UM01825

RHF2S025 User Manual

V0.3

Document information

Info	Content
Keywords	RisingHF, LoRaWAN, WiFi, Industrial Gateway, User Manual
Abstract	This document is a user manual for RHF2S025.

Content

Figure

Table

1. Preface

RHF2S025 is an intelligent gateway with LoRaWAN ,LTE 4G(optional)and WiFi functions.It is developed and produced by RisingHF. RHF2S025 has a small size, simple appearance and high reliability, which could help customer to setup a LoRaWAN network quickly and with efficiency.

2. Connect to iotsquare server

The iotsquare server is a LPWAN network service cloud platform developed by RisingHF. Iotsquare provides management services for massive LoRaWAN standard devices, gateways and network communications in the global frequency band, and acts as a data transmission channel to seamlessly interface with application servers.

2.1. Get Started

2.1.1Add Gateway

a) Please contact RisingHF technical docking personnel to obtain login account and password..
https://cloud.iotsquare.xyz

b) Login to iotsquare cloud server, enter ” Gateway->Add Gateway”,It is recommended that the gateway be named: gateway model _A/B_ number, where A/B is convenient for customers to distinguish between class a and class b gateways.

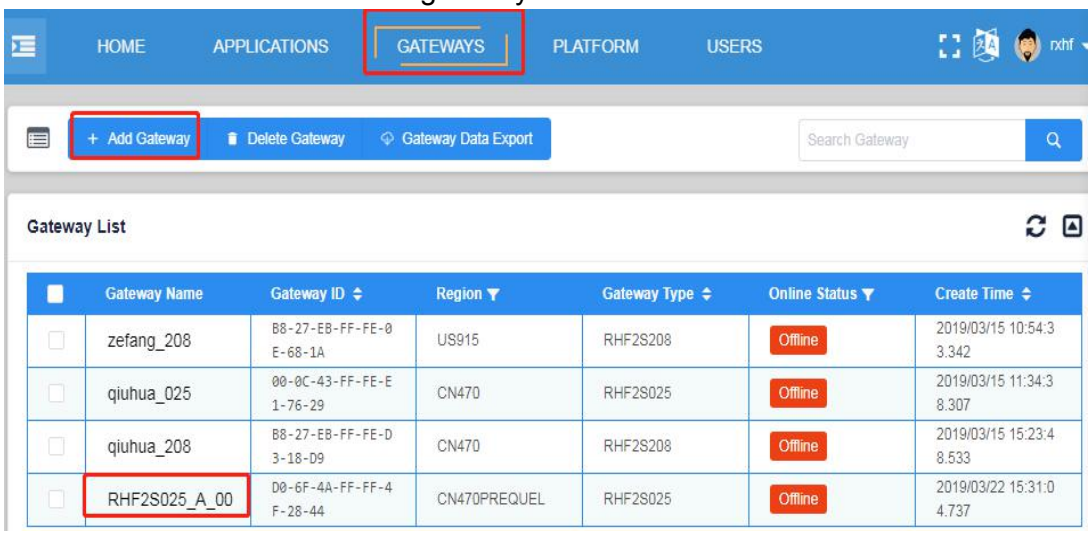

Figure 2-1 Add gateway on the iotsquare server

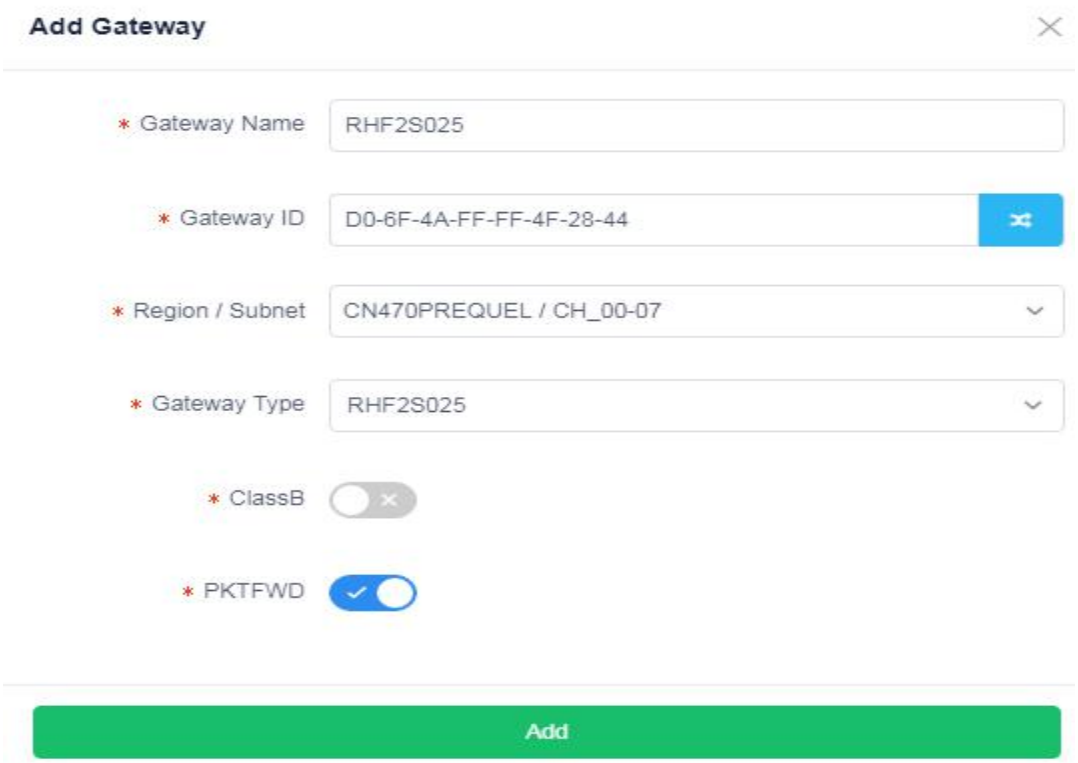

Figure 2- 2 Gateway informations to be filled

2.1.2 Add Applications

Enter “Applications->add application”

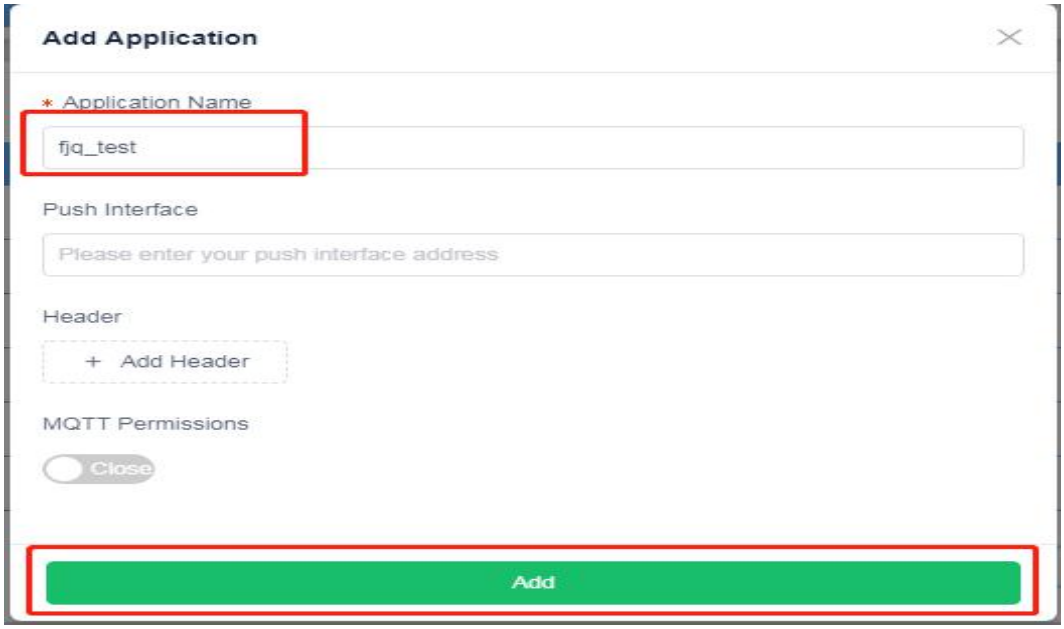

Figure 2- 3 Add application on the iotsquare server

2.1.3 Add Device

Select the application, add a node device, select otaa/abp according to the mode of the node, fill in the node information and frequency plan. Suggested node naming method: node model / product name _ number.

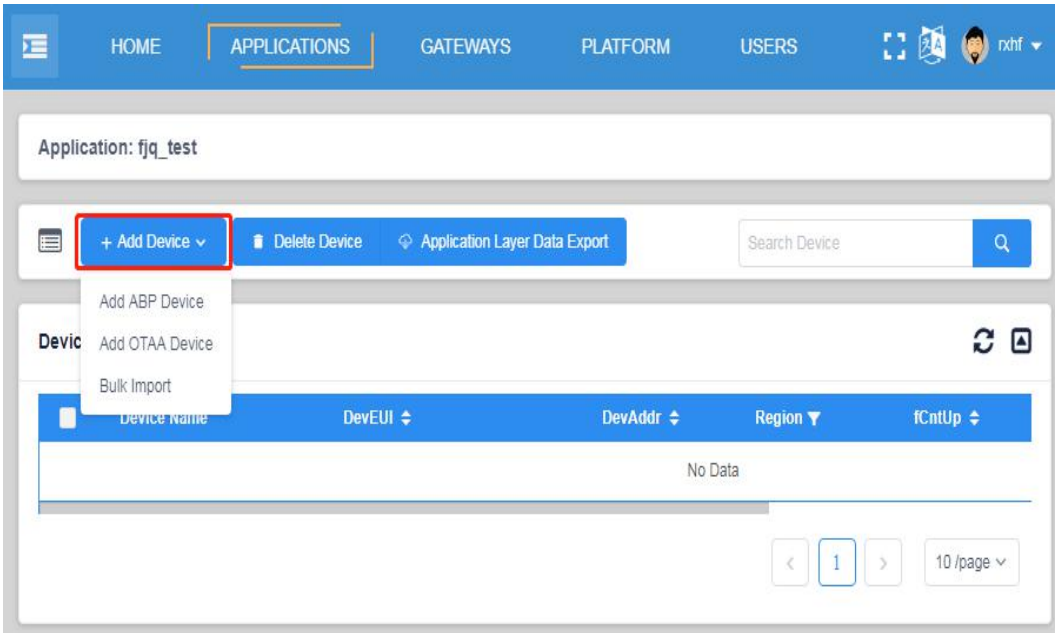

Figure 2-4 Add node on the iotsquare server

2.1.3.1 Add abp Device

a) Fill in the device name;
b) Information such as eui/addr is obtained from the node;
c) The key is set by the node, or the default value is used;
d) The frequency plan of the node/gateway/server should be consistent;
e) The device type is compatible with class A by default. For example, the class A node can be omitted, and the class B/C selects the corresponding option;
f) Click Add;

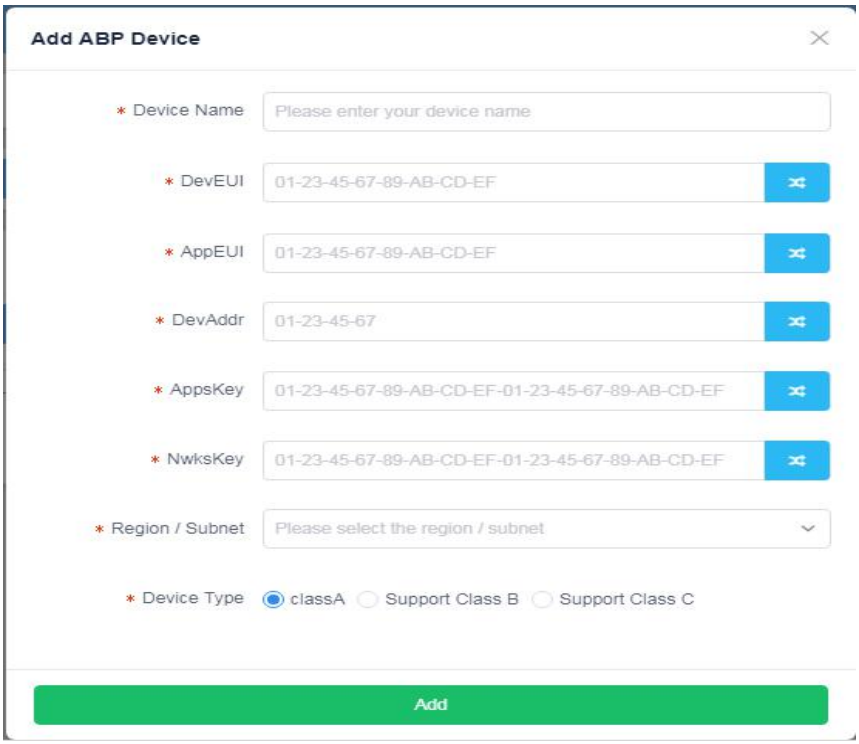

Figure 2-5 Add the abp node on the iotsquare server

c) The node starts to send data. On the iotsquare cloud server, click the device name, and then click the application layer real-time data to view the node real-time data.

Figure 2-6 uplink data on the iotsquare server

2.2. Connect to internet in different modes and modes switch

There are wireless WiFi 、 wired cable and LTE 4G(optional) three ways to connect to the internet for RHF2S025.

2.2.1. AP mode

AP mode is RHF2S025's factory default mode. In this mode, the gateway could connect to the network via DHCP way with a cable. Please connect RHF2S025 network port to the DHCP LAN port of the router with the network cable.

Except the DHCP, RHF2S025 also supports Static IP access. Please access to the web configuration to switch the mode.

1) Get IP address of the device

1. Scan the SSID of RHF2S025 in your PC and connect your PC to the device, usually with the default name “RHF2S025_XXXXXX”, “XXXXXX” stands for last 3bytes of the device MAC address. After your PC connecting to the device, you could get the default ip 192.168.100.1.

2. Connect both your PC and RHF2S025 to the same router, then you could obtain the IP address via DHCP service.

2) Login. Default Username：admin；Password：admin

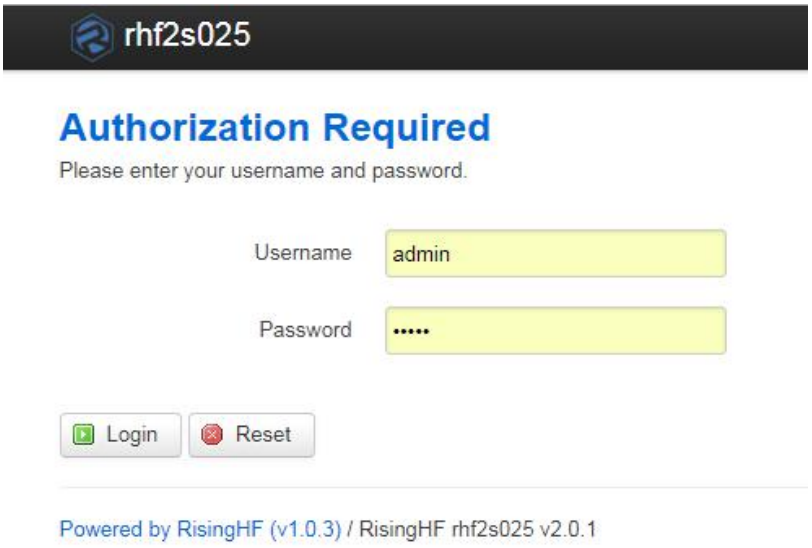

Figure 2-7 Web page login

3) On the Web page, click Network->Ethernet.

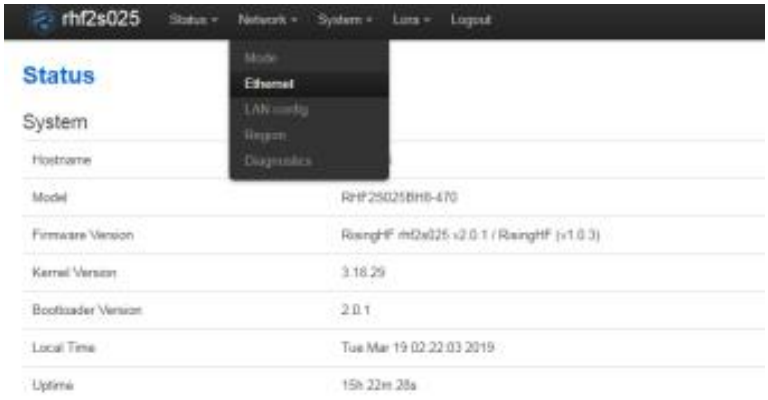

Figure 2-8 The Ethernet menu

4) Select static address，and fill in the appropriate IP address, IP netmask and other information.

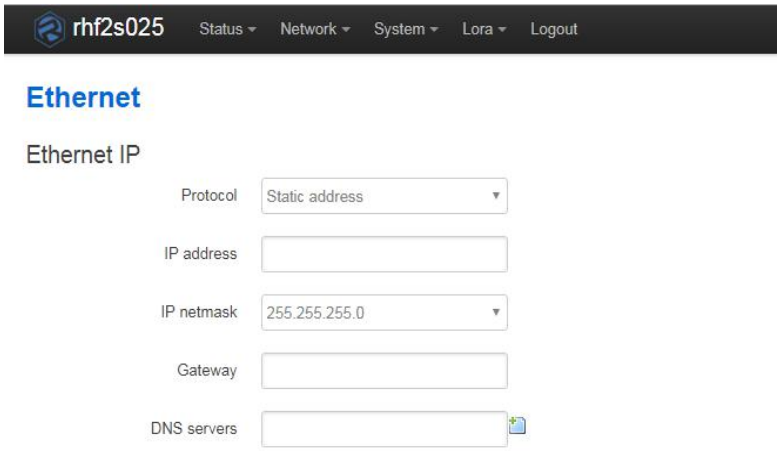

Figure 2-9 Fill in information with static ip

5) Click “Switch protocol” to wait for tens of seconds to connect to the internet.

2.2.2. AP/STA mode

In this mode, RHF2S025 gateway will have both AP and STA functions. The gateway will connect to the internet and cloud server via wireless WiFi, and also provide WiFi services to others stations.

1) On the web page, click Network->Mode

Figure 2-10 Enter the mode menu

2) Select APSTA in the “Network mode” field and click “Scan wifi”

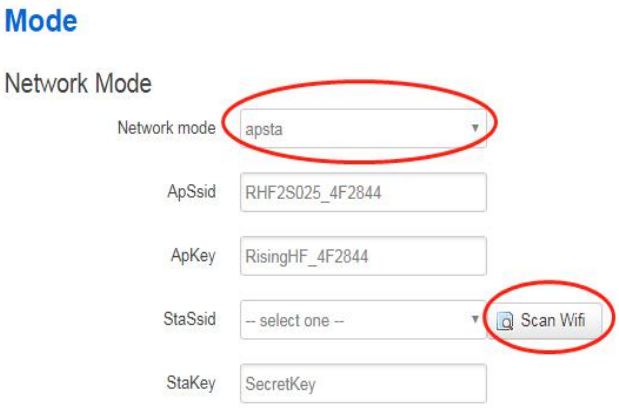

Figure 2-11 Select APSTA mode

3) In the StaSsid field, select the gateway SSID you want to connect to and enter the password in StaKey

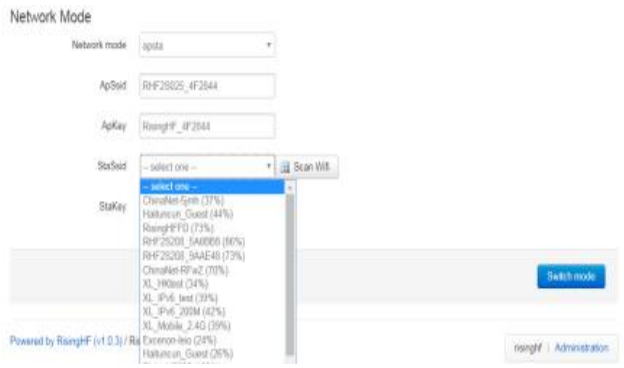

Figure 2-12 Select the scanned SSID

4) Click “Switch mode” to switch mode, wait about 1 minute till the page will automatically refresh, or you could refresh the page by manual. The WiFi led will turn green if it succeeds. If you fill in with wrong Stakey or invalid SSID, the device will return to AP mode.

The green power LED will be ON;
The green system LED will blink;
The green WiFi LED will be ON; (AP/STA mode)
The green LoRaWAN LED will be ON;
The USB LED will be off;

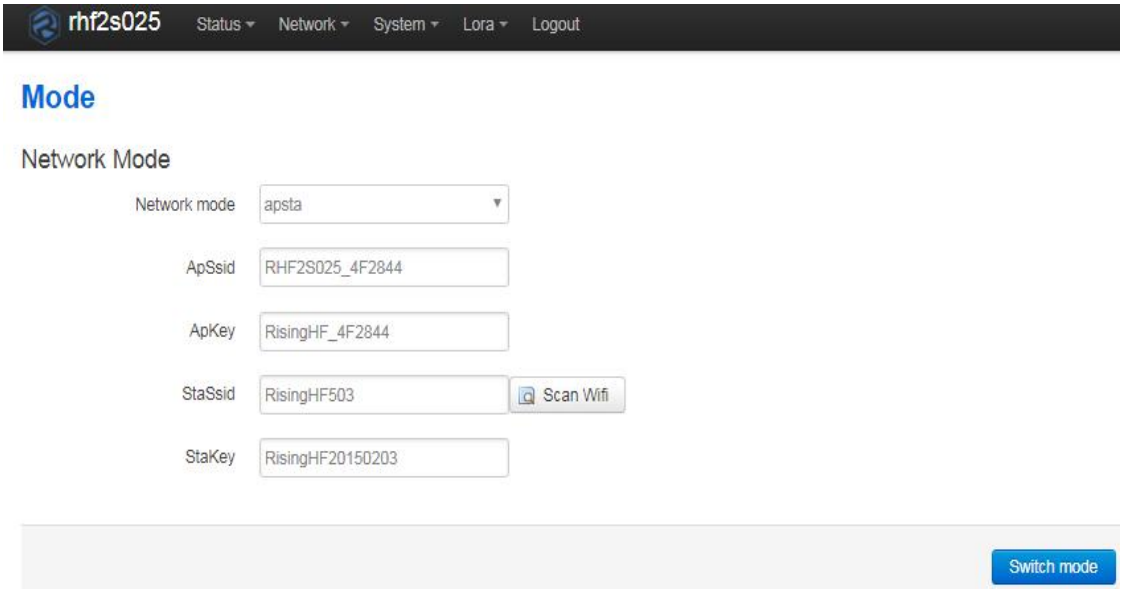

Figure 2-13 Switch mode

Figure 2-14 Led instructions in AP/STA mode when connected to cloud server

2.2.3. PPPoE mode

Customer could use PPPoE mode to dial and connect to internet with RHF2S025.

1) On the web page, click “Network->Mode” to select the “PPPoE” mode.

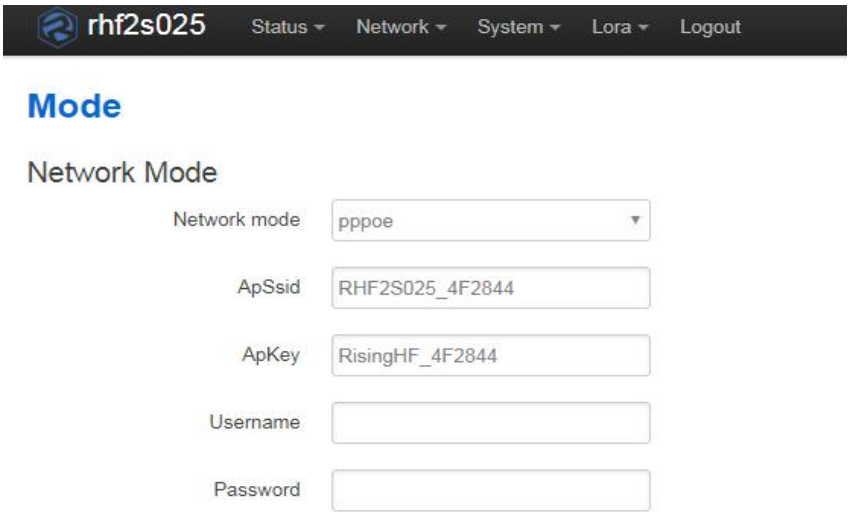

Figure 2-15 Switch to PPPoE mode

2) Fill in the account and password and click “Switch mode” to access into the internet. Please check with your local network operator for your account and password first.

All the methods above could help you connect the gateway RHF2S025 access to the internet and also the cloud server. Then you can demo the LoRaWAN communication with the node.

2.3. LoRaWAN communication example

This example is based on RisingHF LoRaWAN modem RHF76-052AM/RHF3M076B (FW version v2.1.15) with AT command. Here we use the CN470 Prequel frequency plan as an example.

Figure 2-16 RHF3M076B LoRaWAN Modem

1) RHF3M076 is a USB CDC device. Please install the driver before using it. For installation drivers please refer to the RisingHF UM01516 User's manual. The driver file can be downloaded from the RisingHF WiKi or by contacting support@risinghf.com.

2) Open the SSCOM tool and select the COM port and open it.

3) Configure the node/Modem and demo uplink

- //Reset the modem
- At+reset
- //check or re-wirte the DevAddr
- At+id
- At+id=DevAddr,”01 02 03 04”
- //set to ABP mode，ClassA mode
- At+mode=LWABP
- AT+CLASS=A
- //set the data rate scheme
- At+dr=CN470prequel
- //configure the channel (keep the channels same for both GW/server and node side)
- At+ch=0,471.5
- At+ch=1,471.7
- At+ch=2,471.9
- …
- At+ch=7,472.9
- //set Rxwin2
- At+rxwin2=471.3,dr3
- //set initial data rate
- at+dr=dr0
- //set initial power
- AT+POWER=20
- //ADR ON or OFF
- AT+ADR=ON
- //Configure Nwkskey and Appskey (keep the keys same for both server and node side)
- AT+KEY=NwkSKey, "2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F 3C"
- AT+KEY=AppSKey, "2B 7E 15 16 28 AE D2 A6 AB F7 15 88 09 CF 4F 3C"
- //disable duty cycle function (please follow the local rules)
- at+lw=dc,off
- At+lw=jdc,off

- //Demo Uplink
- AT+CMSGHEX="00 11 22 33"
- //Demo downlink

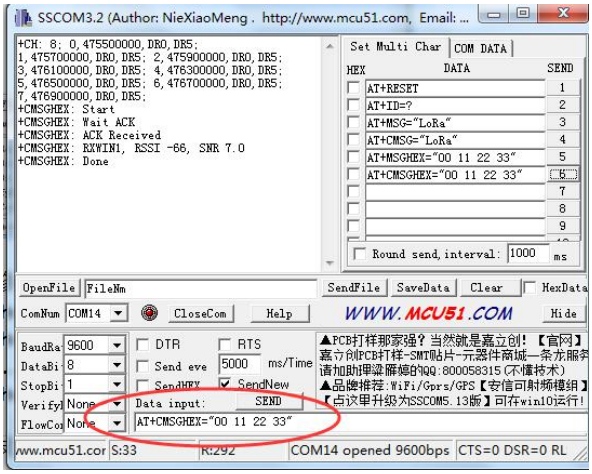

Figure 2-17 Demo uplink with ACK

4) Visit the https://cloud.iotsquare.xyz server. Click on the device name in the iotsquare server to enter the device details.

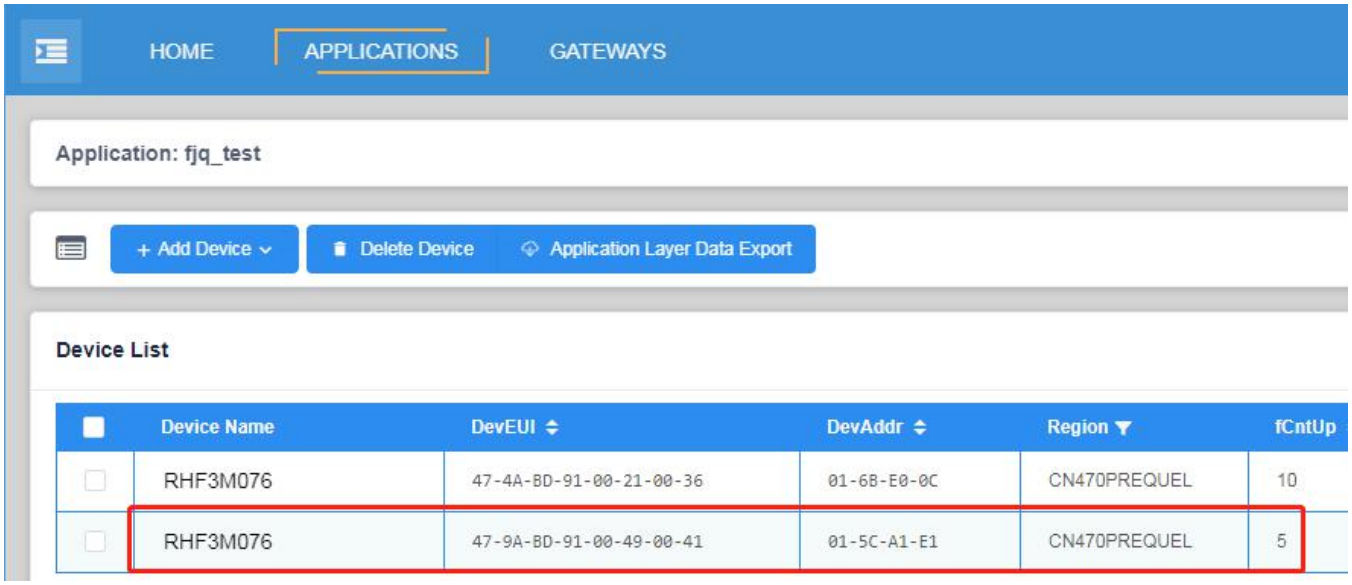

Figure 2-18 Go to the device details page

5) On this page you can see the data "00 11 22 33" sent by the previous RHF3M076. You can also observe the interface while sending data, and the server will dynamically refresh and display the uplink data received immediately.

Figure 2-19 Uplink data received

3. Advanced operation

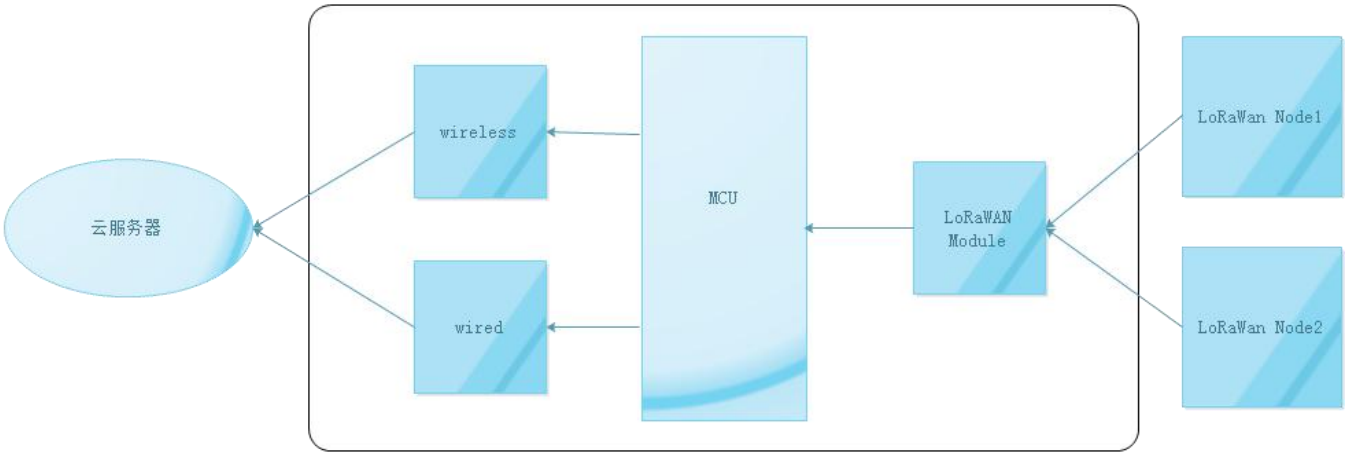

Figure 3-1 LoRaWAN communication structure

3.1. Login on the web

RHF2S025 is built-in a web which could be configured by users. The user can access the “192.168.100.1” into the web configuration interface. Default login user name: admin, password: admin. RHF2S025 factory default mode is the AP mode, and there are two ways to login into web interface.

Use your PC to scan the device SSID (ie WiFi name) which is “RHF2S025_XXXXXX”, “XXXXXX” stands for the last 3bytes of the device MAC address. After connection succeeding, use the browser to access 192.168.100.1 into the web configuration page.

Connect the gateway to a router and use DHCP service to get the ip of the device. The hostname of the gateway also is rhf2s025.

1) Access the ip and open the web page:

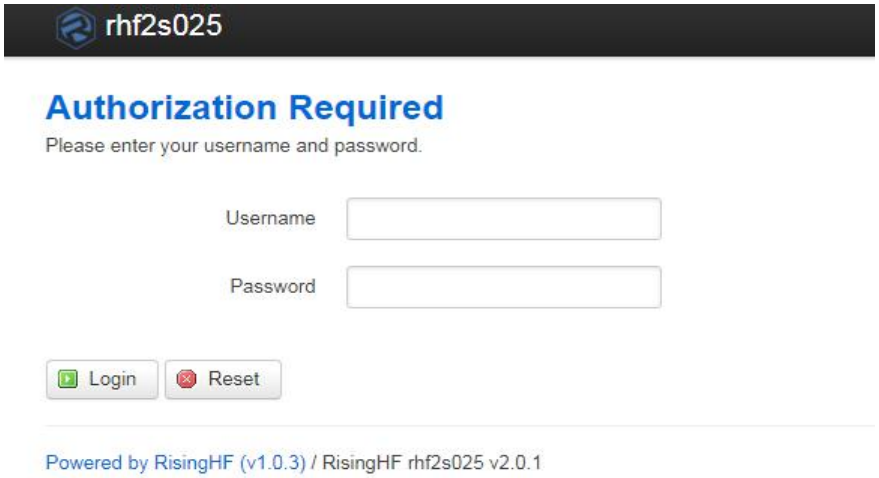

Figure 3- 2 Login on the web page

2) Page after login:

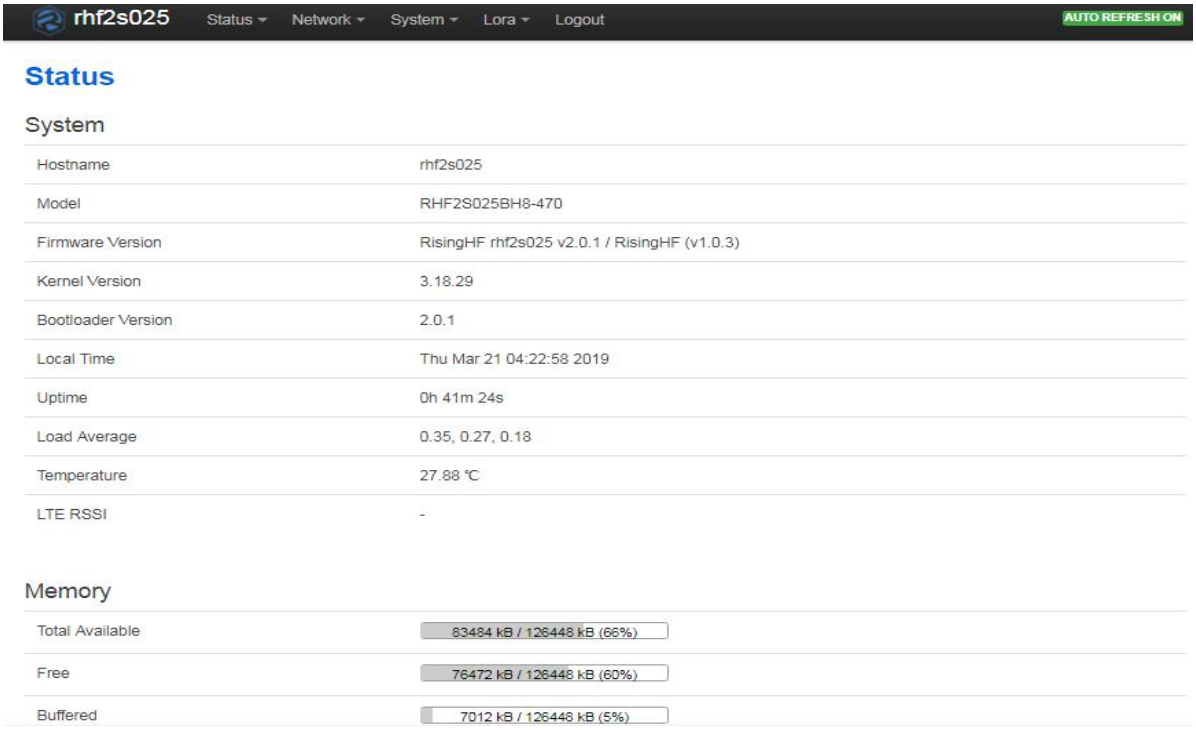

Figure 3- 3 Page after login

RHF2S025 web interface menu is as follows:

Level 1 menu:

Status: Mainly show system status

Network: Network-related configuration, to provide settings of connecting to internet, test network and other functions

System: Common settings for the system

Lora: LoRaWAN SDK configuration

Level 2 menu:

Status:

Overview: Display system status, such as: version, memory, network information and other functions

Network:

Mode: Network configuration, switch modes to access to internet

Ethernet: Ethernet access, be valid in AP mode.

LAN config: LAN configuration, such as: LAN IP address

Region: Region of the gateway location

Diagnostics: check the connection to internet

System

System: System property settings, such as: time, time zone, language

Administration: Modify the password for the current user

Reboot: Reboot the system

Reset: Restore factory settings, the user will lose all data

Lora

Sdk: Built-in SDK, each level 2 menu represents an SDK

Lora rssi: Set the minimum frequency, maximum frequency and stepping to scan the channel noise and display the results in graphical form

Logout: logout

3.2. LoRa SDK

3.2.1. Modify SDK configuration

RHF2S025 is built-in Packet Forwarder SDK, and provides a web page for configuration, User can configure their own SDK according to their needs. Currently available configuration options are shown below:

Protocol Version: The protocol version of the SDK.

Gateway ID: Gateway ID, unique logo on the cloud server. While the GW ID is a little different in different server, please check the cloud server related rules.

Server Address: Cloud server address.

Port: Cloud server upstream and downstream ports.

Global Config：RHF2S025 is built-in configuration file to modify frequency channels. Please check the HW of the gateway before doing the channel modifications.

Note: The above configuration options vary depending on the SDK, and the options may be reduced.

Click Submit to submit the above configuration changes.

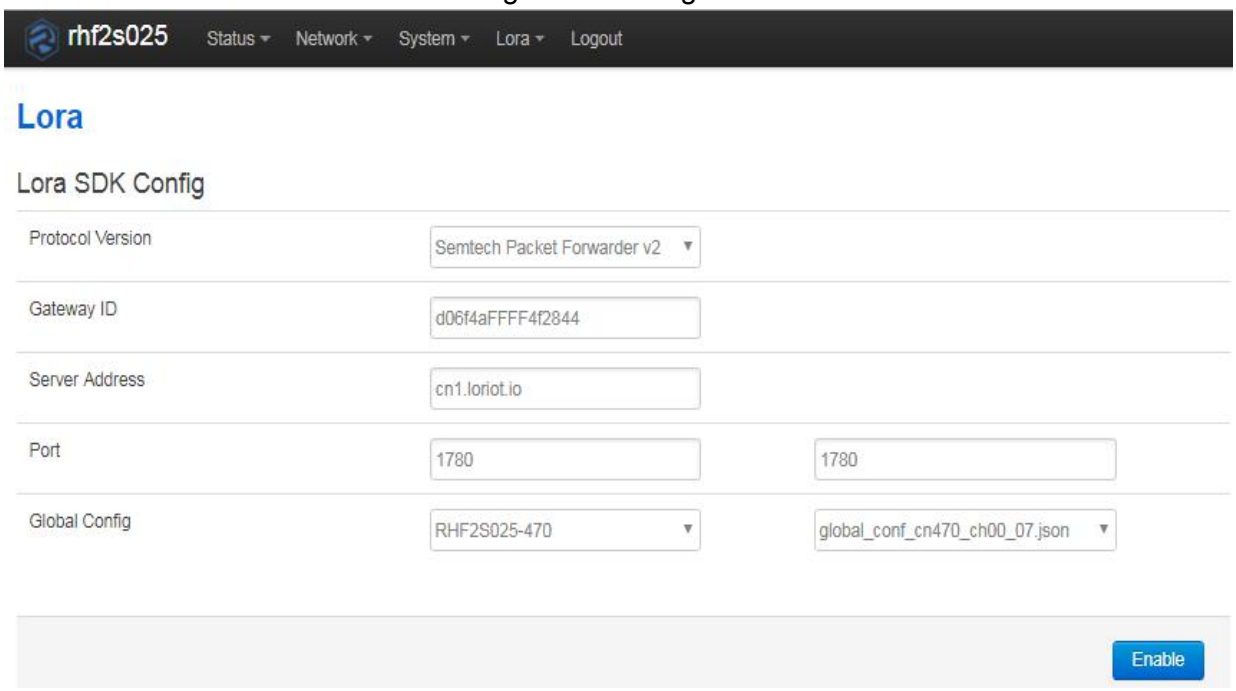

Figure 3-4 LoRa SDK configuration

3.3. Led instruction

RHF2S025 panel provides a total of six LED for functional instructions, which make users know the different status of the device. They are Power, System, WiFi, LoRa,USB and 4G instruction LEDs. In the network RJ45 port there is another LED to show network status.

Figure 3-5 RHF2S025 panel display

Table 3-1 Led descriptions

Power led	Power ON.
System led	When the system is fully activated, the led shows green and blinks slowly;

	when you press the RESET button to restore the factory settings, the led blinks quickly; when you press RESET button to restart the system, the led keeps on; when the device is in upgrading, led blinks slowly.
WiFi led	The WiFi led is a tri-color led, which include green, red and orange. When the WiFi signal is strong, the led is green; if the WiFi signal is poor, the led is orange; in other cases it is red.
LoRa led	The LoRa led include green and red two instructions state. When the system is fully activated, and the gateway start the packet forwarder successfully, it is green; otherwise it is red.
USB led	When there is a U disk the led is always green. If the device is reading from U disk, the led will blink.
RJ45 led	When the device connect to network via cable, the led will blink.
4G led(optional)	The 4G led has a slow flash (75ms bright 3000ms off), fast flashing (600ms bright 600 off), ultra fast flashing (75ms bright 75ms off) three states. Slow flashing: standby state; Fast flashing: no SIM card; registered in the network; registration failed; Ultra Flash: establish a data link;

Note: The System led, WiFi led, LoRa led and USB led will be on for 2 seconds during system startup.

3.4. Key

RHF2S025 have two keys, respectively FCT key and RESET key.

Table 3-2 Functions of the Keys

FCT key	Keep pressing the key for more than 1 second, to enter the WPS mode.
RESET key	Keep pressing the key for more than 1 second and less than 5 second, the device will restart; Keep pressing the key for more than 5 seconds, the device is restored to factory settings.

Wi-Fi Protected Setup (WPS;originally, Wi-Fi Simple Config) is a network security standard to create a secure wireless home network.Created by the Wi-Fi Alliance and introduced in 2006, the goal of the protocol is to allow home users who know little of wireless security and may be intimidated by the available security options to set up Wi-Fi Protected Access, as well as making it easy to add new devices to an existing network without entering long passphrases. Prior to the standard, several competing solutions were developed by different vendors to address the same need.

Note: After the factory settings are restored, the user will lose all configuration data.

3.5. User interface

RHF2S025 provides a total of two external interfaces for users to use, respectively RJ45 and USB interface.

3.5.1. RJ45 interface

The RJ45 network port would be as WAN port in AP and PPPoE mode. Users could connect it to network via wired cable.

AP mode: Connect the device to router with network cable and configure it to AP mode. The higher-level gateway router can be in DHCP or Static IP allocation mode. For details, please refer to section 2.2 of this document.
PPPoE mode: The gateway could dial and connect to internet directly in PPPoE mode without a router. Please refer to Section 2.2 of this document for more details.

The RJ45 network port would be as LAN port in AP/STA mode.
APSTA mode: Others station devices could connect to internet via this RJ45 port, please refer to Section 2.2 of this document for more details.

3.5.2. USB interface

This interface allows you to upgrade the firmware for RHF2S025. When there is a U disk with FW inserted, re-power the device will trigger the upgrading.

NOTE: Do not power off the device or perform other operations during the upgrade process to avoid upgrading failure. The others LEDs would be off for 3 min except the power LED after the FW upgrade successfully.

The device only supports storage device with the format of the FAT32. The NTFS ones are not supported.

4. Connect to others server

4.1. Connect to Loriot

1) New users need register an account in http://cn1.loriot.io
2) Enter Dashboard -> Networks->Sample Network -> Add Gateway To Network

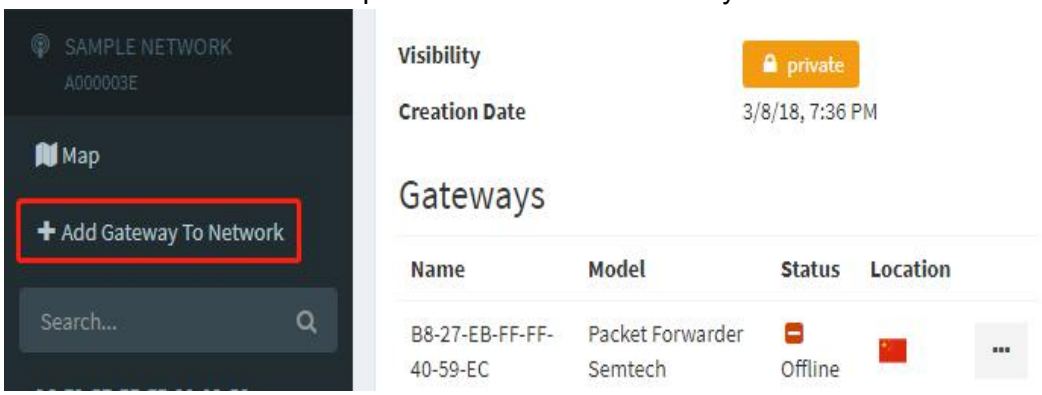

Figure 4- 1 register gateway

3) Select Packet Forwarder Semtech

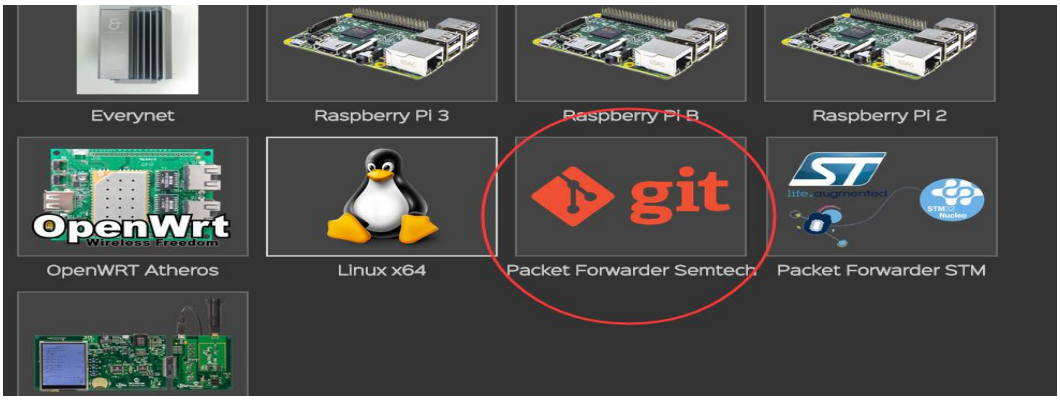

Figure 4-2 select Packet Forwarder

4) Fill in the MAC address, MAC address label is usually posted on the top of the gateway device, the format is xx:xx:xx:xx:xx:xx

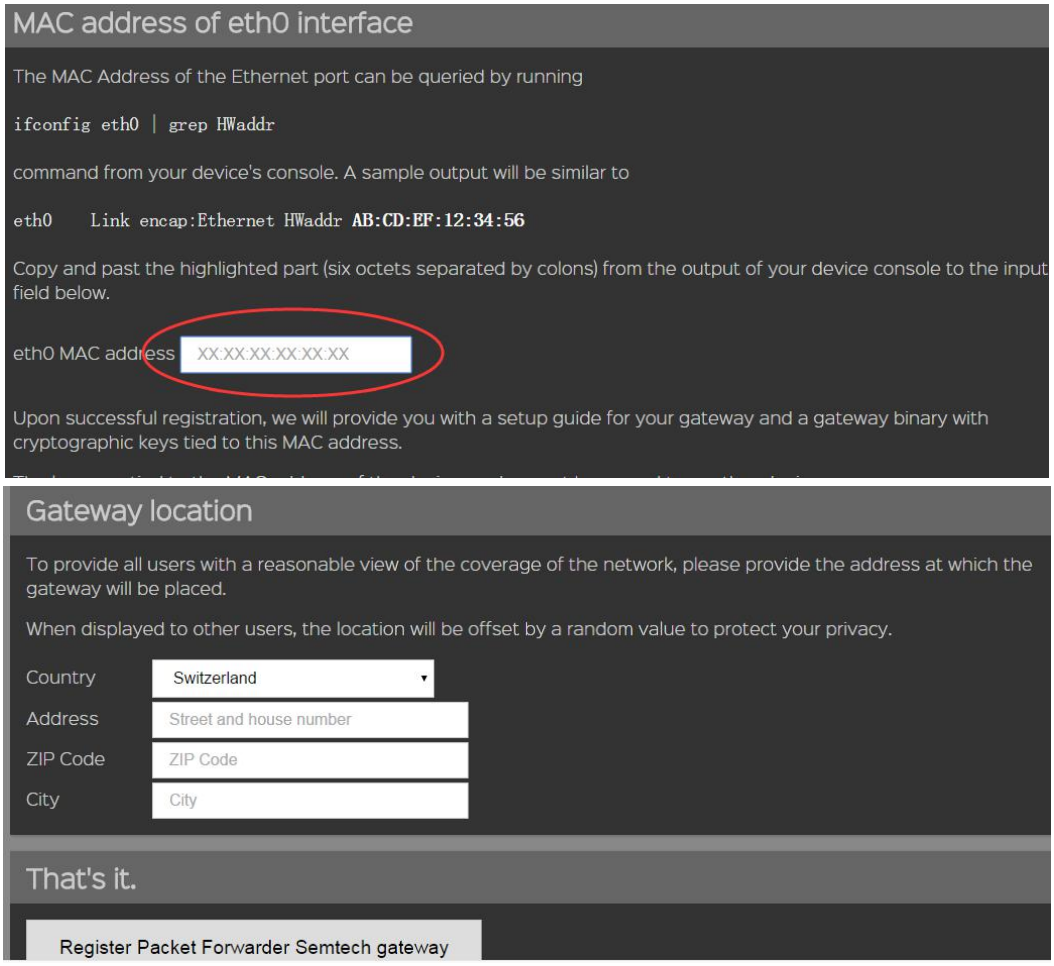

Figure 4-3 Fill in the gateway information

5) Click “Register Packet Forwarder Semtech gateway” to complete the registration

6) Click “Go to the gateway detail page” or click “gateway xx:xx:xx:xx:xx:xx” from the left console to access into the configuration page. You can select CN470 for example in the frequency plan list.

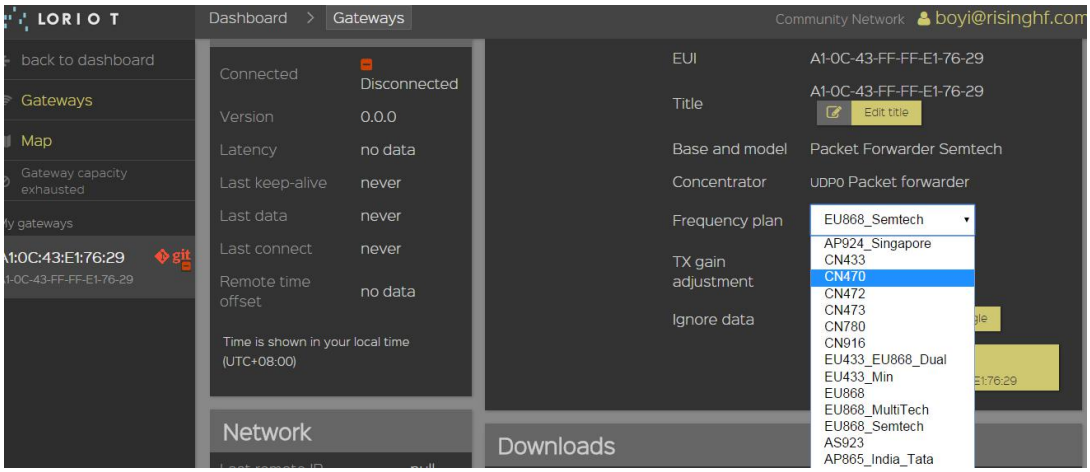

Figure 4- 4 Select frequency plan

7) LoRaWAN communication demo

note: Register a node in the cloud server to do LoRaWAN communication demo. Please refer to RisingHF RHF3M076 user manual ”[RHF-PS01509]LoRaWAN Class AC AT Command Specification - v4.3” for how to use RisingHF LoRaWAN modem.

When the LoRa led turn to green from red, it connected to the cloud server. And you could do LoRaWAN communication with the node.

The green power LED will be ON;

The green system LED will blink;

The red WiFi LED will be ON; (AP mode)

The green LoRaWAN LED will be ON;

The USB LED will be off;

Figure 4- 5 Led instructions in default AP mode when connected to cloud server

5. Power adapter

RHF2S025 is powered by a 12V/1.5A adapter.

Figure 5-1 Power Adapter

6. Restore factory settings

Keep pressing the RESET key for more than 5 seconds, with system led being from the slow blinking to quick blinking, RHF2S025 will restore factory settings.

Note: After the factory settings are restored, the user will lose all configuration data.

7. Upgrade firmware

Follow the steps below to upgrade the firmware:
1) Download the FW into the U disk from RisingHF website. User can't change the firmware name, or the device will fail to upgrade.
2) Insert the U disk into the device and then power on again.
3) USB LED will blink fast, it means the firmware in the U disk is being read.
4) System led start blinking, the system is being upgraded.
5) The System led stop blinking and the system has been upgraded successfully.
Note: Don't power off when in upgrading, or you need re-do the step from 2) to 5)

8. Troubleshooting

Q1：RHF2S025 provides three kinds of mode to connect to network, but how to use them?

A1：APmode: When the gateway is far away from the router, but a wired connection is possible.
APSTA mode: When the gateway is nearby the router and WiFi signal is strong.
PPPoE mode: No superior router, gateway device need dial and connect to network directly.

Q2：Fail to connect to internet after switching mode?

A2：If switching to APmode, please check whether the higher-level router can access to the Internet, or the higher-level router is in static IP mode.

If switching to APSTA mode, please check whether the StaSsid and StaKey are correct when connecting to the higher-level router. If it fail to switch mode, it will return to APmode.

If switching to PPPoE mode, please confirm whether Username and Password are correct, or whether the account has been disabled by the operator.

Q3：I want to switch to APSTA mode, but the device is in APmode?

A3：If you fill in with wrong SSID and StaKey, it will fail to switch to APSTA mode and return to APmode.

Q4：Why there is no instructions after switching mode?

A4：After switching mode, the gateway will restart WiFi or even switch LAN LAN / WAN lead to disconnect the computer from the device, then the computer will lose the gateway device IP.

Q5：Gateway/server can’t receive uplink data?

A5：Please check the SDK configuration on the web page. Please make sure the configurations are same in both GW/server and node side.

Q6：How do I determine that the gateway is already connected to the cloud server?

A6：When the gateway is connected to the cloud server, the cloud server shows the gateway on line. If the gateway is not connected to the cloud server, follow these steps to troubleshoot:

1) Check whether the gateway is connected to the Internet, you can do it in the web page Network-> Diagnostics. Ping succeed means the device connect to network, ortherwise the device disconnect to network.

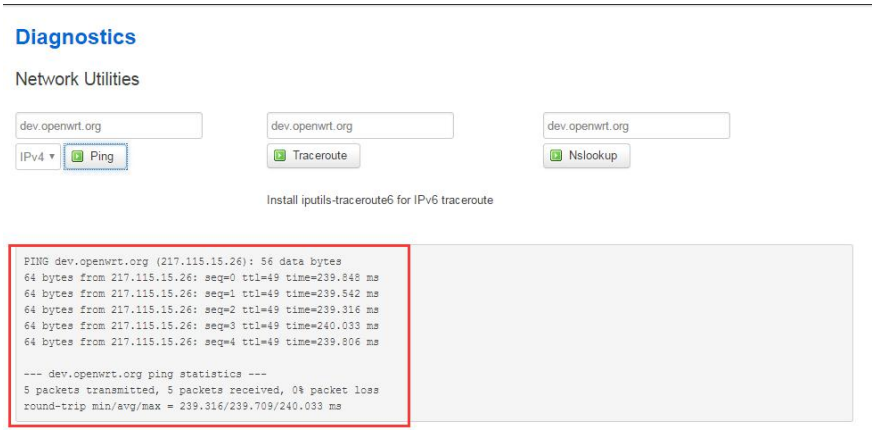

Figure 8-1 Test to connect to Internet results

2) If the device connects to the Internet, you have to check the cloud server address, the uplink and downlink port, and Lora boot SDK configuration.

Q7：How to do when the firmware upgrade fail?

A7：Power on RHF2S025, it means the upgrading fails when the system led doesn't start to blink slowly in 3 min. Please refer to section 6 of this document to repeat the upgrading steps.

Q8： What is the range of the DHCP pool?

A8：The DHCP pool is from xxx.xxx.xxx.100 ~ xxx.xxx.xxx.254. Modification is not acceptable.

Q9：How to modify RHF2S025 time zone?

A9：The East eight time zone is used in default. Please modify it in web page System-> System.

Revision

V0.3 2019-04-23

+Add description to connect to Loriot server

V0.2 2019-04-04

+ Add environmental noise scanning part function introduction

V0.1 2019-03-18

+ First version

Please Read Carefully:

Information in this document is provided solely in connection with RisingHF products. RisingHF reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All RisingHF products are sold pursuant to RisingHF's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the RisingHF products and services described herein, and RisingHF assumes no liability whatsoever relating to the choice, selection or use of the RisingHF products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by RisingHF for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN RISINGHF'S TERMS AND CONDITIONS OF SALE RisingHF DISCLAIMS ANY EXPRESS OR IMPLIEDWARRANTY WITH RESPECT TO THE USE AND/OR SALE OF RisingHF PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIEDWARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWSOF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

RISINGHF PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE RISINGHF PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF RISINGHF HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY RISINGHF AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO RISINGHF PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

Resale of RisingHF products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by RisingHF for the RisingHF product or service described herein and shall not create or extend in any manner whatsoever, any liability of RisingHF.

RisingHF and the RisingHF logo are trademarks or registered trademarks of RisingHF in various countries.
Information in this document supersedes and replaces all information previously supplied.
The RisingHF logo is a registered trademark of RisingHF. All other names are the property of their respective owners.

© 2015 RISINGHF - All rights reserved

http://www.risinghf.com