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# **LPS8N -- LoRaWAN Gateway User Manual**

last modified by Kilight Cao

on 2024/05/18 14:36

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# 1. Introduction

## 1.1 What is the LPS8N

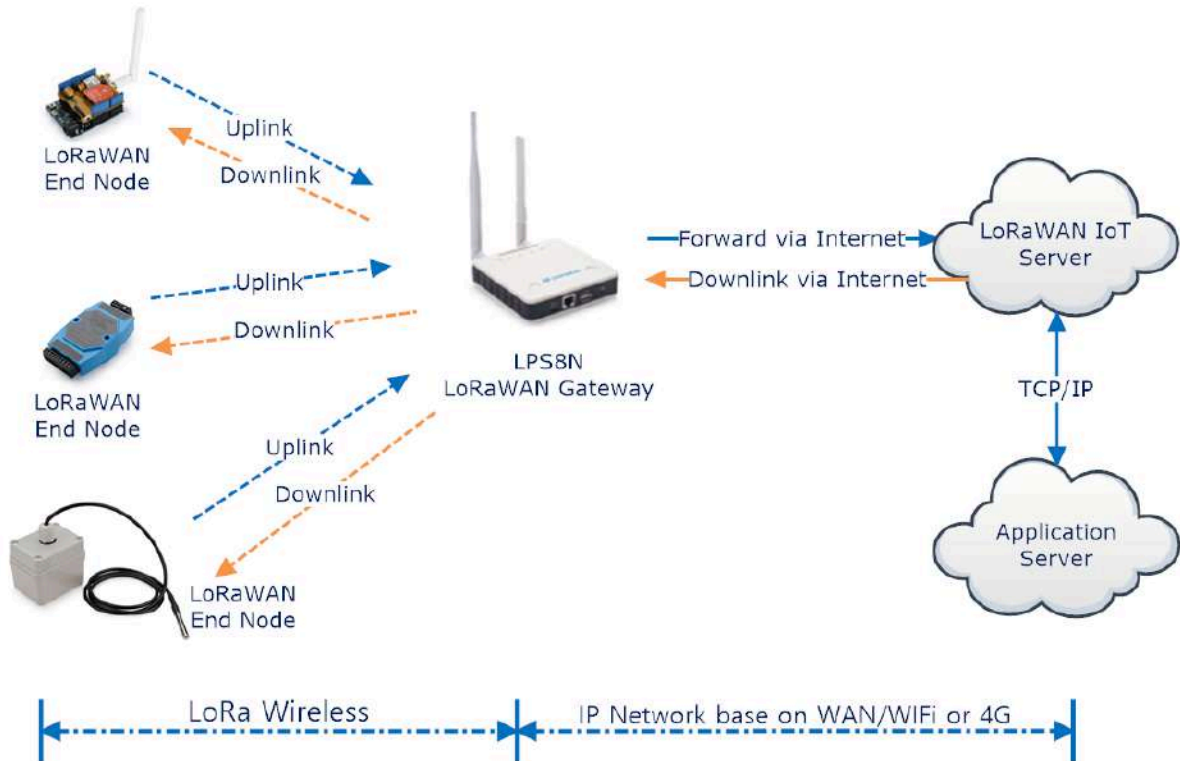
The LPS8N is an **open source LoRaWAN Indoor Gateway**. It lets you bridge LoRa wireless network to an IP network via WiFi, Ethernet, 3G or 4G cellular network. The LoRa wireless allows users to send data and reach extremely long ranges at low data-rates.

The LPS8N uses **Semtech packet forwarder** & **LoRaWAN Station connection** and fully compatible with LoRaWAN protocol. It includes a **SX1302 LoRaWAN concentrator**, which provides 10 programmable parallel demodulation paths.

LPS8N has **pre-configured standard LoRaWAN frequency bands** to use for different countries. User can also **customized the frequency bands** to use in their own LoRa network.

LPS8N 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.

### LPS8N 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: 5V DC, 2A, Type C
- 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
- 70 dB CW interferer rejection at 1 MHz offset
- Able to operate with negative SNR, CCR up to 9dB
- 8 x 8 channels LoRa packet detectors, 8 x SF5-SF12 LoRa demodulators, 8 x SF5-SF10 LoRa demodulators, 125/250/500 kHz LoRa demodulator 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](#)
- Micro SIM Slot
- External 4G Sticker Antenna.
- Up to 150Mbps downlink and 50Mbps uplink data rates
- Worldwide LTE, UMTS/HSPA+ and GSM/GPRS/EDGE coverage
- MIMO technology meets demands for data rate and link reliability in modern wireless communication systems

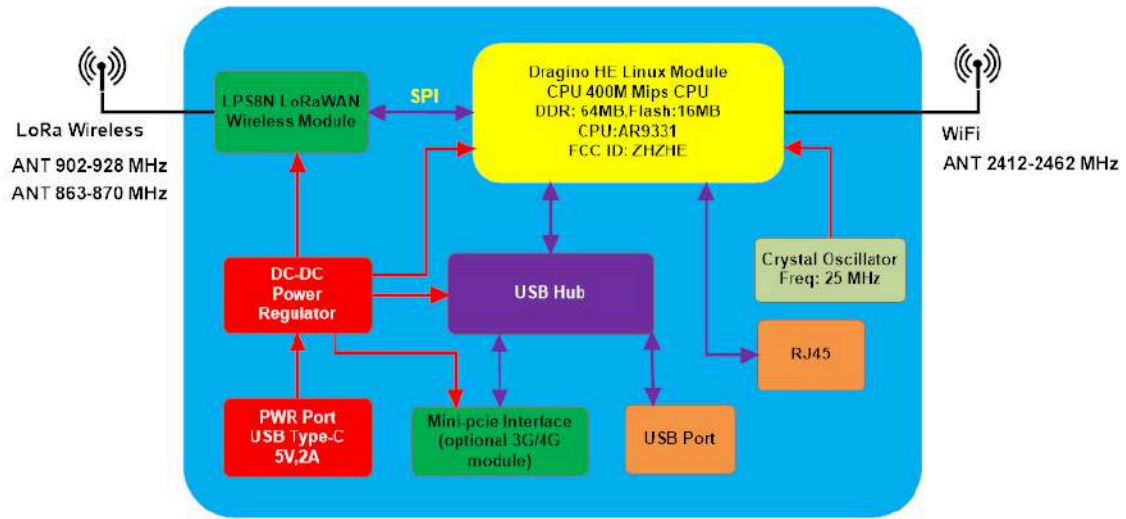
## 1.3 Features

- Open Source OpenWrt system
- Managed by Web GUI, SSH via WAN or WiFi
- Remote access with Reverse-SSH or remote.it
- Emulates 49x LoRa demodulators
- LoRaWAN Gateway
- 10 programmable parallel demodulation paths
- Pre-configure to support different LoRaWAN regional settings.
- Allow to customize LoRaWAN regional parameters.
- Support Local decode ABP end node info and transfer to MQTT server
- Support different level log in.
- Support Semtech Packet Forwarder
- Support LoRaWAN basic station.
- Optional 3G/4G cellular connection

## 1.4 Hardware System Structure



## LPS8N System Overview:







## 1.5 LPS8N Applications



## 1.6 LED Indicators

LPS8N has totally four LEDs, They are:

- **Power LED**  : This **RED LED** will be **solid on** if the device is properly powered.
- **Wireless LED**  : No function yet.
- **SYS LED**  : This **RGB LED** will show different colors on different states:
  - **SOLID BLUE**: Device is alive with LoRaWAN server connection.
  - **BLINKING BLUE**: a) Device has internet connection but no LoRaWAN Connection. or b) Device is in booting stage, in this stage, it will **BLINKING BLUE** for several seconds and then with **SOLID RED** and **BLINKING BLUE** together
  - **SOLID RED**: Device doesn't have Internet connection.
- **ETH LED**  : This LED shows the ETH interface connection status.

## 1.7 Button Instruction

LPS8N 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 BLUE 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 LPS8N

The LPS8N is configured as a WiFi Access Point by factory default. You can access and configure the LPS8N after connecting to its WiFi network, or via its WAN Ethernet port.

## 2.1 Find IP address of LPS8N

### 2.1.1 Connect via WiFi

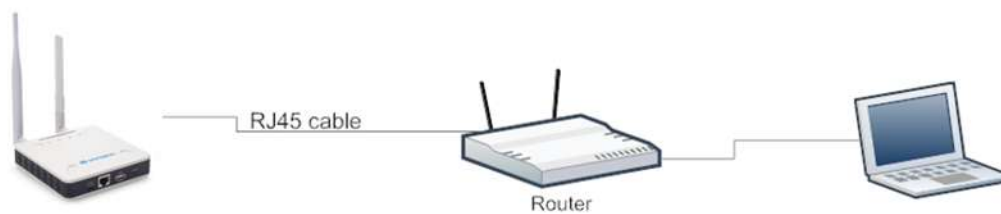


At the first boot of LPS8N, it will auto generate a WiFi network called **dragino-xxxxxx** with password: **dragino+dragino**



User can use a PC to connect to this WiFi network. The PC will get an IP address 10.130.1.xxx and the LPS8N has the default IP 10.130.1.1

### 2.1.2 Connect via Ethernet with DHCP IP from router



Alternatively, connect the LPS8N Ethernet port to your router and LPS8N 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 LPS8N. You can also use this IP to connect.

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



If the LPS8N already connect to the router via WiFi, use can use the WiFi IP to connect to LPS8N.

### 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 LPS8N ip address (depends on your connect method)

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

or

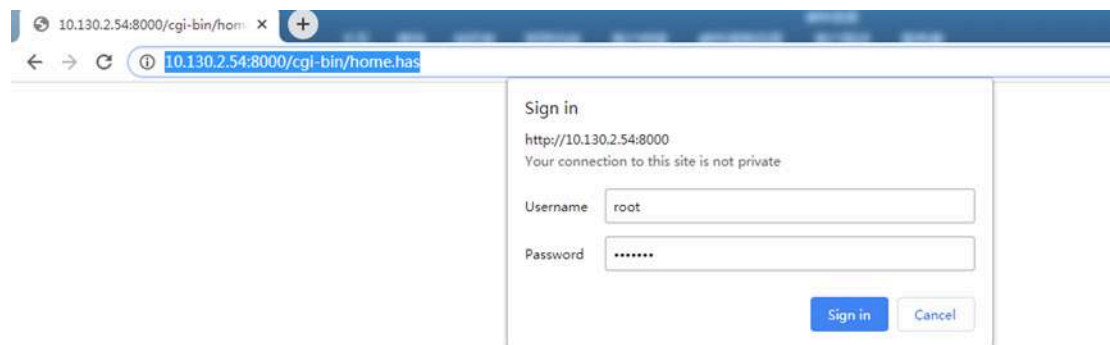
[http://IP\\_ADDRESS](http://IP_ADDRESS) or [http://IP\\_ADDRESS:8000](http://IP_ADDRESS:8000)

You will see the login interface of LPS8N as shown below.

The account details for Web Login are:

**User Name:** root

**Password:** dragino



## 3. Typical Network Setup

### 3.1 Overview

The LPS8N 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**

### 3.2 Use WAN port to access Internet

By default, the LPS8N is set to use the WAN port to connect to an upstream network. When you connect the LPS8N's WAN port to an upstream router, LPS8N 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, LPS8N 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](#)

**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

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

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 LPS8N 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 LPS8N 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.

A screenshot of the 'Cellular Settings' web interface. It features a title 'Cellular Settings' at the top. Below it are two checked checkboxes: 'Enable Cellular WAN' and 'Use Cellular as Backup WAN'. There are several input fields: 'APN' with the value '3gnet', 'Service' with a dropdown menu showing 'UMTS / GPRS', 'Dial Number' with the value '\*99#', 'Pincode' with the placeholder 'SIM Pincode', 'Username' with the placeholder 'SIM Acct Username', and 'Password' with the placeholder 'SIM Acct Password'. A 'Show' button is next to the password field. At the bottom are 'Save&Apply' and 'Cancel' buttons.

**Cellular Settings**

☒ Enable Cellular WAN

☒ Use Cellular as Backup WAN

APN

Service

Dial Number




Pincode

Username

Password  [Show](#)

### 3.5 Check Internet connection

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

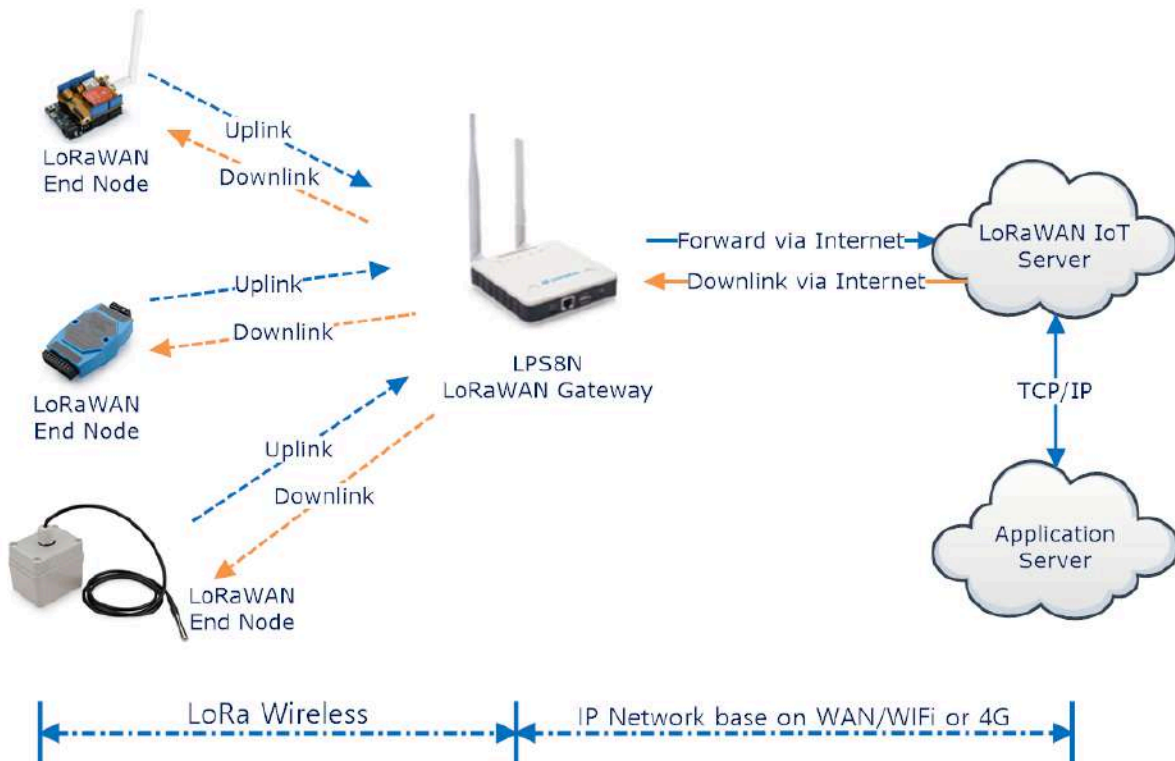
- GREEN Tick  : This interface has Internet connection.
- Yellow Tick  : This interface has IP address but don't use it for internet connection.
- RED Cross  : This interface doesn't connected.



## 4. Example: Configure as a LoRaWAN gateway

LPS8N 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.

### LPS8N In a LoRaWAN IoT Network:



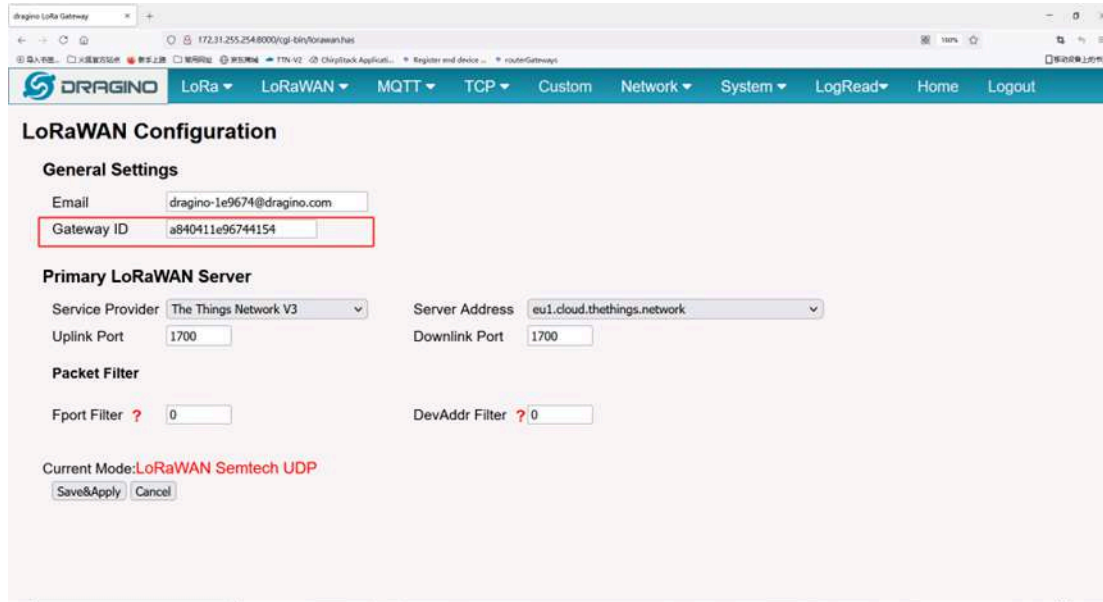
This chapter describes how to use the LPS8N to work with (TTN v3) [LoRaWAN Server](http://www.thethingsnetwork.org) ([www.thethingsnetwork.org](http://www.thethingsnetwork.org))



## 4.1 Create a gateway in TTN V3 Server

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

Every LPS8N has a unique gateway id. The ID can be found at LoRaWAN page:



The example gateway id is: **a840411e96744154**

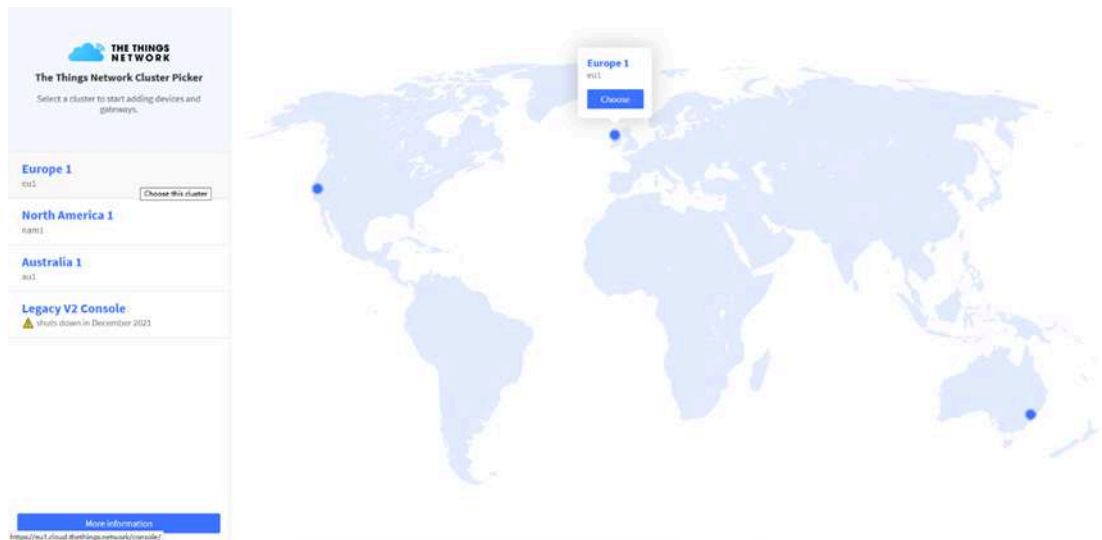
### Step 2: Sign up a user account in TTN server

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



### Step 3: Choose the TTNv3 Cluster Picker

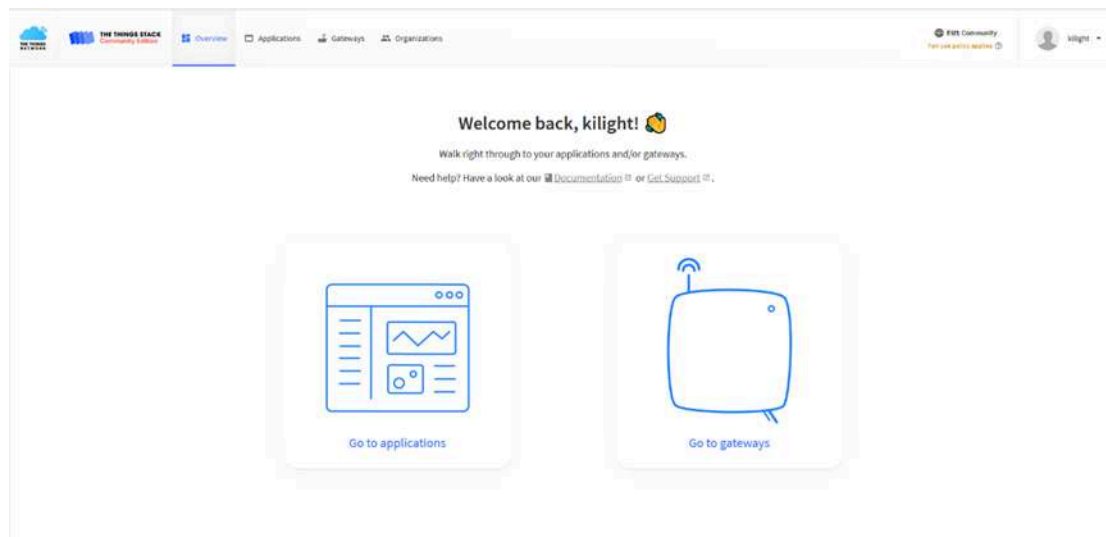




**Note: Choose the cluster corresponds to a specific Gateway server address**

- 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:

**Add gateway**

**General settings**

**Owner**  
kilight

**Gateway ID**  
lps8test-1

**Gateway EUI**  
AB 40 41 1E 96 74 41 54

**Gateway name**  
LPS8-Gateway

**Gateway description**  
Description for my new gateway

Optional gateway description; can also be used to save notes about the gateway.

**Gateway Server address**  
eu1.cloud.thethings.network

The address of the Gateway Server to connect to

Put the Gateway ID here

Gateway Server address must match the gateway configuration

LoRaWAN options

Frequency plan

Europe 863-870 MHz (SF12 for RX2)

Schedule downlink rate

Enabled

Enable server-side buffer of downlink messages

Enforce duty cycle

Enabled

Recommended for all gateways in order to respect spectrum regulations

Schedule any time delay

530 milliseconds

Configure gateway delay (minimum: 130ms, default: 530ms)

Gateway updates

Automatic updates

Enabled

Gateway can be updated automatically

Channel

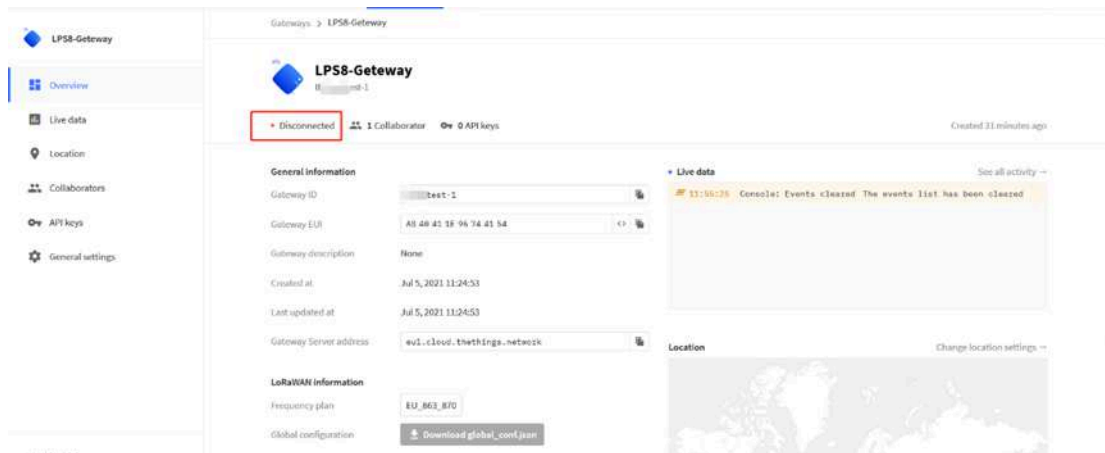
Stable

Channel for gateway automatic updates

Create gateway

**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.

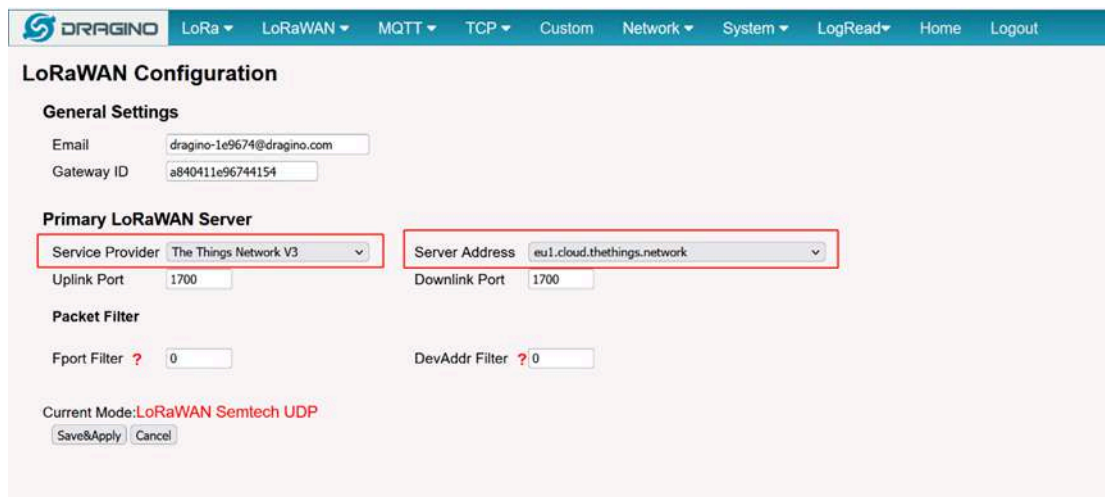


## 4.2 Configure LPS8N to connect to TTN v3

You can now configure the LPS8N to let it connect to TTN network V3.

Make sure your LPS8N has a working Internet Connection first.

Choose the right server provider and click [Save&Apply](#).



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

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



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

The screenshot shows the 'LPS8-Gateway' configuration page in the TTN v3 portal. The page is divided into several sections:

- Overview:** Shows the gateway's status as 'Online' and 'Last seen 3 seconds ago'.
- General information:**
  - Gateway ID: 1
  - Gateway EUI: A8 40 41 1E 96 74 41 54
  - Gateway description: None
  - Created at: Jul 5, 2021 11:24:53
  - Last updated at: Jul 5, 2021 11:24:53
  - Gateway Server address: eu1.cloud.thethings-network
- LoRaWAN information:**
  - Frequency plan: EU\_863\_870
- Live data:** A table showing recent activity, including 'Receive gateway status' and 'Receive uplink message' events.
- Location:** A map showing the gateway's location.

## 4.3 Configure frequency

We also need to set the frequency plan in LPS8N to match the end node we use, so to receive the LoRaWAN packets from the LoRaWAN sensor.

**LoRa Configuration**

Debug Level: Low

**Radio Settings**

Keep Alive Period (sec): 30

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

Buttons: Save&Apply, Disable, Cancel

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

**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' form in the LoRaWAN Gateway User Manual interface. The form is titled 'Add application' and is located under the 'Applications' tab. It contains the following fields:

- Owner:** A dropdown menu with 'kilight' selected.
- Application ID:** A text input field with 'test00test' entered.
- Application name:** A text input field with 'My new application' entered.
- Description:** A text area with 'Description for my new application' entered.

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 button labeled 'Create application'.

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

Start Register the end device

The screenshot shows the 'Register end device' form in the LoRaWAN Gateway User Manual interface. The form is titled 'Register end device' and is located under the 'Applications' tab. It contains the following fields:

- From The LoRaWAN Device Repository:** A dropdown menu with 'Manually' selected.
- Preparation:** A section containing the following fields:
  - Activation mode:** A dropdown menu with 'Over the air activation (OTAA)' selected. This field is highlighted with a red box.
  - LoRaWAN version:** A dropdown menu with 'MAC V1.0.3' selected. This field is highlighted with a red box.
- Network Server address:** A text input field with 'eu1.cloud.thethings.network' entered.
- Application Server address:** A text input field with 'eu1.cloud.thethings.network' entered.
- External Join Server:** A checkbox labeled 'Enabled' which is currently unchecked.
- Join Server address:** A text input field with 'eu1.cloud.thethings.network' entered.

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.

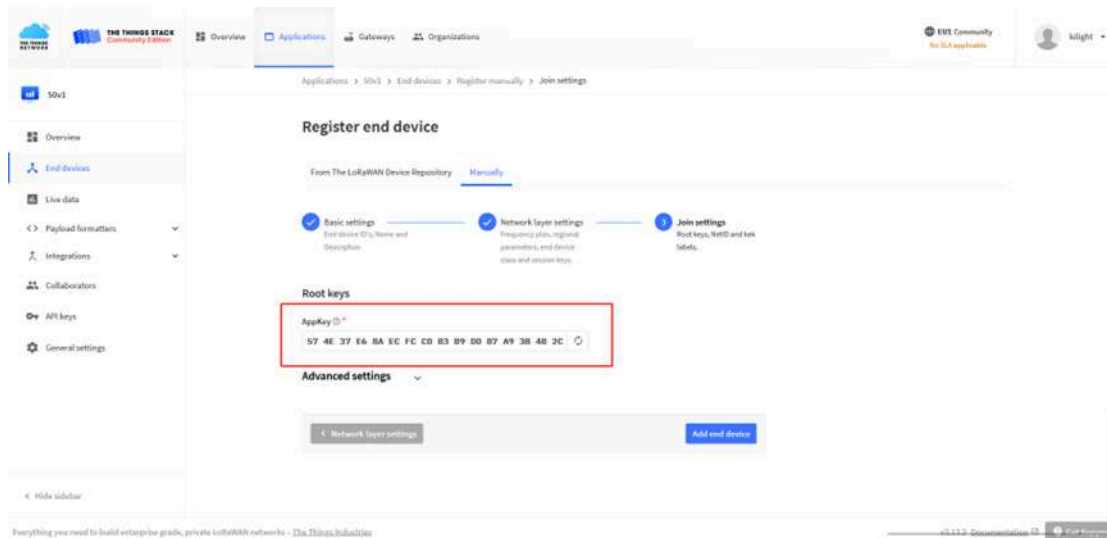


The screenshot shows the 'Register end device' interface with the 'Manually' tab selected. The 'Basic settings' step is active, showing fields for 'End device ID', 'AppEUI', 'DevEUI', 'End device name', and 'End device description'. The 'End device ID' field contains '022222 test'. The 'AppEUI' field contains '3F 77 AD E3 68 CA AD 65 00'. The 'DevEUI' field contains 'AD 40 41 00 05 B5 B5 4E'. The 'End device name' field contains 'test'. The 'End device description' field is empty. A 'Network layer settings' button is visible at the bottom right.

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

The screenshot shows the 'Register end device' interface with the 'Network layer settings' step active. The 'Frequency plan' dropdown is set to 'Europe 863-870 MHz (SF12 for RX2)'. The 'LoRaWAN version' dropdown is set to 'MAC V1.0.3'. The 'Regional Parameters version' dropdown is set to 'PHY V1.0.3 REV A'. The 'LoRaWAN class capabilities' section has 'Supports class B' unchecked and 'Supports class C' checked. An 'Advanced settings' dropdown is visible at the bottom left. A 'Join settings' button is visible at the bottom right.

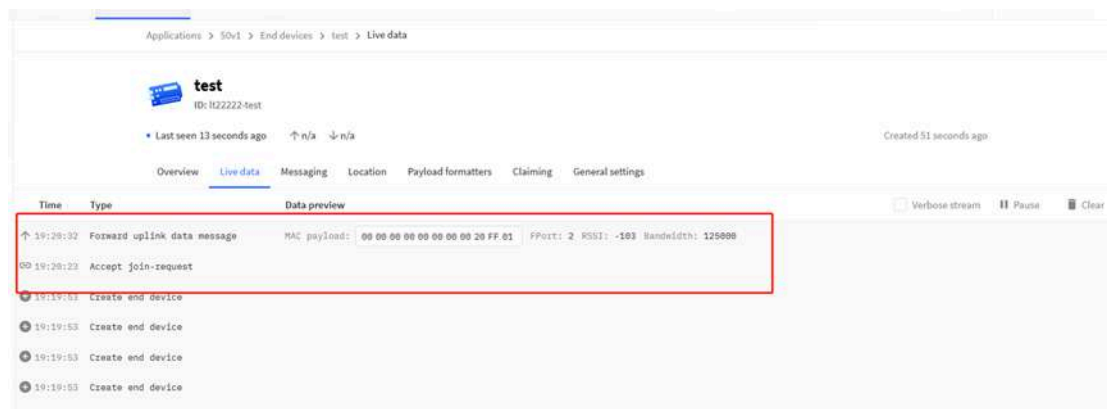
Secondly, choose the corresponding frequency and LoRaWAN class capabilities.



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 LPS8N 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](#)

The 'LoRa Configuration' form includes a 'Debug Level' dropdown set to 'Low'. Under 'Radio Settings', the 'Keep Alive Period (sec)' is set to 30. The 'Frequency Plan' dropdown menu is open, showing a list of available frequency bands. The 'CN470 China 470MHz (470~510)' option is currently selected.

Frequency Plan
EU868 Europe 868Mhz (863~870)
EU868 Europe 868Mhz (863~870)
<b>CN470 China 470MHz (470~510)</b>
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

Buttons: Save&Apply, Disable, Cancel

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

## 5.2.2 LoRa --> ABP Decryption

The LPS8N 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](#)

### Decrypt ABP End Node Packets

Enable ABP Decryption ☐ SAVE

**Add Key**

Dev ADDR:

APP Session Key:

Network Session Key:

ADD\_KEY

**Delete Key**      Dev ADDR: DELETE

**ABP Keys:**

Dev ADDR | APP Session Key | Network Session Key

## 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.

### LoRaWAN Configuration

#### General Settings

Email

dragino-1ecc10@dragino.com

Gateway EUI

a840411ecc104150

#### Primary LoRaWAN Server

Service Provider

The Things Network V3

Server Address

eu1.cloud.thethings.network

Uplink Port

1700

Downlink Port

1700

#### Secondary LoRaWAN Server

Service Provider

Disable

#### Packet Filter

Primary server Fport Filter ?

Level 0

DevAddr Filter ?

Level 0

NwkId Filter ?

Level 0

Secondary server Fport Filter

Level 0

DevAddr Filter

Level 0

NwkId Filter

Level 0

#### Add Filter

Server Name:

Filter type:

Filter Value

1,2,3 or 018229BB

ADD\_FILTER

DELET Filter

DELETE

**Note:**

\*: User can ignore the latitude and longitude settings here, LPS8N will use the actually value from GPS module.

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

---

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See: [Filter unwanted LoRaWAN packets](#)

### 5.3.2 LoRaWAN --> LoRaWAN -- Basic Station

The screenshot shows the Dragino web interface for configuring a LoRaWAN Basic Station. The top navigation bar includes links for LoRa, LoRaWAN, MQTT, TCP, Custom, Network, System, LogRead, Home, and Logout. The main content area is titled 'LoRaWAN -- Basic Station' and features a dropdown menu with options: 'LoRaWAN -- Semtech UDP', 'LoRaWAN -- Basic Station' (highlighted), 'Helium IoT', and 'LORIoT'. Below this, the 'General Settings' section contains fields for 'Email' (dragino-21d648@) and 'Gateway ID' (a84041ff21d648), along with a 'Restore Configuration' button. The 'Primary LoRaWAN Server' section includes a 'Service Provider' dropdown set to 'The Things Network -- Basic Station', and fields for 'CUPS Server URI' (example: https://eu1.cloud.thethings.network:443), 'CUPS Authorization Key' (example: NNSXS.ZWT4MDZ3R24GFIRNJB6A3OKZWPRNT6HZLXM3PXLJT42TOKFSAGZ3JZIRVJ), 'LNS Authentication Key' (example: NNSXS.ZWT4MDZ3R24GFIRNJB6A3OKZWPRNT6HZLXM3PXLJT42TOKFSAGZ3JZIRVJ), and 'CUPS Certificate Authority' (Not Found CUPS Certificate Authority). There are buttons for 'DEFAULT\_CERTIFICATE', 'Choose File' (No file chosen), and 'Upload\_CUPS\_Cert'. At the bottom, a status bar indicates the current mode is 'LoRaWAN Semtech UDP' and provides 'Save&Apply' and 'Cancel' buttons.

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

The basic station mode support **TTN/AWS/Chirpstack/ThingPark/Senet** Platform.

Instruction:

[The Thing Network](#)

[AWS-IoT LoRaWAN Core](#)

[Chirpstack](#)

[ThingPark](#)

[Senet](#)

### 5.3.3 LoRaWAN --> LORIoT

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

Instruction: [Notes for LORIoT](#)

#### LORIoT Client Configuration

**LORIoT software not installed.**

Server Address	<input type="text" value="Sydney - au1.loriot.io"/>	Server Port	<input type="text" value="Default"/>
Client Certificate	<input type="text"/>	Client Key	<input type="text"/>
CA File	<input type="text"/>		

Device EUI: A840411D25DF

[Certificate Management](#)

## 5.4 MQTT Settings

If end nodes works in ABP mode, user can configure LPS8N to transfer the data to MQTT broker,

Instruction: [MQTT Forward Instruction](#)

**DRAGINO** LoRa LoRaWAN **MQTT** TCP HTTP Custom System LogRead

### MQTT Client Configuration

MQTT Server Profile: General

Broker Address [-h]: Server URL

User ID [-u]: User ID

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

Certificate [--cert]:

CA File [--cafile]:

Key [--key]:

Client ID [-i]: dragino-1d25dc

**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 Network

### 5.5.1 Network --> Network Status



## 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: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.a840411ecc13	no	eth0 wlan0

#### WiFi

wlan0 ESSID: "dragino-lecc10"  
Access Point: A8:40:41:1E:CC:10  
Mode: Master Channel: 11 (2.462 GHz)  
Tx-Power: 17 dBm Link Quality: unknown/70  
Signal: unknown Noise: -92 dBm  
Bit Rate: unknown  
Encryption: WPA2 PSK (CCMP)  
Type: nl80211 HW Mode(s): 802.11bgn

Refresh

### 5.5.2 Network --> Network

**LAN Settings:** When the LPS8N has the AP enable, LAN settings specify the network info for LPS8N's own network.

**WAN Settings:** Setting for LPS8N WAN port

**WiFi Settings:** Setting for LPS8N WiFi IP when use it as WiFi Client

## Network

### LAN Settings

IP Address	<input type="text" value="10.130.1.1"/>	Gateway	<input type="text" value="255.255.255.255"/>
Netmask	<input type="text" value="255.255.255.0"/>	DNS	<input type="text" value="8.8.8.8"/>

### WAN Settings

Enable DHCP

### WiFi WAN Settings

Enable DHCP

### 5.5.3 Network --> WiFi

LPS8N WiFi Settings.

## WiFi

### Radio Settings

Channel (1-11)

11

Tx Power (0-18) dBm

17

### WiFi Access Point Settings

Enable WiFi Access Point ☒

WiFi Name SSID

dragino-1ecc10

Passphrase (8-32 char)

\*\*\*\*\*

Show

Encryption

WPA2

### WiFi WAN Client Settings

Enable WiFi WAN Client ☐

Host WiFi SSID

Host-SSID

Passphrase

\*\*\*\*\*

Show

WiFi Survey

Choose WiFi SSID...

Encryption

WPA2

Save&amp;Apply

Cancel

Refresh

## 5.5.4 Network --> 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

☒ Enable Cellular WAN☒ Use Cellular as Backup WAN

APN

3gnet

Service

UMTS / GPRS

Dial Number

\*99#

Pincode

SIM Pincode

Username

SIM Acct Username

Password

SIM Acct Password

Show

Save&amp;Apply


Cancel

**Note \*: For LPS8N which doesn't have the cellular module, this page will shows Cellular not detected.**

## 5.6 System

### 5.6.1 System --> System Overview


Shows the system info:

 LoRa ▼ LoRaWAN ▼ MQTT ▼ TCP ▼ Custom Network ▼

### System Overview

<b>Device Model:</b>	LPS8-N
<b>Hostname:</b>	dragino-22af08
<b>Firmware:</b>	lgw-5.4.1661158991
<b>Build Time:</b>	Build Mon 22 Aug 2022 05:03:11 PM CST
<b>FWD version:</b>	Release:2022-07-23 02:29:28, Version:2.0.6
<b>Cellular :</b>	Not Detected
<b>System Time:</b>	Thu Aug 25 08:56:00 UTC 2022
<b>Uptime:</b>	2:05
<b>Load Avg:</b>	0.30, 0.39, 0.43
<b>Memory:</b>	Free Memory: 19024 / Total Memory: 60192kB
<b>IoT Service:</b>	station
<b>ETH0 MAC:</b>	A8:40:41:22:AF:0B
<b>ETH1 MAC:</b>	A8:40:41:22:AF:0A
<b>WiFi MAC:</b>	AA:40:41:22:AF:08

Internet Connection OK



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

## System General

### System Password

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

### TimeZone

Timezone

### Port Forwarding

Enable HTTP Forward ☒  
Enable SSH Forward ☒

### Fallback Settings

Fallback Interface ☒ [Set Fallback Service](#)

### Keepalive\_Script

Interval setting

### Logread Level

Logread level  [Change\\_Level](#)

### Enable Internet Detect and Recover

Enable Internet Detect ☐ [Enable Detect Service](#)

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

#### System Password:

There are two login for LPS8N: **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.

Fallback Settings: Enable/Disable the Fallback interface.

Keepalive\_Script: Set the keepalive\_script interval.

Logread Level: Change the logread level.

Eable Internet Detect and Recover: Enable/Disable the Internet Detect interface,Internet Detect is enabled by default. When there is no gateway network, it will reboot after 15 minutes.

### 5.6.3 System --> Backup/Restore Config

**Backup/Restore**

Click "Generate archive"to download a tar archive of the current configuration files."


**Download backup:**  [Download Backup File](#)

To restore configuration files,you can upload a previously generated backup archive here.


**Restore backup:**  未选择文件

### 5.6.4 System --> Remote.it

In the **System-> Remote.it** interface, users can configure the gateway to be accessed remotely via Remote.it.  
the users can refer to this link to configure them: [Monitor & Remote Access Gateway](#)

**Remote.it** 

**1. Install Remote.it**

**2. Register**   
Bulk ID Code / License Key

**3. Remove**  
 To change registration, please Remove and then Install again.

**Status**  
Remoteit is not installed  
Device is not registered

### 5.6.5 System --> Remote Mgnt & Auto Provision

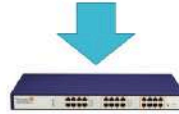
Auto Provision is the feature for batch configure and remote management. It can be used in below two cases:

Case 1:  
Batch  
configure  
gateways  
before  
deploy

Local Area Network (LAN)



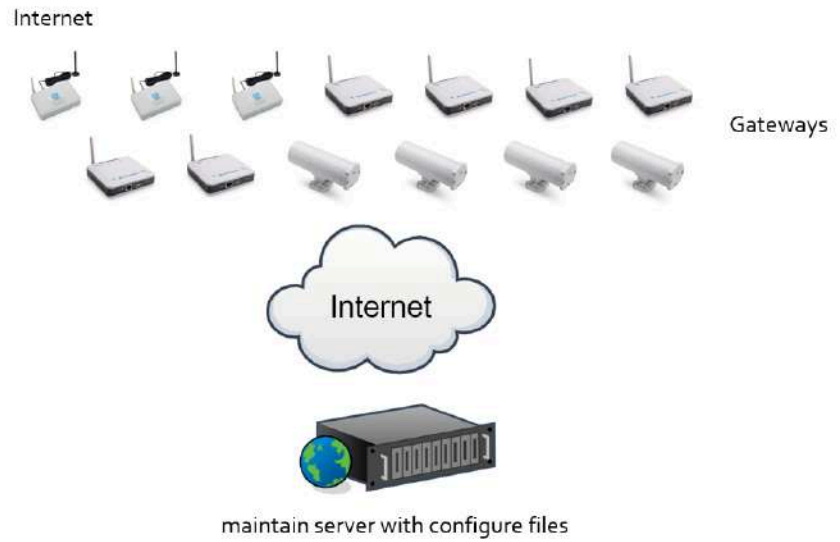
Gateways



http server with configure files



Case 2:  
Maintain  
gateway  
configure  
from  
cloud



## 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/LPS8N/Firmware/Application\\_Note/&file=Auto-update-feature.pdf](http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LPS8N/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](#)

### R-SSH Host Settings

Login ID	<input type="text" value="sshuser"/>	
Host Address	<input type="text" value="support.dragino.com"/>	Host Port <input type="text"/>
Connect at Startup <input type="checkbox"/>	GWID: a84041ffff1d25dc	
Connection Status: <b>Not connected to RSSH Host</b>		
<input type="button" value="Save"/> <input type="button" value="Connect"/> <input type="button" value="Disconnect"/> <input type="button" value="SetDefault"/> <input type="button" value="Cancel/Refresh"/>		

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](#)

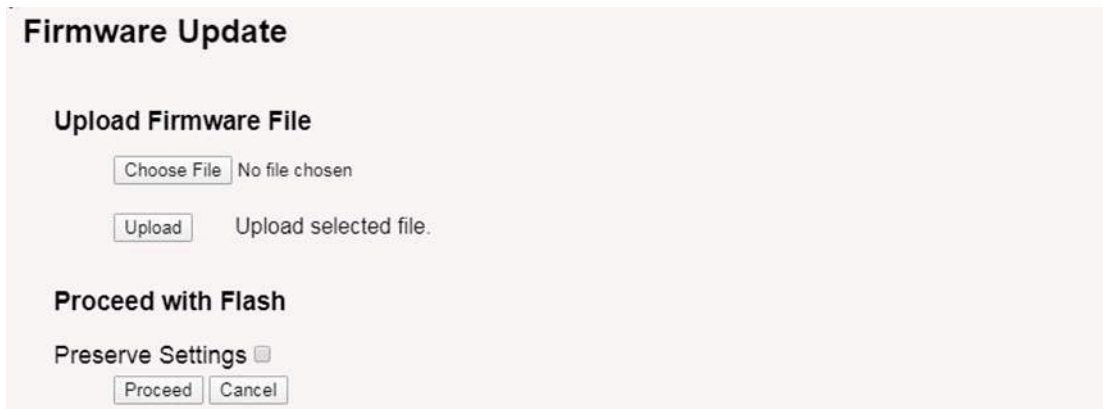
## 5.6.6 System --> Firmware Upgrade

We keep improving the LPS8N 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/LPS8N/Firmware](http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LPS8N/Firmware) )
- **Change Log:** [Firmware Change Log](#).  
( [http://www.dragino.com/downloads/downloads/LoRa\\_Gateway/LPS8N/Firmware/ChangeLog](http://www.dragino.com/downloads/downloads/LoRa_Gateway/LPS8N/Firmware/ChangeLog) )

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

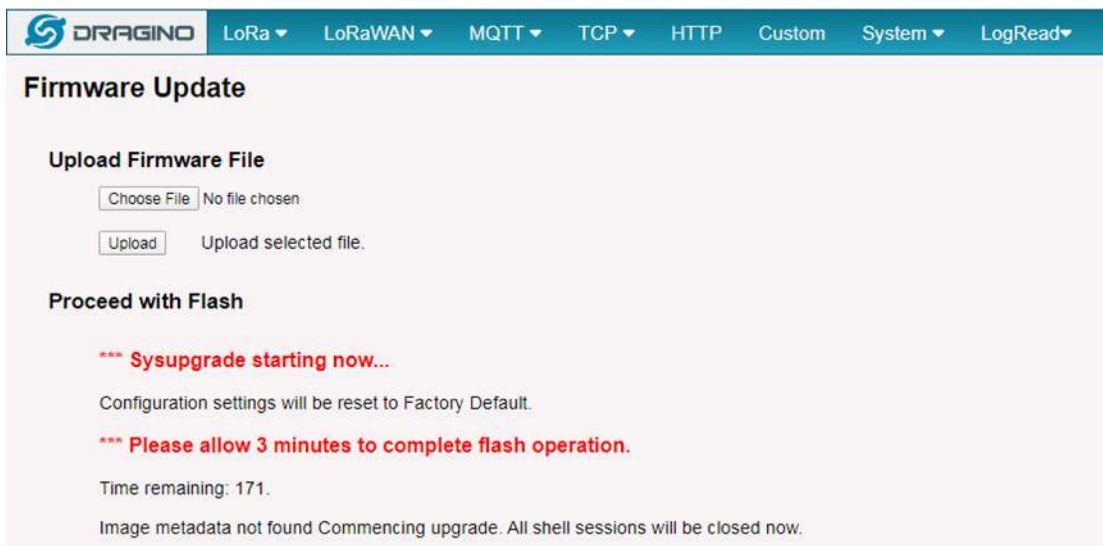
**Web--> System--> Firmware Upgrade**



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

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

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



**NOTE\*:** User can also upgrade firmware via Linux console  
SCP the firmware to the system/**var** directory and then run  
`root@OpenWrt:~# /sbin/sysupgrade -n /var/Your_Image`

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

### 5.6.7 System --> Reboot/Reset

## Reboot / Reset

### Reboot

REBOOT

### Reset to Factory Default

RESET

## 5.6.8 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

```
atftp - 0.7.1-5
base-files - 190-r5-ce45a50
blkid - 2.32-2
block-mount - 2018-04-16-e2436836-1
busybox - 1.28.3-4
ca-certificates - 20180409
colord - 1.26.1-1
```

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

## 5.7 LogRead

### 5.7.1 LogRead --> LoRa Log

Show the frequency for LoRa Radio and traffics.

## 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

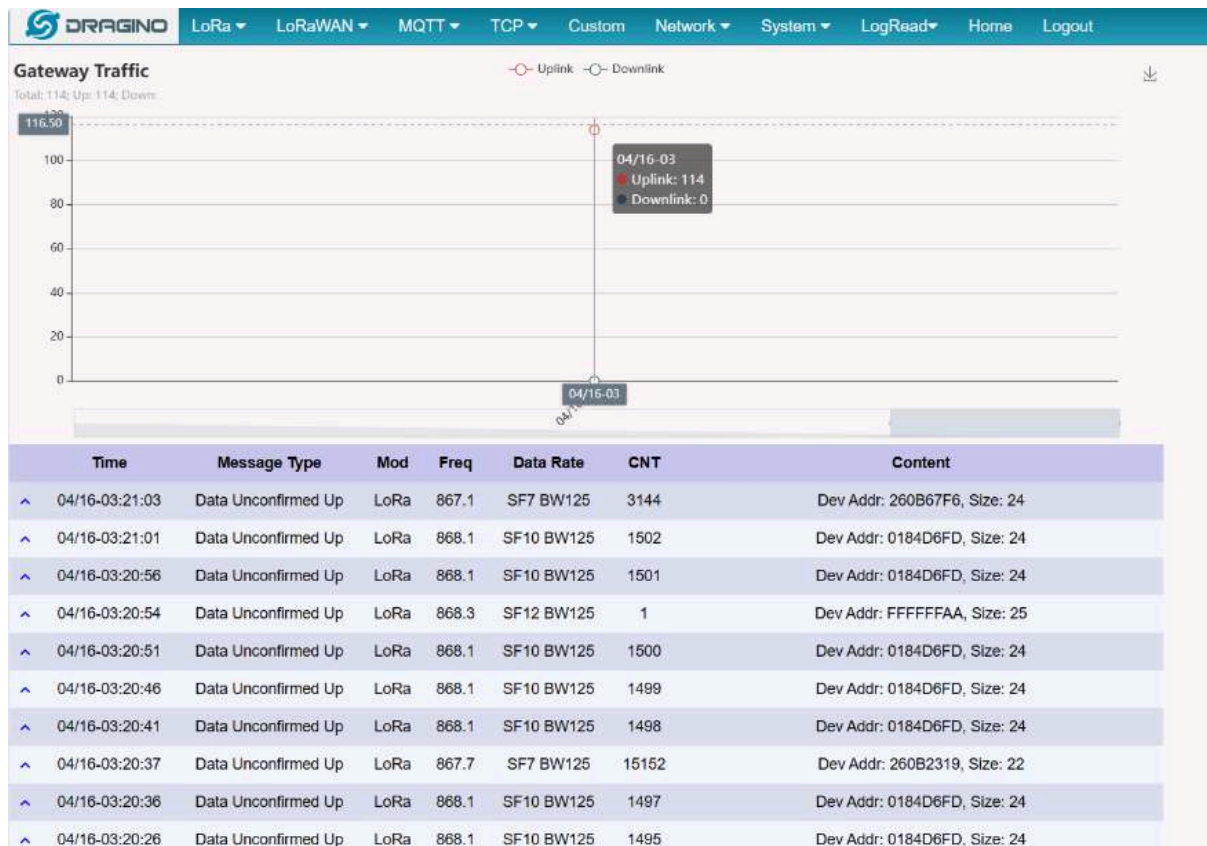
chan\_multSF\_5

Lora MAC, 125kHz, all SF, 867.5 MHz

chan\_multSF\_6

## 5.7.2 LogRead --> Gateway Traffic

Show the gateway traffic:



## 5.7.3 LogRead --> System Log

Show the system log

## System Log

### USB Devices:

```

Bus 001 Device 003: ID 0403:6001 Future Technology Devices International, Ltd FT232 Serial (UART) IC
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:

```

Linux version 4.9.109 (root@DraginoHK) (gcc version 7.3.0 (OpenWrt GCC 7.3.0 r7360-e15565a) ) #0 Fri Jun 29 16:58:53 2018
MyLoader: zysp=aaaaaaa, boardp=2aabaaab, parts=aaaa2aab
bootconsole [early0] enabled
CPU0 revision is: 00019374 (MIPS 24Kc)
SoC: Atheros AR9330 rev 1
Determined physical RAM map:
memory: 04000000 @ 00000000 (usable)
Initrd not found or empty - disabling initrd
Primary instruction cache 64kB, VIPT, 4-way, linesize 32 bytes.
Primary data cache 32kB, 4-way, VIPT, cache aliases, linesize 32 bytes

```

### Previous Log:

## 5.7.4 LogRead --> Record Log

This interface can record gateway logs:



# 6. More features

## 6.1 NTP Service/Time Synchronization

The gateway time sync service is provided by ntpd

### 1). Modify the NTP server address:

###Linux command

```

uci set system.ntp.server='0.openwrt.pool.ntp.org' #Required
uci add_list system.ntp.server='1.openwrt.pool.ntp.org' #Optional
uci add_list system.ntp.server='2.openwrt.pool.ntp.org' #Optional
uci add_list system.ntp.server='3.openwrt.pool.ntp.org' #Optional
uci commit system #Required

```

**Note:** If the NTP server is a Windows host, it may cause the time synchronization to fail,

## 6.2 Packet Filtering

Drop unwanted packets.

See: <http://wiki.dragino.com/xwiki/bin/view/Main/Filter%20unwanted%20LoRaWAN%20packets/>

## 6.3 Remote Access

Remote Access Devices for management.

Instruction: <http://wiki.dragino.com/xwiki/bin/view/Main/Monitor%20%26%20Remote%20Access%20Gateway/?Remote%20Access>

## 6.4 How to decode ABP LoRaWAN node

Decode ABP:

<http://wiki.dragino.com/xwiki/bin/view/Main/Communicate%20with%20ABP%20End%20Node%20without%20LoRaWAN%20Network%20Server%20---%20LG308/>

## 6.5 How to set data to MQTT broker

Only support ABP LoRaWAN End Node

Instruction: <http://wiki.dragino.com/xwiki/bin/view/Main/MQTT%20Forward%20Instruction/>

## 6.6 How the gateway connects to Chirpstack v3/v4 via gateway-bridge

If the Chirpstack v3 Gateway-bridge is used, the corresponding gateway firmware must be used :

[Chirpstack-gateway-bridge/Chirpstack-Bridge-V3.14.6-Bridge--build-v5.4.1679487778-20230322-2024/](#)

Chirpstack v3 via gateway-bridge Instruction: <http://wiki.dragino.com/xwiki/bin/view/Main/Notes%20for%20ChirpStack/#H4.A0A0HowthegatewayconnectstoChirpstackv3viagateway-bridge>

If the Chirpstack v4 Gateway-bridge is used, the corresponding gateway firmware must be used :

[Chirpstack-gateway-bridge/Chirpstack-Bridge-V4--build-v5.4.1670655072-20221210-1452/](#)

Chirpstack v4 via gateway-bridge Instruction: <http://wiki.dragino.com/xwiki/bin/view/Main/Notes%20for%20ChirpStack/#H4.A0HowthegatewayconnectstoChirpstackv4viagateway-bridge>

**Note:** Different chirpstack versions use different gateway-bridge configurations.

After updating the Chirpstack gateway-bridge firmware, there is no need to re-download and install the Chirpstack gateway-bridge package

## 6.7 How does the gateway connect to Chirpstack via MQTT Forwarder



ChirpStack MQTT Forwarder is a MQTT packet forwarder for LoRa gateways. By default it forwards packets in Protobuf binary format, optionally it can be configured to use JSON encoding for debugging. In contrast to the ChirpStack Gateway Bridge, this component must always be installed on the gateway.

### 6.7.1 Configure Packet Forwarder

In the Dragino web-interface, you must configure the Packet Forwarder such that it forwards to localhost on port 1700.

By default, the web-interface can be accessed by entering the following URL in your browser: **https://GATEWAY-IP-ADDRESS:8000** (replace GATEWAY-IP-ADDRESS by the actual IP address of your gateway). The default credentials are **root / dragino**.

- In the **LoRaWAN** menu, click **LoRaWAN -- Semtech UDP**
- Configure the following settings:
  - **Service Provider:** *Custom / Private LoRaWAN*
  - **Server Address:** *localhost*
  - **Uplink Port:** *1700*
  - **Downlink Port:** *1700*
- Click **Save&Apply**

### 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 ?  NwkId Filter ?

Secondary server Fport Filter  DevAddr Filter  NwkId Filter

#### Add Filter

Server Name:  Filter type:  Filter Value

DELET Filter

Current Mode: **LoRaWAN Semtech UDP**

## 6.7.2 Install ChirpStack MQTT Forwarder

### SSH login

First user must login into the gateway using SSH, user can refer to the link to access the Linux console via SSH to the gateway: [SSH Access for Linux console](#)

### Download IPK

Use the following commands to download the latest version of the chirpstack-mqtt-forwarder package:

```
cd /tmp
wget https://artifacts.chirpstack.io/downloads/chirpstack-mqtt-forwarder/vendor/dragino/mips_24kc/chirpstack-mqtt-forwarder_4.3.0-r1_mips_24kc.ipk
```

### Install IPK

Use the opkg package-manager to install the downloaded package. Example:

```
opkg install chirpstack-mqtt-forwarder_4.3.0-r1_mips_24kc.ipk
```

```
root@dragino-1ecc10:~# cat /etc/banner
DRAGINO
W I F I , L I N U X , M C U , E M B E D D E D
openWRT 18.06
Version: Dragino-v2 IDC-5.4.1715828543
Build Thu 16 May 2024 11:02:23 AM CST
www.dragino.com

root@dragino-1ecc10:~# cd /tmp
root@dragino-1ecc10:/tmp# wget https://artifacts.chirpstack.io/downloads/chirpstack-mqtt-forwarder/vendor/dragino/mips_24kc/chirpstack-mqtt-forwarder_4.3.0-r1_mips_24kc.ipk
Downloading 'https://artifacts.chirpstack.io/downloads/chirpstack-mqtt-forwarder/vendor/dragino/mips_24kc/chirpstack-mqtt-forwarder_4.3.0-r1_mips_24kc.ipk'
Connecting to 188.169.134.65:443
Writing to 'chirpstack-mqtt-forwarder_4.3.0-r1_mips_24kc.ipk'
chirpstack-mqtt-forw 100% [*****] 1383k 0:00:00 ETA
download completed (141667 bytes)
root@dragino-1ecc10:/tmp# opkg install chirpstack-mqtt-forwarder_4.3.0-r1_mips_24kc.ipk
Installing chirpstack-mqtt-forwarder (4.3.0-r1) to root...
Configuring chirpstack-mqtt-forwarder.
```

### Configuration

To connect the ChirpStack MQTT Forwarder to your MQTT broker, you must update the ChirpStack MQTT Forwarder configuration file.

This file is located at: `/etc/chirpstack-mqtt-forwarder/chirpstack-mqtt-forwarder.toml`

#### ChirpStack MQTT Forwarder Setting:

`topic_prefix` --> This corresponds to the frequency of the ChirpStack server

`server` --> Fill in the ChirpStack server address, Example: `tcp://10.130.2.15:1883`

`username,password,ca_cert,tls_cert,tls_key` parameters should be set as required.

Use commands to modify configuration files:

```
vim /etc/chirpstack-mqtt-forwarder/chirpstack-mqtt-forwarder.toml
```

```
# For a complete configuration example and documentation, please refer to:
# https://www.chirpstack.io/docs/chirpstack-mqtt-forwarder/configuration.html

[logging]
level="info"
log_to_syslog=true

[backend]
enabled="semtech_udp"

[backend.semtech_udp]
bind="0.0.0.0:1700"

[mqtt]
topic_prefix="eu868"
server="tcp://10.130.2.15:1883"
username=""
password=""
ca_cert=""
tls_cert=""
tls_key=""

~
```

Use the following commands to (re)start and stop the ChirpStack MQTT Forwarder service:

```
# start
```

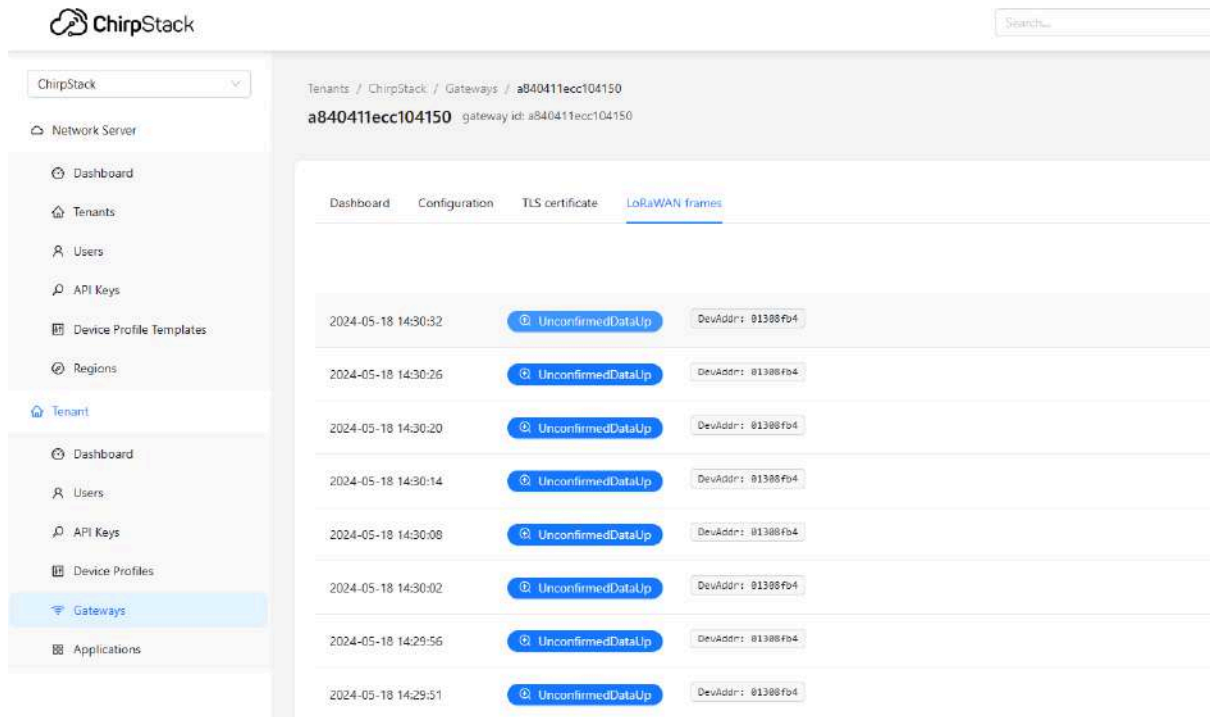
```
# stop
```

```
# restart
```

## Check result

```
Sat May 18 06:22:39 2024 root@drapino-lcc10:/tmp# tcpdump -n -i eth0 -c 1000000 -s 1572 -S 1572 -V -w /var/log/tcpdump.pcap
Sat May 18 06:22:39 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-UP] received packages from node: 0130f08d (FCm=129)
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [PKTS] [Server-UP] "PushData" received, timestamp: 1572-05-18T06:22:32.088397Z, "chan":1,"rfch":1,"freq":868.500000,"mid":0,"stat":1,"modu":1
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: PushData received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-DOWN] PUSHData received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: Sending uplink event, uplink id: 114069933, topic: eub8/gateway/s404l1ecc1da150/event/up
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [NETWRK][Server-UP] PUSHACK received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-UP] received packages from node: 0130f08d (FCm=129)
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: PUSHData received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-DOWN] PUSHData received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: Sending PULL ACK, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-DOWN] PULL ACK received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: Sending PULL ACK, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-DOWN] PULL ACK received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: Sending uplink event, uplink id: 114069933, topic: eub8/gateway/s404l1ecc1da150/event/up
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [NETWRK][Server-UP] PUSHACK received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-UP] received packages from node: 0130f08d (FCm=129)
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: "PushData" received, timestamp: 1572-05-18T06:22:32.088397Z, "chan":1,"rfch":1,"freq":868.500000,"mid":0,"stat":1,"modu":1
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: PushData received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-DOWN] PUSHData received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 user.info chirpstack-matt-forwarder[1597]: Sending uplink event, uplink id: 114069933, topic: eub8/gateway/s404l1ecc1da150/event/up
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [NETWRK][Server-UP] PUSHACK received, random.token: 47654, remote: 127.0.0.1:40128
Sat May 18 06:22:32 2024 daemon.info fwd[1448]: [INFO] [PKTS][Server-UP] received packages from node: 0130f08d (FCm=129)
```

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The screenshot displays the ChirpStack web interface. On the left is a sidebar menu with options like Network Server, Tenant, and various management tools. The main content area shows the 'LoRaWAN frames' page for gateway 'a840411ecc104150'. It features a table of data frames with columns for timestamp, status (UnconfirmedDataUp), and DevAddr (01308fb4).

Timestamp	Status	DevAddr
2024-05-18 14:30:32	UnconfirmedDataUp	01308fb4
2024-05-18 14:30:26	UnconfirmedDataUp	01308fb4
2024-05-18 14:30:20	UnconfirmedDataUp	01308fb4
2024-05-18 14:30:14	UnconfirmedDataUp	01308fb4
2024-05-18 14:30:08	UnconfirmedDataUp	01308fb4
2024-05-18 14:30:02	UnconfirmedDataUp	01308fb4
2024-05-18 14:29:56	UnconfirmedDataUp	01308fb4
2024-05-18 14:29:51	UnconfirmedDataUp	01308fb4

## 6.8 How to extend the gateway size of memory with USB device (SD/TF card, USB flash drive).

USB card reader plugged into the USB port of the gateway

Access the gateway Linux Command Line

Check the USB device

```
br-lan: port 2(wlan0) entered forwarding state
eth1: link down
eth1: link up (10Mbps/Full duplex)
usb 1-1.3: new high-speed USB device number 4 using ehci-platform
usb-storage 1-1.3:1.0: USB Mass Storage device detected
scsi host0: usb-storage 1-1.3:1.0
scsi 0:0:0:0: Direct-Access              MassStorageClass          PQ: 0 ANSI: 6
sd 0:0:0:0: [sda] 122138624 512-byte logical blocks: (62.5 GB/58.2 GiB)
sd 0:0:0:0: [sda] write Protect is off
sd 0:0:0:0: [sda] Mode Sense: 23 00 00 00
scsi 0:0:0:1: Direct-Access              MassStorageClass          PQ: 0 ANSI: 6
sd 0:0:0:0: [sda] write cache: disabled, read cache: enabled, doesn't support DPO or FUA
sd 0:0:0:1: [sdb] Attached SCSI removable disk
sda: sda1
sd 0:0:0:0: [sda] Attached SCSI removable disk
root@dragino-2500d8:~# lsusb
Bus 001 Device 003: ID 2c7c:0125
Bus 001 Device 004: ID 2537:1081
Bus 001 Device 002: ID 1a40:0101 Terminus Technology Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
root@dragino-2500d8:~# ls /dev/sda*
/dev/sda /dev/sda1
root@dragino-2500d8:~#
```

Mount the USB device

```
mount /dev/sda1 /mnt/
```

```
root@dragino-2500d8:~# lsusb
Bus 001 Device 003: ID 2c7c:0125
Bus 001 Device 008: ID 2537:1081
Bus 001 Device 002: ID 1a40:0101 Terminus Technology Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
root@dragino-2500d8:~# mount /dev/sda1 /mnt/
root@dragino-2500d8:~# df -h /mnt/
```

Set up the automatic mount on boot

```
sed -i '3cmount /dev/sda1 /mnt/' /etc/rc.local
```

```
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
root@dragino-2500d8:~# mount /dev/sda1 /mnt/
root@dragino-2500d8:~# df -h /mnt/
Filesystem      Size      Used Available Use% Mounted on
/dev/sda1       29.7G      32.0K      29.7G   0% /mnt
root@dragino-2500d8:~#
```

## 6.9 More instructions

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

## 6.10 Auto-Provision

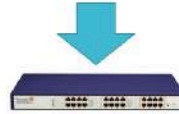
Auto Provision is the feature for batch configure and remote management. It can be used in below two cases:

Case 1:  
Batch  
configure  
gateways  
before  
deploy

Local Area Network (LAN)

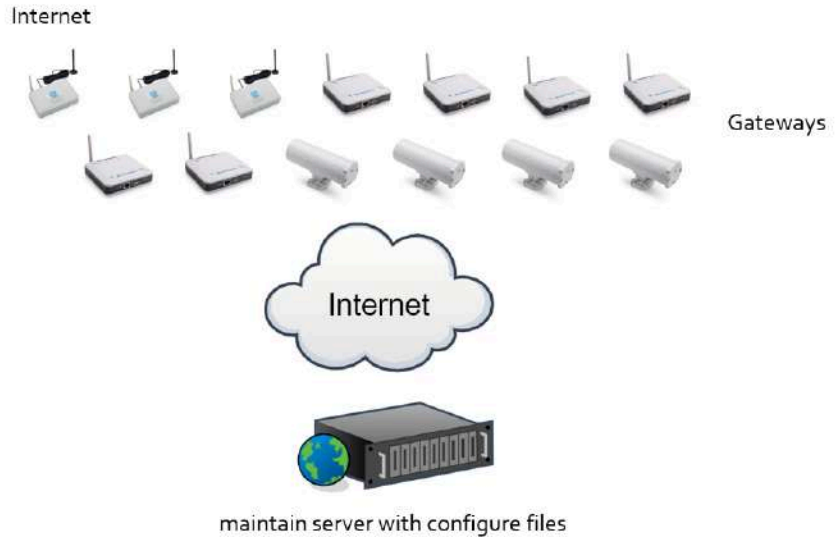


Gateways



http server with configure files

## Case 2: Maintain gateway configure from cloud



## 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/LPS8N/Firmware/Application\\_Note/&file=Auto-update-feature.pdf](http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LPS8N/Firmware/Application_Note/&file=Auto-update-feature.pdf)



## 7. Linux System

The LPS8N 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 LPS8N are connected to the same network, then use a SSH tool (such as [putty](#) in Windows) to access it.

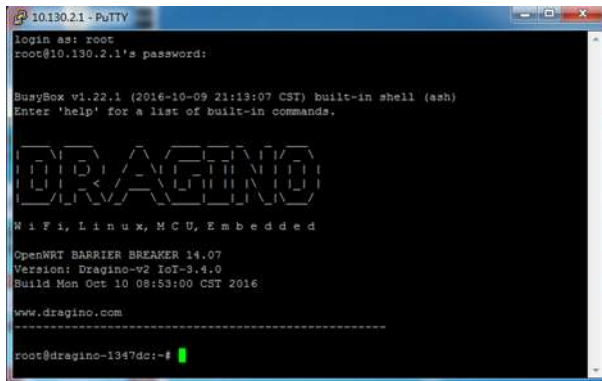
IP address: IP address of LPS8N

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

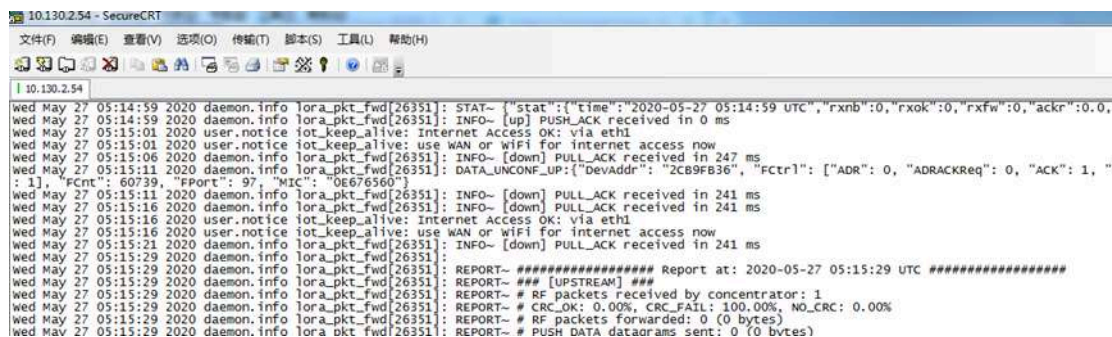
User Name: **root**

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.



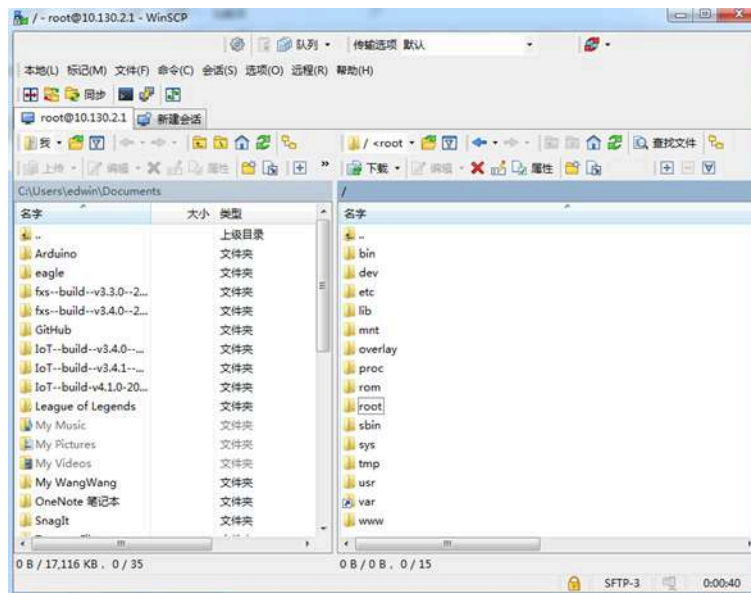
### 7.2 Edit and Transfer files

The LPS8N 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 LPS8N, or edit the files directly in the windows.

Screenshot is as below:



## 7.3 File System

The LPS8N 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 LPS8N flash.

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

## 7.4 Package maintenance system

LPS8N 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 LPS8N 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](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

We keep improving the LPS8N 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/LPS8N/Firmware](http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LPS8N/Firmware) )
- **Change Log:** [Firmware Change Log](#).  
( [http://www.dragino.com/downloads/downloads/LoRa\\_Gateway/LPS8N/Firmware/ChangeLog](http://www.dragino.com/downloads/downloads/LoRa_Gateway/LPS8N/Firmware/ChangeLog) )

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

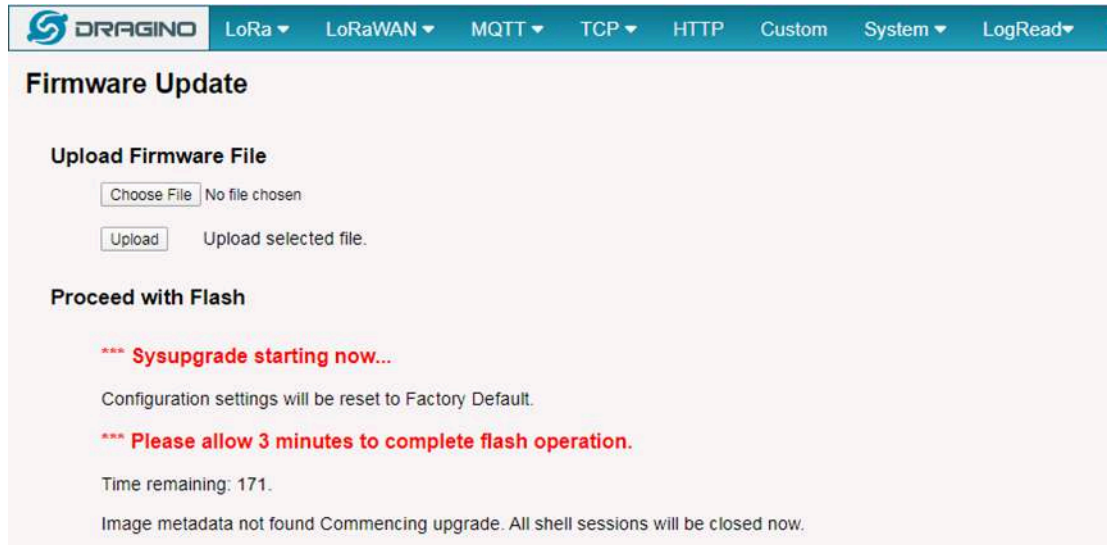
### 8.1 Upgrade via Web UI

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

LPS8N 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 make my own firmware for the gateway, where can I find the source code?

Yes, You can make your own firmware for the LPS8N for branding purposes or to add customized applications.

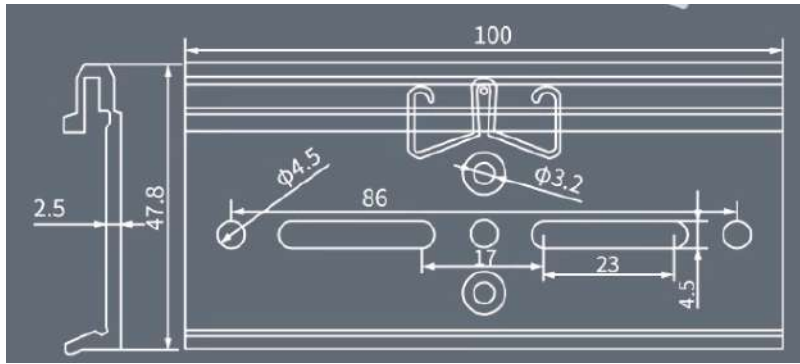
The source code and compile instructions can be found at: [https://github.com/dragino/openwrt\\_lede-18.06](https://github.com/dragino/openwrt_lede-18.06)

### 10.3 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.

## **10.4 DIN Rail Mounting Reference.**





## 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.
```

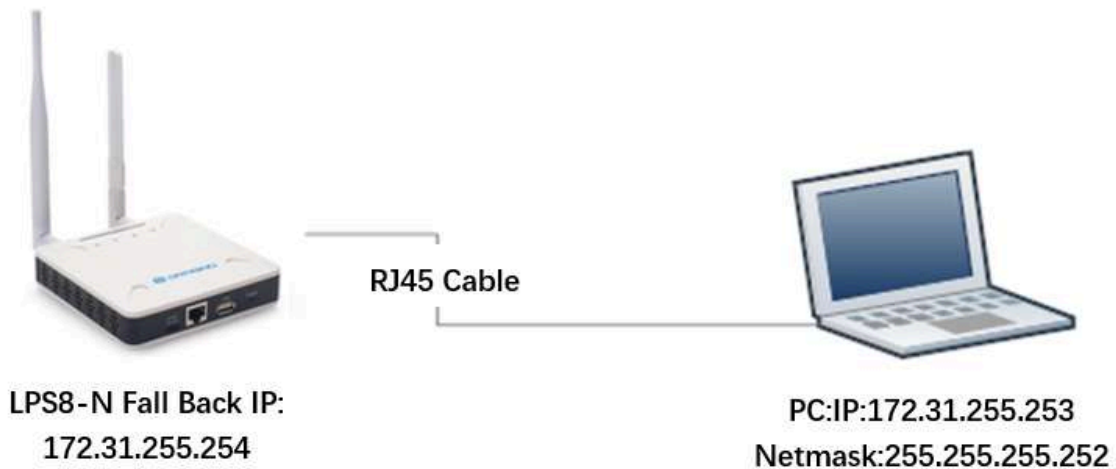
In this case, you can use the **-force-depends** option to install such package as long as the actual kernel version is the same.

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

### 11.2 How to recover the LPS8N if the firmware crashes

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

### 11.3 I configured LPS8N for WiFi access and lost its IP. What to do now?



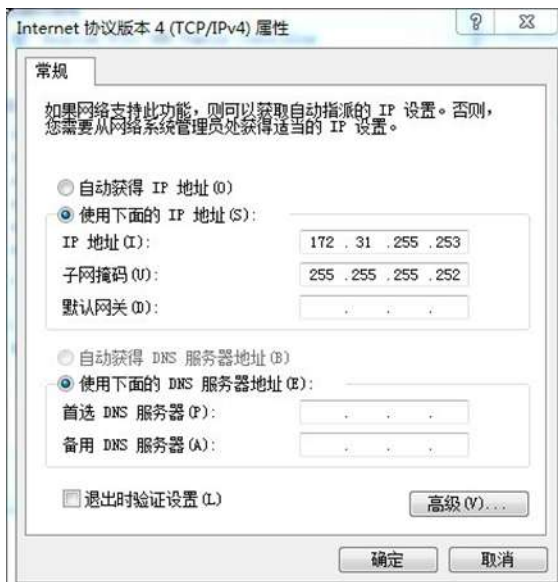
The LPS8N has a fall-back IP address on its WAN port. This IP is always enabled so you can use the fall-back IP to access LPS8N no matter what the WiFi IP is. The fall back IP is useful for connecting and debug the unit.

**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 LPS8N'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 LPS8N via Web or Console.

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



## **11.4 I connect to the LPS8N's SSID but LPS8N didn't assign DHCP IP to my laptop?**

This is a known bug for the firmware version before 2019-09-23 for LPS, the issue was fixed since version: LG02\_LG08--build-v5.2.1569218466-20190923-1402.

In the old version, user can use the [fall back ip method](#) to access and configure the device.

## **11.5 When i power on LPS8N , i can only see PWR LED is on. other LEDs are not blinking.**

If there is no LED blink except the PWR led. There might be:

- 1) Power adapter issue. In this case, please try another power adapter.
- 2) Mother Board broken.

## **11.6 Why does the gateway reboot every 15 minutes without Internet?**

Check whether Internet Detect is enabled on the System-->General interface.

Internet Detect is enabled by default. When there is no gateway network, it will reboot after 15 minutes.

**System General**

**System Password**

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

Password (admin)  [Show](#) [SetAdminPassword](#)

**TimeZone**

Timezone

**Port Forwarding**

Enable HTTP Forward ☒

Enable SSH Forward ☒

**Fallback Settings**

Fallback Interface ☒ [Set Fallback Service](#)

**Keepalive\_Script**

Interval setting

**Logread Level**

Logread level  [Change\\_Level](#)

**Enable Internet Detect and Recover**

**Enable Internet Detect** ☒ [Enable Detect Service](#)

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

System Overview

General

Back Up / Restore Config

Remote.it

WireGuard

Remote Mgmt

Firmware Upgrade

Reboot / Reset

Package Maintain

## 12. Order Info

**PART:** LPS8N-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-AFX**: America:Verizon, AT&T(FirstNet), U.S.Cellular; Canada:Telus

- **EC25-AUX:** 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:

- LPS8N 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: 12 x 12 x 3 cm
- Weight: 187g
- Package Size: 14.5 x 13.5 x 6 cm
- Weight: 300g

## 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)