdown menu currently showing 'UMTS / GPRS'), Dial Number (with placeholder '*99#'), Pincode (with placeholder 'SIM Pincode'), Username (with placeholder 'SIM Acct Username'), and Password (with placeholder 'SIM Acct Password' and a 'Show' button). At the bottom of the form are two buttons: 'Save&Apply' and 'Cancel'.

Note *: For DLOS8N which doesn't have the cellular module, this page will shows Cellular not detected.

5.5.6 System --> Network Status

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

System Status

Network / WiFi Status

```

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
    
```

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)



http server with configure files

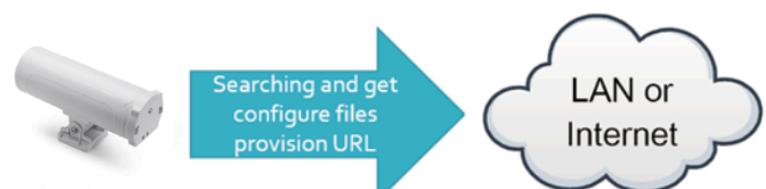
Case 2:
Maintain
gateway
configure
from
cloud

Internet



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/LPS8/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](#)

The screenshot displays the DRAGINO web interface. At the top, there is a navigation bar with the DRAGINO logo and several menu items: LoRa, LoRaWAN, MQTT, TCP, Custom, Network, System, LogRead, Home, and Logout. Below the navigation bar, the page is divided into three main sections:

- Auto Provision:** This section contains a form with a "Provision Server" field set to "eth1_net" and a "RequestUpdate" button. Below the form, the "Configure Version" is set to "0". A red error message states: "Get provision file fail: Failed to allocate uclient context".
- R-SSH Host Settings:** This section includes a "Connection Type" dropdown menu, a "Login ID" field with "rsshuser", a "Host Address" field with "support.dragino.com", and an "RSSH ID" field with "a84041ffff1ab428". There is a "Connect at Startup" checkbox which is unchecked. The "Connection Status" is displayed as "Not connected to RSSH Host" in red. Below the status are buttons for "Save", "Connect", "Disconnect", "SetDefault", and "Cancel/Refresh". A note below these buttons reads: "Note: Auto connection after startup may take up to 5 minutes to clear previous connection".
- Generate New Keys:** This section shows the "Current Key ID" as "No keyfile present". There is a "Generate" button and a red warning message: "Caution: Generating new keys will break any existing server connections!!". A blue link "Download Public Key" is also present.

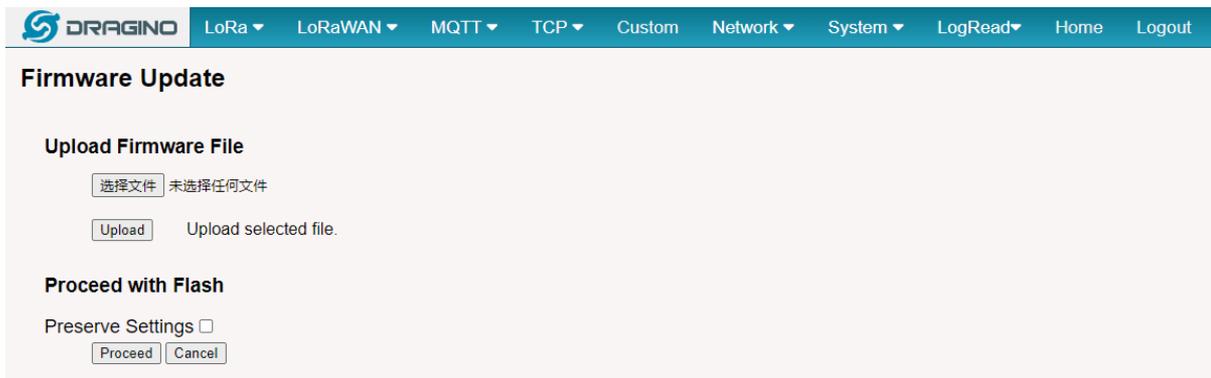
5.5.8 System --> Firmware Upgrade

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-xxxx-squashfs-sysupgrade.bin** is the upgrade Image. There are different methods to upgrade, as below.

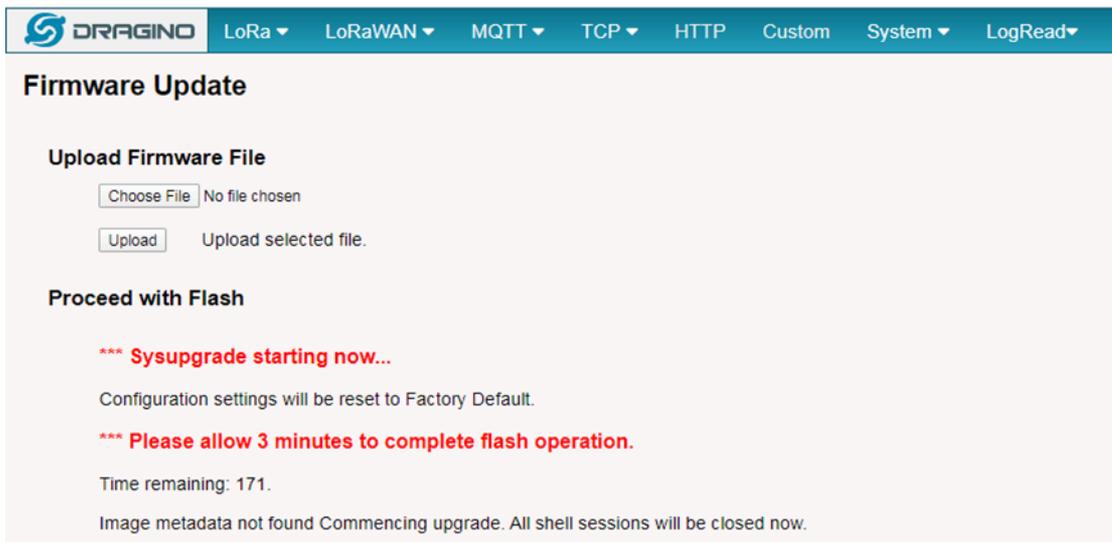
Web--> System--> Firmware Upgrade



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.

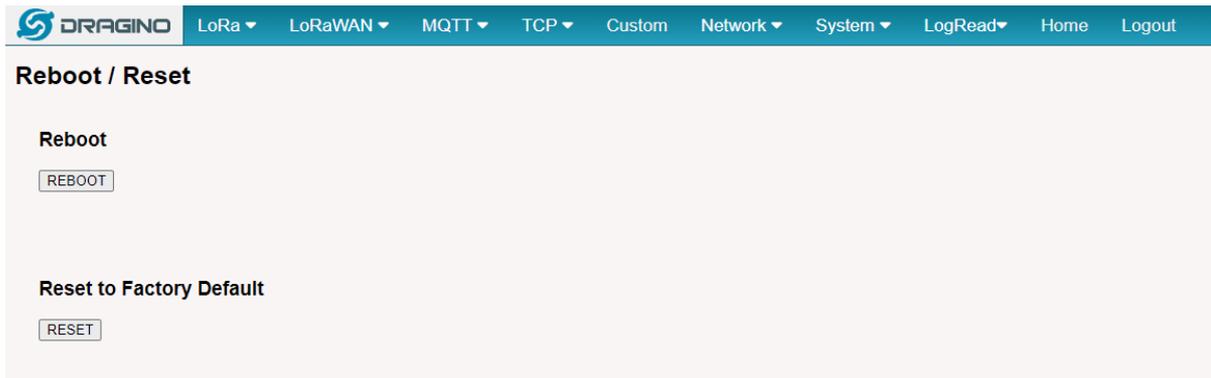
The system will automatically boot into the new firmware after upgrade.



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

DRAGINO

[LoRa](#)
[LoRaWAN](#)
[MQTT](#)
[TCP](#)
[Custom](#)
[Network](#)
[System](#)
[LogRead](#)
[Home](#)
[Logout](#)

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"/>

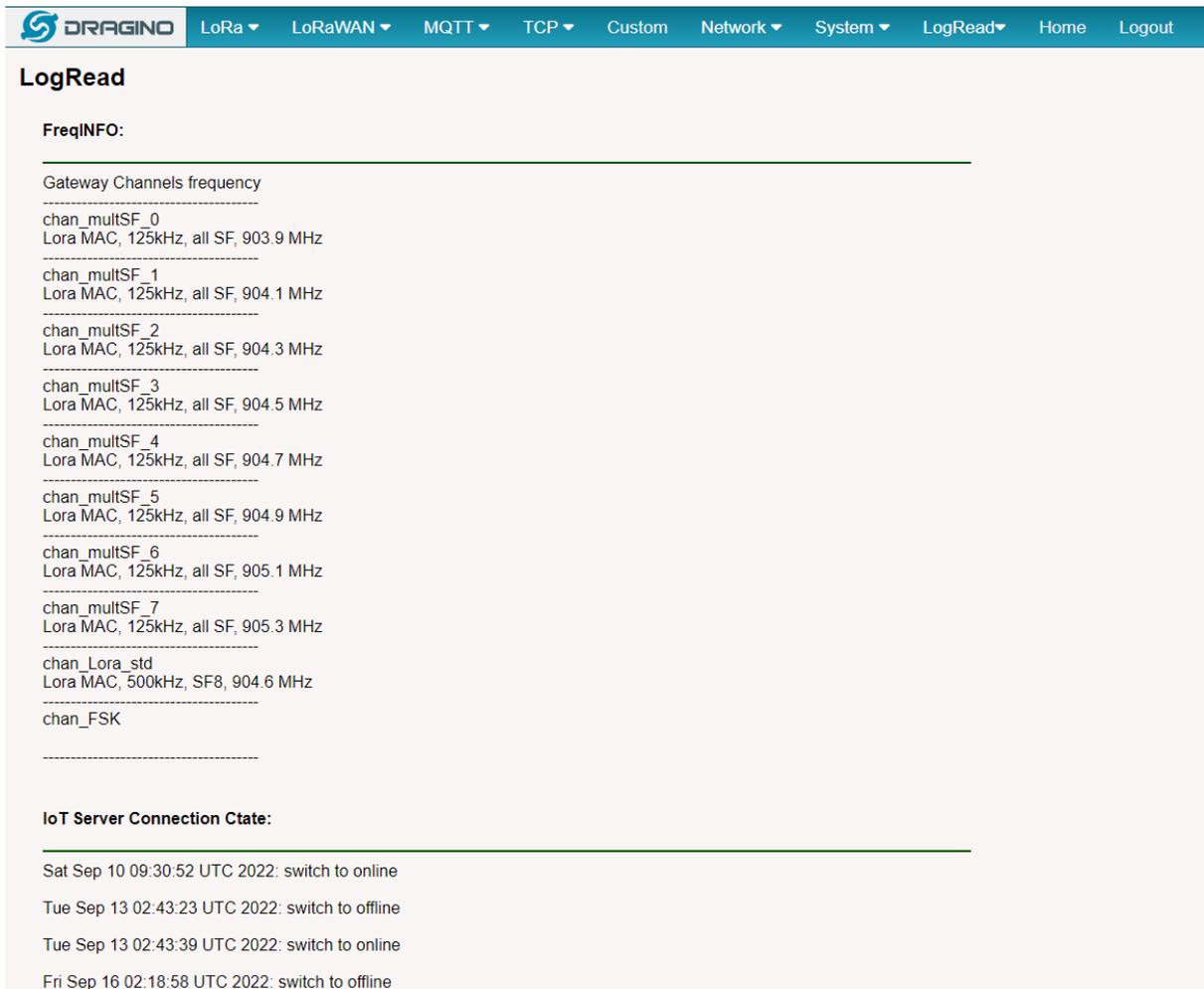
Installation Progress

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.



The screenshot shows the DRAGINO web interface. The top navigation bar includes the DRAGINO logo and several menu items: LoRa, LoRaWAN, MQTT, TCP, Custom, Network, System, LogRead, Home, and Logout. The main content area is titled "LogRead" and contains two sections:

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 Cdate:

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

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

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":"A00000000000100", "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/grpc+proto", "grpc-encoding": "identity" }, source: None
})), oui: 9, uri: http://44.238.156.97:8080/, pubkey: 11w77YQLgUt8HUJrMtntGGr97RyXmotIofs5Ct2ELmbFoYsQa, 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/grpc+proto", "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":"QGMLASaAppgCPisit0iI3StRqXdzgEmh"}]}]
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-
    
```

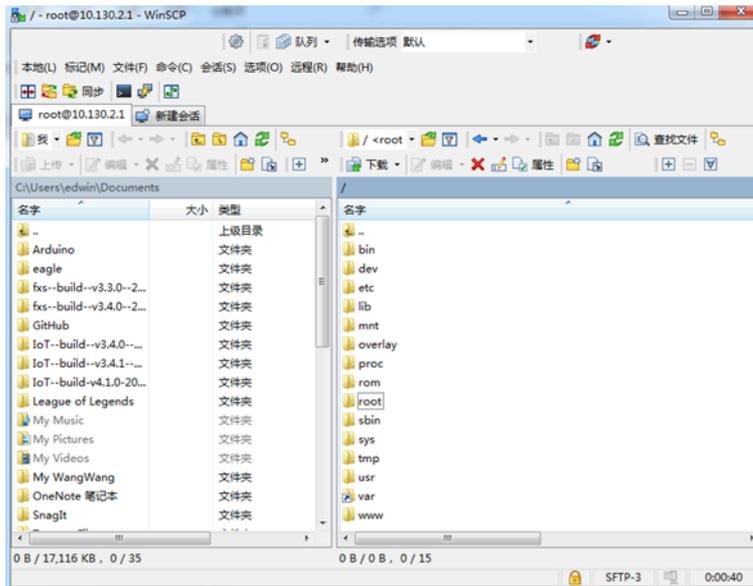
Network State:

6. More features

6.1 More instructions

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

Screenshot is as below:



7.3 File System

The DLOS8N has a 16MB flash and a 64MB RAM. The /var and /tmp directories are in the RAM, so contents stored in /tmp and /var will be erased after rebooting the device. Other directories are in the flash and will remain after reboot.

The Linux system uses around 8MB ~10MB flash size which means there is not much room for user to store data in the DLOS8N flash.

You can use an external USB flash memory device to extend the size of flash memory for storage.

7.4 Package maintenance system

DLOS8N 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 DLOS8N to use *iperf*.

Below are some example *opkg* commands. For more information please refer to the [OPKG package maintenance 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

Configuring uclibcxx.

Configuring iperf.

8. Upgrade Linux Firmware

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/DLSO8N/Firmware)

- **Change Log:** [Firmware Change Log](#).

(http://www.dragino.com/downloads/downloads/LoRa_Gateway/DLOS8N/Firmware/ChangeLog)

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

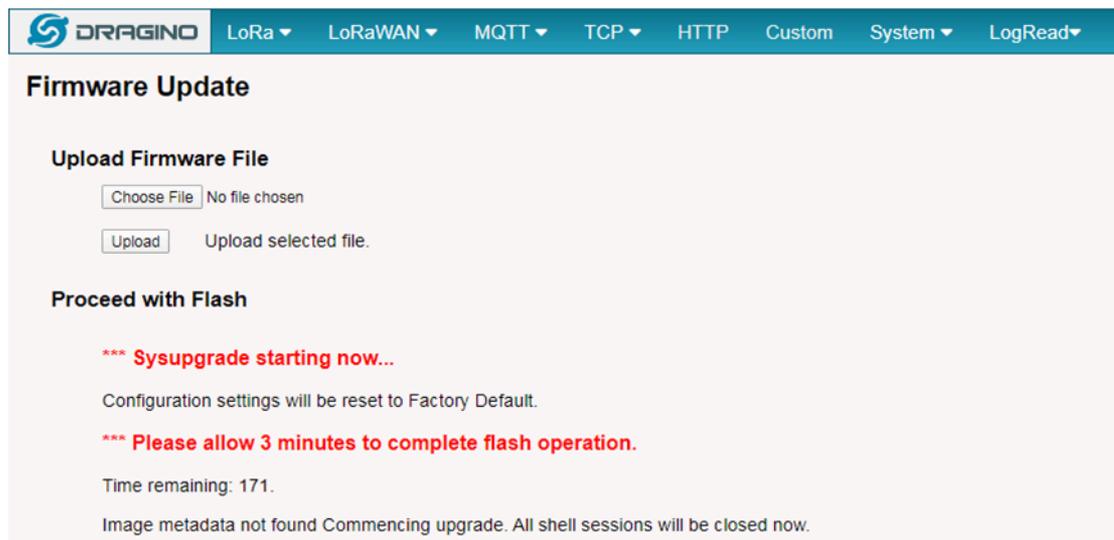
8.1 Upgrade via Web UI

Go to the page: **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.



8.2 Upgrade 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.

9. OTA System Update

DLOS8N 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 DLOS8N to LORIoT?

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

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 DLOS8N 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

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.

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 I 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.

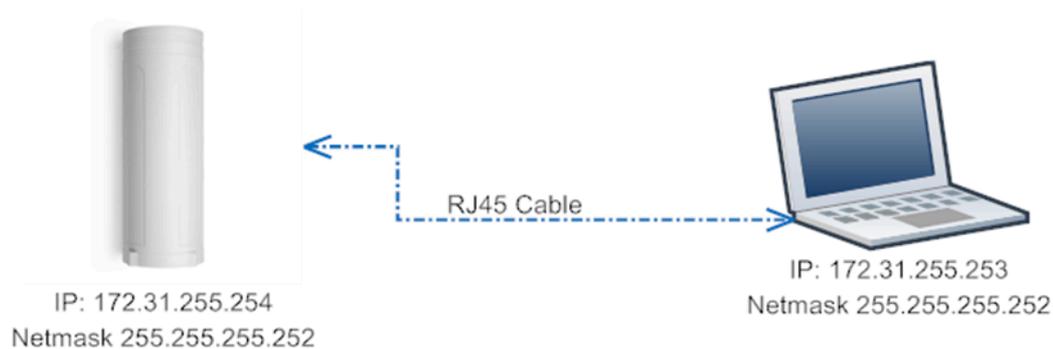
In this case, you can use the `-force-depends` option to install such package as long as the actual kernel version is the same.

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

11.2 How to recover the DLOS8N if the firmware crashes

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

11.3 I configured DLOS8N for WiFi access and lost its IP. What to do now?



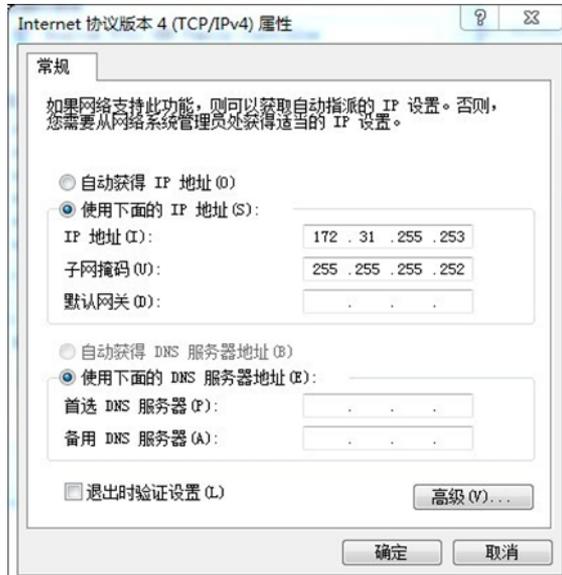
The DLOS8N has a fall-back IP address on its WAN port. This IP is always enabled so you can use the fall-back IP to access DLOS8N no matter what the WiFi IP is. The fall back IP is useful for connecting and debug the unit.

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 DLOS8N's WAN port
2. Configure PC's Ethernet port has IP: 172.31.255.253 and Netmask: 255.255.255.252

As below photo:



3. In the PC, use IP address 172.31.255.254 to access the DLOS8N via Web or Console.

Please note the latest firmware uses port 8000 for http and 2222 for ssh access.

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*

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

More info about valid bands, please see [EC25-E product page](#).

13. Packing Info

Package Includes:

- DLOS8N LoRaWAN Gateway x 1
- Stick Antenna for LoRa RF part. Frequency is one of 470 or 868 or 915Mhz depends the model ordered
- 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 12 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