HP0D Full Hotspot for Helium User Manual

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Table of Contents:

1. Introduction

1.1 What is HP0D

The HP0D is an outdoor LoRaWAN Gateway. It lets you bridge LoRa wireless network to an IP network via WiFi,Ethernet, optional 3G or 4G. The LoRa wireless allows users to send data and reach extremely long ranges at low data rates.

HP0D has passed Helium Full Hotspot Approval. It supports the **miner feature from Helium** and has a built-in ATECC608 encryption chip. It can be used as a Helium Full Hotspot for the project. It also supports Semtech packet forwarder and LoRaWAN Station connection, it is fully compatible with LoRaWAN protocol.HP0D supports two LoRaWAN servers at the same time, **users can use HP0D for helium mining and connects max 2 x LoRaWAN servers at the same time**.

Dragino already paid HP0D $40 onboarding cost and $10 location cost for each HP0D. It is ready to use for Helium, user only needs to input HNT wallet address and use QR Code to onboarding HP0D when it arrives.

HP0D has pre-configured standard LoRaWAN frequency bands to use for different countries. Users can also customize the frequency bands to use in their own LoRaWAN network.

1.2 Specifications

Hardware System:

Linux Part:

- Raspberry Pi 4

Interface:

- 10M/100M RJ45 Ports x 1
- LoRaWAN Wireless
- Power Input: 12V 2A, DC

Operating Condition:

- Work Temperature: -20 ~ 65°C
- Storage Temperature: -20 ~ 65°C
- Power Input: 12V 2A, DC

1.3 Features

- Open-Source Linux system
- RPi4 with 2G /4G or 8G RAM
- Managed by Web GUI, SSH via Internet
- Support Semtech UDP packet forwarder
- Support LoRaWAN Station Connection
- Support Helium Miner
- External fiberglass antenna
- Firmware OTA
- 802.3af PoE
- Lighting Protection
- Remote Monitoring
- Support Helium LoRaWAN server and secondary LoRaWAN server
- Include prepaid $40 onboarding cost and $10 location cost.
- Remote.it remote management (https://wiki.dragino.com /index.php?title=Reverse_SSH_Access#Use_Remote.it_service) .

1.4 Label info and login name

1.4.1 Label information:

Device hostname: dragino-xxxxxx
Band: US915/AU915/AS923_1-AS923_4/KR920/EU868/IN865/RU864
Miner animal name: xxx-xxx-xxx
Miner address: 12xxxxxx
Eth MAC address: A8: 40: 41: EF: FE: CD
Login: root/d59f2d5b (the root is the Login account for the Web-UI and SSH.)
SN: device serial number.

2. Quick Start & Onboarding

The HP0D is configured as a Wi-Fi Access Point by factory default. You can access and configure the HPD after connecting to its Wi-Fi network, or via its WAN Ethernet port.

2.1 Connect HP0D Web UI

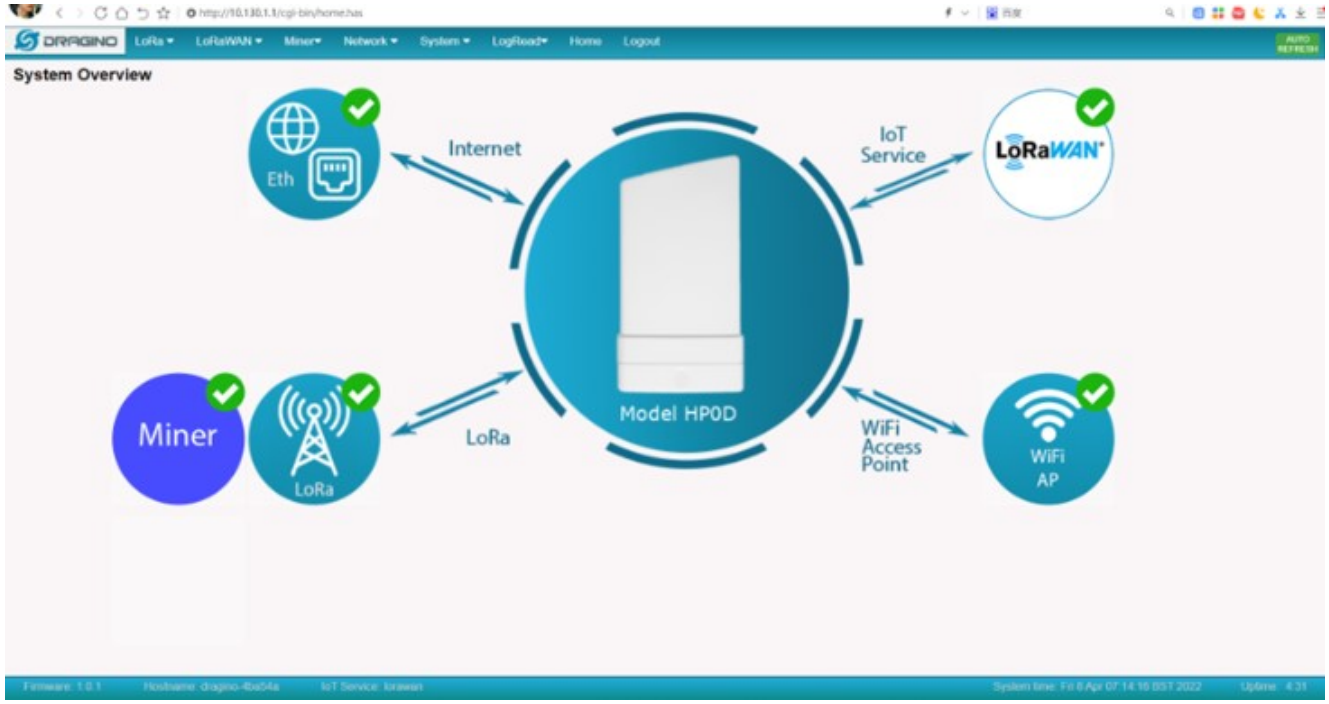
2.1.1 via HP0D's Access Point

At the first boot of HP0D, it will auto-generate a Wi-Fi network

called : ***HPD-dragino-xxxxxx***

with password: ***dragino+dragino***

You can use a PC to connect to this Wi-Fi network. The PC will get an IP address 10.130.1.xxx and the HP0D has the default IP 10.130.1.1



2.1.2 Connect via HP0D hostname

Connect the HP0D Ethernet port to your router and HP0D will obtain an IP address. If your PC(Windows/Mac/Ubuntu) connects to the same network with the HP0D, you can access the HP0D Web-UI via HP0D's hostname.

Like: ***http://dragino-4ba54a***

2.1.3 Connect via Ethernet Port

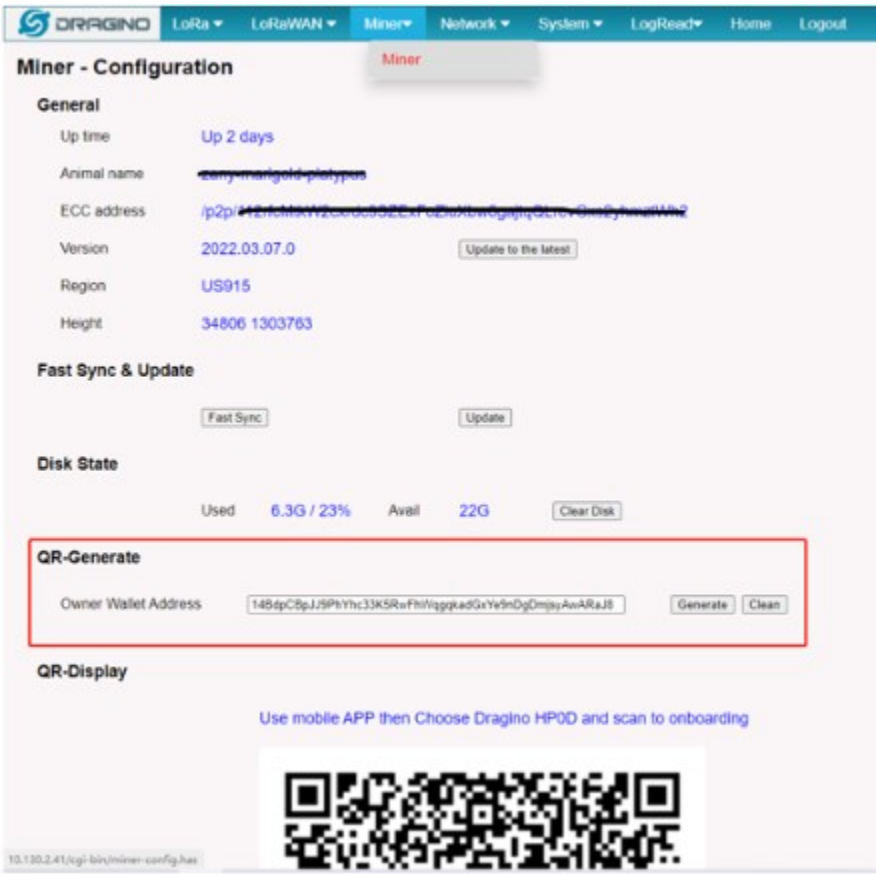
Connect the HP0D Ethernet port to your router and HP0D will obtain an IP address from your router. In the router's management portal, you should be able to find what IP address the router has assigned to the HP0D.

If you get the IP address from the router, like: 10.130.2.42 , you can use this IP address to connect the WEB UI or SSH access of HP0D.

2.2 Generate QR Code

*Go to **Miner** --> **QR Generate**, input your Helium Wallet Address, and click Generate.*

Note: After onboarding, this wallet will become the owner of this hotspot.

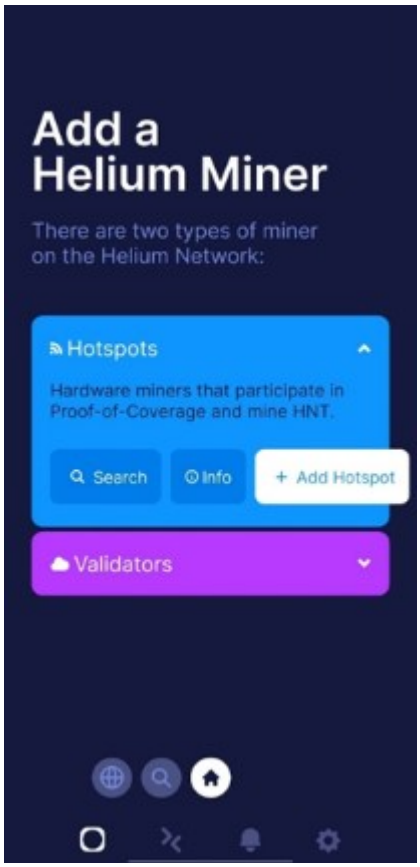


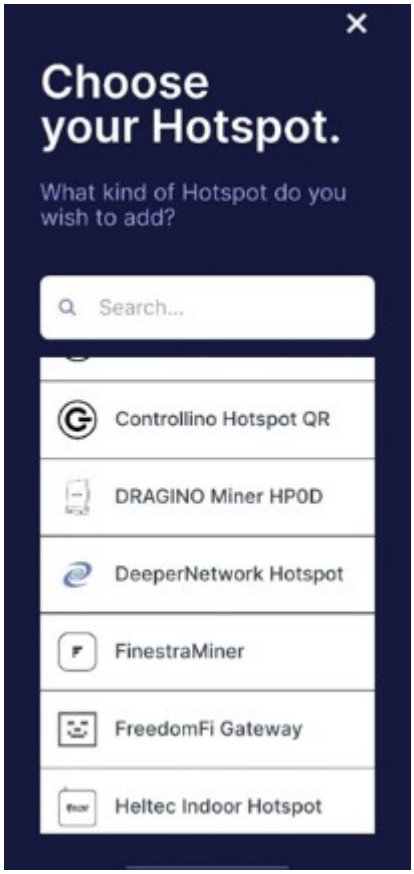
2.3 Onboarding Hotspot

1. *Download the Helium Hotspot APP from the Apple or Google Play store.*

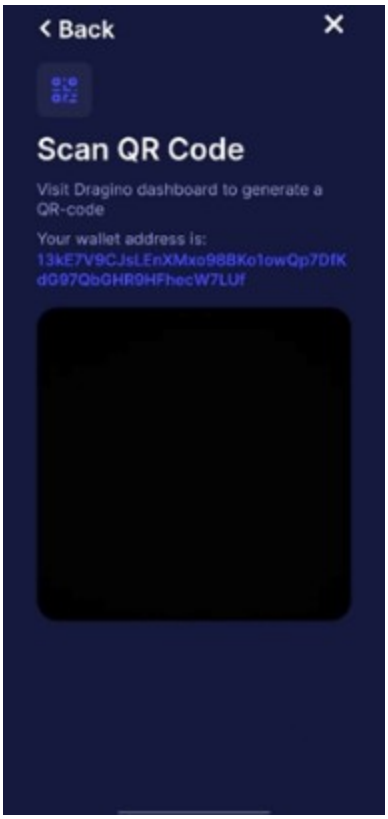
Note: the APP version needs to be greater than 3.11.

2. *To add a hotspot, select* ***"Hotspot"****. On this tab, click the* ***"+ Add Hotspot"*** *in the mid where choose the* ***"DRAGINO Miner HP0D"***



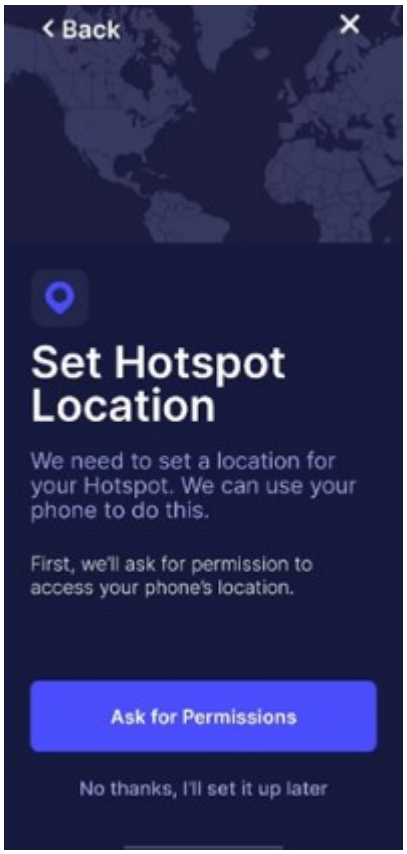


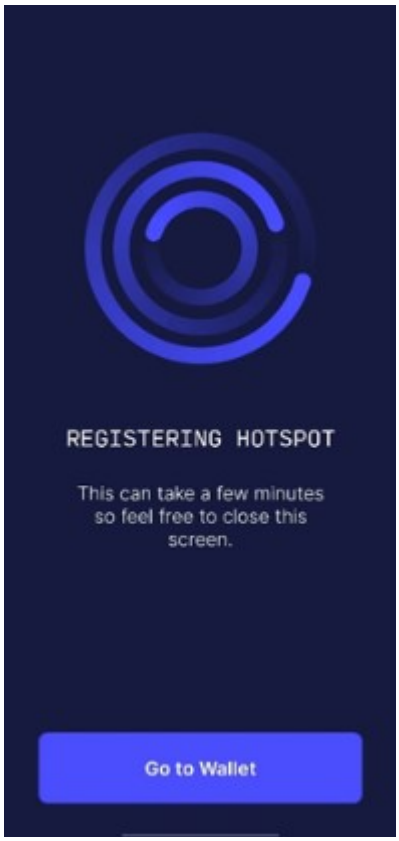
3. *Scan the QR Code you generated in the previous step.*



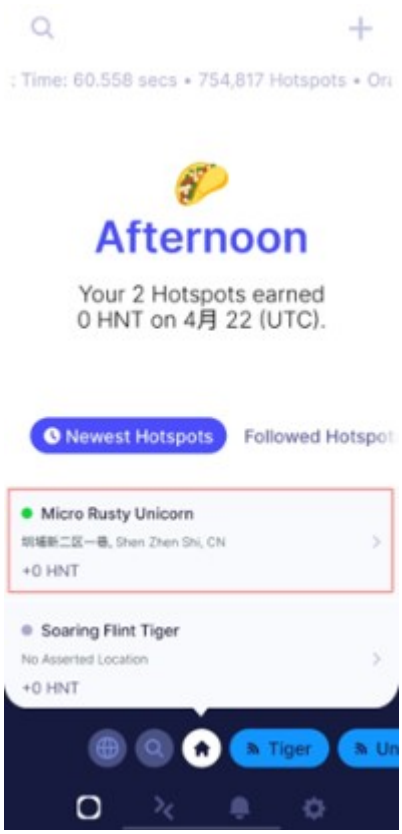
4. *Onboarding your device*

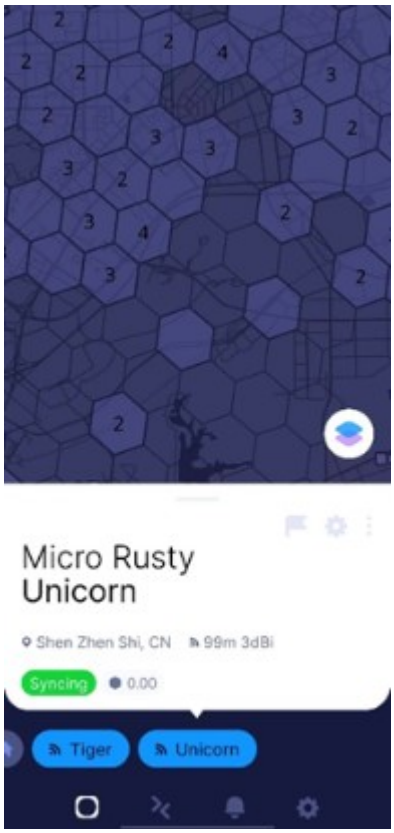
Mobile APP will get info from the onboarding server. If the MAC address doesn't appear, it means the network connection of the mobile to the onboarding server might have an issue.





5. *Check onboarding status where you can check from mobile:*



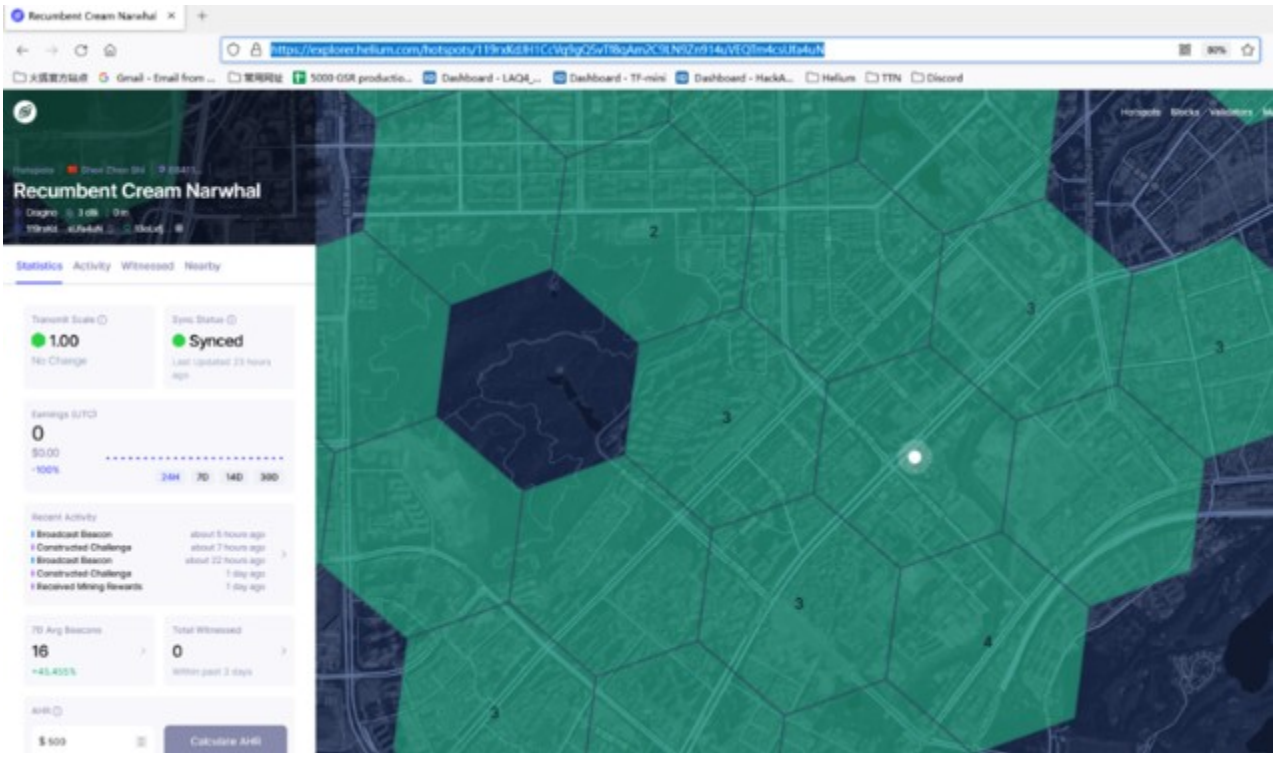


You can also see the hotspot status in the below link:

*https://explorer.helium.com/hotspots/**< YOUR_HOTSPORT_KEY >***

Example:

Green Synced means hotspot works normally.



2.4 Set the Port Forwarding

Helium Hotspots may not work if the Hotspot is behind a firewall or uses an incompatible NAT type. Other times it may be because of a router configuration or the internet is offline. This article aims to help resolve any issues you may have.

- **44158/TCP**: the Miner communicates to other Miners over this port. The networking logic knows how to get around a lack of forwarding here, but you will get better performance by forwarding the port
- **1680/UDP**: the radio connects to the Miner over this port. You will not be able to forward packets or participate in Proof of Coverage without this

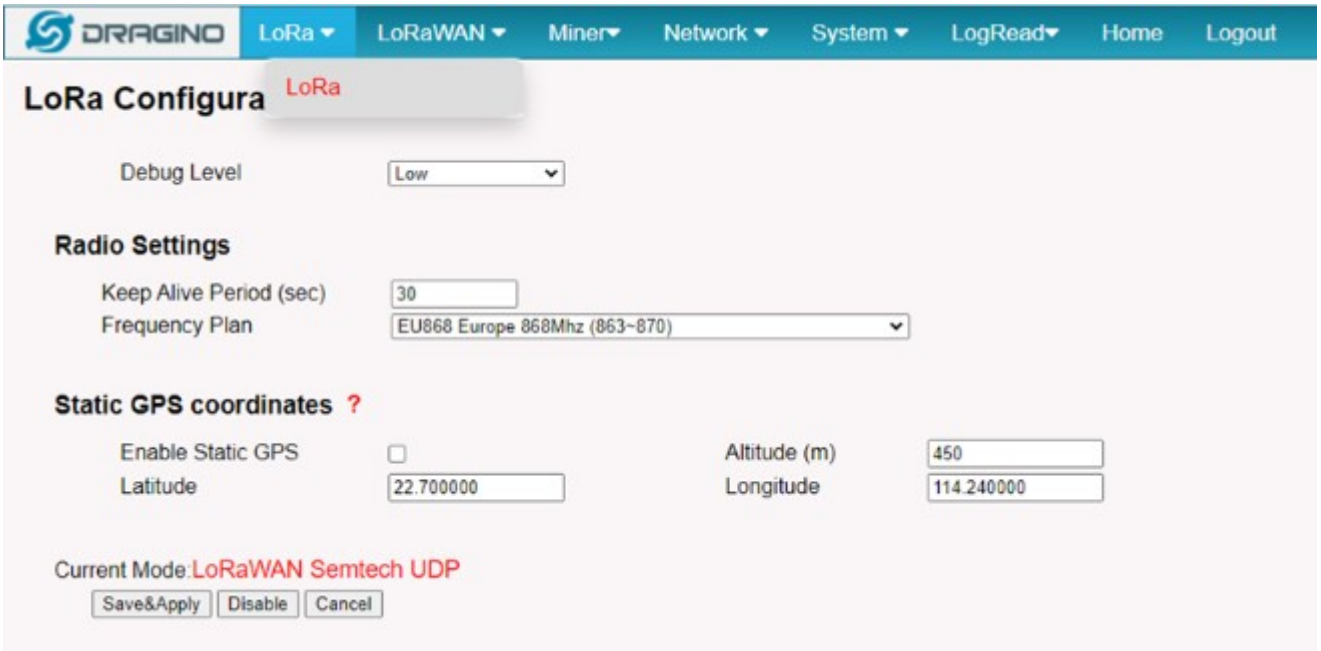
Note: Please refer to more detailed Settings

https://docs.helium.com/troubleshooting/network-troubleshooting/ (https://docs.helium.com/troubleshooting/network-troubleshooting/)

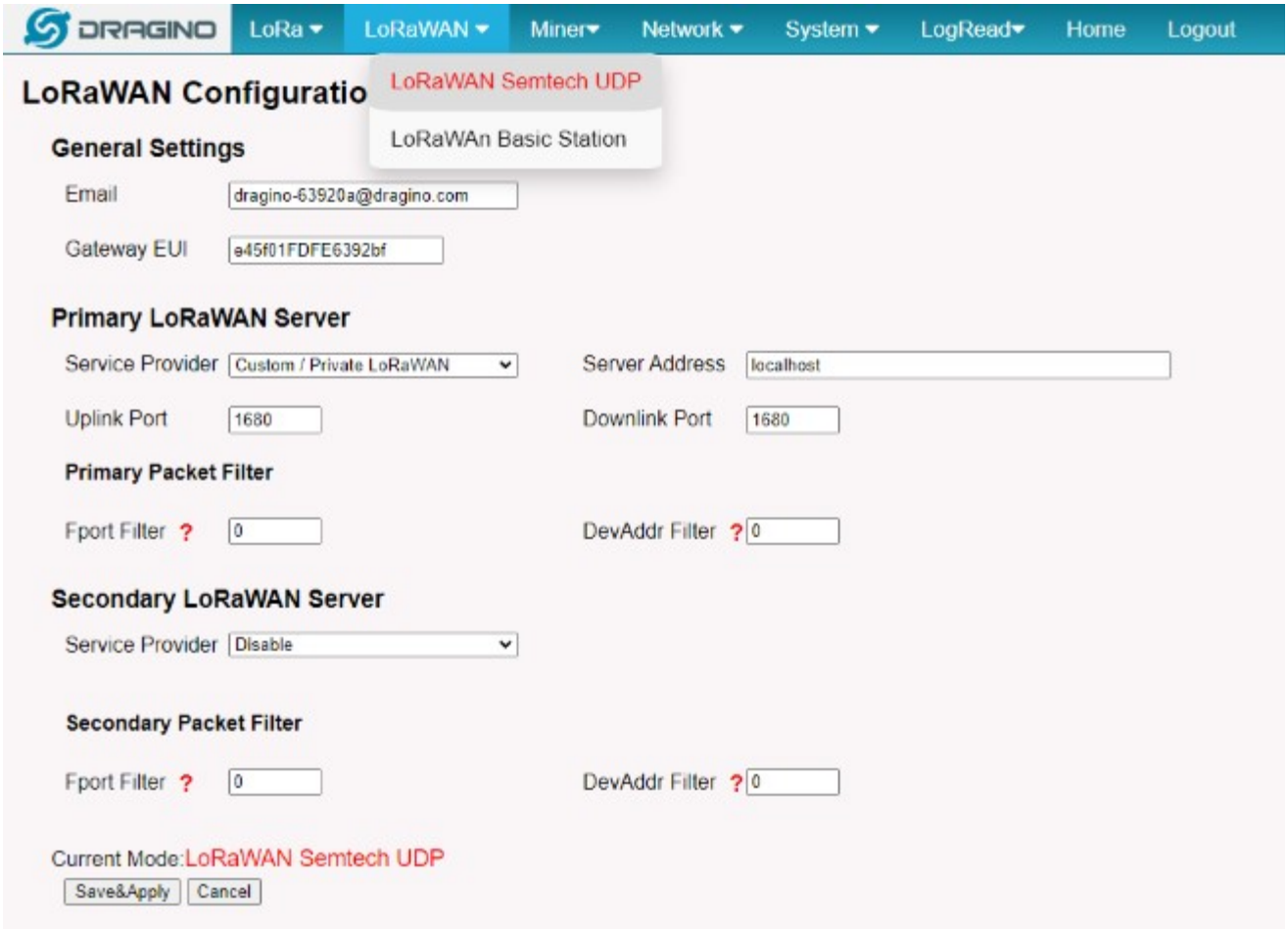
https://www.youtube.com/watch?v=GKusVC7ovrE (https://www.youtube.com/watch?v=GKusVC7ovrE)

3. Check the configuration of HP0D

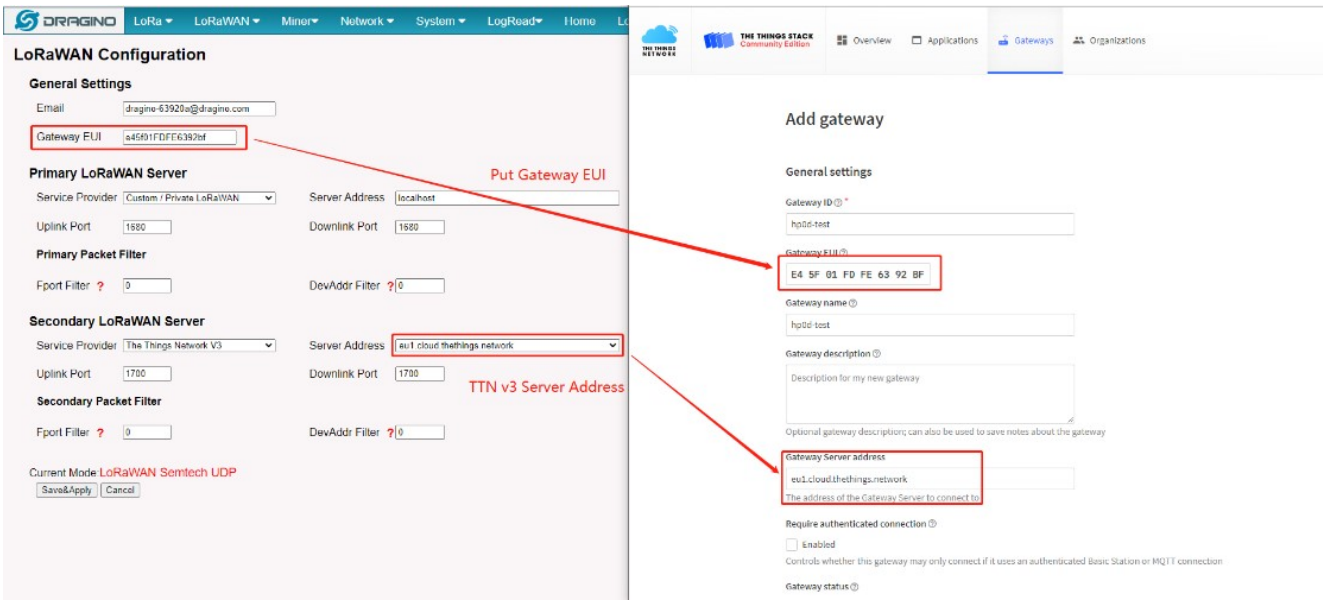
3.1 LoRa frequency configuration

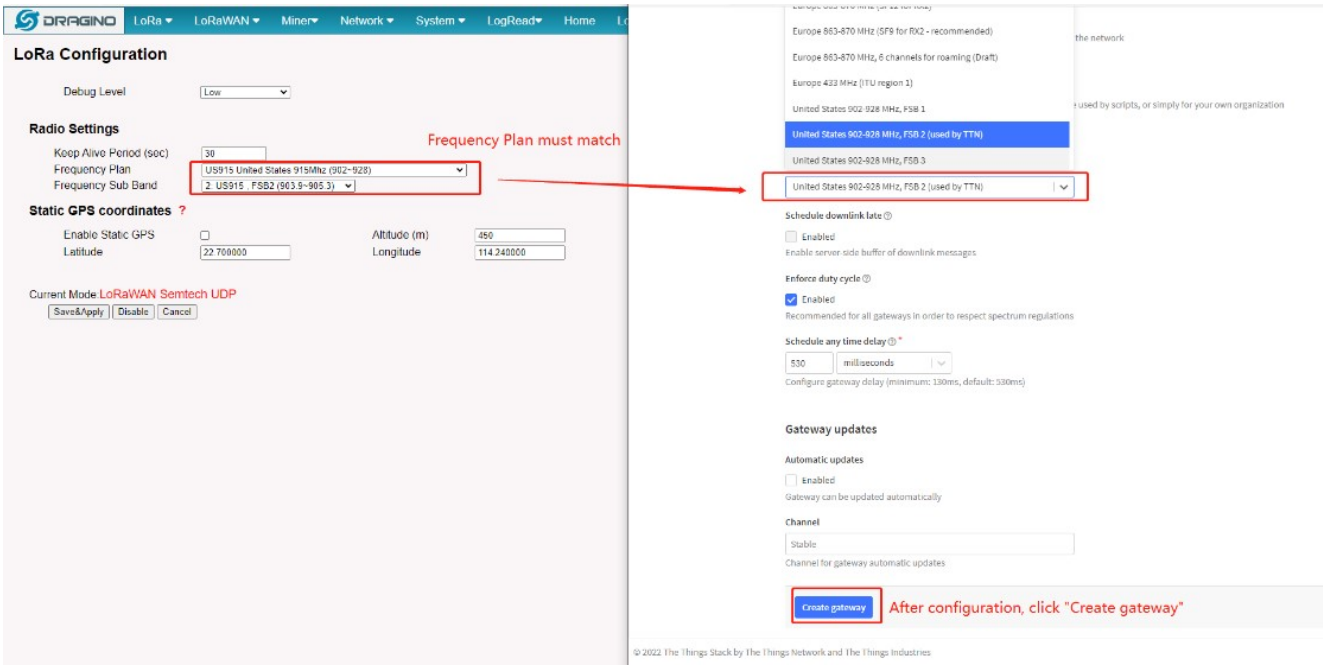


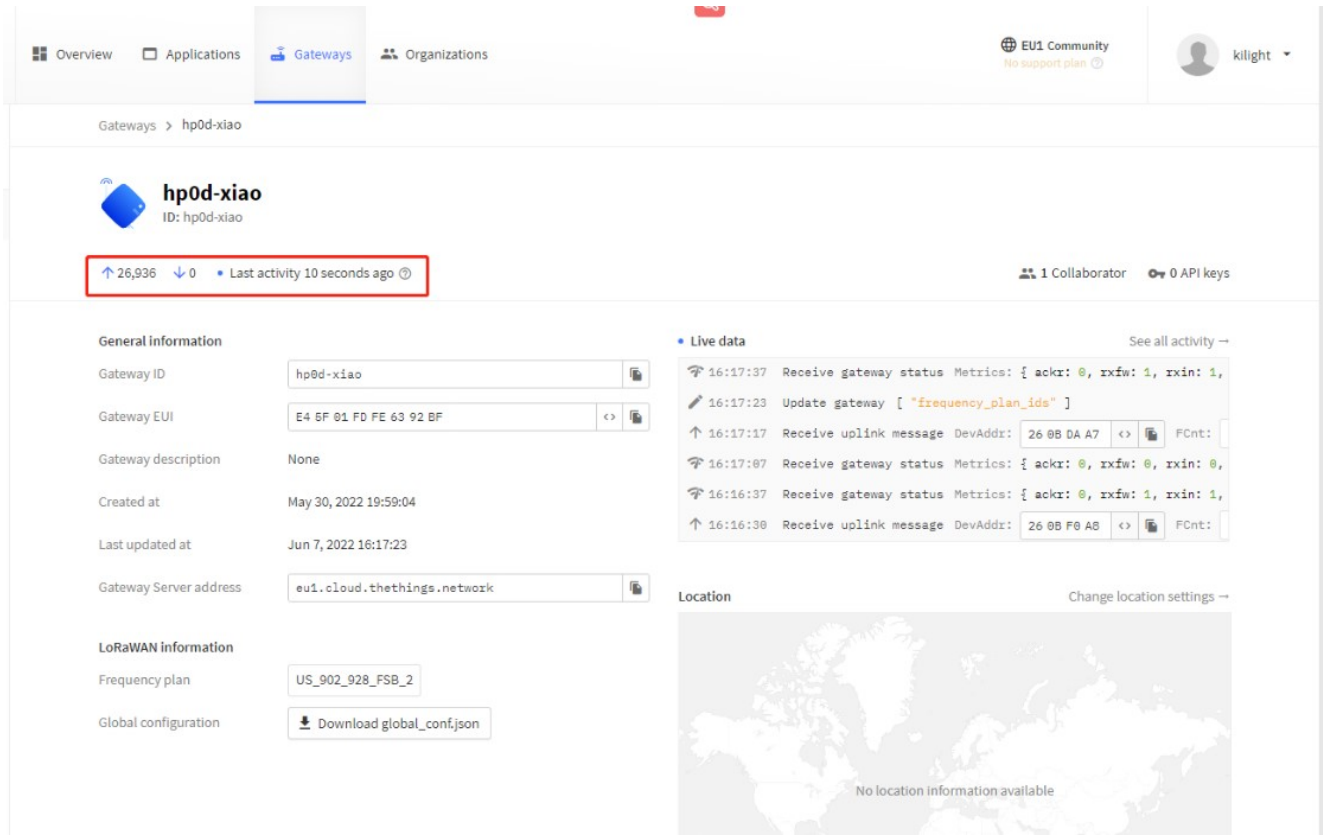
3.2 Check the LoRaWAN Server Address



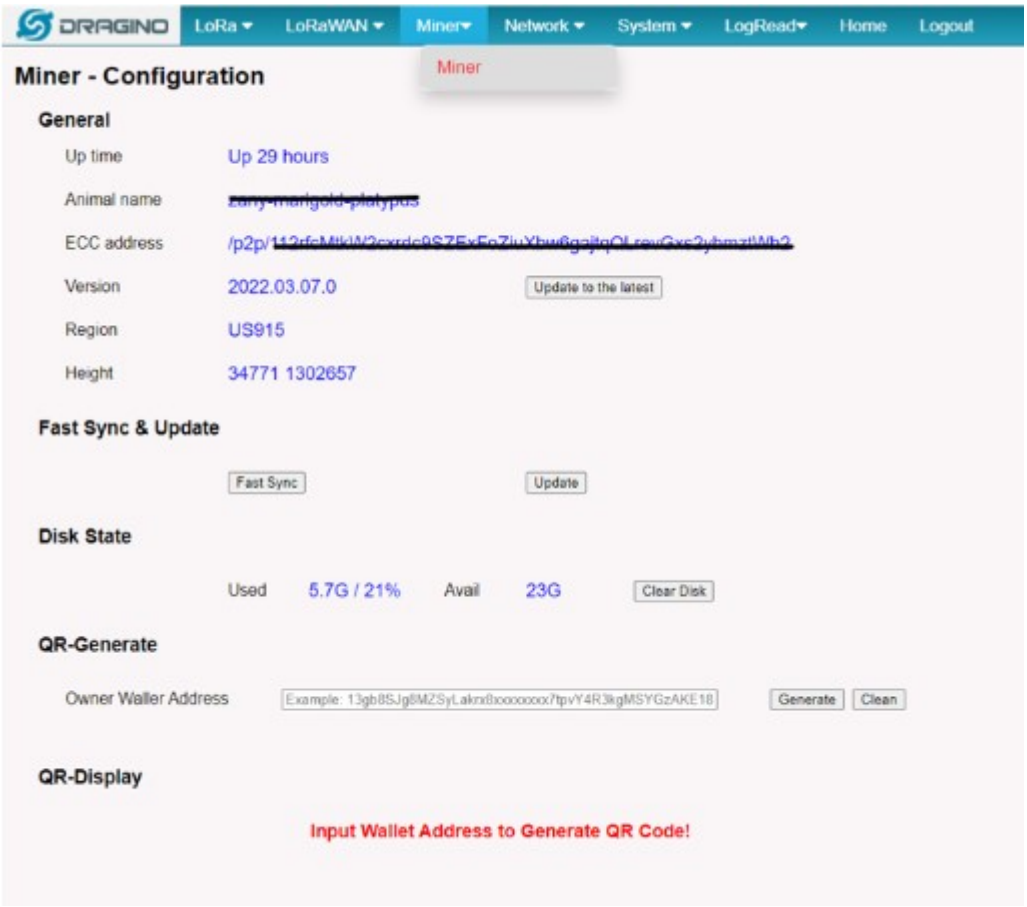
3.2.1 Configure the Secondary LoRaWAN Server





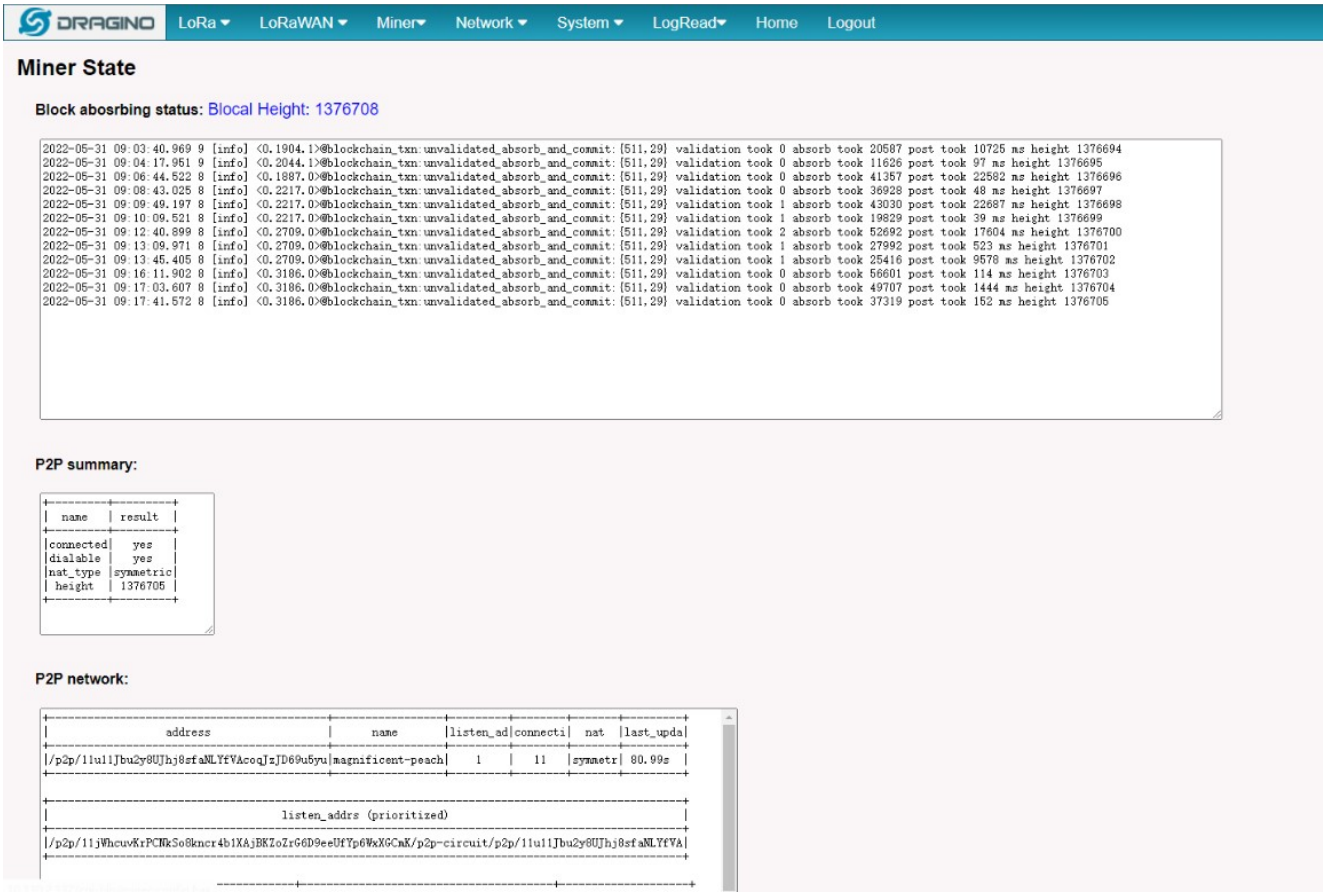


3.3 Check Miner configuration



Note: Check the Region and Height, the default height is greater than 1, if it is 1 please Click the mid button of Update, and then wait 10mins to check here.

3.4 Check the Miner state



Note: Absorption status can show whether the hotspot is working properly The p2p network can see how your hotspot is interacting with the surrounding hotspots usually, the nat_type should be 'none'

4. Installation of Antenna

HP0D uses Fiber Glass Antenna.

The user needs to connect the antenna cable's SMA connector to the HP03 and connect the N-Type connector to the antenna and install it as below:

5. SSH Access for Linux console

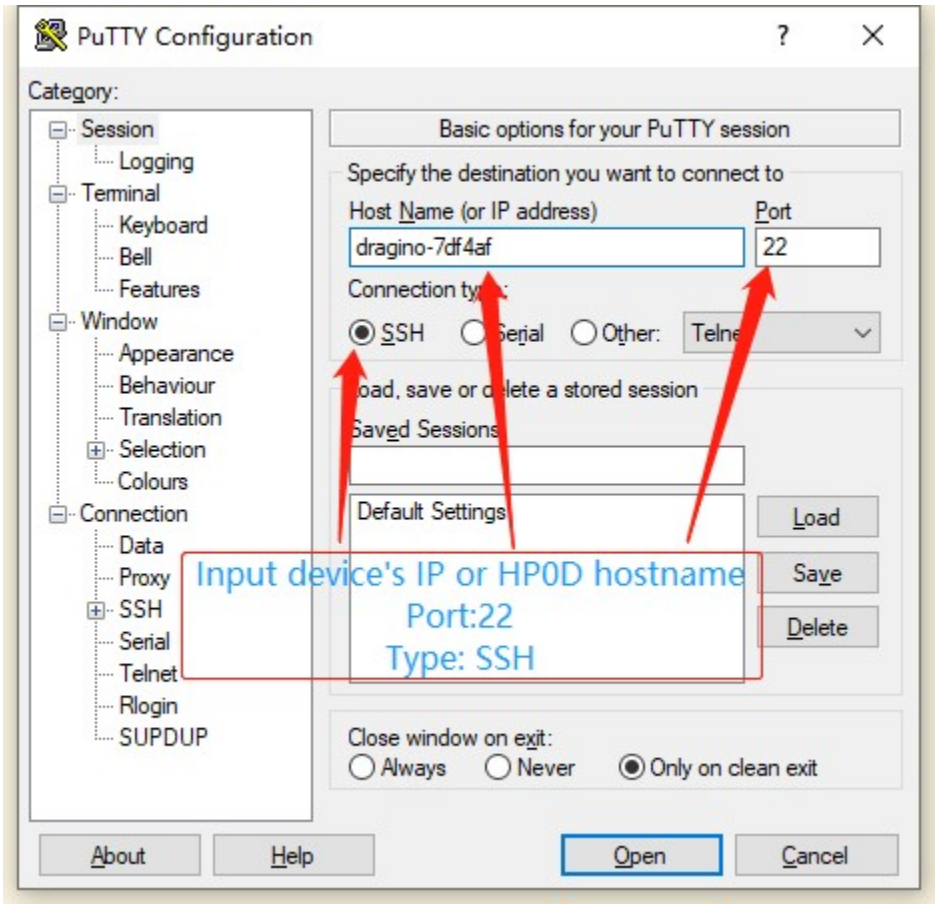
Connect the HP0D Ethernet port to your router and HP0D will obtain an IP address from your router.

In the router's management portal, you should be able to find what IP address the router has assigned to the HP0D.

You can use this IP or hostname of HP0D to connect the WEB UI or SSH access of HP0D.

*Make sure your PC and the HP0D are in the same network, the use an SSH tool (such as **putty (http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html)**) to access it.*

Below are screenshots:



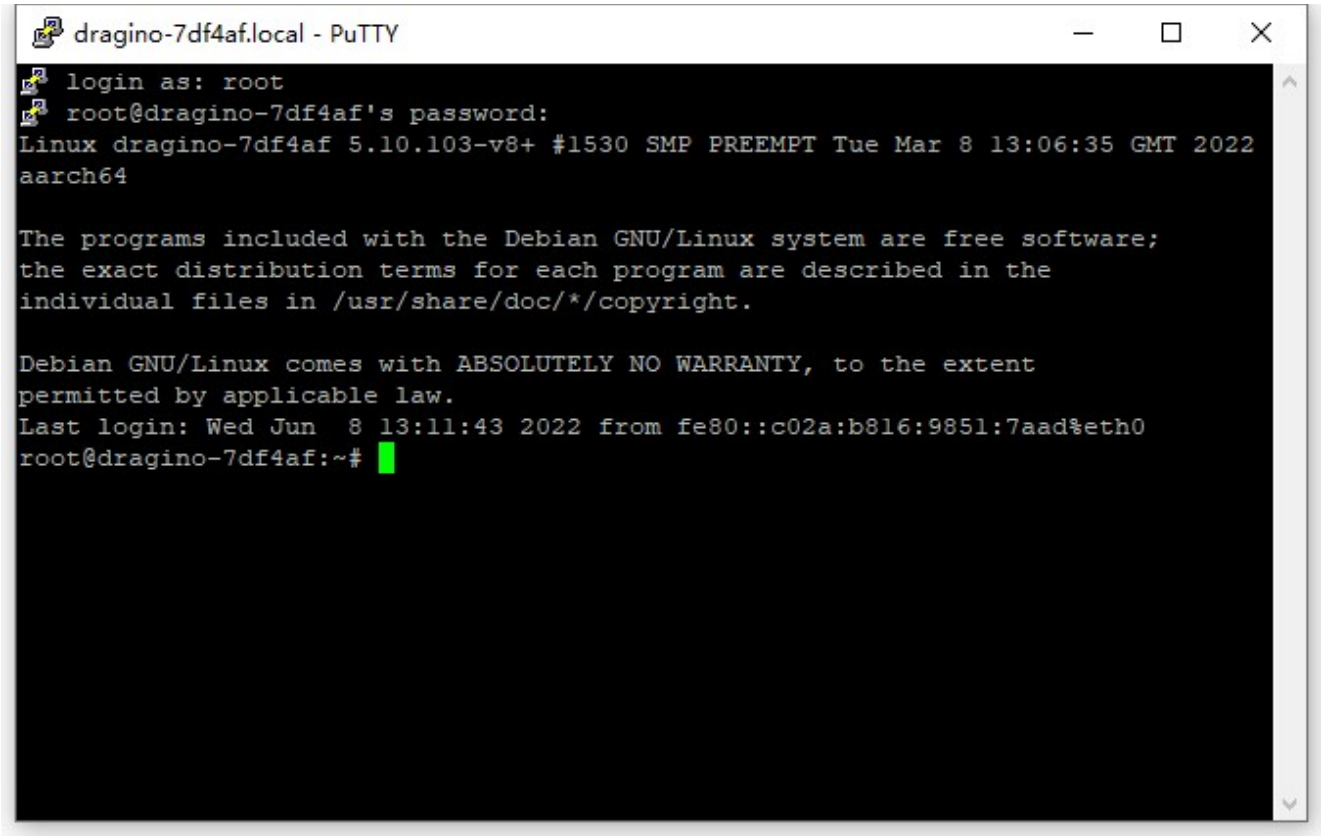
IP address: ***IP address of HP0D or hostname of HP0D (Such as dragino-7df4af)***

Port: ***22***

User Name: ***root***

Password: ***Randomly generated (found on device's label)***

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



6. How to change the Wireless function of HP0D

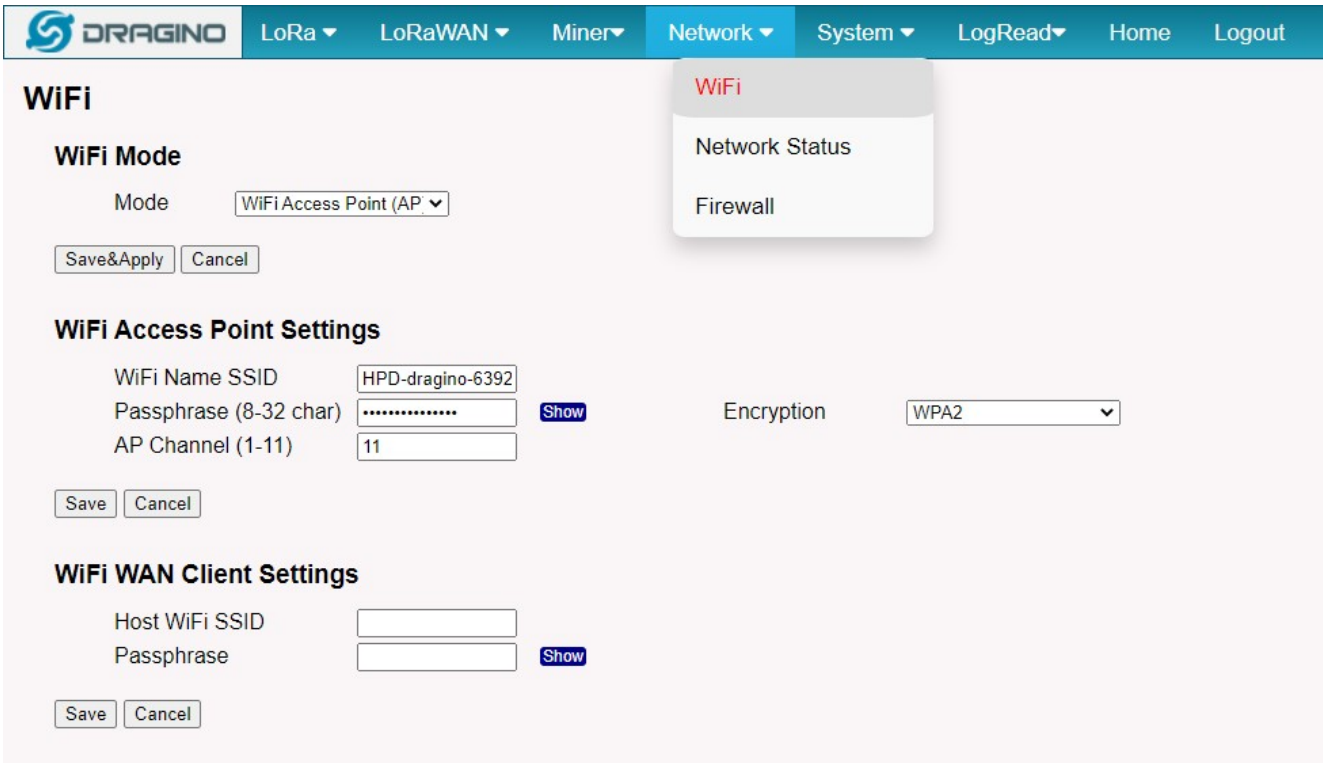
The wireless function is configured as AP by default and the web page does not support configuration,

if you want to configure it as STA(client)connection mode,

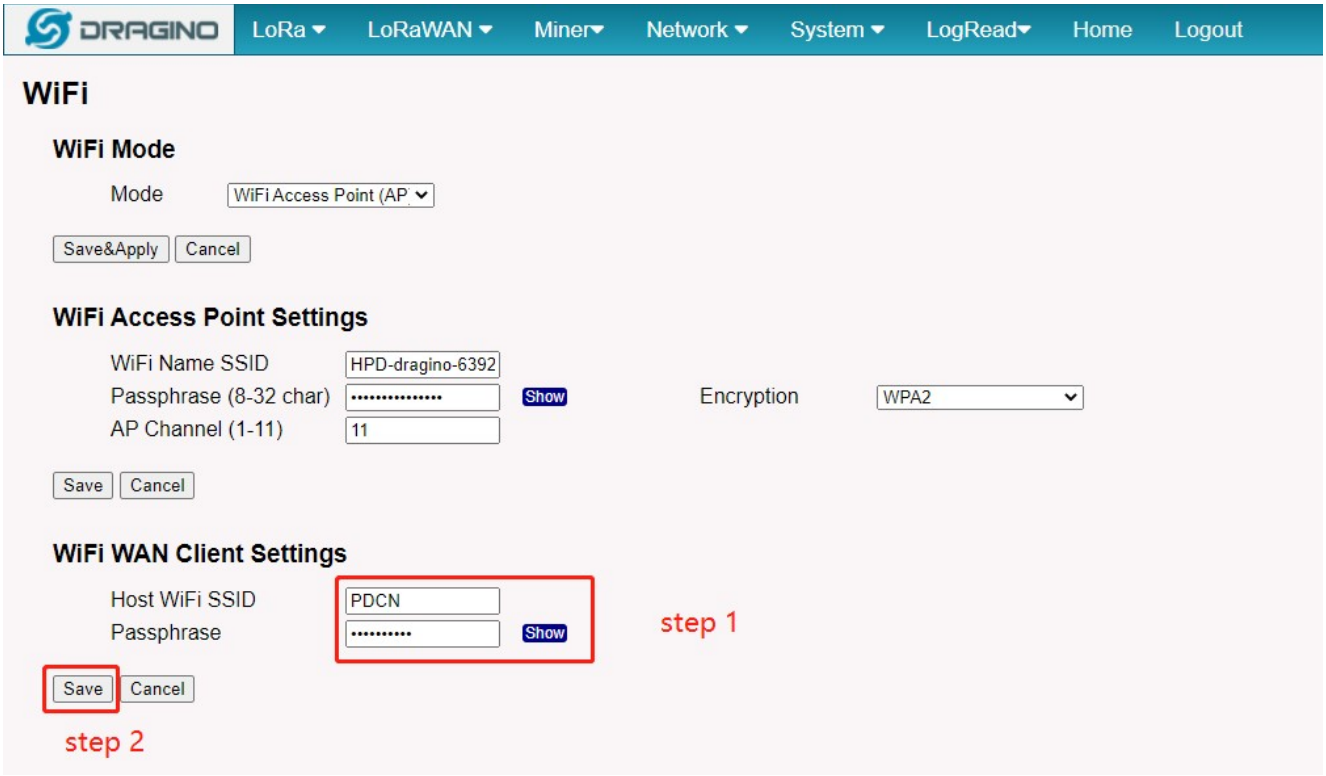
*you can configure your WiFi info on the **/Network/WiFi** page.*

Note: the wireless state is as AP

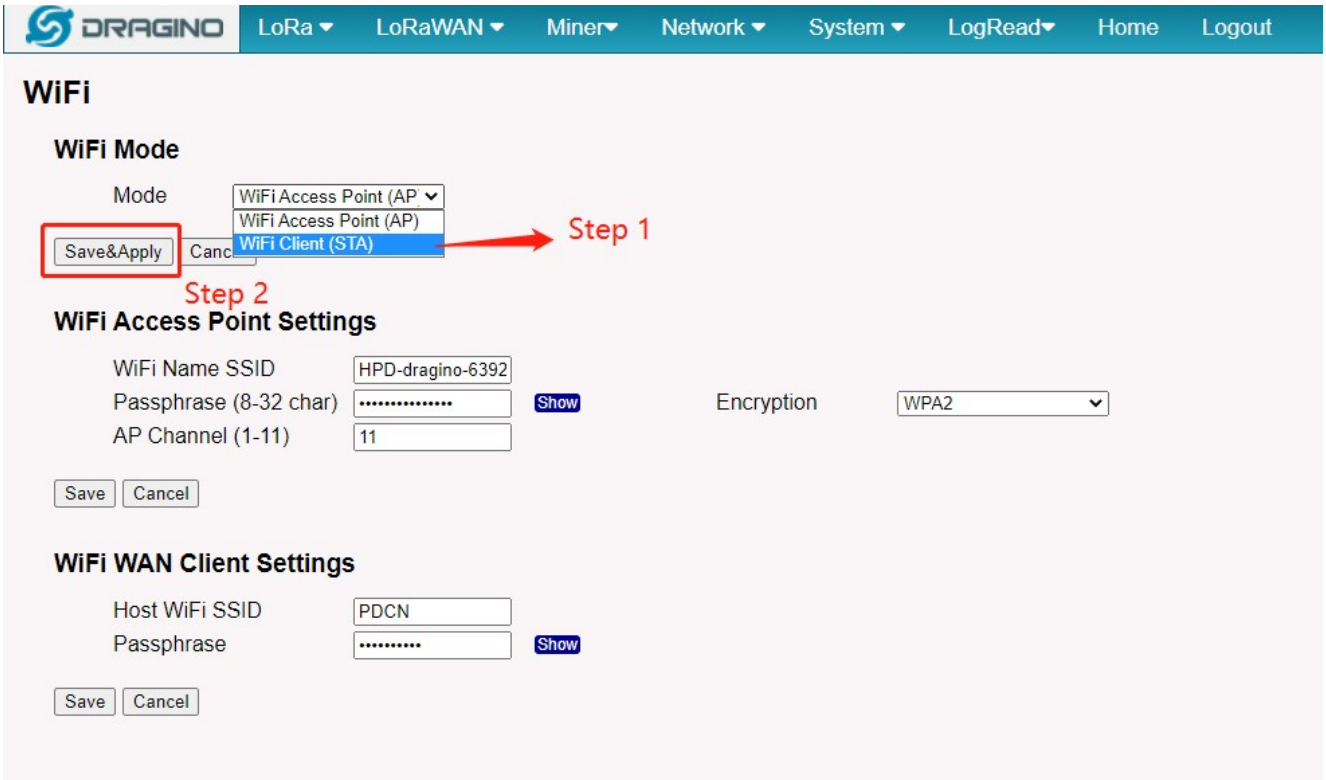
6.1 Access WiFi configuration page



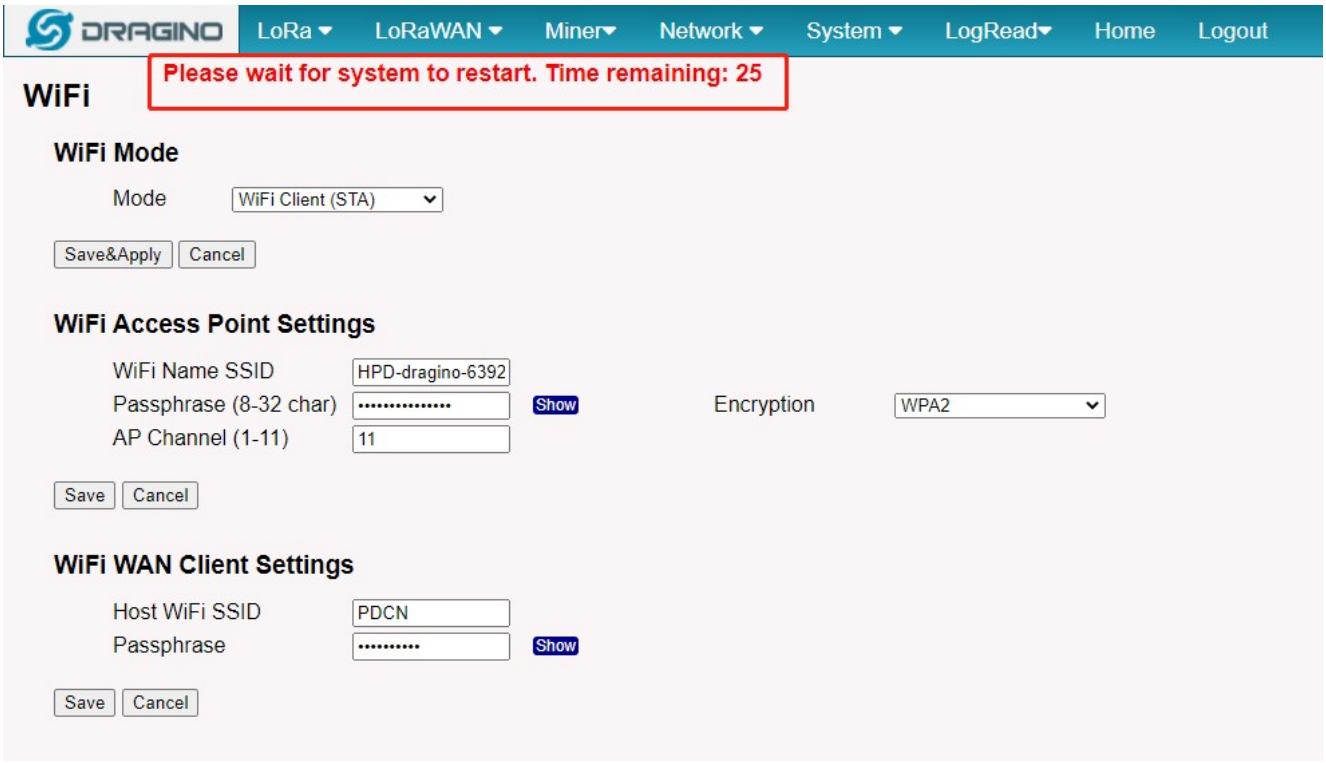
6.2 Enter your WiFi information and save



6.3 Change the WiFi mode.



6.4 Wait system to restart



Note: When the time remaining is finished it will turn to the home page.

6.5 Check the STA state

7. Trouble Shootings

7.1 How to get a wallet address?

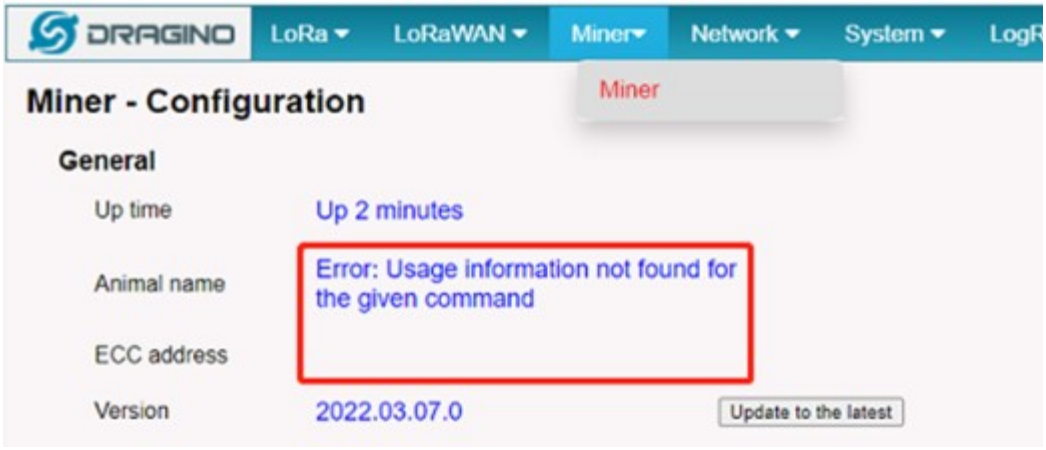
Download the helium Hotspots APP on the Apple or Google Play store to generate your own wallet.

7.2 Onboarding -- Unable to access Web-UI --> Miner

Users can log in to the HP0D, able to access other Web Pages except for the miner page.

If you first boot the device where you need to wait for 10 mins for the initialization connection to the Helium server.

7.3 Onboarding -- Some parameters on the miner page show timeout



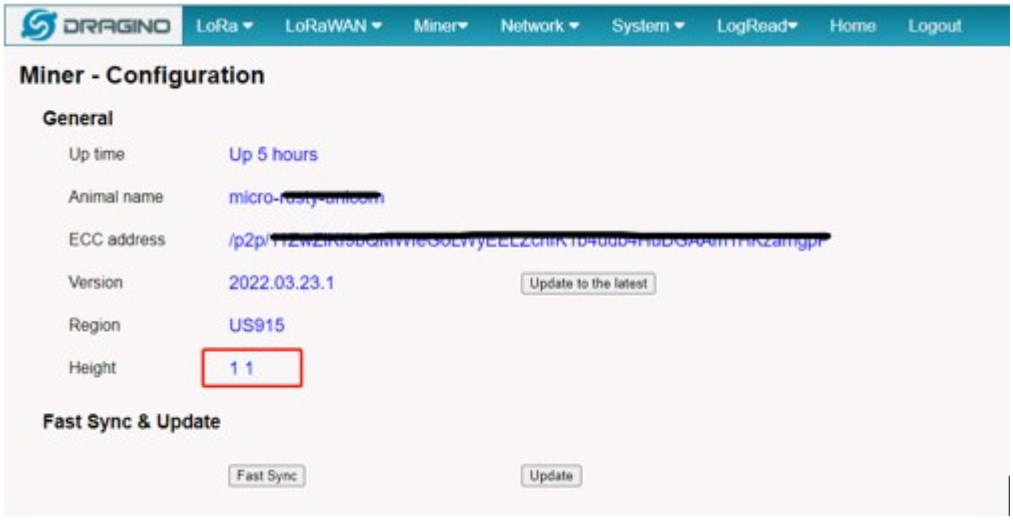
HP0D is establishing a connection to the Helium server and is not finished. And you might see above.

It might relate to the network which might be up to 10mins.

7.4 Onboarding – Bad Gateway

This is caused by the process leading too long which just needs to refresh the page.

7.5 Onboarding -- Why did QR Code generate aways fail?



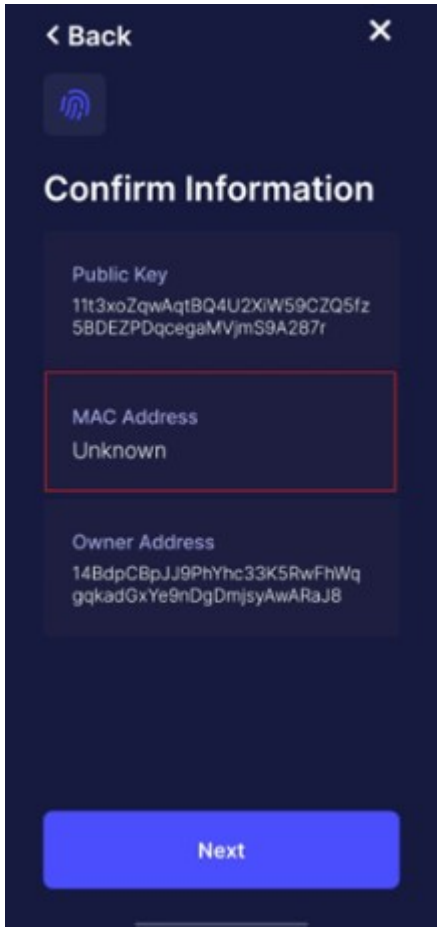
This may be related to the current block height, if the device is synchronizing to the latest height or if the device block height is much lower than the current height as the above picture like '1 1', the QR code generation may fail.

7.6 Onboarding -- Why is the QR Code not quite the same as the manual?

Please ensure that you enter the correct wallet address and that your network is up and running, the user can click the button of 'Clean' to re-generate the QR Code.

7.7 Onboarding – MAC address is 'Unknown' after

scan QR Code

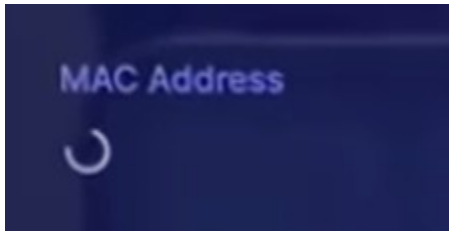


If you see the MAC Address shows the 'Unknown' where is due to the provisioning error, please contact us to help you solve it.

7.8 Onboarding – MAC address is being refreshed after scanning the QR Code

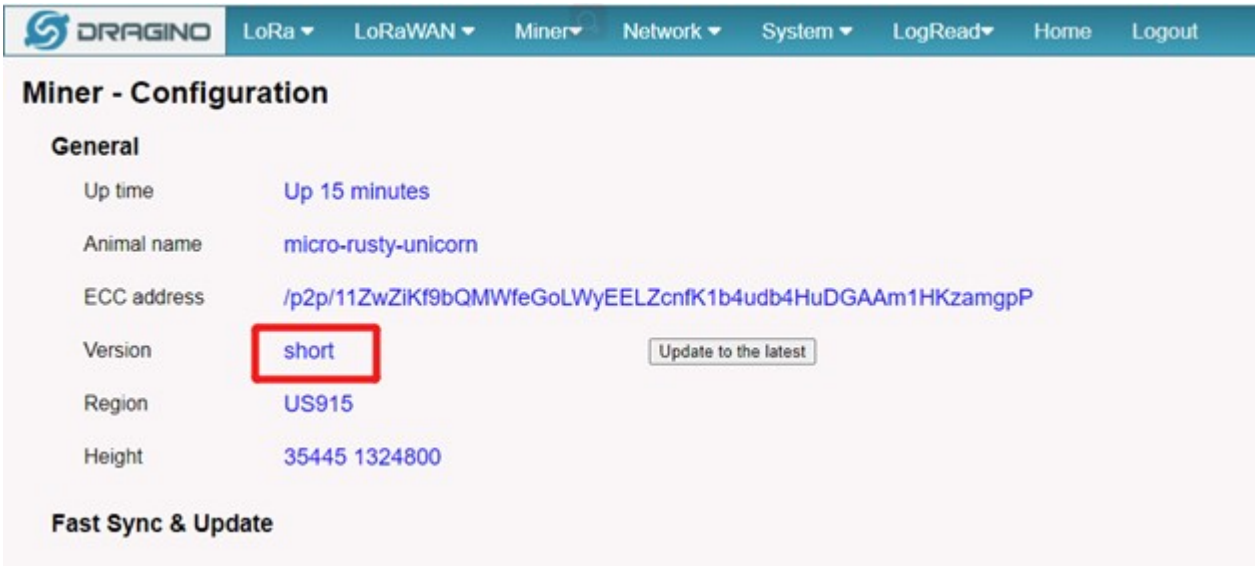
After scanning the QR Code, Mobile APP will connect to the Helium onboarding server and provide the public key/ wallet address to the onboarding server. The server will return the match MAC address for this hotspot.

If you don't see the MAC address, make sure your mobile has a good internet connection.



7.9 HP0D Web --> Miner --> Version shows ‘short’

This is caused by the server connection delay, which does not affect the regular use.



7.10 Mobile APP crash after scanning the QR Code?

- ***Make sure you have input the correct Wallet address to generate QR Code.***
- ***Make sure your mobile app uses the same wallet address as the one to generate QR Code.***
- ***Make sure your mobile app's relevant permission is enabled.***
- ***Known: The Android 11 version may cause this kind of issue.***

7.11 Why the frequency/region is not the same as what I purchased?

Each HP0D is inspected and configured prior to shipping.

If your HP0D Web-UI – Miner region is not the same as the shell labels, please contact our support team that will solve this issue for you.

7.12 Can use the frequency to a region where is no support?

Please make sure that the region supports this frequency, you can confirm the appropriate frequency through this link:

https://docs.helium.com/lorawan-on-helium/frequency-plans (https://docs.helium.com/lorawan-on-helium/frequency-plans)

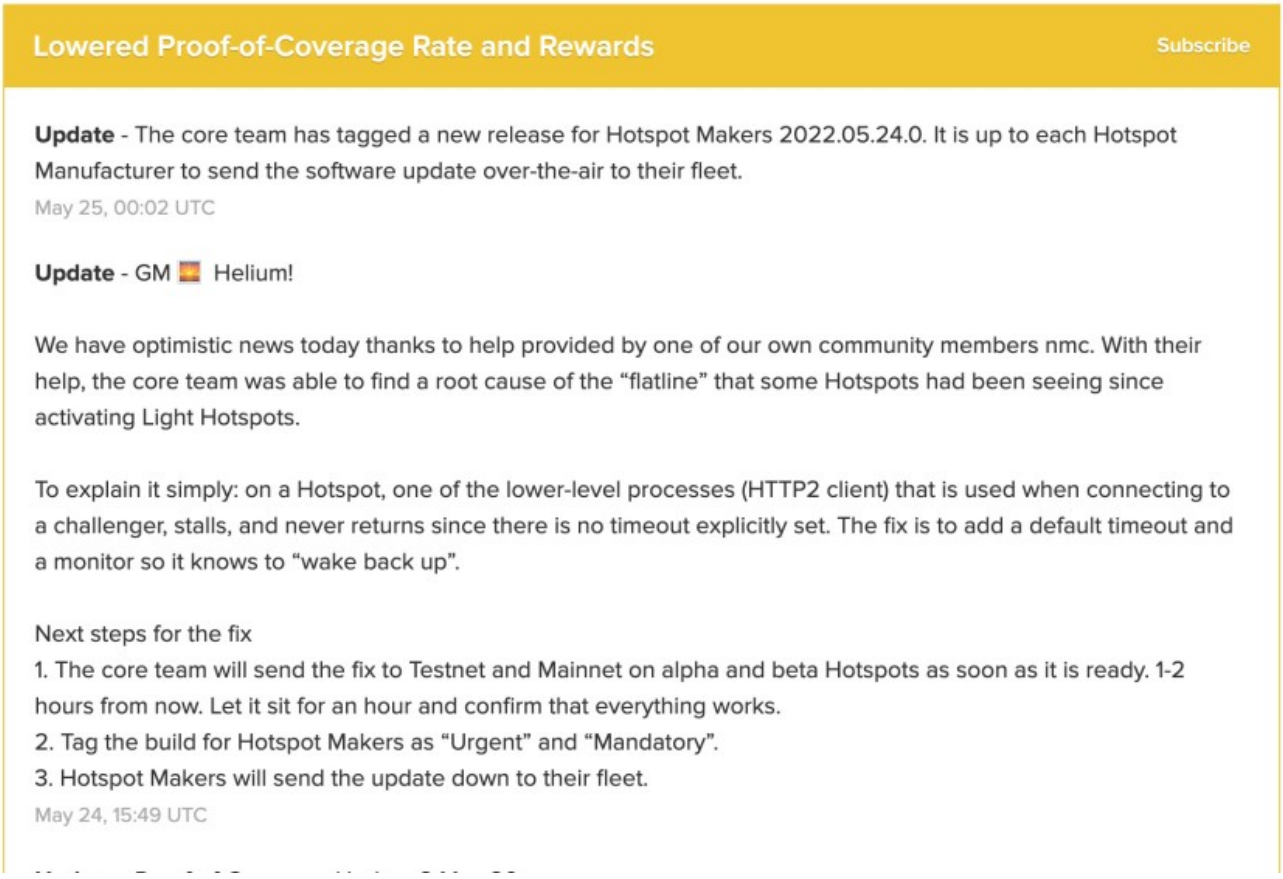
7.13 Can change the frequency of the HP0D Miner?

We do not recommend doing this, it may damage your device

7.14 Low Reward and not transmit issue

We had released the 0524 version for the miner, Users can check the miner version in the HP0D web UI.

If it is lower than the 0524 version, users can manually upgrade it via the 'draginoups' command in the HP0D's CLI.



7.15 Why is my miner version not the latest

By default, as soon as a new version of helium is released, we will push the upgrade the same day.

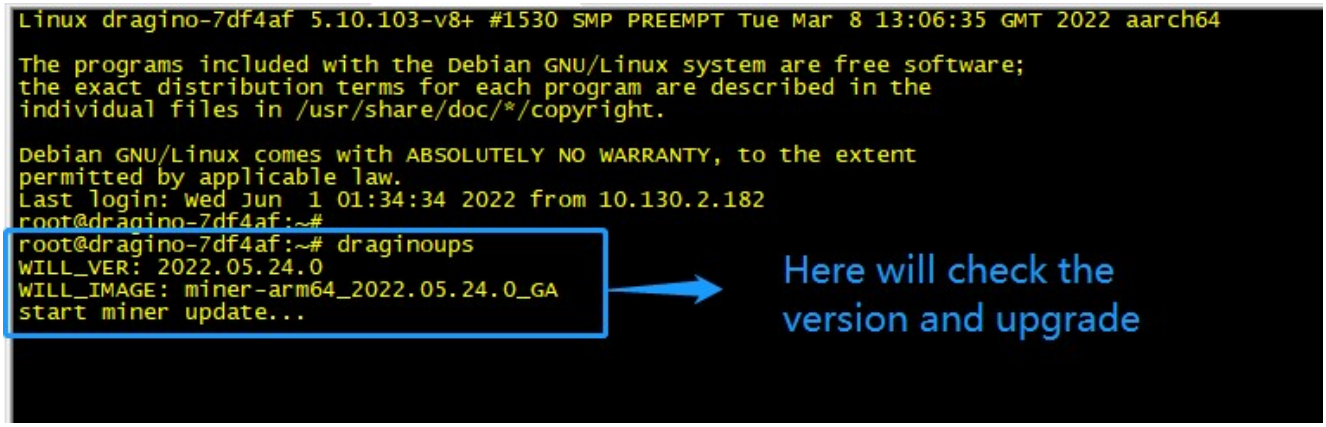
However, the download and upgrade may fail due to the network.

You can reboot your hotspot where the hotspot will try to upgrade when per booting.

*and **We offer manual check methods:***

Use the "draginoups" command to check

***Note: How to access the hotspot CLI refer to (Such as Step 5**. (http://8.211.40.43/xwiki/bin/view/Main/User%20Manual%20for%20All%20Gateway%20models/HP0D#H5.SSHAccessforLinuxconsole))*



7.16 Why is my miner running down?

the default, the Miner is managed by docker.

If you find the miner is offline where the miner is running down.

What You can do?

1. Reboot the hotspot and check again.

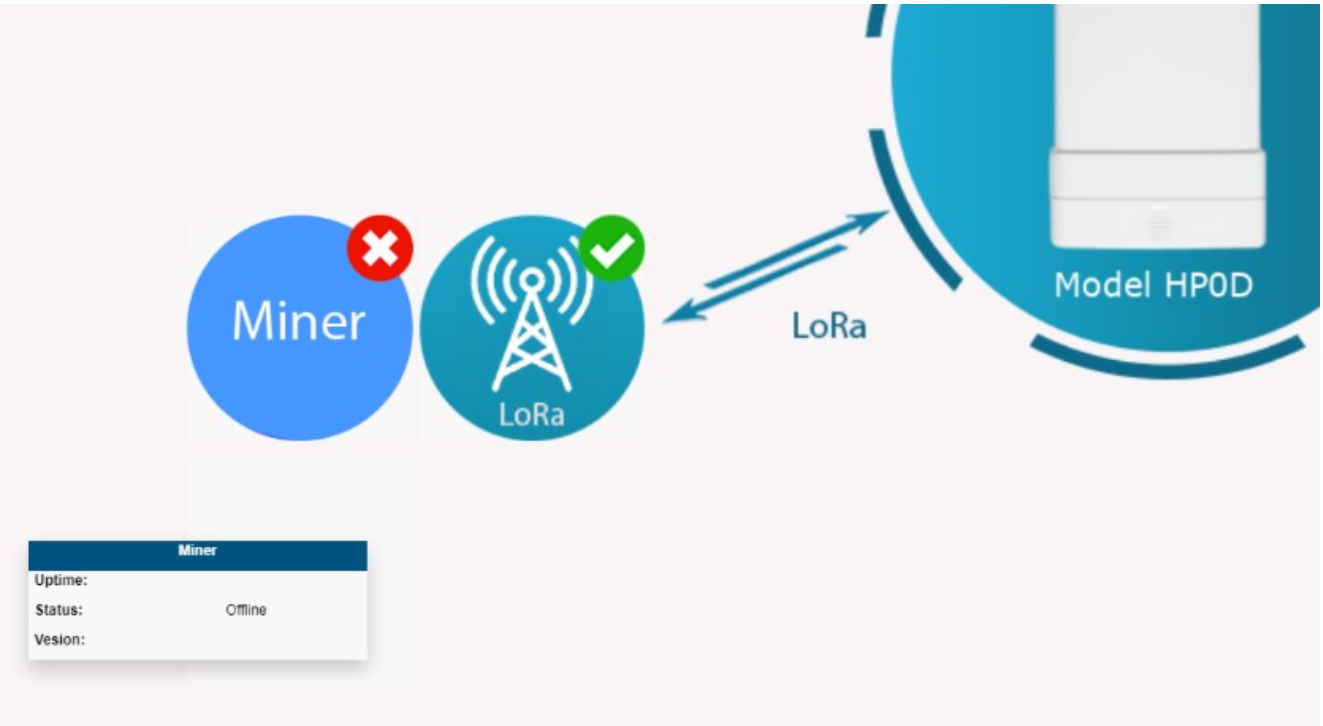
Usually, if the miner is just down, then a reboot is the quickest way

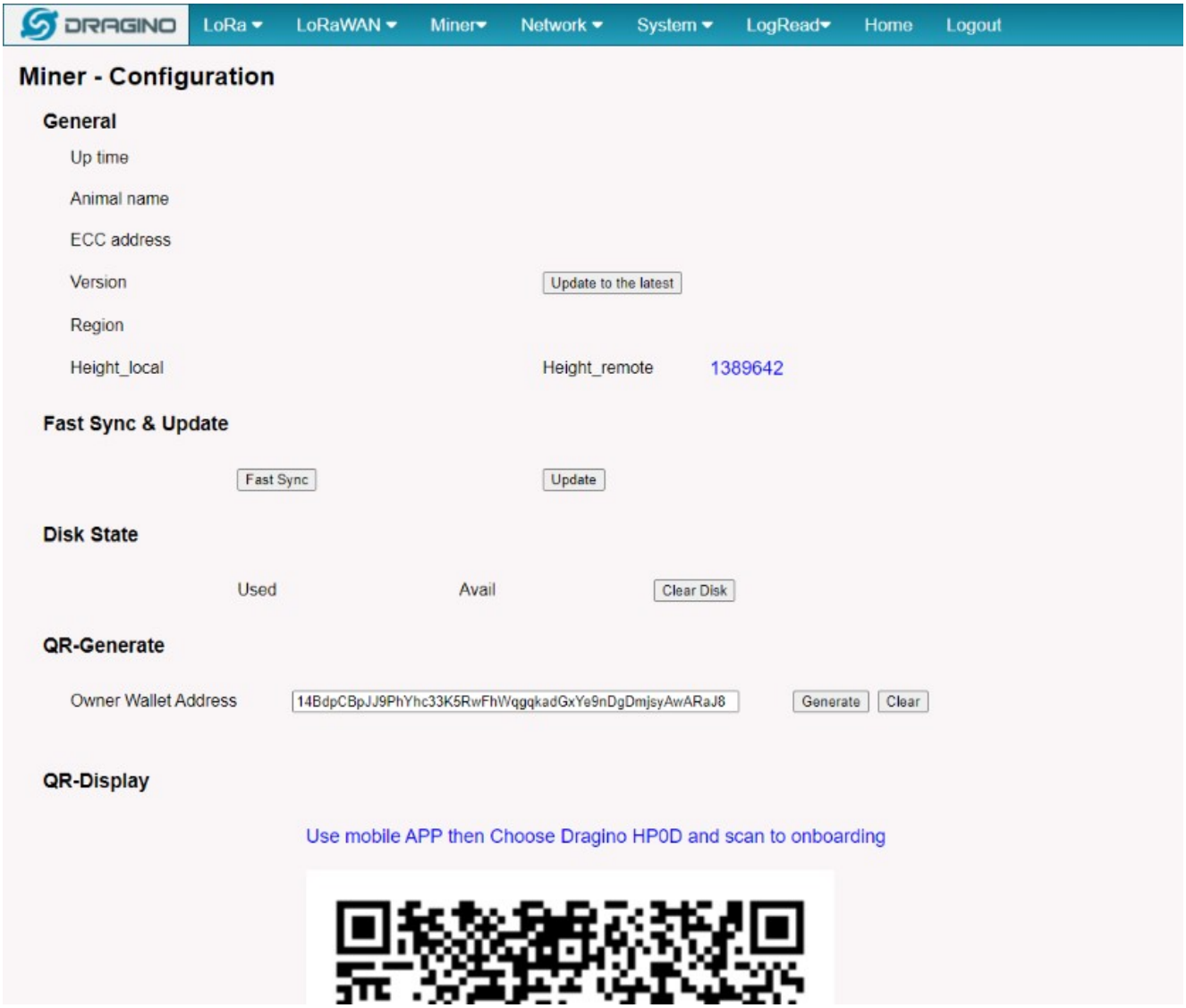
2. Reinstall the Miner manually.

If rebooting does not solve the problem you can reinstall MINER by one of the following methods

1). There is an update button in the middle of the miner page, click this button and then the miner will be reinstalled.

2). Run the "*minerup update*" command to reinstall the miner


Miner
LoRa
LoRa
Model HP0D
Miner
Uptime:
Status:
Offline
Vesion:



7.17 More commands for debugging.

I'm trapped somewhere, what can I do first?

dragino provides a method of self-testing

1.) Is Hotspot's Miner running?

2). Is the miner version up to date?

3). Is the height gap between local height and remote height kept within 100

Note: You can find the above three points on the Miner page, and If you are familiar with the Linux command line you can use the following command

```
minerup update  #--> reinstall miner but not clearing memory
```

```
minerup flush    #-->  reinstall miner and clear memory
minerup snap     #-->  load a snap_short to sync the block height
minerup gap      #-->  check the height between local and remote.
draginoup        #-->  check the miner version gap between local and remote.


doker ps          #--> show the miner running state
miner versions   #--> show the miner  version
```

7.18 Why does my hotspot not have some of the features described in this WiKi

This is the result of the OTA not being updated in time

You can reboot your hotspot or upgrade these packages manually.

```
apt update
apt install dragino*
```

8. How to flash a new OS for the hotspot, the hotspot's setting will be factory settings

The hotspot is based on the Rpi-4B so the OS has been installed on the SD card.

So you have to re-flash the image into the SD card.

Warning: Do not reset unless necessary

Preparations:

1. *Open the HP0D shell, and take out the SD card from the Raspberry PI 4B (Make sure the SD card is empty)*

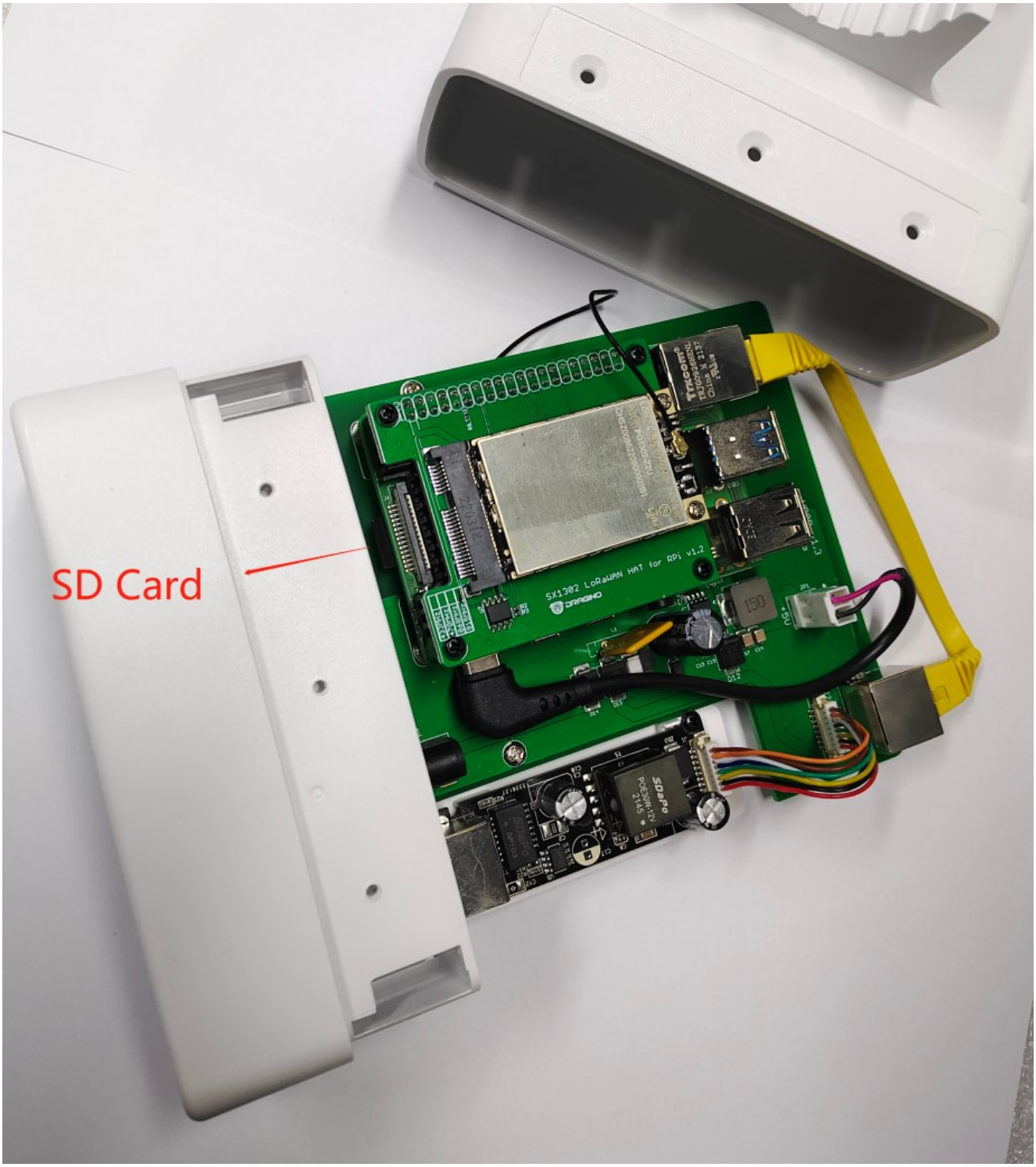
2. *Download the OS image: (Such as **draginohp0d-1.9img (http://repo.dragino.com/release/hp0d-image/draginohp0d-1.9.img)**)*

3. *A card reader device*

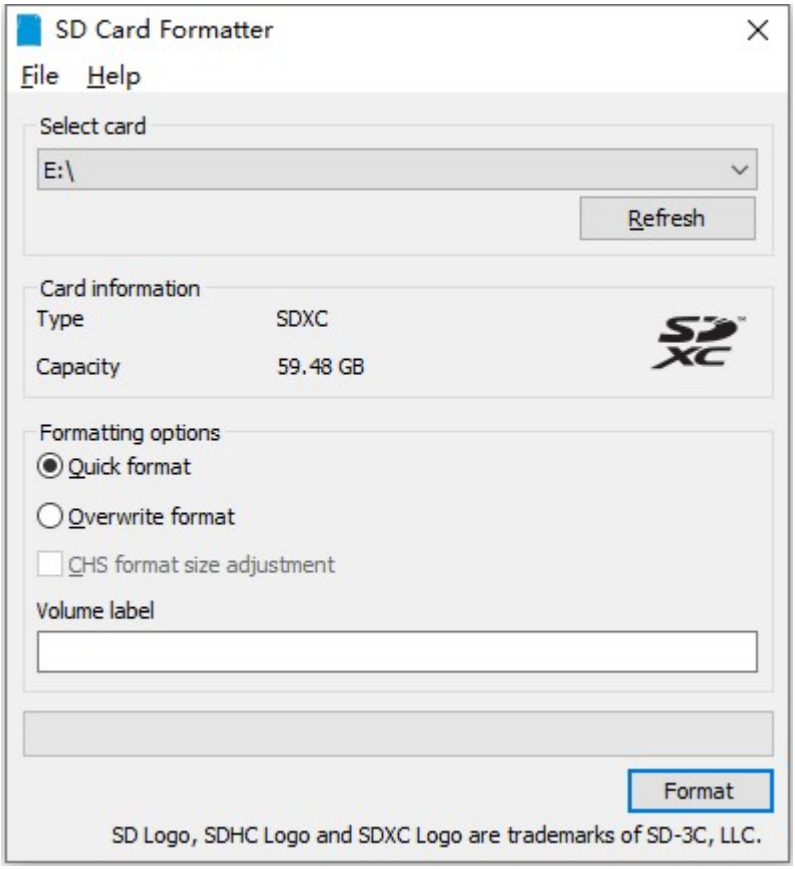
4. *A Flash software tool (Such as **balenaEtcher (https://www.balena.io/etcher/)**)*

5. *SD Card* ***formatter (http://repo.dragino.com/release/tool/PanasonicSDFormatter.zip)***

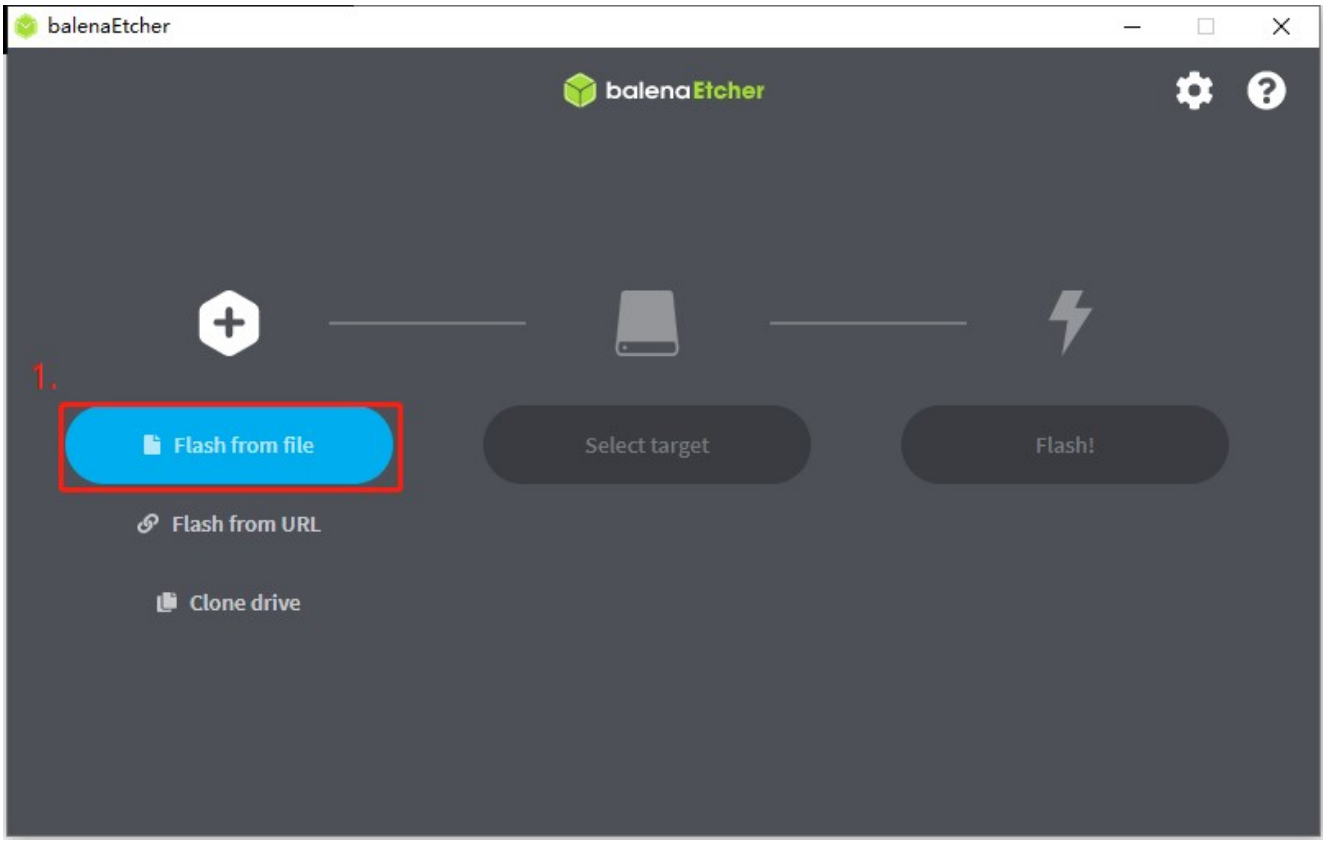
HP0D's enclosure



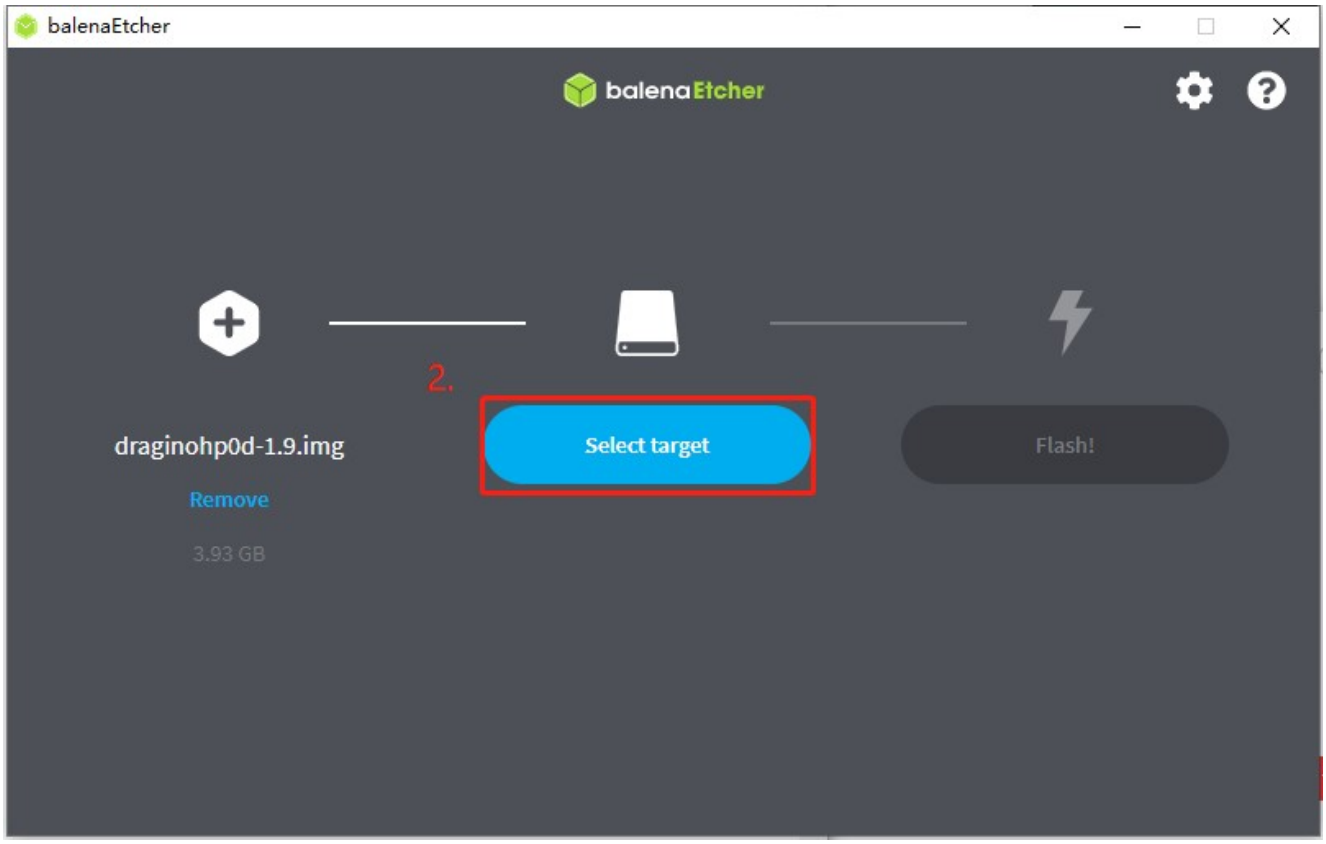
Step 1. Formatting the SD Card

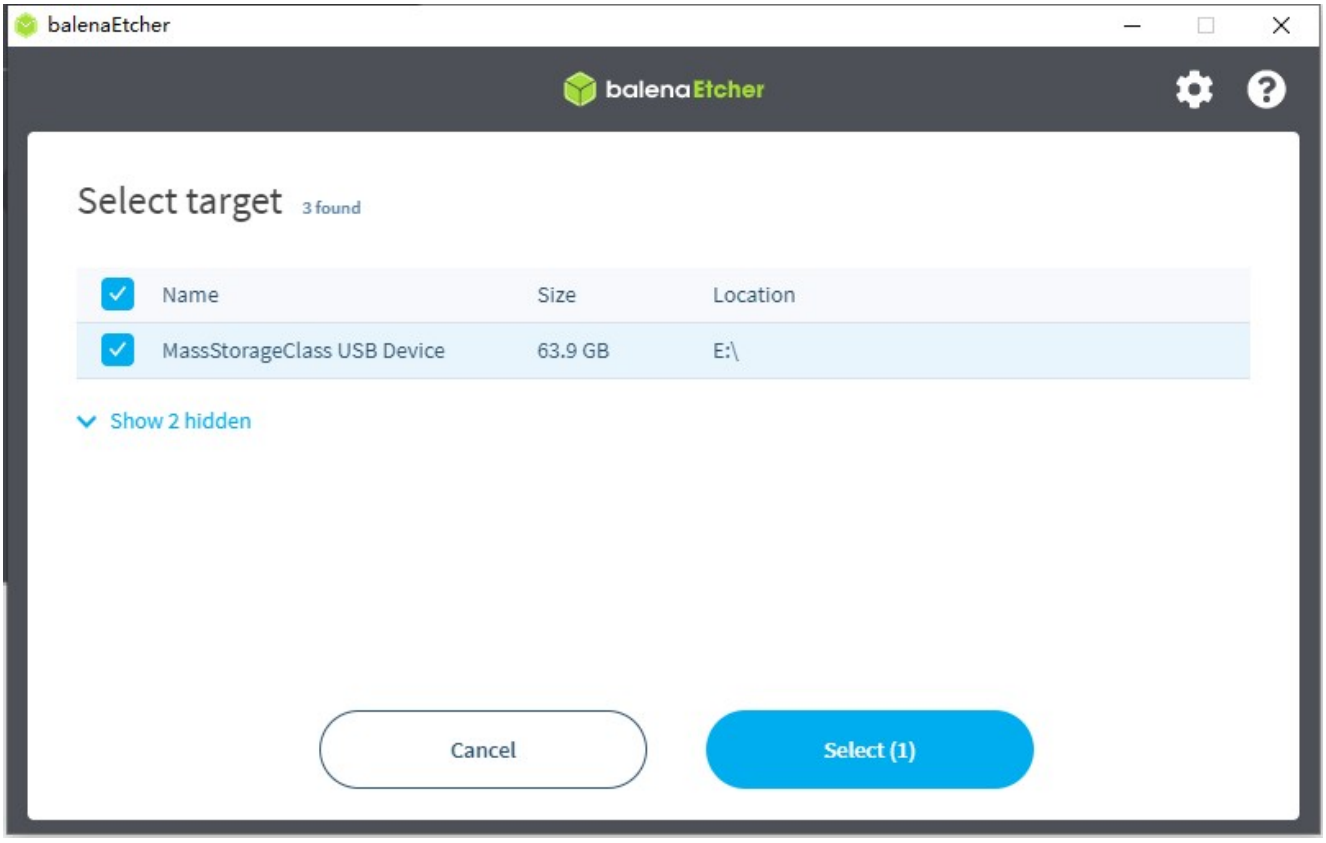


Step 2. Select the OS image

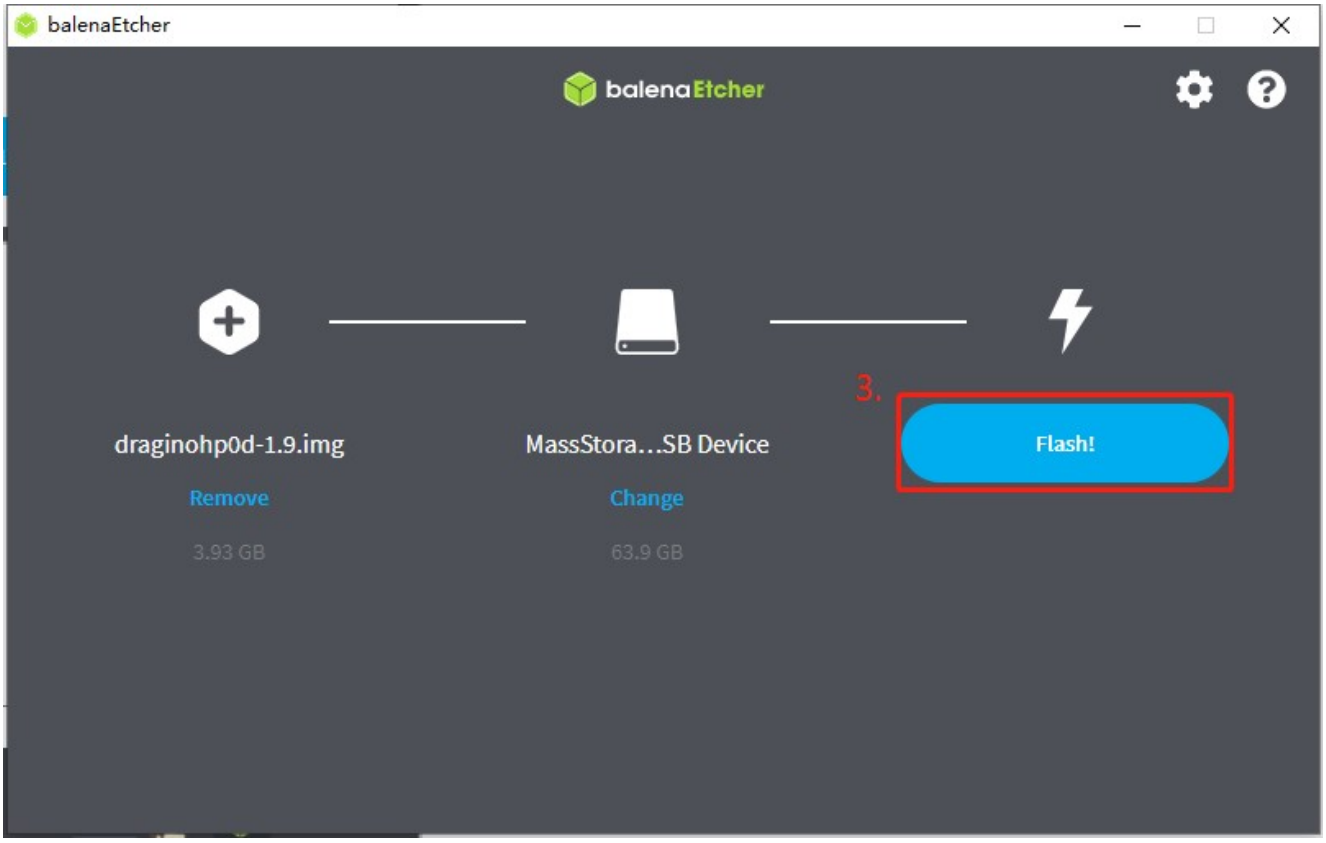


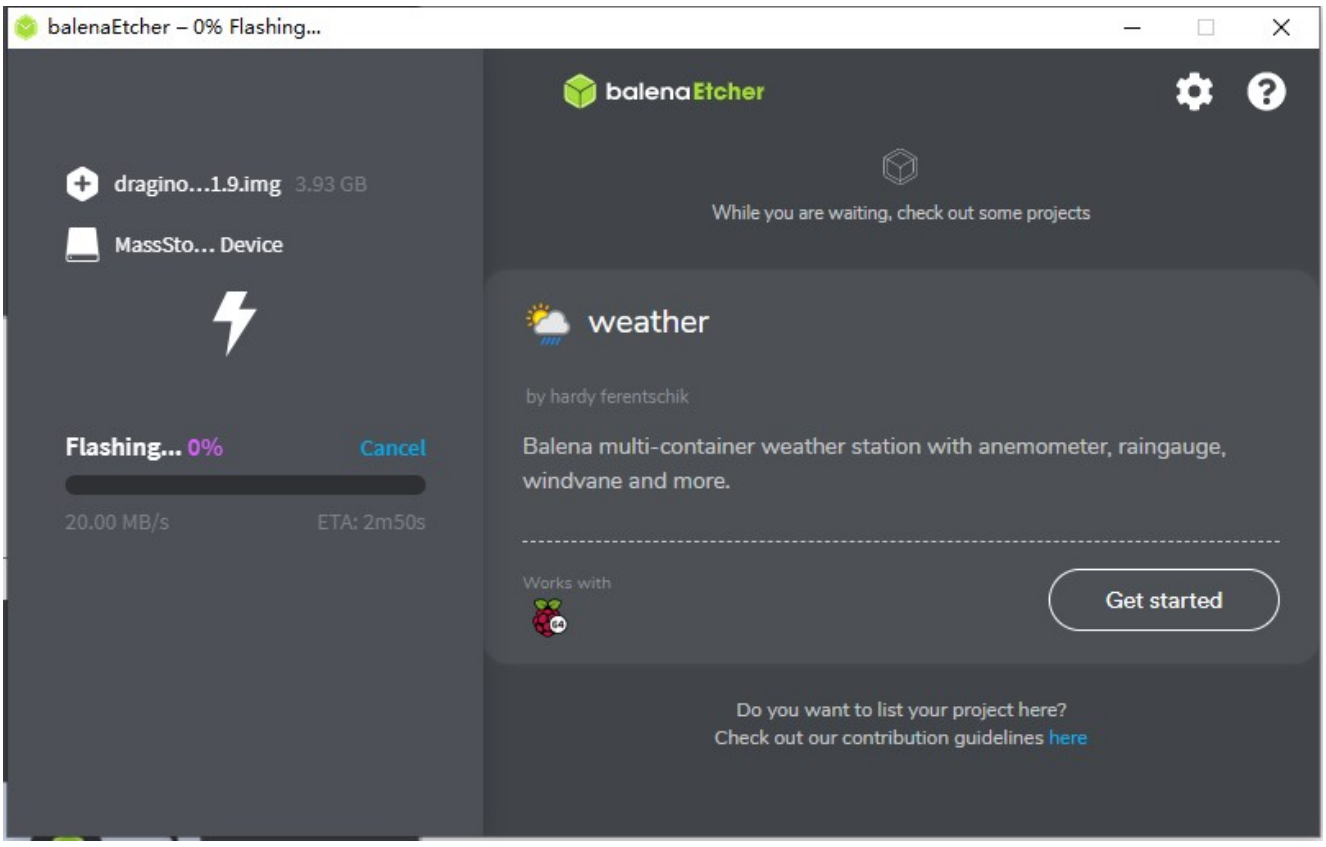
Step 3. Select the target



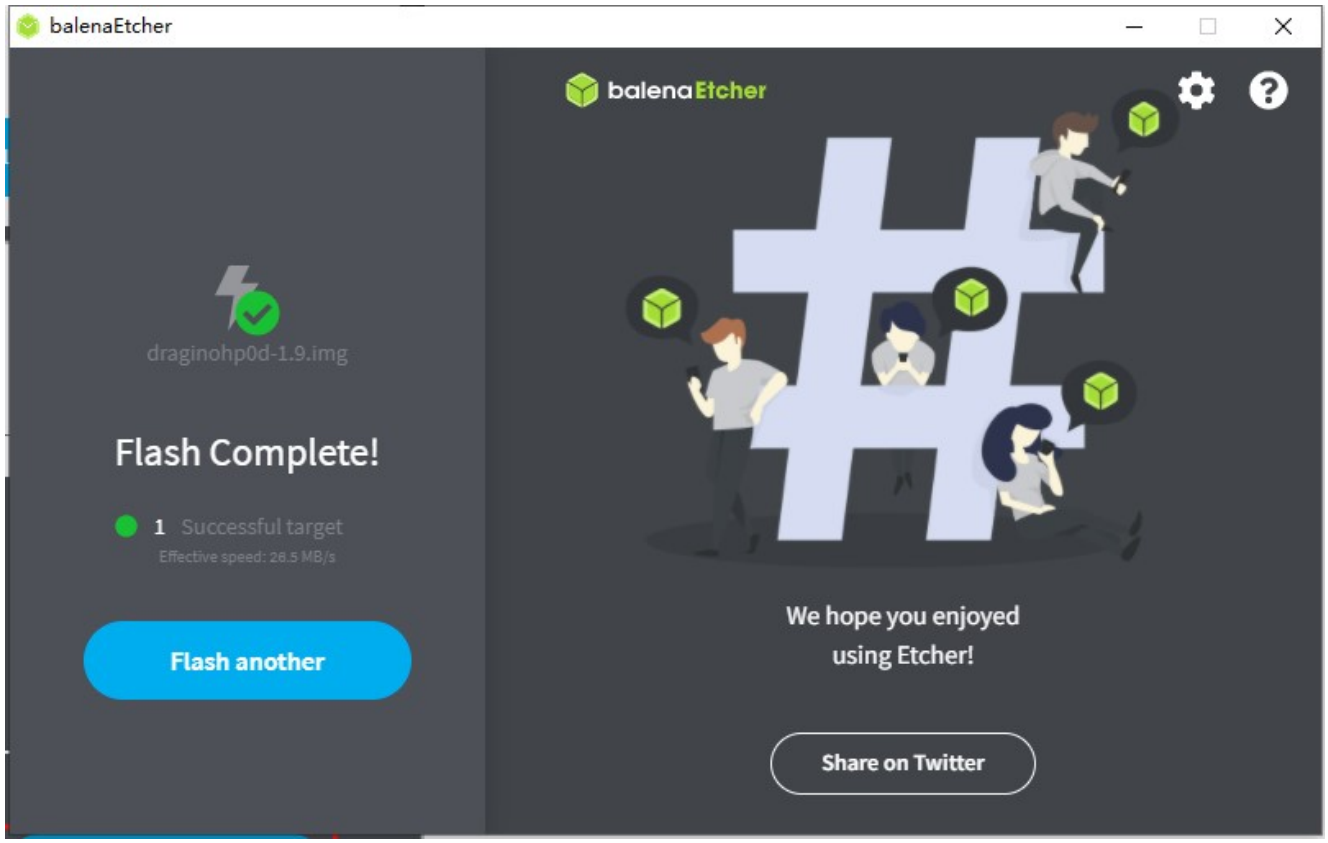


Step 4. Flash start





Flash Complete



Step 4. Re-install the SD card into the hotspot and boot it

Step 5. Configure the correct region for the miner

by the default, the factory settings apply to the US915.

if your region is not the US915, you have to configure the correct region for the miner.

Access the hotspot CLI, and run these Linux commands

```
###update the software of dragino
apt update
apt install dragino*
```

```
root@dragino-98a9dd:~# apt update
Hit:1 http://47.89.8.92 hparm64 InRelease
Hit:2 http://archive.raspberrypi.org/debian bullseye InRelease
Hit:3 https://download.docker.com/linux/debian bullseye InRelease
Hit:4 http://deb.debian.org/debian bullseye InRelease
Hit:5 http://deb.debian.org/debian bullseye-updates InRelease
Err:6 http://security.debian.org/debian-security bullseye-security InRelease
  Temporary failure resolving 'debian.map.fastlydns.net' Temporary failure resolving 'security.debian.org'
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
26 packages can be upgraded. Run 'apt list --upgradable' to see them.
W: Failed to fetch http://security.debian.org/debian-security/dists/bullseye-security/InRelease  Temporary failure resolving 'deb
W: Some index files failed to download. They have been ignored, or old ones used instead.
root@dragino-98a9dd:~# apt install dragino*
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
Note, selecting 'dragino-ui' for glob 'dragino*'
Note, selecting 'draginofwd' for glob 'dragino*'
Note, selecting 'draginoups' for glob 'dragino*'
Note, selecting 'dragino-utily' for glob 'dragino*'
dragino-ui is already the newest version (2022-05-31).
dragino-utily is already the newest version (2022-06-08).
draginofwd is already the newest version (2022-05-15).
draginoups is already the newest version (2022-06-08).
0 upgraded, 0 newly installed, 0 to remove and 26 not upgraded.
root@dragino-98a9dd:~# uci set miner.general.region=EU868
root@dragino-98a9dd:~# uci commit miner
root@dragino-98a9dd:~# minerup update
```

###configure the correct region for the miner and update it

uci set miner.general.region=<Region; Such as AS923_1/AU915/US915/EU868/IN865>

uci commit miner

minerup update

```
root@dragino-98a9dd:~# uci set miner.general.region=EU868
root@dragino-98a9dd:~# uci commit miner
root@dragino-98a9dd:~# minerup update
uci: Entry not found
miner
miner
Untagged: quay.io/team-helium/miner:miner-arm64_2022.06.02.1_GA
Untagged: quay.io/team-helium/miner@sha256:43d2bde49fe11fc459682edfdabafb9b09a44b843dbe106ff71863f2e8fd4c79
Deleted: sha256:1f6f64922cd0abbbd36932d6758e3d3c1b1817f20aab632db5a0d1b9f9348ca5
Deleted: sha256:f56faf11be87365034b3755df92d3dfc66eeb4d51b2589677a021a1cbe71d1f9
Deleted: sha256:e52ffd0cf28d141891a0f4c7b0a1da004cfcbd3c0e0af647aa92d5a6bfb97e83
Deleted: sha256:5dc6a2bfa3738c9460ac42b6631a9445f1fd2b856f0e870bd3d558390291b3c7
Deleted: sha256:183c87cf818d86a70b3d06dece2b063bd23f0a4b7ff51c49bdbcba6587966a0f
Deleted: sha256:4f4ce317c6bbf55719e49973d32d33ba456d7cb08693a6d6fb372690eacee23b
Total reclaimed space: 0B
Unable to find image 'quay.io/team-helium/miner:miner-arm64_2022.06.02.1_GA' locally
miner-arm64_2022.06.02.1_GA: Pulling from team-helium/miner
9981e73032c8: Pull complete
fd6f084d705e: Pull complete
4b3fe8923f0a: Pull complete
f0db6f44d43d: Pull complete
9b509b9260be: Pull complete
Digest: sha256:43d2bde49fe11fc459682edfdabafb9b09a44b843dbe106ff71863f2e8fd4c79
Status: Downloaded newer image for quay.io/team-helium/miner:miner-arm64_2022.06.02.1_GA
921576742a47c9eb50487ebbba678ce146ba4f56960798c558dd86c7d3b6c05c
```

###check the miner version

draginoups

```
root@dragino-98a9dd:~# draginoups
WILL_VER: 2022.06.02.1
WILL_IMAGE: miner-arm64_2022.06.02.1_GA
root@dragino-98a9dd:~#
```

###unblock the function of wireless
rfkill unblock wlan
uci set wireless.general.mode=ap
uci commit wireless

9. How does the HP0D access to the network via a USB 4G Dongle

We have reserved enough space inside the HP0D to use a USB 4G Dongle,

so you can install a USB 4G Dongle in order for the hotspot to access the network via 4G.

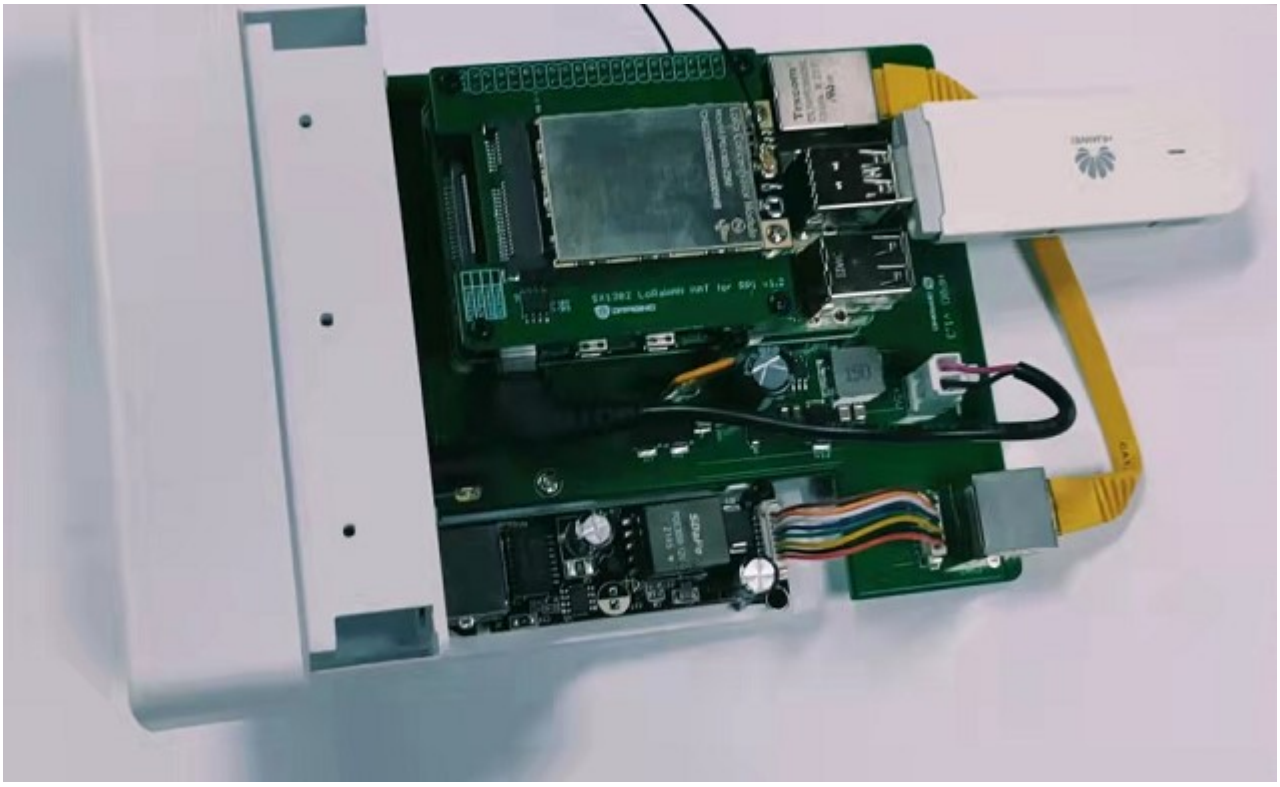
Preparations:

1). A USB 4G Dongle, Such as HUAWEI E3327,ZTE...

2). A Sim card that can access the 4g network.

3). open the hotspot's shell.

9.1. Open the HP0D shell and access the USB 4G Dongle into the Rpi.

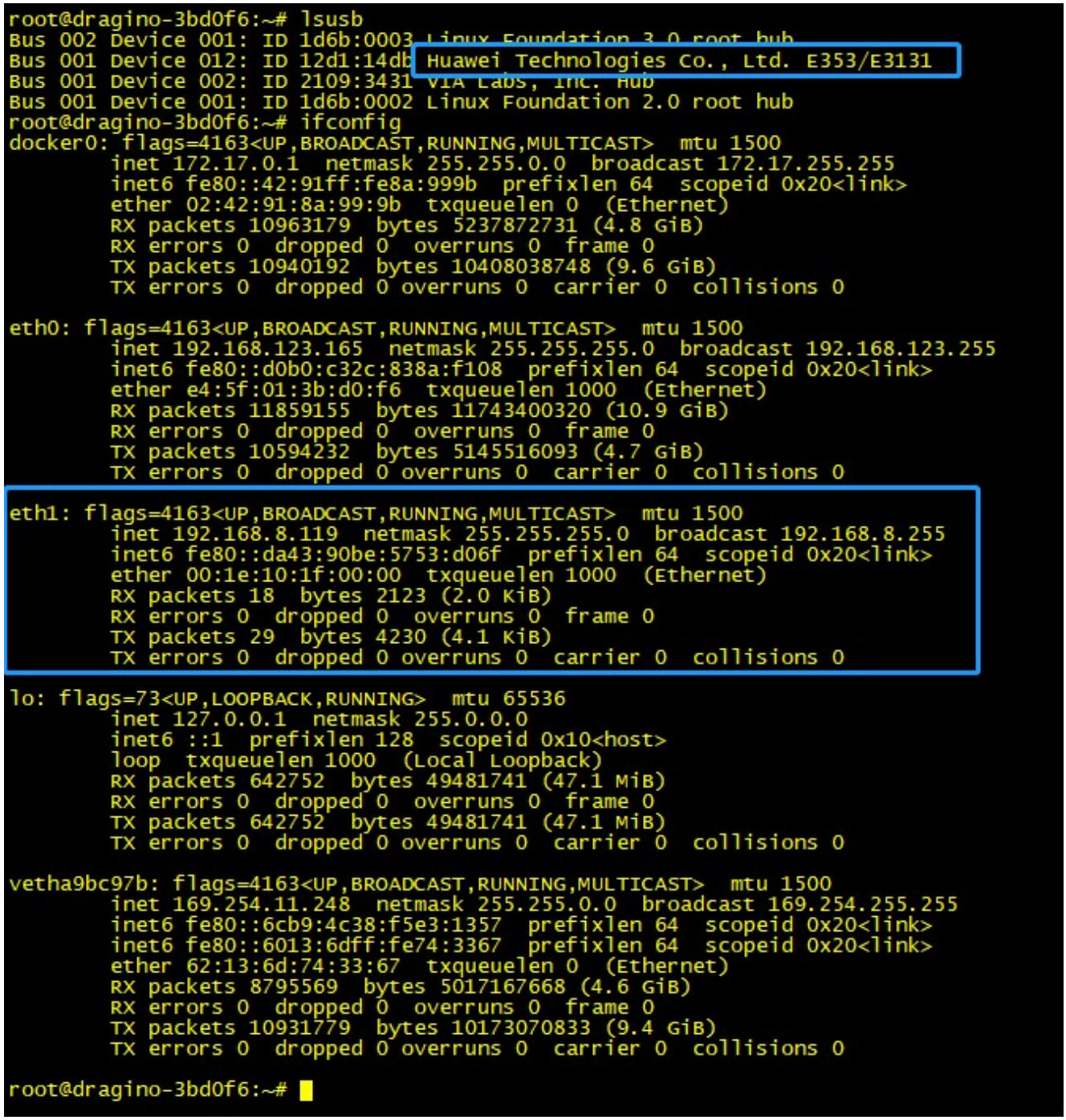


9.2. Checking the USB 4G Dongle network

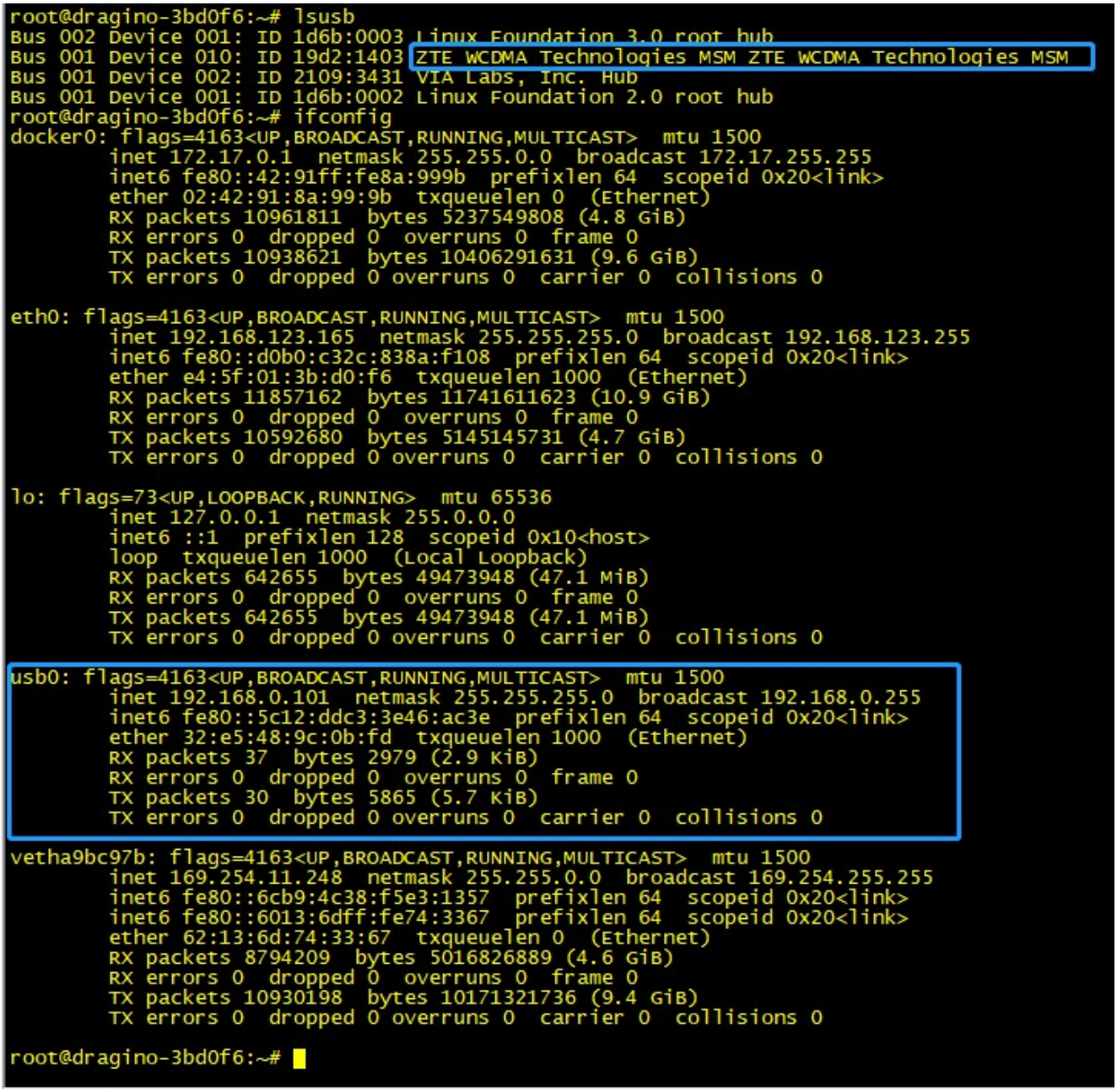
We have installed drivers for common USB 4G Dongle,

and managed by NetworkManager, once hp0d detects an available USB 4G Dongle it will try to dial up the range network

HUAWEI-E3327


root@dragino-3bd0f6:~# lsusb
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 012: ID 12d1:14db Huawei Technologies Co., Ltd. E353/E3131
Bus 001 Device 002: ID 2109:3431 VIA Labs, Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
root@dragino-3bd0f6:~# ifconfig
docker0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 172.17.0.1 netmask 255.255.0.0 broadcast 172.17.255.255
inet6 fe80::42:91ff:fe8a:999b prefixlen 64 scopeid 0x20<link>
ether 02:42:91:8a:99:9b txqueuelen 0 (Ethernet)
RX packets 10963179 bytes 5237872731 (4.8 GiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 10940192 bytes 10408038748 (9.6 GiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 192.168.123.165 netmask 255.255.255.0 broadcast 192.168.123.255
inet6 fe80::d0b0:c32c:838a:f108 prefixlen 64 scopeid 0x20<link>
ether e4:5f:01:3b:d0:f6 txqueuelen 1000 (Ethernet)
RX packets 11859155 bytes 11743400320 (10.9 GiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 10594232 bytes 5145516093 (4.7 GiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
eth1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 192.168.8.119 netmask 255.255.255.0 broadcast 192.168.8.255
inet6 fe80::da43:90be:5753:d06f prefixlen 64 scopeid 0x20<link>
ether 00:1e:10:1f:00:00 txqueuelen 1000 (Ethernet)
RX packets 18 bytes 2123 (2.0 KiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 29 bytes 4230 (4.1 KiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
inet 127.0.0.1 netmask 255.0.0.0
inet6 ::1 prefixlen 128 scopeid 0x10<host>
loop txqueuelen 1000 (Local Loopback)
RX packets 642752 bytes 49481741 (47.1 MiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 642752 bytes 49481741 (47.1 MiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
vetha9bc97b: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
inet 169.254.11.248 netmask 255.255.0.0 broadcast 169.254.255.255
inet6 fe80::6cb9:4c38:f5e3:1357 prefixlen 64 scopeid 0x20<link>
inet6 fe80::6013:6dff:fe74:3367 prefixlen 64 scopeid 0x20<link>
ether 62:13:6d:74:33:67 txqueuelen 0 (Ethernet)
RX packets 8795569 bytes 5017167668 (4.6 GiB)
RX errors 0 dropped 0 overruns 0 frame 0
TX packets 10931779 bytes 10173070833 (9.4 GiB)
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
root@dragino-3bd0f6:~#

ZTE



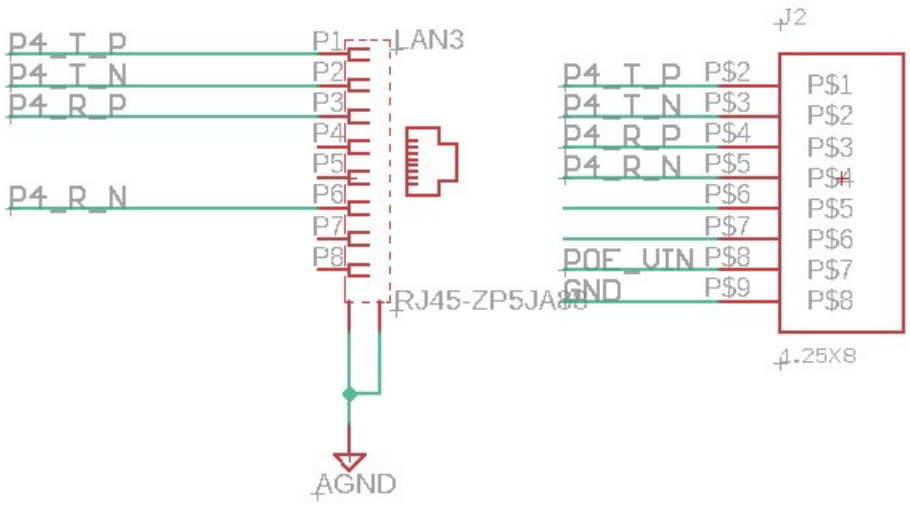
10. PoE introduction

*The HP0D is use the **IEEE 802.3 af compliant PoE port** (input 44 ~ 57 v, output 12V)*

So you can use the PoE switches *or PoE injector to power the device.*

Note: The RJ45 Indicator light only represents the PoE power supply, so when you use DC to power the hotspot and the RJ45 indicator light is off ---> this is normal

Wiring schematic:



11. OTA Version Info

When does the OTA update happen?

HP0D will check OTA update on a) Every Booting. b) Every Night. Below is the OTA update version info

2022/05/14

1. *Update to the latest miner version: miner-arm64_2022.05.13.0_GA*
2. *Add postinst after auto-update*
3. *Add Miner version mark.*
4. *Add fast sync if miner GAP is large*

2022/05/18

1. *Update minerup to speed up synchronized blocks*

2022/05/24

1. *Update to the latest miner version: miner-arm64_2022.05.24.0_GA*

2022/05/31

1. *Add WiFi STA icon display*
2. *Optimize AP icon display*
3. *Optimize home icon display*
4. *Fix for Miner icon URL bug*
5. *Add the secondary server configuration*

12. Supports

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

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

13. Order Info

HP0D-XXX

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

14. 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

15. 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.

♥ 0 Tags:

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