

UM01649

IoT Discovery User Manual

V2.1

Document Information

Item	Content
Keyword	<i>LoRaWAN, UM, IoT, Wireless communication</i>
Abstract	This document describes how to use, test and configure RisingHF RHF2S001 IoT Discovery LoRa Kit

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1 Introduction

RisingHF IoT Discovery is a LoRa kit which integrates evaluation, development and quick test features which is designed by RisingHF. This document will describe the usage of IoT Discovery (RHF2S001) in details, include how to build up hardware, how to connect to a LoRaWAN network, how to test hardware and so on.

1.1 Product List

- 1 x Raspberry Pi
- 1 x RHF0M301
- 1 x RHF4T002
- 1 x RHF3M076
- 3 x RHF76-052
- 1 x USB to UART adapter
- 1 x 4 pin dual female splittable jumper wire
- 1 x SD Card
- 1 x 5V/2A Adapter
- 3 x USB cables
- 1 x Ethernet cable
- 2 x Antenna

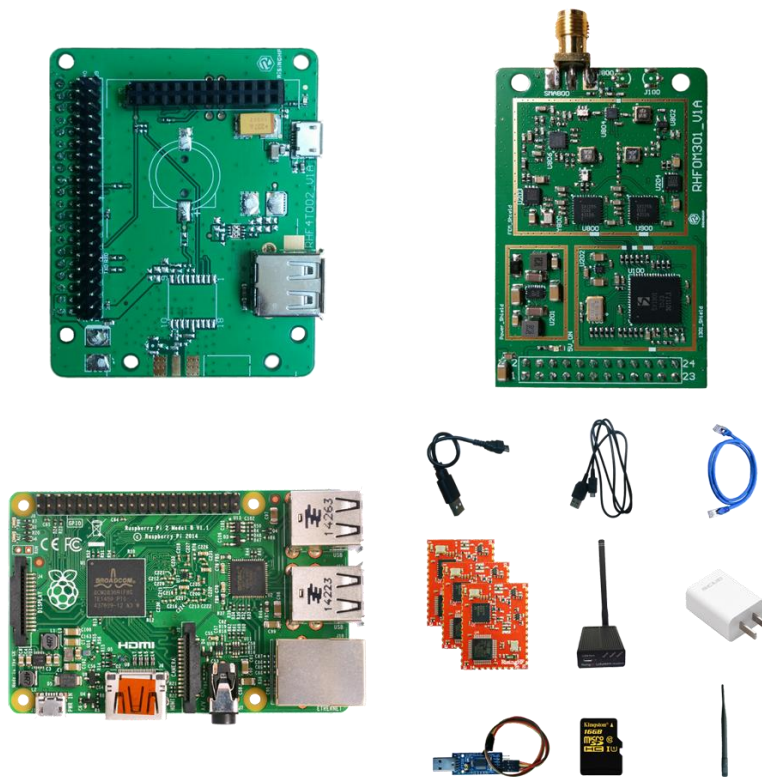


Figure 1 IoT Discovery Product list

2 Get started



Figure 2 RHF2S001 package

Open each box, and take out "Rpi + RHF0M301 + RHF4T002", SD card is already burned RisingHF standard image. Please follow below description and pictures to connect the core gateway board.



Figure 3 Raspberry Pi + RHF4T002 + RHF0M301 Top View

Definition of 4 connectors in below picture:

- **Yellow** Gateway kit main supply connector)
- **Red** USB Host connector, used to supply power for Raspberry Pi
- **Green** Raspberry Pi power input connector (Micro USB)
- **Blue** RPi Ethernet port

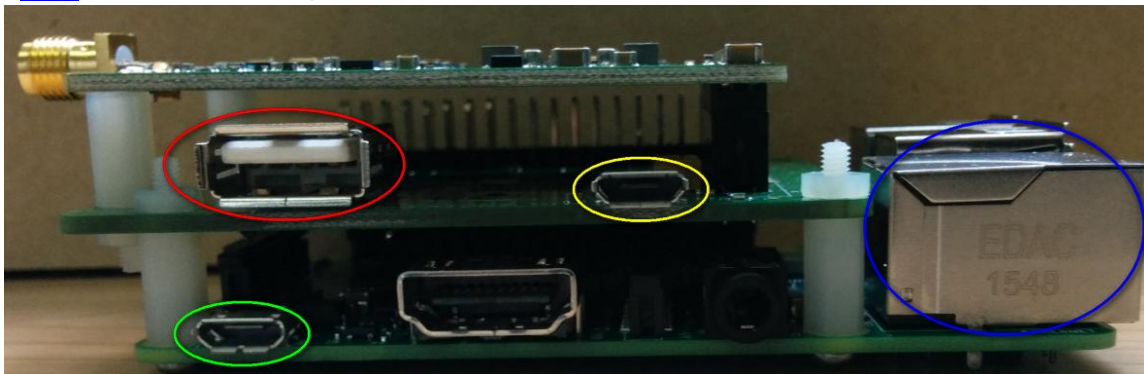


Figure 4 RPi+RHF4T002+RHF0M301 side view

Please follow below picture to connect short USB cable (15cm), long USB cable (1M) and 5V/2A adapter.



Figure 5 Connect USB Cables

2.1 USB Serial Tool

Follow below picture to connect FT232 USB to serial tool

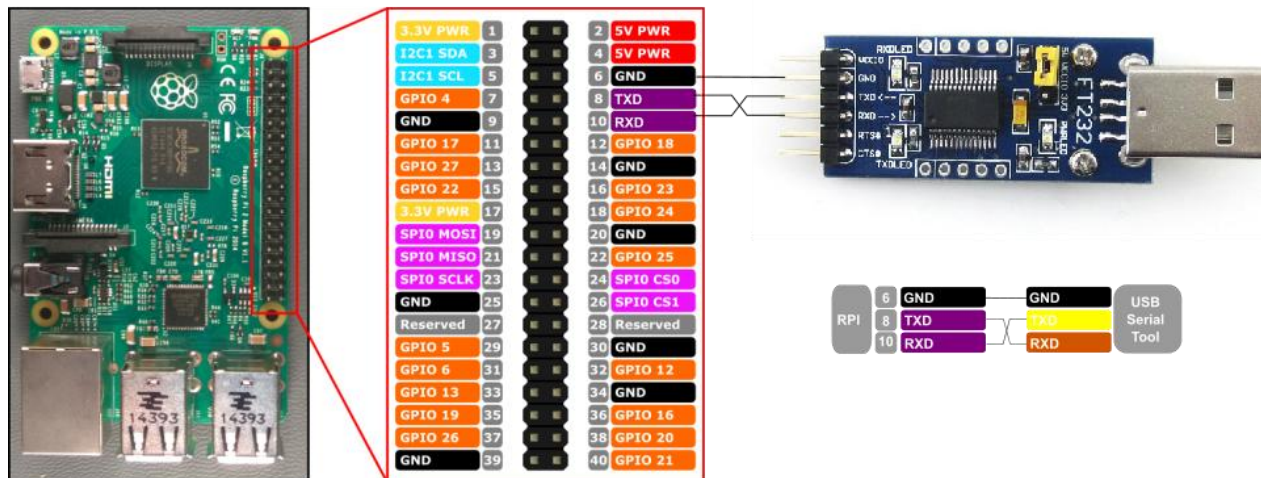


Figure 6 RPi and FT232 connection map

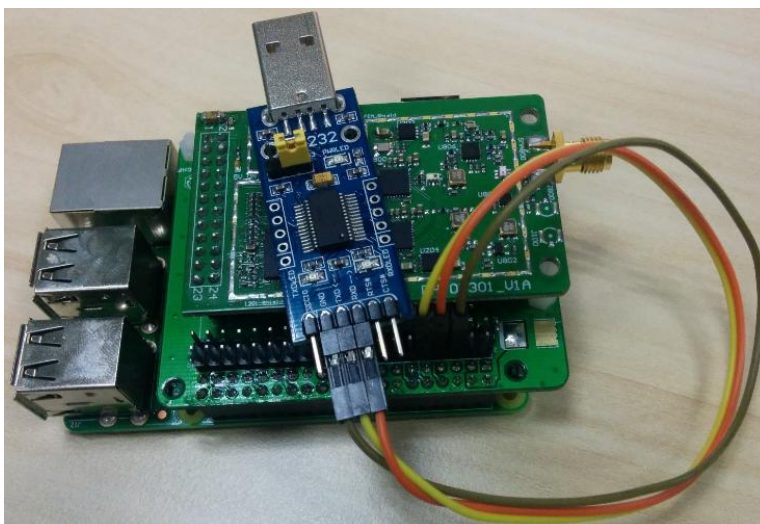


Figure 7 RPi and FT232 real product connections

2.2 Software Tools

In the following chapters, below tools will be needed, please install it to your computer¹:

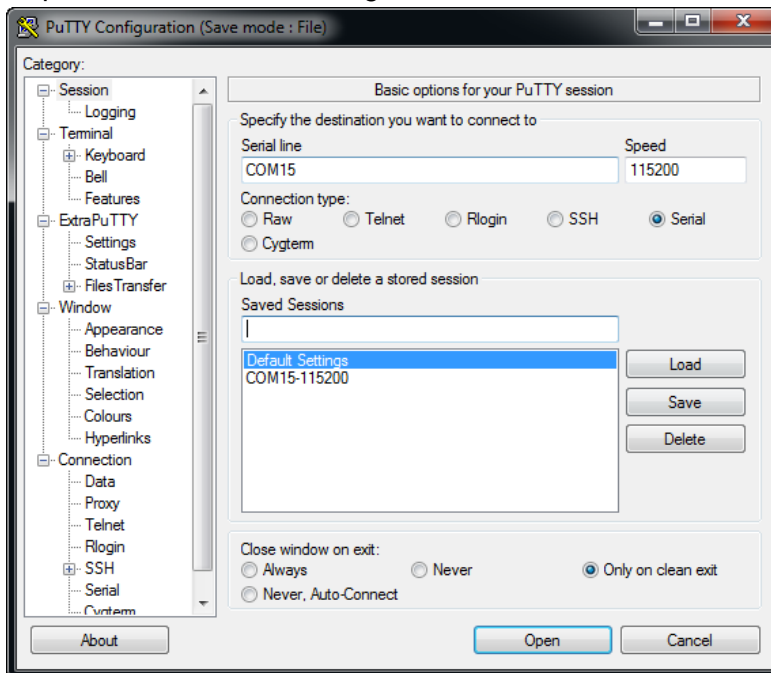
- SSCOM, portable serial tool, used to control RHF3M076
- ExtraPuTTY, terminal tool include both serial and SSH terminal, used to control RPi
- Internet browser, used to access RHF2S001 integrated LoRaWAN server (It is recommended to use Chrome or Firefox)

Please access [RisingHF Wiki Resources RHF2S001 Section](#) to download related tools. You may have your other favorite serial tools, if you have any trouble to use it, please make comparison test with the proposal tool.

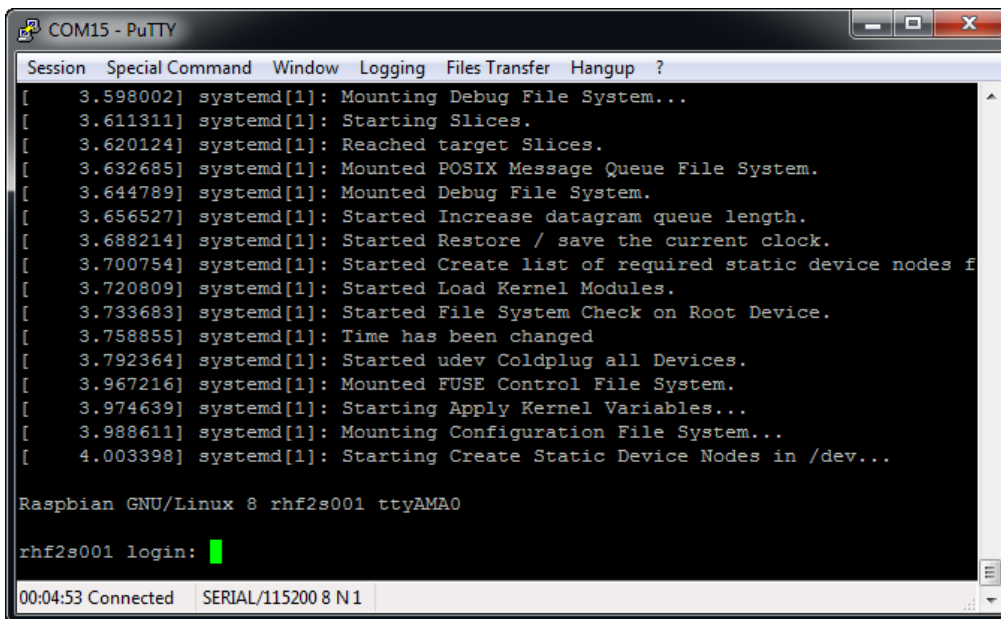
¹ This document assumes user use Windows operating system

2.3 Power Up

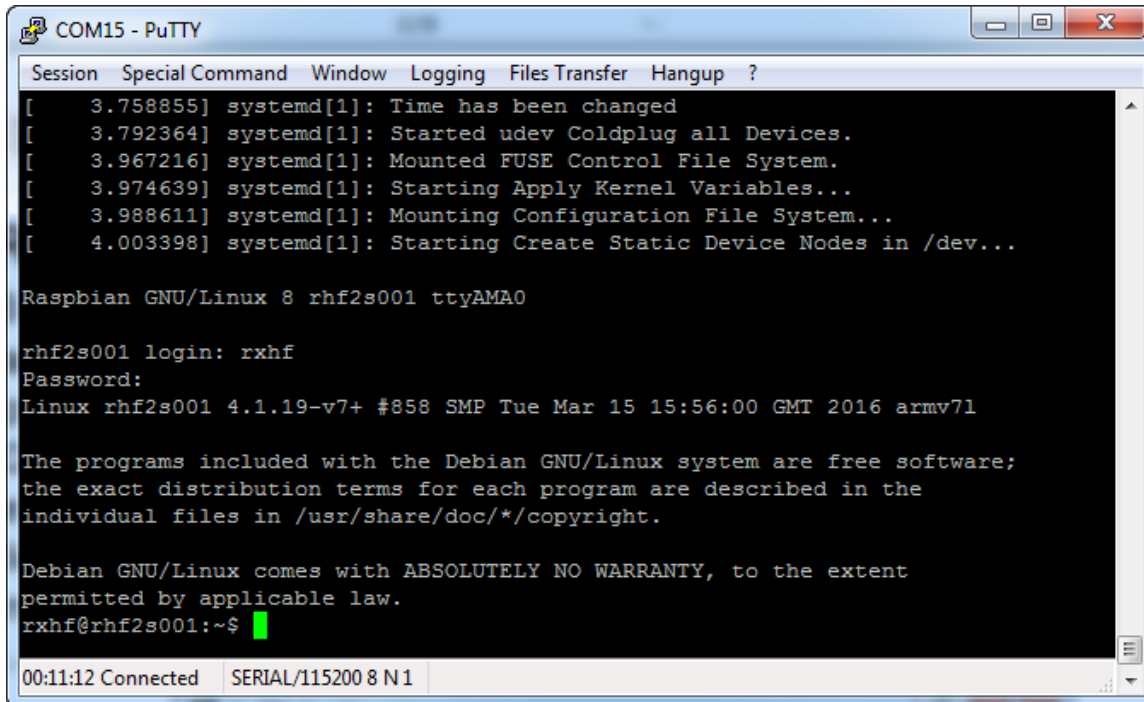
- First, make sure the serial tool and RPi (RHF4T002 Adapter) are connected correctly.
- Plug FT232 tool to PC (If COM port is not recognized correctly, please refer below driver installation chapter)
- Open “Device Manager” to get the right COM port. Like COM15 for example. Configure ExtraPuTTY according to below picture (Speed 115200, others use defaults), click “Open”. As the gateway is still not opened, so there is nothing in the terminal.



- Power the gateway up. Booting log will be showed in the ExtraPuTTY terminal, in the end it will prompt you to input your log in name. Please note it takes 1 or 2 minutes to get the prompt information.



- e) Please use RHF2S001 default user name and password to log in. (Username: **rxhf**, Password: **risinghf**). Note, when input the password, there is no any echo



```
COM15 - PuTTY
Session Special Command Window Logging Files Transfer Hangup ?
[ 3.758855] systemd[1]: Time has been changed
[ 3.792364] systemd[1]: Started udev Coldplug all Devices.
[ 3.967216] systemd[1]: Mounted FUSE Control File System.
[ 3.974639] systemd[1]: Starting Apply Kernel Variables...
[ 3.988611] systemd[1]: Mounting Configuration File System...
[ 4.003398] systemd[1]: Starting Create Static Device Nodes in /dev...

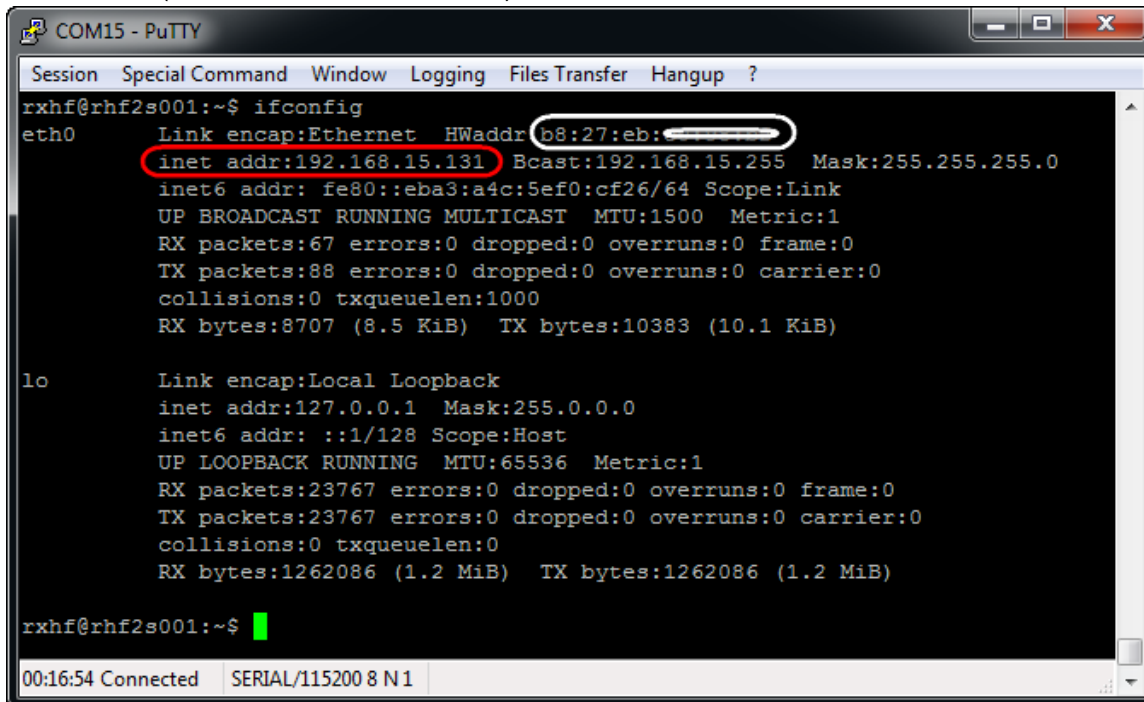
Raspbian GNU/Linux 8 rhf2s001 ttyAMA0

rhf2s001 login: rxhf
Password:
Linux rhf2s001 4.1.19-v7+ #858 SMP Tue Mar 15 15:56:00 GMT 2016 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
rxhf@rhf2s001:~$
```

- f) Connect RHF2S001 with router through ethernet cable
- g) Run ifconfig to check the ip address and mac address. IP is in the red circle, MAC address is in white circle (Format: b8:27:eb:xx:xx:xx)

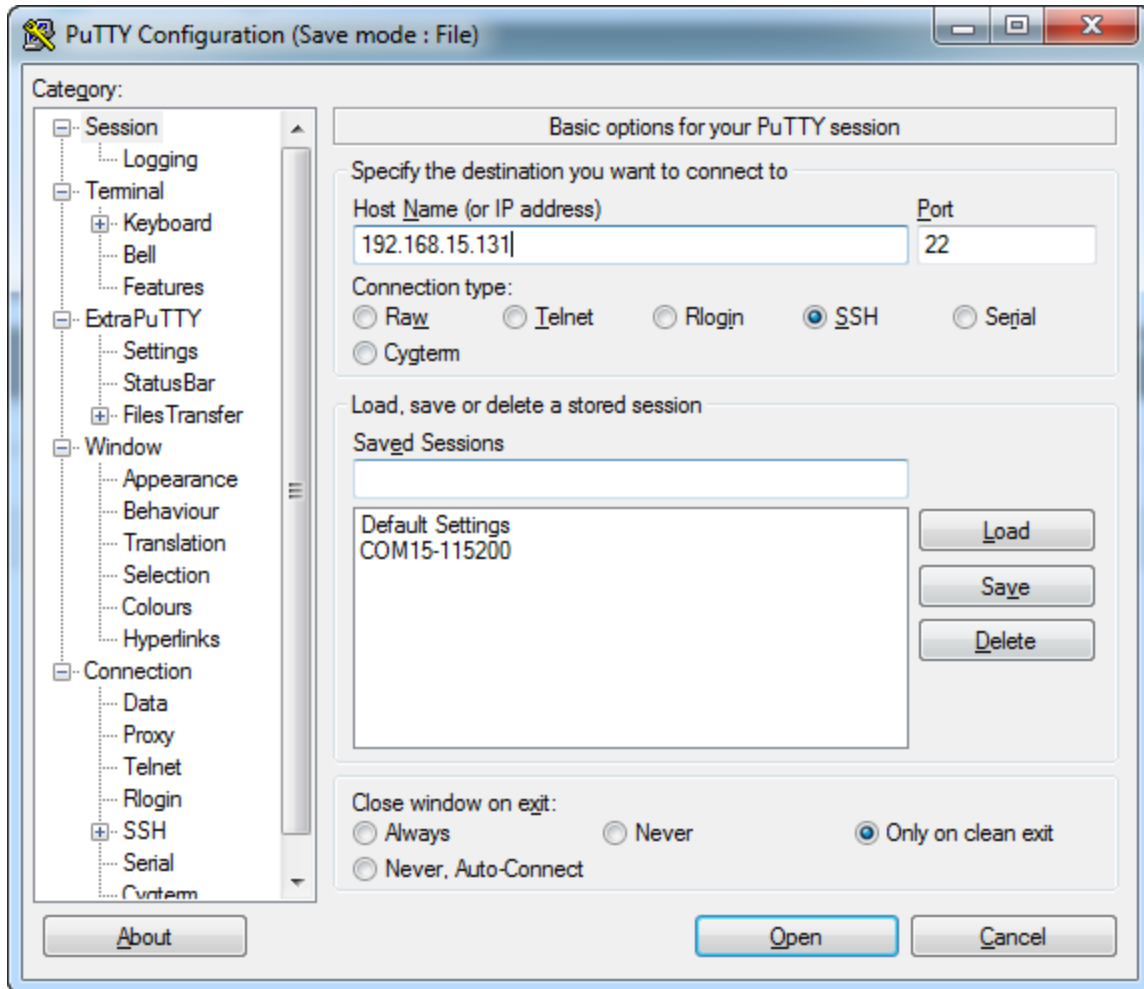


```
COM15 - PuTTY
Session Special Command Window Logging Files Transfer Hangup ?
rxhf@rhf2s001:~$ ifconfig
eth0      Link encap:Ethernet  HWaddr b8:27:eb:xx:xx:xx
          inet addr:192.168.15.131  Bcast:192.168.15.255  Mask:255.255.255.0
          inet6 addr: fe80::eba3:a4c:5ef0:cf26/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:67 errors:0 dropped:0 overruns:0 frame:0
          TX packets:88 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:8707 (8.5 KiB)  TX bytes:10383 (10.1 KiB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:23767 errors:0 dropped:0 overruns:0 frame:0
          TX packets:23767 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1262086 (1.2 MiB)  TX bytes:1262086 (1.2 MiB)

rxhf@rhf2s001:~$
```

After you get the IP, it is recommended to login RHF2S001 again through SSH. Because SSH is faster (Ethernet than UART) and stable. We normally use serial tool to get the IP. Reopen ExtraPuTTY input the IP and use default port 22 to connect again.



h) Please note, the RHF2S001 connects to internal server by default. The following chapter will show you how to use the internal server.

2.4 Expand SD Card File System

By default, the image enables only 2GB for Raspbian System, it is recommended to expand to use the whole SD card (8GB or 16GB). Or the SD card will be full soon.

Run below command to start raspi-config,

```
sudo raspi-config
```

Choose "Expand Filesystem", when finished reboot to make it effect. Run command "df -h" to know to SD card capacity and usage.

Please refer to Raspberry Pi raspi-config tool instruction for details.

<https://www.raspberrypi.org/documentation/configuration/raspi-config.md>

2.5 Use RHF2S001 integrated LoRaWAN server

2.5.1 Connect Gateway with internal server

Run below commands, and check the status:

```
sudo systemctl status pktfwd
```

If pktfwd service is not active, run below command to start it:

```
sudo systemctl enable pktfwd
sudo systemctl restart pktfwd
```

2.5.2 Frequency Plan

2.5.2.1 EU868 Frequency Plan

Detailed channel definition:

	EU868	Uplink DR
CH0	867.1	DR0 ~ DR5
CH1	867.3	DR0 ~ DR5
CH2	867.5	DR0 ~ DR5
CH3	867.7	DR0 ~ DR5
CH4	867.9	DR0 ~ DR5
CH5	868.1	DR0 ~ DR5
CH6	868.3	DR0 ~ DR5
CH7	868.5	DR0 ~ DR5

2.5.2.1 US915 HYBRID Frequency Plan

	US915	Uplink DR
CH0	902.3	DR0 ~ DR3
CH1	902.5	DR0 ~ DR3
CH2	902.7	DR0 ~ DR3
CH3	902.9	DR0 ~ DR3
CH4	903.1	DR0 ~ DR3
CH5	903.3	DR0 ~ DR3
CH6	903.5	DR0 ~ DR3
CH7	903.7	DR0 ~ DR3
CH64	903.0	DR4

2.5.3 RHF76-052AM Settings

2.5.3.1 EU868

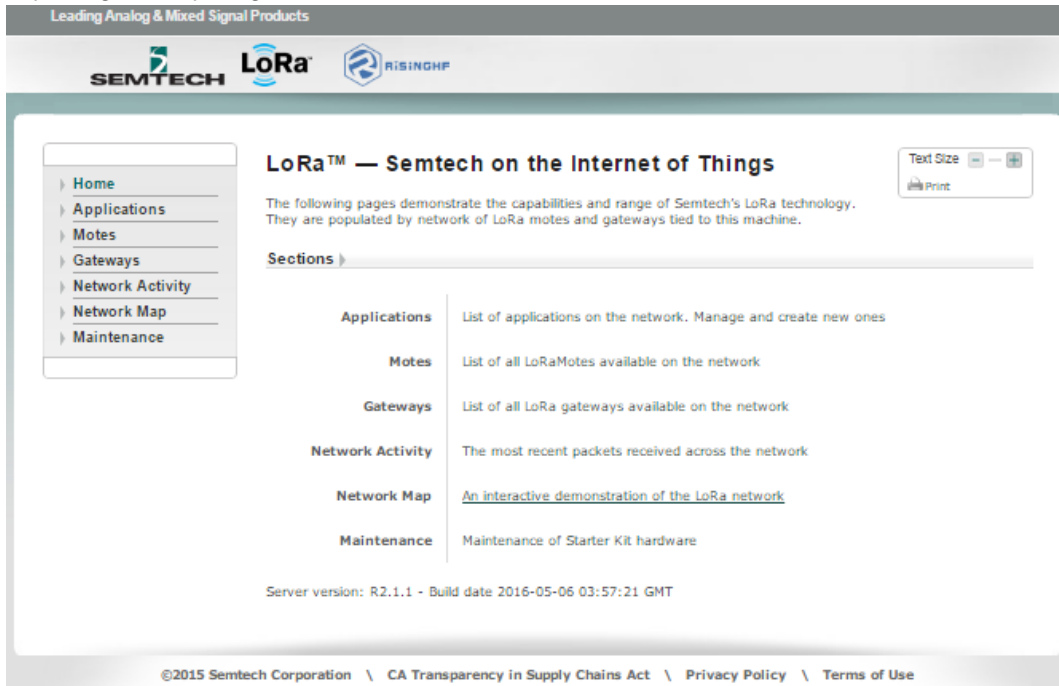
```
AT+FDEFAULT=RISINGHF
AT+DR=EU868
```

2.5.3.2 US915 HYBRID

```
AT+FDEFAULT=RISINGHF
AT+DR=US915HYBRID
AT+RXWIN2=923.3,DR8
```

2.5.4 Access Internal Server Console

Access ip of your gateway to get the web server console, which is showed as below:



2.5.5 ABP Mode

a) Use SSCOM to get device ID

at+id

+ID: DevAddr, 00:82:2c:96

+ID: DevEui, 47:97:c5:34:90:1d:00:48

+ID: AppEui, 52:69:73:69:6e:67:48:46

b) Create a new application at Applications page, fill into Name, Owner and EUI, among them EUI is 8 bytes hexadecimal number

Applications

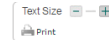
Below is a list of LoRa applications on the network. Use the fields at the top to set up a new one on the server.

Name ^	Owner	EUI (AppEUI)	Configured Motes
New: <input type="text" value="rhf3m076"/>	<input type="text" value="rxhf"/>	<input type="text" value="0000000000000001"/>	<input type="button" value="Add"/>
defaultApp	[Unknown]	00-00-00-00-00-00-00	<input type="button" value="Delete"/> 0
null	[Unknown]	FF-FF-FF-FF-FF-FF-FE	<input type="button" value="Delete"/> 0

c) When finished, click button behind application to configure device.

rhf3m076 Motes

Below are the motes configured for this application. A new one may be commissioned using over-the-air protocol or personalisation.



Over-the-Air Motes

Motes ordinarily join the network by negotiating with the server using an application key. Enter this key below to prepare the server.

Mote (DevEUI)	Application Key (AppKey)
New: <input type="text"/>	<input type="text"/>

Personalised Motes

Personalised motes are configured with the network address, application session key and network session key already present, so they are ready to communicate on the network. Enter these same details below to prepare the server.

Mote (DevEUI)	Network Address (DevAddr)	Application Session Key (AppSKey)	Network Session Key (NwkSKey)
New: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

d) Fill ABP mode related information, DevEui/DevAddr/NwkSKey/AppSKey.

DevEui: RHF3M076 get through AT+ID command

DevAddr: RHF3M076 get through AT+ID command

NWKSKEY: Default value 2B7E151628AED2A6ABF7158809CF4F3C

APPSKEY: Default value 2B7E151628AED2A6ABF7158809CF4F3C

Personalised Motes

Personalised motes are configured with the network address, application session key and network session key already present, so they are ready to communicate on the network. Enter these same details below to prepare the server.

Mote (DevEUI)	Network Address (DevAddr)	Application Session Key (AppSKey)	Network Session Key (NwkSKey)
New: 47:97:c5:34:00:1d:00:48	00:82:2c:96	2B7E151628AED2A6ABF7158809CF4F3C	2B7E151628AED2A6ABF7158809CF4F3C

e) Test through below commands:

at+mode=lwabp

+MODE: LWABP

AT+MSGHEX="0a 0b 0c 0d 0e"

+MSGHEX: Start LoRaWAN transaction

+MSGHEX: TX "0A 0B 0C 0D 0E "

+MSGHEX: Wait ACK

+MSGHEX: ACK Received

+MSGHEX: RXWIN1, RSSI -47, SNR 3.25

+MSGHEX: Done

2.5.6 OTAA Mode

a) Delete device which is just added, avoid DevEui collision

b) Check AppEui from Application page

Applications

Below is a list of LoRa applications on the network. Use the fields at the top to set up a new one on the server.

Name	Owner	EUI (AppEUI)	Configured Motes
New: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Add"/>
defaultApp	[Unknown]	00-00-00-00-00-00-00	<input type="button" value="Delete"/> 0
null	[Unknown]	FF-FF-FF-FF-FF-FF-FE	<input type="button" value="Delete"/> 0
rhf3m076	rxhf	00-00-00-00-00-00-01	<input type="button" value="Delete"/> 0

c) Use at+id=appeui, " 00-00-00-00-00-00-01" command to set RHF3M076 APPEUI

at+id=appeui, " 00-00-00-00-00-00-01"

d) Fill in DevEui and AppKey

Over-the-Air Notes

Motes ordinarily join the network by negotiating with the server using an application key. Enter this key below to prepare the server.

Mote (DevEUI)	Application Key (AppKey)
New: 47:97:c5:34:00:1d:00:48	2B7E151628AED2A6ABF7158809CF4F3C <input type="button" value="Add"/>

at+mode=lwotaa

+MODE: LWOTAA

at+join

+JOIN: Starting

+JOIN: NORMAL, count 1, 0s, 0s

+JOIN: Network joined

+JOIN: NetID 000000 DevAddr 00:82:2c:96

+JOIN: Done

AT+CMGHEX="0a 0b 0c 0d 0e"

+CMGHEX: Start LoRaWAN transaction

+CMGHEX: TX "0A 0B 0C 0D 0E "

+CMGHEX: Wait ACK

+CMGHEX: ACK Received

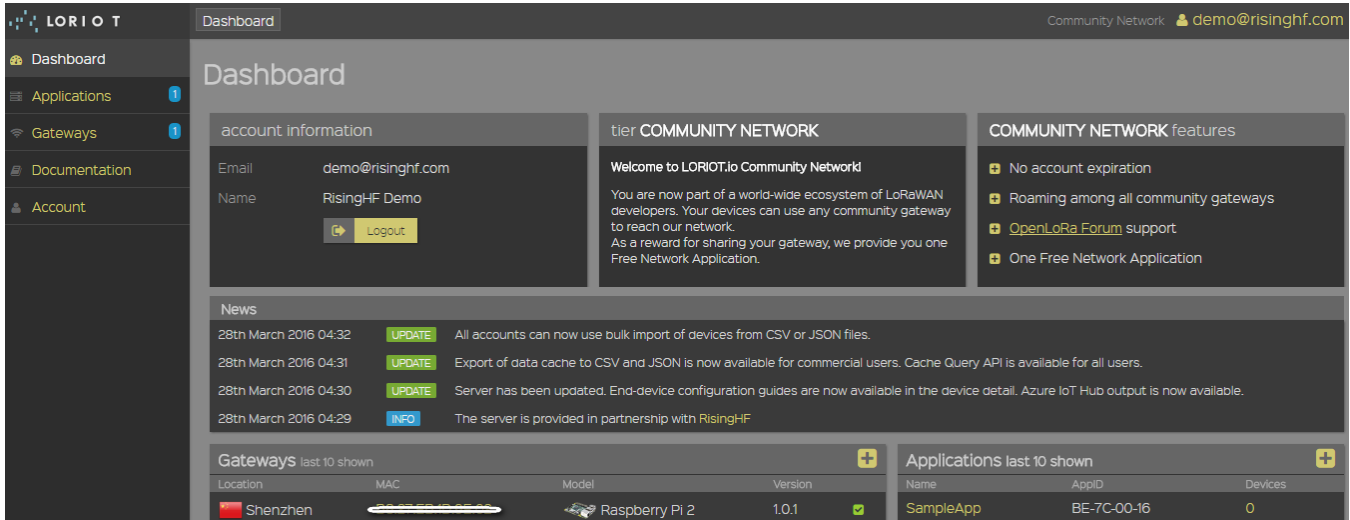
+CMGHEX: RXWIN1, RSSI -47, SNR 3.25

+CMGHEX: Done

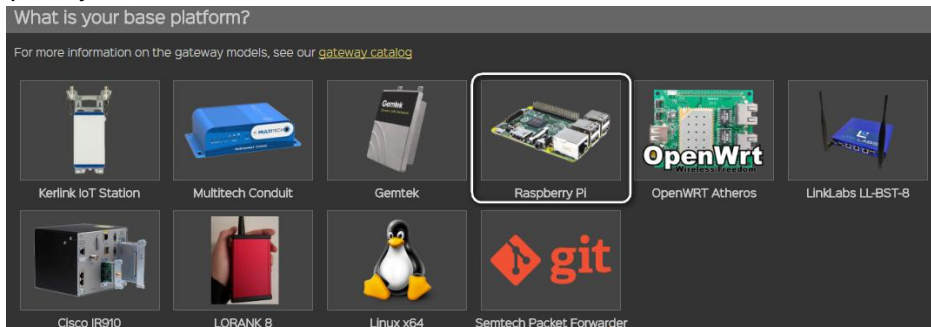
3 Connect To Lorient Server

3.1 Lorient Server Gateway Registration

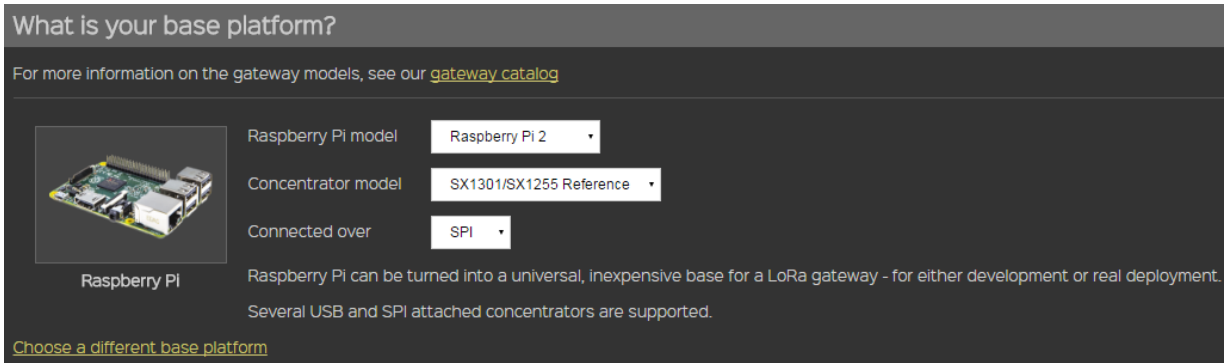
- a) New user need register an account first, registration address <https://cn1.loriot.io/register.html>. Fill in UserName, Password and email address to register, after registration an email will be sent to you, please follow the instruction in the email to activate.
- b) After successful activation, access <https://cn1.loriot.io/home/login.html> to log in. Default tier is “Community Network”, it supports 1 Gateway (RHF2S001) and 10 nodes.



- c) Enter Dashboard -> Gateway, click “Add Gateway” start to add Gateway
- d) Select “Raspberry Pi”



- e) Raspberry Pi model -> Raspberry Pi 2
- Concentrator model -> SX1301/SX1255 Reference (for RHF2S001-434, RHF2S001-470)
SX1301 Reference (for RHF2S001-868, RHF2S001-920, RHF2S001-780)
- Connected over -> SPI



- f) Fill in the MAC address of your RHF2S001, should be in format of b8:27:eb:xx:xx:xx. And also input Gateway Location information.
- g) Click “Register Raspberry Pi gateway” to finish the registration.
- h) Click the registered gateway to enter configuration page, switch “Frquency Plan” manually, your plan here is decided by the type of your RHF2S001 type, available plan are CN470, CN473, CN434, CN780, EU868, after selected please refresh the page to get the exact channel.
- i) Run command:


```
cd /home/rxhf/loriot/1.0.2
sudo systemctl stop pktfwd
sudo gwrst
./lrt -f -i eth0 -s cn1.loriot.io
```

To start loriot gateway service and connect the gateway to loriot server. Replac cn1.loriot.io with the server you choose(ap1.loriot.io / eu1.loriot.io / us1.loriot.io etc.)

Status is showed as below after the gateway is connected:

Status	
Connected	✔ Connected
Version	1.0.1
Latency	75 ms
Last keep-alive	a few seconds ago 17th May 2016, 17:37:45
Last data	never
Last connect	3 minutes ago 17th May 2016, 17:35:10
Remote time offset	no data
Time is shown in your local time (UTC+08:00)	

- j) Finish gateway registration. Next is to register node.

3.2 Loriot Server Connect Node device

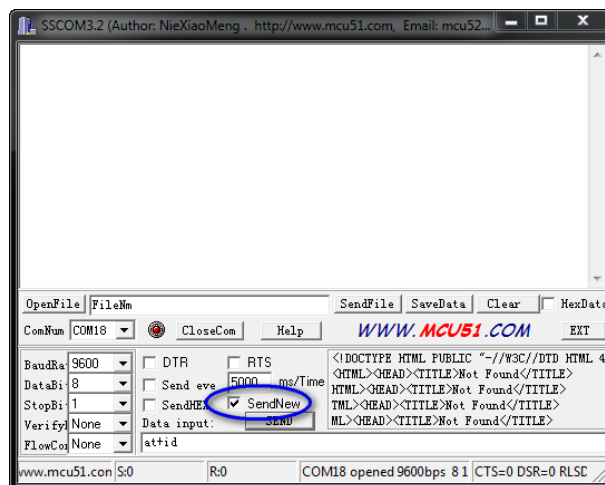
3.2.1 RHF3M076 Configuration

Connect RHF3M076 with your PC before configuration, like below picture:



图 8 RHF3M076

- RHF3M076 will be recognized as a USB CDC (COM Port) device. Please refer to UM01516 about how to install driver. The driver file could be downloaded from RisingHF Wiki or contact support@risinghf.com
- Open SSCOM tool, please note SSCOM only scan com port when it is opened, if the device is connected after SSCOM is opened, please reopen SSCOM to refresh device list.
- Make sure "SendNew" option is checked this will make SSCOM append Windows newline "\r\n" for every command. So that RHF3M076 could recognize the command.



- Send "AT+CH" to get channel list. RHF3M076 work at 868MHz by default.
at+ch
+CH: 3; 0,868100000,DR0,DR5; 1,868300000,DR0,DR5; 2,868500000,DR0,DR5;
- Configure RHF3M076 channels according to the selected frequency plan. Current gateway channels could be got from "Dashboard -> Gateway -> Your Gateway" Use below command to reconfigure the channels:
 (For exmpale: CN470)
at+ch=0,471.5
at+ch=1,471.7
at+ch=2,471.9

At lease set 3 channels to overwrite all default channels, when finished execute "at+ch" to check channel list:

```
at+ch
+CH: 3; 0,471500000,DR0,DR5; 1,471700000,DR0,DR5; 2,471900000,DR0,DR5;
```

- f) Send "AT+ID" to check device DEVADDR, DEVEUI, APPEUI
- ```
at+id
+ID: DevAddr, 00:82:2c:96
+ID: DevEui, 47:97:c5:34:90:1d:00:48
+ID: AppEui, 52:69:73:69:6e:67:48:46
```
- g) After get DEVADDR, DEVEUI, APPEUI, go back Lorient server to add node

### 3.2.2 ABP Mode

- a) Log in Lorient server , Click "Dash Board" -> "Applications" -> "SimpleApp"
- b) Click "Import ABP" , input below items:  
 DevAddr: RHF3M076 get through "AT+ID" command (Note: Lorient doesn't support colon connector, need remove manually)  
 FCntUp: Set to 1  
 FCntDn: Set to 1  
 NWKSKEY: Default value 2B7E151628AED2A6ABF7158809CF4F3C  
 APPSKEY: Default value 2B7E151628AED2A6ABF7158809CF4F3C  
 EUI: DEVEUI, RHF3M076 get through "AT+ID" command

| Parameter                | LoRaWAN name | Format        | Value                            |
|--------------------------|--------------|---------------|----------------------------------|
| End-device address       | DevAddr      | 8 hex digits  | 00822c96                         |
| Sequence number uplink   | FCntUp       | Decimal       | 1                                |
| Sequence number downlink | FCntDn       | Decimal       | 1                                |
| Network session key      | NWKSKEY      | 32 hex digits | 2B7E151628AED2A6ABF7158809CF4F3C |
| Application session key  | APPSKEY      | 32 hex digits | 2B7E151628AED2A6ABF7158809CF4F3C |
| EUI (optional)           | DevEUI       | 16 hex digits | 4797c534901d0048                 |

[Import device](#)

If you want to Import existing device with an APPKEY, please use the [import OTAA function](#).  
 If your device doesn't have an EUI assigned, one will be generated for it from a pool of private addresses

- c) Click "Import Device" finish device import
- d) "Dashboard -> Applications -> SampleApp", click "Devices" in the left side, continue click DevAddr to add the device
- e) Set "Seqno checking" to "Relaxed" (Relaxed mode will allow device sequence number reset)
- f) Back to SSCOM, send command:

```
AT+CMSSGHEX="0a 0b 0c 0d 0e"
+CMSSGHEX: Start LoRaWAN transaction
+CMSSGHEX: TX "0A 0B 0C 0D 0E "
+CMSSGHEX: Wait ACK
+CMSSGHEX: ACK Received
+CMSSGHEX: RXWIN1, RSSI -47, SNR 3.25
+CMSSGHEX: Done
```

| Device EUI       | Local time            | Freq [MHz] | Data rate      | RSSI | SNR | Seq # | Port | Payload              |
|------------------|-----------------------|------------|----------------|------|-----|-------|------|----------------------|
| 4797C534901D0048 | 6:41:32 PM            |            |                |      |     | 1     |      | (enqueued data sent) |
| 4797C534901D0048 | 5/17/2016, 6:41:32 PM | 471.500    | 5F12 BW125 4/5 | -38  | 8.8 | 1     | 8    | 0a 0b 0c 0d 0e       |

### 3.2.3 OTAA Mode

Note: OTAA mode is unavailable for free Lorient account

- a) Delete already joined ABP mode device to avoid DEVEUI collision
- b) Log in Lorient server, click "Dash Board" -> "Applications" -> "SimpleApp"

Click "Import ABP" , input below items:

DevEui: RHF3M076 get through "AT+ID" command

APPKEY: Default value 2B7E151628AED2A6ABF7158809CF4F3C

| Parameter       | LoRaWAN name | Format                            |                                  |
|-----------------|--------------|-----------------------------------|----------------------------------|
| Device EUI      | DevEUI       | 16 hex digits, can include dashes | 4797c534001d0048                 |
| Application key | APPKEY       | 32 hex digits                     | 2B7E151628AED2A6ABF7158809CF4F3C |

[Import device](#)

Other keys (NWKSEKEY, APPSKEY) and parameters (DevAddr) will be re-generated upon every network join.

- c) Check AppEui from SampleApp page (Note: unavailable for free account)

| Features                |                         |
|-------------------------|-------------------------|
| Application EUI         | BE-7C-00-03-BE-7C-00-03 |
| Over-the-air activation | enabled                 |
| Downlink (TX)           | enabled                 |
| Gateway information     | location                |
| Output verbosity        | extended                |

Upgrade to [commercial account](#) to enable the advanced features

- d) Use `at+id=appeui,"BE-7C-00-03-BE-7C-00-03"` command to set RHF3M076 APPEUI.

`at+id=appeui,"BE-7C-00-03-BE-7C-00-03"`

- e) Run below commands in sequence to set OTAA mode work as OTAA mode

`at+mode=lwotaa`

`+MODE: LWOTAA`

`at+join`

`+JOIN: Starting`

`+JOIN: NORMAL, count 1, 0s, 0s`

`+JOIN: Network joined`

`+JOIN: NetID 4C5254 DevAddr a9:4b:5c:0a`

`+JOIN: Done`

`AT+CMGHEX="0a 0b 0c 0d 0e"`

`+CMGHEX: Start LoRaWAN transaction`

`+CMGHEX: TX "0A 0B 0C 0D 0E "`

`+CMGHEX: Wait ACK`



```
+CMGHEX: ACK Received
+CMGHEX: RXWIN1, RSSI -47, SNR 3.25
+CMGHEX: Done
```

## 4 Advanced Usage

### 4.1 Hardware Performance Test

This chapter is just for hardware developer who wants to integrate RHF0M301 to their own design. Make sure there is no background process is accessing RHF0M301 module:

- a) Stop pktfwd  
`sudo systemctl stop pktfwd`
- b) Stop Lorient binary if you once start it

Test command list:

- a) Enter test directory  
`cd ~/risinghf/test`
- b) Hardware reset  
`sudo gwrst`
- c) Hardware connection validation  
`./test_loragw_reg`
- d) RX test  
// Different frequency use different configuration file, syncword34 directory contains LoRaWAN format data packet receiving configuration file  
`./util_rx_test -c ./cfg/freq_conf_470.json`
- e) TX test  
Use `util_tx_test` and `util_tx_continuous`, refer to the help information (`-h` parameter could be used to get help information)
- f) Channel scan to use `util_rssi_histogram` (Note: SX1301 RSSI value precision is very limited).

Detailed usage:

```
rxhf@rhf2s001:~/risinghf/test$./util_rssi_histogram -h
Available options:
-h print this help
--file log file name
--fmin start frequency in Hz, default is 863 MHz
--fmax stop frequency in Hz, default is 870 MHz
--fstep frequency resolution in Hz, default is 50 kHz
-n number of RSSI captures, each capture is 4096 samples long, default is 90 (3s for 125Khz capture rate)
-p div ratio of capture rate (32 MHz/p), default is 256 (125 kHz)
```

Eg:

```
./util_rssi_histogram --fmin 470000000 --fmax 471000000 --file a.csv
```

## 5 Others

---

### 5.1 RHF3M076 Driver Installation

Reference:

[http://wiki.risinghf.com/lib/exe/fetch.php?media=extranet:rhf-um01516\\_lorawan\\_modem\\_driver\\_installation\\_guide.pdf](http://wiki.risinghf.com/lib/exe/fetch.php?media=extranet:rhf-um01516_lorawan_modem_driver_installation_guide.pdf)

### 5.2 FT232 Driver Installation

Refer to FTDI Official document:

FTDI:

[http://www.ftdichip.com/Support/Documents/AppNotes/AN\\_119\\_FTDI\\_Drivers\\_Installation\\_Guide\\_for\\_Windows7.pdf](http://www.ftdichip.com/Support/Documents/AppNotes/AN_119_FTDI_Drivers_Installation_Guide_for_Windows7.pdf)

RisingHF mirror

[http://wiki.risinghf.com/lib/exe/fetch.php?media=extranet:an\\_119\\_ftdi\\_drivers\\_installation\\_guide\\_for\\_windows7.pdf](http://wiki.risinghf.com/lib/exe/fetch.php?media=extranet:an_119_ftdi_drivers_installation_guide_for_windows7.pdf)

### 5.3 Recover SD Card

Contact support@risinghf.com to get image address and extract password. And refer to below document to burn SD card.

<https://www.raspberrypi.org/documentation/installation/installing-images/windows.md>

### 5.4 Raspberry Pi Raspbian Version

RisingHF Image is based on 2016-03-18-raspbian-jessie-lite.img

### 5.5 Configure Static IP Address

- a) Backup files which will be modified

```
cp /etc/dhcpd.conf /etc/dhcpd.conf.bak
```
- b) Configure new IP address. Please replace below ip\_address, routers, domain\_name\_servers with the one you need. Take effect after reboot

```
sudo su
cp /etc/dhcpd.conf.bak /etc/dhcpd.conf
echo "interface eth0" >> /etc/dhcpd.conf
echo "static ip_address=172.0.41.196/16" >> /etc/dhcpd.conf
echo "static routers=172.0.0.254" >> /etc/dhcpd.conf
echo "static domain_name_servers=223.5.5.5" >> /etc/dhcpd.conf
```

If configuration has something wrong, please use below command to rescue

```
cp /etc/dhcpd.conf.bak /etc/dhcpd.conf
```

## 5.6 Internal MySQL Database

RHF2S001 internally integrated LoRaWAN server depends on MySQL, because of Raspberry Pi data is saved at SD card, and MySQL will erase and write data to SD card frequently, this will lead to potential risk to damage SD card. So please be warned, during your testing and development, please backup your data in time in case of any lost.

**Usermae:** root

**Passwod:** root

Command to log in mysql:

```
mysql -u root -p
```

For users who need use phpMyAdmin, please install through apt-get command

## Revision

V2.1 2016-12-07

+ Update sections which are not aligned

V2.0 2016-11-23

+ This branch is for Sseed only

+ Add US915 support for SseedStudio

V1.2 2016-07-26

+ Fix typo

V1.1 2016-06-22

+ AT+CMMSGHEX format

V1.0 2016-05-17

+ Draft



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