MS48-LR -- LoRaWAN To Modbus Gateway

Last modified by Kilight Cao (/xwiki/bin/view/XWiki/Kilight) on 2024/07/19 15:22

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1. Introduction

1.1 What is MS48-LR

The MS48-LR is an **open-source LoRaWAN To Modbus Gateway**. It lets you bridge LoRa wireless network to an IP network via **WiFi , Ethernet or Cellular Netw** Optional 4G module). The LoRa wireless allows users to send data and reach extremely long ranges at low data rates.

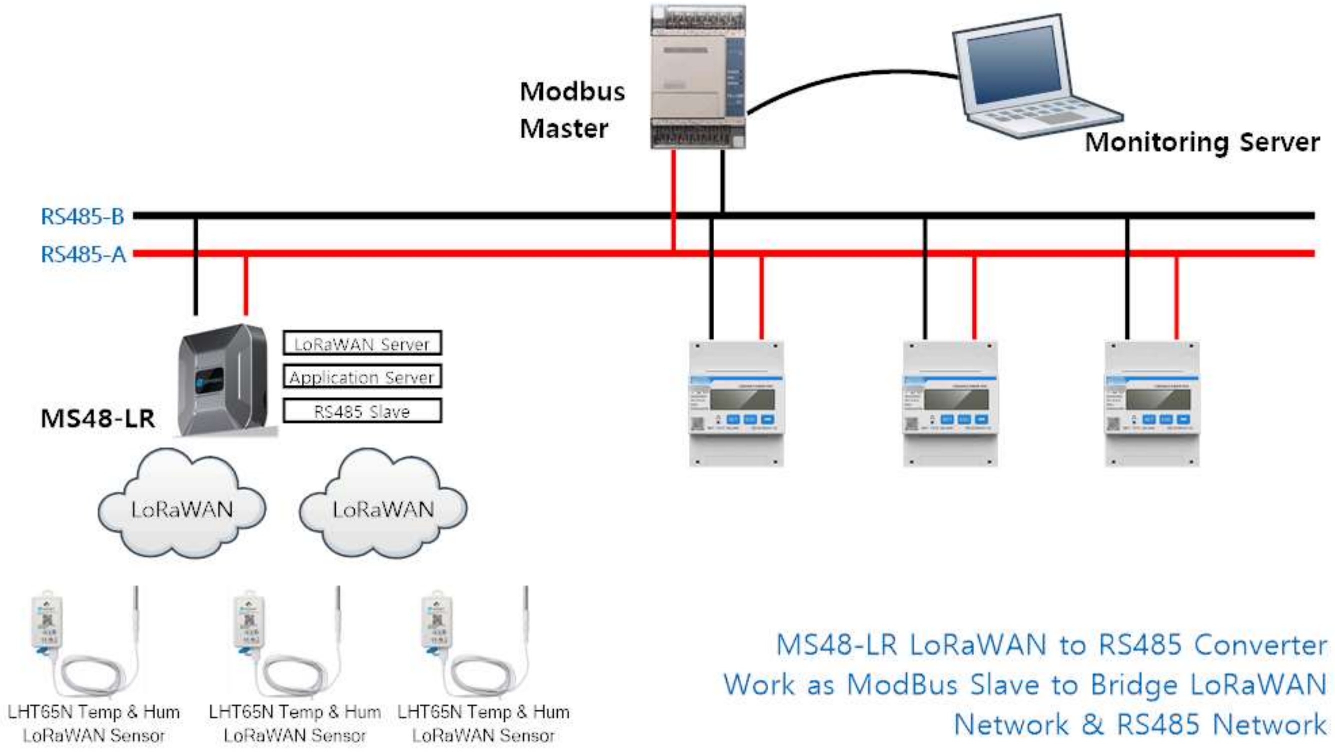
The MS48-LR is fully compatible with LoRaWAN protocol. MS48-LR includes a **built-in LoRaWAN Server and IoT server**, User can connect virous LoRaWAN device and use PLC to access these devices via Modbus network.

Different countries use different LoRaWAN frequency bands. MS48-LR has these bands pre-configured. Users can also customize the frequency bands to use in th network.

MS48-LR supports **remote management**. System Integrator can easy to remote monitor the gateway and maintain it.

1.2 How does it work?

The MS48-LR can run as a Modbus RS485-RTU slave, which writes the data from the LoRaWAN sensor uplink data into the registers of the 03 function code



1.3 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
- USB 2.0 host connector x 1
- Mini-PCI E connector x 1
- RS485 Interface x 1
- RS232 Interface x 1

LoRa Spec:

- Up to -140 dBm sensitivity with SX1250 Tx/Rx front-end
- 70 dB CW interferer rejection at 1 MHz offset
- Able to operate with negative SNR, CCR up to 9dB
- 8 x 8 channels LoRa packet detectors,8 x SF5-SF12 LoRa demodulators,8 x SF5-SF10 LoRa demodulators,125/250/500 kHz LoRa demodulator and 1 x (G)FSK
- Dual digital TX & RX radio front-end interfaces
- 10 programmable parallel demodulation paths
- Dynamic data-rate (DDR) adaptation
- True antenna diversity or simultaneous dual-band operation

Cellular 4G LTE (optional):

- Quectel: **EC25 LTE module** (https://www.quectel.com/product/ec25minipcie.htm)
- Standard Size SIM Slot
- 2 x 4G Sticker Antenna.
- Up to 150Mbps downlink and 50Mbps uplink data rates
- Worldwide LTE,UMTS/HSPA+ and GSM/GPRS/EDGE coverage
- MIMO technology meets demands for data rate and link reliability in modem wireless communication systems

Operating Condition:

- Work Temperature: -20 ~ 70°C
- Storage Temperature: -20 ~ 70°C
- Power Input: 12V, 2A, DC

1.4 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 **ChirpStack** local LoRaWAN server
- Built-in **Node-Red** local Application server
- Act as Modbus Slave mode

1.5 LED Indicators

MS48-LR has totally four LEDs, They are:

➢ **LED 1 (ETH LED):** This GREEN LED will blink GREEN when the ETH port is connecting

➢ **LED 2 (RET LED):** This GREEN LED will show different colors in different states:

✓ **SOLID GREEN:** When the Long press 4-5s Toggle button,the device will reload the Network and Initialize wifi configuration,This GREEN LED will SOL Until the reload is finished.

✓ **BLINKING GREEN:** When the Long press 10s Toggle button,the device will restore the factory settings,This GREEN LED will BLINKIND GREEN Until tl finished.

➢ **LED 3:** This GREEN LED is undefined

➢ **LED 4 (Power LED):** This GREEN LED will be solid if the device is properly powered

➢ **LED 5 (WIFI LED):** This LED shows the WIFI interface connection status.

✓ **SOLID GREEN:** The device enables the WiFi WAN Client and connects to the WiFi successfully.

✓ **BLINKING GREEN:** The device's WiFi WAN Client connection is unsuccessful.

✓ **OFF:** The device WiFi WAN Client is not enabled.

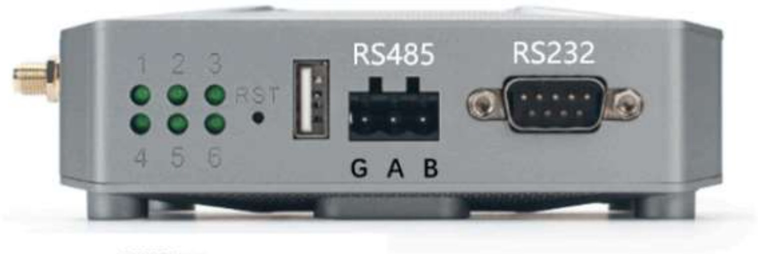
➢ **LED 6 (SYS LED):** This GREEN LED will show different colors in different states:

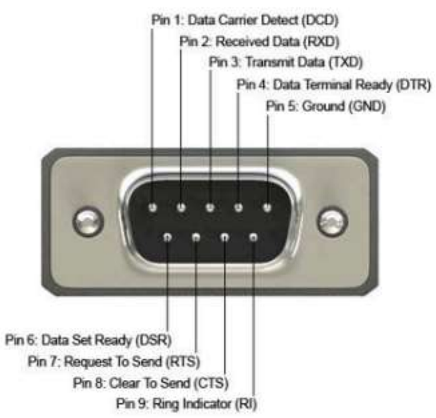
✓ **SOLID GREEN:** The device is alive with a LoRaWAN server connection.

✓ **BLINKING GREEN:** a) no LoRaWAN Connection. or b) Device is in booting stage, in this stage, it will BLINKING GREEN for several seconds and then BLINKING GREEN together

✓ **OFF:** Device doesn't have an Internet connection.

1.6 RS485 & RS232 interface




RS232 Pinout
Pin 1: Data Carrier Detect (DCD)
Pin 2: Received Data (RXD)
Pin 3: Transmit Data (TXD)
Pin 4: Data Terminal Ready (DTR)
Pin 5: Ground (GND)
Pin 6: Data Set Ready (DSR)
Pin 7: Request To Send (RTS)
Pin 8: Clear To Send (CTS)
Pin 9: Ring Indicator (RI)

1.7 Button Instruction

The MS48-LR has two black buttons, which are:

RST: Press and release, and the gateway will restart

LED status: All LEDs are off except for the LED 4 (Power LED).

Toggle:

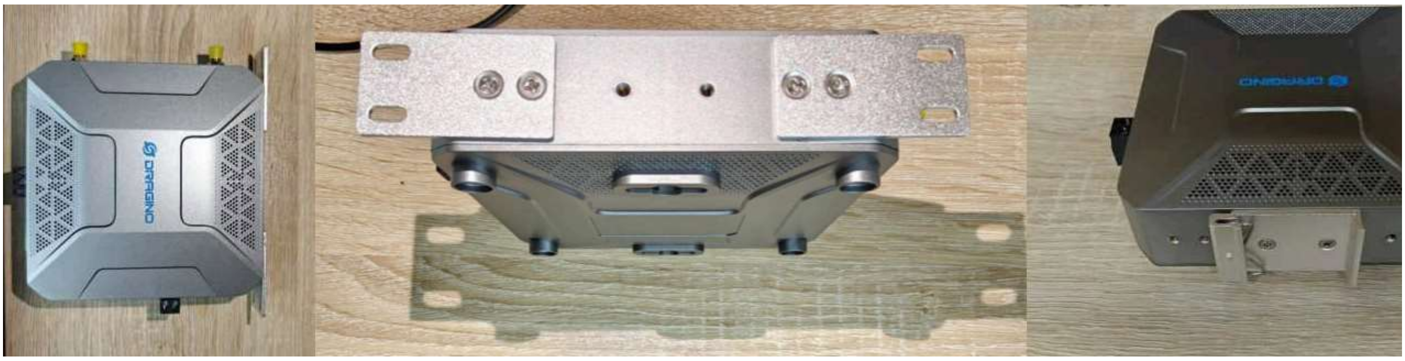
➢ **Long press 4-5s :** the gateway will reload the Network and Initialize wifi configuration

LED status: LED 2 (RET LED) will SOLID GREEN Until the reload is finished.

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

LED status: LED 2 (RET LED) will BLINKIND GREEN Until the restore is finished.

1.8 Installation



2. Quick Start

The MS48-LR 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 MS48-LR accessible to the network.

2.1 Access and Configure MS48-LR

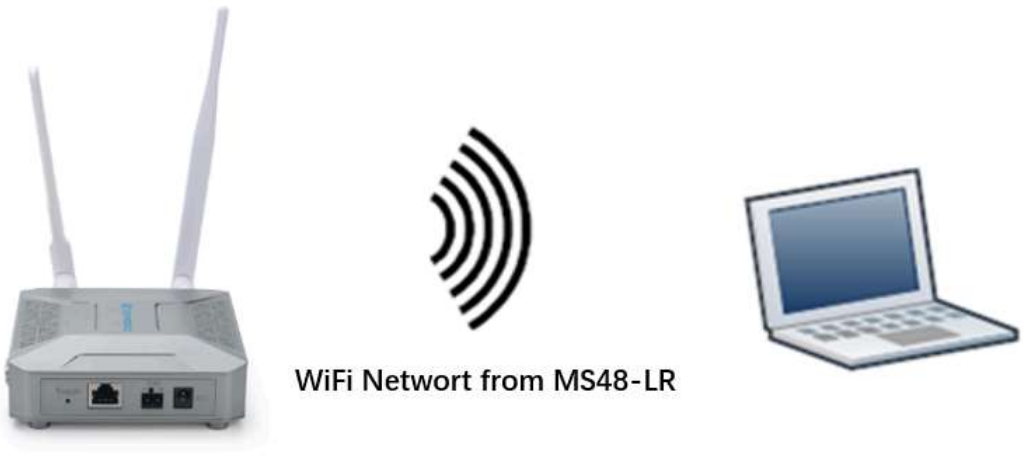
2.1.1 Find IP address of MS48-LR

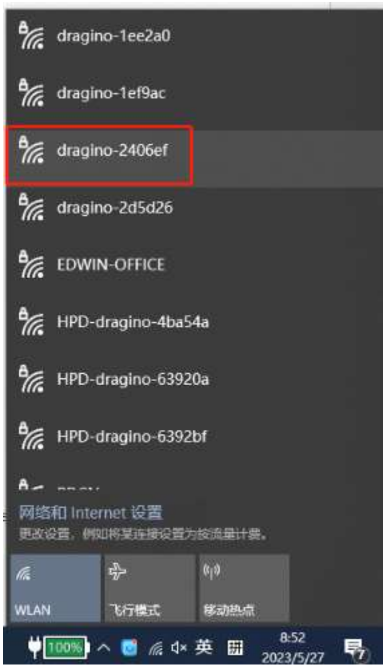
Method 1: Connect via MS48-LR WiFi

At the first boot of MS48-LR, it will auto generate a WiFi network called ***dragino-xxxxxx*** with password:

dragino+dragino

User can use a PC to connect to this WiFi network. The PC will get an IP address 10.130.1.xxx and the MS48-LR has the default IP **10.130.1.1**

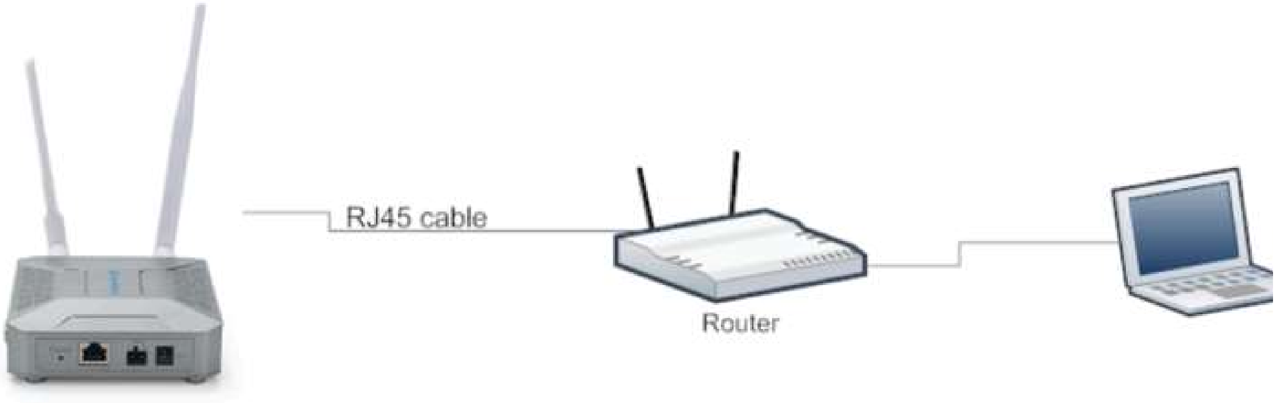




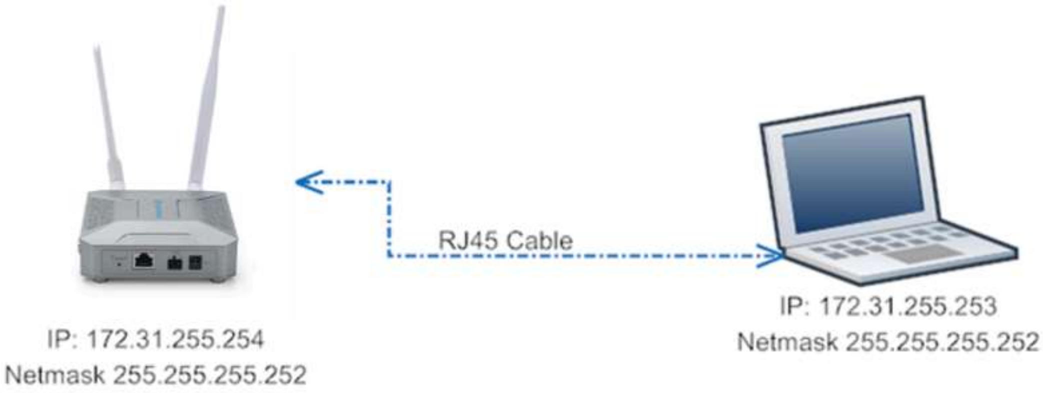
Method 2: Connect via Ethernet with DHCP IP from the router

Connect the MS48-LR Ethernet port to your router and MS48-LR can obtain an IP address from your router. In the router's management portal, you should be abl IP address the router has assigned to the MS48-LR.

You can also use this IP to connect.



Method 3: Connect via MS48-LR Fallback IP



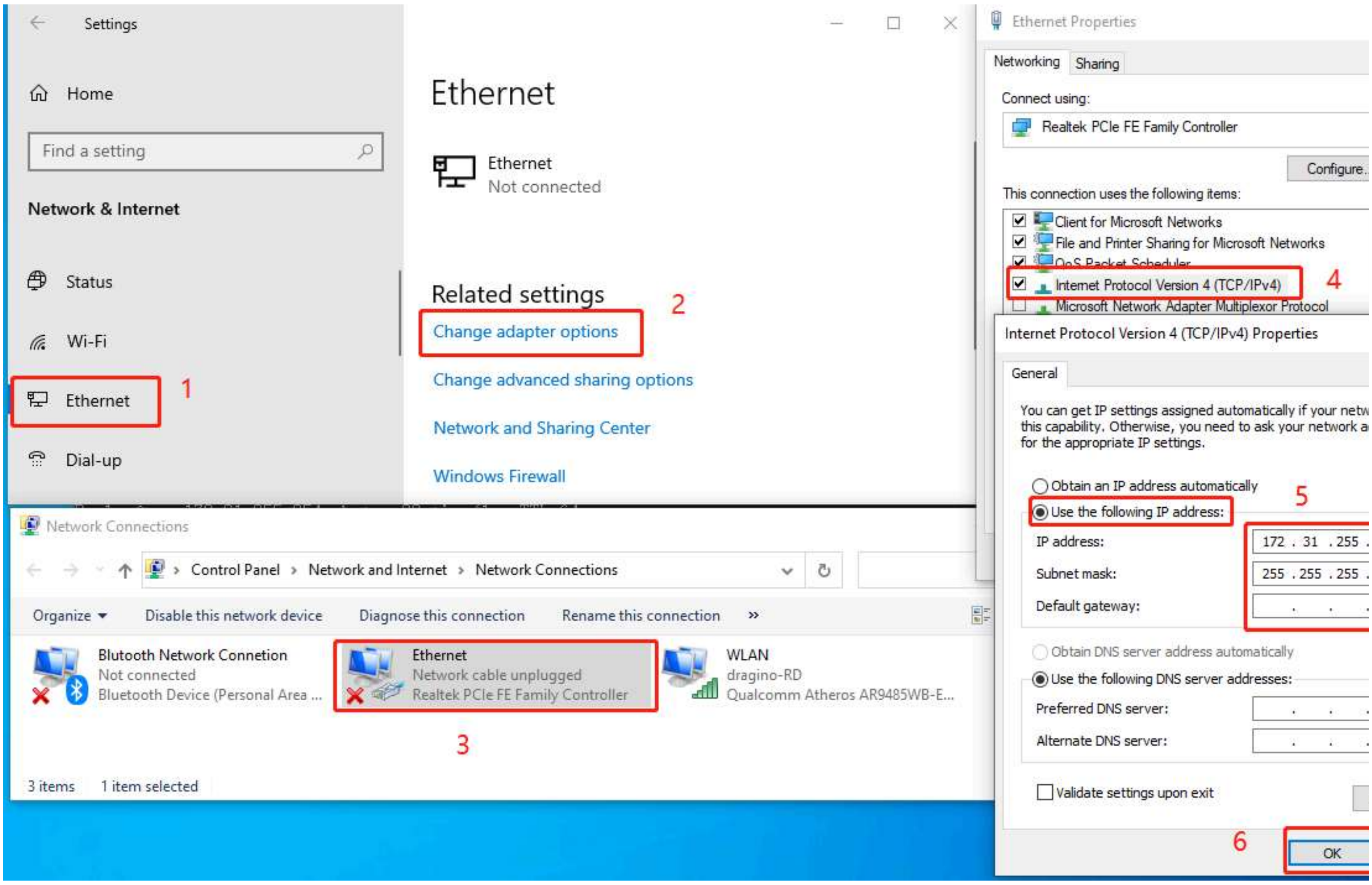
Steps to connect via fallback IP:

1. Connect the PC's Ethernet port to MS48-LR's WAN port

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

Settings --> Network & Internet --> Ethernet --> Change advanced sharing options --> Double-click"Ethernet" --> Internet Protocol Version 4 (TCP/IPv4)

As in the below photo:

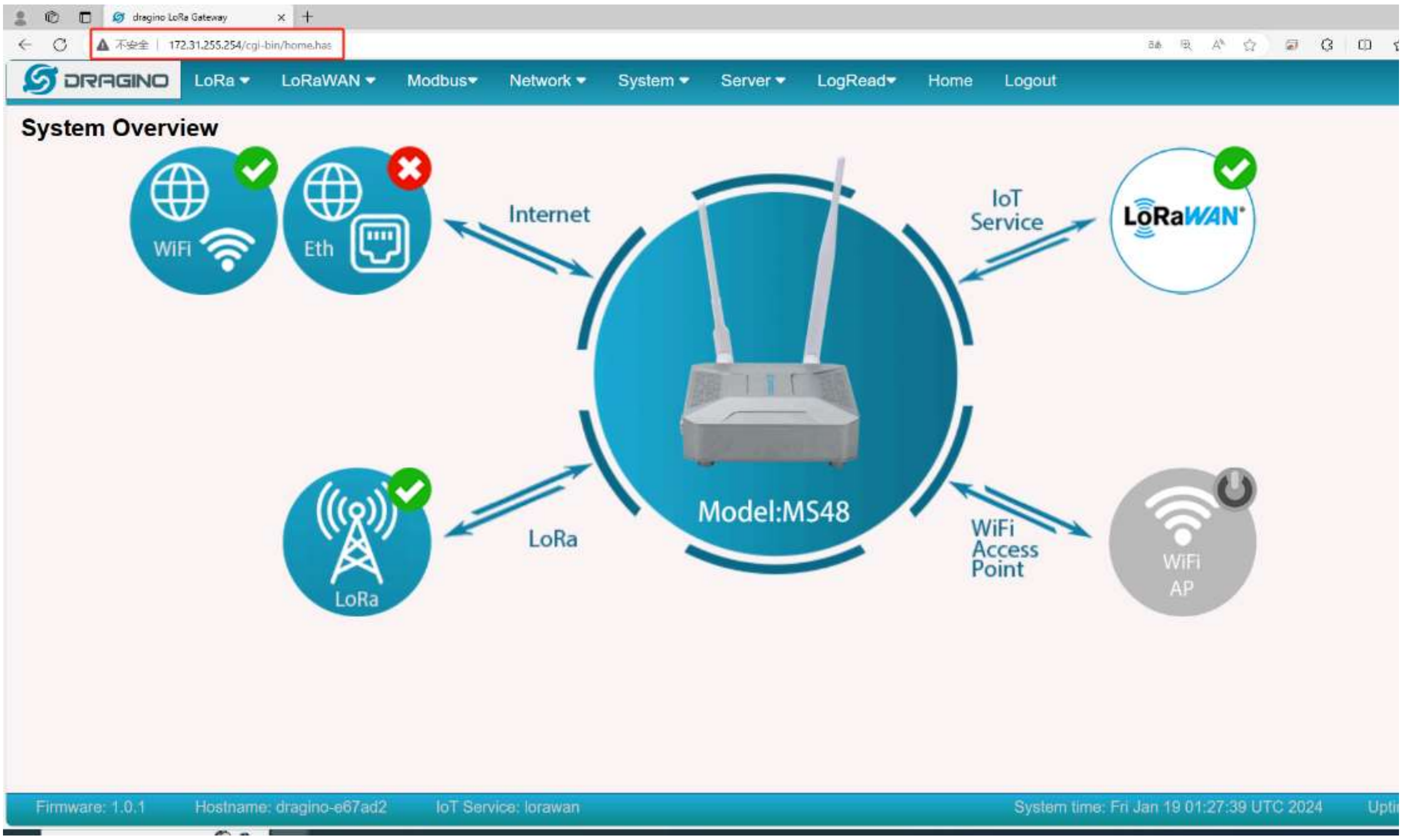


Settings
Home
Find a setting
Network & Internet
Status
Wi-Fi
Ethernet
Dial-up
1
Ethernet
Ethernet
Not connected
Related settings
Change adapter options
2
Change advanced sharing options
Network and Sharing Center
Windows Firewall
Network Connections
Control Panel › Network and Internet › Network Connections
Organize ▾ Disable this network device Diagnose this connection Rename this connection »
Blutooth Network Connetion
Not connected
Bluetooth Device (Personal Area ...
Ethernet
Network cable unplugged
Realtek PCIe FE Family Controller
3
WLAN
dragino-RD
Qualcomm Atheros AR9485WB-E...
3 items 1 item selected
Ethernet Properties
Networking Sharing
Connect using:
Realtek PCIe FE Family Controller
Configure...
This connection uses the following items:
☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ QoS Packet Scheduler
☑ Internet Protocol Version 4 (TCP/IPv4)
4
☐ Microsoft Network Adapter Multiplexor Protocol
Internet Protocol Version 4 (TCP/IPv4) Properties
General
You can get IP settings assigned automatically if your netw
this capability. Otherwise, you need to ask your network a
for the appropriate IP settings.
○ Obtain an IP address automatically
5
● Use the following IP address:
IP address: 172 . 31 . 255 .
Subnet mask: 255 . 255 . 255 .
Default gateway: . . .
○ Obtain DNS server address automatically
● Use the following DNS server addresses:
Preferred DNS server: . . .
Alternate DNS server: . . .
☐ Validate settings upon exit
6
OK

Configure computer Ethernet port steps video: **fallback ip.mp4 (/xwiki/bin/download/Main/User%20Manual%20for%20All%20Gateway%20models/MS48-LR_LoRaWAN_To_Modbus_Gateway/WebHome/fallback%20ip.mp4)**

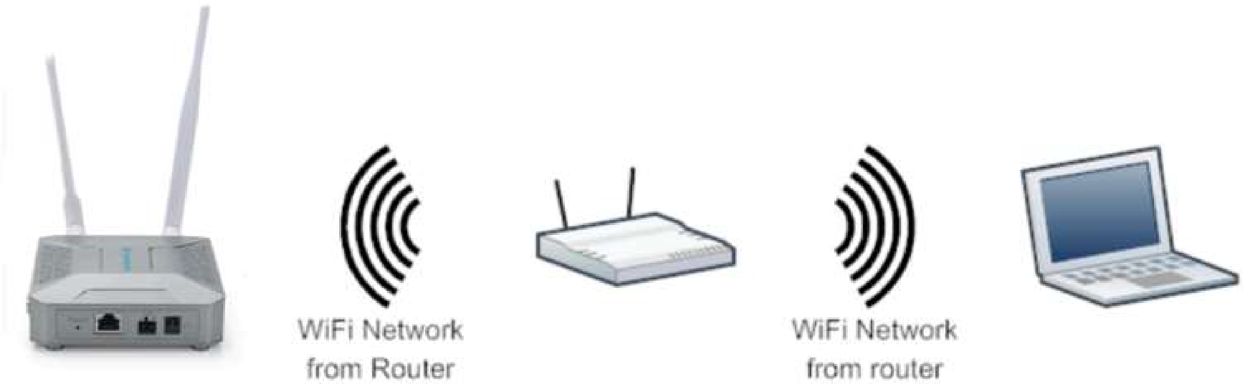
If you still can't access the MS48-LR fallback ip, follow this connection to debug : **Trouble Shooting (http://wiki.dragino.com/xwiki/bin/view/Main/User%20Manual%20for%20All%20Gateway%20models/HP0C/#H9.3A0FallbackIPdoesnotwork2Chowcan**

3. In the PC, use IP address 172.31.255.254 to access the MS48-LR via Web or Console.

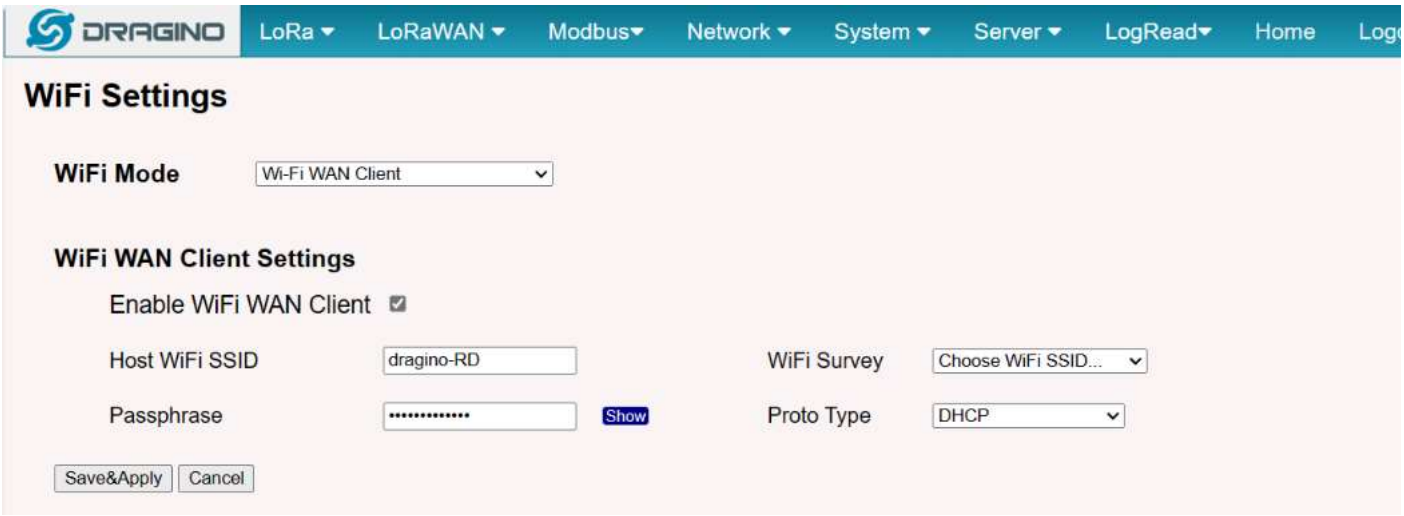


dragino LoRa Gateway
不安全 | 172.31.255.254/cgi-bin/home.has
DRAGINO
LoRa ▾ LoRaWAN ▾ Modbus▾ Network ▾ System ▾ Server ▾ LogRead▾ Home Logout
System Overview
WiFi
Eth
Internet
IoT Service
LoRaWAN
Model:MS48
LoRa
LoRa
WiFi Access Point
WiFi AP
Firmware: 1.0.1 Hostname: dragino-e67ad2 IoT Service: lorawan System time: Fri Jan 19 01:27:39 UTC 2024 Upti

Method 4: Connect via WiFi with DHCP IP from the router



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



WiFi Settings

WiFi Mode: Wi-Fi WAN Client

WiFi WAN Client Settings

Enable WiFi WAN Client ☑

Host WiFi SSID: dragino-RD

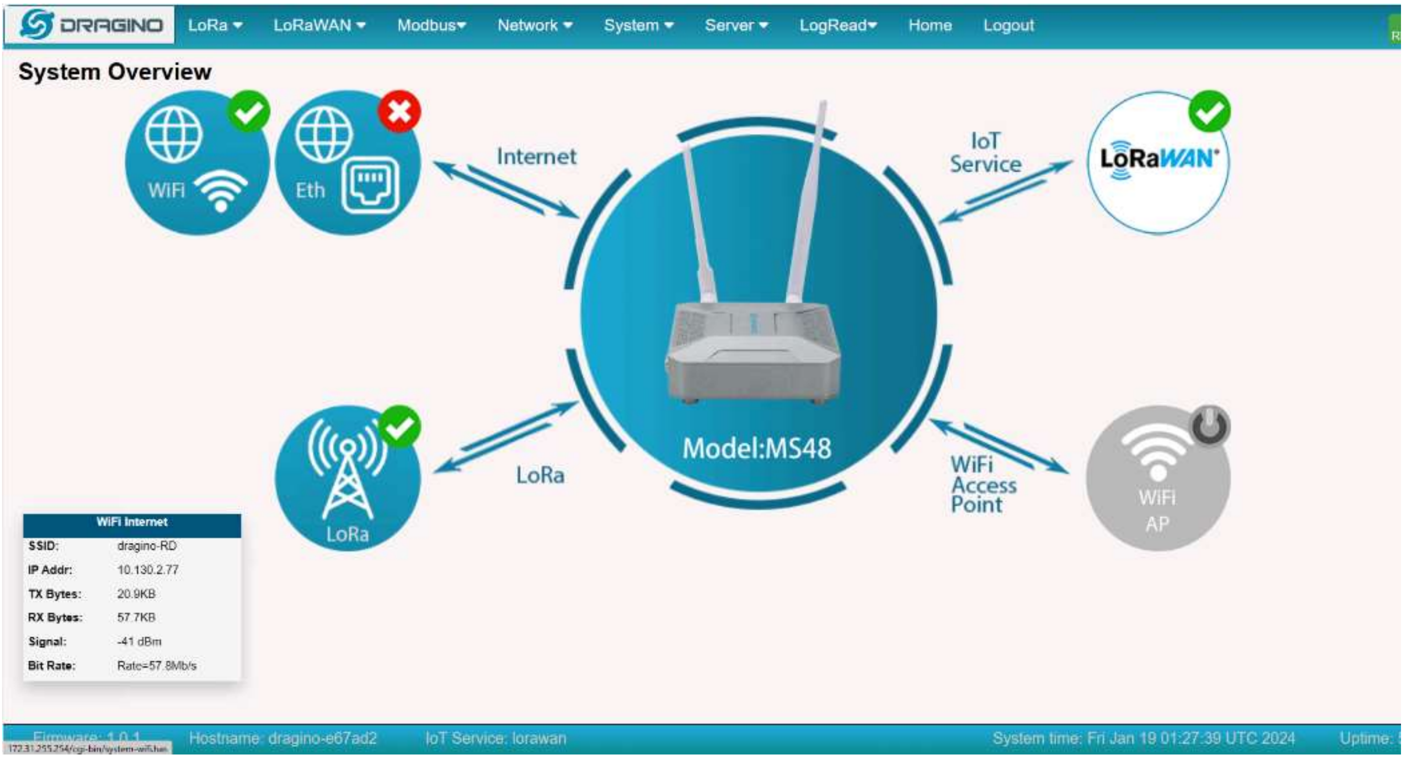
WiFi Survey: Choose WiFi SSID...

Passphrase: •••••••••••••• Show

Proto Type: DHCP

Save&Apply Cancel

Wi-Fi configuration successful



WiFi Internet

SSID:	dragino-RD
IP Addr:	10.130.2.77
TX Bytes:	20.9KB
RX Bytes:	57.7KB
Signal:	-41 dBm
Bit Rate:	Rate=57.8Mb/s

Firmware: 1.0.1 Hostname: dragino-e67ad2 IoT Service: lorawan System time: Fri Jan 19 01:27:39 UTC 2024 Uptime:

172.31.255.254/cgi-bin/system-wifi.has

2.1.2 Access Configure Web UI

Web Interface

Open a browser on the PC and type the MS48-LR ip address (depends on your connect method)

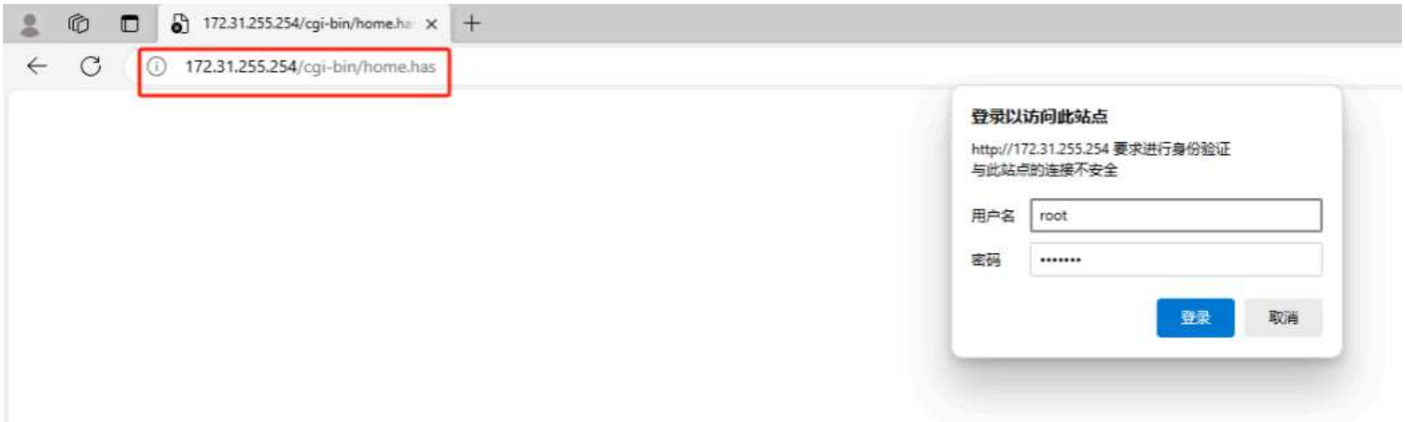
http://IP_ADDRESS (http://ip_address/) or ***http://172.31.255.254 (http://172.31.255.254(/)*** (Fallback IP)

You will see the login interface of MS48-LR as shown below.

The account details for Web Login are:

User Name: root

Password: dragino


172.31.255.254/cgi-bin/home.ha
172.31.255.254/cgi-bin/home.has
登录以访问此站点
http://172.31.255.254 要求进行身份验证
与此站点的连接不安全
用户名 root
密码 •••••••
登录
取消

2.2 Typical Network Setup

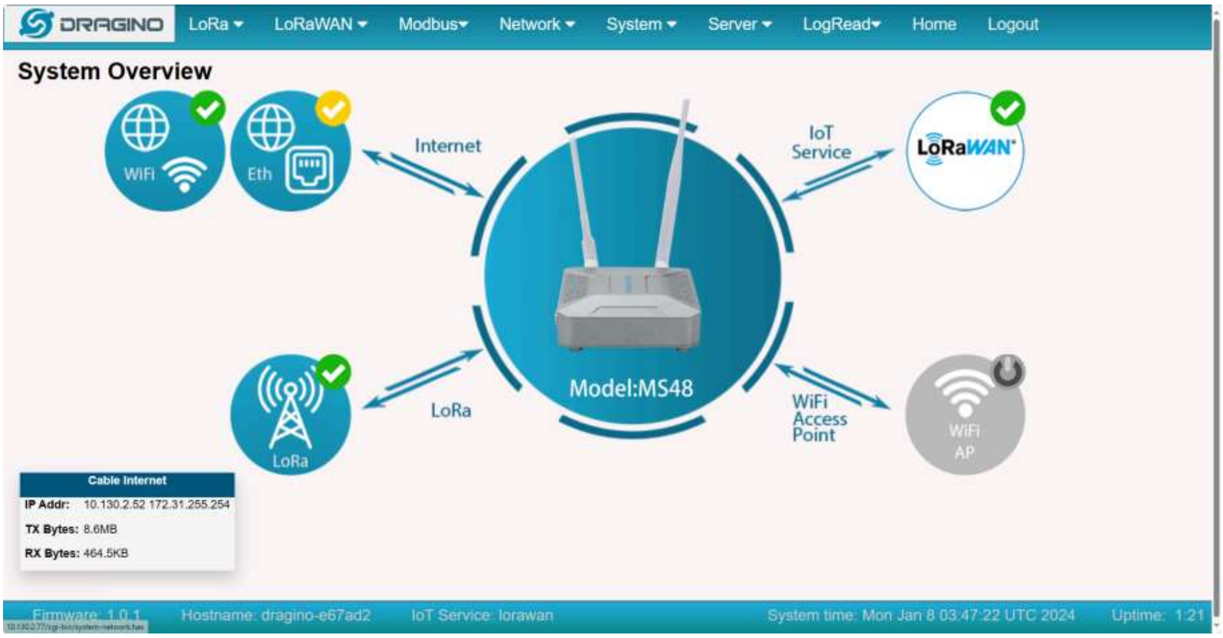
2.2.1 Overview

MS48-LR supports flexible network set up for different environment. This section describes the typical network topology can be set in MS48-LR. The typical netwo includes:

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

2.2.2 Use the WAN port to access the Internet

By default, the MS48-LR is set to use the WAN port to connect to an upstream network. When you connect the MS48-LR's WAN port to an upstream router, MS48- IP address from the router and have Internet access via the upstream router. The network status can be checked on the **home page**:



Cable Internet

IP Addr: 10.130.2.52 172.31.255.254

TX Bytes: 8.6MB

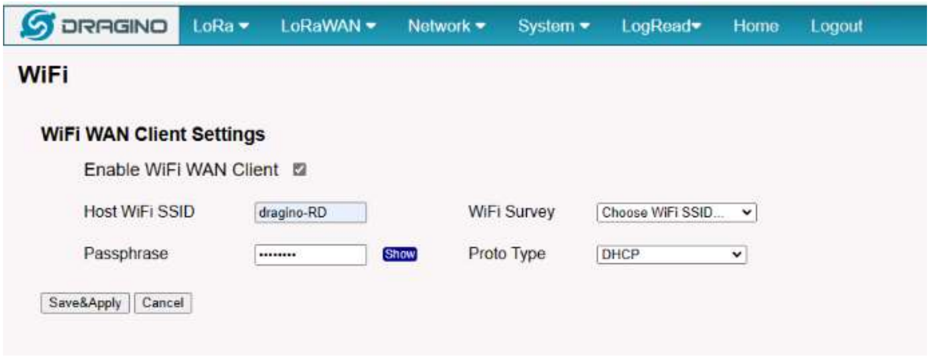
RX Bytes: 464.5KB

Firmware: 1.0.1 Hostname: dragino-e67ad2 IoT Service: lorawan System time: Mon Jan 8 03:47:22 UTC 2024 Uptime: 1:21

2.2.3 Access the Internet as a WiFi Client

In the WiFi Client Mode, MS48-LR acts as a WiFi client and gets DHCP from an upstream router via WiFi.

The settings for WiFi Client is under page **Network --> Wi-Fi**



WiFi

WiFi WAN Client Settings

Enable WiFi WAN Client ☑

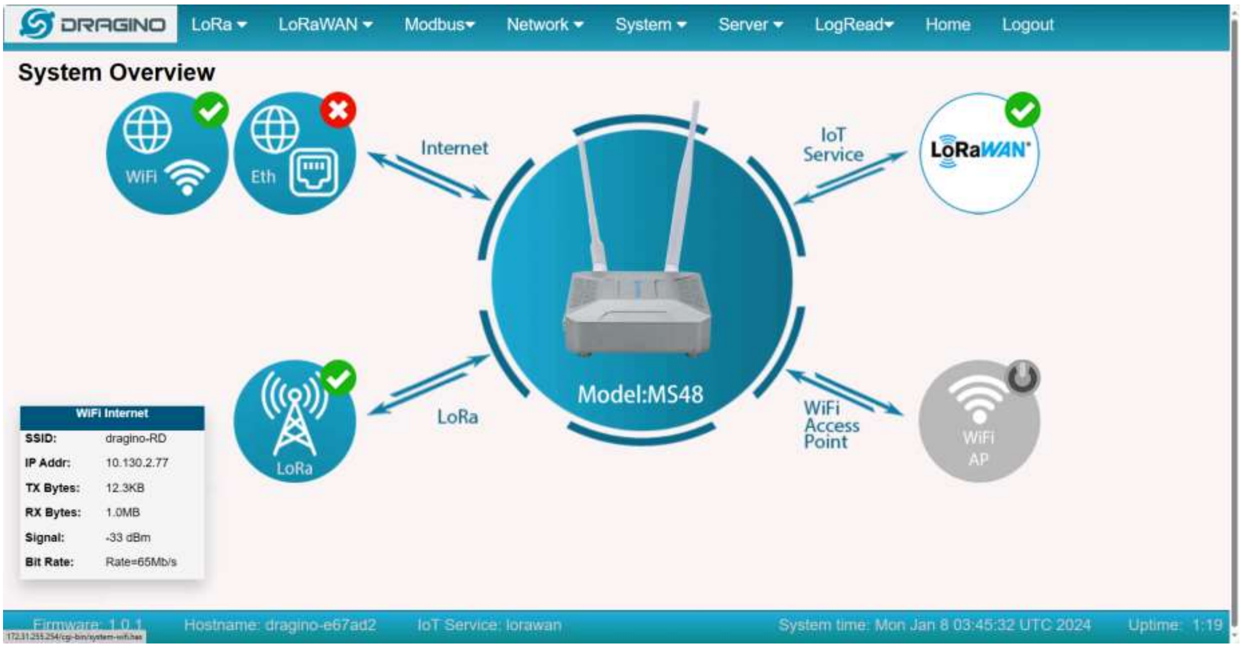
Host WiFi SSID: dragino-RD

Passphrase: ••••••••

WiFi Survey: Choose WiFi SSID...

Proto Type: DHCP

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



System Overview

WiFi Internet

SSID:	dragino-RD
IP Addr:	10.130.2.77
TX Bytes:	12.3KB
RX Bytes:	1.0MB
Signal:	-33 dBm
Bit Rate:	Rate=65Mb/s

Firmware: 1.0.1 Hostname: dragino-e67ad2 IoT Service: lorawan System time: Mon Jan 8 03:45:32 UTC 2024 Uptime: 1:19

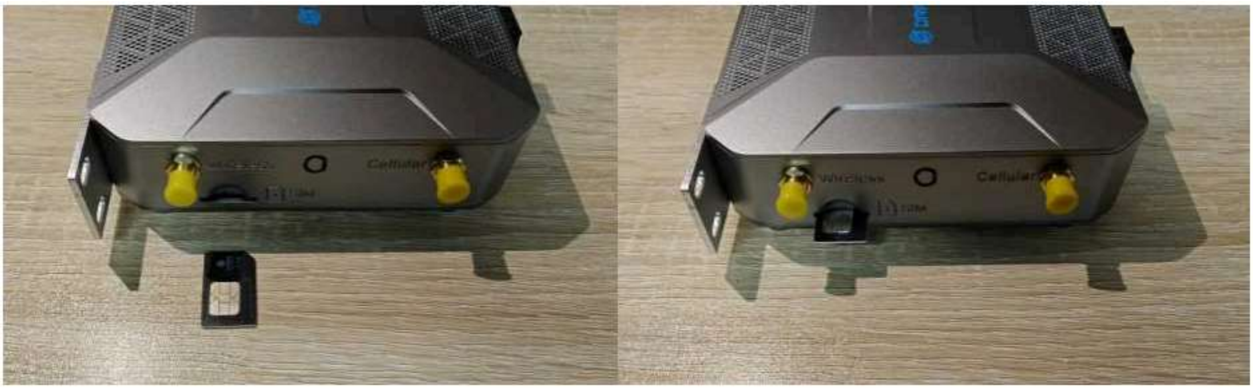
2.2.4 Use built-in 4G modem for internet access

Users can see whether MS48-LR has EC25 on the label of the gateway to determine whether there is 3G/4G Cellular modem.

If the MS48-LR has 3G/4G Cellular modem, user can use it as main internet connection or back up.

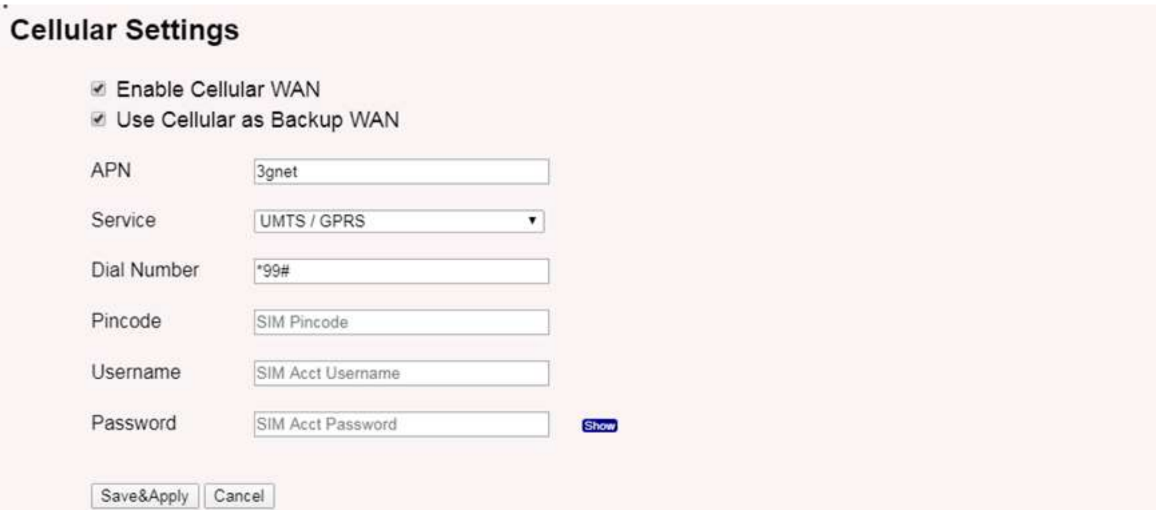
First, install the Micro SIM card as below direction

Second, Power off/ ON MS48-LR to let it detect the SIM card.



The set up page is **Network --> Cellular**

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



Cellular Settings

☑ Enable Cellular WAN

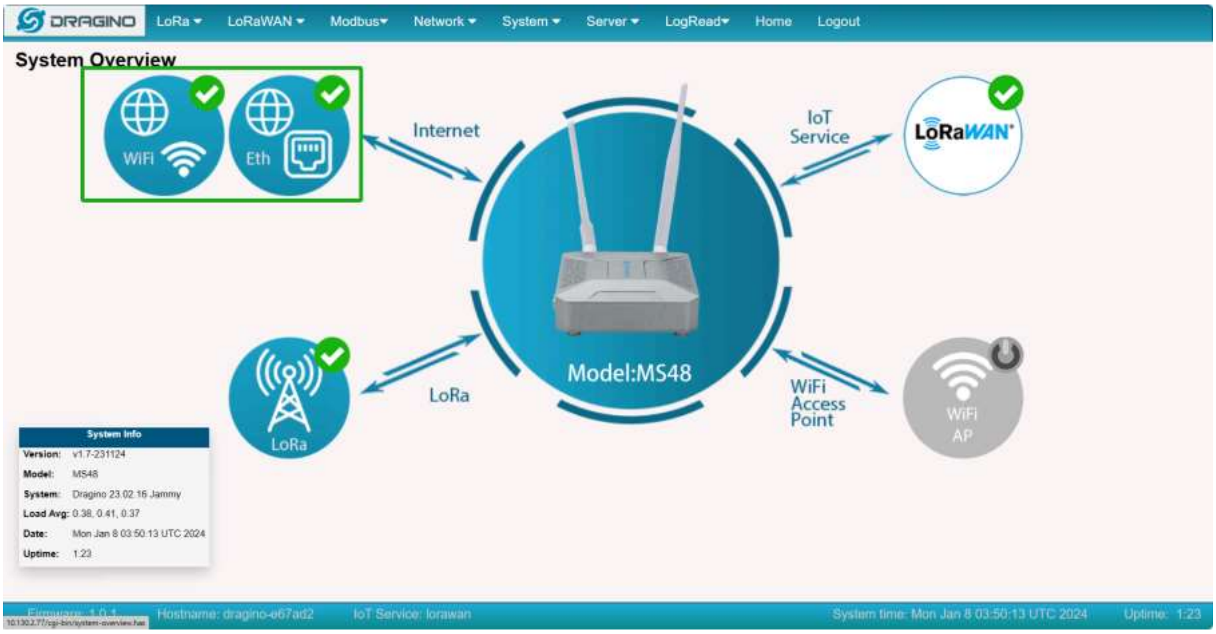
☑ Use Cellular as Backup WAN

APN	3gnet
Service	UMTS / GPRS ▾
Dial Number	*99#
Pincode	SIM Pincode
Username	SIM Acct Username
Password	SIM Acct Password

2.2.5 Check Internet connection

In the **Home** page, we can check the Internet connection.

- GREEN Tick ✓ : This interface has Internet connection.
- Yellow Tick ✓ : This interface has IP address but don't use it for internet connection.
- RED Cross ✗ : This interface doesn't connected or no internet.



Version: v1.7-231124
Model: MS48
System: Dragino 23.02.16 Jammy
Load Avg: 0.38, 0.41, 0.37
Date: Mon Jan 8 03:50:13 UTC 2024
Uptime: 1:23

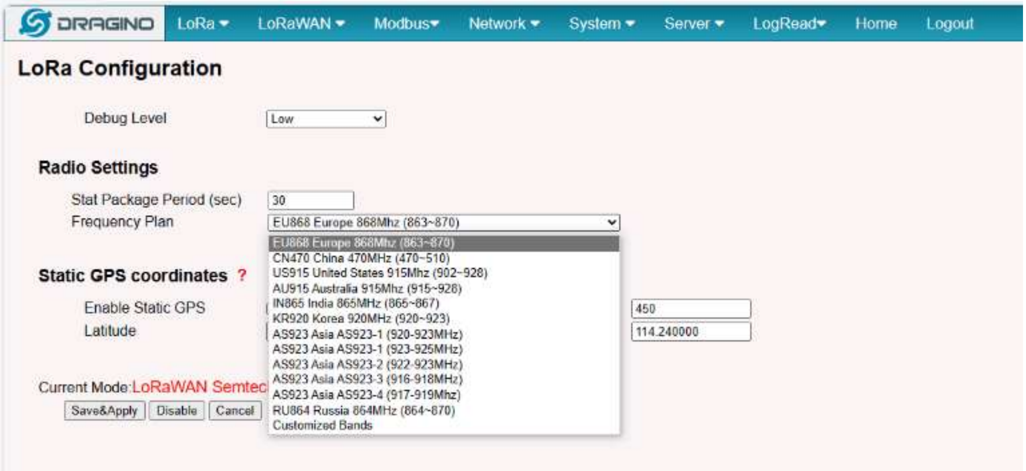
Firmware: 1.0.1 Hostname: dragino-e67ad2 IoT Service: lorawan System time: Mon Jan 8 03:50:13 UTC 2024 Uptime: 1:23

10.130.2.77/cgi-bin/system-overview.has

2.3 Bridge LoRaWAN network to Modbus network

Step 1: Configure the LoRa Radio to your area Frequency Plan

The Frequency Plan has to be set the same as the Sensor node Frequency Plan.



LoRa Configuration

Debug Level: Low

Radio Settings

Stat Package Period (sec): 30

Frequency Plan: EU868 Europe 868Mhz (863~870)

- EU868 Europe 868Mhz (863~870)
- CN470 China 470MHz (470~510)
- US915 United States 915Mhz (902~928)
- AU915 Australia 915Mhz (915~928)
- IN865 India 865MHz (865~867)
- KR920 Korea 920MHz (920~923)
- AS923 Asia AS923-1 (920-923MHz)
- AS923 Asia AS923-1 (923-925MHz)
- AS923 Asia AS923-2 (922-923MHz)
- AS923 Asia AS923-3 (916-918MHz)
- AS923 Asia AS923-4 (917-919Mhz)
- RU864 Russia 864MHz (864~870)
- Customized Bands

Static GPS coordinates ?

Enable Static GPS

Latitude

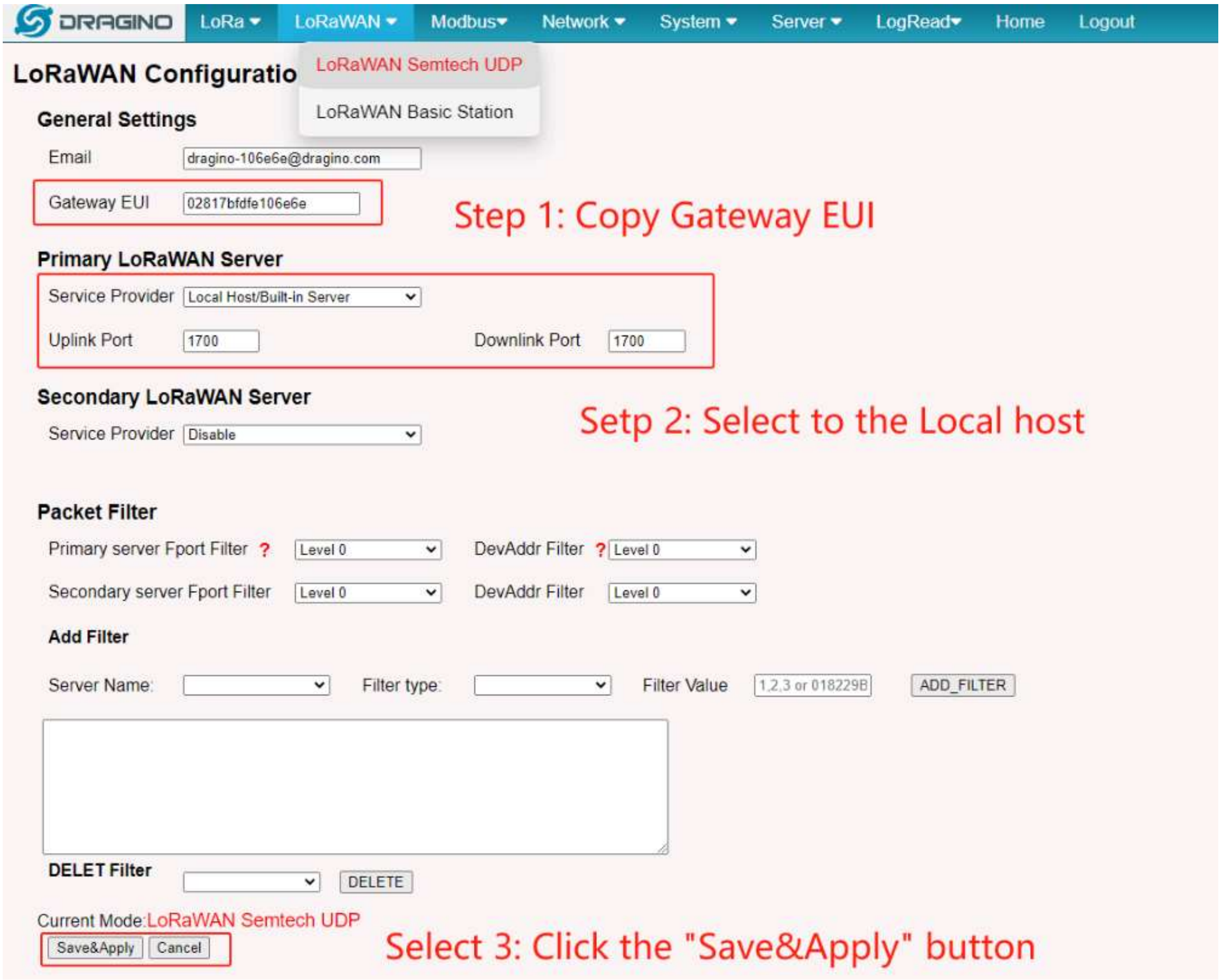
450

114.240000

Current Mode:LoRaWAN Semtec

Step 2: Copy the unique Gateway EUI & Configure the LoRaWAN Server address

Every MS48-LR has a unique gateway EUI. The ID can be found on the LoRaWAN Semtech page:



LoRaWAN Configuratio

General Settings

Email: dragino-106e6e@dragino.com

Gateway EUI: 02817bfdfe106e6e

Step 1: Copy Gateway EUI

Primary LoRaWAN Server

Service Provider: Local Host/Built-in Server

Uplink Port: 1700

Downlink Port: 1700

Secondary LoRaWAN Server

Service Provider: Disable

Setp 2: Select to the Local host

Packet Filter

Primary server Fport Filter ?: Level 0

DevAddr Filter ?: Level 0

Secondary server Fport Filter: Level 0

DevAddr Filter: Level 0

Add Filter

Server Name:

Filter type:

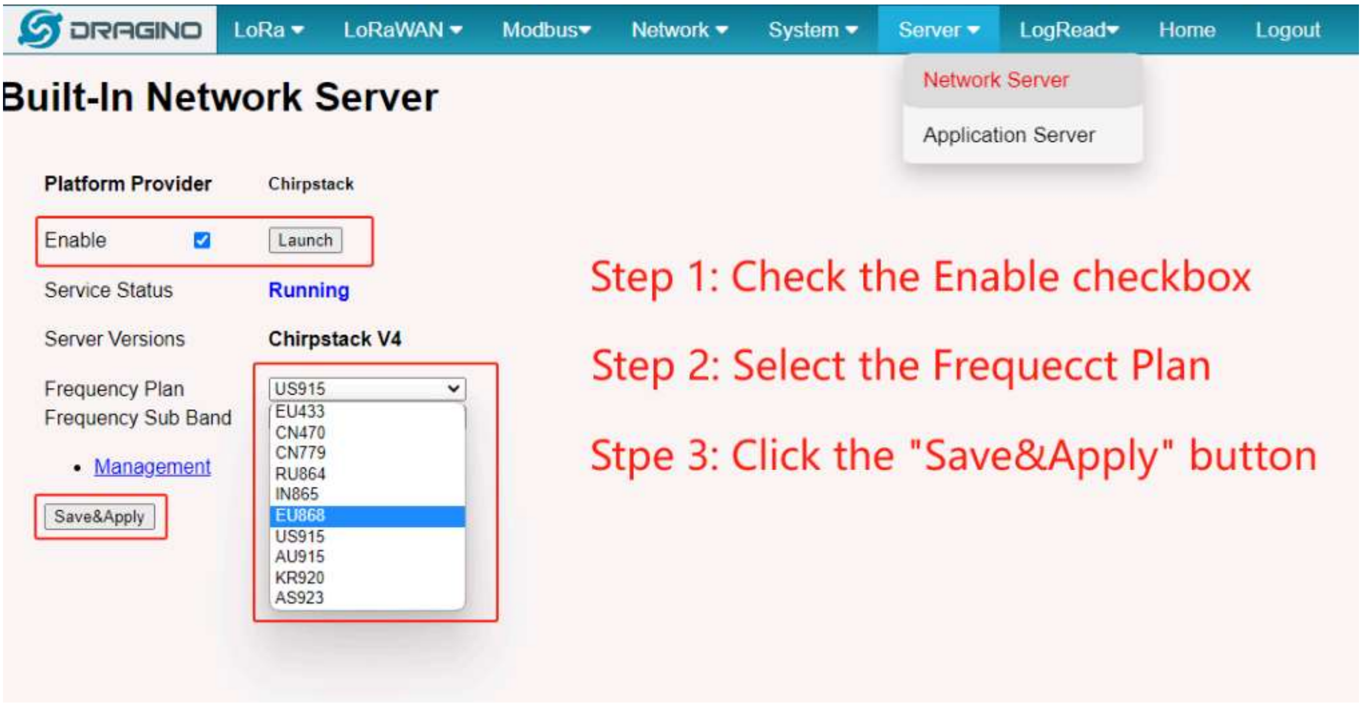
Filter Value: 1,2,3 or 018229B

DELET Filter

Current Mode:LoRaWAN Semtech UDP

Select 3: Click the "Save&Apply" button

Step 3: Enable the Built-in LoRaWAN Network Server



Built-In Network Server

Platform Provider Chirpstack

Enable ☑ Launch

Service Status Running

Server Versions Chirpstack V4

Frequency Plan US915

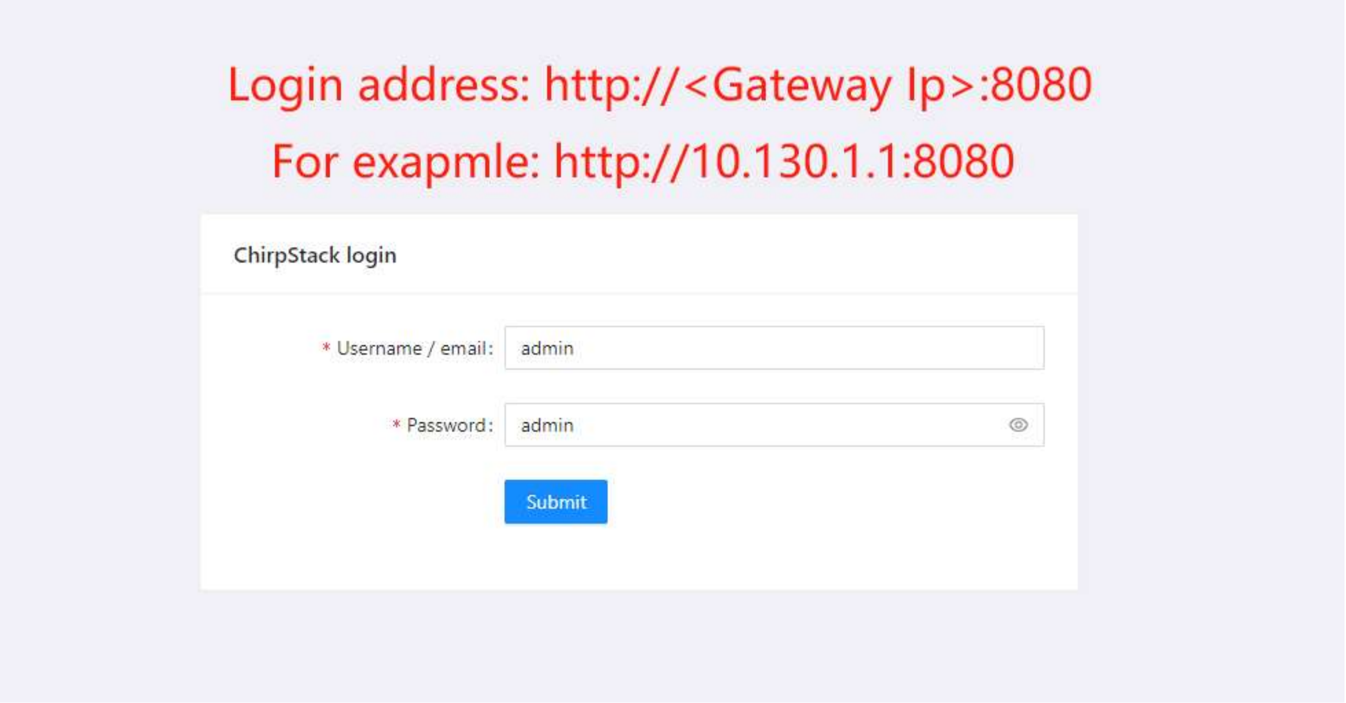
Frequency Sub Band

Step 1: Check the Enable checkbox

Step 2: Select the Frequecct Plan

Stpe 3: Click the "Save&Apply" button

Step 4: Logging to the Built-in LoRaWAN Network Server



Login address: http://<Gateway Ip>:8080

For exapmle: http://10.130.1.1:8080

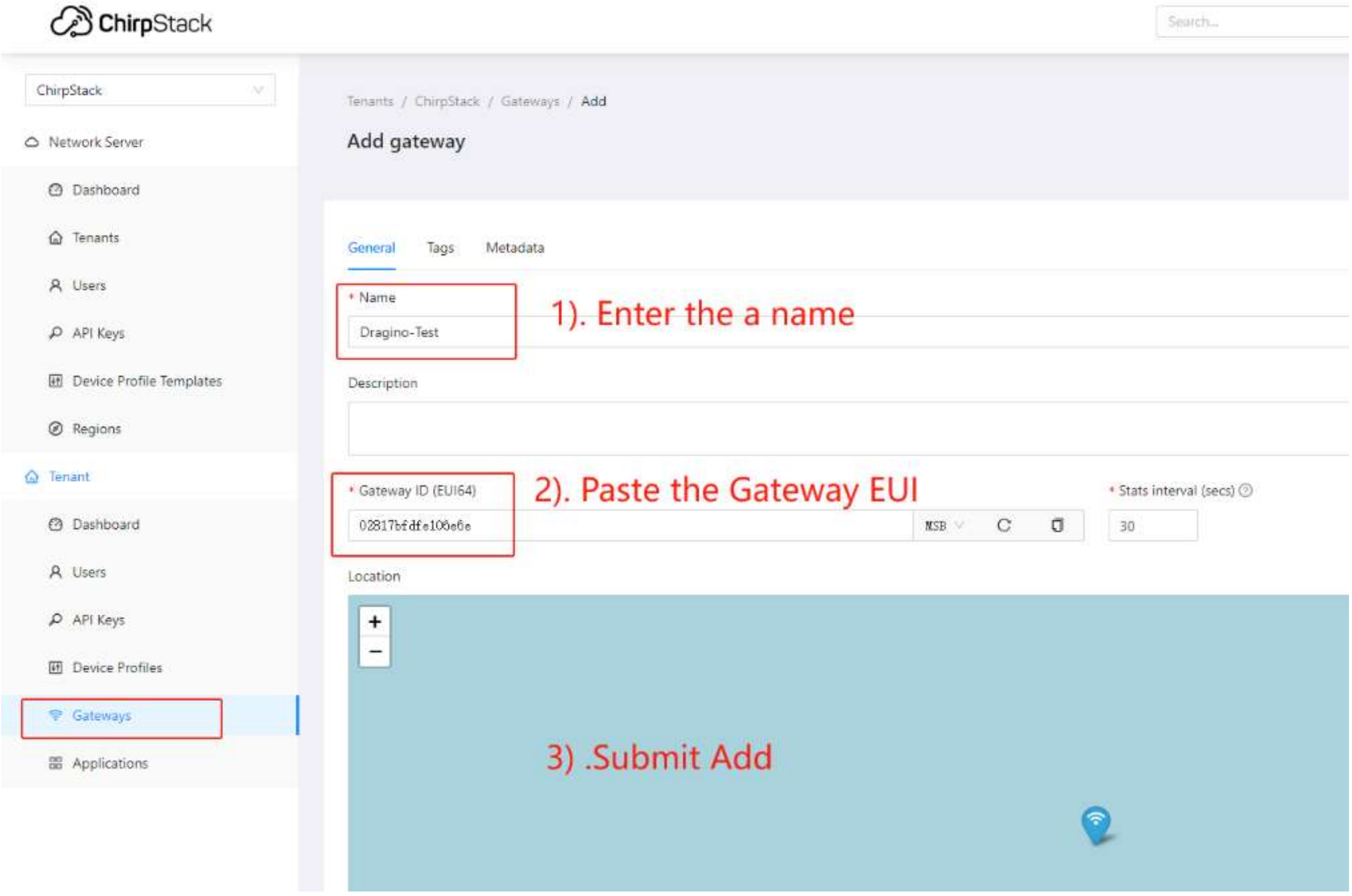
ChirpStack login

* Username / email: admin

* Password: admin

Step 5: Register the gateway to the built-in ChirpStack

Copy Gateway EUI from the previous step to the following interface:



Add gateway

* Name: Dragino-Test

1). Enter the a name

Description

* Gateway ID (EUI64): 02817bfdfe106e6e

2). Paste the Gateway EUI

* Stats interval (secs): 30

Location

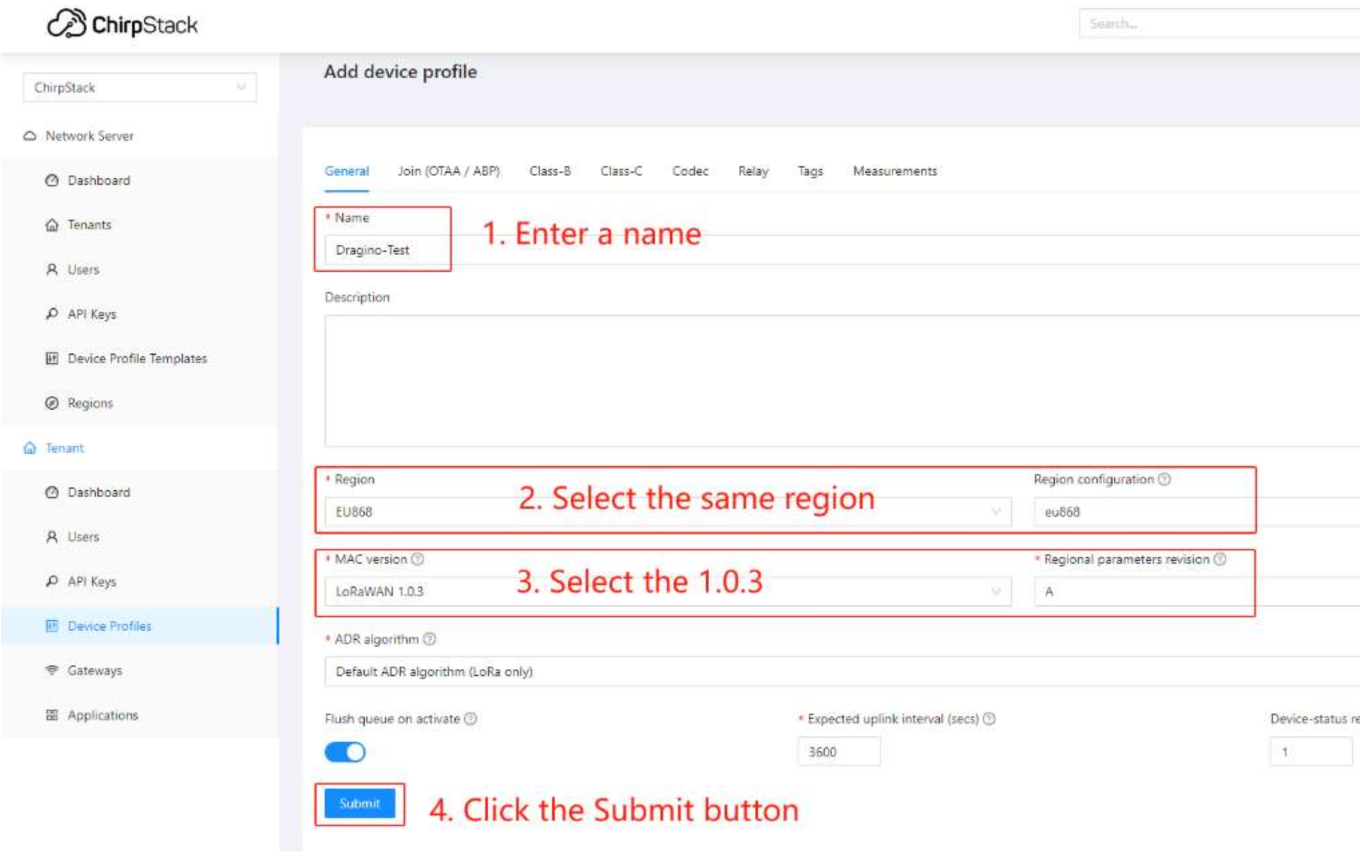
3) .Submit Add

Step 6: Register the Sensor-node to the built-in ChirpStack

The gateway is already set up to connect to the built-in ChirpStack network, so we now need to configure the built-in ChirpStack.

Create a device in ChirpStack with the OTAA keys from LHT65N.

1) Add Device Profiles



Add device profile

* Name: Dragino-Test

1. Enter a name

Description

* Region: EU868

2. Select the same region

Region configuration: eu868

* MAC version: LoRaWAN 1.0.3

3. Select the 1.0.3

* Regional parameters revision: A

* ADR algorithm: Default ADR algorithm (LoRa only)

Flush queue on activate: ●

* Expected uplink interval (secs): 3600

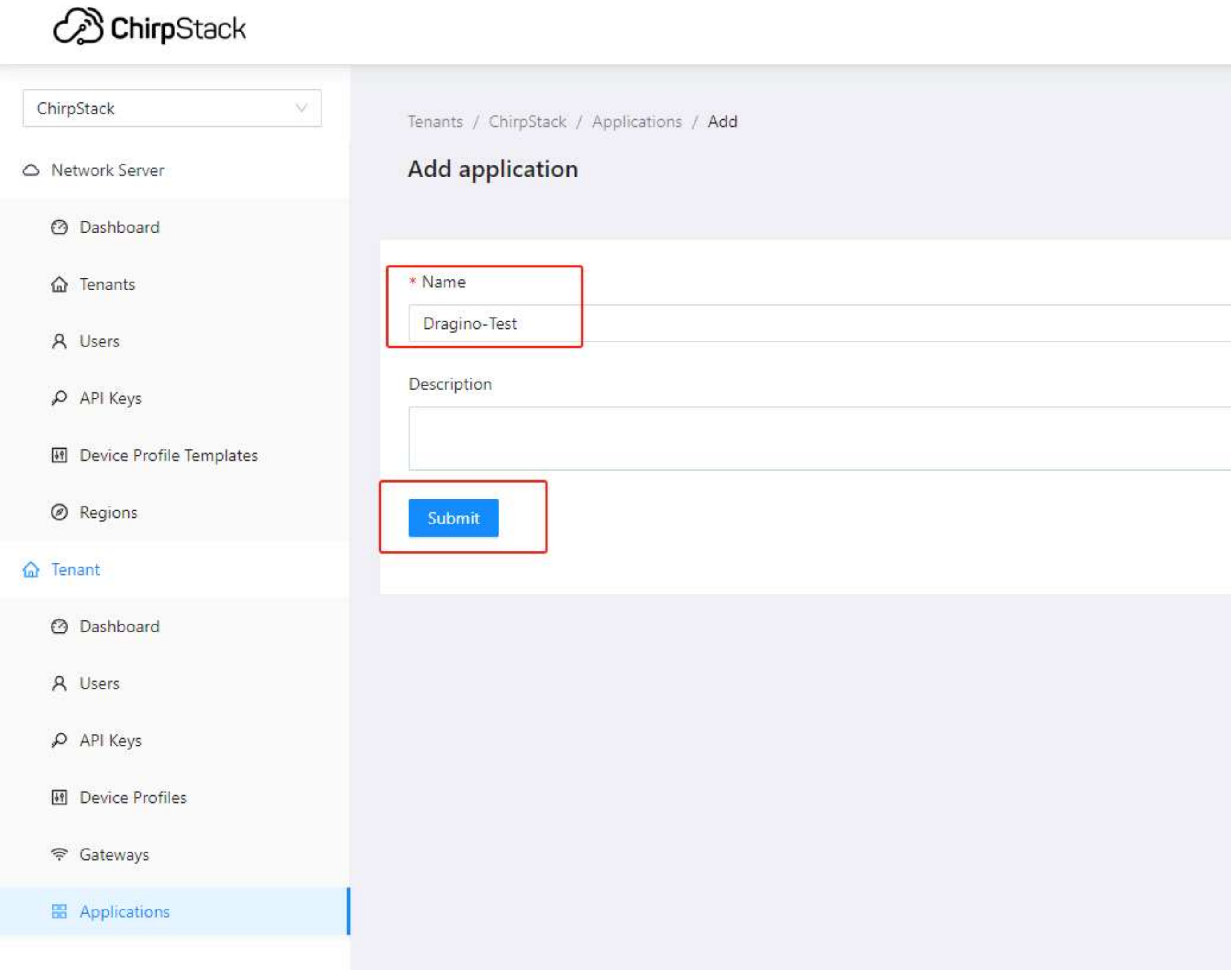
1

Submit

4. Click the Submit button

2) Add End Node Device

Create an Application

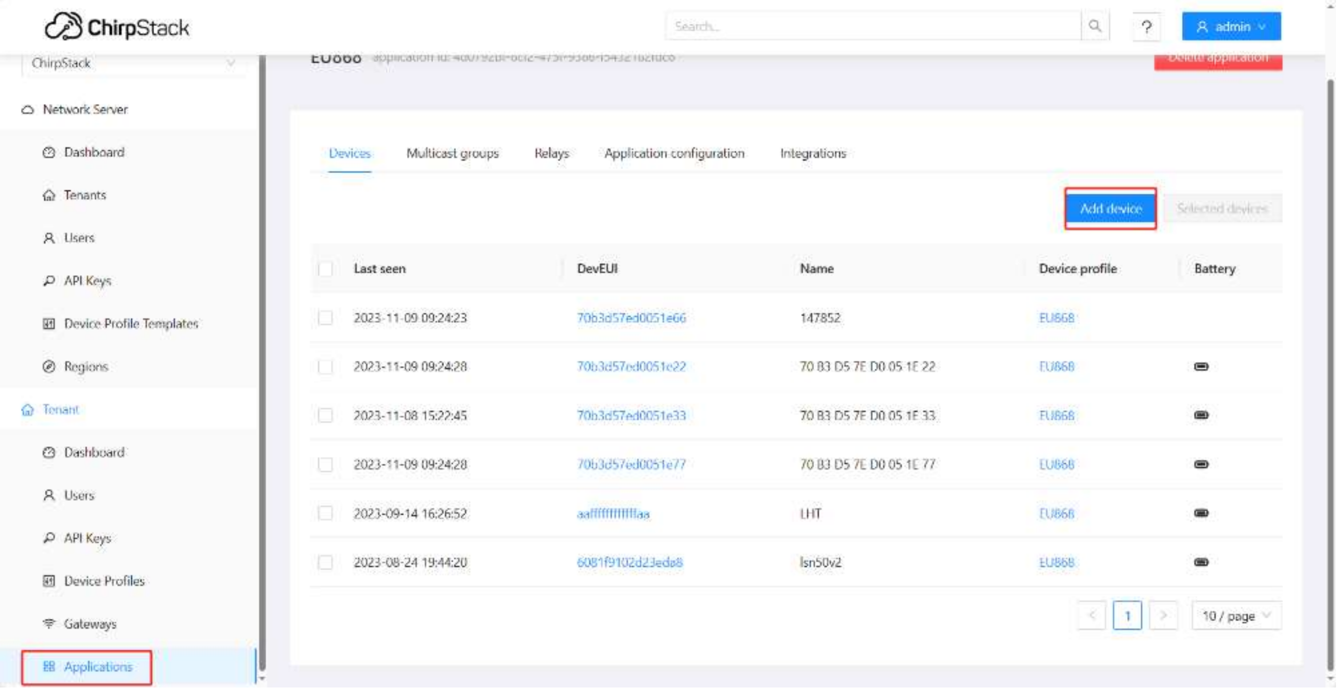


Add application

* Name: Dragino-Test

Description:

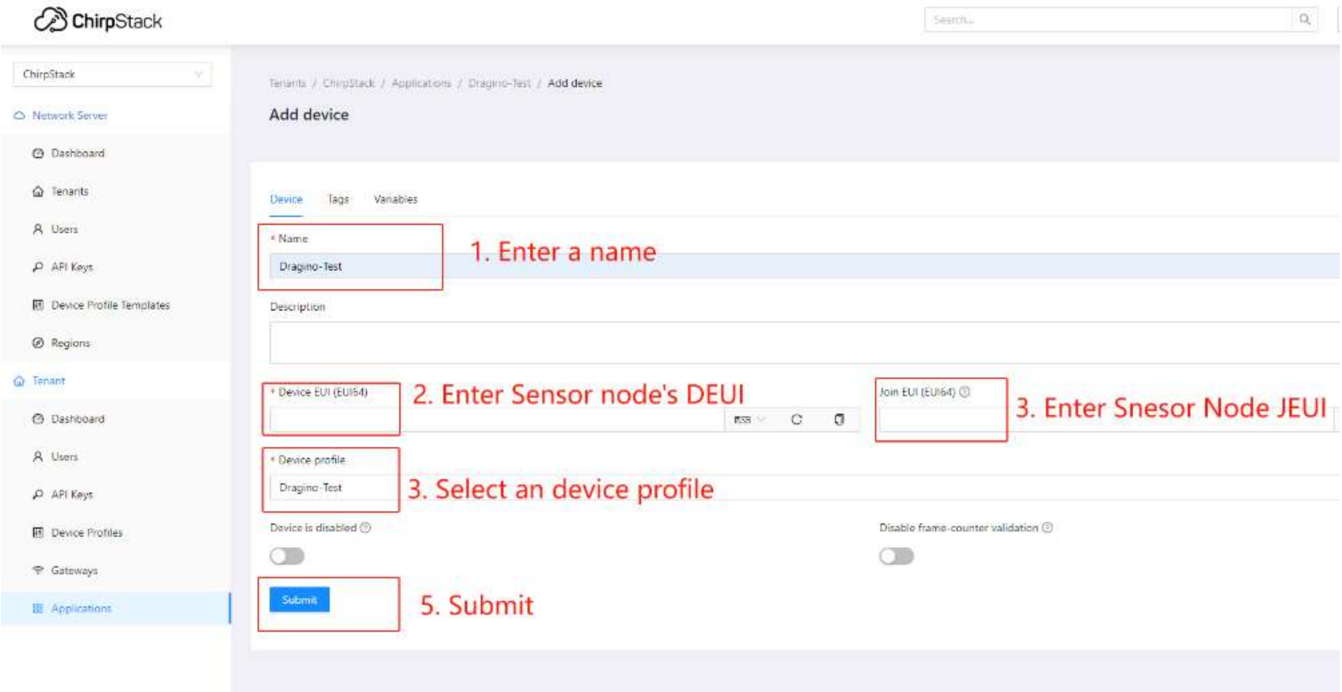
Add a device for the sensor node



□	Last seen	DevEUI	Name	Device profile	Battery
□	2023-11-09 09:24:23	70b3d57ed0051e66	147852	EU868	
□	2023-11-09 09:24:28	70b3d57ed0051e22	70 B3 D5 7E D0 05 1E 22	EU868	▬
□	2023-11-08 15:22:45	70b3d57ed0051e33	70 B3 D5 7E D0 05 1E 33	EU868	▬
□	2023-11-09 09:24:28	70b3d57ed0051e77	70 B3 D5 7E D0 05 1E 77	EU868	▬
□	2023-09-14 16:26:52	aaffffffffffffaa	LHT	EU868	▬
□	2023-08-24 19:44:20	6081f9102d23eda8	lsn50v2	EU868	▬

< 1 > 10 / page

Enter Device EUI, Join EUI(APP EUI)and APPKEY of the node Device, and select the Device profile added in the previous step



Add device

* Name: Dragino-Test

1. Enter a name

Description

* Device EUI (EUI64)

2. Enter Sensor node's DEUI

Join EUI (EUI64)

3. Enter Snesor Node JEUI

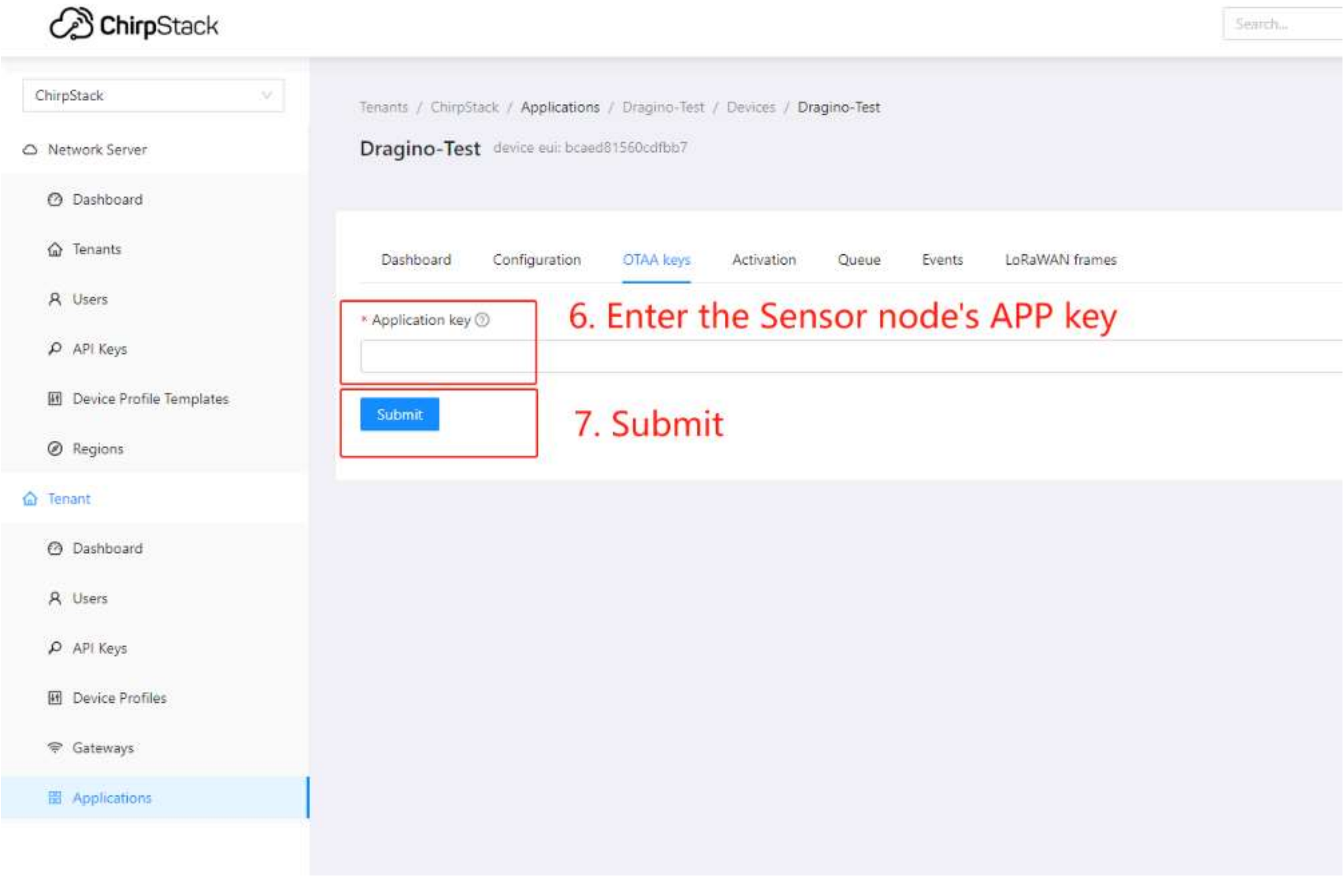
* Device profile: Dragino-Test

3. Select an device profile

Device is disabled

Disable frame-counter validation

5. Submit



Dragino-Test device eui: bcaed81560cdfbb7

* Application key

6. Enter the Sensor node's APP key

7. Submit

Step 7: Configure Modbus RTU/TCP Slave

The gateway can as a Modbus RTU slave to run, the user can set a range of the register to write a sensor node uplink data.

For example, there is a sensor node EUI is 70b3d57ed0051e22, the register start is 0xABCD and the register length is 14, which means the uplink data will be writt register starting at 0xABCD register and the maximum write length not to exceed 14 registers.

So the sensor node 70b3d57ed0051e22 uplink data will be written to the 0xABCD - 0xABE1 register.

Note: Since the length of the payload is the same for different sensor nodes if The length of the data is greater than the configuration length, the data replaced with FFFF.

Slave Setting:

Slave Mode ---> Support both RTU and TCP mode

Enable Modbus Slave ---> Enable Slave

Slave Address/Port ---> Set the slave address/port

Show Sensor History ---> See the sensor data log

Sensor Settings:

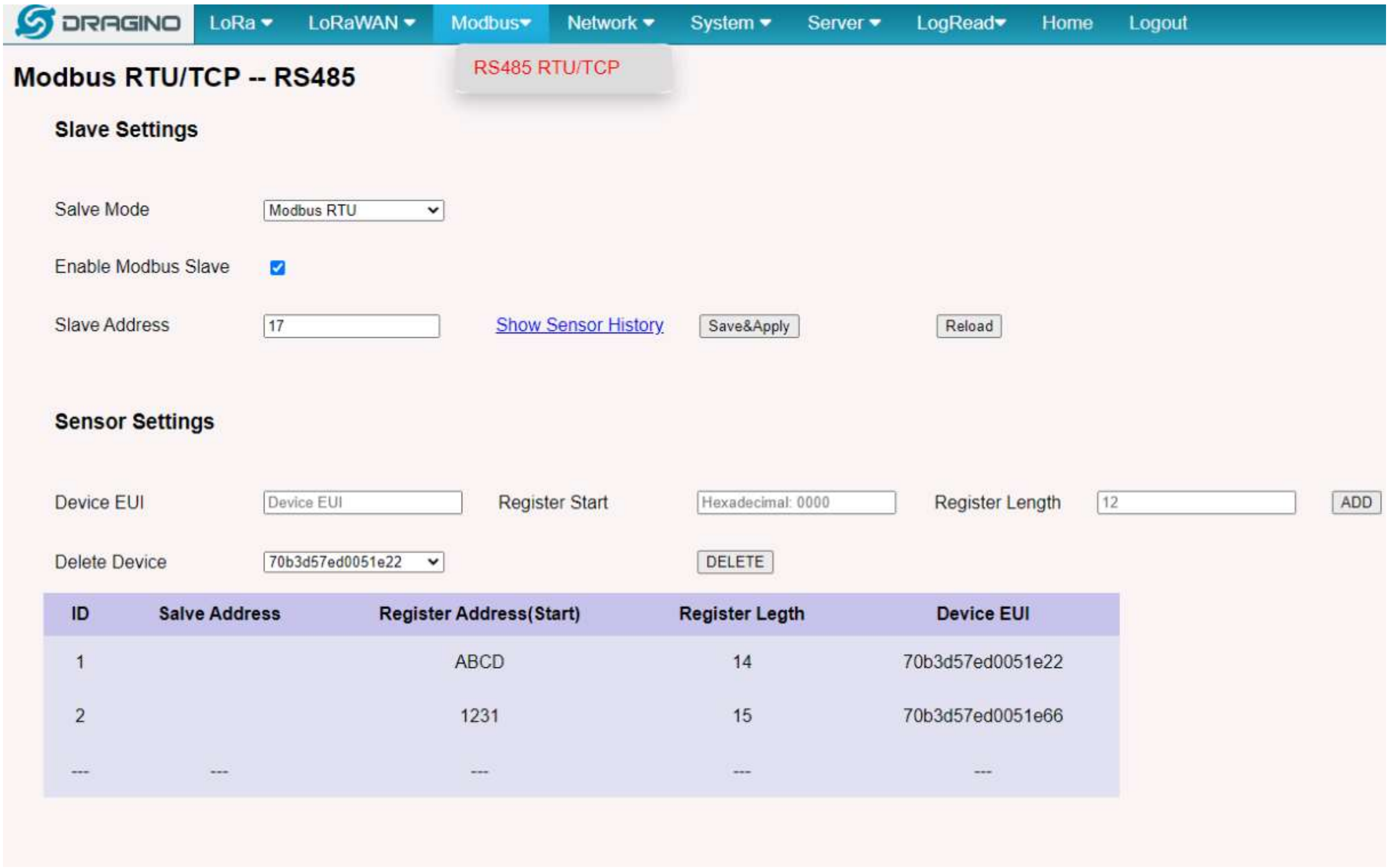
Device EUI ---> Sensor node's EUI

Register Start ---> Setting the start register address to write the sensor node's data

Register Length ---> The maximum write length with register

Note: Only 1 sensor can be written in the range set by the registers

1) RTU Mode:



Modbus RTU/TCP -- RS485

Slave Settings

Salve Mode: Modbus RTU

Enable Modbus Slave: ☑

Slave Address: 17

Show Sensor History | Save&Apply | Reload

Sensor Settings

Device EUI: Device EUI | Register Start: Hexadecimal: 0000 | Register Length: 12 | ADD

Delete Device: 70b3d57ed0051e22 | DELETE

ID	Salve Address	Register Address(Start)	Register Legth	Device EUI
1		ABCD	14	70b3d57ed0051e22
2		1231	15	70b3d57ed0051e66
---	---	---	---	---

After the sensor node is active at the built-in server Chirpstack, the user can add it to this page and enable the Modbus RS485-RTU Slave.

Then MS48-LR will write the uplink data to the 03 code register and record the uplink data.

PLC read the MS48-LR register

Settings:

Function : 03 code

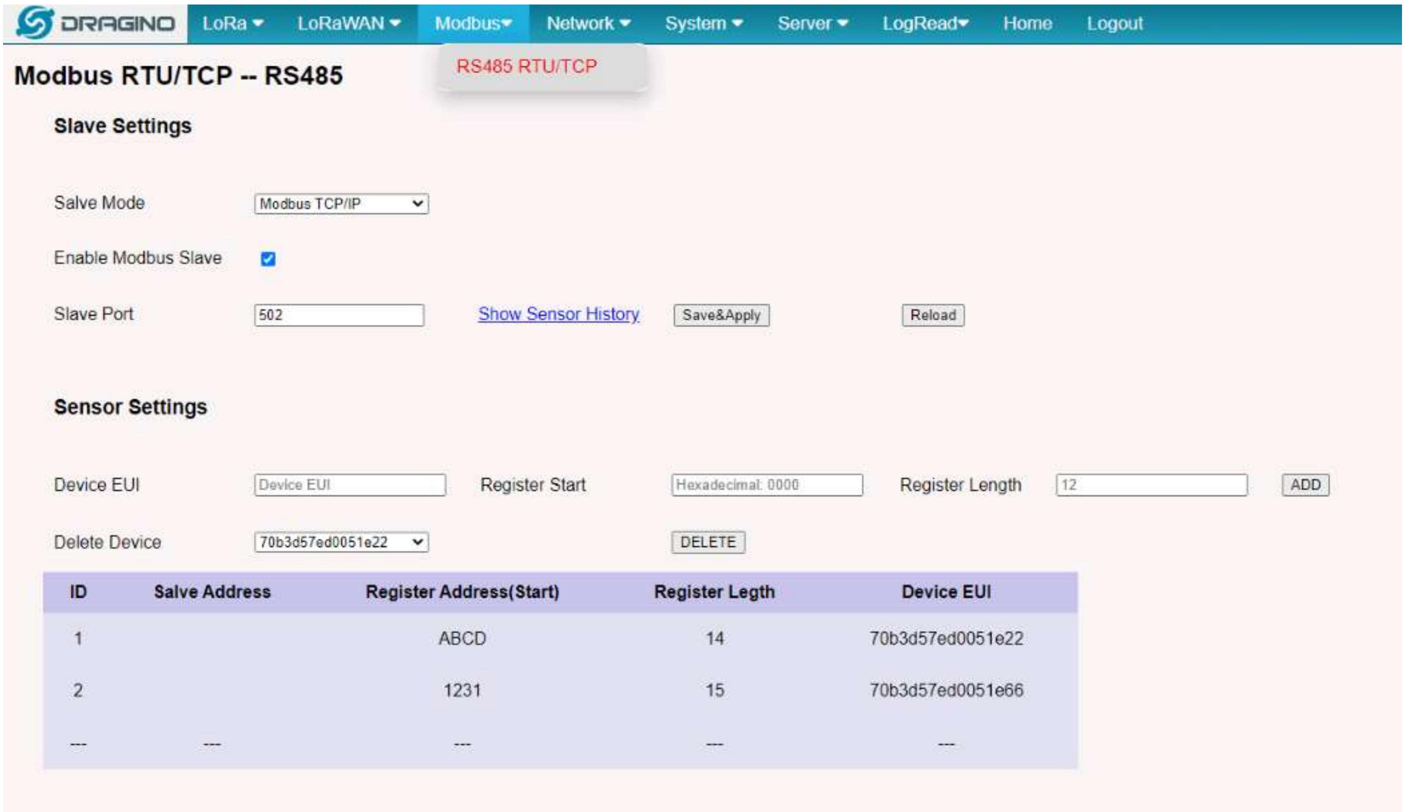
Bit rate : 9600

Parity bit : none

Stop bit : 1

Response Timeout : Greater than 3000ms

2) TCP Mode:



Modbus RTU/TCP -- RS485

Slave Settings

Salve Mode: Modbus TCP/IP

Enable Modbus Slave: ☑

Slave Port: 502

Sensor Settings

Device EUI: Device EUI

Register Start: Hexadecimal: 0000

Register Length: 12

Delete Device: 70b3d57ed0051e22

ID	Salve Address	Register Address(Start)	Register Legth	Device EUI
1		ABCD	14	70b3d57ed0051e22
2		1231	15	70b3d57ed0051e66
---	---	---	---	---

PLC read the MS48-LR register

Settings:

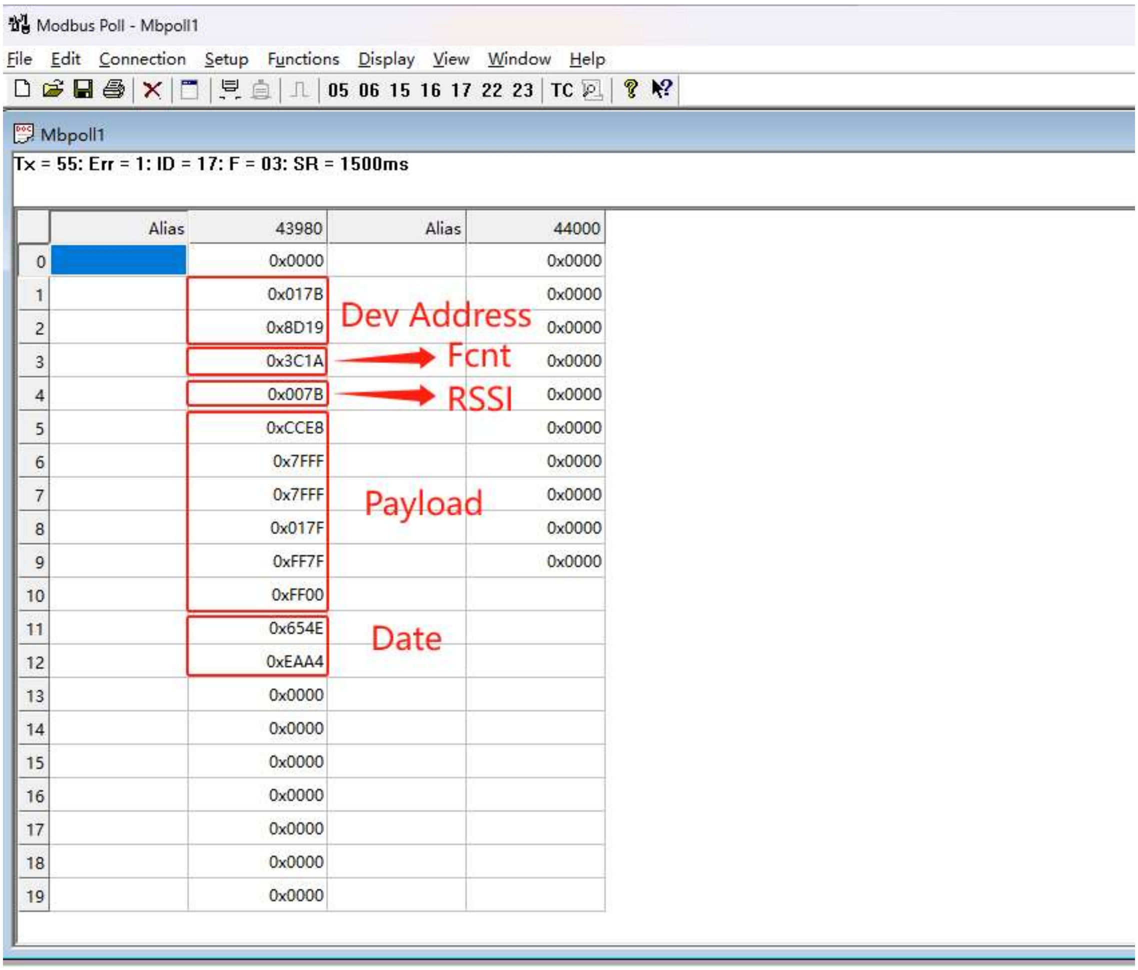
Function : 03 code

IP Address : Gateway IP Address

Server Port : Slave Port

Connect Timeout : Greater than 3000ms

3) PLC(Modbus server/master) data show:

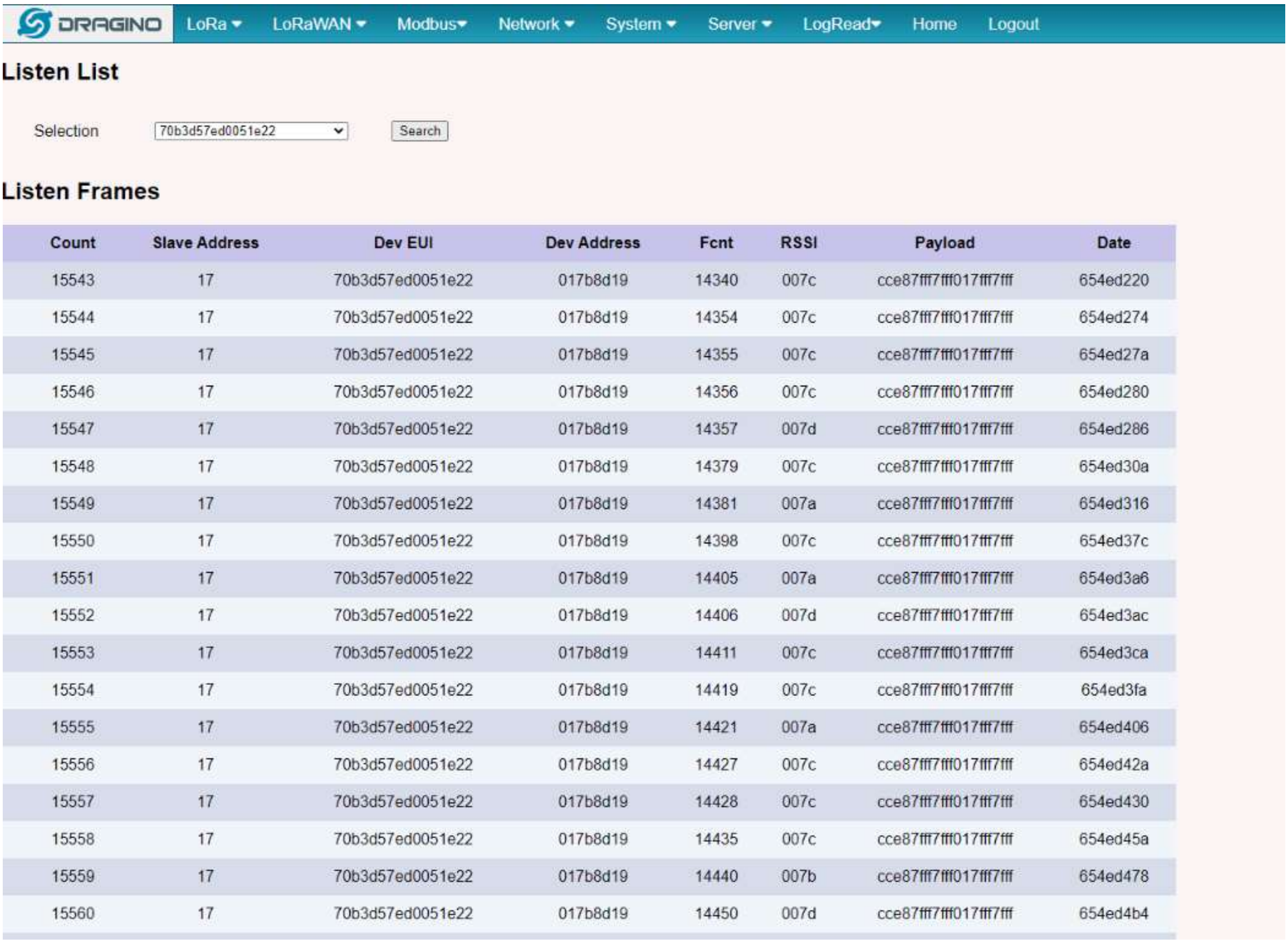


Tx = 55: Err = 1: ID = 17: F = 03: SR = 1500ms

	Alias	43980	Alias	44000
0		0x0000		0x0000
1		0x017B		0x0000
2		0x8D19		0x0000
3		0x3C1A		0x0000
4		0x007B		0x0000
5		0xCCE8		0x0000
6		0x7FFF		0x0000
7		0x7FFF		0x0000
8		0x017F		0x0000
9		0xFF7F		0x0000
10		0xFF00		
11		0x654E		
12		0xEAA4		
13		0x0000		
14		0x0000		
15		0x0000		
16		0x0000		
17		0x0000		
18		0x0000		
19		0x0000		

History Data:

Click the Show Sensor History will launch to this page



Listen List

Selection 70b3d57ed0051e22

Listen Frames

Count	Slave Address	Dev EUI	Dev Address	Fcnt	RSSI	Payload	Date
15543	17	70b3d57ed0051e22	017b8d19	14340	007c	cce87fff7fff017fff7fff	654ed220
15544	17	70b3d57ed0051e22	017b8d19	14354	007c	cce87fff7fff017fff7fff	654ed274
15545	17	70b3d57ed0051e22	017b8d19	14355	007c	cce87fff7fff017fff7fff	654ed27a
15546	17	70b3d57ed0051e22	017b8d19	14356	007c	cce87fff7fff017fff7fff	654ed280
15547	17	70b3d57ed0051e22	017b8d19	14357	007d	cce87fff7fff017fff7fff	654ed286
15548	17	70b3d57ed0051e22	017b8d19	14379	007c	cce87fff7fff017fff7fff	654ed30a
15549	17	70b3d57ed0051e22	017b8d19	14381	007a	cce87fff7fff017fff7fff	654ed316
15550	17	70b3d57ed0051e22	017b8d19	14398	007c	cce87fff7fff017fff7fff	654ed37c
15551	17	70b3d57ed0051e22	017b8d19	14405	007a	cce87fff7fff017fff7fff	654ed3a6
15552	17	70b3d57ed0051e22	017b8d19	14406	007d	cce87fff7fff017fff7fff	654ed3ac
15553	17	70b3d57ed0051e22	017b8d19	14411	007c	cce87fff7fff017fff7fff	654ed3ca
15554	17	70b3d57ed0051e22	017b8d19	14419	007c	cce87fff7fff017fff7fff	654ed3fa
15555	17	70b3d57ed0051e22	017b8d19	14421	007a	cce87fff7fff017fff7fff	654ed406
15556	17	70b3d57ed0051e22	017b8d19	14427	007c	cce87fff7fff017fff7fff	654ed42a
15557	17	70b3d57ed0051e22	017b8d19	14428	007c	cce87fff7fff017fff7fff	654ed430
15558	17	70b3d57ed0051e22	017b8d19	14435	007c	cce87fff7fff017fff7fff	654ed45a
15559	17	70b3d57ed0051e22	017b8d19	14440	007b	cce87fff7fff017fff7fff	654ed478
15560	17	70b3d57ed0051e22	017b8d19	14450	007d	cce87fff7fff017fff7fff	654ed4b4

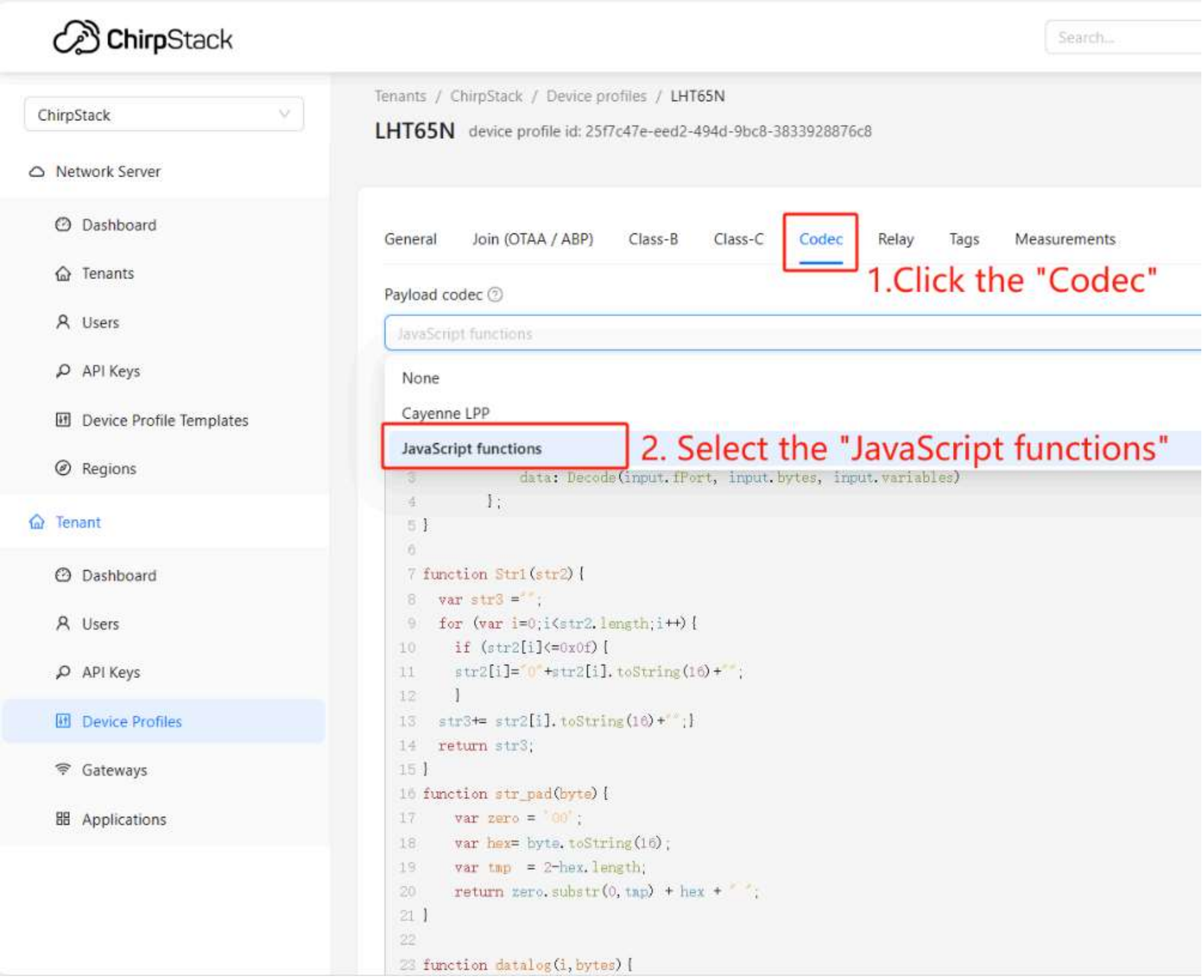
Step 8: Configure Sensor decode to Built-in Chirpstack

1) Add Sensor's decode to Chirpstack

Users can find the ChirpStack v4 decoder code for the Dragino End node in this link：

https://github.com/dragino/dragino-end-node-decoder (https://github.com/dragino/dragino-end-node-decoder)

The following example is to add the LHT65N decoder：



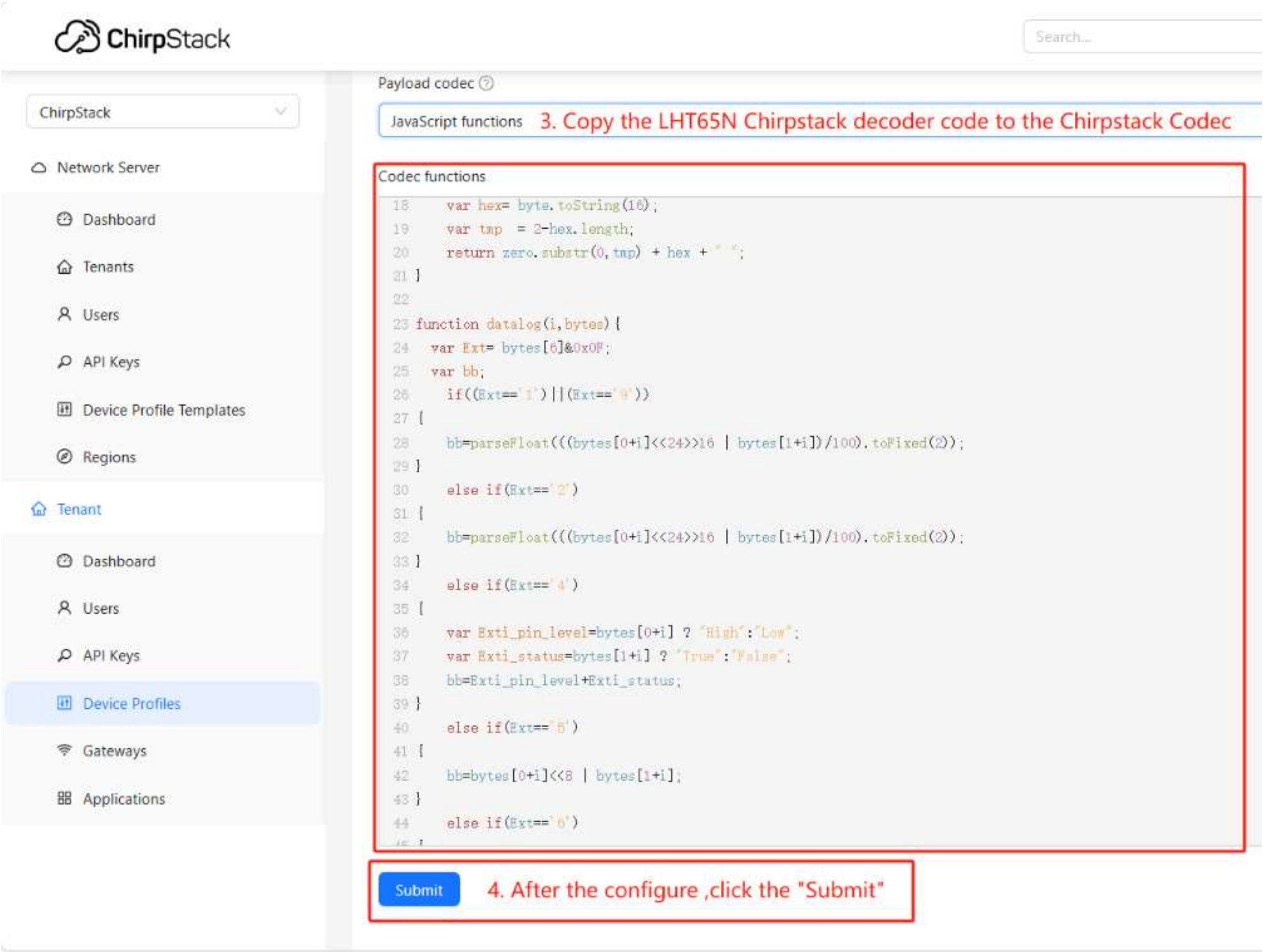
LHT65N device profile id: 25f7c47e-eed2-494d-9bc8-3833928876c8

1.Click the "Codec"

Payload codec: JavaScript functions

2. Select the "JavaScript functions"

```
            data: Decode(input.fPort, input.bytes, input.variables)
        };
}

function Str1(str2){
  var str3 ='';
  for (var i=0;i<str2.length;i++){
    if (str2[i]<=0x0f){
    str2[i]='0'+str2[i].toString(16)+'';
    }
  str3+= str2[i].toString(16)+'';}
  return str3;
}
function str_pad(byte){
    var zero = '00';
    var hex= byte.toString(16);
    var tmp  = 2-hex.length;
    return zero.substr(0,tmp) + hex + ' ';
}

function datalog(i,bytes){
```



Payload codec

JavaScript functions

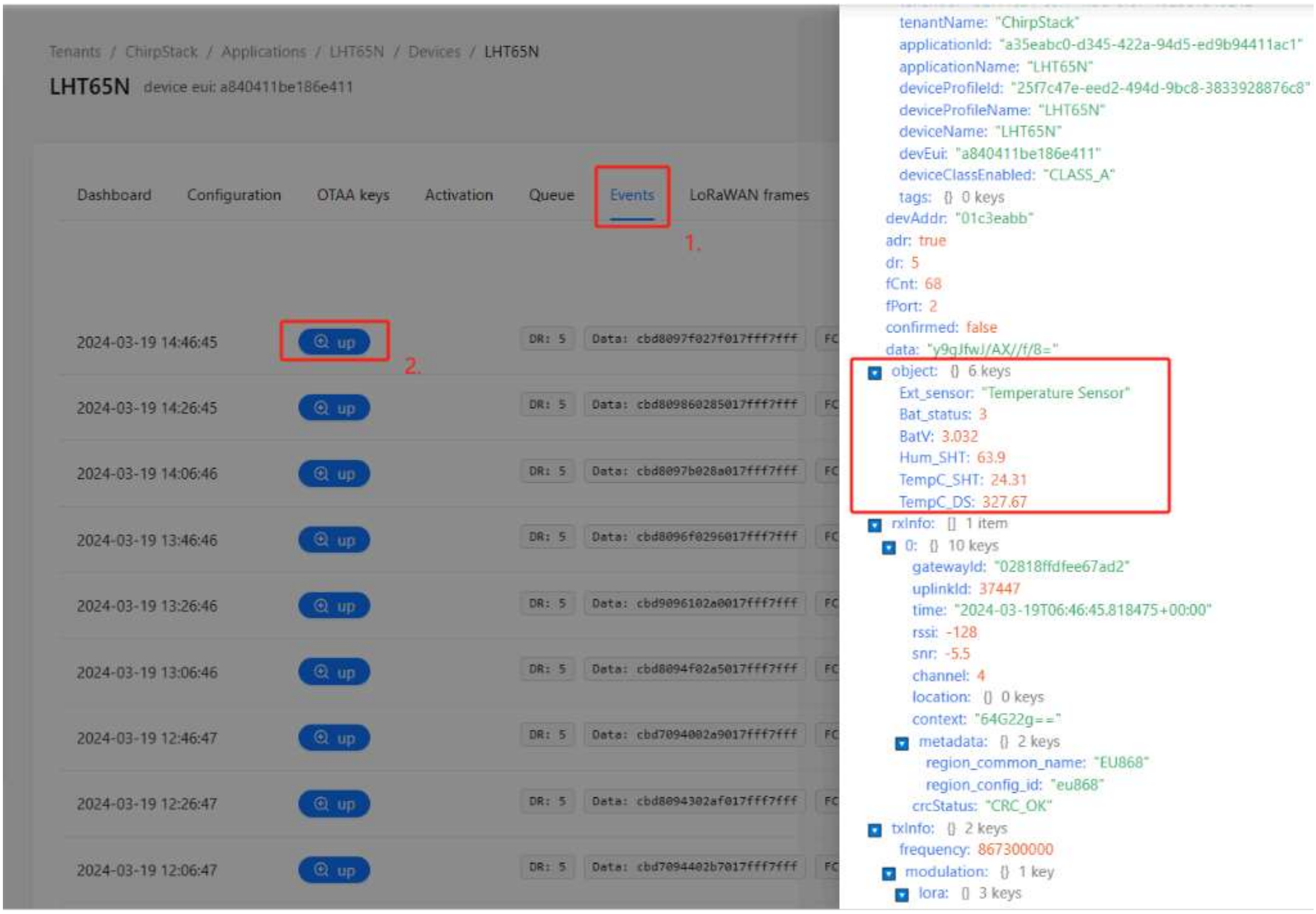
3. Copy the LHT65N Chirpstack decoder code to the Chirpstack Codec

Codec functions

```
    var hex= byte.toString(16);
    var tmp  = 2-hex.length;
    return zero.substr(0,tmp) + hex + ' ';
}

function datalog(i,bytes){
  var Ext= bytes[6]&0x0F;
  var bb;
    if((Ext=='1')||(Ext=='9'))
{
    bb=parseFloat(((bytes[0+i]<<24>>16 | bytes[1+i])/100).toFixed(2));
}
    else if(Ext=='2')
{
    bb=parseFloat(((bytes[0+i]<<24>>16 | bytes[1+i])/100).toFixed(2));
}
    else if(Ext=='4')
{
    var Exti_pin_level=bytes[0+i] ? 'High':'Low';
    var Exti_status=bytes[1+i] ? 'True':'False';
    bb=Exti_pin_level+Exti_status;
}
    else if(Ext=='5')
{
    bb=bytes[0+i]<<8 | bytes[1+i];
}
    else if(Ext=='6')
```

4. After the configure ,click the "Submit"

2) Check the decode on ChirpStack


Tenants / ChirpStack / Applications / LHT65N / Devices / LHT65N
LHT65N device eui: a840411be186e411
Dashboard
Configuration
OTAA keys
Activation
Queue
Events
LoRaWAN frames
1.
2.

```
2024-03-19 14:46:45   up   DR: 5   Data: cbd8097f027f017fff7fff   FC
2024-03-19 14:26:45   up   DR: 5   Data: cbd809860285017fff7fff   FC
2024-03-19 14:06:46   up   DR: 5   Data: cbd8097b028a017fff7fff   FC
2024-03-19 13:46:46   up   DR: 5   Data: cbd8096f0296017fff7fff   FC
2024-03-19 13:26:46   up   DR: 5   Data: cbd9096102a0017fff7fff   FC
2024-03-19 13:06:46   up   DR: 5   Data: cbd8094f02a5017fff7fff   FC
2024-03-19 12:46:47   up   DR: 5   Data: cbd7094002a9017fff7fff   FC
2024-03-19 12:26:47   up   DR: 5   Data: cbd8094302af017fff7fff   FC
2024-03-19 12:06:47   up   DR: 5   Data: cbd7094402b7017fff7fff   FC
```

```
    tenantName: "ChirpStack"
    applicationId: "a35eabc0-d345-422a-94d5-ed9b94411ac1"
    applicationName: "LHT65N"
    deviceProfileId: "25f7c47e-eed2-494d-9bc8-3833928876c8"
    deviceProfileName: "LHT65N"
    deviceName: "LHT65N"
    devEui: "a840411be186e411"
    deviceClassEnabled: "CLASS_A"
    tags: {} 0 keys
  devAddr: "01c3eabb"
  adr: true
  dr: 5
  fCnt: 68
  fPort: 2
  confirmed: false
  data: "y9gJfwJ/AX//f/8="
  object: {} 6 keys
    Ext_sensor: "Temperature Sensor"
    Bat_status: 3
    BatV: 3.032
    Hum_SHT: 63.9
    TempC_SHT: 24.31
    TempC_DS: 327.67
  rxInfo: [] 1 item
    0: {} 10 keys
      gatewayId: "02818ffdfee67ad2"
      uplinkId: 37447
      time: "2024-03-19T06:46:45.818475+00:00"
      rssi: -128
      snr: -5.5
      channel: 4
      location: {} 0 keys
      context: "64G22g=="
      metadata: {} 2 keys
        region_common_name: "EU868"
        region_config_id: "eu868"
      crcStatus: "CRC_OK"
  txInfo: {} 2 keys
    frequency: 867300000
    modulation: {} 1 key
      lora: {} 3 keys
```

Step 9: Configure Modbus RTU/TCP Slave Sensor Decode

For example, there is a sensor node EUI is a840411be186e411, the register start is 0x0000 and the register length is 14, which means the uplink data will be writte register starting at 0x0000 register and the maximum write length not to exceed 14 registers.

Add Decode Data TempC_SHT, the register start address is 0x000F and the register length is 2, which means the Decode Data TempC_SHT will be written to the re at 0x000F register and the maximum write length not to exceed 2 registers.

So the sensor node a840411be186e411 uplink data will be written to the 0x0000 - 0x000E register, and the Decode Data TempC_SHT will be written to the 0x000F register.

Note: Since the length of the payload is the same for different sensor nodes if The length of the data is greater than the configuration length, the data replaced with FFFF.

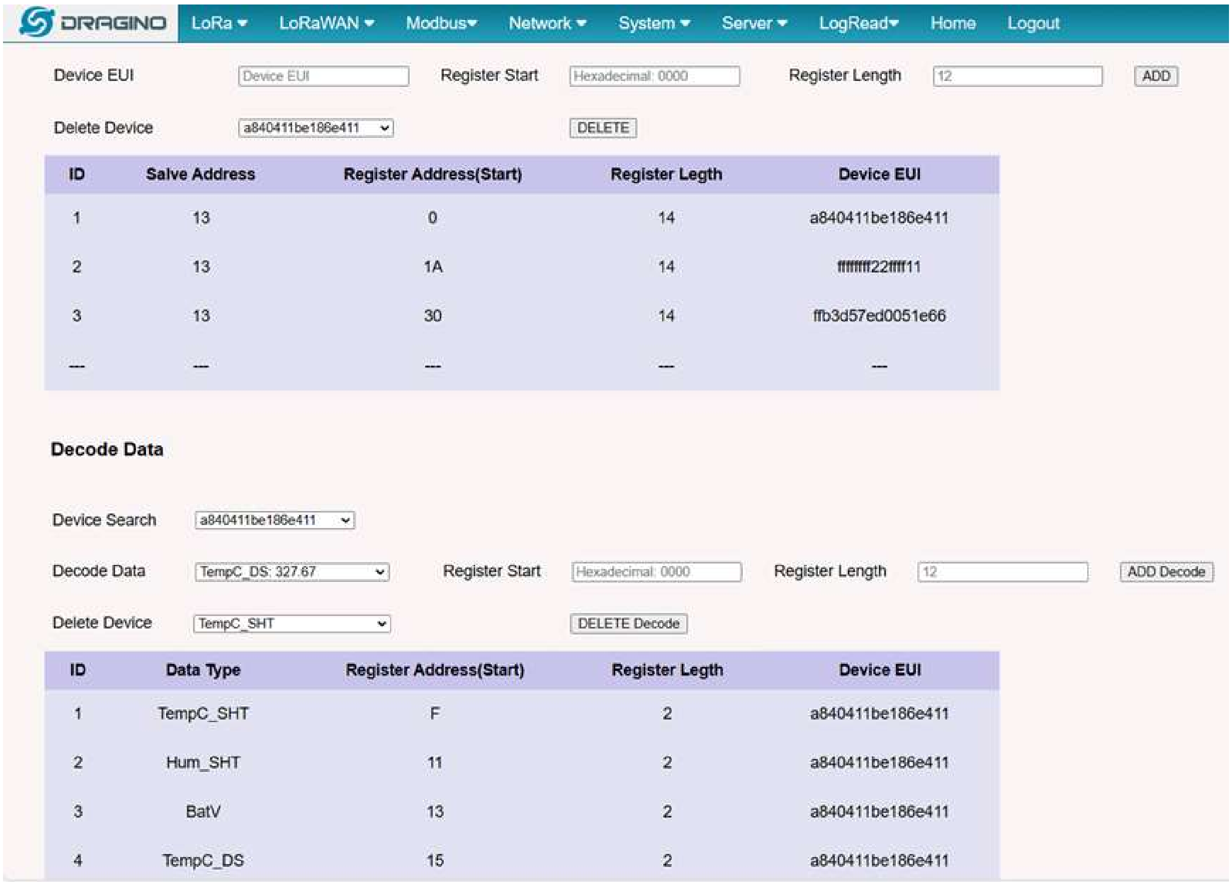
Decode Data:

Device Type ---> Sensor decoder data

Register Start ---> Setting the start register address to write the sensor node's decoder data

Register Length ---> The maximum write length with register

Note: Only 1 Data can be written in the range set by the registers



Device EUI [Device EUI] Register Start [Hexadecimal: 0000] Register Length [12] ADD

Delete Device [a840411be186e411] DELETE

ID	Salve Address	Register Address(Start)	Register Legth	Device EUI
1	13	0	14	a840411be186e411
2	13	1A	14	ffffffff22ffff11
3	13	30	14	ffb3d57ed0051e66
---	---	---	---	---

Decode Data

Device Search [a840411be186e411]

Decode Data [TempC_DS: 327.67] Register Start [Hexadecimal: 0000] Register Length [12] ADD Decode

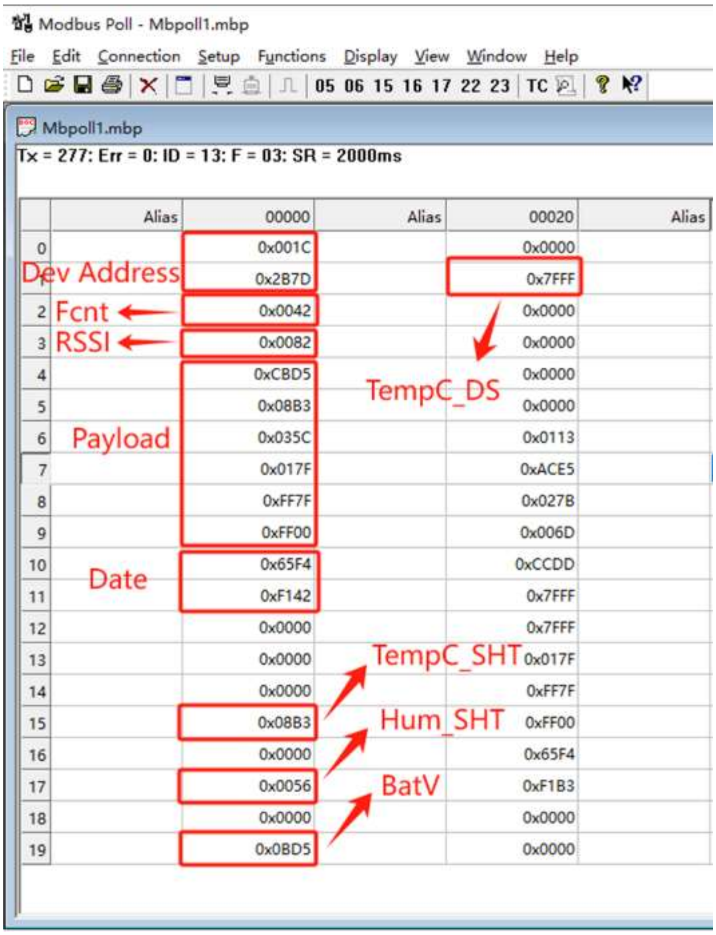
Delete Device [TempC_SHT] DELETE Decode

ID	Data Type	Register Address(Start)	Register Legth	Device EUI
1	TempC_SHT	F	2	a840411be186e411
2	Hum_SHT	11	2	a840411be186e411
3	BatV	13	2	a840411be186e411
4	TempC_DS	15	2	a840411be186e411

PLC(Modbus server/master) data show:

Note: Since the decoded data is of floating point type, it is converted to an integer before being written to the Mobdbus' registers.

For example: 23.20(real data) ---> 2320(register show).



Tx = 277: Err = 0: ID = 13: F = 03: SR = 2000ms

	Alias	00000	Alias	00020	Alias
0		0x001C		0x0000	
1		0x2B7D		0x7FFF	
2		0x0042		0x0000	
3		0x0082		0x0000	
4		0xCBD5		0x0000	
5		0x08B3		0x0000	
6		0x035C		0x0113	
7		0x017F		0xACE5	
8		0xFF7F		0x027B	
9		0xFF00		0x006D	
10		0x65F4		0xCCDD	
11		0xF142		0x7FFF	
12		0x0000		0x7FFF	
13		0x0000		0x017F	
14		0x0000		0xFF7F	
15		0x08B3		0xFF00	
16		0x0000		0x65F4	
17		0x0056		0xF1B3	
18		0x0000		0x0000	
19		0x0BD5		0x0000	

2.4 Accept data to registers for specified Fport

For example, there is a sensor node EUI is f4bbf5a0da6f4da5,

- the sensor payload uplink is using Fport=2
- the sensor status uplink is using Fport=5

If the accept fport is not set, it may cause the registers to be written with 0 decoded data during status uplink, because status uplinks typically do not decoded data.

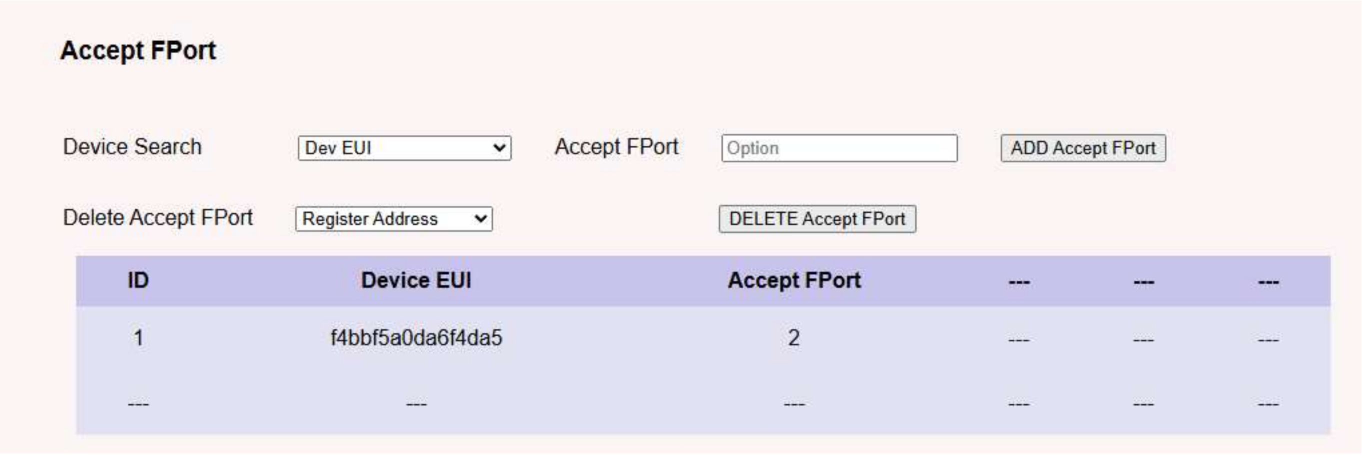
To avoid 0 data being written to the registers. the users can set accept Fport for the sensor,

i.e., the data will be written to the register only when the MS48-LR receives the uplink of the specified Fort

Accept Fport:

DevEUI ---> Sensor node DevEUI

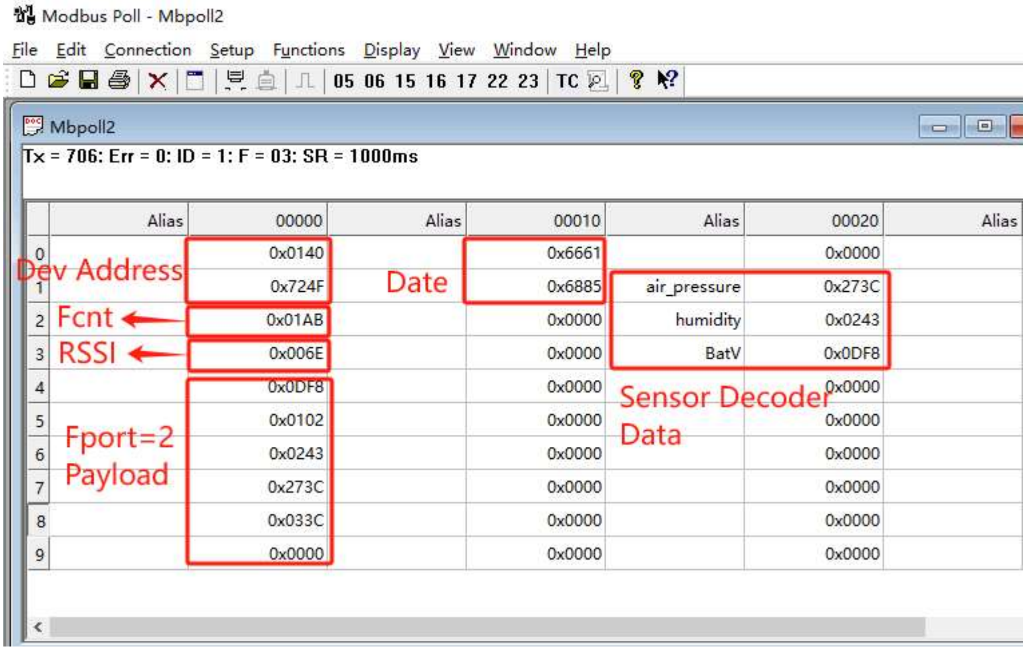
Accept FPort ---> Setting the Accept Fport



Accept FPort

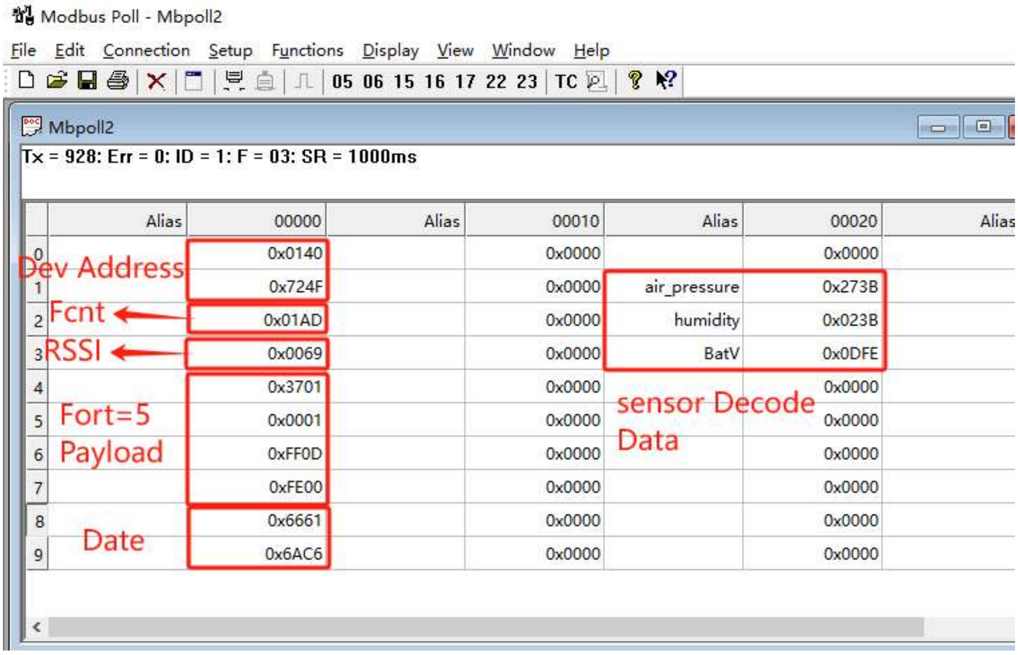
ID	Device EUI	Accept FPort	---	---	---
1	f4bbf5a0da6f4da5	2	---	---	---
---	---	---	---	---	---

PLC(Modbus server/master) data show:



Tx = 706: Err = 0: ID = 1: F = 03: SR = 1000ms

	Alias	00000	Alias	00010	Alias	00020	Alias
0		0x0140		0x6661		0x0000	
1		0x724F		0x6885	air_pressure	0x273C	
2		0x01AB		0x0000	humidity	0x0243	
3		0x006E		0x0000	BatV	0x0DF8	
4		0x0DF8		0x0000		0x0000	
5		0x0102		0x0000		0x0000	
6		0x0243		0x0000		0x0000	
7		0x273C		0x0000		0x0000	
8		0x033C		0x0000		0x0000	
9		0x0000		0x0000		0x0000	



Tx = 928: Err = 0: ID = 1: F = 03: SR = 1000ms

	Alias	00000	Alias	00010	Alias	00020	Alias
0		0x0140		0x0000		0x0000	
1		0x724F		0x0000	air_pressure	0x273B	
2		0x01AD		0x0000	humidity	0x023B	
3		0x0069		0x0000	BatV	0x0DFE	
4		0x3701		0x0000		0x0000	
5		0x0001		0x0000		0x0000	
6		0xFF0D		0x0000		0x0000	
7		0xFE00		0x0000		0x0000	
8		0x6661		0x0000		0x0000	
9		0x6AC6		0x0000		0x0000	

3. Web Configure Pages

3.1 Home

Shows the system running status:

3.2 LoRa Settings

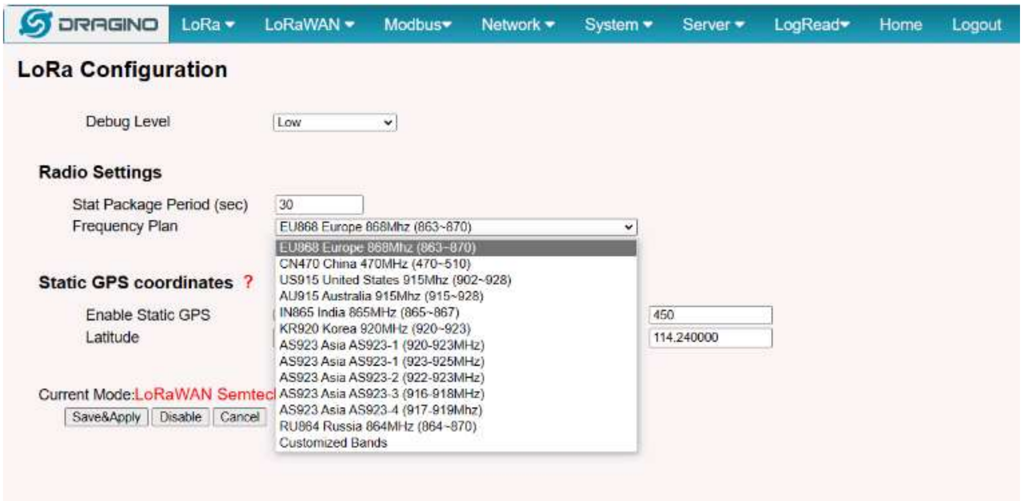
3.2.1 LoRa --> LoRa

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 MS48-LR 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**



LoRa Configuration

Debug Level: Low

Radio Settings

Stat Package Period (sec): 30

Frequency Plan: EU868 Europe 868Mhz (863~870)

- EU868 Europe 868Mhz (863~870)
- CN470 China 470MHz (470~510)
- US915 United States 915Mhz (902~928)
- AU915 Australia 915Mhz (915~928)
- IN865 India 865MHz (865~867)
- KR920 Korea 920MHz (920~923)
- AS923 Asia AS923-1 (920-923MHz)
- AS923 Asia AS923-1 (923-925MHz)
- AS923 Asia AS923-2 (922-923MHz)
- AS923 Asia AS923-3 (916-918MHz)
- AS923 Asia AS923-4 (917-919Mhz)
- RU864 Russia 864MHz (864~870)
- Customized Bands

Static GPS coordinates ?

Enable Static GPS

Latitude

450

114.240000

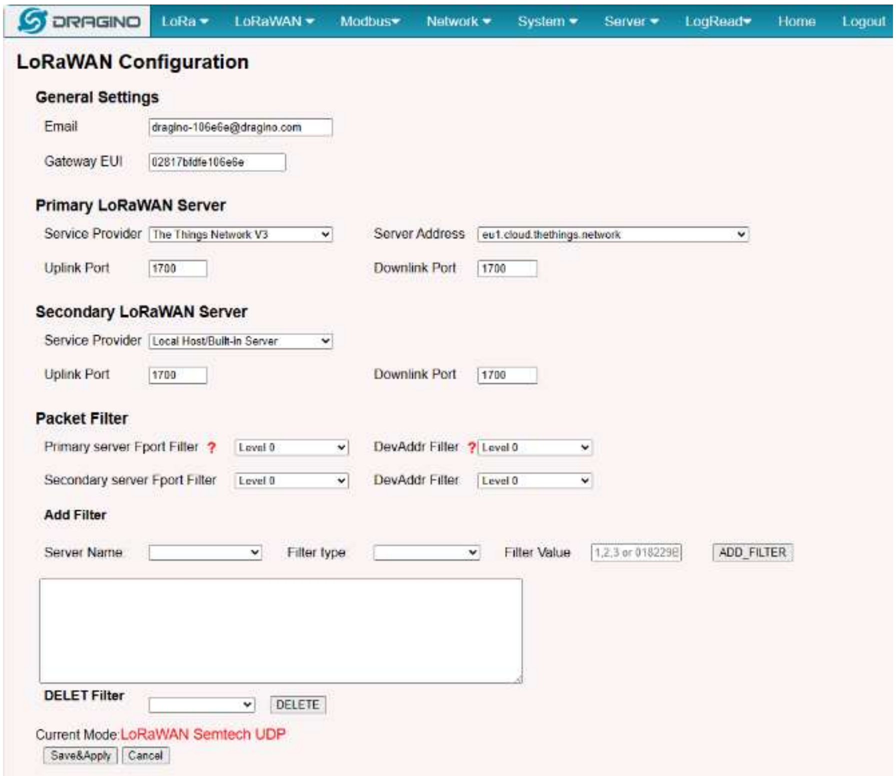
Current Mode:LoRaWAN Semtec

Note *: See this instruction for how to customize the frequency band: [How to customized LoRaWAN frequency band - DRAGINO (http://wiki.dragino.com/xwiki/bin/view/Main/How%20to%20customized%20LoRaWAN%20frequency%20band/)]

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 (http://www.thethingsnetwork.org/) , ChirpStack (https://www.chirpsta



LoRaWAN Configuration

General Settings

Email: dragino-106e6e@dragino.com

Gateway EUI: 02817bfdfe106e6e

Primary LoRaWAN Server

Service Provider: The Things Network V3

Server Address: eu1.cloud.thethings.network

Uplink Port: 1700

Downlink Port: 1700

Secondary LoRaWAN Server

Service Provider: Local Host/Built-In Server

Uplink Port: 1700

Downlink Port: 1700

Packet Filter

Primary server Fport Filter ?: Level 0

DevAddr Filter ?: Level 0

Secondary server Fport Filter: Level 0

DevAddr Filter: Level 0

Add Filter

Server Name

Filter type

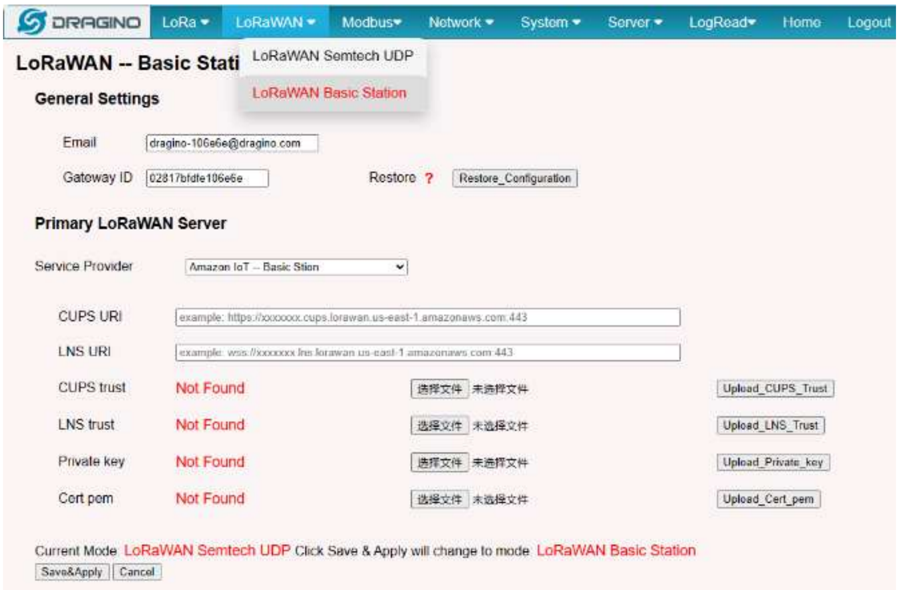
Filter Value: 1,2,3 or 0182298

DELET Filter

Current Mode:LoRaWAN Semtech UDP

3.3.2 LoRaWAN --> LoRaWAN Basic Station

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



LoRaWAN -- Basic Stati

General Settings

Email: dragino-106e6e@dragino.com

Gateway ID: 02817bfdfe106e6e

Restore ?

Primary LoRaWAN Server

Service Provider: Amazon IoT -- Basic Stion

CUPS URI: example: https://xxxxxxx.cups.lorawan.us-east-1.amazonaws.com:443

LNS URI: example: wss://xxxxxxx.lns.lorawan.us-east-1.amazonaws.com:443

CUPS trust	Not Found	选择文件 未选择文件	Upload_CUPS_Trust
LNS trust	Not Found	选择文件 未选择文件	Upload_LNS_Trust
Private key	Not Found	选择文件 未选择文件	Upload_Private_key
Cert pem	Not Found	选择文件 未选择文件	Upload_Cert_pem

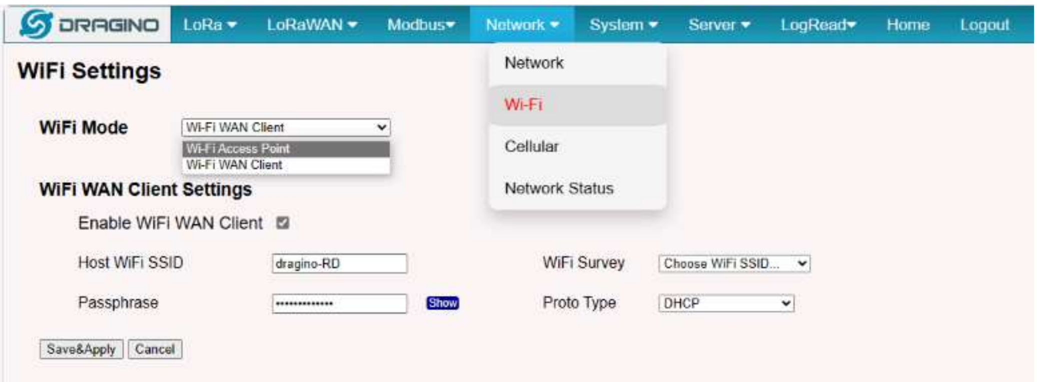
Current Mode: LoRaWAN Semtech UDP Click Save & Apply will change to mode: LoRaWAN Basic Station

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 (http://wiki.dragino.com/xwiki/bin/view/Main/Use%20of%20LoRaWAN%20Basic%20Station/)

3.4 Network Settings

3.4.1 Network --> WiFi

Users can configure the wifi WAN and enable Wifi Access Point on this interface



WiFi Settings

WiFi Mode: Wi-Fi WAN Client

WiFi WAN Client Settings

Enable WiFi WAN Client ☑

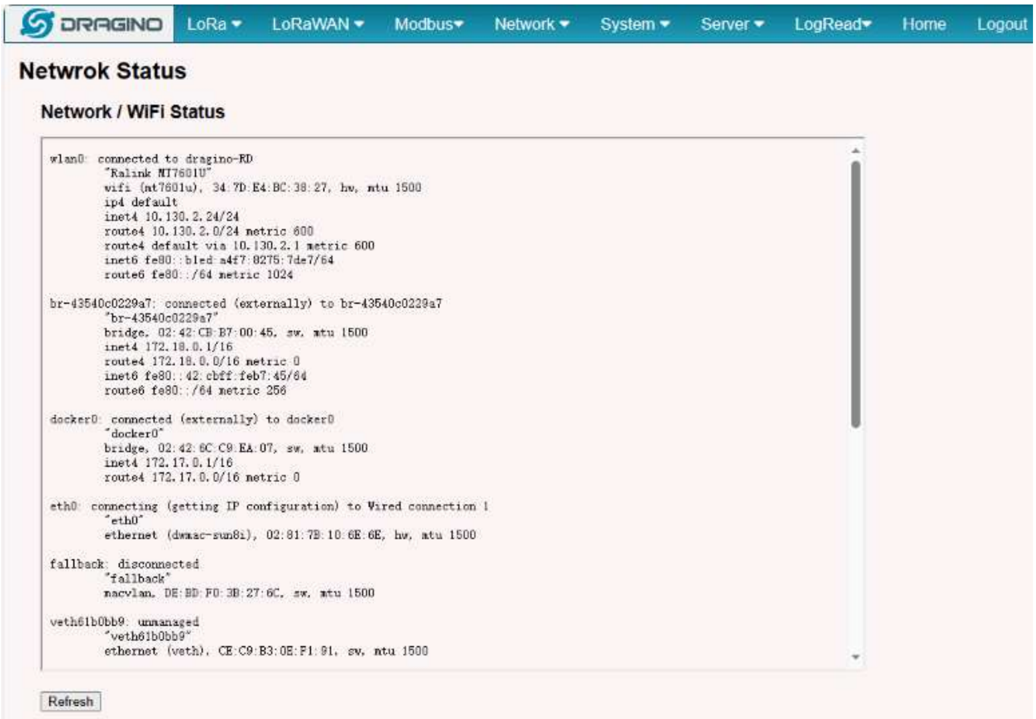
Host WiFi SSID: dragino-RD

WiFi Survey: Choose WiFi SSID...

Passphrase: ••••••••••••••

Proto Type: DHCP

3.4.2 Network --> System Status



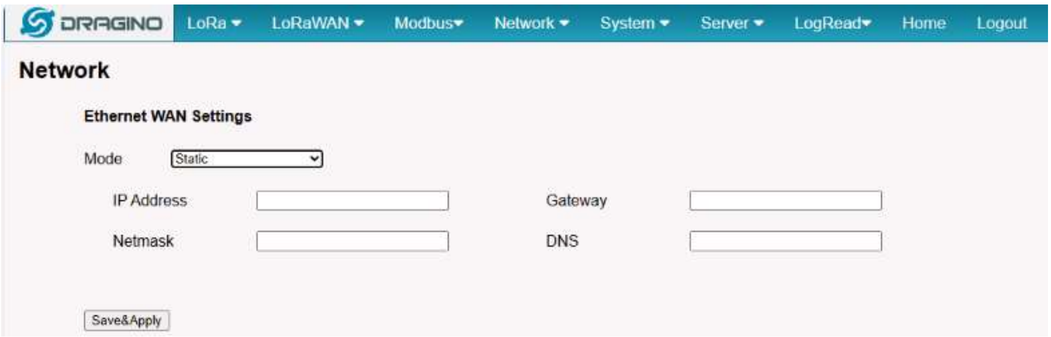
Netwrok Status

Network / WiFi Status

```
wlan0: connected to dragino-RD
        "Ralink MT7601U"
        wifi (mt7601u), 34:7D:E4:BC:38:27, hw, mtu 1500
        ip4 default
        inet4 10.130.2.24/24
        route4 10.130.2.0/24 metric 600
        route4 default via 10.130.2.1 metric 600
        inet6 fe80::b1ed:a4f7:8275:7de7/64
        route6 fe80::/64 metric 1024

br-43540c0229a7: connected (externally) to br-43540c0229a7
        "br-43540c0229a7"
        bridge, 02:42:CB:B7:00:45, sw, mtu 1500
        inet4 172.18.0.1/16
        route4 172.18.0.0/16 metric 0
        inet6 fe80::42:cbff:feb7:45/64
        route6 fe80::/64 metric 256

docker0: connected (externally) to docker0
        "docker0"
        bridge, 02:42:6C:C9:EA:07, sw, mtu 1500
        inet4 172.17.0.1/16
        route4 172.17.0.0/16 metric 0

eth0: connecting (getting IP configuration) to Wired connection 1
        "eth0"
        ethernet (dwmac-sun8i), 02:81:7B:10:6E:6E, hw, mtu 1500

fallback: disconnected
        "fallback"
        macvlan, DE:BD:F0:3B:27:6C, sw, mtu 1500

veth61b0bb9: unmanaged
        "veth61b0bb9"
        ethernet (veth), CE:C9:B3:0E:F1:91, sw, mtu 1500
```

3.4.3 Network --> Network

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



Network

Ethernet WAN Settings

Mode: Static

IP Address:

Gateway:

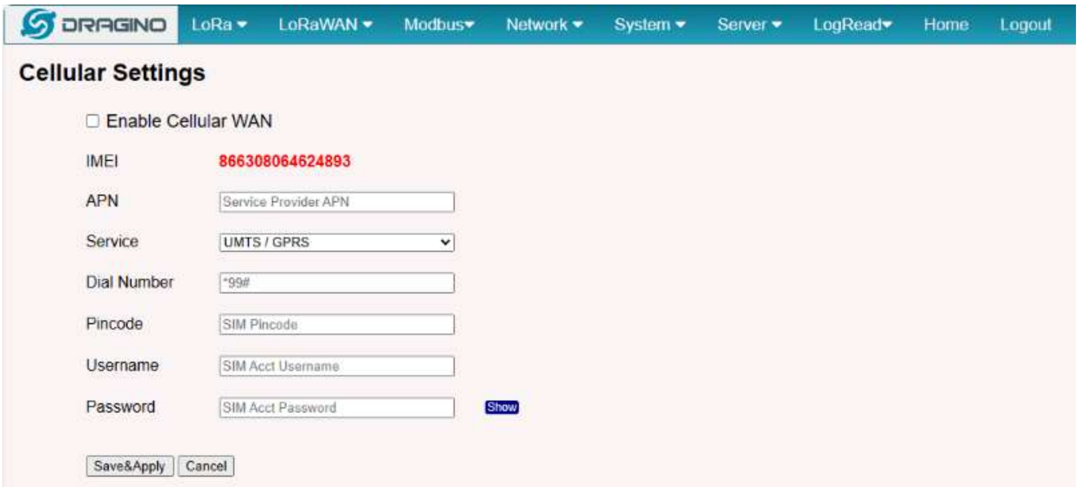
Netmask:

DNS:

3.4.4 Network --> Cellular

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

Note: APN cannot be empty.



Cellular Settings

☐ Enable Cellular WAN

IMEI: 866308064624893

APN: Service Provider APN

Service: UMTS / GPRS

Dial Number: *99#

Pincode: SIM Pincode

Username: SIM Acct Username

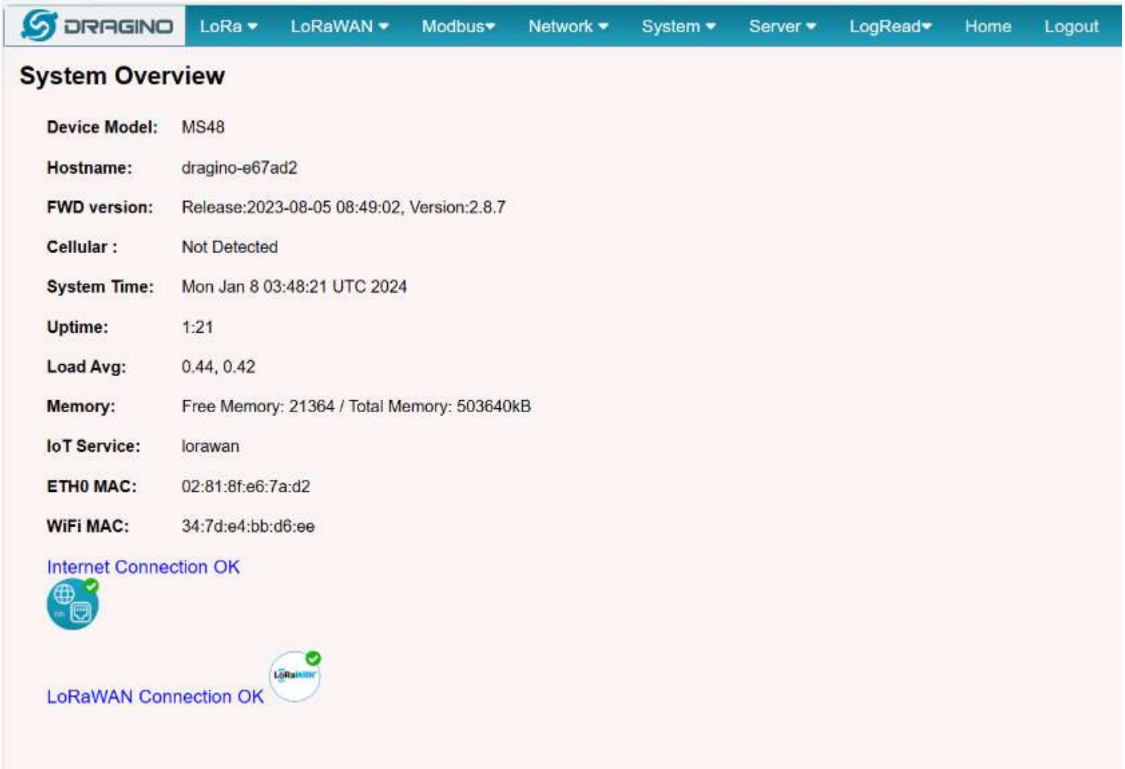
Password: SIM Acct Password

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

3.5 System

3.5.1 System --> System Overview

Shows the system info:



System Overview

Device Model: MS48

Hostname: dragino-e67ad2

FWD version: Release:2023-08-05 08:49:02, Version:2.8.7

Cellular : Not Detected

System Time: Mon Jan 8 03:48:21 UTC 2024

Uptime: 1:21

Load Avg: 0.44, 0.42

Memory: Free Memory: 21364 / Total Memory: 503640kB

IoT Service: lorawan

ETH0 MAC: 02:81:8f:e6:7a:d2

WiFi MAC: 34:7d:e4:bb:d6:ee

Internet Connection OK

LoRaWAN Connection OK

3.5.2 System --> System General

There are two login for MS48-LR: **root /dragino** or **admin /dragino**. Both root and admin has the same right for WEB access. But root user has also the right to ac to Linux system. admin only able to access WEB interface.

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

Timezone: Set device timezone.

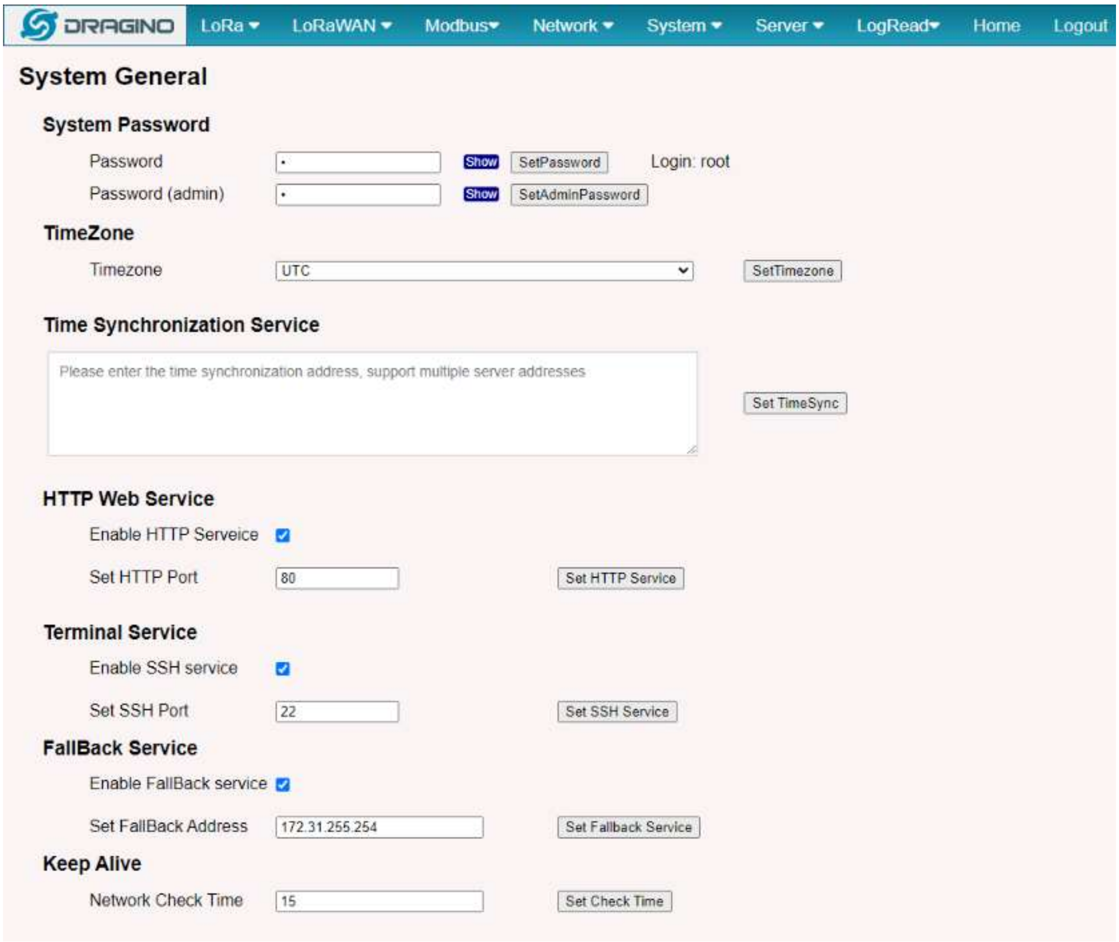
Time Synchronization Service: Set the time synchronization server.

HTTP Web Service: Enable/Disable the HTTP service via WAN interface.

Terminal Service: Enable/Disable the SSH service via WAN interface.

Fallback Settings: Enable/Disable the Fallback interface.

Keepalive_Script: Set the keepalive_scrpt interval.



System General

System Password

Password • Show SetPassword Login: root

Password (admin) • Show SetAdminPassword

TimeZone

Timezone UTC SetTimezone

Time Synchronization Service

Please enter the time synchronization address, support multiple server addresses

Set TimeSync

HTTP Web Service

Enable HTTP Serveice ☑

Set HTTP Port 80 Set HTTP Service

Terminal Service

Enable SSH service ☑

Set SSH Port 22 Set SSH Service

FallBack Service

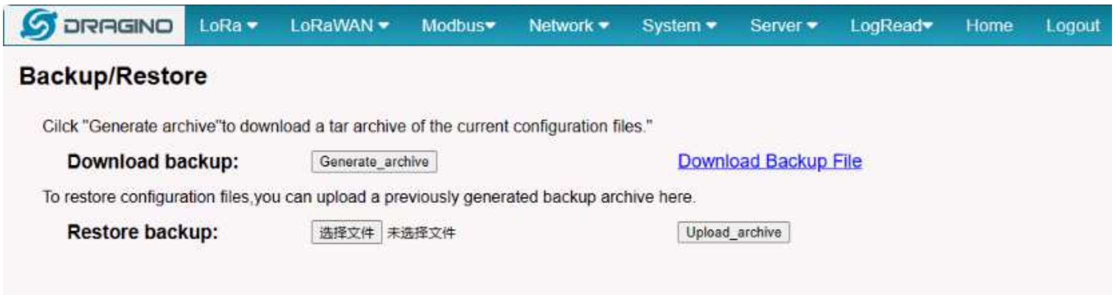
Enable FallBack service ☑

Set FallBack Address 172.31.255.254 Set Fallback Service

Keep Alive

Network Check Time 15 Set Check Time

3.5.3 System --> Backup/Restore



Backup/Restore

Cilck "Generate archive"to download a tar archive of the current configuration files."

Download backup: Generate_archive Download Backup File

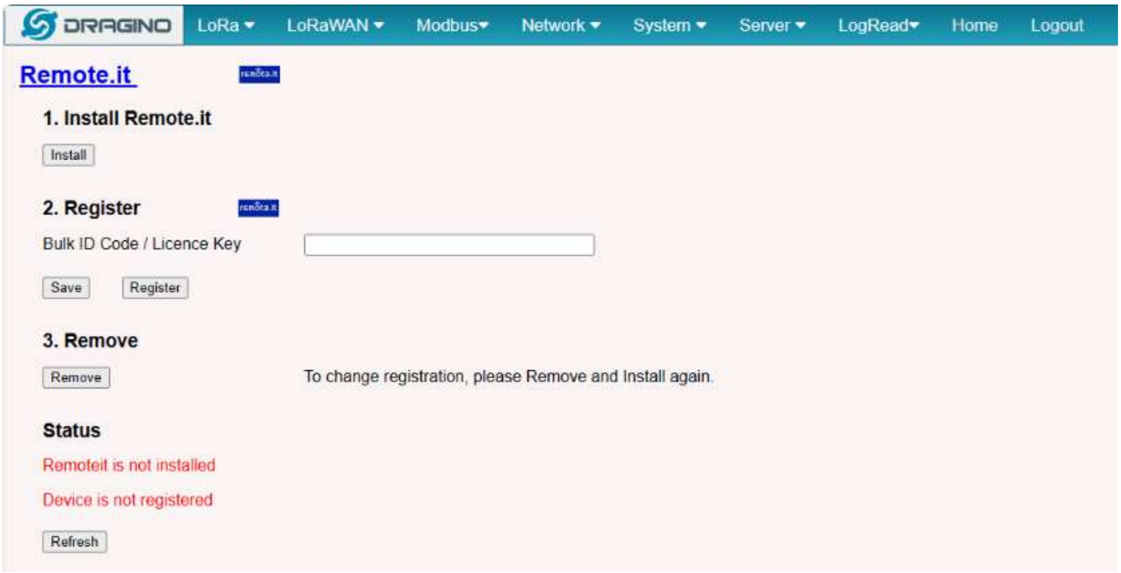
To restore configuration files,you can upload a previously generated backup archive here.

Restore backup: 选择文件 未选择文件 Upload_archive

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 (http://wiki.dragino.com/xwiki/bin/view/Main/Monitor%20%26%20Remote%20Access%20Gateway/?Remote%20Access#H2.1A0RemoteAccessviaRemo**



Remote.it

1. Install Remote.it

Install

2. Register

Bulk ID Code / Licence Key

Save Register

3. Remove

Remove To change registration, please Remove and Install again.

Status

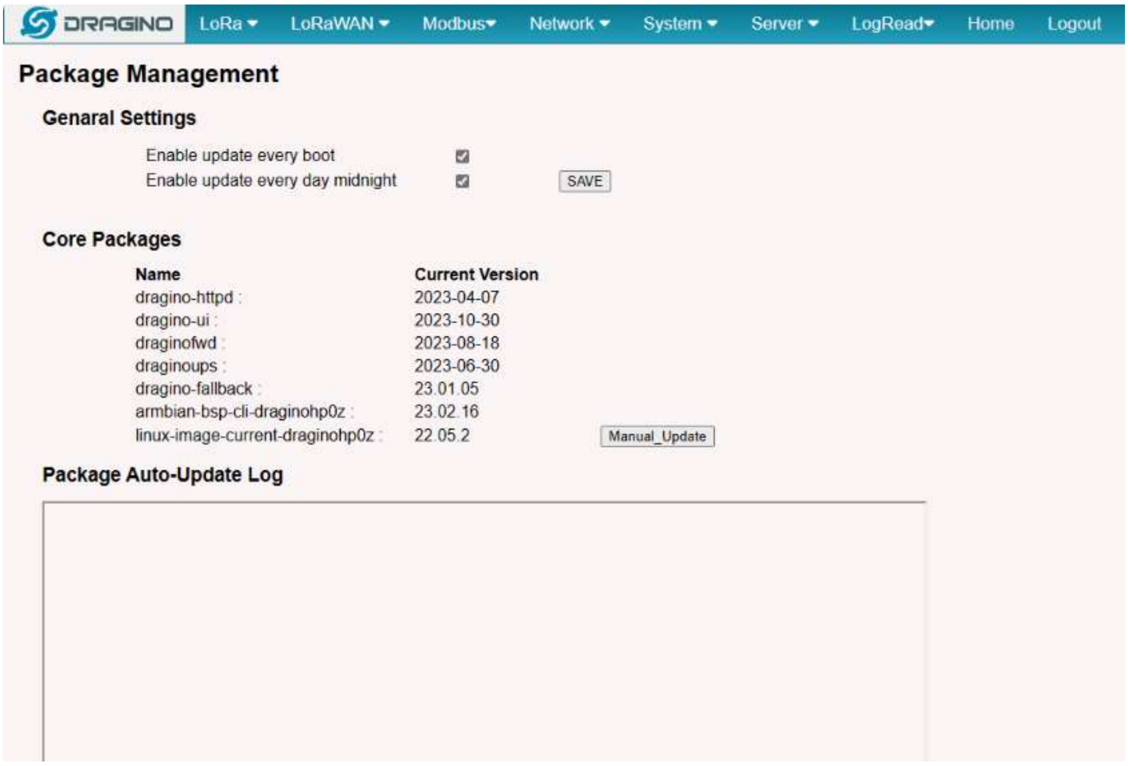
Remoteit is not installed

Device is not registered

Refresh

3.5.5 System --> Package Management

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



Package Management

Genaral Settings

Enable update every boot ☑

Enable update every day midnight ☑ SAVE

Core Packages

Name	Current Version
dragino-httpd :	2023-04-07
dragino-ui :	2023-10-30
draginofwd :	2023-08-18
draginoups :	2023-06-30
dragino-fallback :	23.01.05
armbian-bsp-cli-draginohp0z :	23.02.16
linux-image-current-draginohp0z :	22.05.2

Manual_Update

Package Auto-Update Log

4. Build-in Server

the default factory version of MS48-LR is installed with the built-in Applicant server: **Node-Red**, LoRaWAN Server: **ChirpStack**.

Note:

Path: Server --> Network Server

Server --> Application Server

Troubleshooting:

1. URL does not jump properly

For the ChirpStack, you can use the local IP address and the port is **8080** to access it.

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

4.1 LoRaWAN Network Server -- ChirpStack

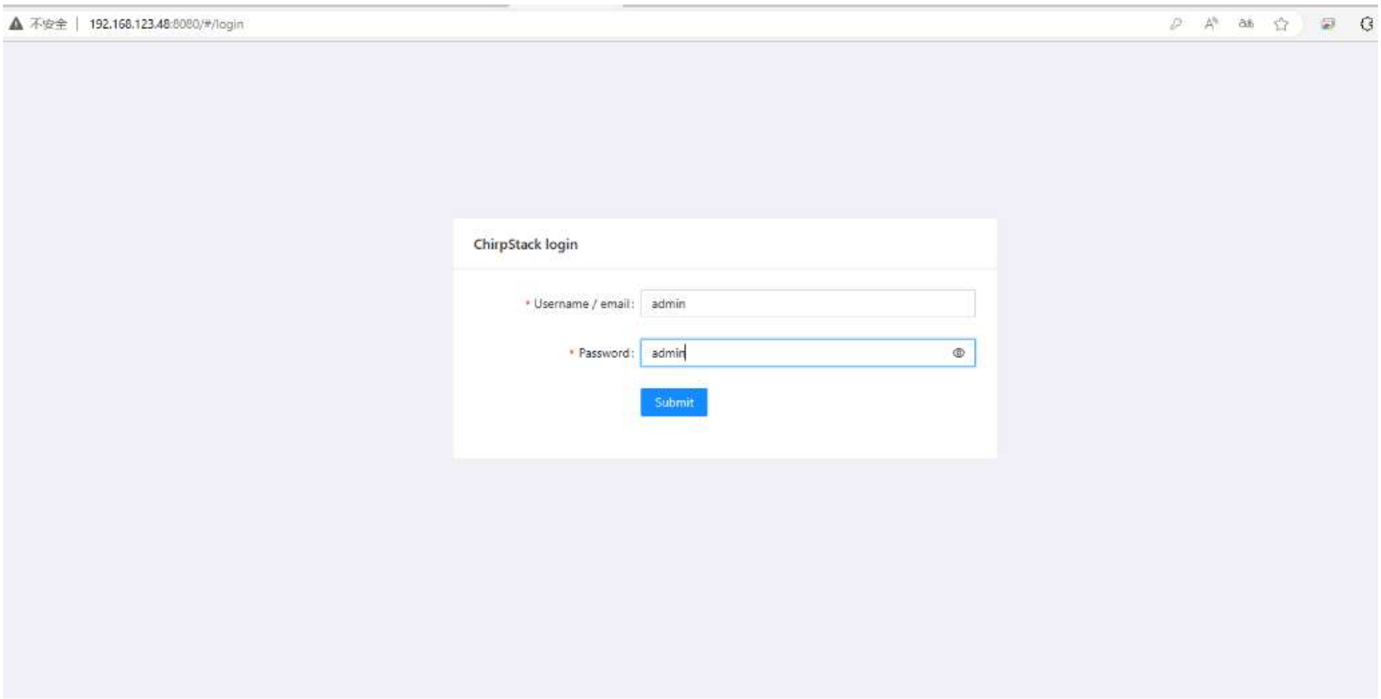
You can access the gateway's built-in LNS server of **ChirpStack** via the URL(***http://<hostname>:8080 or http://<local-IPV4-address>***) in your browser.

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

Login account:

Username : admin

Password: admin



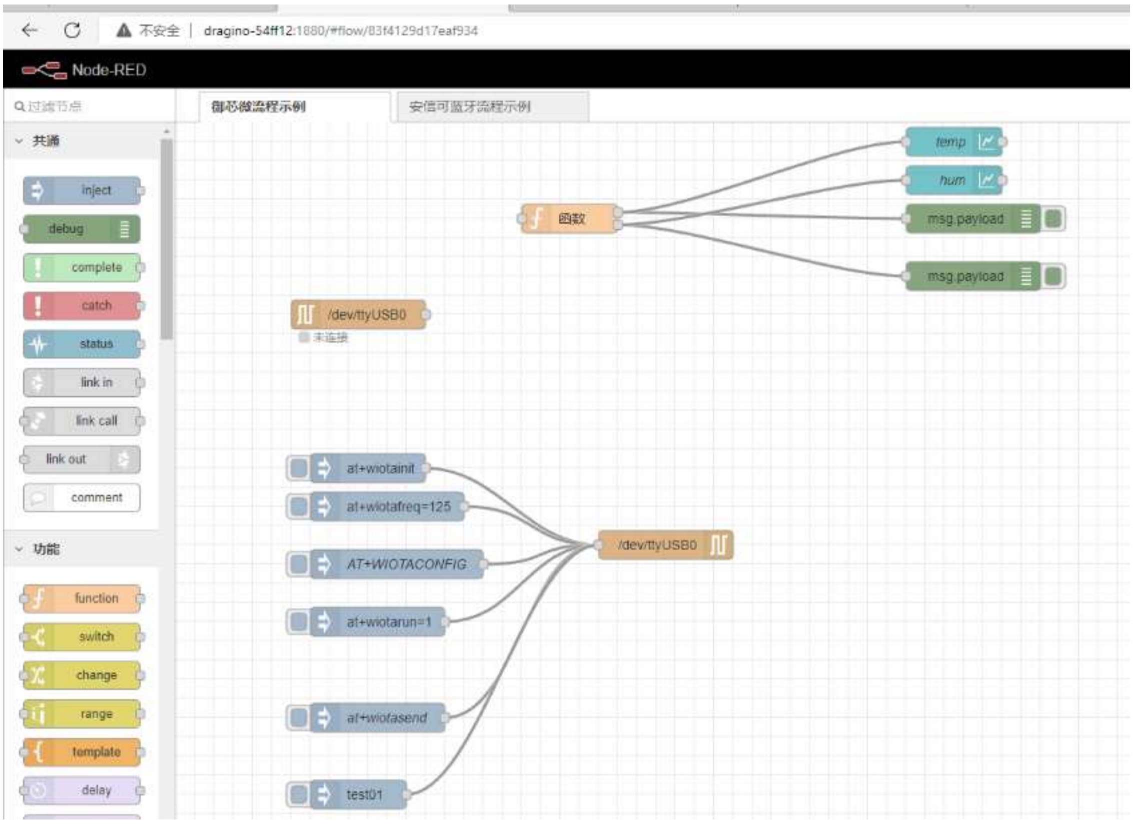
* Username / email: admin

* Password: admin

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> (http://<Local-IPV4-Address>)***



Using Node-Red, InfluxDB and Grafana

The MS48-LR 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 (http://wiki.dragino.com/xwiki/bin/view/Main/Armbian%20OS%20instruction/#H2.6HowtoinstallGrafanaandinfluxdb)

Upgrade the node.js

By default, the MS48-LR node.js uses the pre-install version v12 which is due to Debian the ultra-stable via ultra-old.

the users can refer to this link to upgrade them.

http://wiki.dragino.com/xwiki/bin/view/Main/Armbian%20OS%20instruction/#H2.5Howtoupgradethenodejsversiontothelatest. (http://wiki.dragino.com/xwiki/bin/view/Main/Armbian%20OS%20instruction/#H2.5Howtoupgradethenodejsversiontothelatest.)

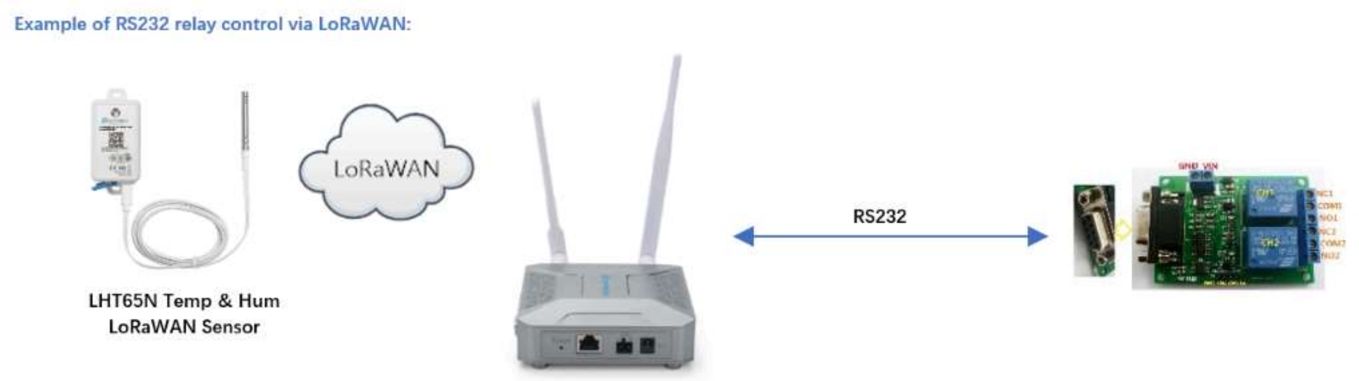
5. Use RS232 Interface

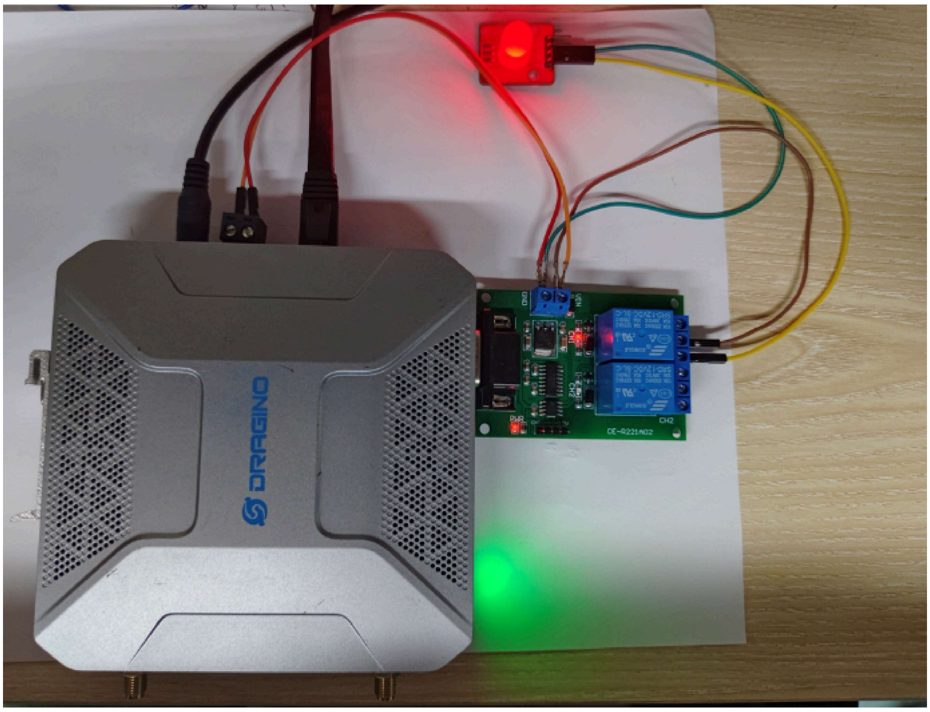
MS48-LR includes a local ChirpStack Server and Node-Red. This example shows how to configure LHT65N to use with the local Node-Red server. This example ass already have:

- LHT65N register on MS48-LR Built-In ChirpStack server already
- The user is able to see the data on the built-in ChirpStack server device page
- The RS232 relay is connected to the RS232 interface of the MS48-LR

The MS48-LR RS232 interface corresponds to **/dev/ttyS2.**

Below are the steps for the MS48-LR read LHT65N's temperature control RS232 relay example:


Example of RS232 relay control via LoRaWAN:



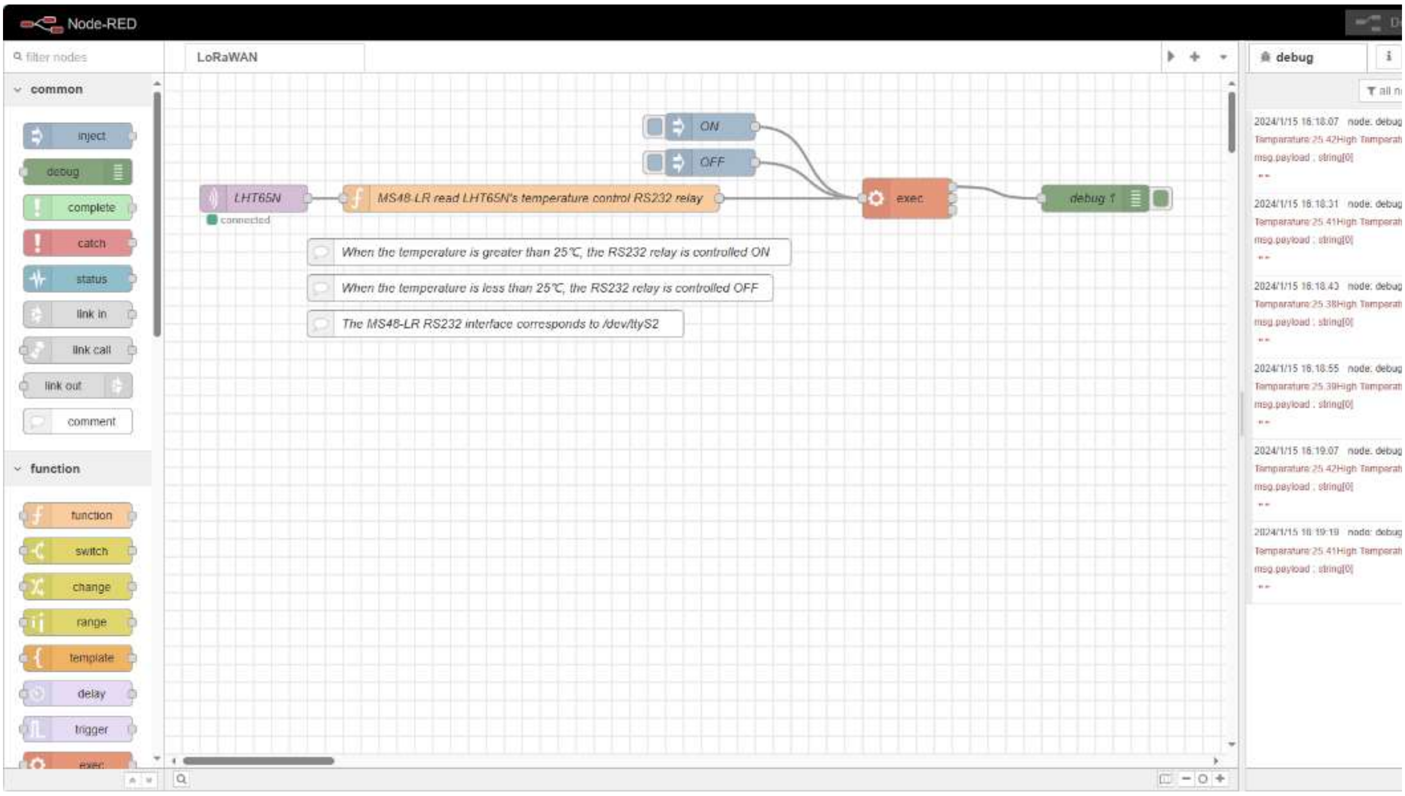
5.1 Link Node-Red to Local ChirpStack

Users can download the Node-Red decoder from this link and import it into the Node-Red platform: **MS48-LR read LHT65N's temperature control RS232 relay. (/xwiki/bin/download/Main/User%20Manual%20for%20All%20Gateway%20models/MS48-LR_LoRaWAN_To_Modbus_Gateway/WebHome/MS48-LR%20read%20LHT65N%27s%20temperature%20control%20RS232%20relay.json?rev=1.1)**

For more information on importing Input Flow, check out this link: **Import Input Flow for Dragino Sensors (http://wiki.dragino.com/xwiki/bin/view/Main/No RED/#H3.A0ImportInputFlowforDraginoSensors)**

After importing the Input Flow is complete, the user needs to edit the MQTT in the node

The specific steps can be found at this link: **Example: Use Local Server ChirpStack and Node-Red (http://wiki.dragino.com/xwiki/bin/view/Main/Notes%20for%20ChirpStack/#H12.A0Example:UseLocalServerChirpStackandNode-RedinLPS8v2)**



When the temperature is greater than 25℃, the RS232 relay is controlled ON

When the temperature is less than 25℃, the RS232 relay is controlled OFF

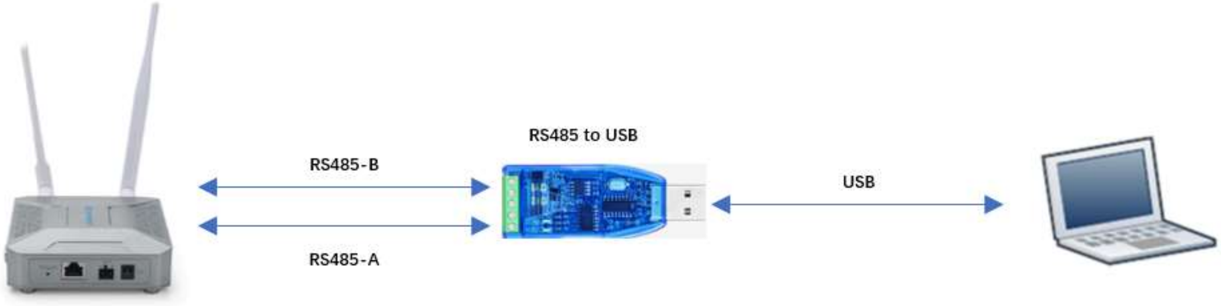
The MS48-LR RS232 interface corresponds to /dev/ttyS2

```
2024/1/15 16:18:07   node: debug
Tamparature:25.42High Temperat
msg.payload : string[0]
""
2024/1/15 16:18:31   node: debug
Temparature:25.41High Temperat
msg.payload : string[0]
""
2024/1/15 16:18:43   node: debug
Temparature:25.38High Temperat
msg.payload : string[0]
""
2024/1/15 16:18:55   node: debug
Temparature:25.39High Temperat
msg.payload : string[0]
""
2024/1/15 16:19:07   node: debug
Temparature:25.42High Temperat
msg.payload : string[0]
""
2024/1/15 16:19:19   node: debug
Temparature:25.41High Temperat
msg.payload : string[0]
""
```

6. Use RS485 Interface

The MS48-LR RS485 interface corresponds to **/dev/ttyS1.**

Below are the steps for the MS48-LR RS485 interface to manually send and receive data:



6.1 Initialize the GPIO21

Users need to run the following command to configure GPIO21:

```
echo 21 > /sys/class/gpio/export
echo "out" > /sys/class/gpio/gpio21/direction
```

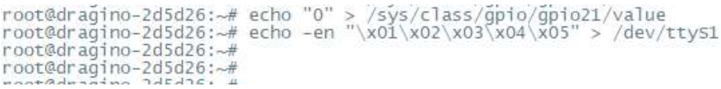
6.2 Set the RS485 Tx Mode

Set the MS48-LR RS485 port to Tx mode by lowering the GPIO21 level:

```
echo "0" > /sys/class/gpio/gpio21/value
```

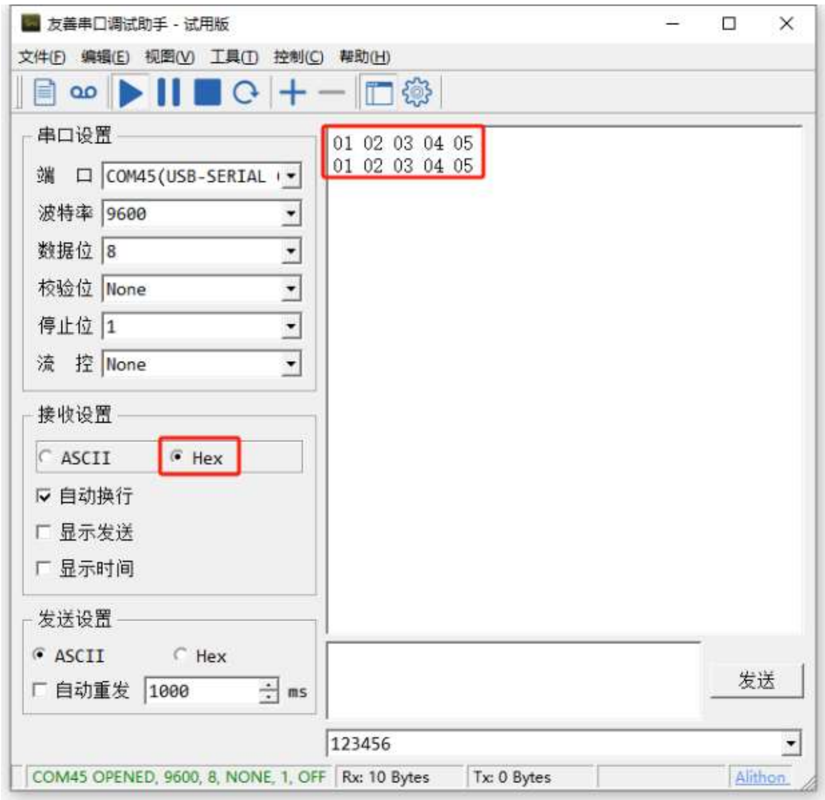
Run the following command to send hexadecimal data:

```
echo -en "\x01\x02\x03\x04\x05" > /dev/ttyS1
```



```
root@dragino-2d5d26:~# echo "0" > /sys/class/gpio/gpio21/value
root@dragino-2d5d26:~# echo -en "\x01\x02\x03\x04\x05" > /dev/ttyS1
root@dragino-2d5d26:~#
root@dragino-2d5d26:~#
```

Users can use the serial port tool to check the data sent by MS48-LR RS485:



友善串口调试助手 - 试用版

串口设置

- 端　口 COM45(USB-SERIAL (
- 波特率 9600
- 数据位 8
- 校验位 None
- 停止位 1
- 流　控 None

接收设置

○ ASCII ● Hex

☑ 自动换行

□ 显示发送

□ 显示时间

发送设置

● ASCII ○ Hex

□ 自动重发 1000 ms

```
01 02 03 04 05
01 02 03 04 05
```

123456

COM45 OPENED, 9600, 8, NONE, 1, OFF | Rx: 10 Bytes | Tx: 0 Bytes | Alithon

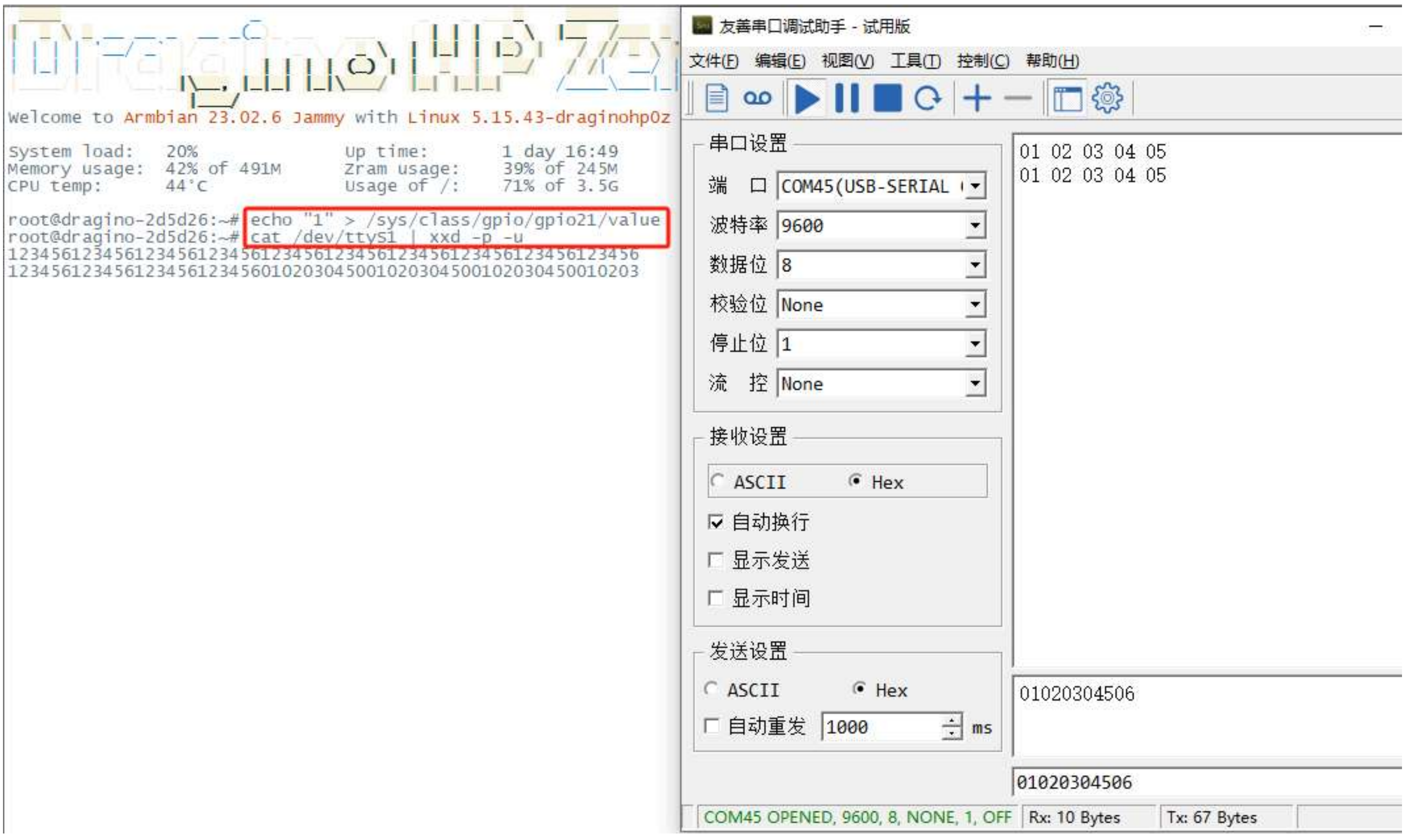
6.3 Set the RS485 Rx Mode

Set the MS48-LR RS485 port to Rx mode by pulling up the GPIO21 level:

```
echo "1" > /sys/class/gpio/gpio21/value
```

Run the following command to check the data received by the MS48-LR RS485:

```
cat /dev/ttyS1 | xxd -p -u
```



```
Welcome to Armbian 23.02.6 Jammy with Linux 5.15.43-draginohp0z

System load:   20%               Up time:       1 day 16:49
Memory usage:  42% of 491M       Zram usage:    39% of 245M
CPU temp:      44°C              Usage of /:    71% of 3.5G

root@dragino-2d5d26:~# echo "1" > /sys/class/gpio/gpio21/value
root@dragino-2d5d26:~# cat /dev/ttyS1 | xxd -p -u
123456123456123456123456123456123456123456123456123456123456
123456123456123456123456010203045001020304500102030450010203
```

友善串口调试助手 - 试用版
文件(F) 编辑(E) 视图(V) 工具(T) 控制(C) 帮助(H)

串口设置
端　口: COM45(USB-SERIAL (
波特率: 9600
数据位: 8
校验位: None
停止位: 1
流　控: None

接收设置
○ ASCII ● Hex
☑ 自动换行
□ 显示发送
□ 显示时间

发送设置
○ ASCII ● Hex
□ 自动重发 1000 ms

```
01 02 03 04 05
01 02 03 04 05
```

01020304506

01020304506

COM45 OPENED, 9600, 8, NONE, 1, OFF | Rx: 10 Bytes | Tx: 67 Bytes

7. More Services

♥ 0 Tags: Created by Xiaoling (/xwiki/bin/view/XWiki/Xiaoling) on 2023/11/11 11:34

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