



LPS8N LoRaWAN Gateway User Manual

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Table of Contents

1	Introduction	5
1.1	What is the LPS8N	5
1.2	Specifications.....	6
1.3	Features.....	7
1.4	Hardware System Structure.....	7
1.5	LPS8N Applications.....	8
1.6	LED Indicators.....	8
2	Access and Configure LPS8N	9
2.1	Find IP address of LPS8N	9
2.1.1	Connect via WiFi	9
2.1.2	Connect via Ethernet with DHCP IP from router	9
2.1.3	Connect via WiFi with DHCP IP from router	10
2.1.4	Connect via Ethernet with fall back ip	10
2.2	Access Configure Web UI.....	10
3	Typical Network Setup	11
3.1	Overview	11
3.2	Use WAN port to access Internet.....	11
3.3	Access the Internet as a WiFi Client.....	12
3.4	Check Internet connection.....	13
4	Example: Configure as a LoRaWAN gateway	13
4.1	Create a gateway in TTN V3 Server.....	15
4.2	Configure LPS8N to connect to TTN v3	18
4.3	Configure frequency	20
4.4	Add a LoRaWAN End Device	21
5	Web Configure Pages	24
5.1	Home	24

5.2	LoRa Settings	25
5.2.1	LoRa --> LoRa	25
5.2.2	LoRa --> ABP Decryption	26
5.3	LoRaWAN Settings.....	27
5.3.1	LoRaWAN --> LoRaWAN	27
5.3.2	LoRaWAN --> Amazon AWS-IoT	27
5.3.3	LoRaWAN --> LORIoT	27
5.4	MQTT Settings.....	28
5.5	System	29
5.5.1	System --> System Overview.....	29
5.5.2	System --> General (login settings)	30
5.5.3	System --> Network	30
5.5.4	System --> WiFi	31
5.5.5	System --> Network Status.....	31
5.5.6	System --> Remote Mgnt & Auto Update	31
5.5.7	System --> Firmware Upgrade	34
5.5.8	System --> Reboot/Reset	35
5.5.9	System --> Package Maintain	36
5.6	LogRead.....	36
5.6.1	LogRead --> System Log	37
6	More features	37
6.1	Packet Filtering.....	37
6.2	Remote Access.....	37
6.3	How to decode ABP LoRaWAN node	37
6.4	How to set data to MQTT broker.....	37
6.5	More instructions	38
6.6	Auto-Provision	38
7	Linux System	39
7.1	SSH Access for Linux console	39
7.2	Edit and Transfer files	40
7.3	File System.....	41
7.4	Package maintenance system	42
8	Upgrade Linux Firmware	43
8.1	Upgrade via Web UI	43

8.2	Upgrade via Linux console.....	44
9	FAQ.....	44
9.1	How can I configure for a customized frequency band?.....	44
9.2	Can I make my own firmware for the gateway, Where can I find the source code?	44
9.3	Can I use 868Mhz version for 915Mhz bands?.....	44
10	Trouble Shooting.....	45
10.1	I get kernel error when install new package, how to fix?	45
10.2	How to recover the LPS8N if the firmware crashes	45
10.3	I configured LPS8N for WiFi access and lost its IP. What to do now?.....	46
10.4	I connect to the LPS8N's SSID but LPS8N didn't assign DHCP IP to my laptop?	47
11	Order Info	47
12	Packing Info	47
13	Support.....	47
14	FCC Warning	48

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. The LoRa wireless allows users to send data and reach extremely long ranges at low data-rates.

The LPS8N uses **Semtech packet forwarder & LoRaWAN Basic Station** and fully compatible with LoRaWAN protocol. It includes a **SX1302 LoRa 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 12~ 2.462GHz
- Tx power:
 - ✓ 11n20 tx power : 11db
 - ✓ 11n40 tx power : 9db
 - ✓ 11b tx power: 15db
 - ✓ 11g tx power: 12db
- Wifi Sensitivity
 - ✓ 11g 54M : -71dbm
 - ✓ 11n 20M : -67dbm

LoRa Spec:

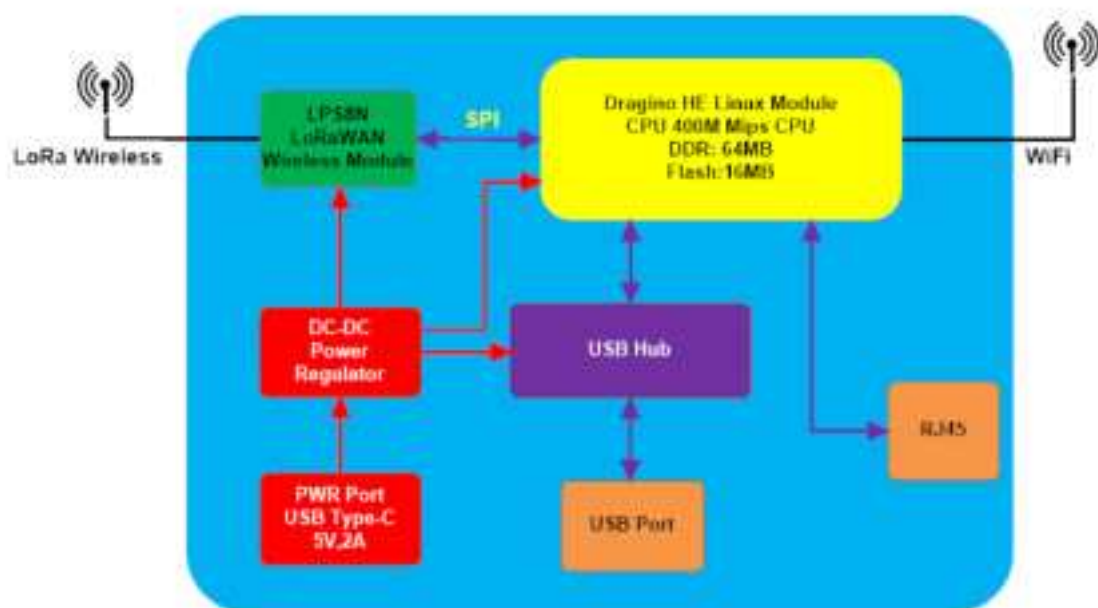
- Up to -140 dBm sensitivity
- 70 dB CW interferer rejection at 1 MHz offset
- Able to operate with negative SNR, CCR up to 9dB
- Emulates 49 x LoRa demodulators and 1 x (G)FSK demodulator
- Dual digital TX & RX radio front-end interfaces
- 10 programmable parallel demodulation paths
- Dynamic data-rate (DDR) adaptation
- True antenna diversity or simultaneous dual-band operation

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.

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.
- **LoRa LED** : This **RGB LED** will **blink GREEN** when LoRaWAN module starts or transmit a packet.
- **SYS LED** : This **RGB LED** will shows different colors on different state:
 - ✓ **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.

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

You 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 can 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 in the LPS8N 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 (The web port has been changed to 8000 in **WAN interface**(WAN port or WiFi Client Mode) since firmware 5.3.xxx firmware)

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 can be set in LPS8N. 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 as below:



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): 11 Tx Power (0-18) dBm: 17

WiFi Access Point Settings
Enable WiFi Access Point: ☒
WiFi Name SSID: dragino-10a124
Passphrase (8-32 char): Encryption: WPA2




WiFi WAN Client Settings
Enable WiFi WAN Client: ☒
Host WiFi SSID: dragino-RD
Passphrase: WiFi Survey: dragino-RD (Ch: 6 Ess)
Encryption: WPA/WPA2

Save&Apply Cancel Refresh

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

3.4 Check Internet connection

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

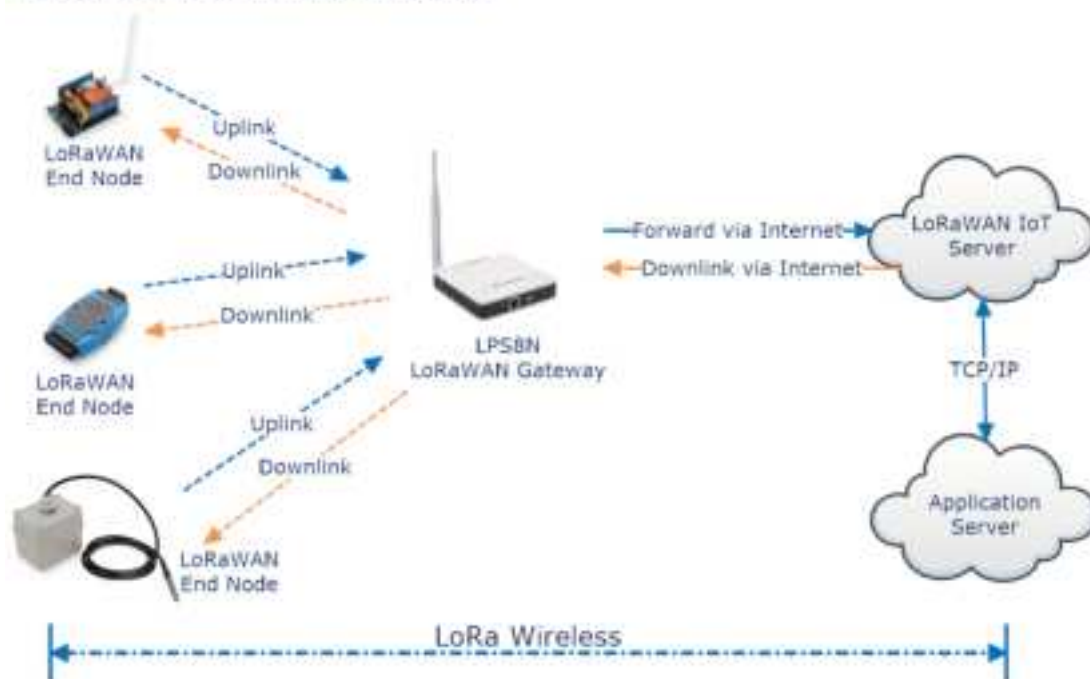
- GREEN Tick  : This interface has Internet connection.
- Yellow Tick  : This interface has IP address but don't use it for internet connection.
- RED Cross  : This interface doesn't connected.



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:

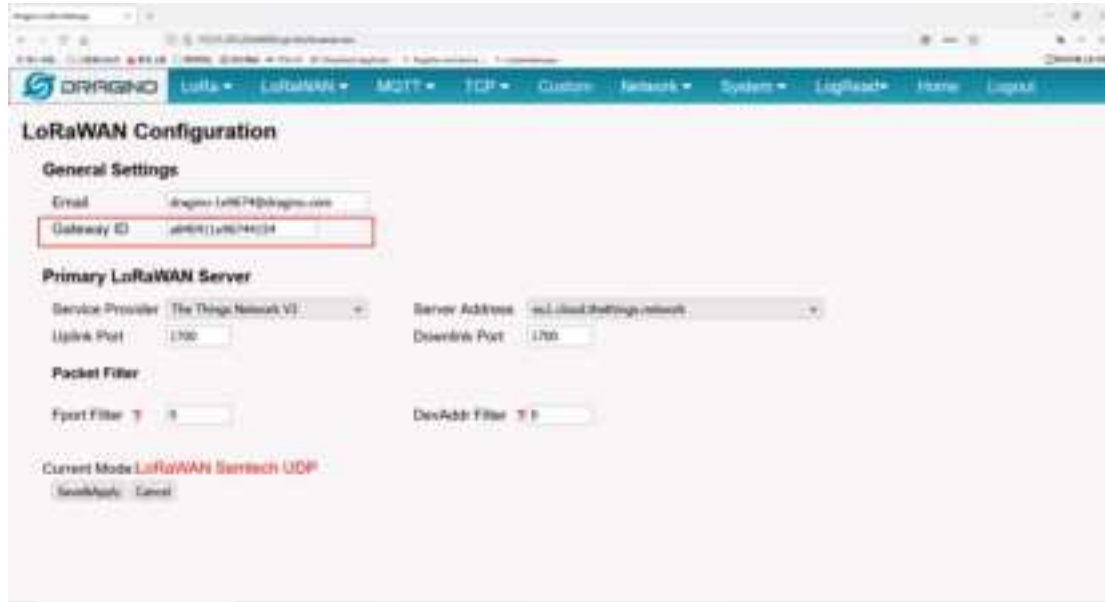


This chapter describes how to use the LPS8N to work with [TTN v3](https://thethingsnetwork.org/).
www.thethingsnetwork.org

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>



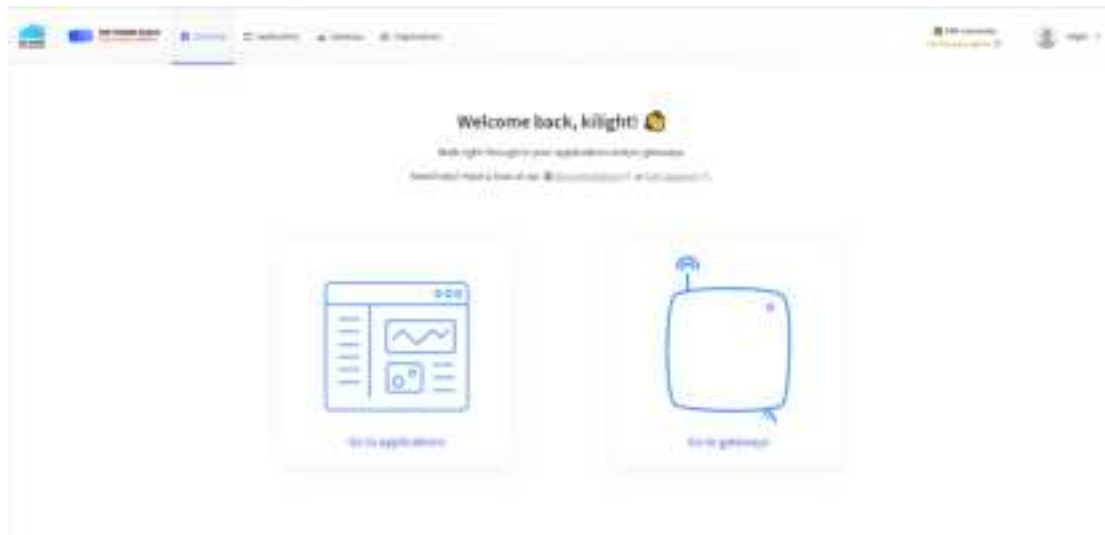
Step 3: Choose the TTNv3 Cluster Picker



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

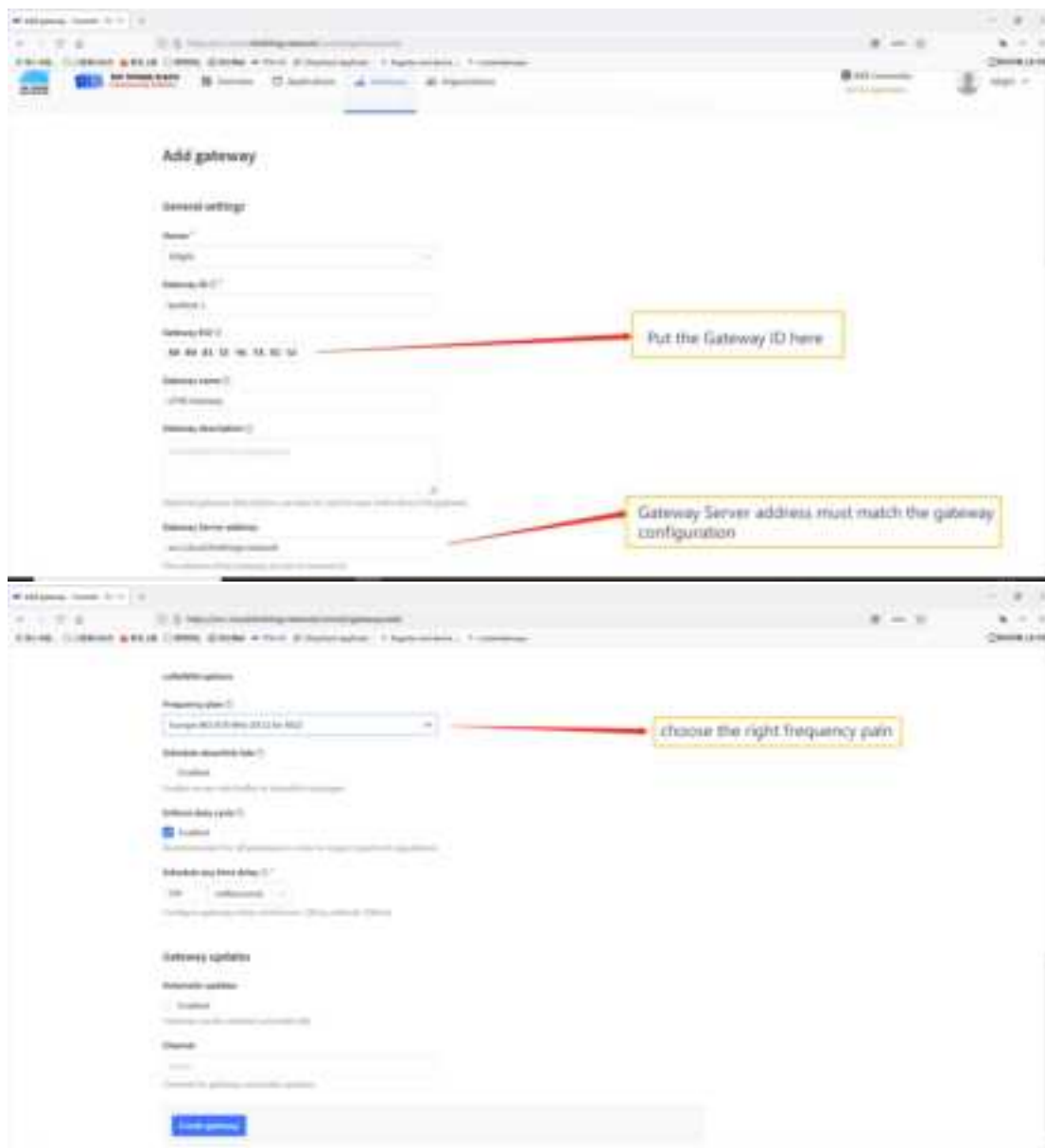
- Europe 1 **corresponding Gateway server address:** eu1.cloud.thethings.network
- North America 1 **corresponding Gateway server address:** nam1.cloud.thethings.network
- Australia 1 **corresponding Gateway server address:** au1.cloud.thethings.network
- Legacy V2 Console : **TTN v2 shuts down in December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

Step 4: Create a Gateway



Click the Gateway icon and then click Add gateway.

Open the following page:



The screenshot shows the 'Add gateway' web form in a browser. The form is divided into two main sections: 'General settings' and 'Gateway update'.

General settings:

- Name:** A text input field.
- Region:** A dropdown menu.
- Gateway ID:** A text input field with a red arrow pointing to it from a yellow box containing the text 'Put the Gateway ID here'.
- Gateway name:** A text input field.
- Gateway description:** A text area.
- Gateway Server address:** A text input field with a red arrow pointing to it from a yellow box containing the text 'Gateway Server address must match the gateway configuration'.

Gateway update:

- Frequency plan:** A dropdown menu with a red arrow pointing to it from a yellow box containing the text 'choose the right frequency plan'.
- Gateway update:** A section with a 'Gateway update' button.

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

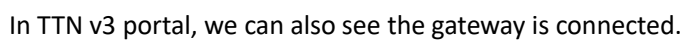
You can now configure the LPS8N to let it connect to TTN network V3.
Make sure your LPS8N has a working Internet Connection first.

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



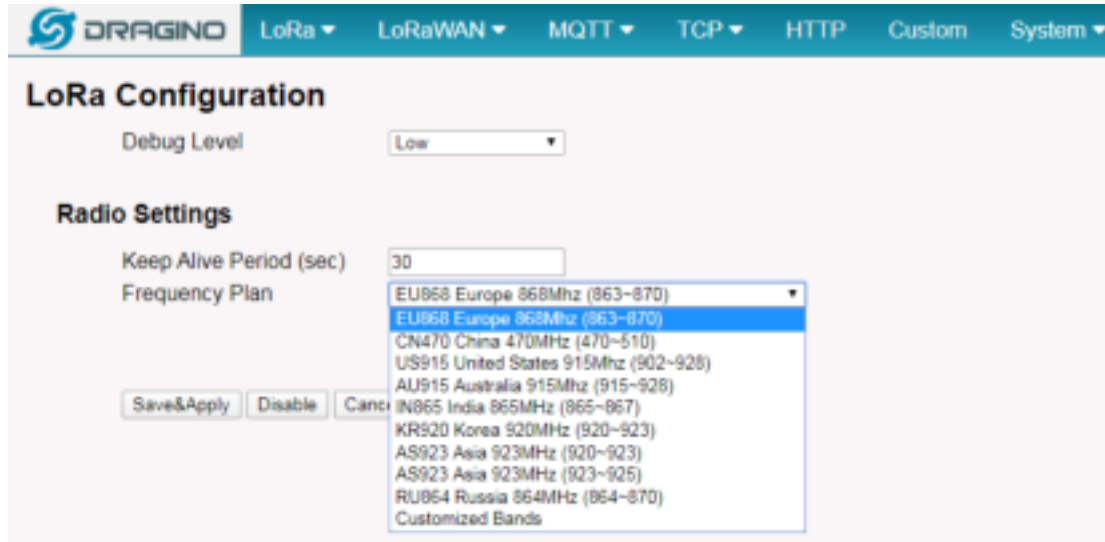
Note: The server address must match the Gateway server address you choose in TTN V3.

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



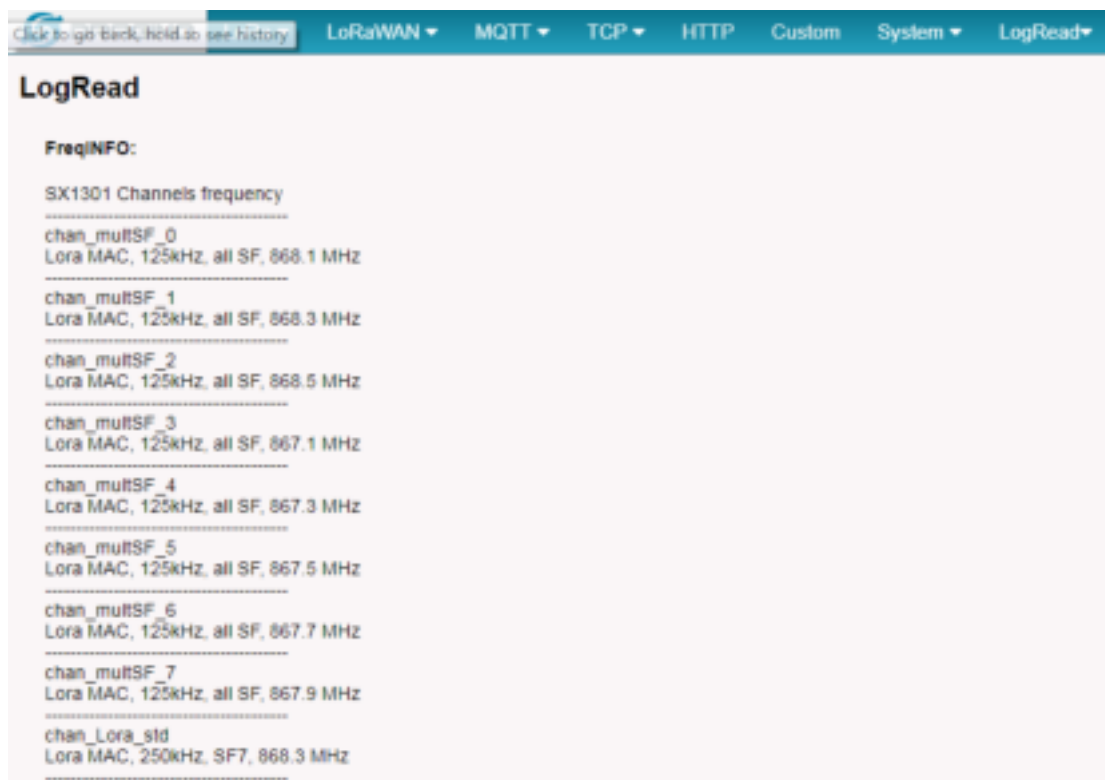
4.3 Configure frequency

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.



The screenshot shows the 'LoRa Configuration' page. Under 'Radio Settings', the 'Frequency Plan' dropdown menu is open, displaying a list of options: EU868 Europe 868Mhz (863-870), CN470 China 470Mhz (470-510), US915 United States 915Mhz (902-928), AU915 Australia 915Mhz (915-928), IN865 India 865Mhz (865-867), KR920 Korea 920Mhz (920-923), AS923 Asia 923Mhz (920-923), AS923 Asia 923Mhz (923-925), RU864 Russia 864Mhz (864-870), and Customized Bands. The 'EU868 Europe 868Mhz (863-870)' option is currently selected. Other settings visible include 'Debug Level' set to 'Low' and 'Keep Alive Period (sec)' set to '30'.

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



The screenshot shows the 'LogRead' page. Under the 'FreqINFO:' section, it lists the SX1301 Channels frequency and provides details for various channels. The information is as follows:

Channel	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

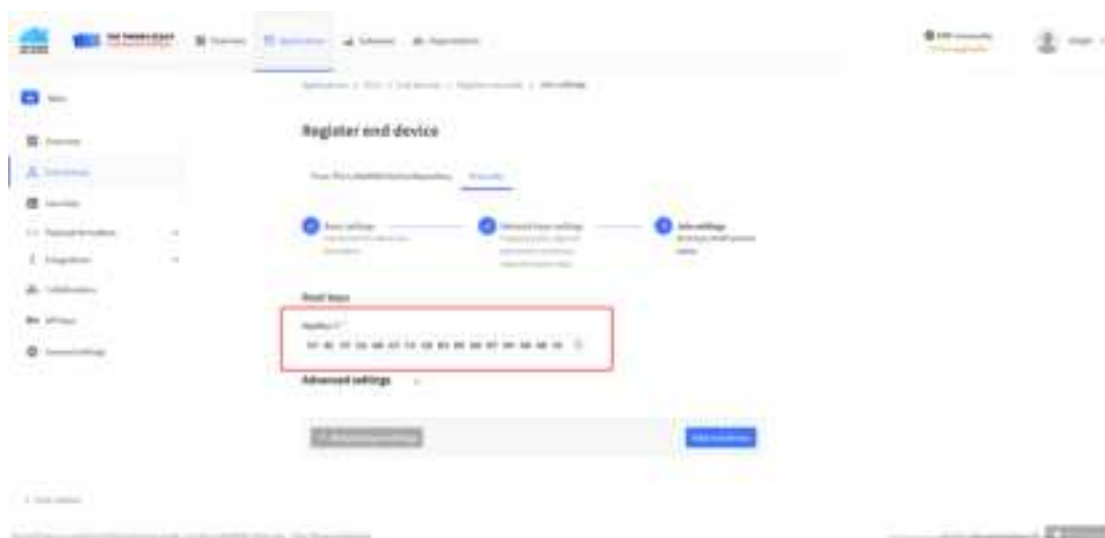
The LoRaWAN version for your device should be provided by the manufacturer in a datasheet as LoRaWAN version or LoRaWAN specification. The most commonly used LoRaWAN versions are v1.0.2 and v1.0.3.



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

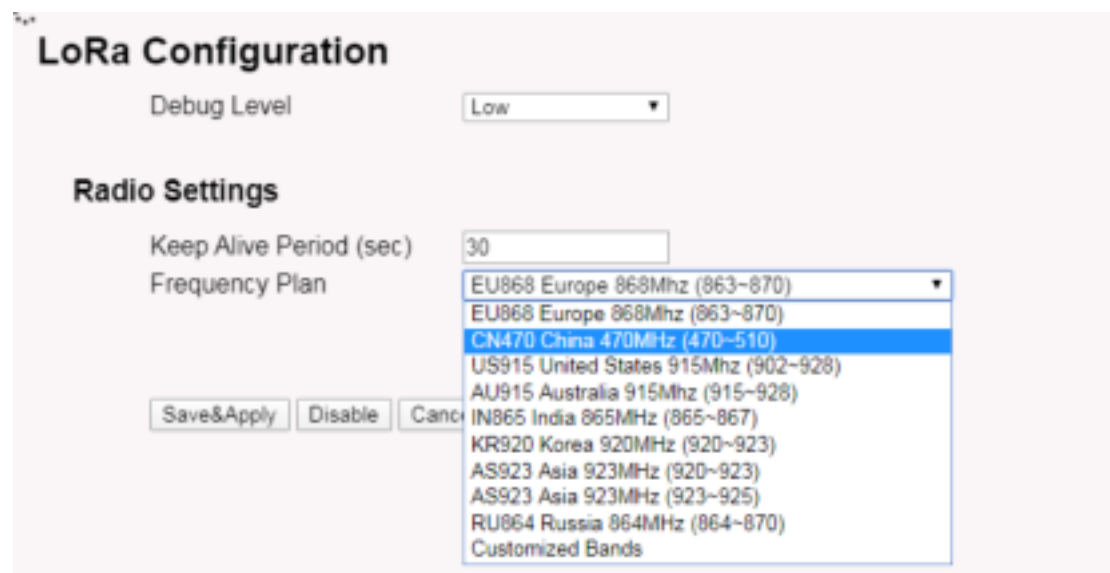
5.2.1 LoRa --> LoRa

This page shows the LoRa Radio Settings. There are a set of default frequency band according to LoRaWAN protocol, and user can customize 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](#)



Note *: See this instruction for how to customize frequency band:

<http://wiki.dragino.com/xwiki/bin/view/Main/How%20to%20customize%20LoRaWAN%20frequency%20band/>

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:

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



The screenshot shows a web interface titled "Decrypt ABP End Node Packets". At the top, there is a toggle switch for "Enable ABP Decryption" and a "SAVE" button. Below this is the "Add Key" section, which contains three input fields: "Dev ADDR" (with a hint "MISD 4 Bytes"), "APP Session Key" (with a hint "MISD 16 Bytes"), and "Network Session Key" (with a hint "MISD 16 Bytes"). An "ADD_KEY" button is located below these fields. The "Delete Key" section features a "Dev ADDR" dropdown menu and a "DELETE" button. At the bottom, the "ABP Keys:" section has a table header with columns for "Dev ADDR", "APP Session Key", and "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



Note

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

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

5.3.2 LoRaWAN --> Amazon AWS-IoT



Please see this instruction to know more detail and demo for how to connect to AWS-IoT LoRaWAN Core:

<http://wiki.dragino.com/xwiki/bin/view/Main/AWS%20IoT%20Core%20for%20LoRaWAN/>

5.3.3 LoRaWAN --> LORIIOT

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

Instruction: <http://wiki.dragino.com/xwiki/bin/view/Main/Notes%20for%20LORIIOT/>

LORIENT Client Configuration

LORIENT software not installed.

Server Address	<input type="text" value="Sydney - eu1.lorient.io"/>	Server Port	<input type="text" value="Default"/>
Client Certificate	<input type="text"/>	Client Key	<input type="text"/>
CA File	<input type="text"/>		

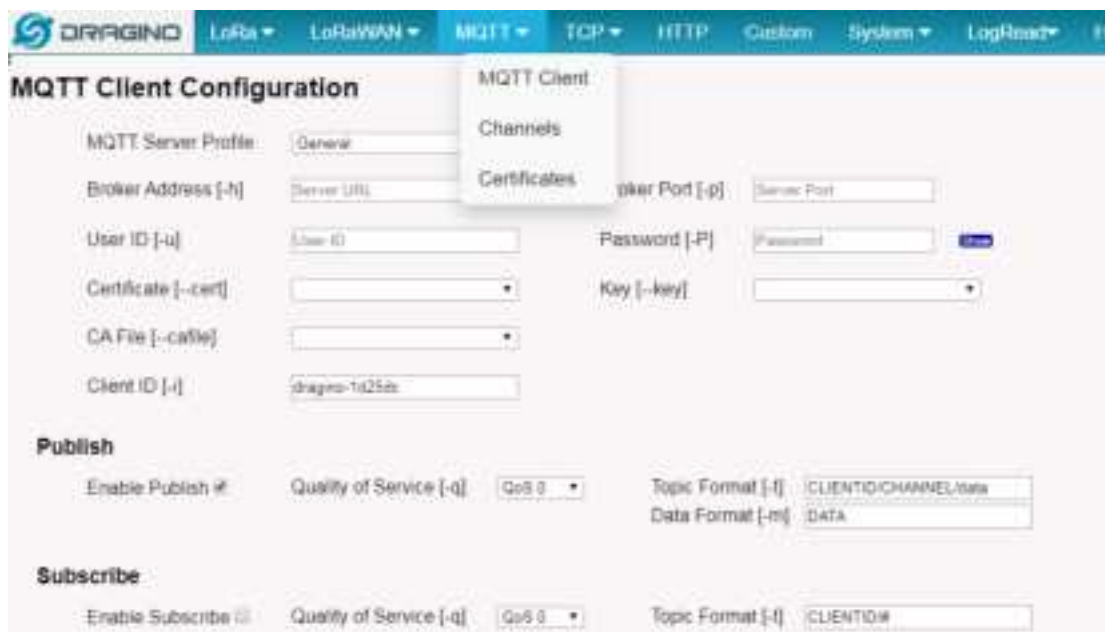
Device EUI: A540411D25DF

[Certificate Management](#)

5.4 MQTT Settings

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

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



MQTT Client Configuration

MQTT Server Profile:

Broker Address [-h]:

User ID [-u]:

Certificate [-cert]:

CA File [-cafile]:

Client ID [-i]:

Broker Port [-p]:
 Password [-P]:

Key [-key]:

Publish

Enable Publish ☐
 Quality of Service [-q]:
 Topic Format [-t]:
 Data Format [-m]:

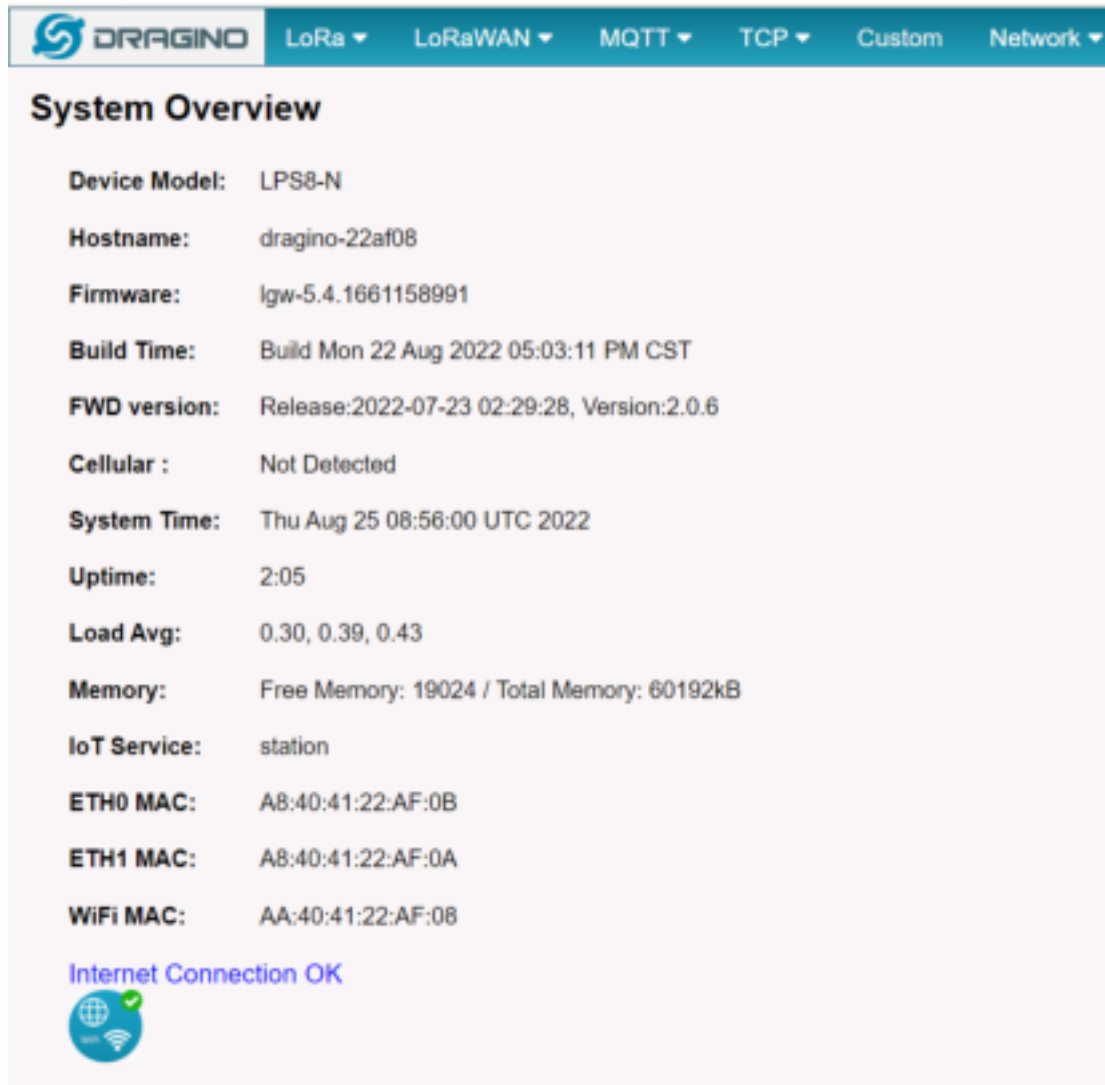
Subscribe

Enable Subscribe ☐
 Quality of Service [-q]:
 Topic Format [-t]:

5.5 System

5.5.1 System --> System Overview


Shows the system info:



The screenshot shows the Dragino web interface. At the top is a navigation bar with the Dragino logo and several menu items: LoRa, LoRaWAN, MQTT, TCP, Custom, and Network. Below this is the 'System Overview' section. It contains a list of system parameters and their values. At the bottom of this section, it indicates 'Internet Connection OK' with a green checkmark icon.

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

Internet Connection OK



5.5.2 System --> General (login settings)



System Password:

There are two logins for LPS8N: **root /dragino** or **admin /dragino**. Both root and admin have the same right for WEB access. But root user has also the right to access via SSH to Linux system. admin only able to access WEB interface.

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

Timezone:

Set device timezone.

Port forwarding:

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

5.5.3 System --> Network



LAN Settings:

When the 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

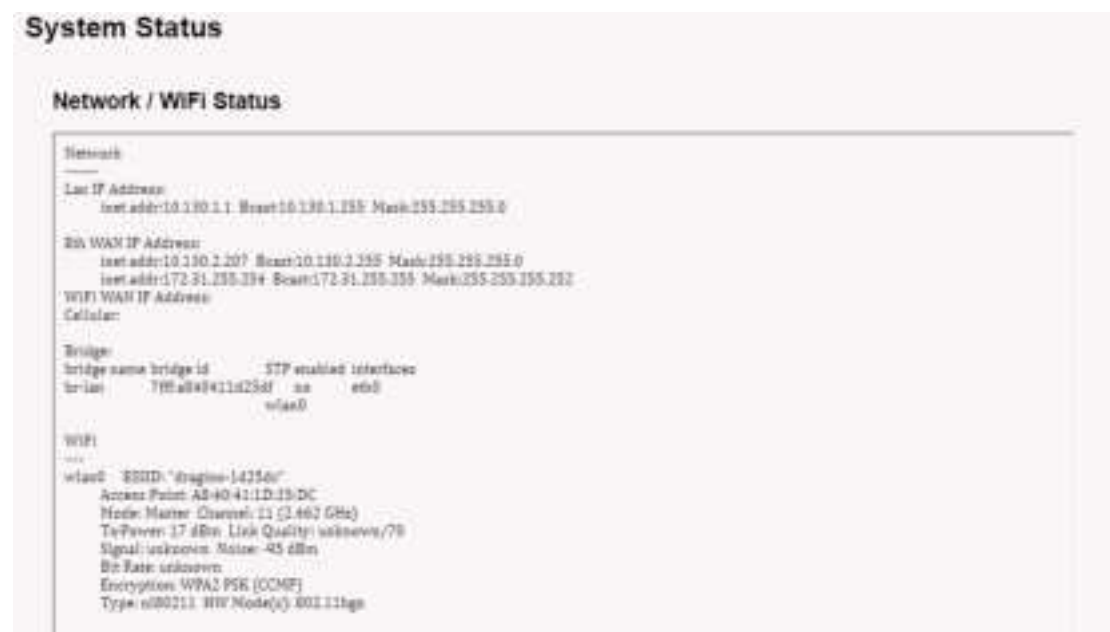
5.5.4 System --> WiFi

LPS8N WiFi Settings.



The screenshot shows the 'WIFI' configuration page. It has three main sections: 'Radio Settings', 'WiFi Access Point Settings', and 'WiFi WAN Client Settings'.
Radio Settings: Includes 'Channel (1-11)' and 'Tx Power (0-18) dBm'.
WiFi Access Point Settings: Includes 'Enable WiFi Access Point' (checkbox), 'WiFi Name SSID' (text field), 'Password (8-32 char)' (password field), and 'Encryption' (dropdown menu).
WiFi WAN Client Settings: Includes 'Enable WiFi WAN Client' (checkbox), 'Host WiFi SSID' (text field), 'Password' (password field), 'WiFi Server' (text field), and 'Encryption' (dropdown menu).
At the bottom are 'Save/Apply', 'Cancel', and 'Reset' buttons.

5.5.5 System --> Network Status



The screenshot shows the 'System Status' page with a 'Network / WiFi Status' section. It displays the following information:
Network:
 - LAN IP Address: 10.130.1.1, Subnet: 10.130.1.255, Mask: 255.255.255.0
 - WAN IP Address: 10.130.2.207, Subnet: 10.130.2.255, Mask: 255.255.255.0
 - WAN IP Address: 172.31.255.33, Subnet: 172.31.255.255, Mask: 255.255.255.252
 - WiFi WAN IP Address: Cellular
Bridge:
 - bridge name: bridge id: STP enabled interfaces
 - br-lan: 7f6a8a9411d23d / ss eth0
 - wlan0
WiFi:
 - wlan0: SSID: "dragino-14256"
 - Access Point: AS-40-41:1D:19:DC
 - Mode: Master Channel: 11 (2.462 GHz)
 - Tx Power: 17 dBm Link Quality: unknown/78
 - Signal: unknown Noise: -85 dBm
 - Bit Rate: unknown
 - Encryption: WPA2 PSK (CCMP)
 - Type: n80211 HW Mode(s): 80211hgn

5.5.6 System --> Remote Mgmt & Auto Update

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

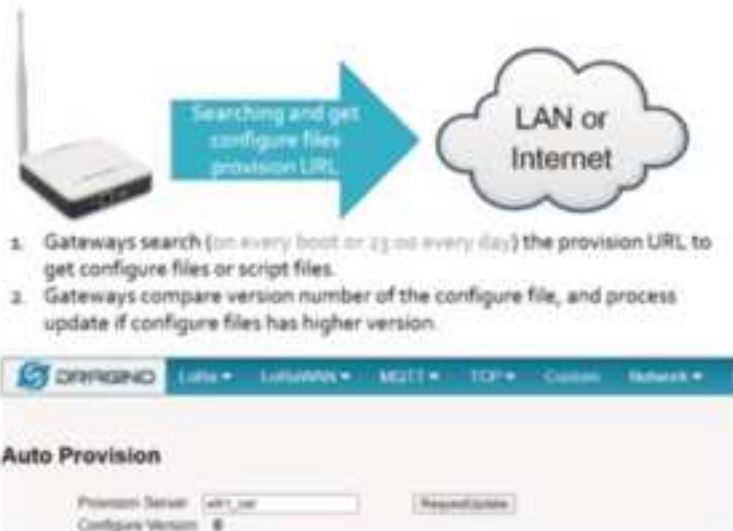
Case 1: Batch configure gateways before deploy



Case 2: Maintain gateway configure from cloud



How it works



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

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

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



R-SSH Host Settings

Login ID:

Host Address: Host Port:

Connect at Startup: ☒ GWD: a84041991d5e

Connection Status: **Not connected to RSSH Host**

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

Generate New Keys

Current Key ID: **No keyfile present**

Caution: Generating new keys will break any existing server connections!

[Download Public Key](#)

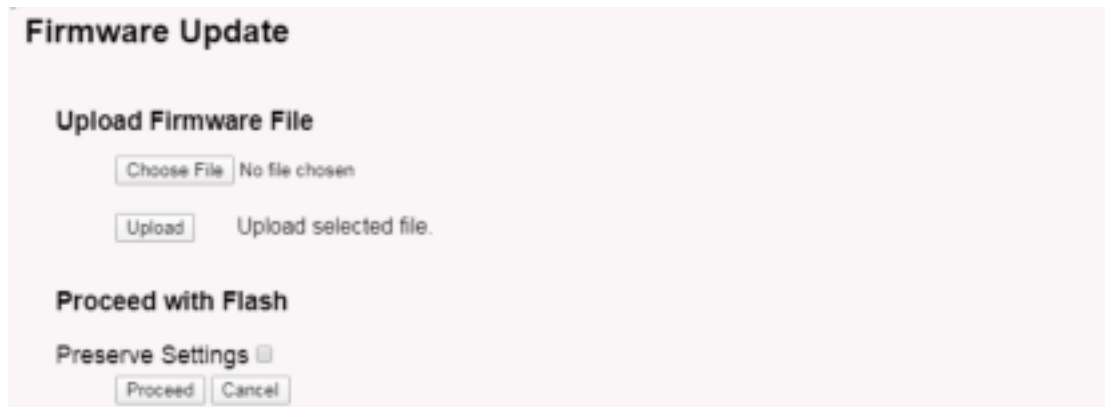
5.5.7 System --> Firmware Upgrade

We keep improving the LPS8N 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 **dragino-lgw-xxxxx-squashfs-sysupgrade.bin** is the upgrade Image. as below.

Web → System → Firmware Upgrade

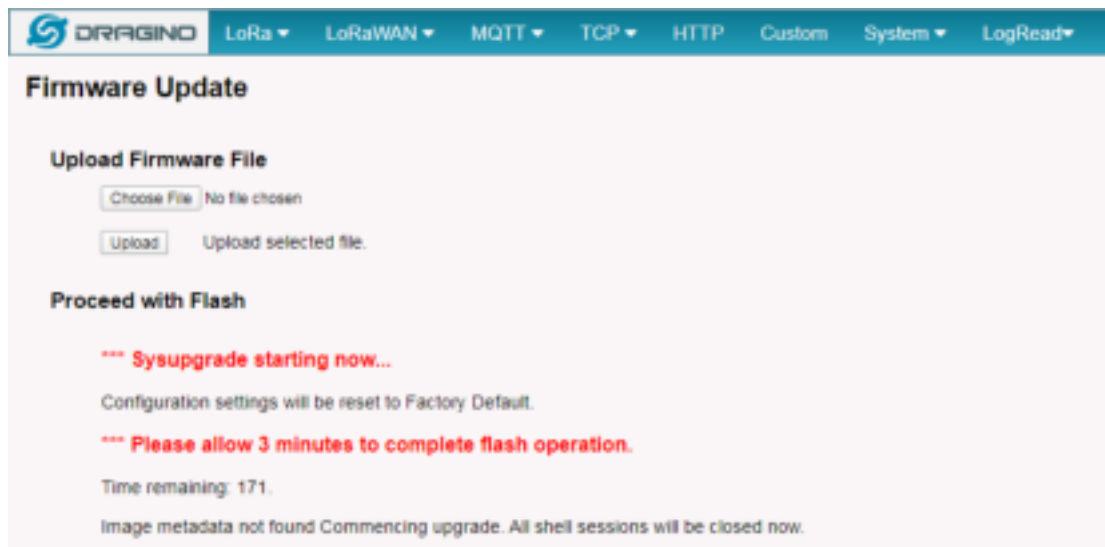


The screenshot shows a web interface titled "Firmware Update". It contains two main sections. The first section, "Upload Firmware File", has a "Choose File" button next to the text "No file chosen", and an "Upload" button next to the text "Upload selected file.". The second section, "Proceed with Flash", has a "Preserve Settings" checkbox which is currently checked, and "Proceed" and "Cancel" buttons below it.

Select the required image and click **Upload**. The image will be uploaded to the device, and then click **Process** 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.



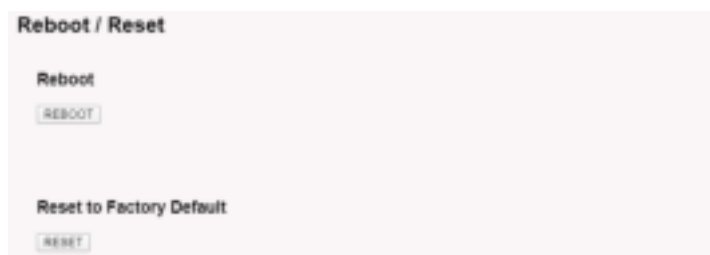
Note *: User can also upgrade firmware via Linux console

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.

5.5.8 System --> Reboot/Reset



5.6.1 LogRead --> System Log

Show the system log



6 More features

6.1 Packet Filtering

Drop unwanted packets:

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

6.2 Remote Access

Remote Access Devices for management:

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

6.3 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/>

6.4 How to set data to MQTT broker

Only support ABP LoRaWAN End Node

Instruction:

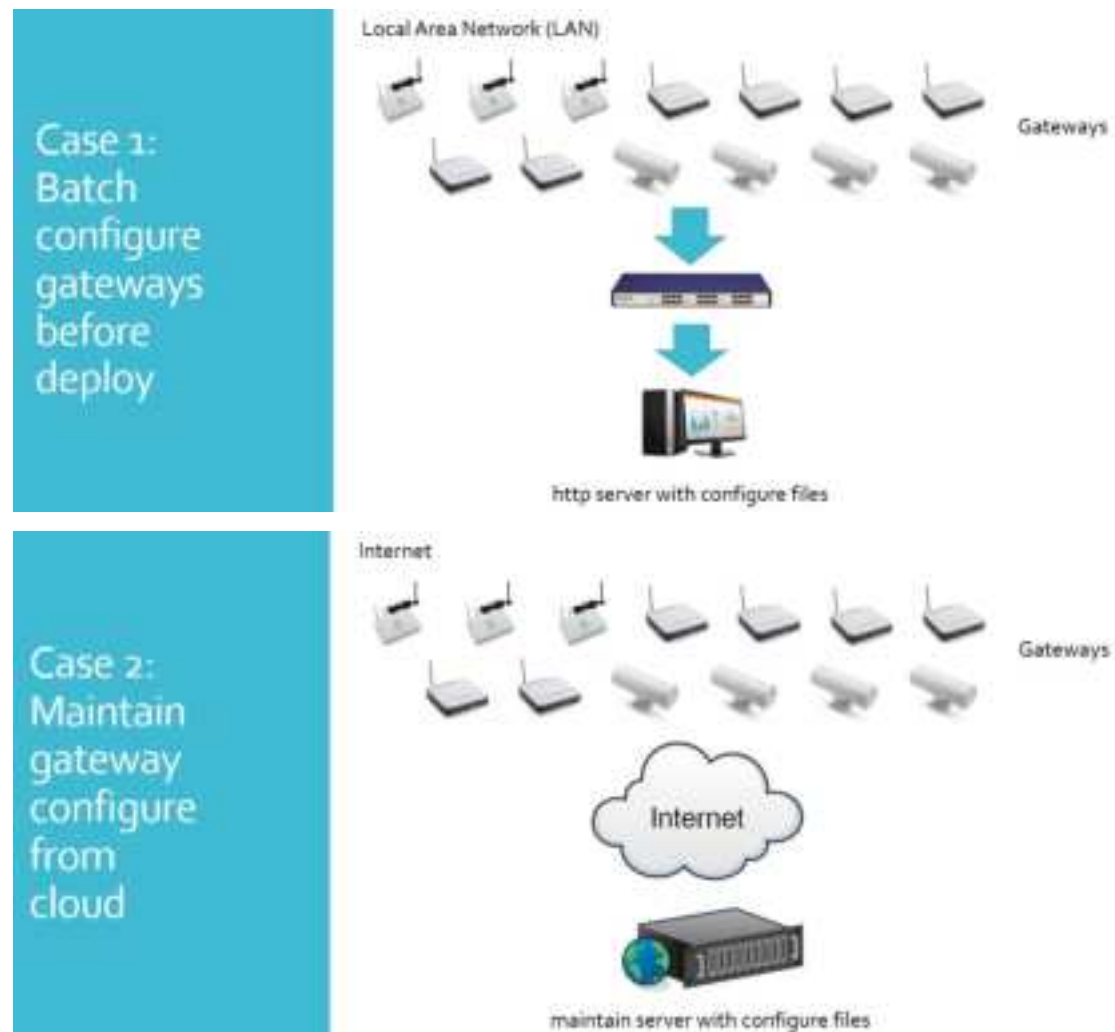
<http://wiki.dragino.com/xwiki/bin/view/Main/MQTT%20Forward%20Instruction/>

6.5 More instructions

<http://wiki.dragino.com/xwiki/bin/view/Main/>(LoRaWAN Gateway)

6.6 Auto-Provision

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





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

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 or 2222 (SSH port in WAN interface has been change to 2222 since firmware 5.3.xx, for security reason)

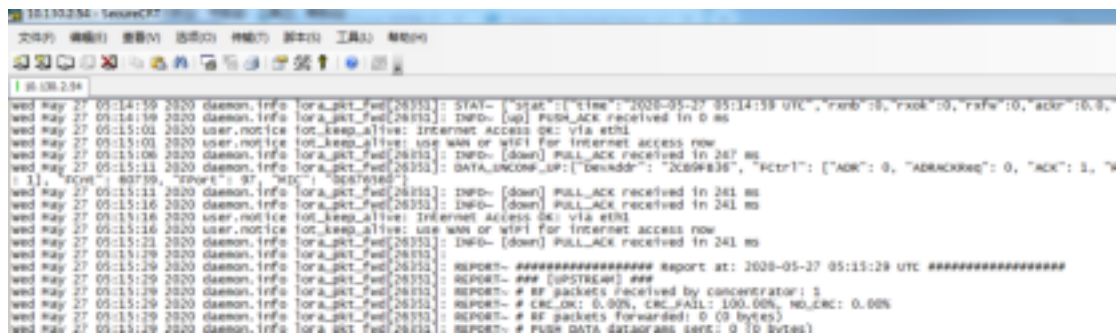
User Name: **root**

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:



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.

LPS8 LoRaWAN Gateway User Manual

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://wiki.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 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.

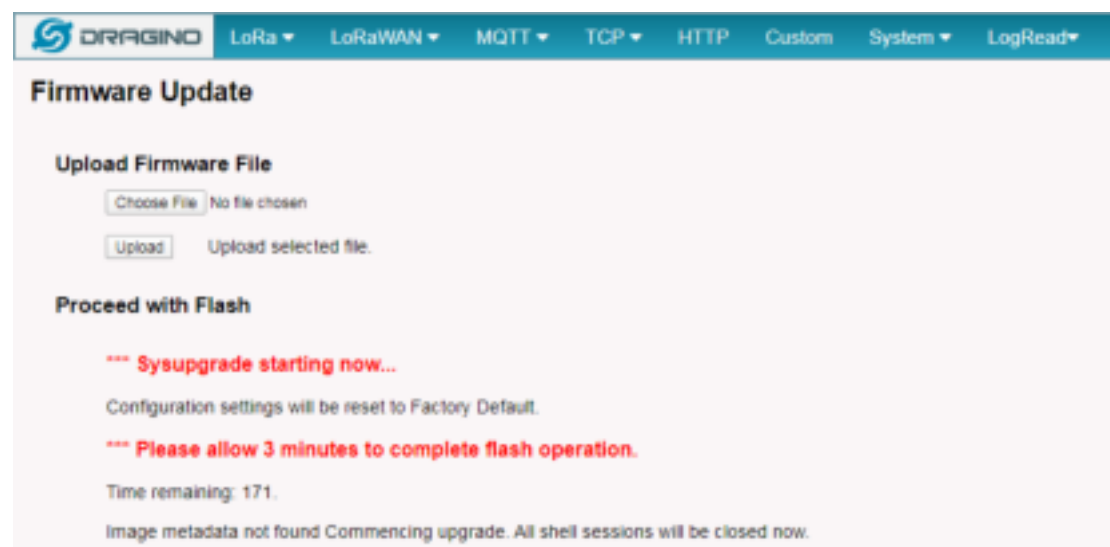
8.1 Upgrade via Web UI

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 FAQ

9.1 How can I configure for a customized frequency band?

See below link for how to customize frequency band:

<http://wiki.dragino.com/xwiki/bin/view/Main/How%20to%20customize%20LoRaWAN%20frequency%20band/>

9.2 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

9.3 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 Trouble Shooting

10.1 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.

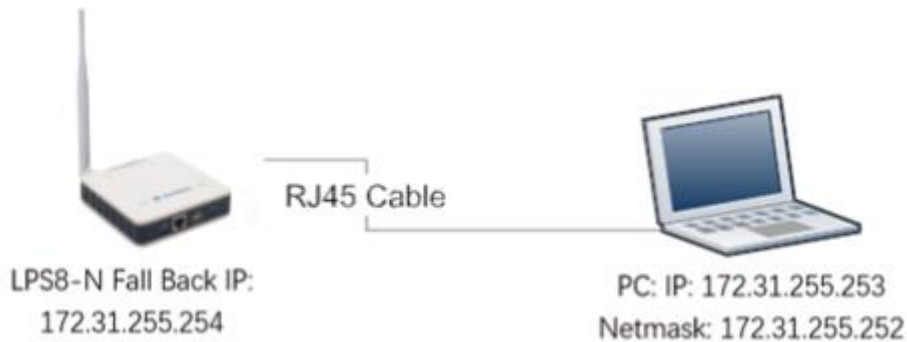
```
Opkg install kmod-dragino2-si3217x_3.10.49+0.2-1_ar71xx.ipk --force-depends
```

10.2 How to recover the LPS8N if the firmware crashes

Please follow this instruction to recover your gateway:

<http://wiki.dragino.com/xwiki/bin/view/Main/How%20to%20Recover%20Gateway%20if%20can%27t%20access%20it/>

10.3 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 LG01'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.

10.4 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 Order Info

PART: LPS8N-XXX:

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

12 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

13 Support

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

support@dragino.com

14 FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two

conditions: (1) this device may not cause harmful interference, and (2) this device must accept

any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance

could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment

generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to

correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body:

Use only the supplied antenna.