LPS8v2 LoRaWAN Indoor Gateway User Manual

last modified by Xiaoling

on 2023/03/01 17:09

Table of Contents

Table of Contents:

1. Introduction

1.1 What is LPS8v2

The LPS8v2 is an **open-source LoRaWAN Gateway**. It lets you bridge LoRa wireless network to an IP network via **WiFi , Ethernet or Cellular Network** (via Optional 4G module). The LoRa wireless allows users to send data and reach extremely long ranges at low data rates.

The LPS8v2 is fully compatible with LoRaWAN protocol. It supports different kinds of LoRaWAN Network Connections such as: **Semtech UDP Packet Forwarder, LoRaWAN Basic Station, ChirpStack MQTT Bridge**, and so on. This makes LPS8V2 work with most LoRaWAN platforms in the market.

LPS8v2 also includes a **built-in LoRaWAN Server and IoT server**, which provide the possibility for the system integrator to deploy the IoT service without cloud service or 3rd servers.

Different countries use different LoRaWAN frequency bands. LPS8v2 has these bands pre-configured. Users can also customize the frequency bands to use in their own LoRa network.

LPS8v2 supports **remote management**. System Integrator can easy to remote monitor the gateway and maintain it.

1.2 Specifications

Hardware System:

- CPU: Quad-core Cortex-A7 1.2Ghz
- RAM: 512MB
- eMMC: 4GB

Interface:

- 10M/100M RJ45 Ports x 1
- Multi-Channel LoRaWAN Wireless
- WiFi 802.11 b/g/n
- Sensitivity: -140dBm
- Max Output Power: 27dBm

Operating Condition:

- Work Temperature: -20 ~ 70°C
- Storage Temperature: -20 ~ 70°C
- Power Input: 5V, 2A, DC

1.3 Features

- Open Source Debian system
- Managed by Web GUI, SSH via WAN or WiFi
- Remote Management
- Auto-provisioning for batch deployment and management
- LoRaWAN Gateway
- 10 programmable parallel demodulation paths
- Pre-configured to support different LoRaWAN regional settings.
- Allow customizing LoRaWAN regional parameters.
- Different kinds of LoRaWAN Connections such as
  - Semtech UDP Packet Forwarder
  - LoRaWAN Basic Station
  - ChirpStack-Gateway-Bridge (MQTT)
- Built-in ***The Things Network*** local LoRaWAN server
- Built-in ***Node-Red*** local Application server

1.4 Block Diagram

1.5 LED Indicators

LPS8-V2 has totally four LEDs, They are:

 # Power LED*: This RED LED will be solid if the device is properly powered*

 # ETH LED*: This RGB LED will blink GREEN when the ETH port is connecting*

 # SYS LED*: This RGB LED will show different colors in different states:*

*# **SOLID GREEN:** The device is alive with a 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 with BLINKING GREEN together*

*# **SOLID RED:** Device doesn't have an Internet connection.*

 # WIFI LED*: This LED shows the WIFI interface connection status.*

1.6 Button Intruction

LPS8-V2 has a black toggle button, which is:

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

LED status: *ETH LED will BLINKIND BULE Until the reload is finished.*

 # Long press more than 10s: *the gateway will restore the factory settings.*

LED status: *ETH LED will SOLID BULE Until the restore is finished.*

2. Quick Start

The LPS8-V2 supports network access via Ethernet or Wi-Fi connection and runs without a network.

In most cases, the first thing you need to do is make the lps8-v2 accessible to the network.

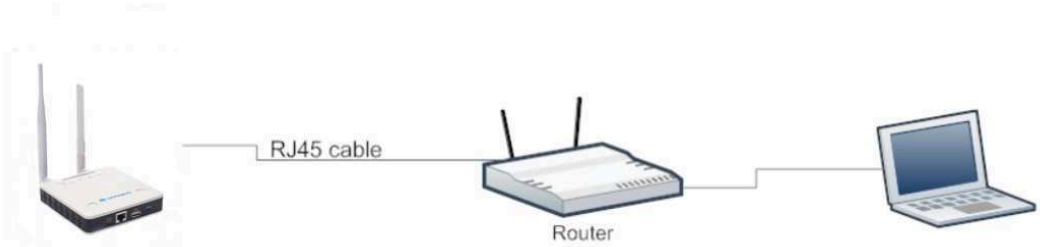
2.1 Connects to the network and accesses the gateway Web UI

2.1.1 connect the network

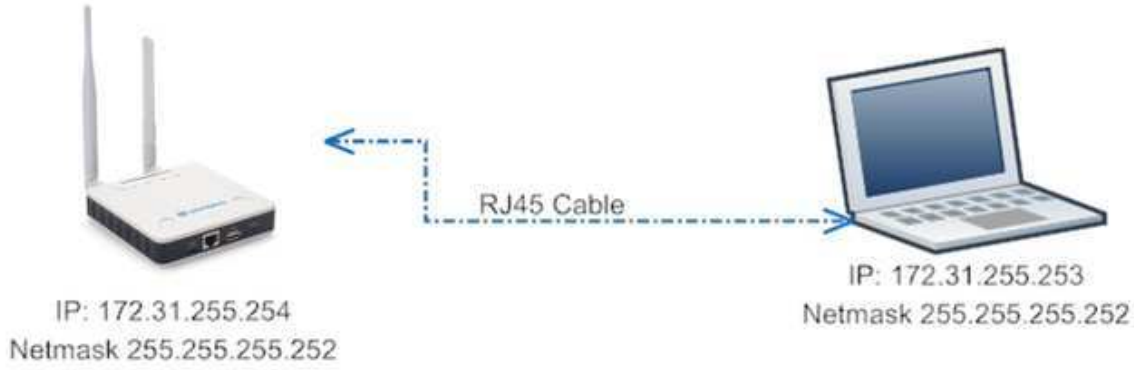
Method 1: Connect via Ethernet with DHCP IP from the router

Connect the LPS8-V2 Ethernet port to your router and LPS8-V2 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 LPS8-V2.

You can also use this IP to connect.



Method 2: Connect via LPS8-V2 Fallback IP



Steps to connect via fallback IP:

1. Connect the PC's Ethernet port to LPS8-V2's WAN port

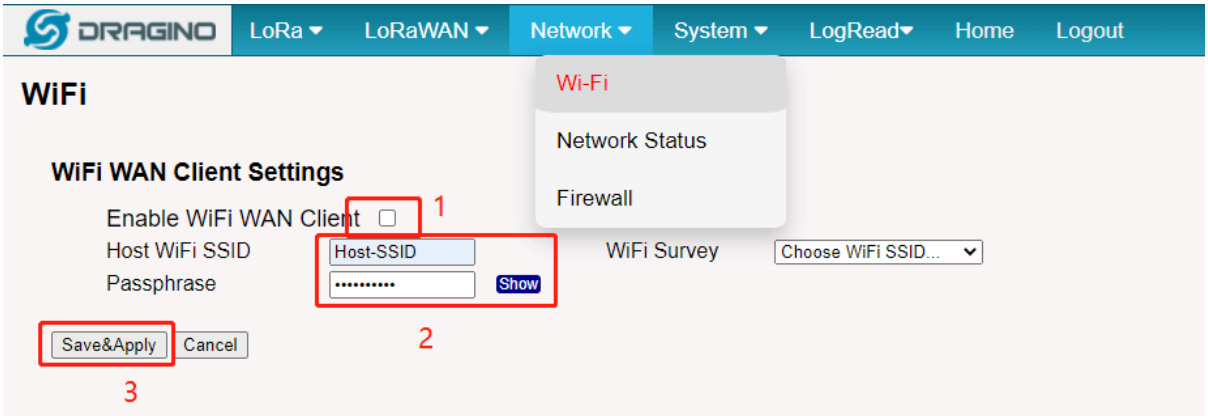
2. Configure PC's Ethernet port has IP: 172.31.255.253 and Netmask: 255.255.255.252

As in the below photo:

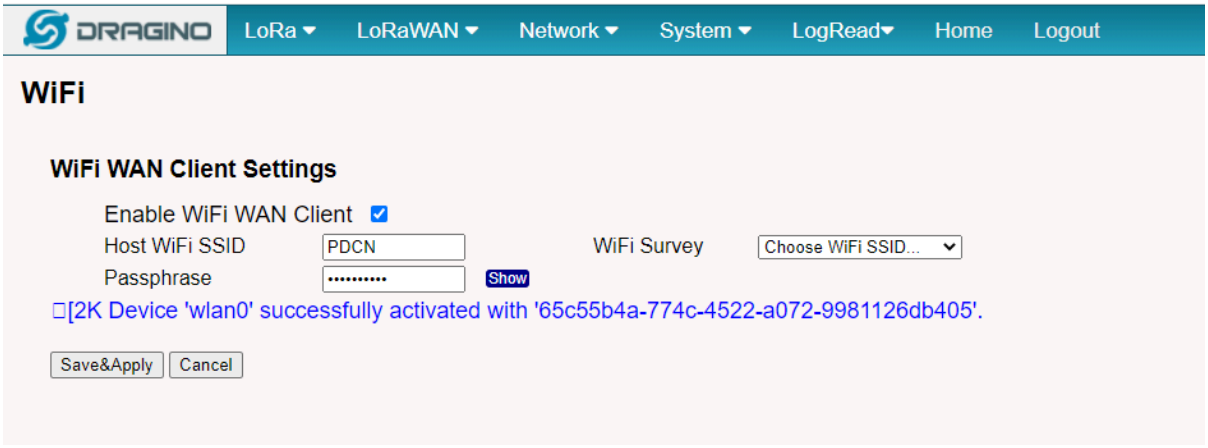
3. In the PC, use IP address 172.31.255.254 to access the LPS8-V2 via Web or Console.

Method 3: Connect via WiFi with DHCP IP from the router

Fill in the WiFi information by checking the box and clicking **Save&Apply**



Wi-Fi configuration successful



2.1.2 Access Configure Web UI

Web Interface

Open a browser on the PC and type the LPS8-V2 ip address (depends on your connect method)

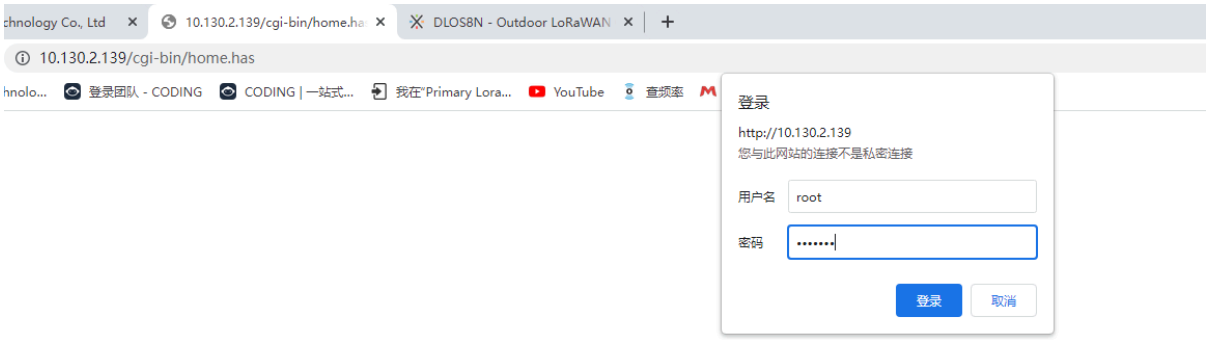
http://IP_ADDRESS or ***http://172.31.255.254***(Fallback IP)

You will see the login interface of LPS8-V2 as shown below.

The account details for Web Login are:

User Name: root

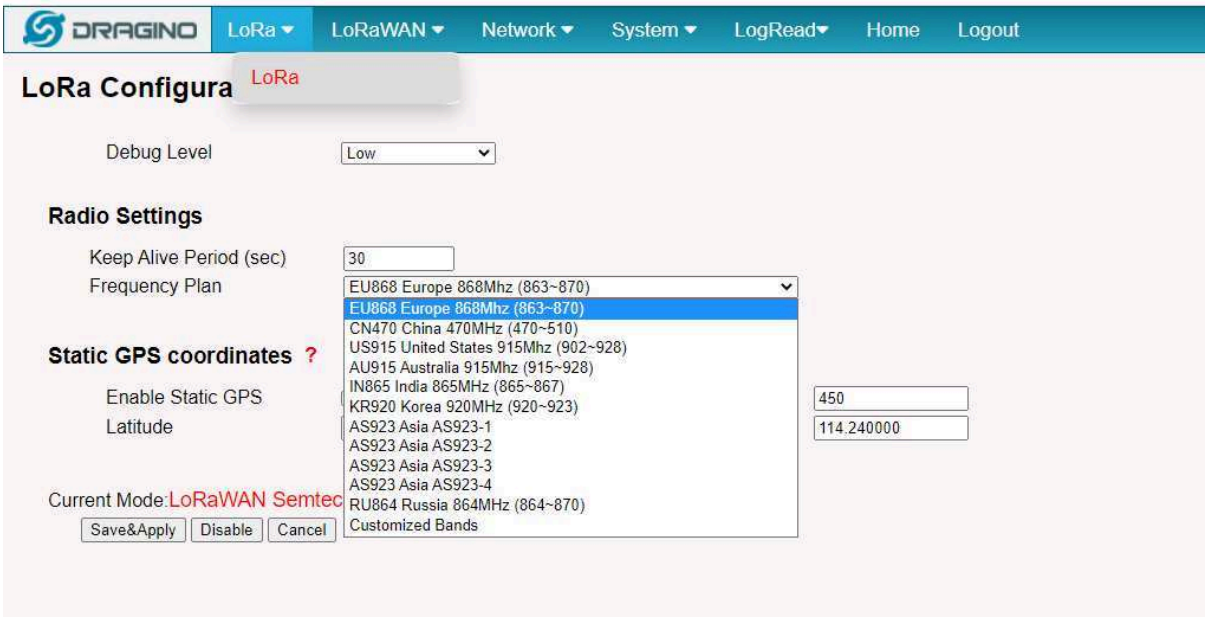
Password: dragino



2.2 The LPS8-V2 is registered and connected to The Things Network

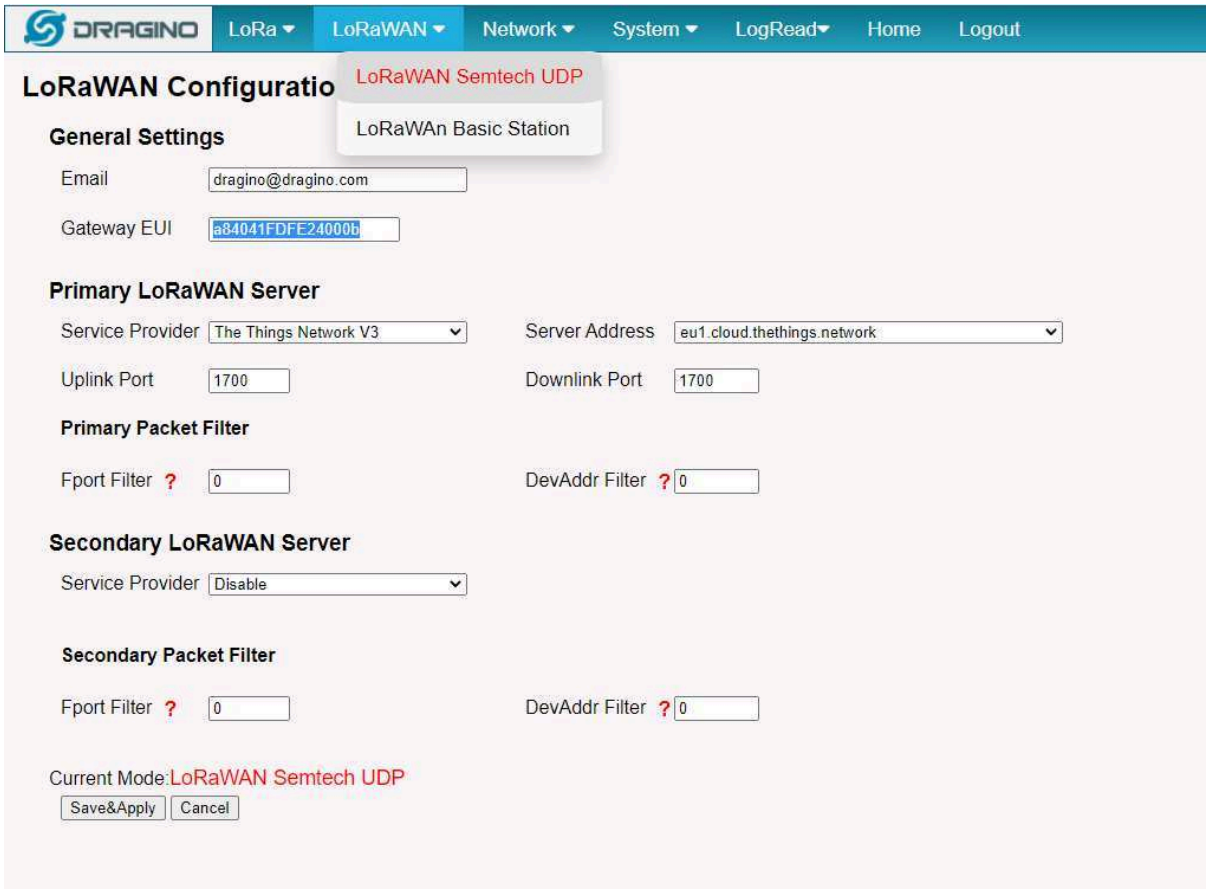
2.2.1 Select your area frequency

First, you need to set the frequency plan in LPS8-V2 to match the end node we use, so to receive the LoRaWAN packets from the LoRaWAN sensor.



2.2.2 Get the only gateway EUI

Every LPS8-V2 has a unique gateway id. The ID can be found on LoRaWAN Semtech page:



Note: Choose the cluster that 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**

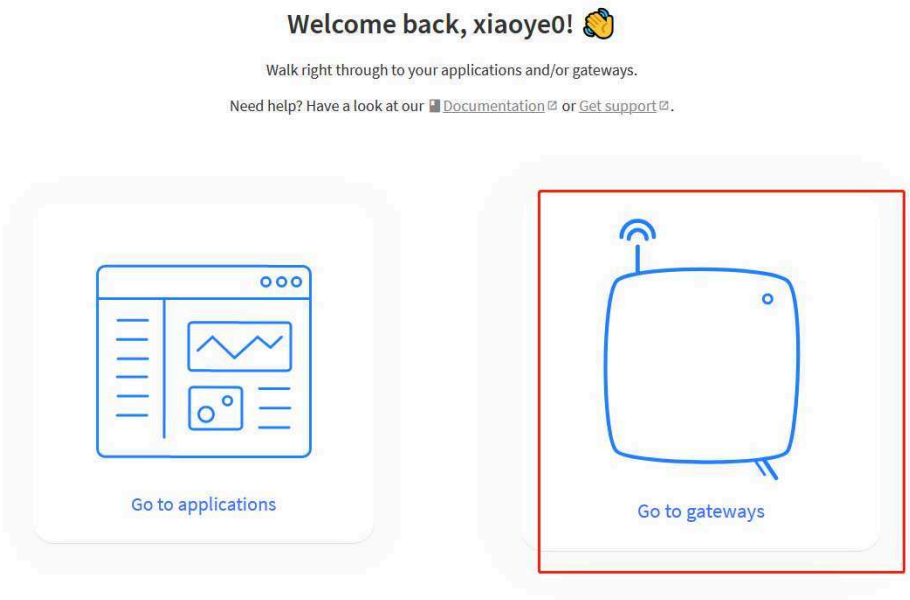
 # Legacy V2 Console: TTN v2 shuts down in December 2021

2.2.3 Register the gateway to The Things Network

Login to The Things Network

https://console.cloud.thethings.network/

Add the gateway



Get it online

3. Web Configure Pages

3.1 Home

Shows the system running status:

3.2 LoRa Settings

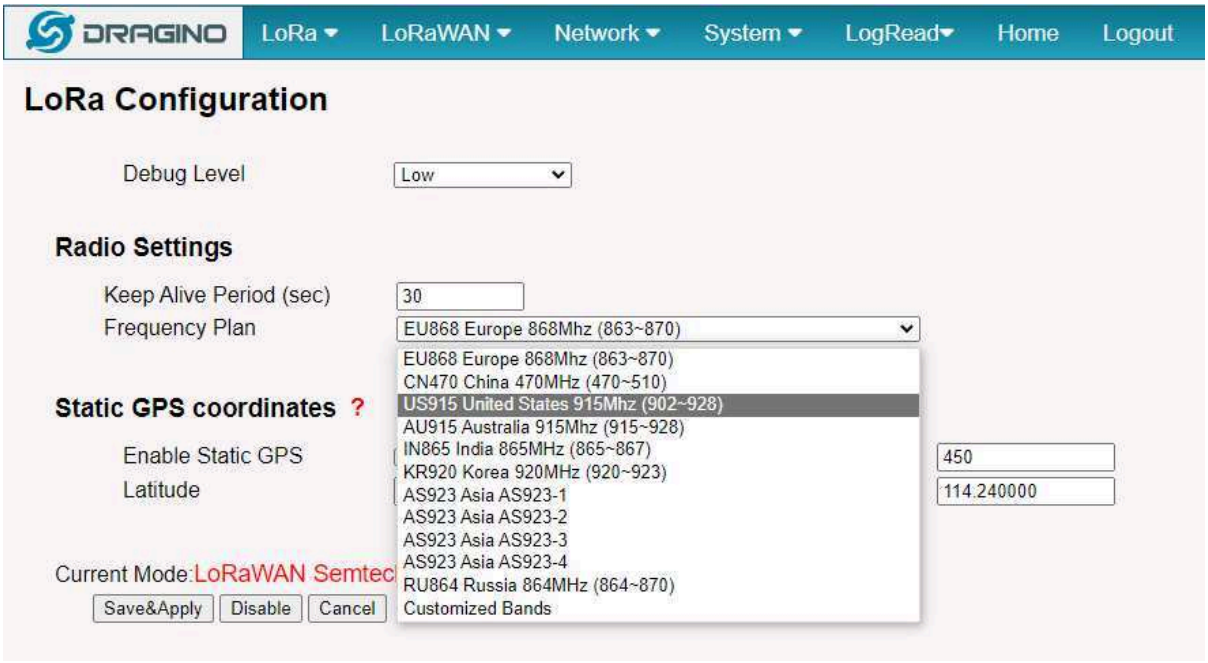
3.2.1 LoRa --> LoRa

This page shows the LoRa Radio Settings. There is a set of default frequency bands according to LoRaWAN protocol, and users can customize the band as well.*

Different LPS8v2 hardware versions can support different frequency ranges:

- ***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 the user choose the frequency plan, the user can see the actual frequency is used by checking the page **LogRead --> LoRa Log***

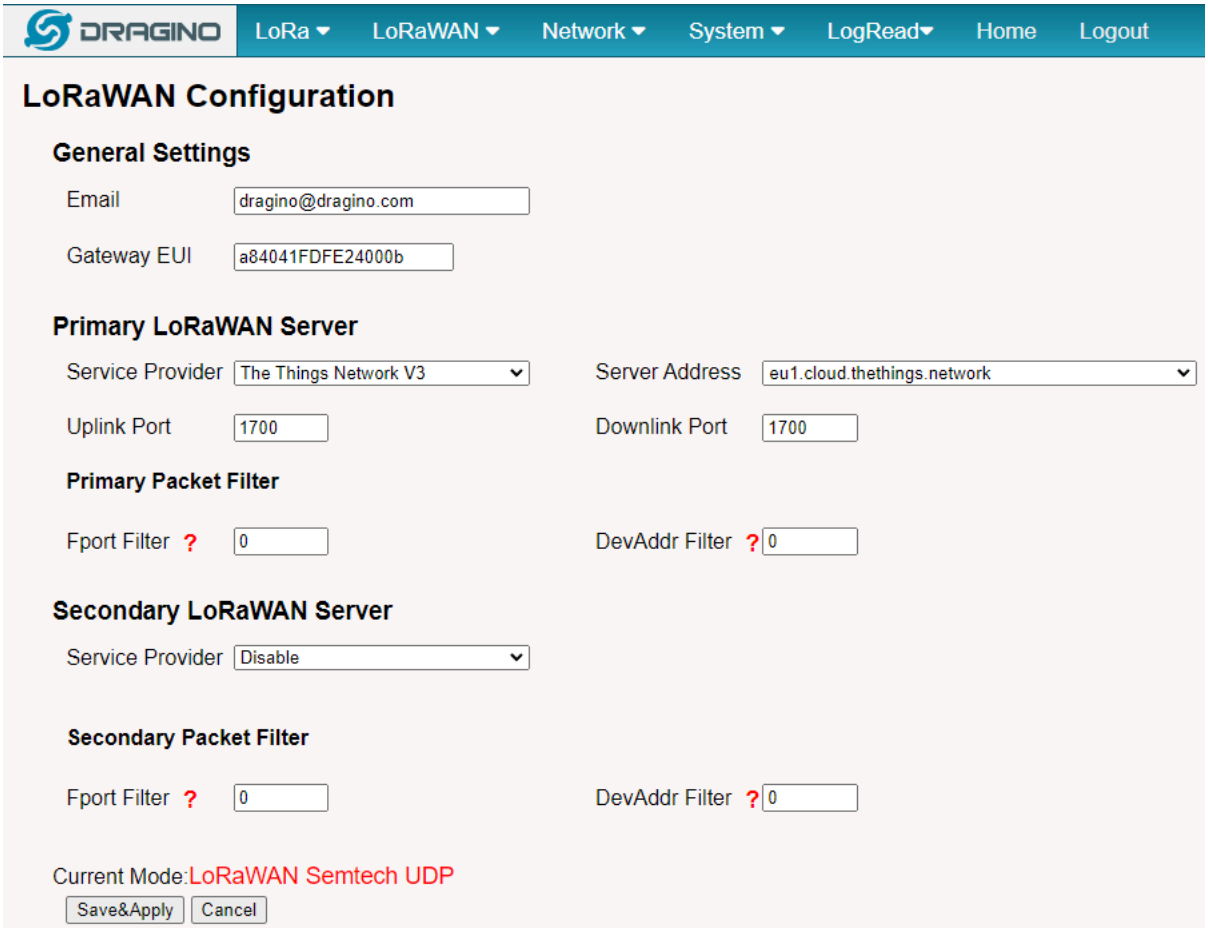


Note *: See this instruction for how to customize the frequency band: How to customized LoRaWAN frequency band - DRAGINO

3.3 LoRaWAN Settings

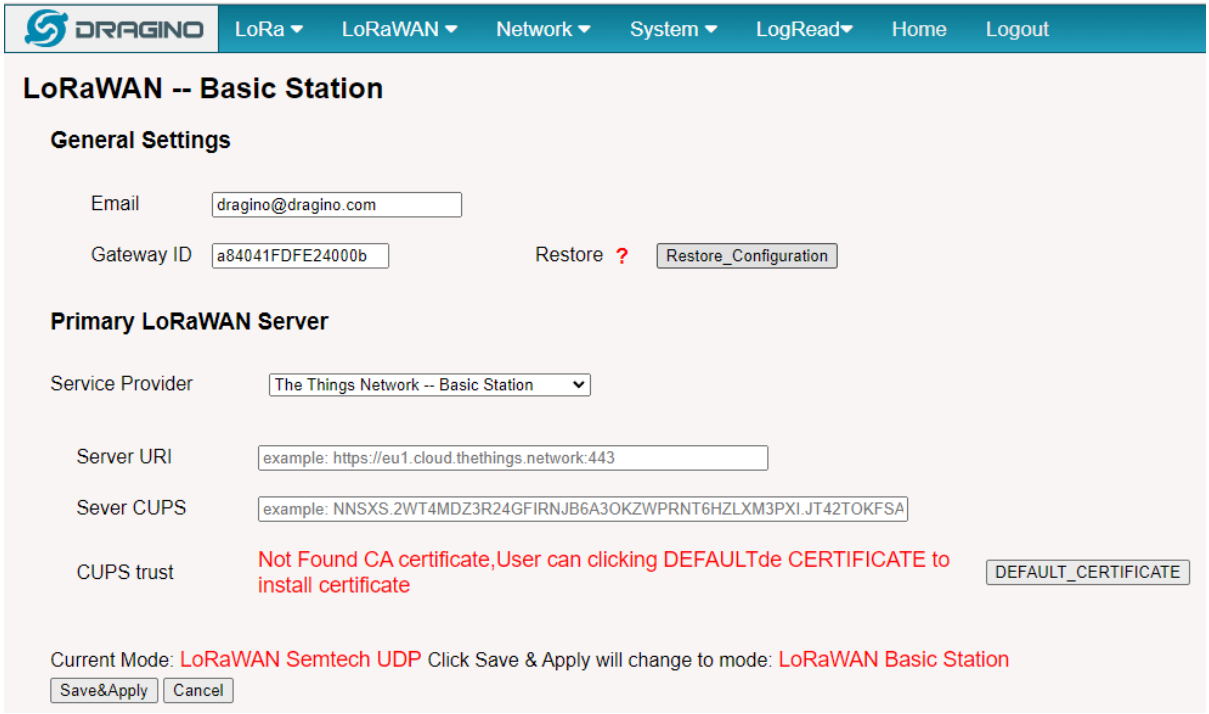
3.3.1 LoRaWAN --> LoRaWAN Semtech UDP

This page is for the connection set up to a general LoRaWAN Network server such as TTN, ChirpStack, etc.



3.3.2 LoRaWAN --> LoRaWAN Basic Station

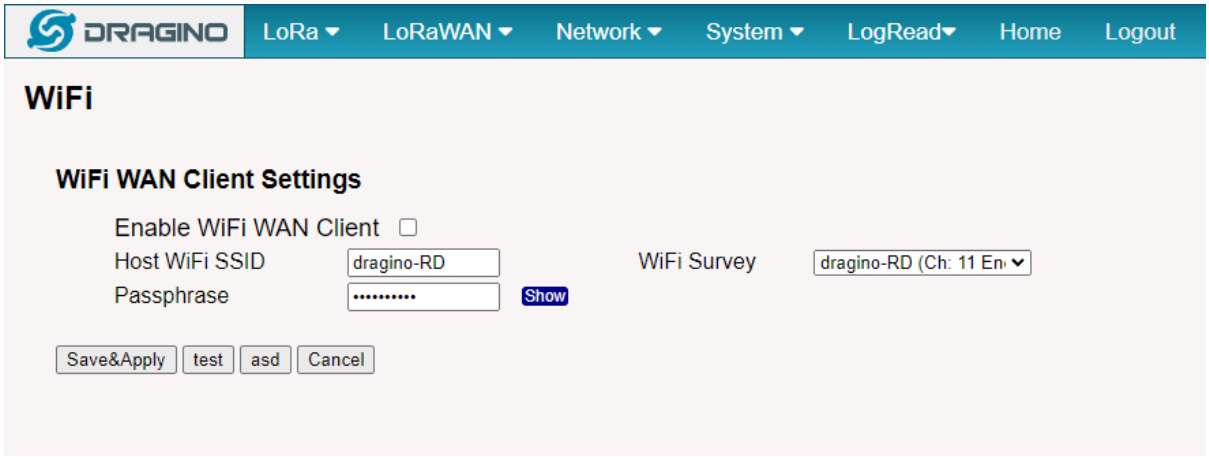
This page is for the connection set up to the TTN Basic Station, AWS-IoT, etc.



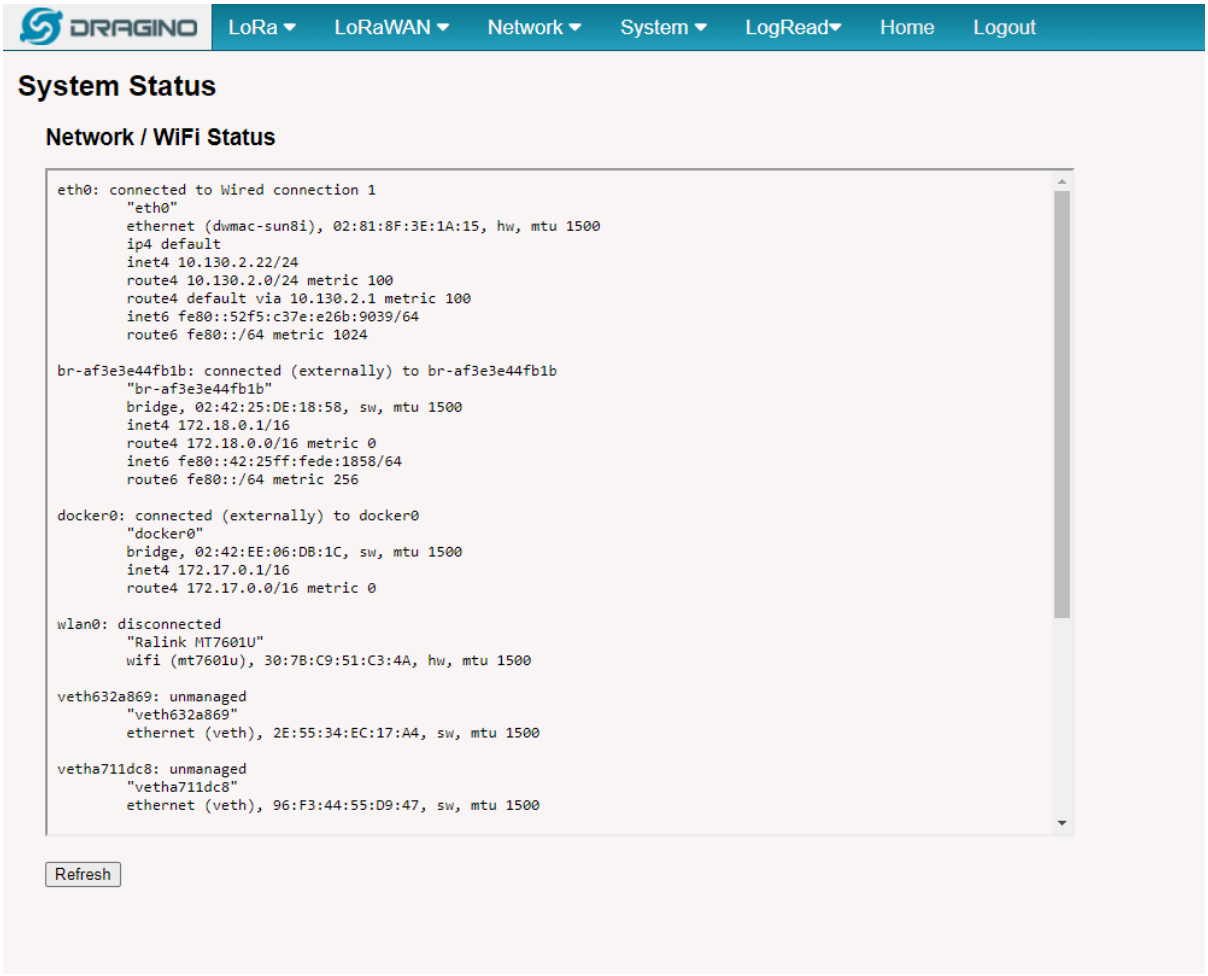
Please see this instruction to know more detail and a demo for how to use of LoRaWAN Basic Station: Use of LoRaWAN Basic Station - DRAGINO

3.4 Network Settings

3.4.1 Network --> WiFi

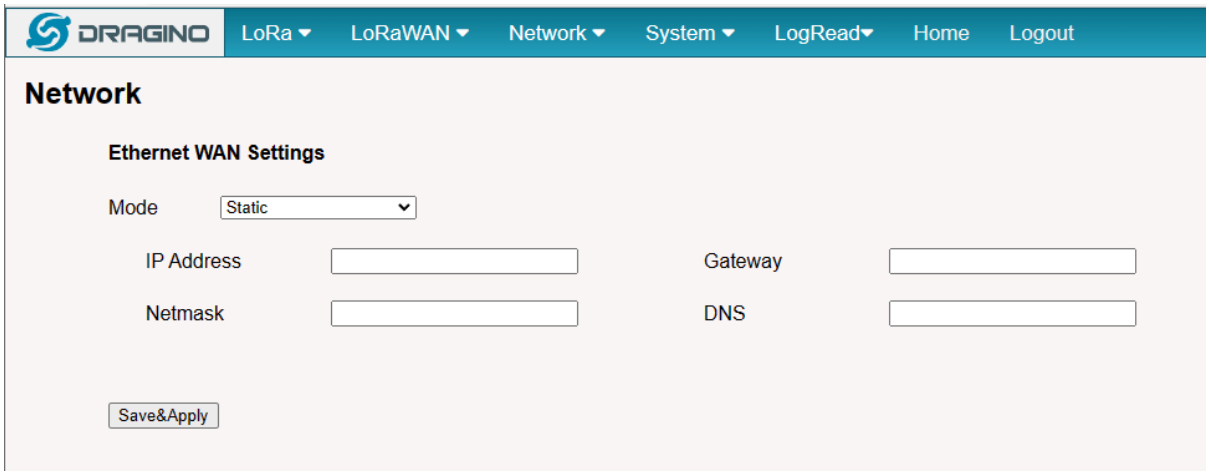


3.4.2 Network --> System Status



3.4.3 Network --> Network

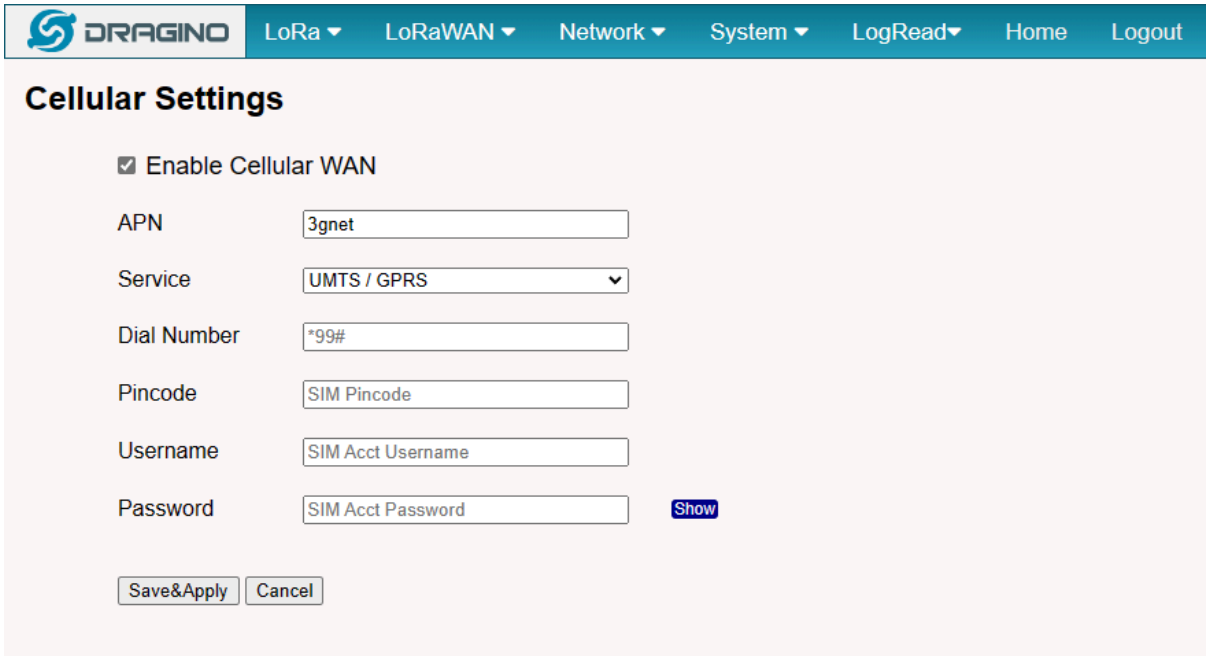
In the Network --> Network interface, Users can set the Ethernet WAN static ip address.



3.4.4 Network --> Cellular

In the Network --> Cellular interface, Users can Enable Cellular WAN and configure Celluar.

Note: APN cannot be empty.

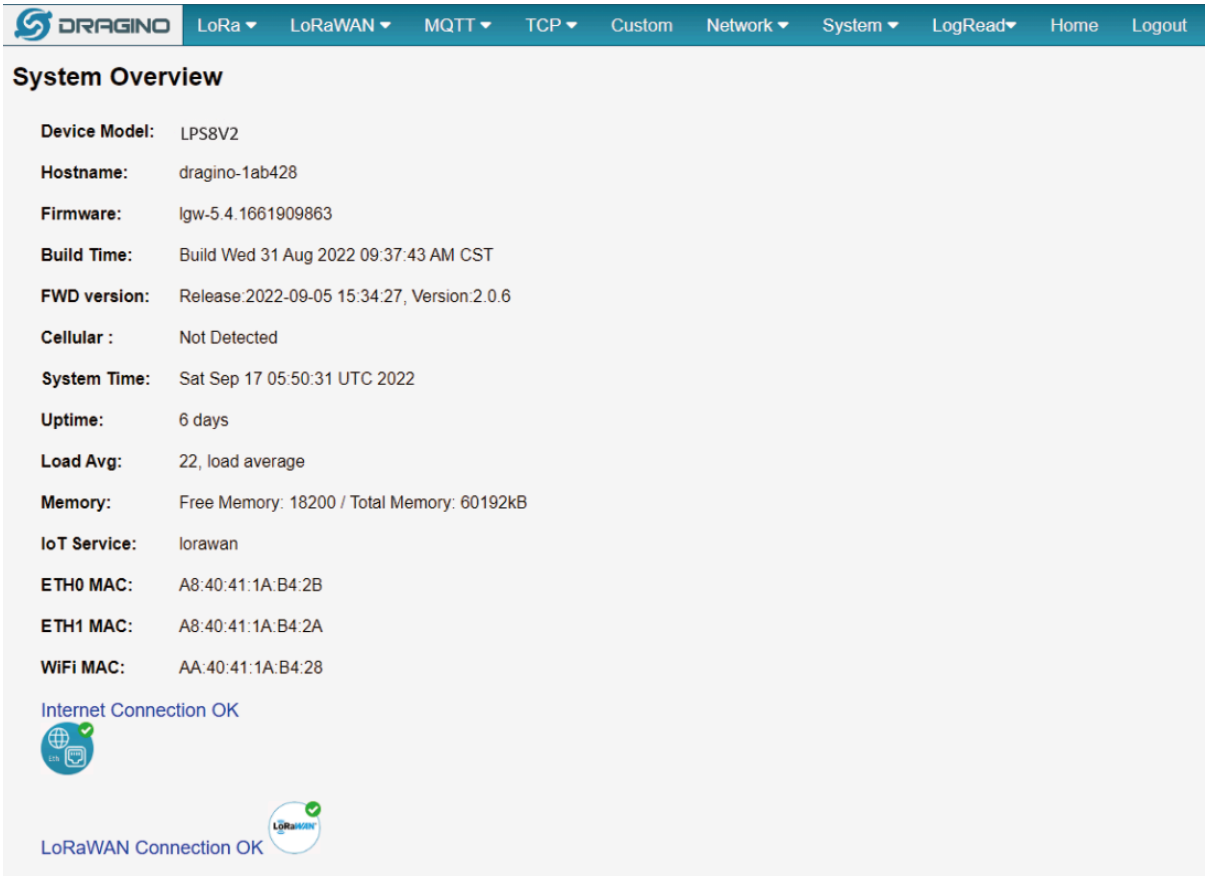


After the configuration is complete, return to the Home interface and put the mouse on the Cell icon to check the Cellualr state.

3.5 System

3.5.1 System --> System Overview

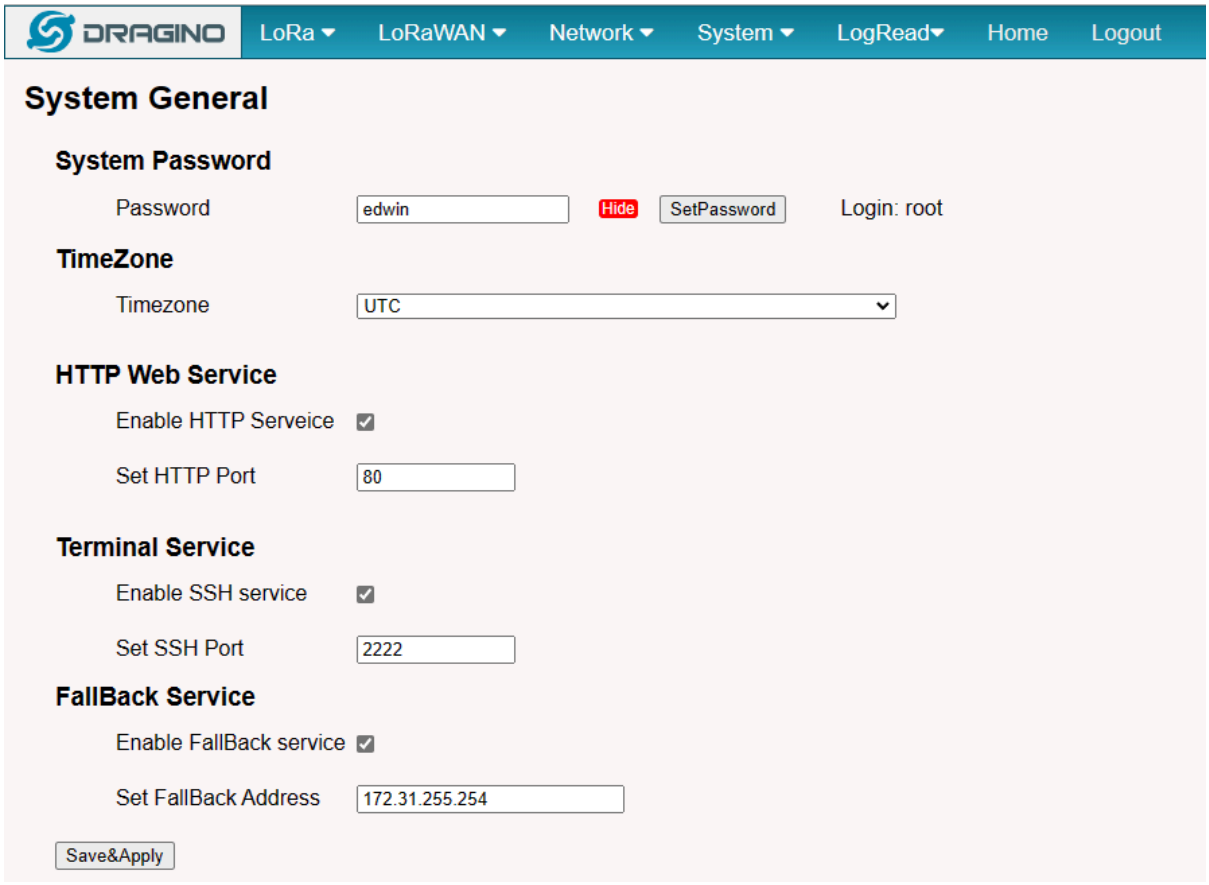
Shows the system info:



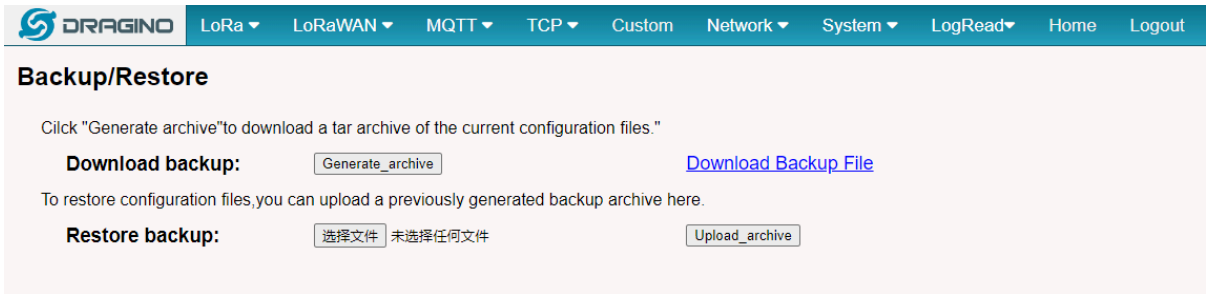
3.5.2 System --> System General

In the System-> System General interface, Users can customize the configuration System Password and set Timezone.

In addition, Users can customize the FallBack IP address.



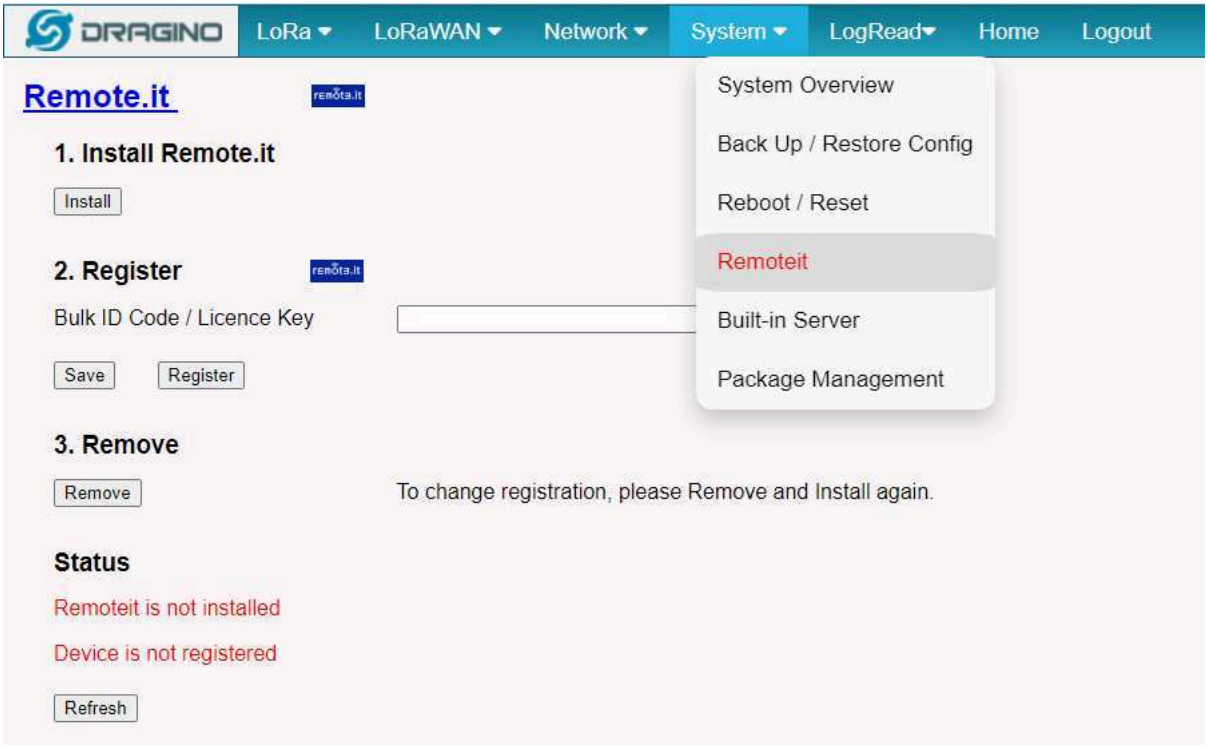
3.5.3 System --> Backup/Restore



3.5.4 System --> Remoteit

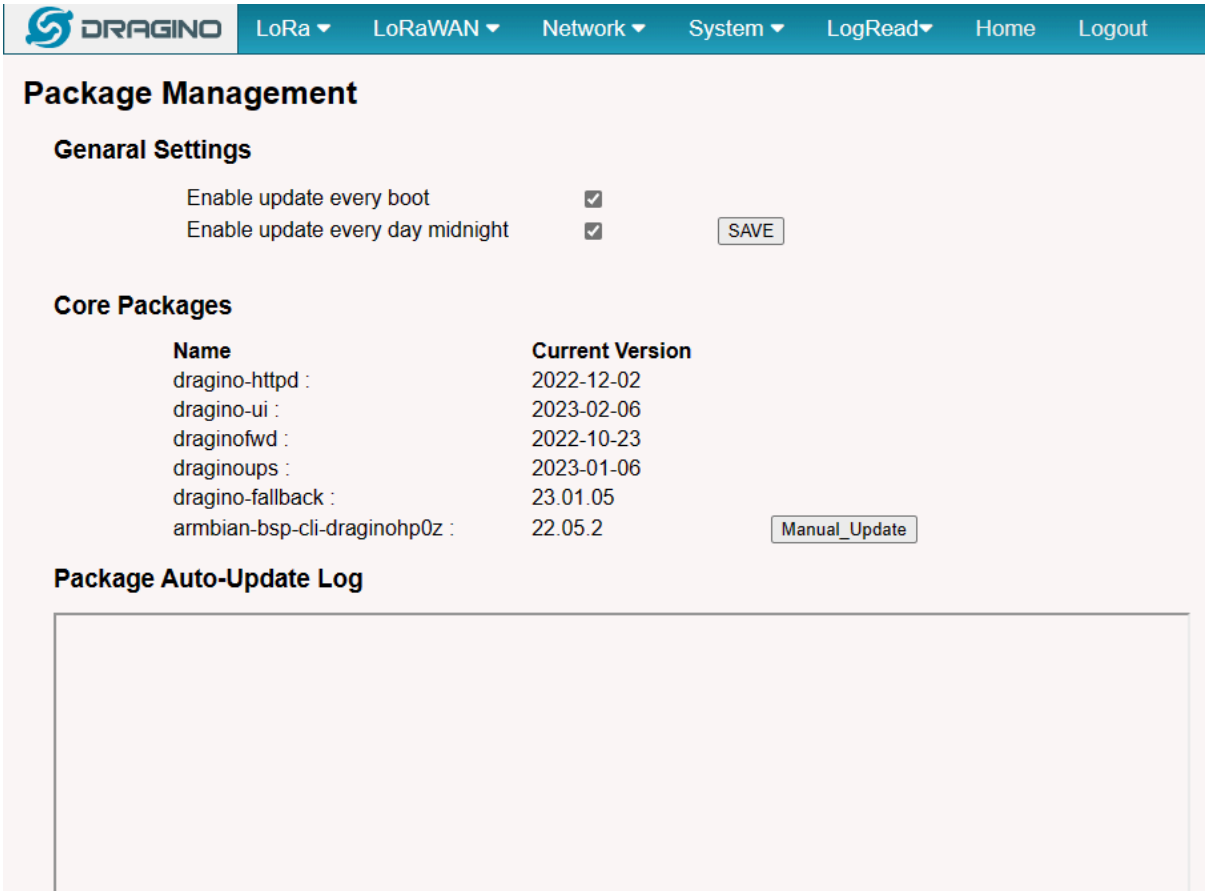
In the System-> Remoteit interface, users can configure the gateway to be accessed remotely via Remote.it.

the users can refer to this link to configure them: **Monitor & Remote Access Gateway**



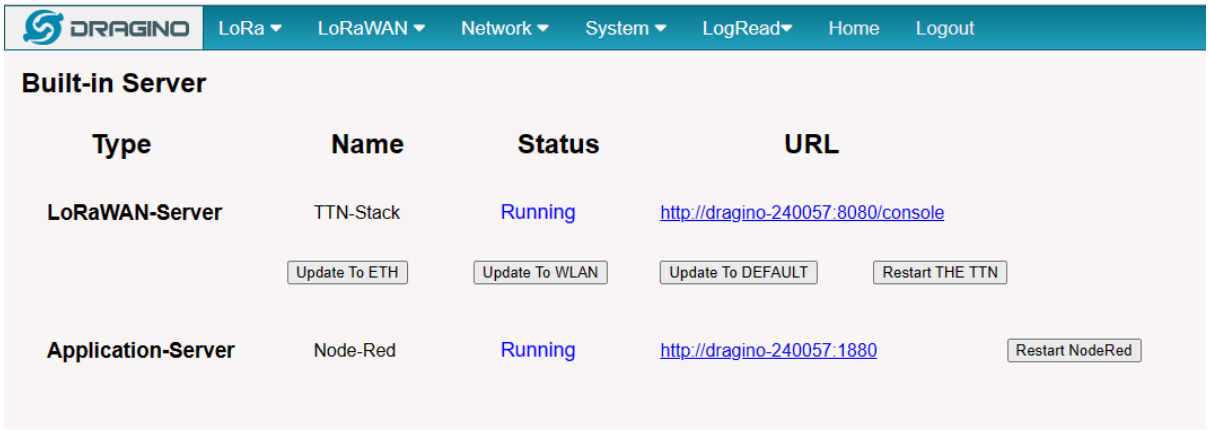
3.5.5 System --> Package Management

In the System --> Package Management interface, Users can check the current version of Core Packages.



4. Build-in Server

The default factory version of LPS8-V2 is installed with the built-in Applicant server: **Node-Red, and** LoRaWAN Server: **The Things Network - Stack (Open Source 3.19 Version).**



Note:

Path: System --> Built-in Server

Troubleshooting:

1. URL does not jump properly

For the ttn-stack, you can click the update the URL which will update the configuration where change the hostname to the current local IP address as the URL.

For the Node-Red, you can use the local IP address and the port is 1880 to access it.

4.1 LoRaWAN Network Server -- The Things Network - Stack (TTN-V3)

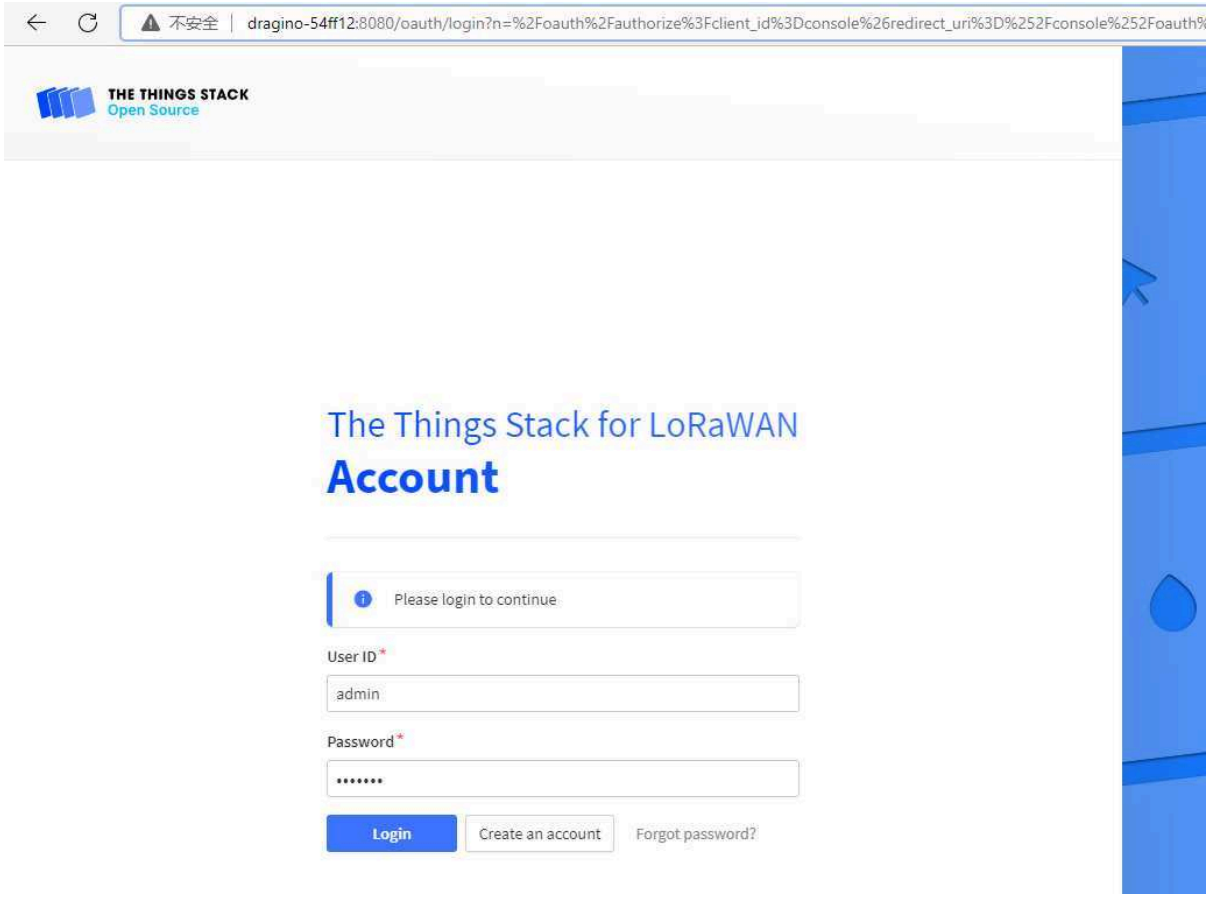
You can access the gateway's built-in LNS server of **The Things Network - Stack** via the URL(***http://<hostname>:8080 or http://<local-IPV4-address>***) in your browser.

Such as ***http://dragino-54ff12:8080 or http://<Local-IPV4-Address>***

Login account:

User ID: **admin**

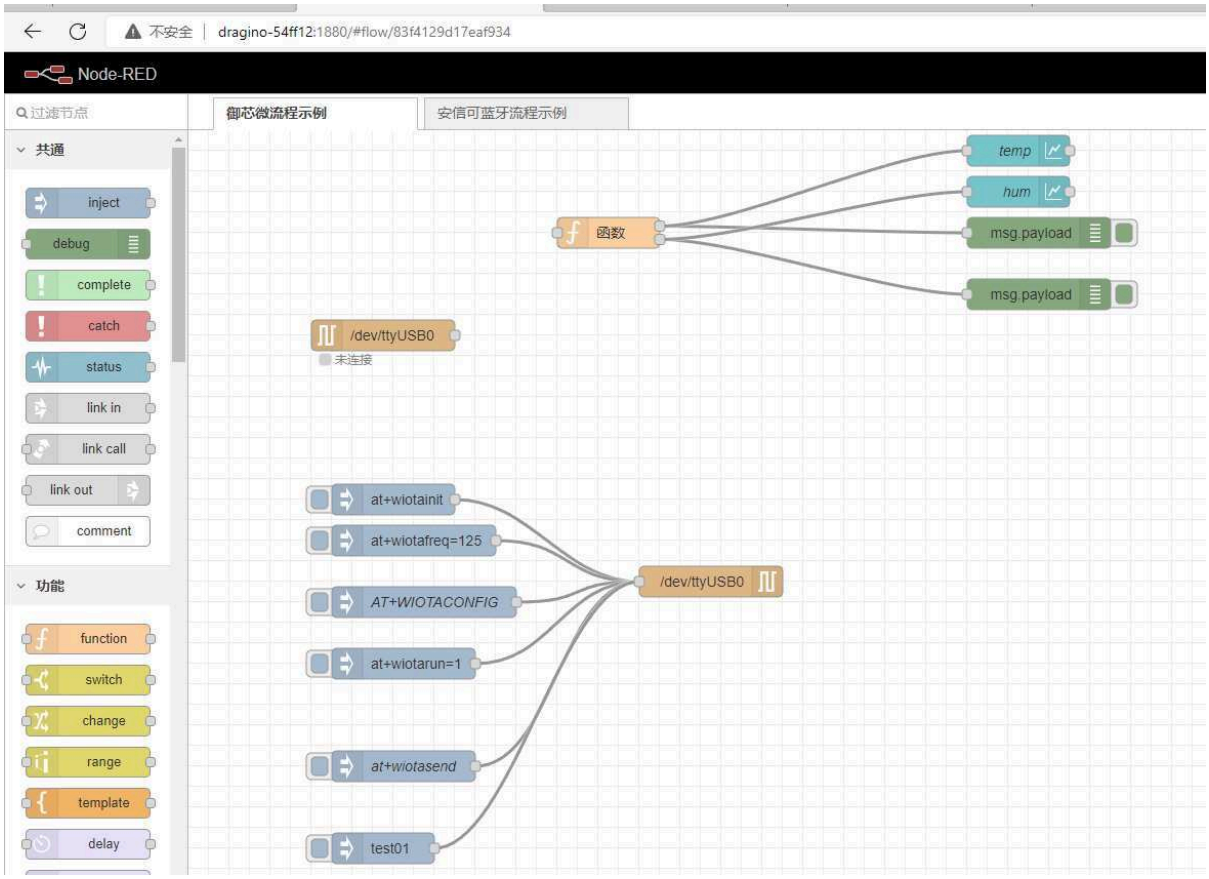
Password: **dragino**



4.2 Application Server -- Node-Red

You can access the gateway's built-in AS server of **Node-Red** via the URL(***http://<hostname>:1880 or http://<local-IPV4-address>***) in your browser.

Such as ***http://dragino-54ff12:1880 or http://<Local-IPV4-Address>***



Using Node-Red, InfluxDB and Grafana

The LPS8-V2 supports this combination, the default, Node-red is pre-installed but the InfluxDB and Grafana is not pre-installed.

the users can refer to this link to install them.

http://wiki.dragino.com/xwiki/bin/view/Main/Armbian%20OS%20instruction/#H2.6HowtoinstallGrafanaandinfluxdb

4.3 How to disable the built-in server

Use the following commands to start and stop the TTNv3 service:

 # start

systemctl start ttnstack

 # stop
systemctl stop ttnstack

 # enable
systemctl enable ttnstack

#disable
systemctl disable ttnstack

Use the following commands to start and stop the Node-Red service:

 # start
systemctl start nodered

 # stop
systemctl stop nodered

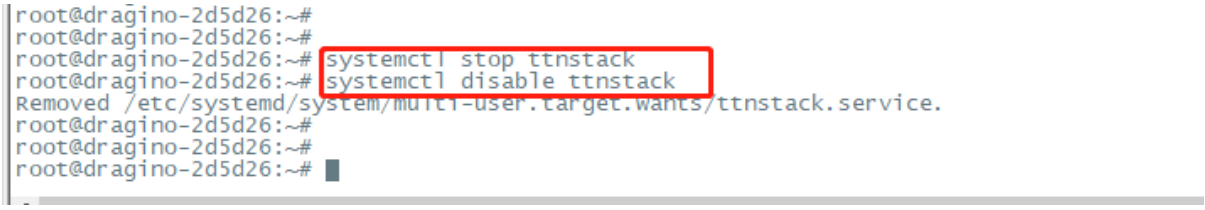
 # enable
systemctl enable nodered

#disable
systemctl disable nodered

4.4 How to use ChirpStack on LPS8-V2

By default, the built-in LoRaWAN network server used on LPS8v2 is TTNv3, so users need to disable TTNv3 services and follow this link to install chirpstack:

ChirpStack open-source LoRaWAN® Network Server documentation



5. How users can access LPS8-V2 using serial USB

USB TTL to LPS8-V2 Connection:

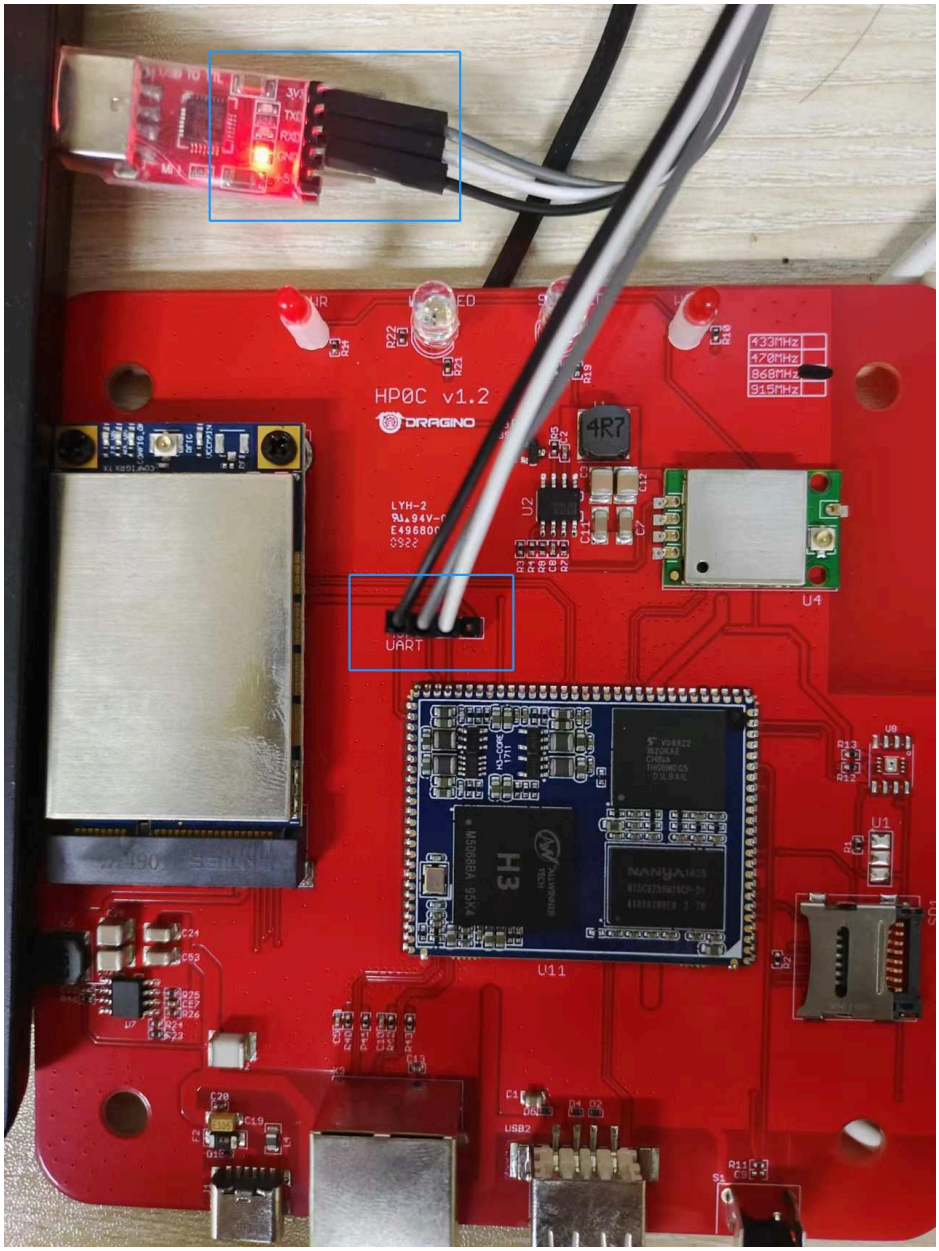
Port 1 of the UART on the LPS8-V2 is GND

TXD <---> UART RXD (Gray line)

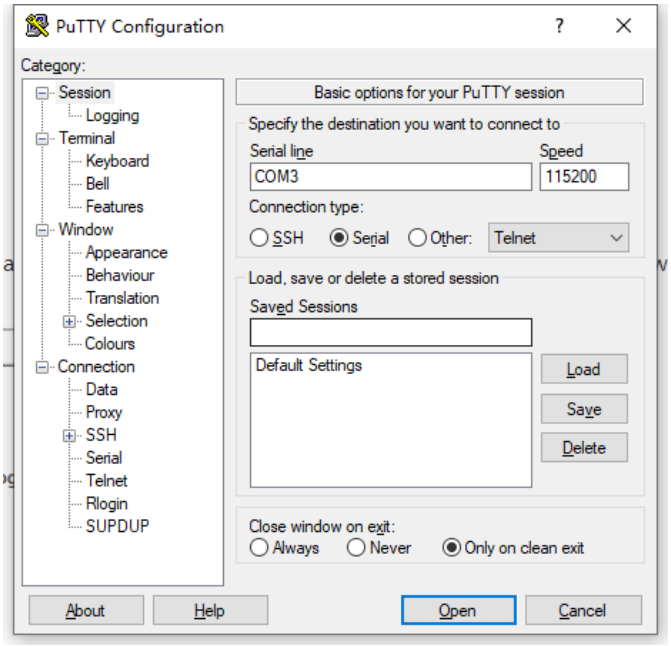
RXD <---> UART TXD (White line)

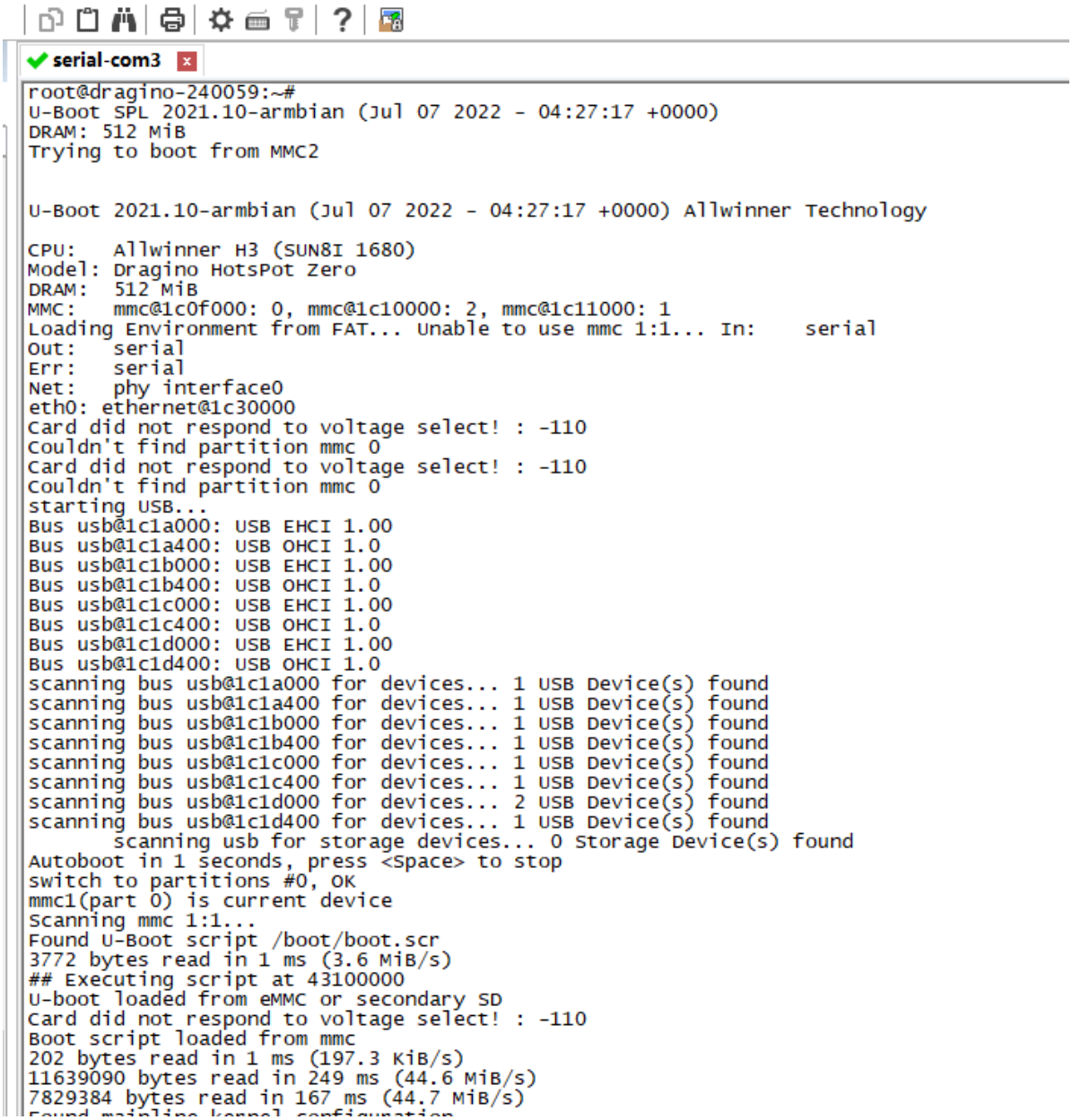
GND <---> GND (Black line)

LPS8v2 UART connection photo



In the PC,you can use the serial port tool(such as putty in Windows), you need to set the serial baud rate to **115200** to access the serial console for LPS8v2. LPS8v2 will output system info once power on as below:

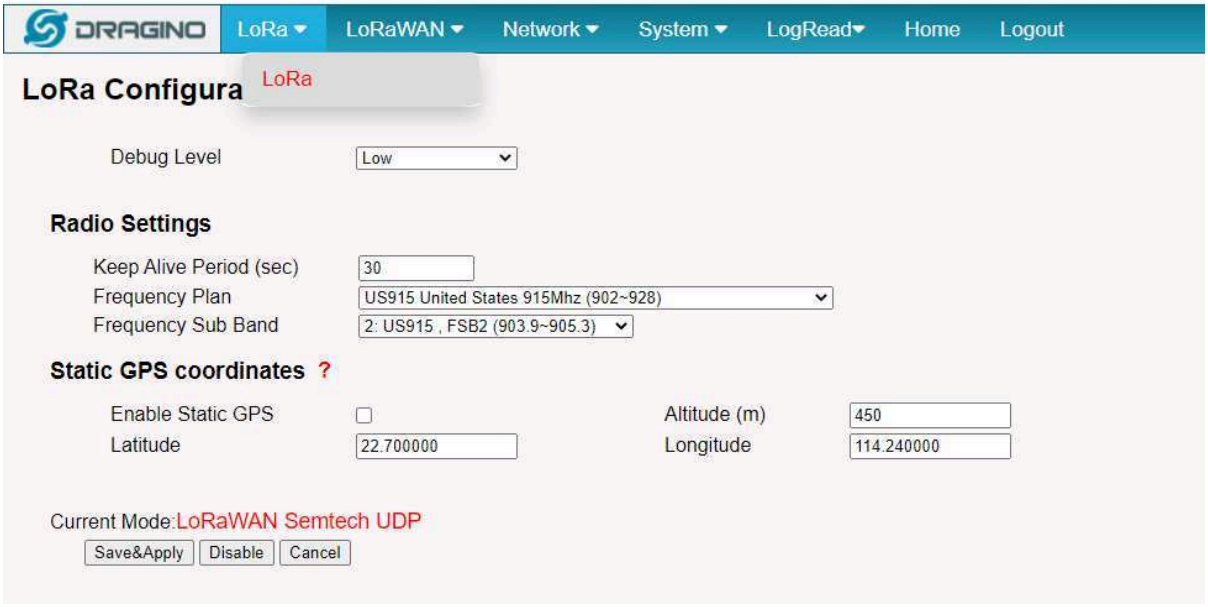

PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
SSH
Serial
Telnet
Rlogin
SUPDUP
Basic options for your PuTTY session
Specify the destination you want to connect to
Serial line
Speed
COM3
115200
Connection type:
SSH
Serial
Other:
Telnet
Load, save or delete a stored session
Saved Sessions
Default Settings
Load
Save
Delete
Close window on exit:
Always
Never
Only on clean exit
About
Help
Open
Cancel



6. Use the helium gateway-rs as the Data-only Hotspot

Step 1: Configure Frequency Band

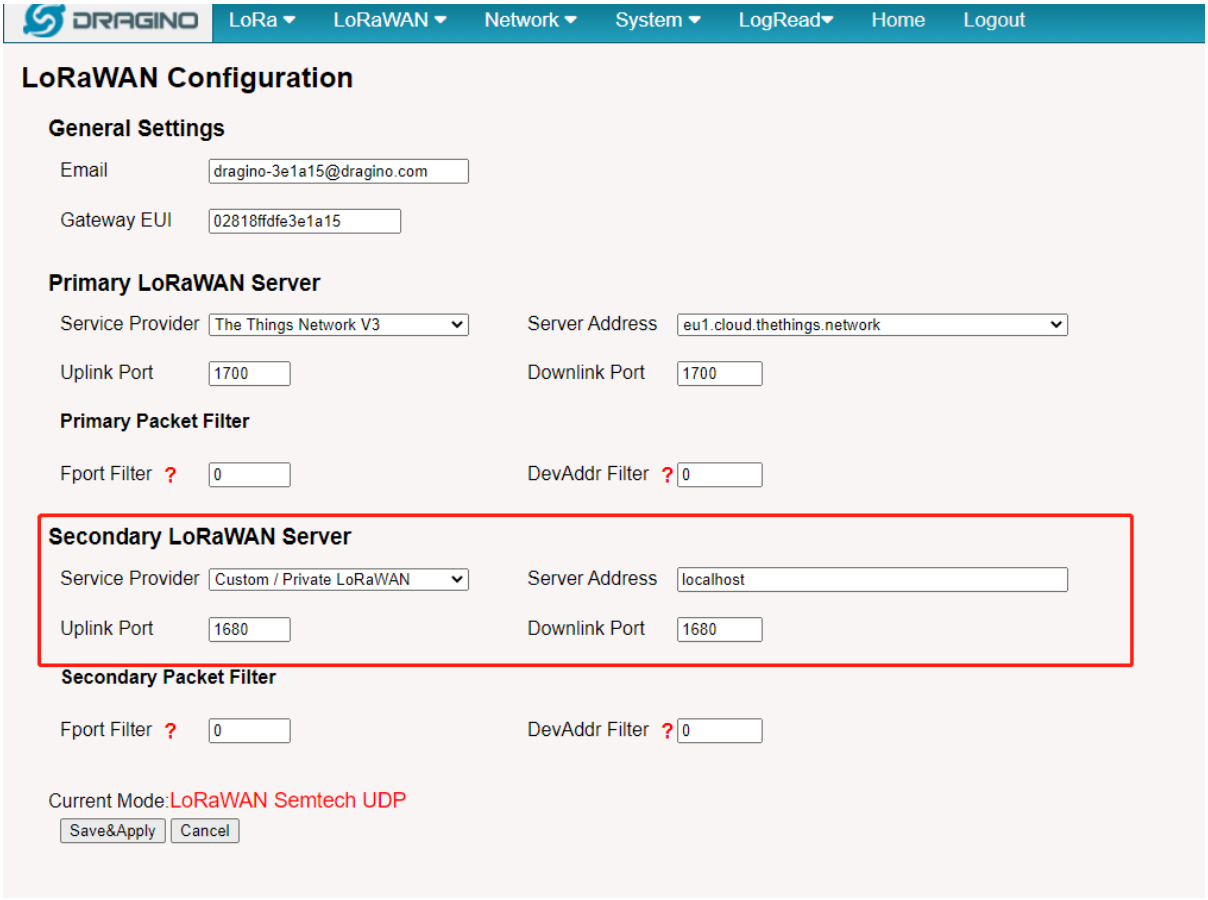
Each country has a requirement for frequency region. Choose the right one for your area.



Step 2: Configure the forward address

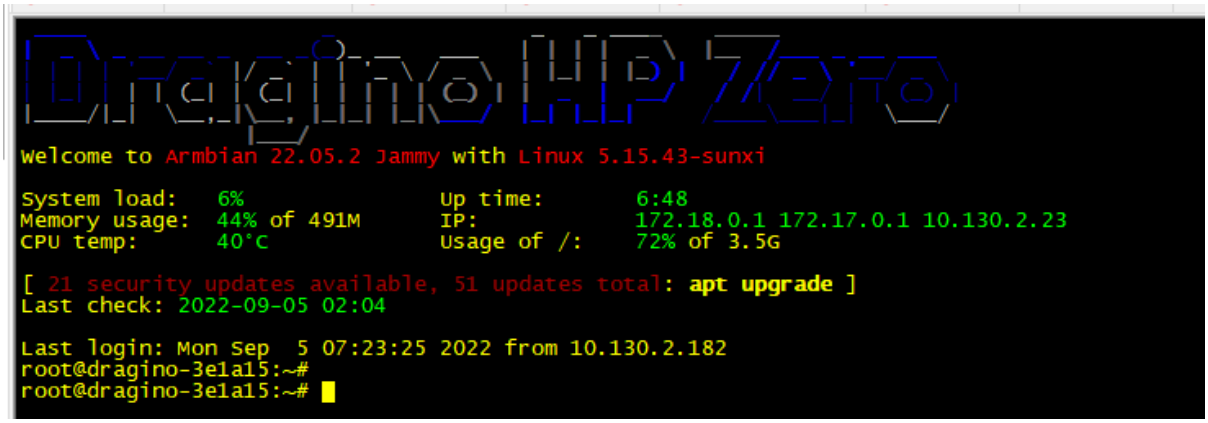
Select one of the servers to configure.

For example:



Step 3: Download and Install the Helium-gateway-rs

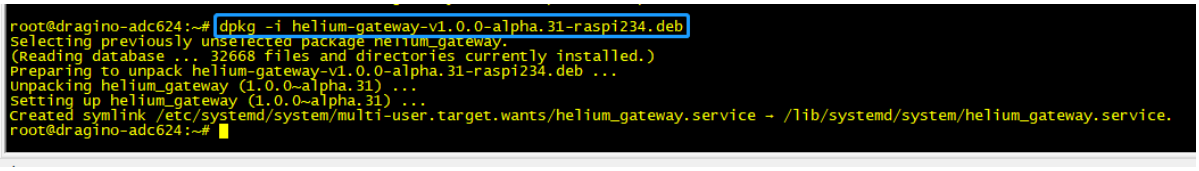
Access the gateway CLI via SSH.



Download gateway-rs.

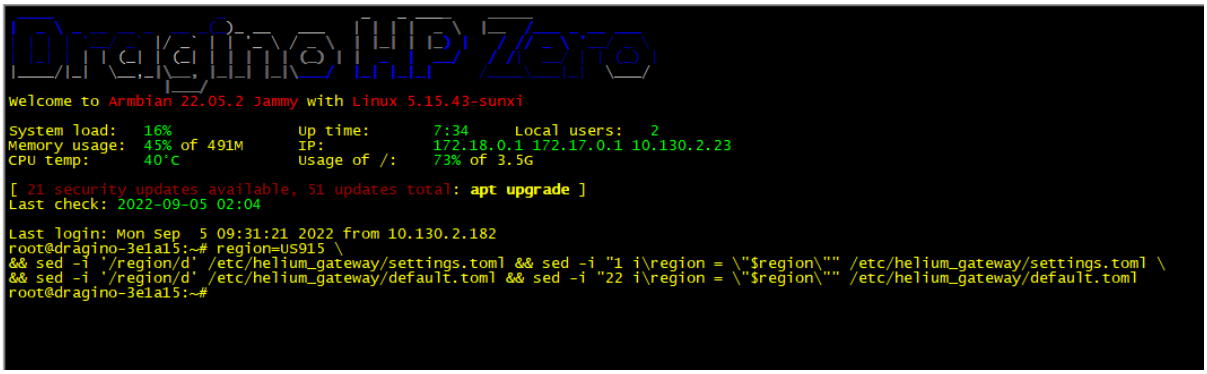
Command: wget http://repo.dragino.com/release/tool/gateway-rs/helium-gateway-v1.0.0-alpha.31-raspi234.deb

Install gateway-rs.



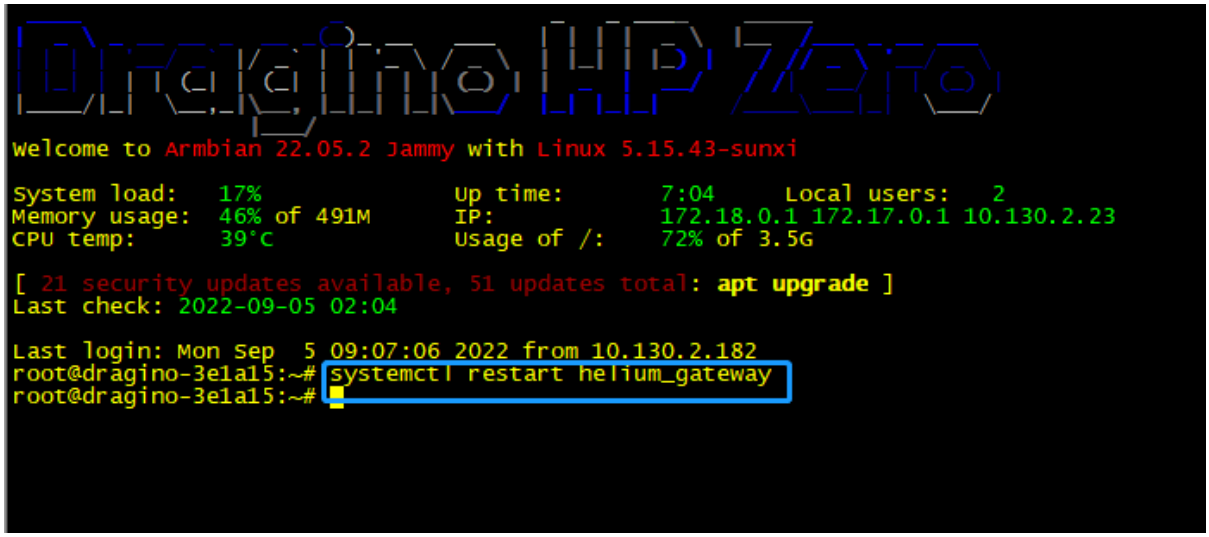
Command: dpkg -i helium-gateway-v1.0.0-alpha.31-raspi234.deb

Modify configuration.



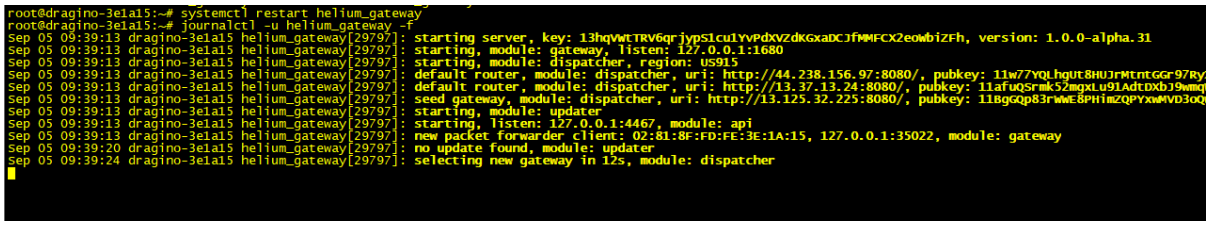
**region=<Enter regional parameters> **
**&& sed -i '/region/d' /etc/helium_gateway/settings.toml && sed -i "1 i\region = \"$region\"" /etc/helium_gateway/settings.toml **
&& sed -i '/region/d' /etc/helium_gateway/default.toml && sed -i "22 i\region = \"$region\"" /etc/helium_gateway/default.toml

Restart the helium_gateway



systemctl restart helium_gateway

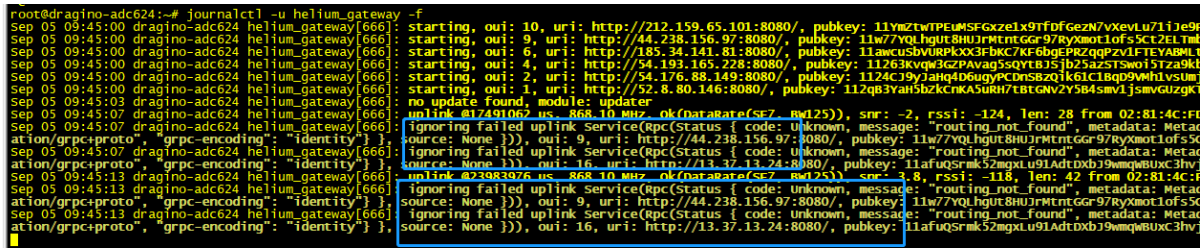
Check the helium_gateway Log:



journalctl -u helium_gateway -f

Note: if your device is not finished the onboarding, which is unable to connect to the Helium console.

where the helium gateway log is shown:



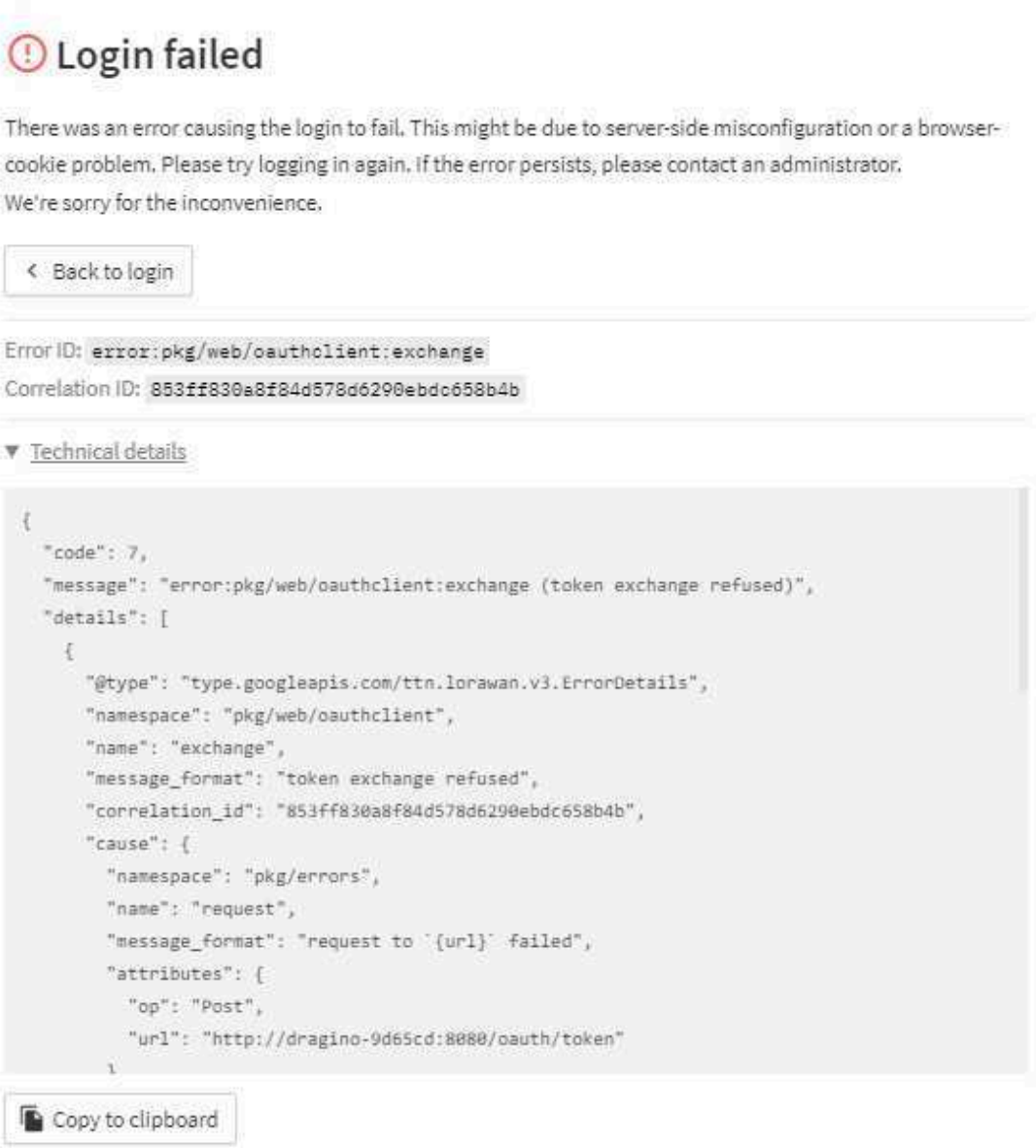
So you have to finish the onboarding, ---Please refer to Step 2.7 to onboarding your LPS8-V2.

7. OTA System Update

LPS8v2 supports system auto update via OTA, please see **this URL** for the detail of this feature.

8. Trouble Shooting

8.1 I can't log in to the built-in Server TTN Stack which shows 'Login failed'.



This is caused by the inconsistency between the built-in TTN-Stack domain configuration and your login URL.

By default, ttn-stack uses the gateway's domain name for URL resolution, but in some networks, they prefer to resolve IP-v4 addresses.

So you can change the domain name of the TTN-Stack configuration to the IPv4 address.

Click the update URL button to configure the URL with the current eth port address.

9. Supports

If you are experiencing issues and can't solve them, you can send mail to support@dragino.com.

With your question as detailed as possible. We will reply and help you in the shortest.

10. Reference

- Install Tago Core: Refer **Install Tago Core in LPS8v2** in Instruction.
- Advance OS Reference Guide for LPS8v2.

11. Order Info

LPS8v2-XXX-YYY

XXX: Frequency Band

- **AS923**: LoRaWAN AS923 band
- **AU915**: LoRaWAN AU915 band
- **EU868**: LoRaWAN EU868 band
- **KR920**: LoRaWAN KR920 band
- **US915**: LoRaWAN US915 band
- **IN865**: LoRaWAN IN865 band

YYY: 4G Cellular Option

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

More info about valid bands, please see EC25-E product page.

12. Manufacturer Info

Shenzhen Dragino Technology Development co. LTD

Room 202, Block B, BCT Incubation Bases (BaoChengTai), No.8 CaiYunRoad

LongCheng Street, LongGang District ; Shenzhen 518116,China

13. FCC Warning

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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.