



HP0A Outdoor LoRaWAN Gateway User Manual

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Table of Contents

1	Introduction	5
1.1	<i>What is the HPOA</i>	5
1.2	<i>Specifications</i>	6
1.3	<i>Features</i>	7
1.4	<i>Hardware System Structure</i>	8
1.5	<i>HPOA Applications</i>	9
1.6	<i>LED Indicators</i>	9
1.7	<i>WiFi Direction</i>	10
2	Access and Configure HPOA	10
2.1	<i>Find IP address of HPOA</i>	10
2.1.1	Connect via WiFi	10
2.1.2	Connect via Ethernet with DHCP IP from router	11
2.1.3	Connect via WiFi with DHCP IP from router	11
2.1.4	Connect via Ethernet with fall back ip	11
2.2	<i>Access Configure Web UI</i>	12
3	Typical Network Setup	13
3.1	<i>Overview</i>	13
3.2	<i>Use WAN port to access Internet</i>	13
3.3	<i>Access the Internet as a WiFi Client</i>	14
3.4	<i>Access the Internet via Cellular</i>	14
3.5	<i>Check Internet connection</i>	15
4	Example: Configure as a LoRaWAN gateway	17
4.1	<i>Create a gateway in TTN Server</i>	18
4.2	<i>Configure HPOA to connect to TTN</i>	20
4.3	<i>Configure frequency</i>	22
4.4	<i>Add a LoRaWAN End Device</i>	23
5	Web Configure Pages	26
5.1	<i>Home</i>	26
5.2	<i>LoRa Settings</i>	27

5.2.1	LoRa --> LoRa	27
5.2.2	LoRa --> ABP Decryption	28
5.3	<i>LoRaWAN Settings</i>	29
5.3.1	LoRaWAN --> LoRaWAN	29
5.3.2	LoRaWAN --> Amazon AWS-IoT	29
5.3.3	LoRaWAN --> LORIoT	30
5.4	<i>MQTT Settings</i>	31
5.5	<i>System</i>	31
5.5.1	System --> System Overview.....	31
5.5.2	System --> General (login settings)	32
5.5.3	System --> Network	33
5.5.4	System --> WiFi	34
5.5.5	System --> Cellular	34
5.5.6	System --> Network Status.....	35
5.5.7	System --> Remote Mgnt & Auto Provision	36
5.5.8	System --> Firmware Upgrade	37
5.5.9	System --> Reboot/Reset	39
5.5.10	System --> Package Maintain	40
5.6	<i>LogRead</i>	41
5.6.1	LogRead --> LoRa Log	41
5.6.2	LogRead --> System Log	41
6	More features	42
6.1	<i>More instructions</i>	42
7	Linux System	43
7.1	<i>SSH Access for Linux console</i>	43
7.2	<i>Valid Commands related to LoRa:</i>	43
7.2.1	LoRa pkt fwd	43
7.2.2	Helium gateway rs	43
7.2.3	Check the fwd and helium gateway rs log	44
7.2.4	Check draginofwd configuration file	44
7.2.5	Test ECC Chip	44
7.3	<i>Edit and Transfer files</i>	45
7.4	<i>The use of Linux system</i>	45
8	Upgrade Linux Firmware	45
9	FAQ	46
9.1	<i>How can I configure for a customized frequency band?</i>	46

9.2	Can I connect HPOA to LORIoT?.....	46
9.3	Can I make my own firmware for the gateway, where can I find the source code?	46
9.4	Can I use 868Mhz version for 915Mhz bands?.....	46
10	Trouble Shooting.....	47
10.1	How to recover the HPOA if the firmware crashes.....	47
10.2	I configured HPOA for WiFi access and lost its IP. What to do now?.....	48
11	Order Info	49
12	Packing Info	49
13	Support.....	49

1 Introduction

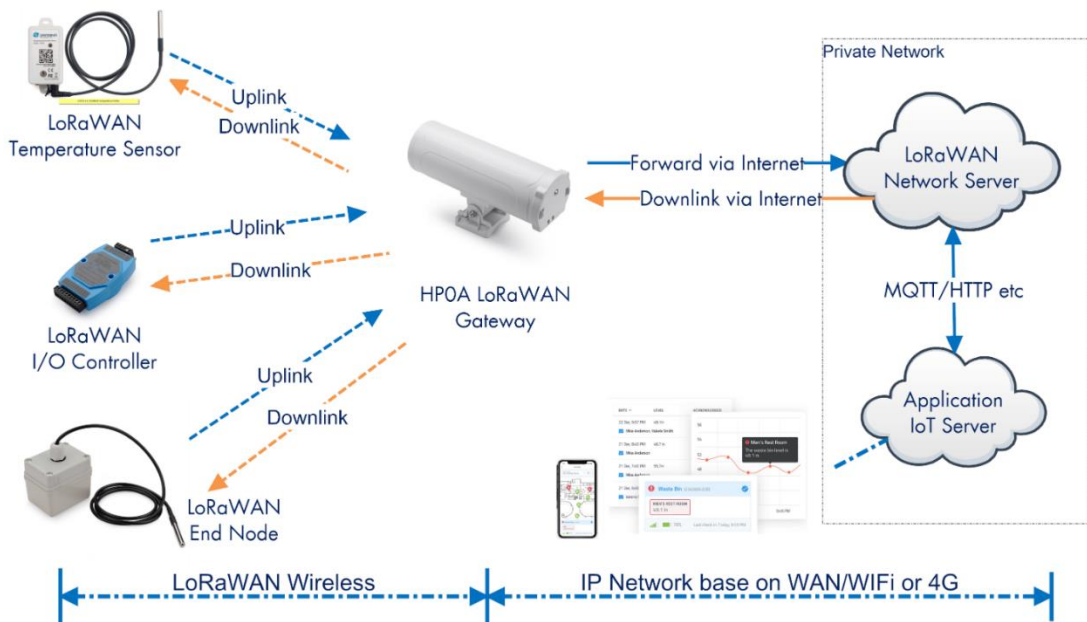
1.1 What is the HPOA

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

The HPOA uses Semtech Packet Forwarder and fully compatible with LoRaWAN protocol. It includes a **multi-channel LoRaWAN concentrator**, which provide 10 programmable parallel demodulation paths.

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

HPOA In a LoRaWAN IoT Network:



1.2 Specifications

Hardware System:

- Quad-core Cortex™-A7 – 1.2GHz
- RAM: 512MB
- eMMC: 4GB

Interface:

- 10M/100M RJ45 Ports x 1
- WiFi : 802.11 b/g/n
- 8-channels LoRaWAN Concentrator
- Power Input: 12 ~ 24 V DC, 1 A
- IEEE 802.3 af compliant PoE port (DC 37 ~ 57 v)
- USB 2.0 host connector x 1
- Mini-PCI E connector x 1

Cellular 4G LTE (optional):

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

Power over Ethernet:

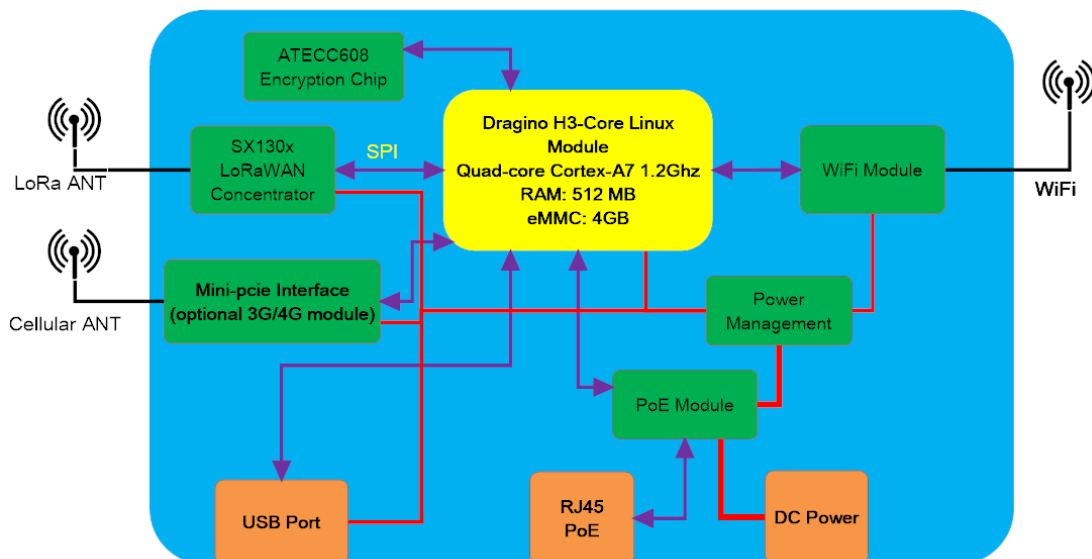
- IEEE 802.3af compliant.
- Support wide input voltage range 37Vdc to 57Vdc.
- Thermal cut off.
- Short circuit protection.
- Over current protection
- Isolation level 4 KVrms.
- Enhanced surge protection

1.3 Features

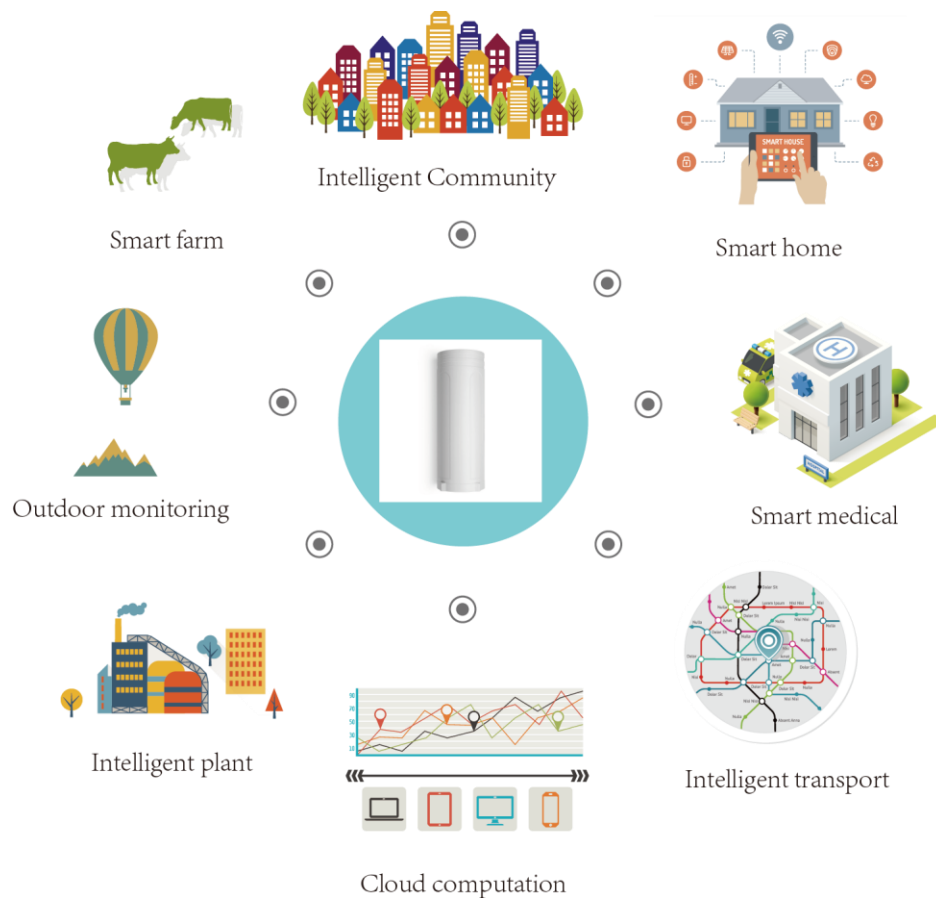
- ✓ Open Source Armbian system
- ✓ Managed by Web GUI, SSH via LAN or WiFi
- ✓ Emulates 49x LoRa demodulators
- ✓ Outdoor LoRaWAN Gateway
- ✓ 10 programmable parallel demodulation paths
- ✓ Far seeing LED indicator
- ✓ Built-in GPS module for location & timing
- ✓ External fiber glass antenna
- ✓ 802.3af PoE
- ✓ IP65
- ✓ Lightning Protection
- ✓ Power Consumption:12v 300 ~500mA

1.4 Hardware System Structure

HP0A LoRaWAN Gateway System Overview:



1.5 HPOA Applications



1.6 LED Indicators



The feature describe is not yet finished. TBD finish in July.

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

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

1.7 WiFi Direction

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



2 Access and Configure HPOA

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

2.1 Find IP address of HPOA

2.1.1 Connect via WiFi



The feature describe is not yet finished. TBD finish in July.

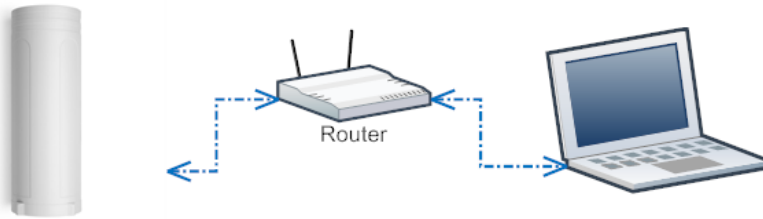
At the first boot of HPOA, it will auto generate a WiFi network called ~~dragino-xxxxx~~ with password:

dragino+dragino



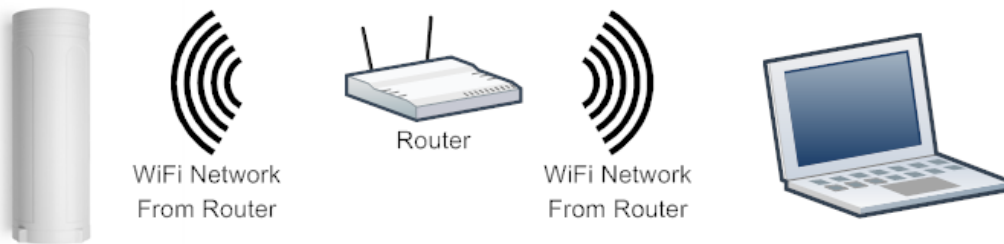
User can use a PC to connect to this WiFi network. The PC will get an IP address 10.130.1.xxx and the HPOA has the default IP [10.130.1.1](#)

2.1.2 Connect via Ethernet with DHCP IP from router



Alternatively, connect the HPOA Ethernet port to your router and HPOA 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 HPOA. You can use this IP to connect the WEB UI or SSH access of HPOA.

2.1.3 Connect via WiFi with DHCP IP from router



The feature describe is not yet finished. TBD finish in July.

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

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 HPOA ip address (depends on your connect method)

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

or

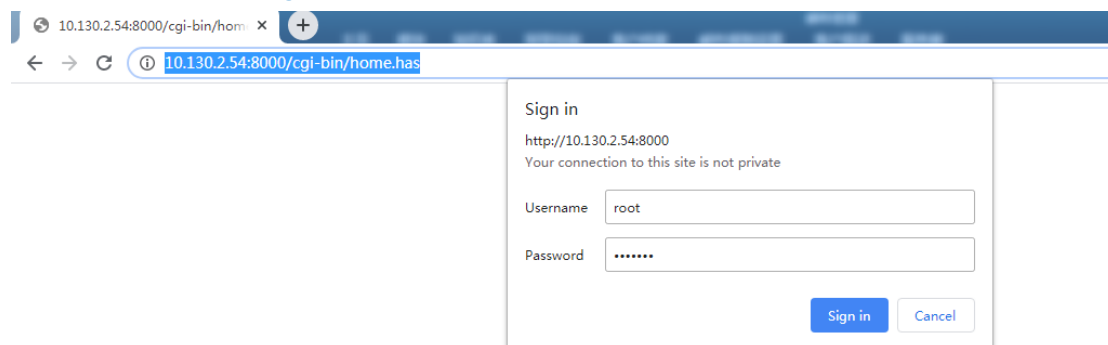
http://IP_ADDRESS or http://IP_ADDRESS:8000

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

The account details for Web Login are:

User Name: root

Password: dragino



3 Typical Network Setup

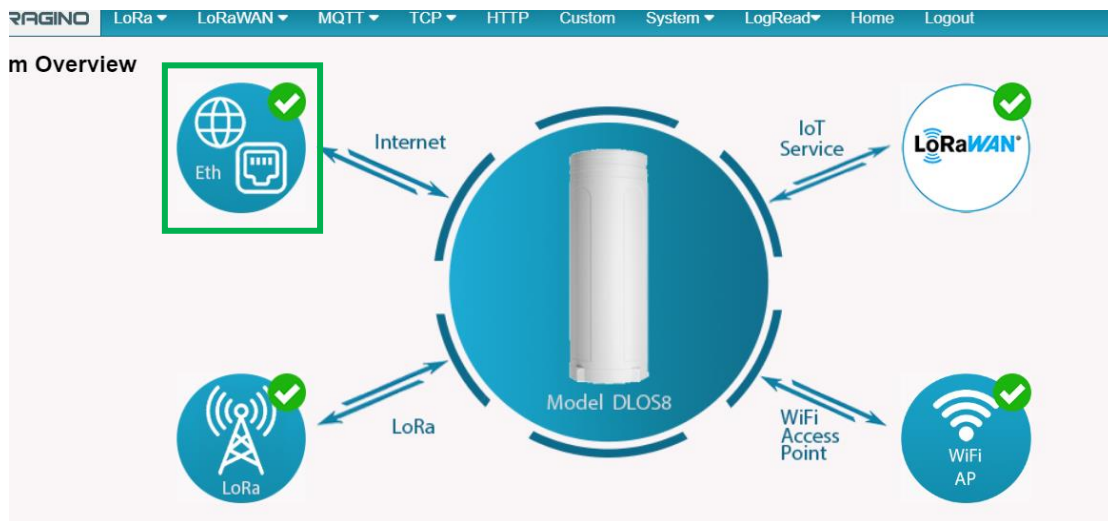
3.1 Overview

The HPOA supports flexible network set up for different environments. This section describes the typical network topology. The network set up includes:

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

3.2 Use WAN port to access Internet

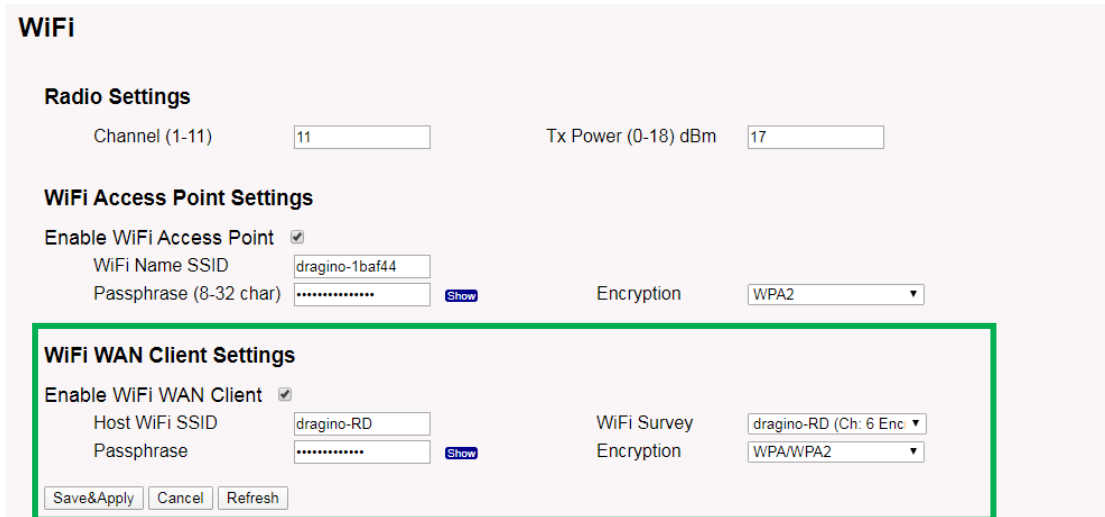
By default, the HPOA is set to use the WAN port to connect to an upstream network. When you connect the HPOA's WAN port to an upstream router, HPOA will get an IP address from the router and have Internet access via the upstream router. The network status can be checked in the [home page](#):



3.3 Access the Internet as a WiFi Client.

In the WiFi Client Mode, HP0A 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

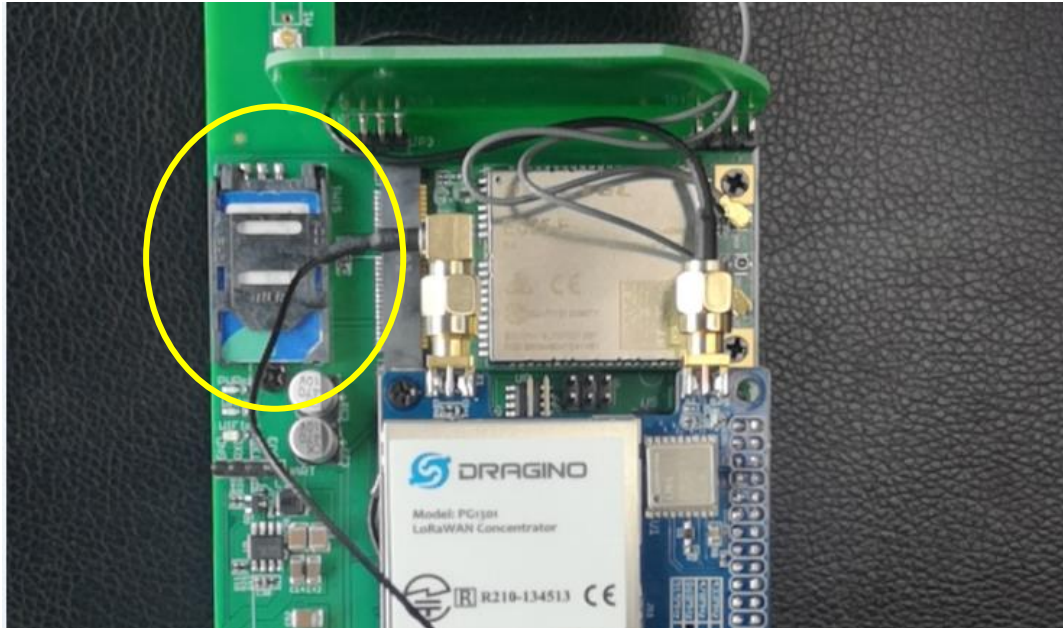
In the WiFi Survey Choose the WiFi AP, and input the Passphrase then click Save & Apply to connect.

3.4 Access the Internet via Cellular

If the HP0A support 3G/4G Cellular modem option, user can use it as main internet connection or back up.

First, release the four screws of HP0A, pull out PCB and install SIM card as below:





The set up page is [System](#) → [Cellular](#)

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

Cellular Settings

Enable Cellular WAN

Use Cellular as Backup WAN

APN

Service

Dial Number




Pincode

Username

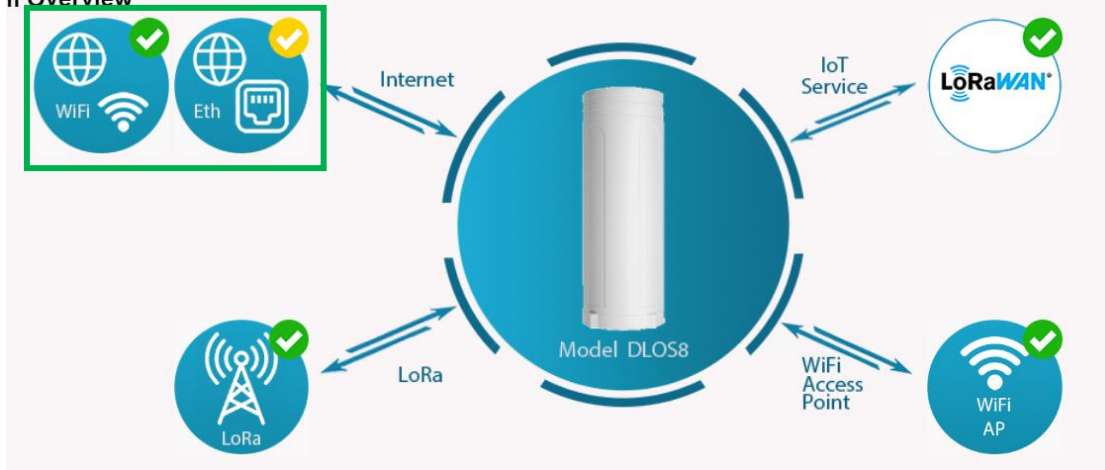
Password [Show](#)

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.

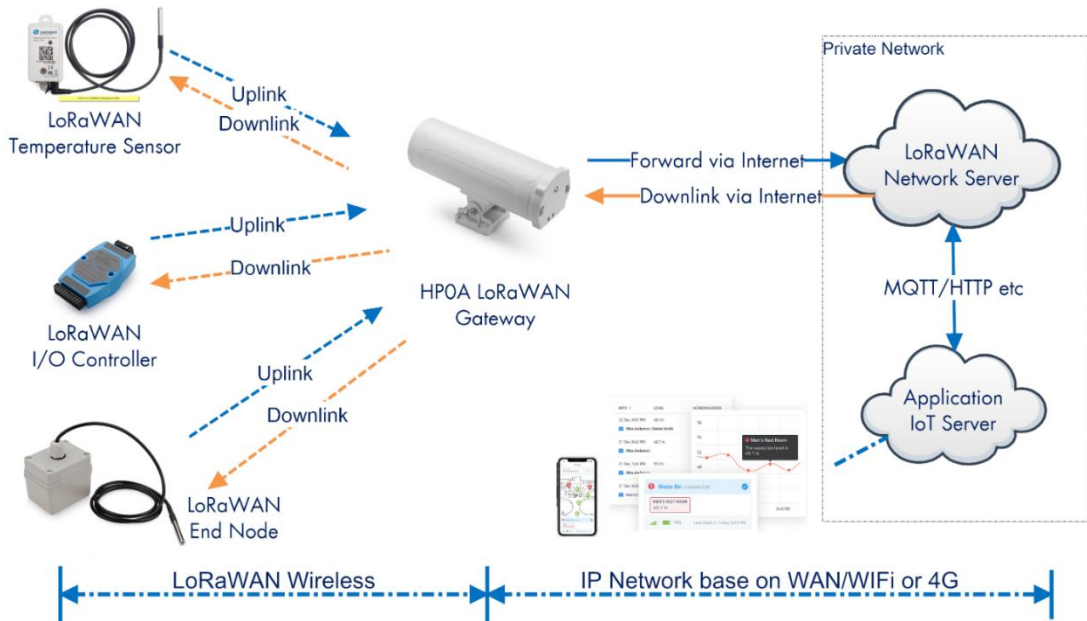
n Overview



4 Example: Configure as a LoRaWAN gateway

HPOA 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.

HPOA In a LoRaWAN IoT Network:



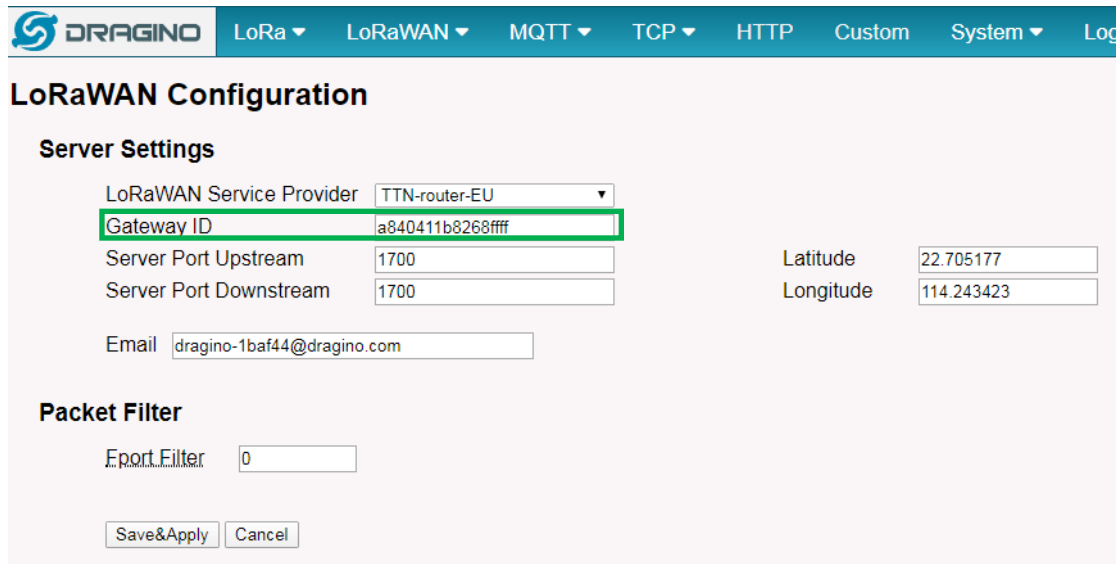
This chapter describes how to use the HPOA to work with

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

4.1 Create a gateway in TTN Server

Step 1: Get a Unique gateway ID.

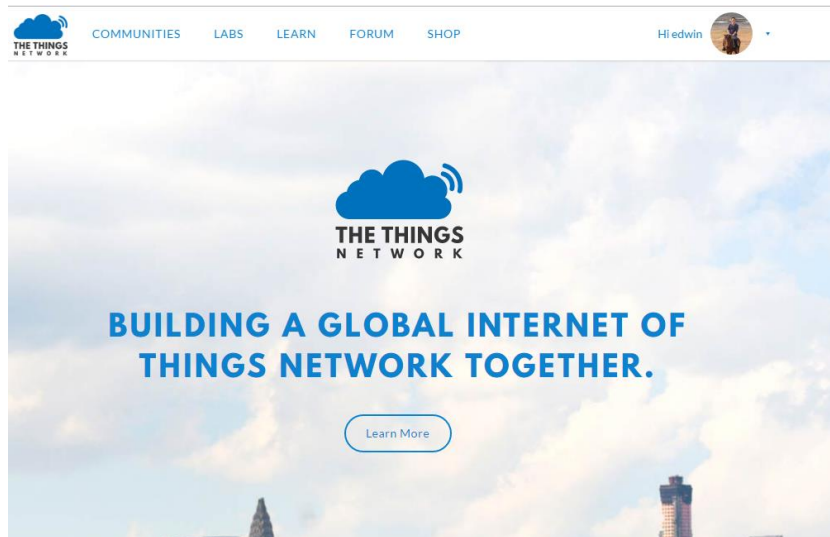
Every HPOA has a unique gateway id. The ID can be found at LoRaWAN page:



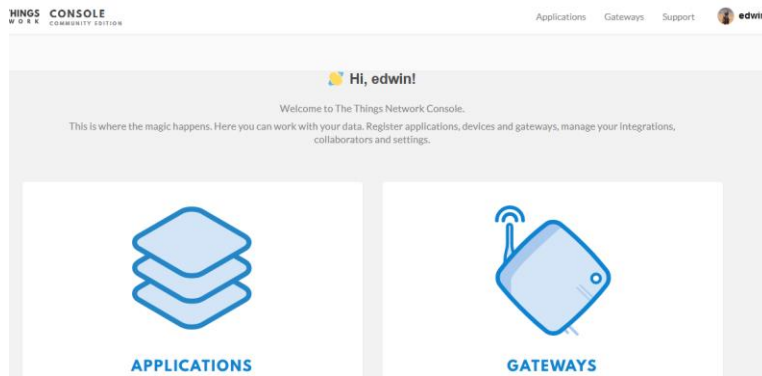
The screenshot shows the 'LoRaWAN Configuration' page. Under 'Server Settings', the 'Gateway ID' field is highlighted with a green border and contains the value 'a840411b8268ffff'. Other fields include 'LoRaWAN Service Provider' (TTN-router-EU), 'Server Port Upstream' (1700), 'Server Port Downstream' (1700), 'Latitude' (22.705177), 'Longitude' (114.243423), and 'Email' (dragino-1baf44@dragino.com). Under 'Packet Filter', the 'Port Filter' field contains the value '0'. At the bottom, there are 'Save&Apply' and 'Cancel' buttons.

The example gateway id is: **a840411b8268ffff**

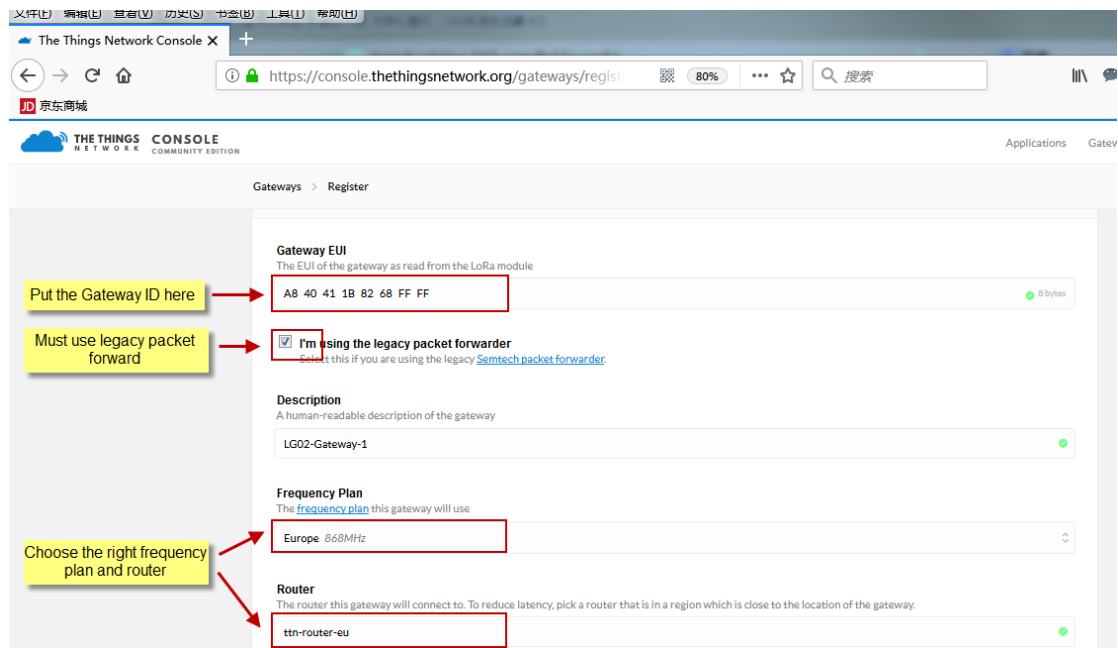
Step 2: Sign up a user account in TTN server



Step 3: Create a Gateway

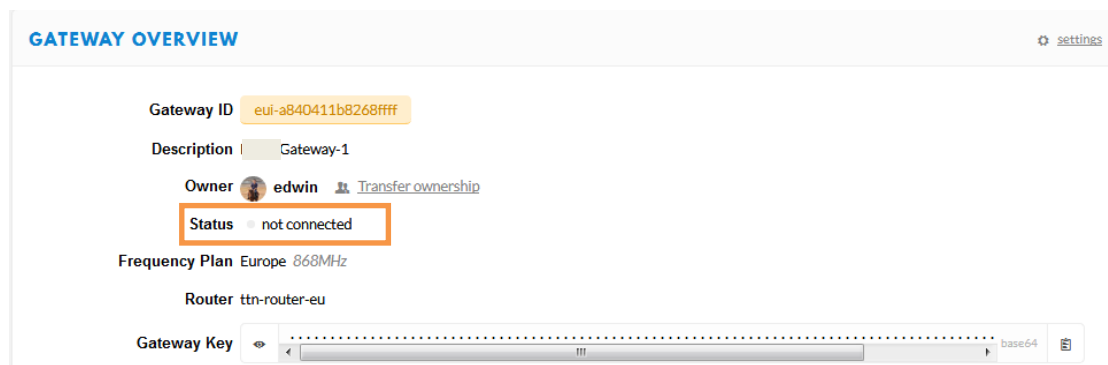


Click on the Gateways icon to open the page below:



Notice: The TTN router should match the Frequency Plan you choose, otherwise you will have problem for End Node to join the network. If you don't know which router you need to select, please check: https://www.thethingsnetwork.org/docs/gateways/packet-forwarder/semtech-udp.html#connect-a-gateway_server-addresses

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



4.2 Configure HPOA to connect to TTN

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

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

LoRaWAN Configuration

Server Settings

LoRaWAN Service Provider	TTN-router-EU		
Gateway ID	a840411b8268ffff	Latitude	22.705177
Server Port Upstream	1700	Longitude	114.243423
Server Port Downstream	1700		

Email: dragino-1baf44@dragino.com

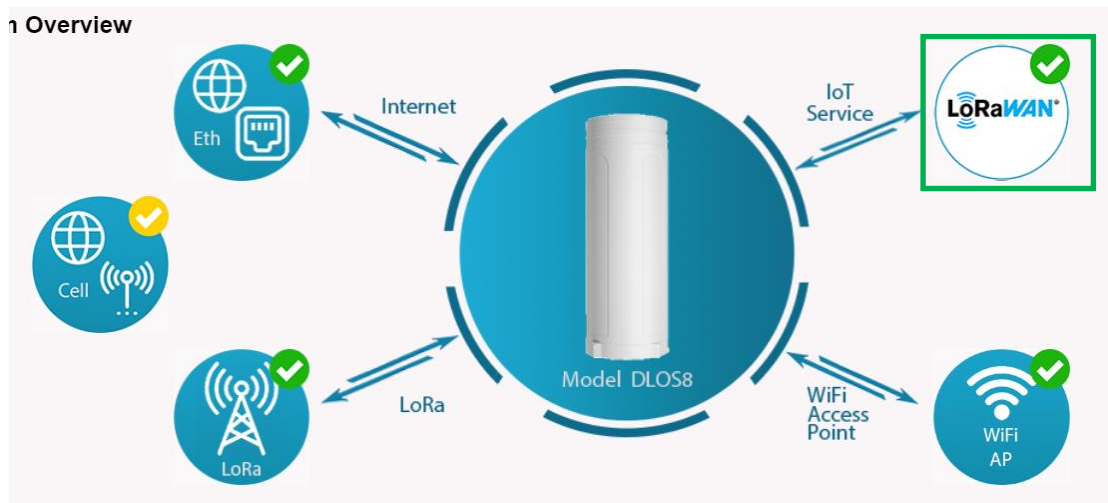
Packet Filter

Eport Filter: 0

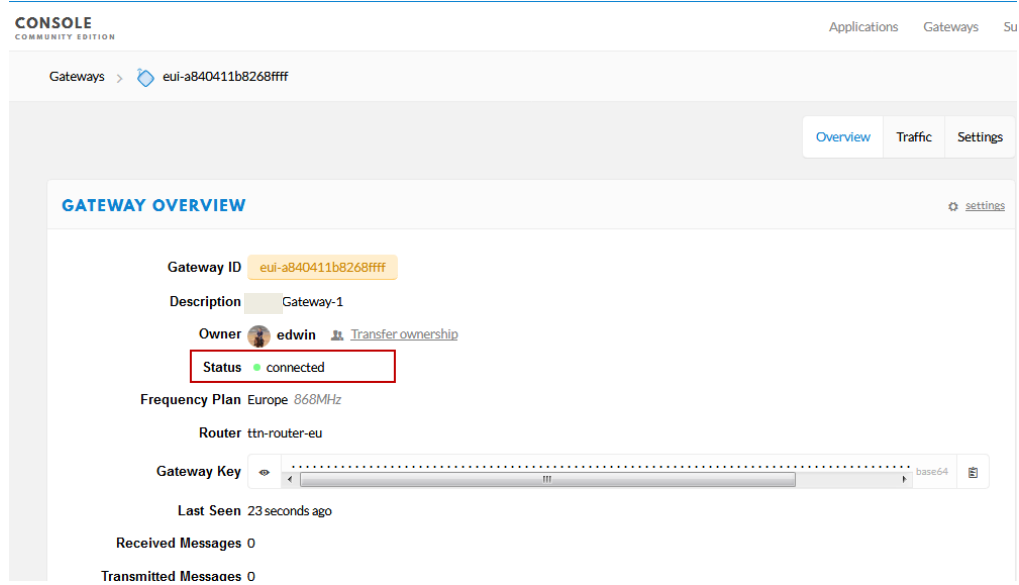
Save&Apply Cancel

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

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



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

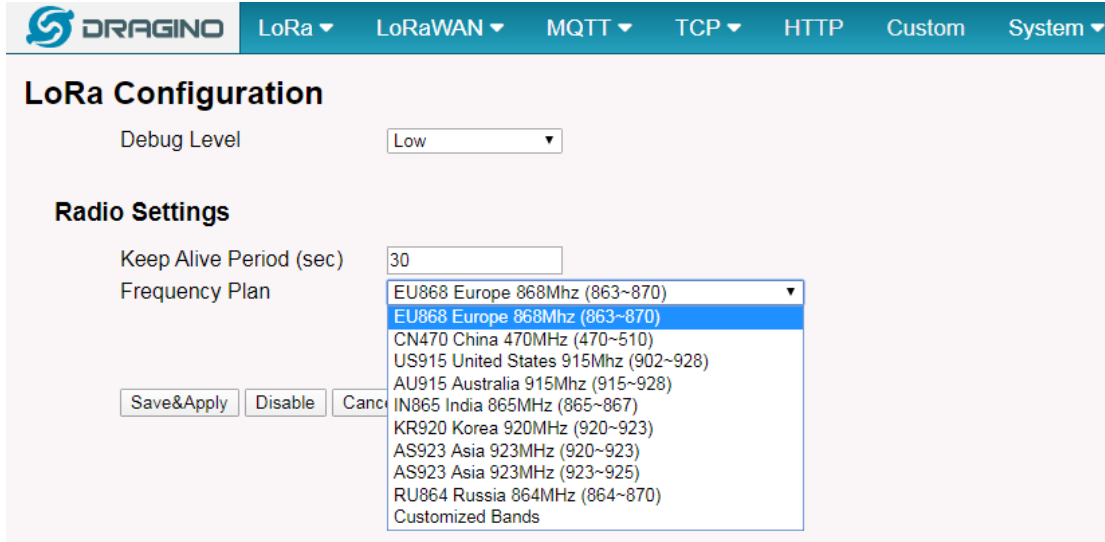


The screenshot shows the 'CONSOLE COMMUNITY EDITION' interface. The breadcrumb path is 'Gateways > eui-a840411b8268ffff'. The page title is 'GATEWAY OVERVIEW' with a 'settings' link. The gateway details are as follows:

- Gateway ID:** eui-a840411b8268ffff
- Description:** Gateway-1
- Owner:** edwin (with a 'Transfer ownership' link)
- Status:** connected (highlighted with a red box)
- Frequency Plan:** Europe 868MHz
- Router:** ttn-router-eu
- Gateway Key:** [redacted] base64 [copy icon]
- Last Seen:** 23 seconds ago
- Received Messages:** 0
- Transmitted Messages:** 0

4.3 Configure frequency

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



LoRa Configuration

Debug Level:

Radio Settings

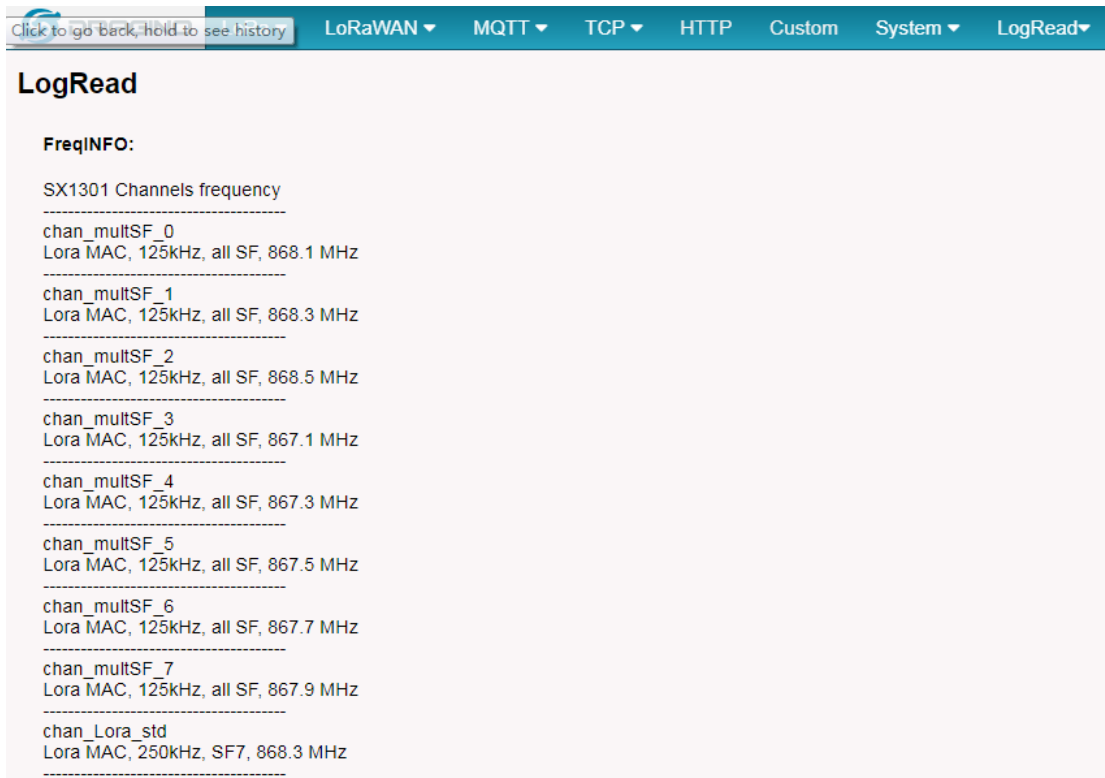
Keep Alive Period (sec):

Frequency Plan:

Save&Apply | Disable | Cancel

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

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 with the OTAA keys from the example LT-33222-L IO Controller device.

Three codes are required to define the device in TTN:

- ✓ DEV EUI - Unique ID code for a particular device.
- ✓ APP EUI - ID code for an Application defined in TTN.
- ✓ 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.

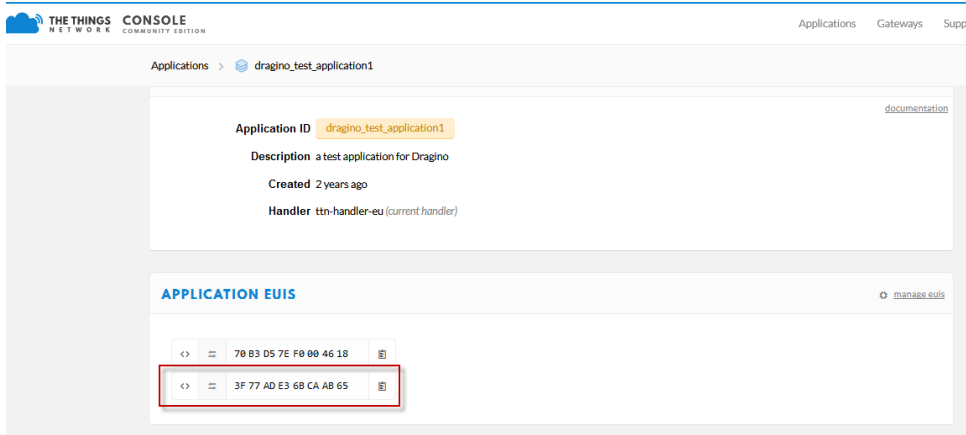


Note: You may be able to change these codes in a device by using a configuration facility on the device e.g. the LT-22222 uses a serial port access and a series of AT commands. Changing the codes may be necessary in the case where you have to use codes assigned by a LoRa WAN server.

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

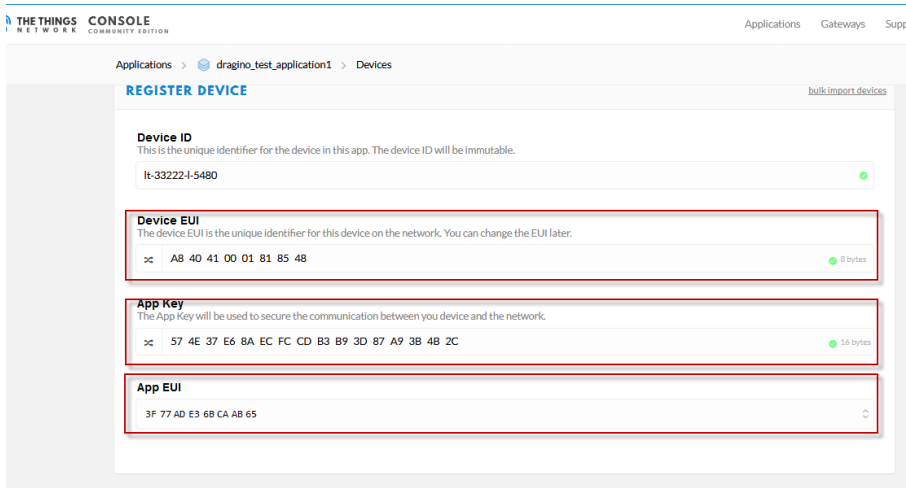
Select **Add Application** to open the screen below.

Note that there is an APP EUI already created by TTN, but this is not the one set in the device. To add the APP EUI for the LT-22222-L device, select **Manage EUIs** and **Add EUI**, then enter the required code.



Select **Devices** and **Register Device** to open the screen below.

Enter the **Device EUI** and **APP KEY** codes, then select the App EUI from the list. Check that all three codes match those shown on the device label before saving the configuration.



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. Select the 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 display.

APPLICATION DATA

|| pause | clear

Filters uplink downlink activation ack error

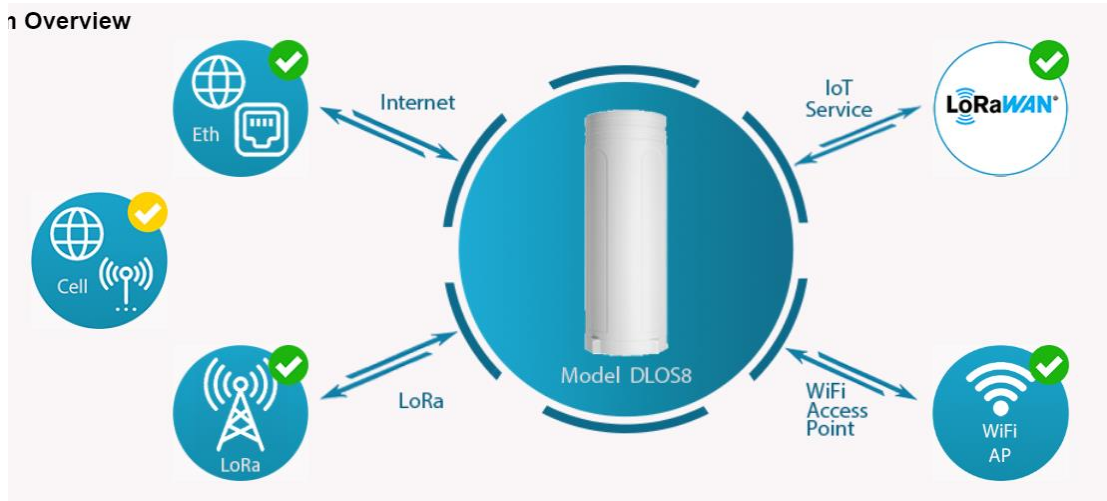
time	counter	port		
16:54:53	0	2	retry	payload: 00 02 01 36 04 C1 04 C2 38
16:54:47			dev addr: 26 01 2C 6B	app eui: FCDEC9B2D32FA6 61 dev eui: A8 40 41 00
16:54:40			dev addr: 26 01 2C 85	app eui: FCDEC9B2D32FA6 61 dev eui: A8 40 41 00
16:54:33			dev addr: 26 01 2E EC	app eui: FCDEC9B2D32FA6 61 dev eui: A8 40 41 00

5 Web Configure Pages

5.1 Home

Shows the system running status.

1 Overview



5.2 LoRa Settings

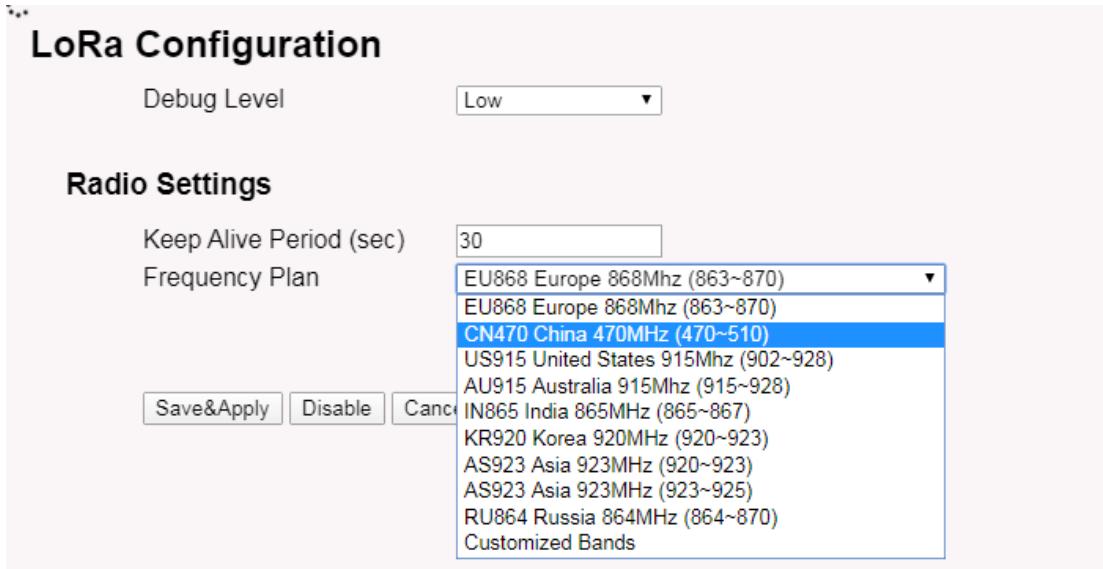
5.2.1 LoRa --> LoRa

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 HPOA 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**



LoRa Configuration

Debug Level

Radio Settings

Keep Alive Period (sec)

Frequency Plan

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

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

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

5.2.2 LoRa --> ABP Decryption

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

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

Detail of this feature:

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

Decrypt ABP End Node Packets

Enable ABP Decryption

Add Key

Dev ADDR:

APP Session Key:

Network Session Key:

Delete Key

Dev ADDR:

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

Server Settings

LoRaWAN Service Provider: TTN-router-EU
Gateway ID: a84041ffff1d25dc
Server Port Upstream: 1700
Server Port Downstream: 1700
Latitude: 22.705177
Longitude: 114.243423
Email: dragino-1d25dc@dragino.com

Packet Filter

Eport.Filter: 0

Save&Apply Cancel

Note

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

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

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

5.3.2 LoRaWAN --> Amazon AWS-IoT

Amazon AWS IoT -- LoRaWAN

Settings

CUPS URI: example: https://xxxxxxx.cups.lorawan.us-east-1.amazonaws.com:443
Email: dragino-1ec39c@dragino.com
Gateway ID: a84041ffff1ec39c
CUPS trust: Not Found
Private key: Not Found
Cert pem: Not Found

Upload_CUPS_Trust
Upload_Private_key
Upload_Cert_pem

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

Save&Apply Cancel

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

LoRaWAN Core: http://wiki.dragino.com/index.php?title=Notes_for_AWS-IoT-Core

5.3.3 LoRaWAN --> LORIoT

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

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

LORIoT Client Configuration

LORIoT software not installed.

Server Address	<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"/>		

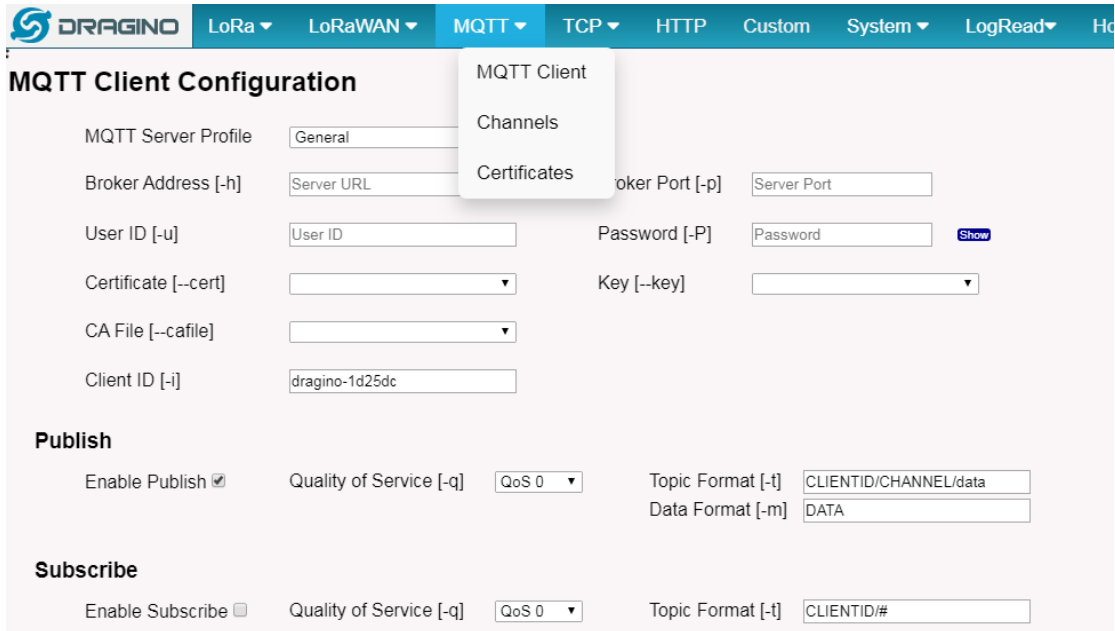
Device EUI: A840411D25DF

[Certificate Management](#)

5.4 MQTT Settings

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

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



MQTT Client Configuration

MQTT Server Profile:

Broker Address [-h]:

User ID [-u]:

Broker Port [-p]:

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

Certificate [--cert]:

Key [--key]:

CA File [--cafile]:

Client ID [-i]:

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:



System Overview

Firmware: Dragino-v2 LG02_LG08-5.4.1592278488

System: "OpenWrt 18.06-SNAPSHOT r5-ce45a50"

Hostname: dragino-1d25dc

Device Model: DLOS8

System Time: Tue Jun 16 06:24:30 UTC 2020

Uptime: 27 min

Load Avg: 0.40, 0.51, 0.43

Memory: Free Memory: 27984 / Total Memory: 60192kB

IoT Service: lorawan

Internet Connection OK

LoRaWAN Connection OK

5.5.2 System --> General (login settings)

System General

System Password

Password Login: root

Password (admin)

TimeZone

Timezone

Port Forwarding

Enable HTTP Forward

Enable SSH Forward

System Password:

There are two login for HPOA: [root /dragino](#) or [admin /dragino](#). Both root and admin has the same right for WEB access. But root user has also the right to access via SSH to Linux system. admin only able to access WEB interface.

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

Timezone:

Set device timezone.

Port forwarding:

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

5.5.3 System --> Network

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

LAN Settings:

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

WAN Settings:

Setting for HPOA WAN port

WiFi Settings:

Setting for HPOA WiFi IP when use it as WiFi Client

5.5.4 System --> WiFi

HPOA WiFi Settings.

WiFi

Radio Settings

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

WiFi Access Point Settings

Enable WiFi Access Point

WiFi Name SSID

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

WiFi WAN Client Settings

Enable WiFi WAN Client

Host WiFi SSID

Passphrase [Show](#) WiFi Survey

Encryption

5.5.5 System --> Cellular

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

Cellular Settings

Enable Cellular WAN

Use Cellular as Backup WAN

APN

Service

Dial Number

Pincode

Username

Password [Show](#)

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

5.5.6 System --> 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:10.130.2.207 Bcast:10.130.2.255 Mask:255.255.255.0
  inet addr:172.31.255.254 Bcast:172.31.255.255 Mask:255.255.255.252
WiFi WAN IP Address:
Cellular:

Bridge:
bridge name bridge id STP enabled interfaces
br-lan 7fff.a840411d25df no eth0
      wlan0

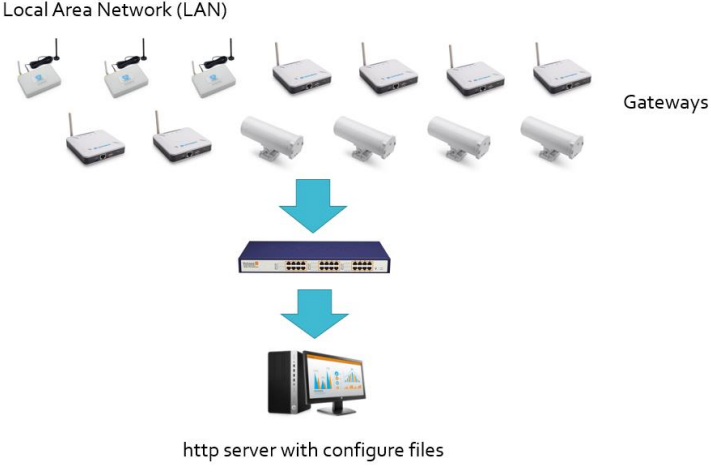
WiFi
----
wlan0 ESSID:"dragino-1d25dc"
      Access Point: A8:40:41:1D:25:DC
      Mode: Master Channel: 11 (2.462 GHz)
      Tx-Power: 17 dBm Link Quality: unknown/70
      Signal: unknown Noise: -95 dBm
      Bit Rate: unknown
      Encryption: WPA2 PSK (CCMP)
      Type: nl80211 HW Mode(s): 802.11bgn
```

5.5.7 System --> Remote Mgmt & Auto Provision

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

Case 1:
Batch configure gateways before deploy

Local Area Network (LAN)

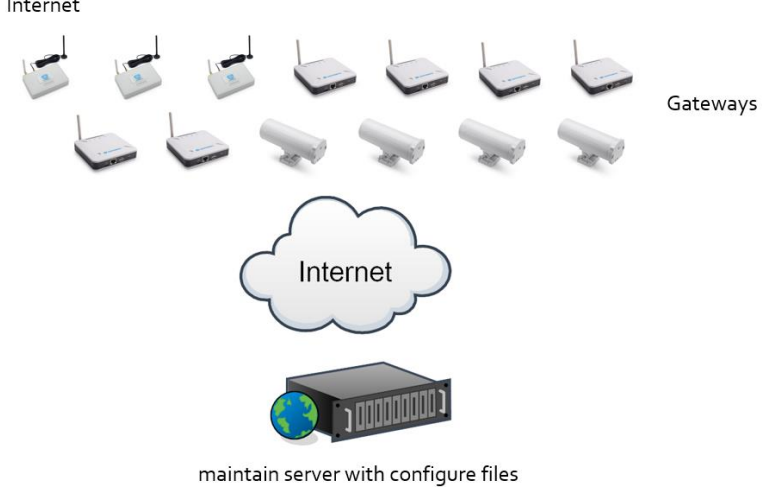


Gateways

http server with configure files

Case 2:
Maintain gateway configure from cloud

Internet

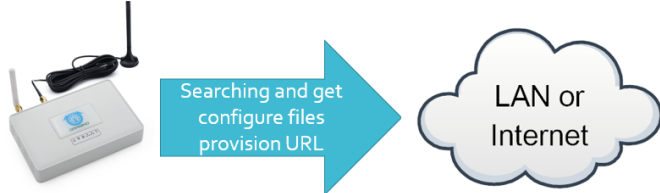


Gateways

Internet

maintain server with configure files


How it works



Searching and get configure files provision URL

LAN or Internet

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.


LoRa ▾ LoRaWAN ▾ MQTT ▾ TCP ▾ Custom Network ▾ S

Auto Provision

Provision Server:

Configure Version: 0

Please see this document for detail:

http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LPS8/Firmware/Application_Note/&file=Auto-update-feature.pdf

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

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

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: Not connected to RSSH Host				
<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](#)

5.5.8 System --> Firmware Upgrade

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

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

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

Web → System → Firmware Upgrade

Firmware Update

Upload Firmware File

No file chosen

Upload selected file.

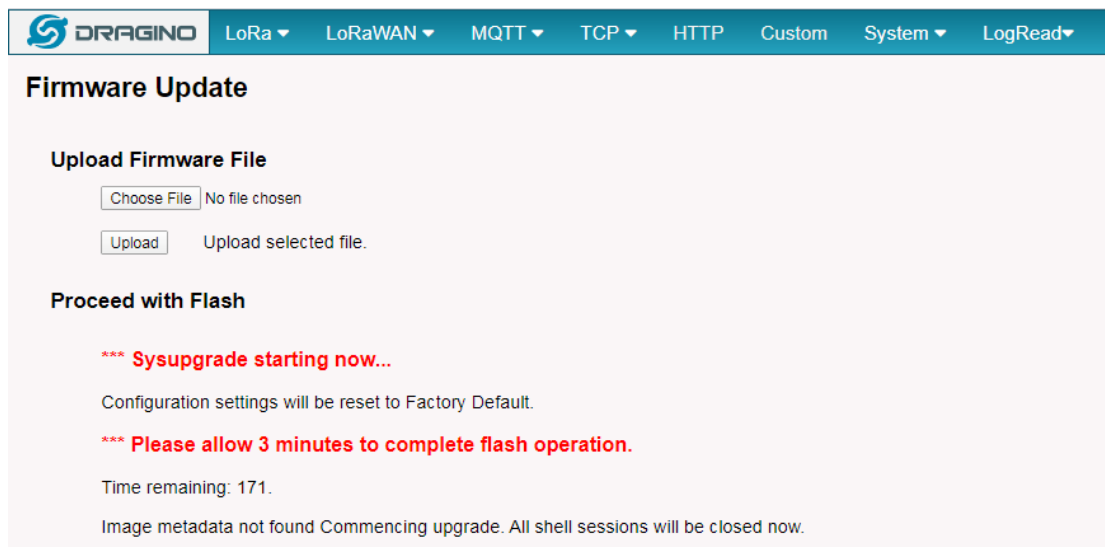
Proceed with Flash

Preserve Settings

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

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

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

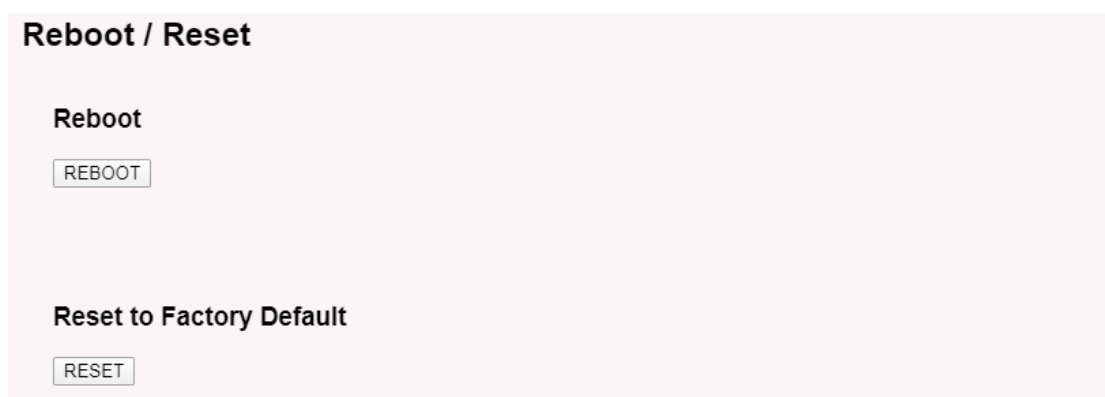


Note *: User can also upgrade firmware via Linux console
SCP the firmware to the system **/var** directory and then run

```
root@OpenWrt:~# /sbin/sysupgrade -n /var/Your_Image
```

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

5.5.9 System --> Reboot/Reset



5.5.10 System --> Package Maintain

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
bikid - 2.32-2
block-mount - 2018-04-16-e2436836-1
busybox - 1.28.3-4
ca-certificates - 20180409
dhcpcd - 7.4.7-17
```

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

5.6 LogRead

5.6.1 LogRead --> LoRa Log

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

Show the frequency for LoRa Radio and traffics.

5.6.2 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: sysp=aaaaaaaa, boardp=2aabaab, 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:

6 More features

6.1 More instructions

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

7 Linux System

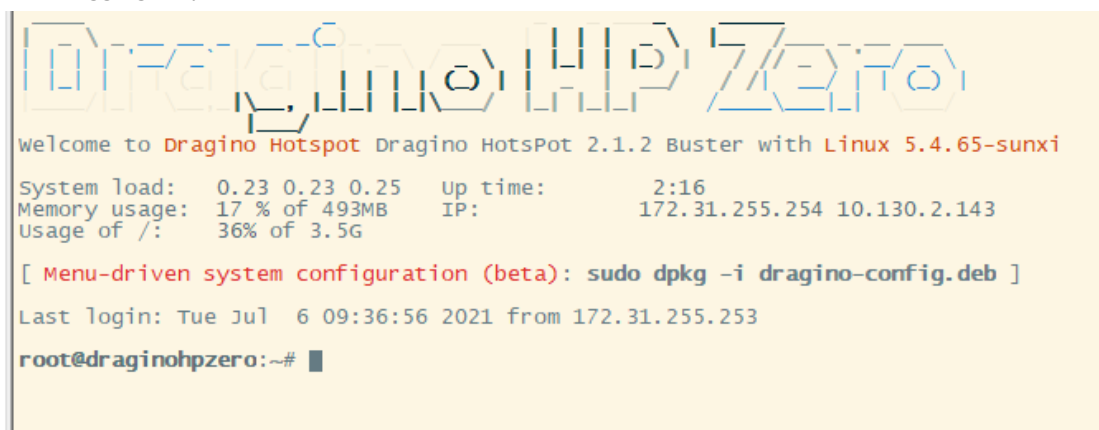
The HPOA is based on the Armbian Linux system. It is open source, and users are free to configure and modify the Linux settings.

7.1 SSH Access for Linux console

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

IP address: IP address of HPOA
Port: 22
User Name: **root**
Password: **dragino** (default)

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



```
Dragino HP Zero  
welcome to Dragino Hotspot Dragino HotSpot 2.1.2 Buster with Linux 5.4.65-sunxi  
System load: 0.23 0.23 0.25 Up time: 2:16  
Memory usage: 17 % of 493MB IP: 172.31.255.254 10.130.2.143  
Usage of /: 36% of 3.5G  
[ Menu-driven system configuration (beta): sudo dpkg -i dragino-config.deb ]  
Last login: Tue Jul 6 09:36:56 2021 from 172.31.255.253  
root@draginohpzero:~# █
```

7.2 Valid Commands related to LoRa:

7.2.1 LoRa pkt fwd

This is to stop/ start / restart the Semtech UDP packet forwarder:

```
service draginofwd start  
service draginofwd stop  
service draginofwd restart
```

7.2.2 Helium gateway rs

Start / Stop the helium gateway rs service:

```
service helium_gateway start  
or /usr/bin/helium_gateway -c /etc/helium_gateway server
```

7.2.3 Check the fwd and helium gateway rs log

draginofwd log : journalctl -u draginofwd -f
helium_gateway log: journalctl -u helium_gateway -f
dragino and helium log: journalctl -u draginofwd -f -u helium_gateway -f

7.2.4 Check draginofwd configuration file

/etc/lora/local_conf.json
/etc/lora/global_conf.json

7.2.5 Test ECC Chip

gateway_mfr ecc test

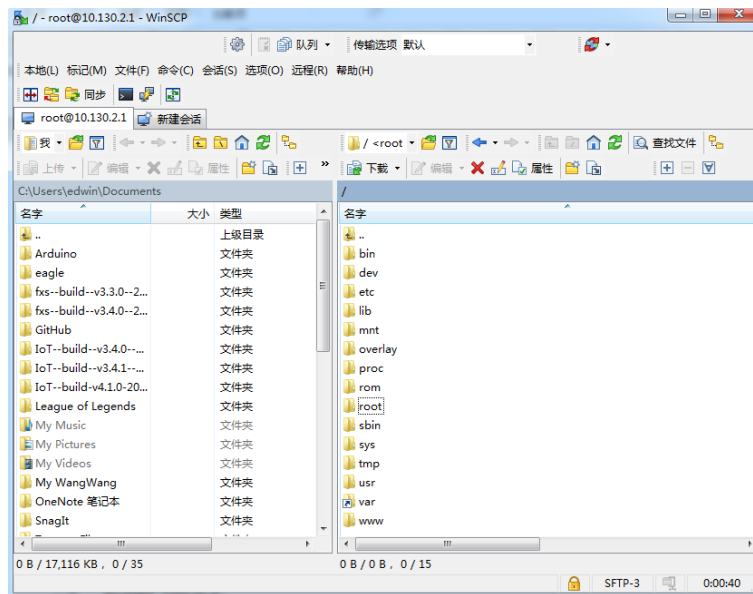
7.3 Edit and Transfer files

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

Screenshot is as below:



7.4 The use of Linux system

HPOA is based on Armbian: <https://www.armbian.com/>. Dragino customized the system to best fit for LoRaWAN application. User can refer: <https://docs.armbian.com/> for more documents for Armbian.

8 Upgrade Linux Firmware

9 FAQ

9.1 How can I configure for a customized frequency band?

9.2 Can I connect HP0A to LORIoT?

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

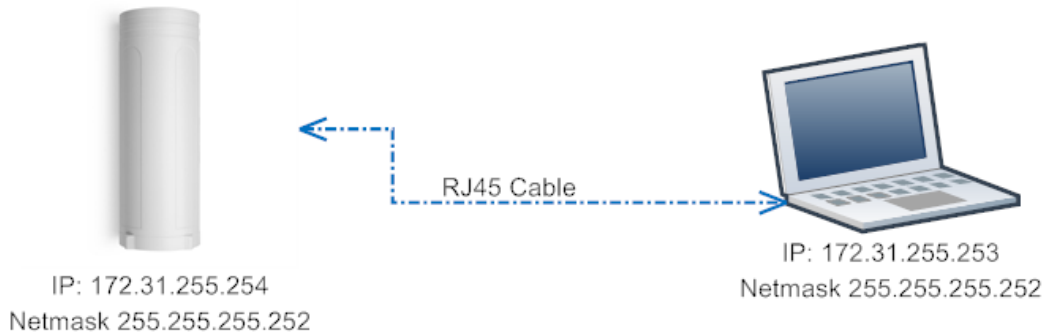
9.4 Can I use 868Mhz version for 915Mhz bands?

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

10 Trouble Shooting

10.1 How to recover the HP0A if the firmware crashes

10.2 I configured HPOA for WiFi access and lost its IP. What to do now?



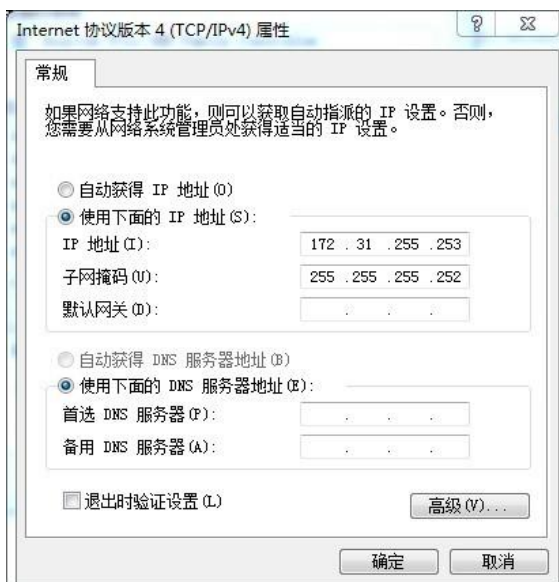
The HPOA has a fall-back IP address on its WAN port. This IP is always enabled so you can use the fall-back IP to access HPOA no matter what the WiFi IP is. The fall back IP is useful for connecting and debug the unit.

(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 HPOA'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 HPOA via Web or Console.

11 Order Info

PART: HPOA-XXX-YYY:

XXX: Frequency Band

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

YYY: 4G Cellular Option

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

12 Packing Info

Package Includes:

- ✓ HPOA 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