LIG16 LoRaWAN Gateway User Manual

Document Version: 1.1

Firmware Version: lgw--build-v5.4.1615882321-20210316-1613/

Version	Description	Date
1.0	Release	2021-Jan-3
1.1	Add AWS-IoT support	2021-Mar-27

1. Introduction 5

1.1 What is LIG16 Indoor LoRaWAN Gateway 5

1.2 Specifications 7

1.3 Features 8

1.4 Hardware System Structure 8

1.5 LIG16 Applications 8

1.6 LED Indicators 9

2. Access and configure LIG16 10

2.1 Find IP address of LIG16 10

2.1.1 Connect via WiFi 10

2.1.2 Connect via WAN port with DHCP IP from router 10

2.1.3 Connect via WiFi with DHCP IP from router 11

2.1.4 Connect via WAN port by fall back ip 11

2.2 Access Configure Web UI 12

3. Typical Network Setup 13

3.1 Overview 13

3.2 Use WAN port to access Internet 13

3.3 Access Internet as a WiFi Client. 14

3.4 Check Internet connection 15

4. Example : Configure as a LoRaWAN gateway 16

4.1 Create a gateway in TTN Server 16

4.2 Configure LIG16 to connect to TTN 18

4.3 Configure frequency 21

4.4 Add a LoRaWAN End Device 22

5. Web Configure Pages 24

5.1 Home 24

5.2 LoRa Settings 25

5.2.1 LoRa --> LoRa 25

5.2.2 LoRa --> ABP Decryption 26

5.3 LoRaWAN Settings 27

5.3.1 LoRaWAN --> LoRaWAN 27

5.3.2 LoRaWAN --> Amazon AWS-IoT 27
5.3.3 LoRaWAN --> LORIOT 27
5.4 MQTT Settings 29
5.5 System 30
5.5.1 System --> System Overview 30
5.5.2 System --> General (login settings) 30
5.5.3 System --> Network 32
5.5.4 System --> WiFi 33
5.5.5 System --> Network Status 33
5.5.6 System --> Remote Mgnt & Auto Update 34
5.5.7 System --> Firmware Upgrade 36
5.5.8 System --> Reboot/Reset 37
5.5.9 System --> Package Maintain 38
5.6 LogRead 39
5.6.1 LogRead --> LoRa Log 39
5.6.2 LogRead --> Gateway Traffic 39
5.6.3 LogRead --> System Log 39
6. More features 41
6.1 More instructions 41
7. Linux System 42
7.1 SSH Access for Linux console 42
7.2 Edit and Transfer files 43
7.3 File System 43
7.4 Package maintain system 44
8. FAQ 45
8.1 How can I configure for a customized frequency band? 45
8.2 Can I make my own firmware for the gateway, where can I find the source code? 45
8.3 Can I use 868Mhz version for 915Mhz bands? 45
8.4 Can I control the triangle LED? 45
9. Trouble Shooting 45
9.1 I get kernel error when install new package, how to fix? 45
9.2 How to recover the LIG16 if firmware crash 46
9.3 I configured LIG16 for WiFi access and lost its IP. What to do now? 46

10. Order Info 47

11. Packing Info 47

12. Support 47

1. Introduction

1.1 What is LIG16 Indoor LoRaWAN Gateway

The LIG16 is an open source **LoRaWAN Pico Gateway**. It lets you bridge LoRa wireless network to an IP network via WiFi, Ethernet network. The LoRa wireless allows users to send data and reach extremely long ranges at low data-rates.

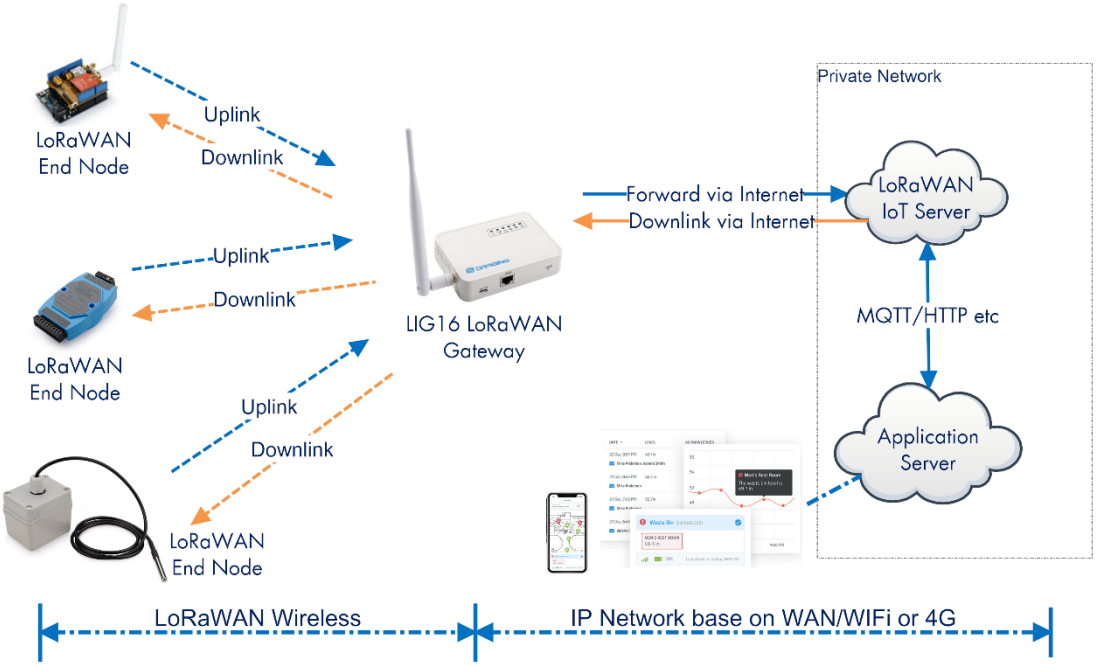
The LIG16 supports Semtech packet forwarder and LoRaWAN Station connection, it is fully compatible with LoRaWAN protocol. It includes a SX1302 LoRa concentrator, which is the new generation baseband LoRa chip for gateway with lower current consumption and higher amount of traffic than preceding devices.

LIG16 has pre-configured standard LoRaWAN frequency bands to use for different countries. User can also customize the frequency bands to use in their own LoRaWAN network.

LIG16 can communicate with ABP LoRaWAN end node without LoRaWAN server. System integrator can use it to integrate with their existing IoT Service without set up own LoRaWAN server or use 3rd party LoRaWAN service.

LIG16 supports auto-provision for mass deployment and long term maintain. System integrator can easily change the configure remotely.

LIG16 In a LoRaWAN IoT Network:



1.2 Specifications

Hardware System:

Linux Part:

- 400Mhz ar9331 processor
- 64MB RAM
- 16MB Flash

Interface:

- 10M/100M RJ45 Ports x 1
- WiFi : 802.11 b/g/n
- LoRaWAN Wireless
- Power Input: USB Type C. 5V , 2A
- USB 2.0 host connector x 1
- SX1302 + 2 x SX1250

WiFi Spec:

- IEEE 802.11 b/g/n
- Frequency Band: 2.4 ~ 2.462GHz
- Tx power:
  - ✓ 11n tx power : mcs7/15: 11db mcs0 : 17db
  - ✓ 11b tx power: 18db
  - ✓ 11g 54M tx power: 12db
  - ✓ 11g 6M tx power: 18db
- Wifi Sensitivity
  - ✓ 11g 54M : -71dbm
  - ✓ 11n 20M : -67dbm

LoRa Spec:

- 70 dB CW interferer rejection at 1 MHz offset
- Up to -141 dBm sensitivity with SX1250 Tx/Rx front-end
- 125 kHz LoRa reception with:
  - ✧ 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

Power Consumption:

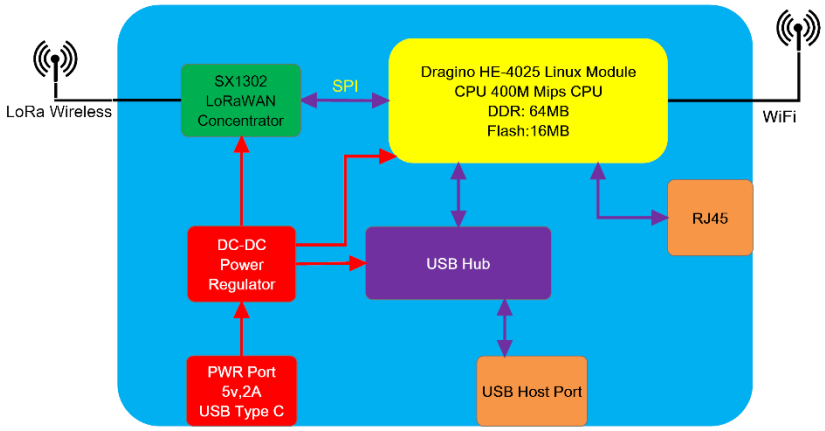
- Max: 5v, 410mA

1.3 Features

- ✓ Open-Source Linux system
- ✓ Managed by Web GUI, SSH via LAN or WiFi
- ✓ LoRaWAN Gateway
- ✓ Auto-Provision

1.4 Hardware System Structure

LIG16 System Overview:



1.5 LIG16 Applications

1.6 LED Indicators

LIG16 has totally 6 LEDs:

- **Power LED** : This **YELLOW LED** will be **solid on** if the device is properly powered.
- **HEART LED** : This **GREEN LED** will be solid on if there is LoRaWAN connection.
- **SYS LED** :This **LED** will show different colors on different state:
  - ✓ **ON**: device have Internet connection.
  - ✓ **BLINKING:** a) Device has internet connection but no LoRaWAN Connection. or b) Device is in booting stage, in this stage, it will **BLINKING** for several seconds.
  - ✓ **OFF**: device doesn't have Internet connection.
- **TRIANGLE LED** : No Function.
- **ETH LED** : This LED shows the ETH interface physical connection status.
- **WiFi LED** : This LED shows the WiFi interface connection status.

2. Access and configure LIG16

The LIG16 is configured as a WiFi Access Point by default. User can access and configure the LIG16 after connecting to its WiFi network, or via its Ethernet ports.

2.1 Find IP address of LIG16

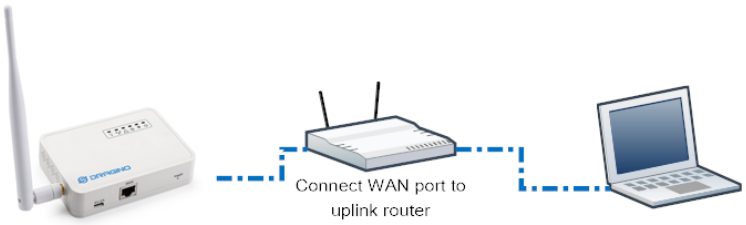
2.1.1 Connect via WiFi

At the first boot of LIG16, it will auto generate an unsecure WiFi network call ***dragino-xxxxxx***

the password is: dragino+dragino

User can use the laptop to connect to this WiFi network. The laptop will get an IP address 10.130.1.xxx and the LIG16 has the default IP 10.130.1.1

2.1.2 Connect via WAN port with DHCP IP from router



Alternatively, connect the LIG16 **WAN port** to your router and LIG16 will obtain an IP address from your router. In the router's management portal, you should be able to find what IP address the router has assigned to the LIG16. You can also use this IP to connect.

2.1.3 Connect via WiFi with DHCP IP from router

If the LIG16 already connect to the router via WiFi, use can use the WiFi IP to connect to LIG16.

2.1.4 Connect via WAN port by fall back ip

The **WAN port** also has a fall back ip address for access if user doesn't connect to uplink router.

2.2 Access Configure Web UI

Web Interface

Open a browser on the PC and type the LIG16 ip address (depends on your connect method)

http://10.130.1.1/ (Access via LIG16's WiFi AP network)

or

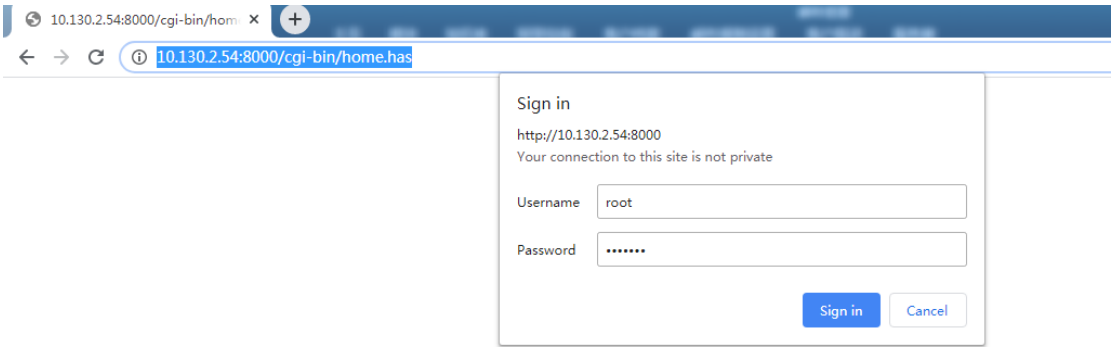
http://IP_ADDRESS or http:// IP_ADDRESS:8000 (If the IP is assigned by uplink router)

You will see the login interface of LIG16 as shown below.

The account details for Web Login are:

User Name: root

Password: dragino



3. Typical Network Setup

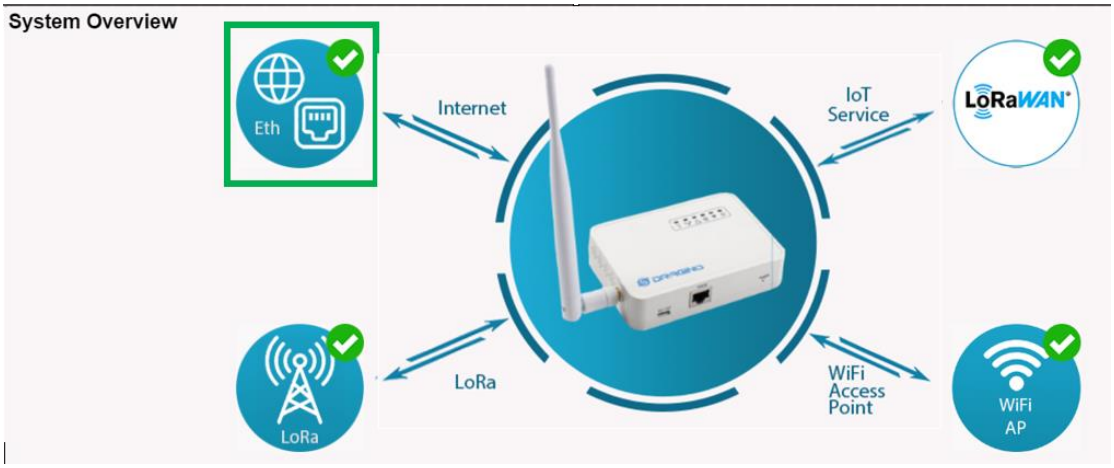
3.1 Overview

LIG16 supports flexible network set up for different environment. This section describes the typical network topology can be set in LIG16. The typical network set up includes:

- ✓ **WAN Port Internet Mode**
- ✓ **WiFi Client Mode**
- ✓ **WiFi AP Mode**

3.2 Use WAN port to access Internet

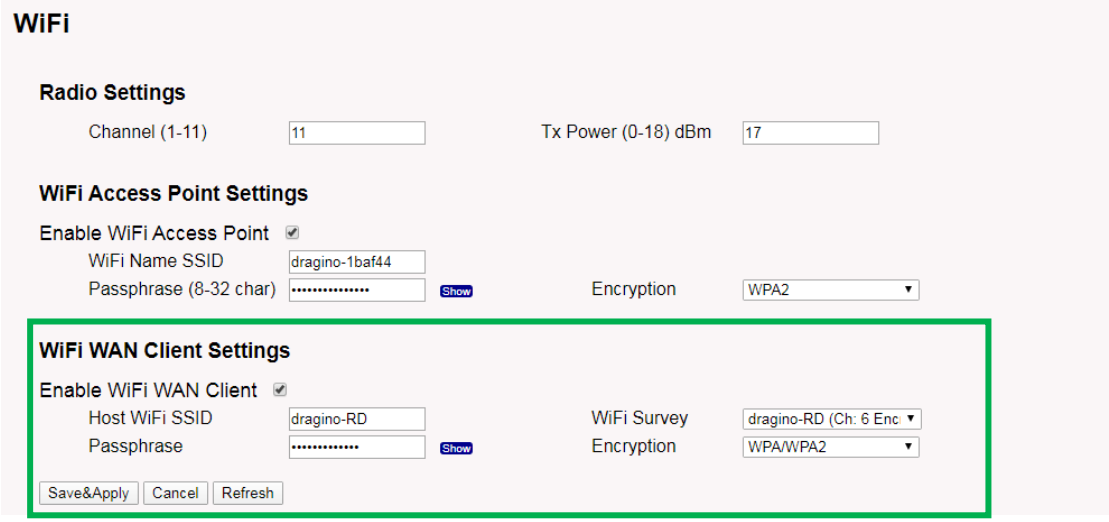
By default, LIG16 is set to use the WAN port to connect to an upstream network. When you connect the LIG16's WAN port to an upstream router, LIG16 will get an IP address from the router and have Internet access via the upstream router. The network status can be checked in the **home page**:



3.3 Access Internet as a WiFi Client.

In the WiFi Client Mode, LIG16 acts as a WiFi client and gets DHCP from an upstream router via WiFi.

The settings for WiFi Client is under page **System → WiFi → WiFi WAN Client Settings**

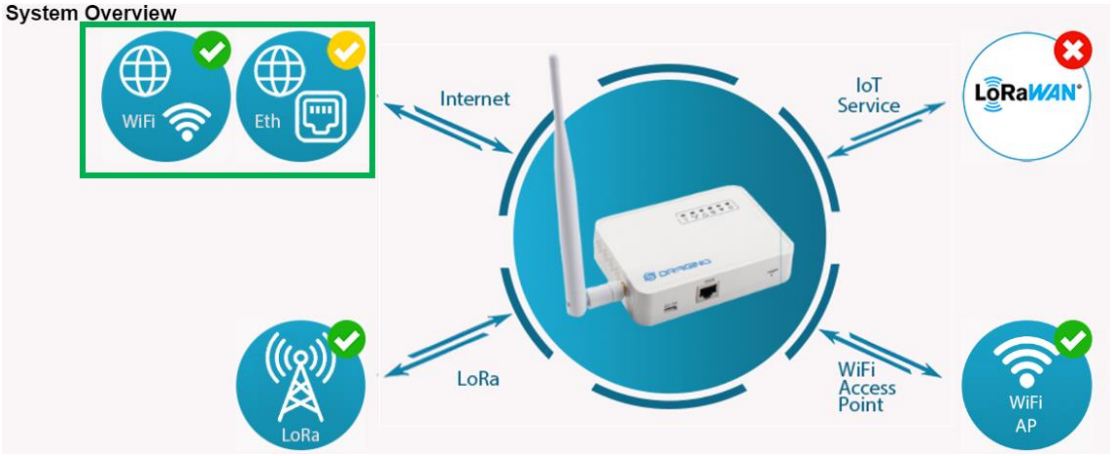


In the WiFi Survey Choose the WiFi AP, and input the Passphrase then click Save & Apply to connect.

3.4 Check Internet connection

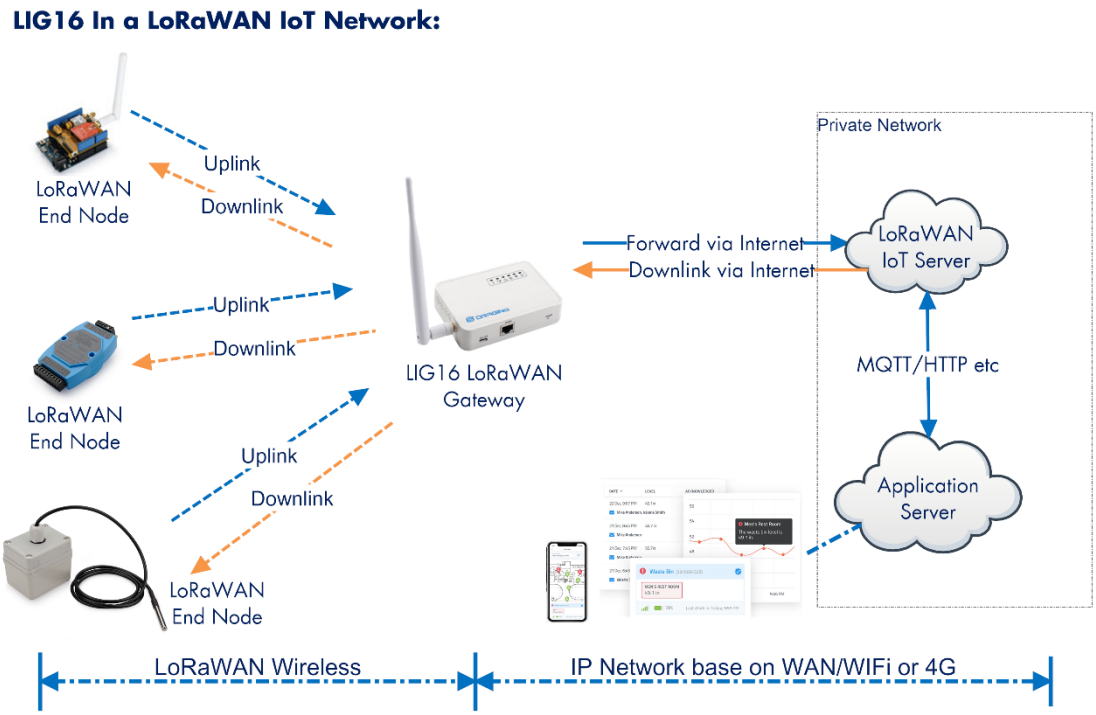
In the **Home** page, we can check the Internet connection.

- 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 connect.



4. Example : Configure as a LoRaWAN gateway

LIG16 is fully compatible with LoRaWAN protocol. It use the legacy Semtech Packet forwarder to forward the LoRaWAN packets to server, the structure is as below.

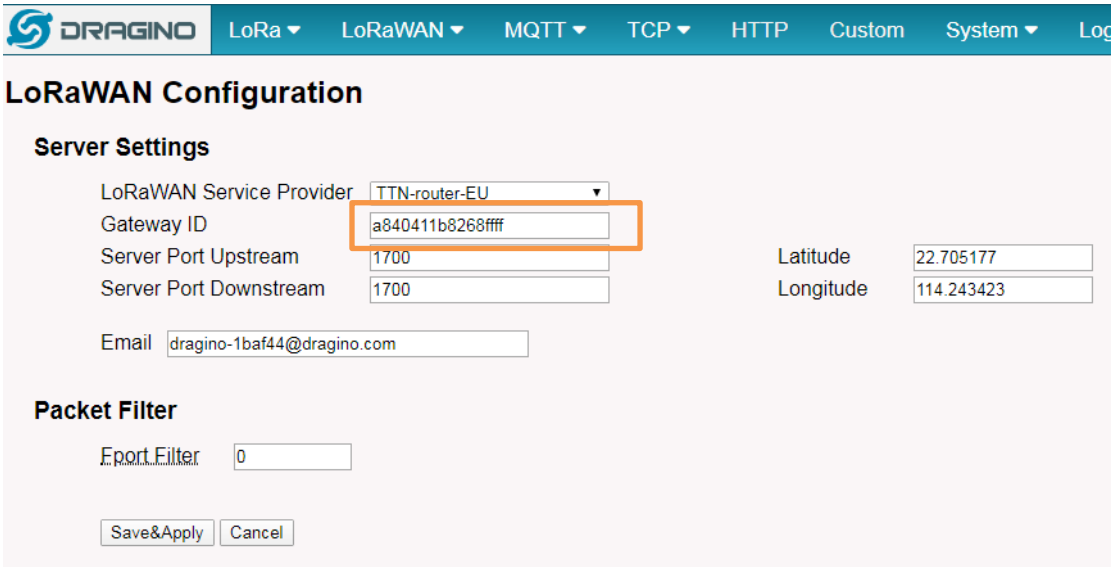


This chapter describes how to use LIG16 to work with TTN LoRaWAN Server. The method to work with other LoRaWAN server is similar.

4.1 Create a gateway in TTN Server

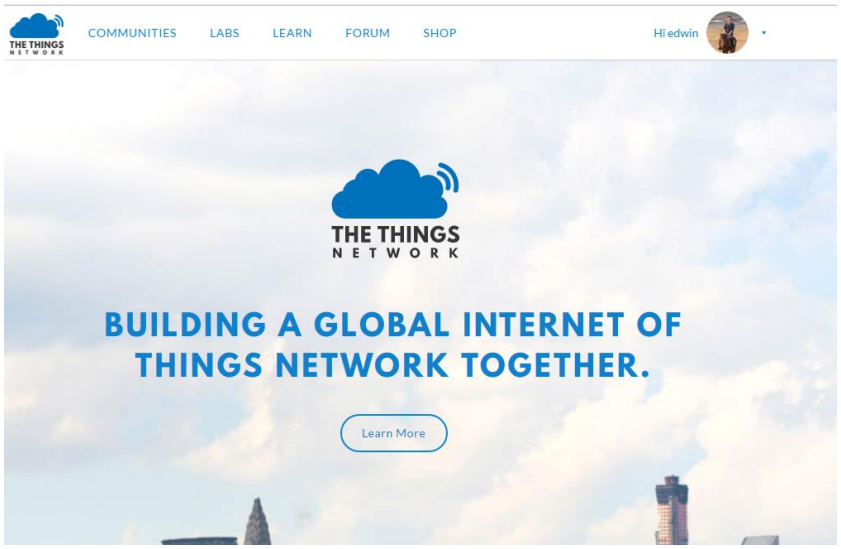
Step 1: Get a Unique gateway ID.

Every LIG16 has a unique gateway id. The id can be found at LoRaWAN page:

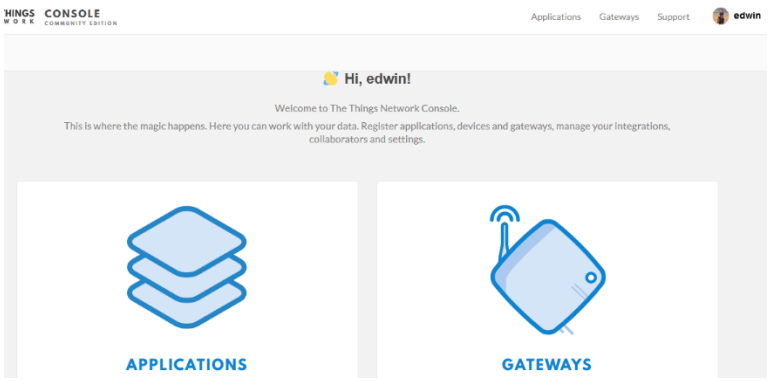


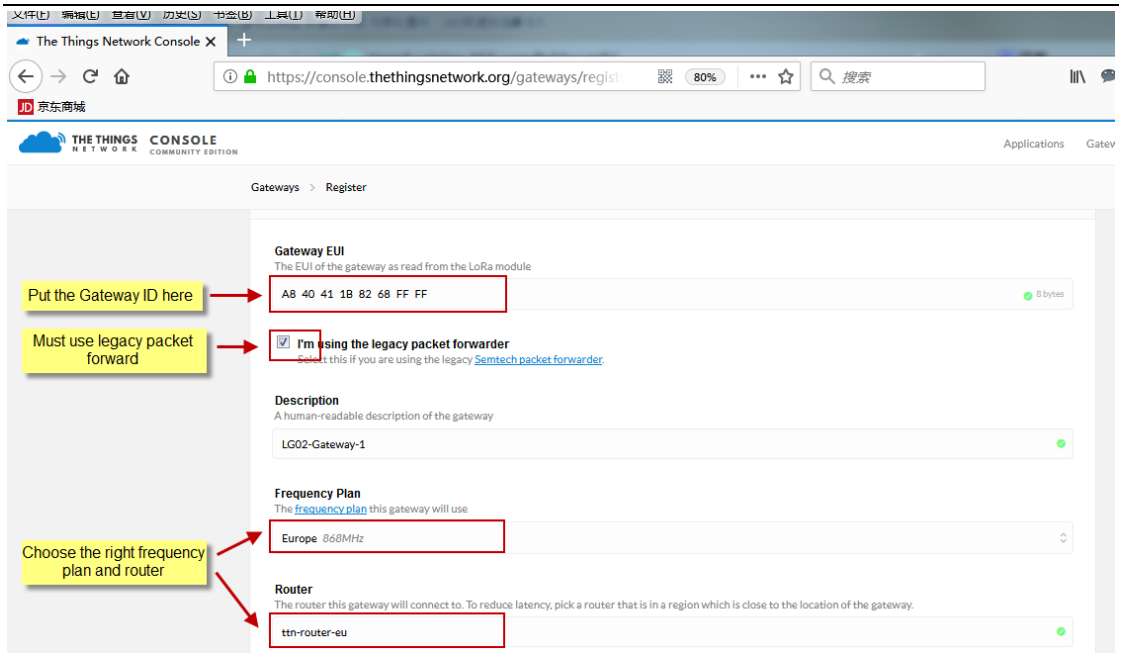
The gateway id is: **a840411b8268ffff**

Step 2: Sign up a user account in TTN server



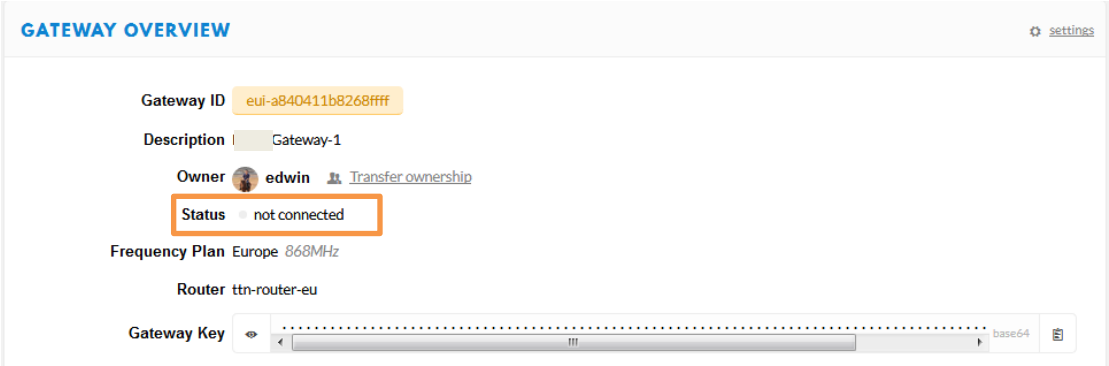
Step 3: Create a Gateway





Notice: The TTN router should match the Frequency Plan you choose, otherwise you will have problem for End Node to join the network. If you don't which router you need to select, please check:
https://www.thethingsnetwork.org/docs/gateways/packet-forwarder/semtech-udp.html#connect-a-gateway_server-addresses

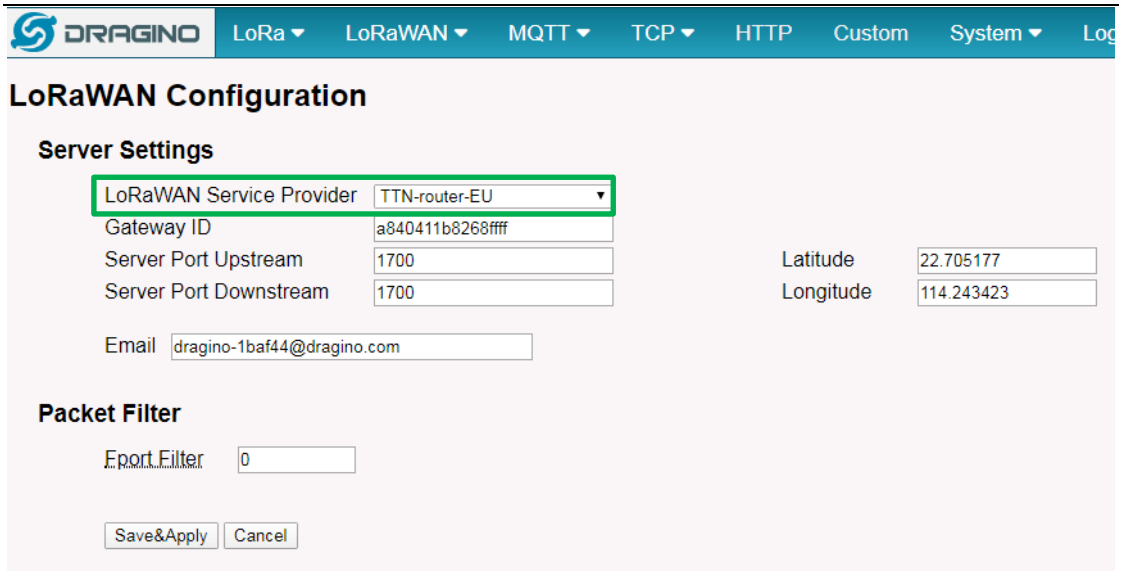
After create the gateway, we can see the gateway info, as below



4.2 Configure LIG16 to connect to TTN

We should configure the LIG16 now to let it connect to TTN network. Make sure your LIG16 has Internet Connection first.

Choose the right server provider and click **Save&Apply**

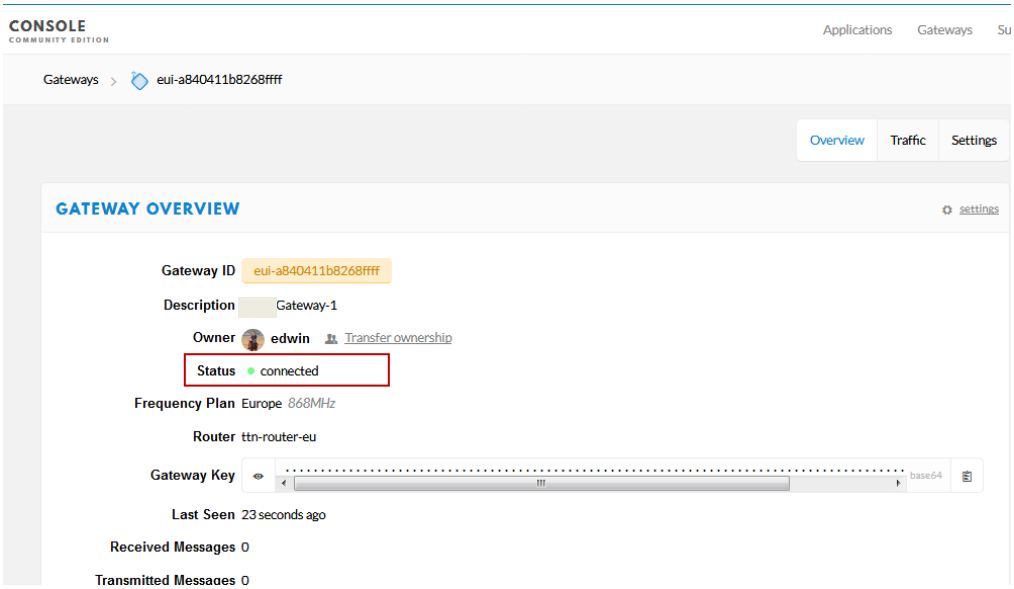


Note: The server address must match the router you choose in TTN.

In the home page, we can see the LoRaWAN connection is ready now.

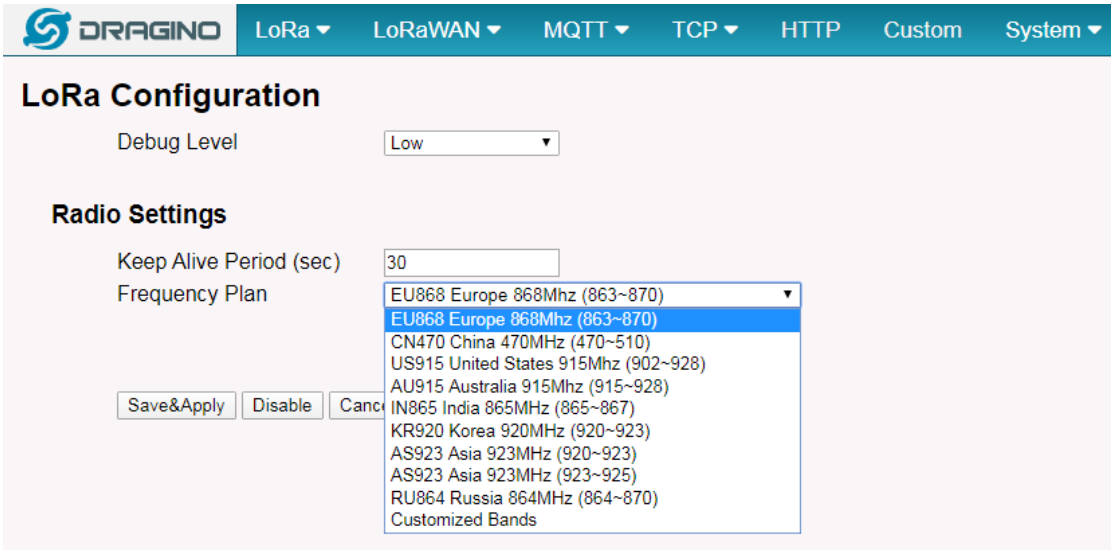
Check Result

After above settings, the LIG16 should be able to connect to TTN, below is the result seen from TTN:

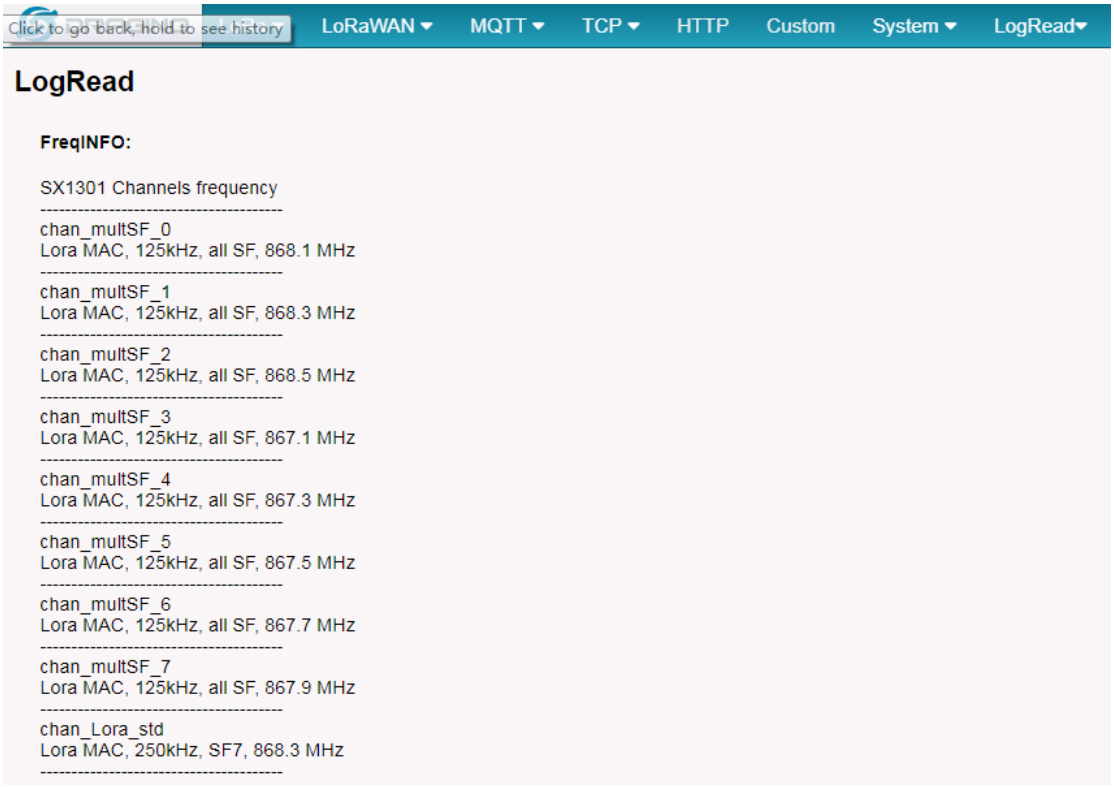


4.3 Configure frequency

We also need to set the frequency plan in LIG16 to match the LoRaWAN end node we use, so to receive the LoRaWAN packets from the LoRaWAN sensor.



In logread page, user can check the frequency actually used.

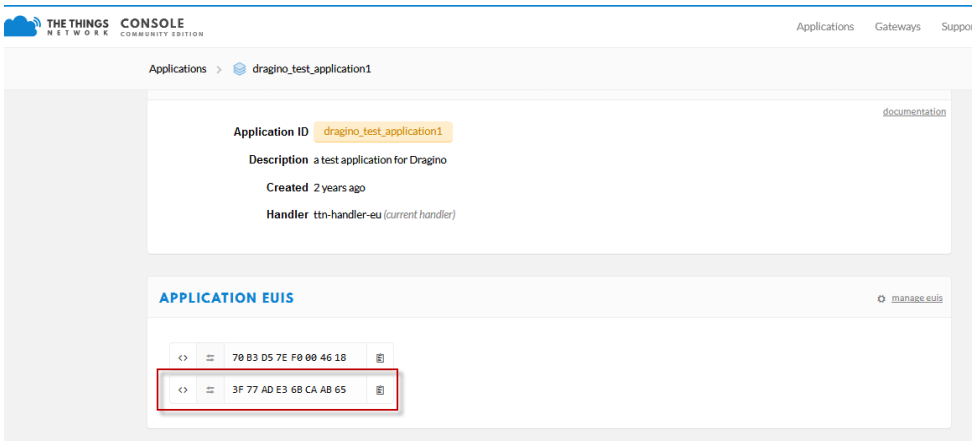


After doing above LIG16 will be able to act as LoRaWAN Gateway. Below section shows how to add a LoRaWAN End device in this LoRaWAN network and see the data from TTN.
We use LT-22222-L as a reference below, for other LoRaWAN devices will be more or less the same.

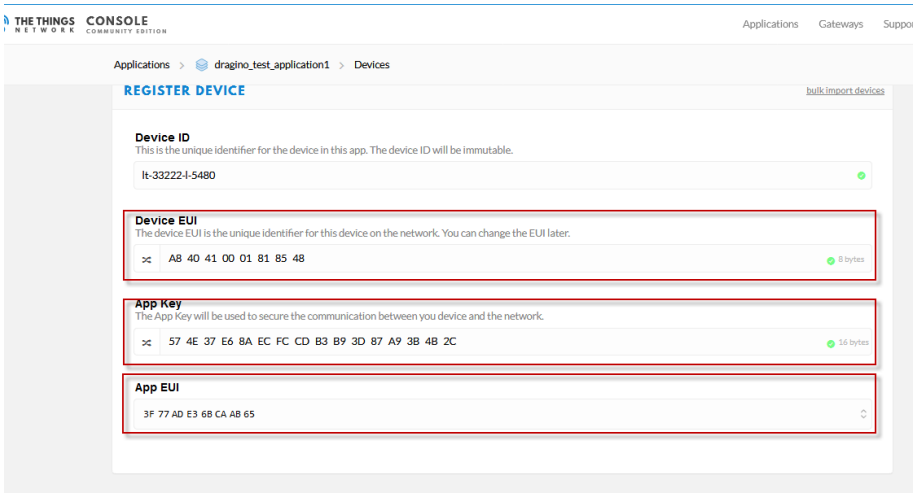
4.4 Add a LoRaWAN End Device

Step 1: Create a device in TTN with the OTAA keys from LT IO controller.
Each LT is shipped with a sticker with the default device EUI as below:

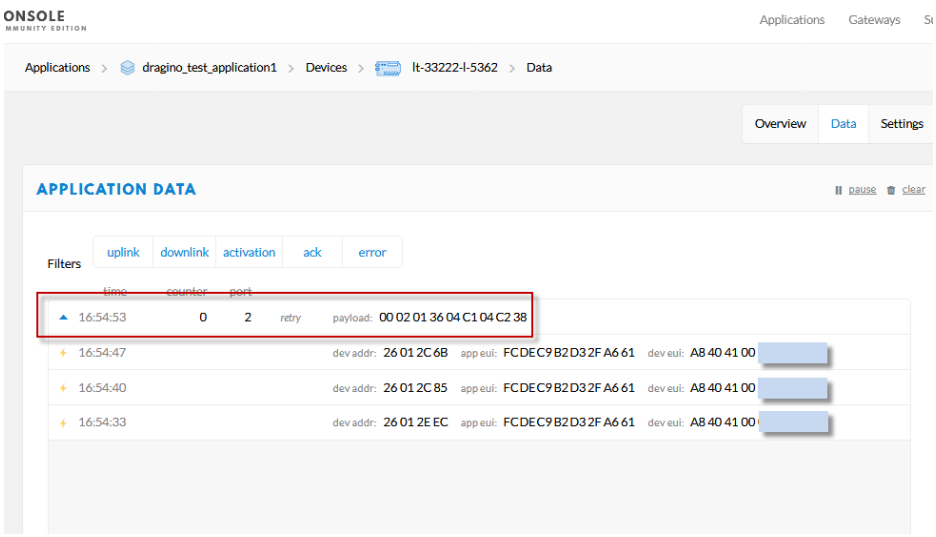
User can enter this key in their LoRaWAN Server portal. Below is TTN screen shot:
Add APP EUI in the application.



Add APP KEY and DEV EUI



Step 2: Power on LT and it will auto join to the TTN network. After join success, it will start to upload message to TTN and user can see in the panel and analyze the data



5. Web Configure Pages

5.1 Home

Shows the system running status:

5.2 LoRa Settings

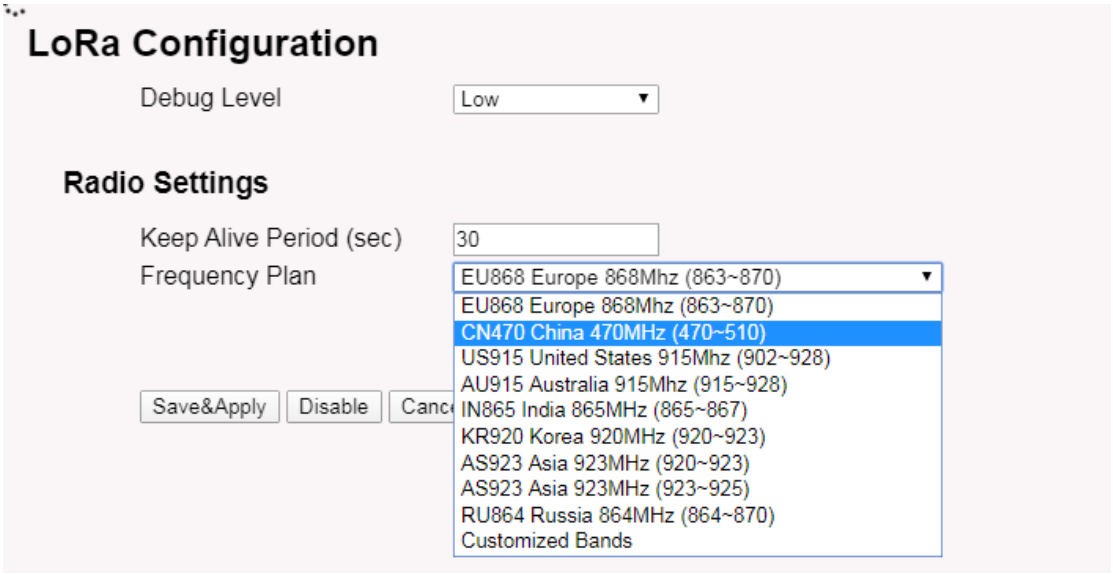
5.2.1 LoRa --> LoRa

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

Different LIG16 hardware version can support different frequency range:

- **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 user choose the frequency plan, he can see the actually frequency in used by checking the page **LogRead --> LoRa Log**



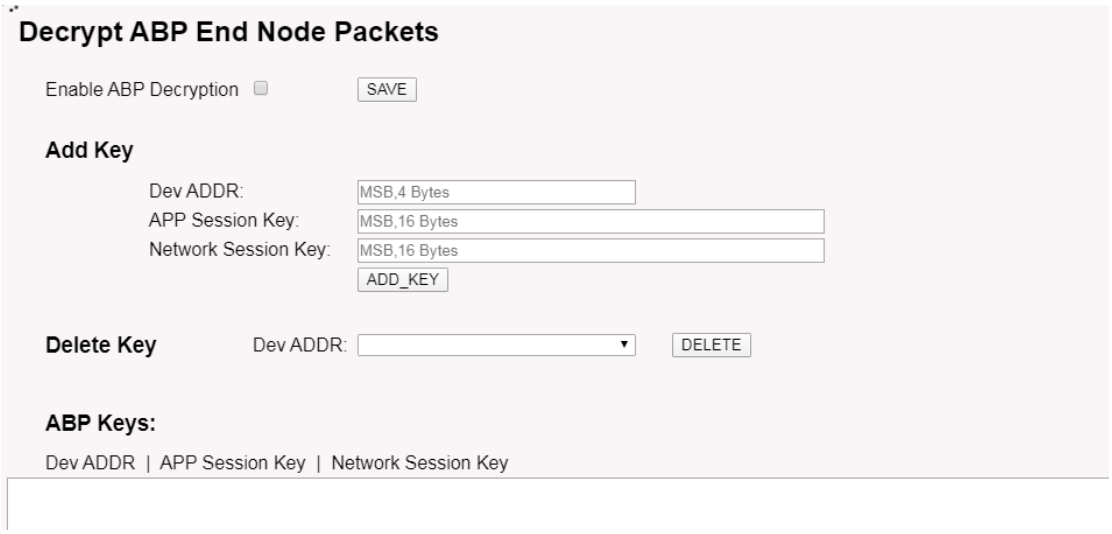
Note *: See this instruction for how to customize frequency band:
http://wiki.dragino.com/index.php?title=Customized_Frequency_Band_for_Gateway

5.2.2 LoRa --> ABP Decryption

The LIG16 can communicate with LoRaWAN ABP End Node without the need of LoRaWAN server. It can be used in some cases such as:

- No internet connection.
- User wants to get data forward in gateway and forward to their server based on MQTT/HTTP, etc. (Combine ABP communication method and MQTT forward together).

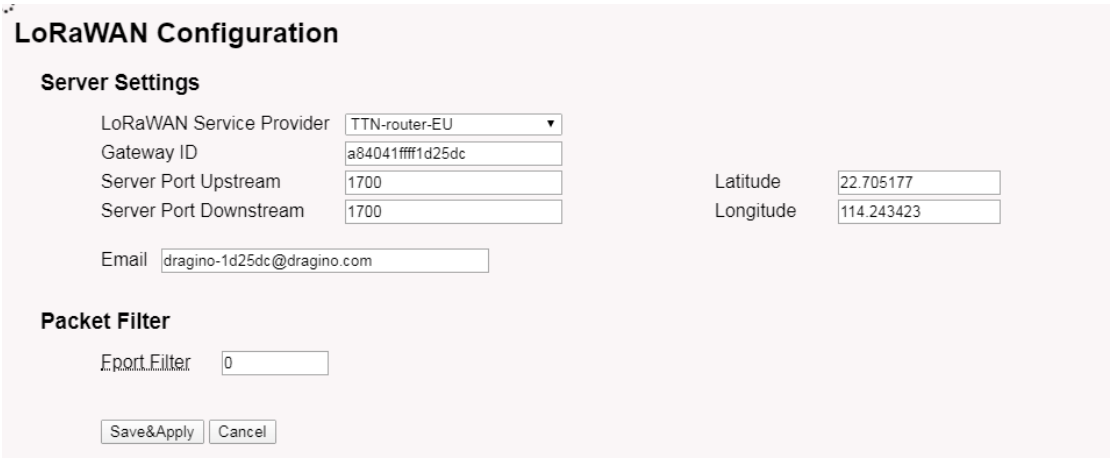
Detail of this feature:
http://wiki.dragino.com/index.php?title=Communication_with_ABP_End_Node



5.3 LoRaWAN Settings

5.3.1 LoRaWAN --> LoRaWAN

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

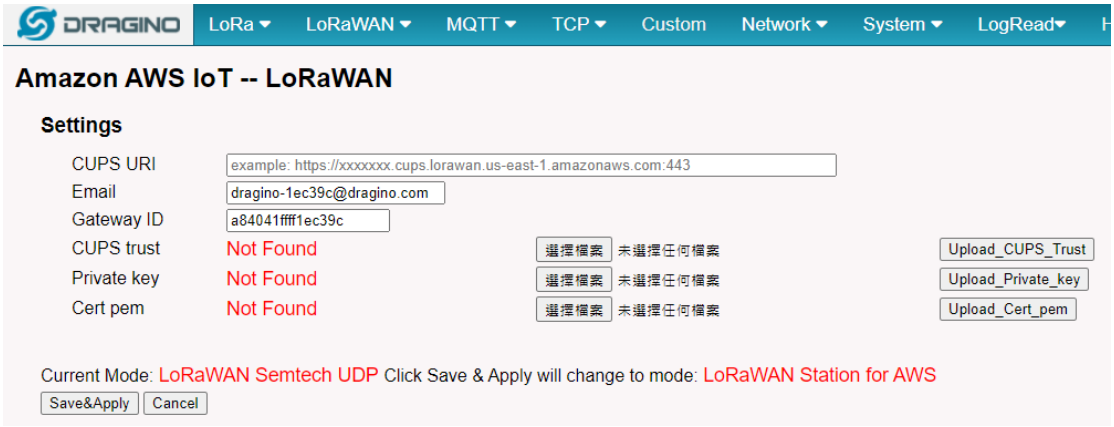


Note

**: Packet filter is to drop the unwanted LoRaWAN packet, instruction see here:

See http://wiki.dragino.com/index.php?title=Main_Page#Filter_unwanted_LoRaWAN_packets

5.3.2 LoRaWAN --> Amazon AWS-IoT

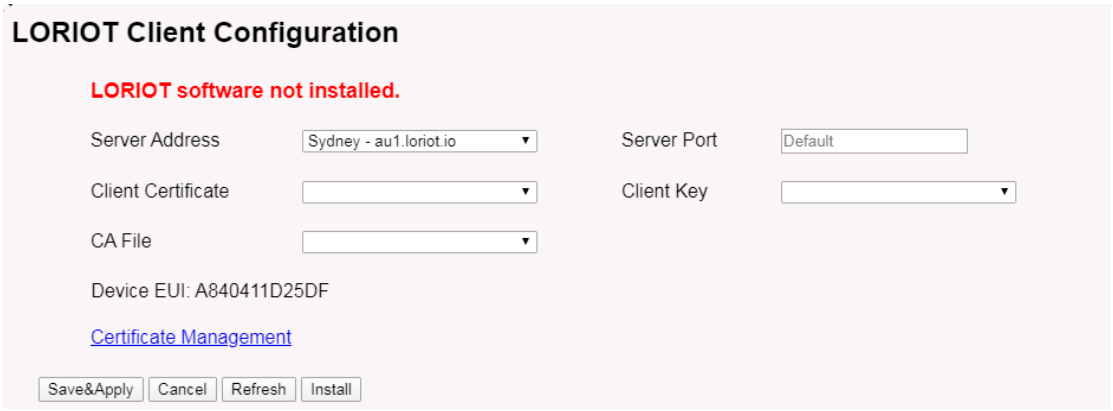


Please see this instruction to know more detail and demo for how to connect to AWS-IoT LoRaWAN Core: http://wiki.dragino.com/index.php?title=Notes_for_AWS-IoT-Core

5.3.3 LoRaWAN --> LORIOT

Settings to communicate to LORIOT LoRaWAN Network Server: https://www.loriot.io/

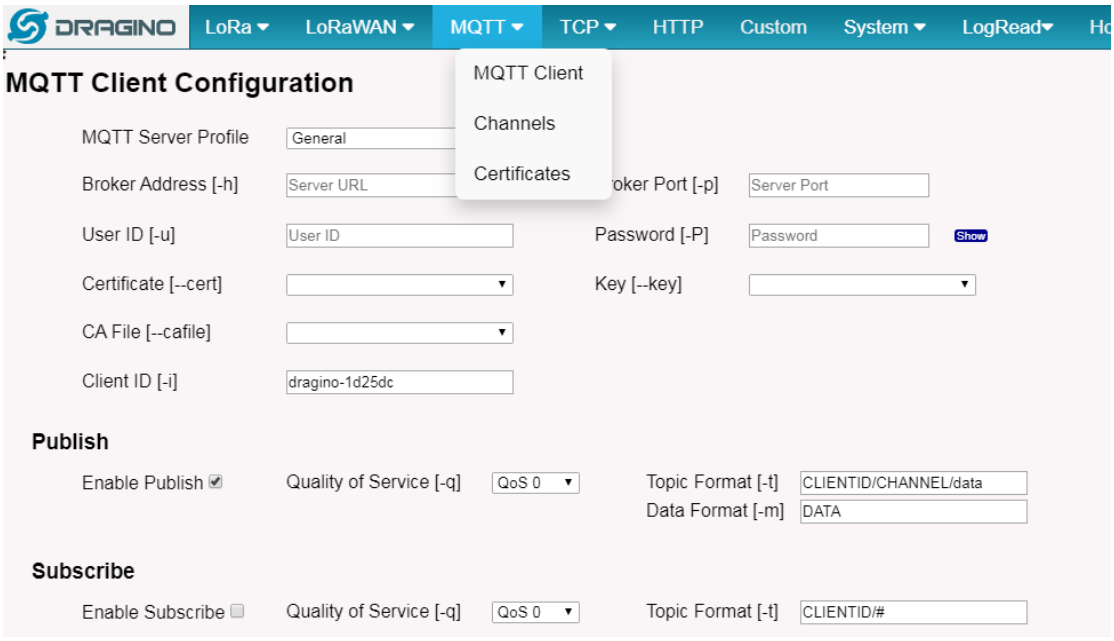
Instruction: http://wiki.dragino.com/index.php?title=Notes_for_LORIOT


LORIOT Client Configuration
LORIOT software not installed.
Server Address
Sydney - au1.loriot.io
Server Port
Default
Client Certificate
Client Key
CA File
Device EUI: A840411D25DF
Certificate Management
Save&Apply
Cancel
Refresh
Install

5.4 MQTT Settings

If end nodes work in ABP mode, user can configure LIG16 to transfer the data to MQTT broker, Instruction:

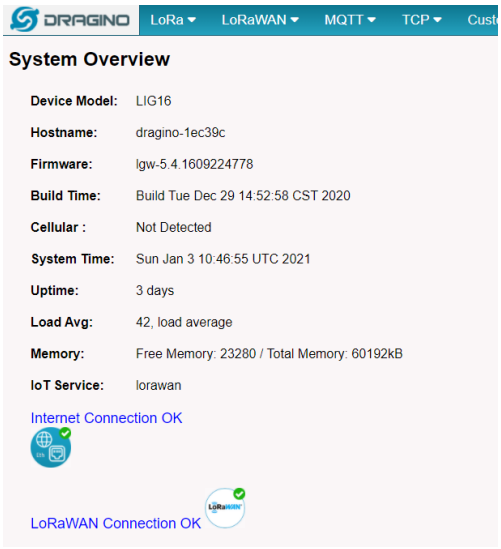
http://wiki.dragino.com/index.php?title=Main_Page#MQTT_Forward_Instruction



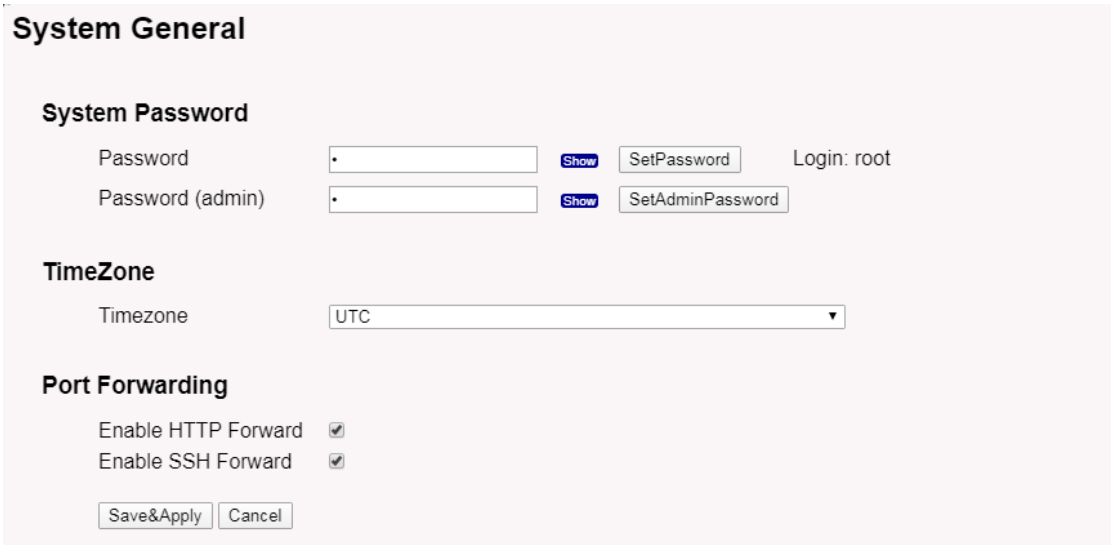
5.5 System

5.5.1 System --> System Overview

Shows the system info:



5.5.2 System --> General (login settings)



System Password:

There are two logins for LIG16: **root /dragino** or **admin /dragino**. Both root and admin have the same right for WEB access. But root user has also the right to access via SSH to Linux system. admin only able to access WEB interface.

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

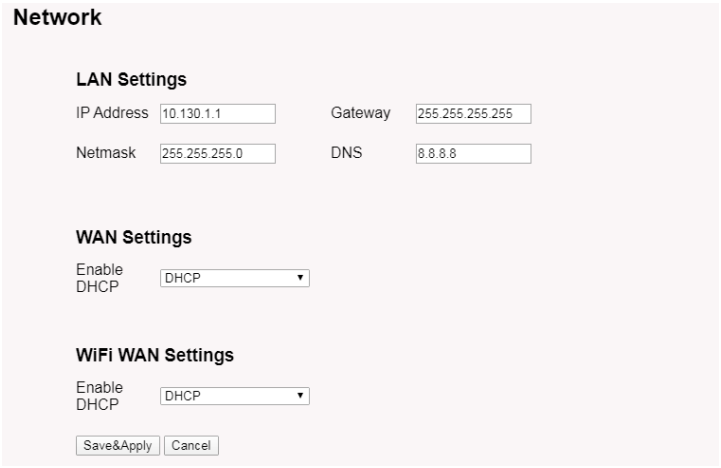
Timezone:

Set device timezone.

Port forwarding:

Enable/Disable the HTTP and SSH access via WAN interface.

5.5.3 System --> Network



LAN Settings:

When the LIG16 has the AP enable, LAN settings specify the network info for LIG16's own network.

WAN Settings:

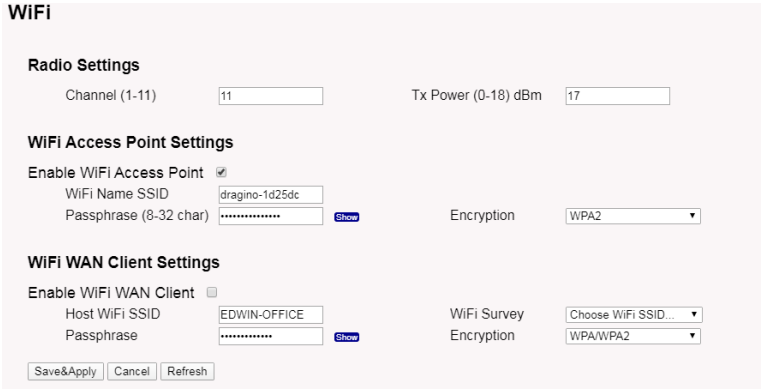
Setting for LIG16 WAN port

WiFi Settings:

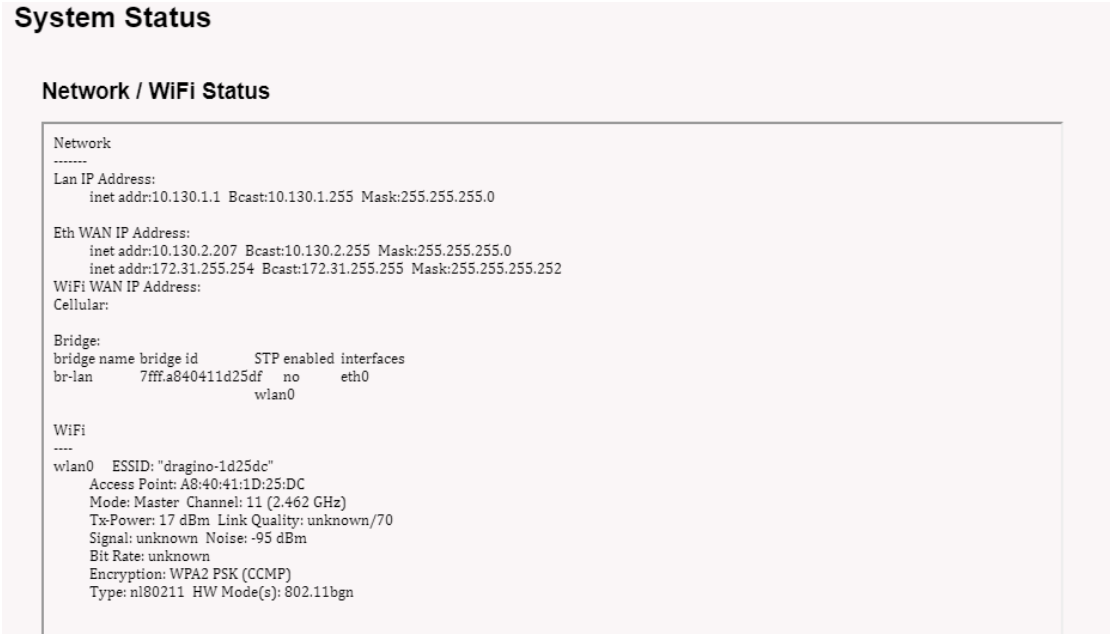
Setting for LIG16 WiFi IP when use it as WiFi Client

5.5.4 System --> WiFi

LIG16 WiFi Settings.



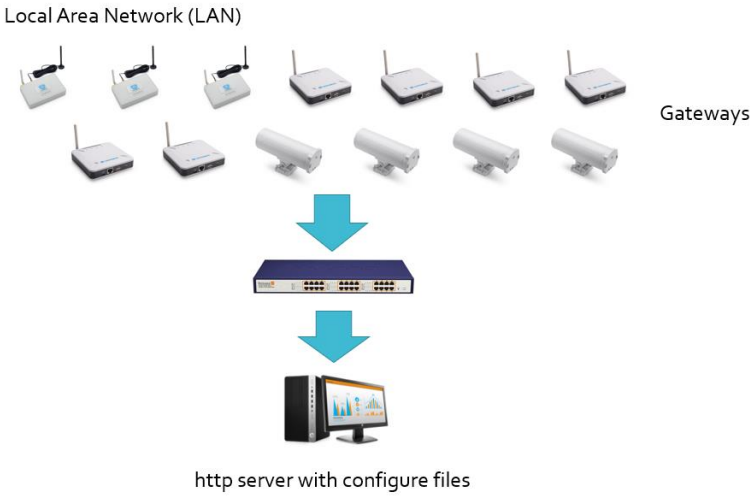
5.5.5 System --> Network Status



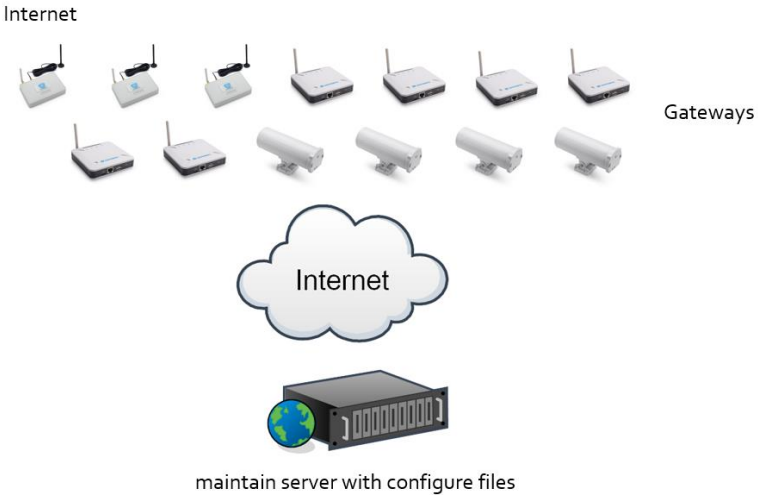
5.5.6 System --> Remote Mgnt & Auto Update

Auto Provision is the feature for batch configure and remote management. It can be used in below two cases:

Case 1: Batch configure gateways before deploy



Case 2: Maintain gateway configure from cloud



How it works

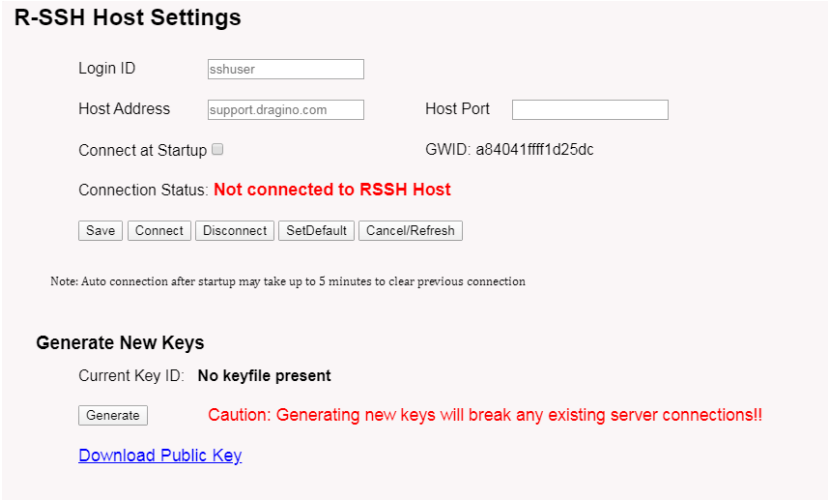
1. Gateways search (on every boot or 23:00 every day) the provision URL to get configure files or script files.
2. Gateways compare version number of the configure file, and process update if configure files has higher version.

Please see this document for detail:

http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LPS8/Firmware/Application_Note/&file=Auto-update-feature.pdf

R-SSH is for remote access device and management, introduction for how to use:

http://wiki.dragino.com/index.php?title=Main_Page#Remote_Access_Gateway_via_Reverse_SSH



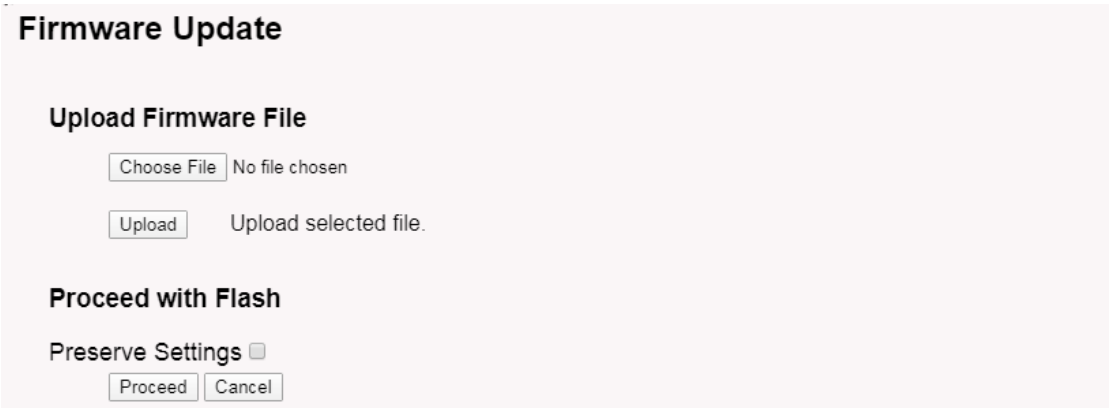
5.5.7 System --> Firmware Upgrade

We keep improving the LIG16 firmware for new features and bug fixes. Below are the links for reference.

- **Latest firmware**: LoRa Gateway Firmware,
(http://www.dragino.com/downloads/index.php?dir=LoRa_Gateway/LIG16/Firmware)
- **Change Log**: Firmware Change Log.
(http://www.dragino.com/downloads/downloads/LoRa_Gateway/LIG16/Firmware/ChangeLog)

The file named as **dragino-lgw–xxxxx-squashfs-sysupgrade.bin** is the upgrade Image. as below.

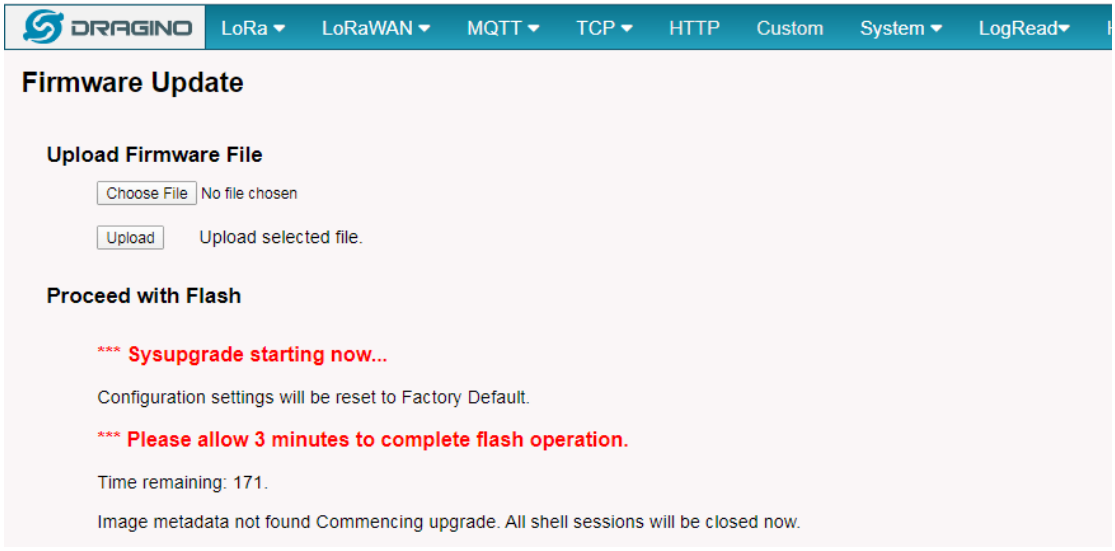
Web → System → Firmware Upgrade



Select the required image and click **Upload.** The image will be uploaded to the device, and then click **Process** to upgrade.

NOTE: You normally need to ***uncheck*** the **Preserve Settings** checkbox when doing an upgrade to ensure that there is no conflict between the old settings and the new firmware. The new firmware will start up with its default settings.

The system will automatically boot into the new firmware after upgrade.



Note *: User can also upgrade firmware via Linux console
SCP the firmware to the system **/var** directory and then run

root@OpenWrt:~# /sbin/sysupgrade –n /var/Your_Image

NOTE: it is important to transfer the image in the /var directory, otherwise it may exceed the available flash size.

5.5.8 System --> Reboot/Reset

5.5.9 System --> Package Maintain

Place to show what packages have been installed and possible to upgrade packages.

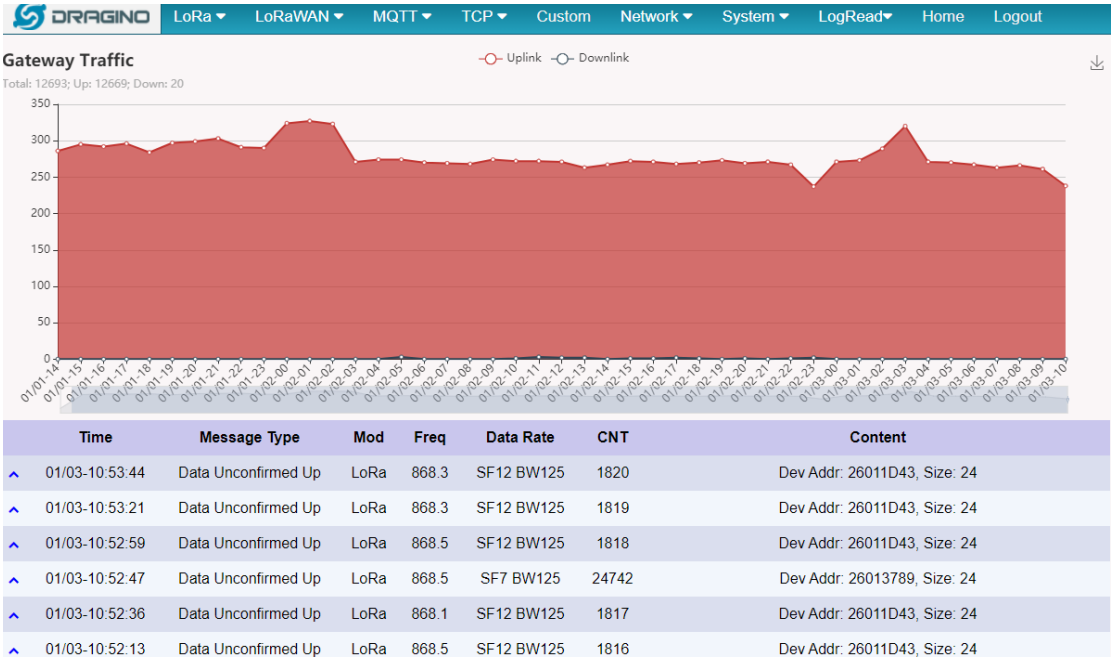
5.6 LogRead

5.6.1 LogRead --> LoRa Log

Show the frequency for LoRa Radio and traffics.

5.6.2 LogRead --> Gateway Traffic

Shows gateway traffic statistics in the past 72 hours and the last 100 gateway traffic entries.



Time	Message Type	Mod	Freq	Data Rate	CNT	Content
01/03-10:53:44	Data Unconfirmed Up	LoRa	868.3	SF12 BW125	1820	Dev Addr: 26011D43, Size: 24
01/03-10:53:21	Data Unconfirmed Up	LoRa	868.3	SF12 BW125	1819	Dev Addr: 26011D43, Size: 24
01/03-10:52:59	Data Unconfirmed Up	LoRa	868.5	SF12 BW125	1818	Dev Addr: 26011D43, Size: 24
01/03-10:52:47	Data Unconfirmed Up	LoRa	868.5	SF7 BW125	24742	Dev Addr: 26013789, Size: 24
01/03-10:52:36	Data Unconfirmed Up	LoRa	868.1	SF12 BW125	1817	Dev Addr: 26011D43, Size: 24
01/03-10:52:13	Data Unconfirmed Up	LoRa	868.5	SF12 BW125	1816	Dev Addr: 26011D43, Size: 24

5.6.3 LogRead --> System Log

Show the system log

System Log
USB Devices:
Bus 001 Device 003: ID 0403:6001 Future Technology Devices International, Ltd FT232 Serial (UART) IC
Bus 001 Device 002: ID 1a40:0101 Terminus Technology Inc. Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Boot Info:
Linux version 4.9.109 (root@DraginoHK) (gcc version 7.3.0 (OpenWrt GCC 7.3.0 r7360-e15565a)) #0 Fri Jun 29 16:58:53 2018
MyLoader: sysp=aaaaaaaa, boardp=2aabaaab, parts=aaaa2aab
bootconsole [early0] enabled
CPU0 revision is: 00019374 (MIPS 24Kc)
SoC: Atheros AR9330 rev 1
Determined physical RAM map:
memory: 04000000 @ 00000000 (usable)
Initrd not found or empty - disabling initrd
Primary instruction cache 64kB, VIPT, 4-way, linesize 32 bytes.
Primary data cache 32kB, 4-way, VIPT, cache aliases, linesize 32 bytes
Previous Log:

6. More features

6.1 More instructions

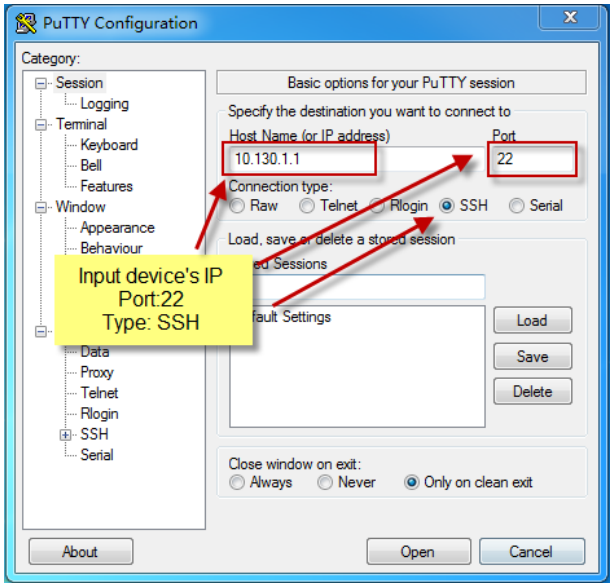
http://wiki.dragino.com/index.php?title=Main_Page#LoRa.2FLoRaWAN_Gateway_Instruction

7. Linux System

The LIG16 bases on OpenWrt Linux System. It is open source, and user are free to configure and modify the inside Linux settings.

7.1 SSH Access for Linux console

User can access to the Linux console via SSH protocol. Make sure your PC and the LIG16 is in the same network, then use a SSH tool (such as putty) to access it. Below are screenshots:



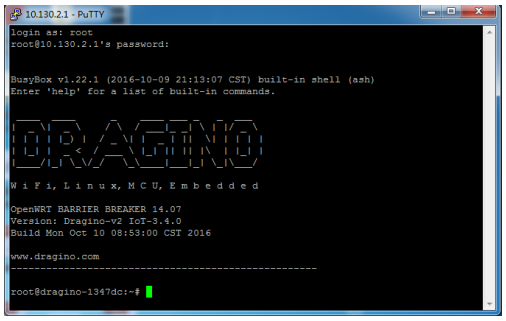
IP address: IP address of LIG16

Port: 22 or 2222

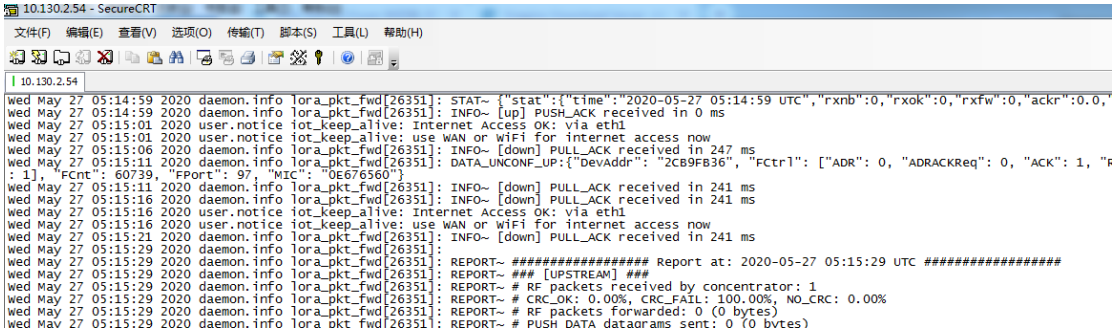
User Name: **root**

Password: **dragino** (default)

After log in, you will be in the Linux console and type command here.

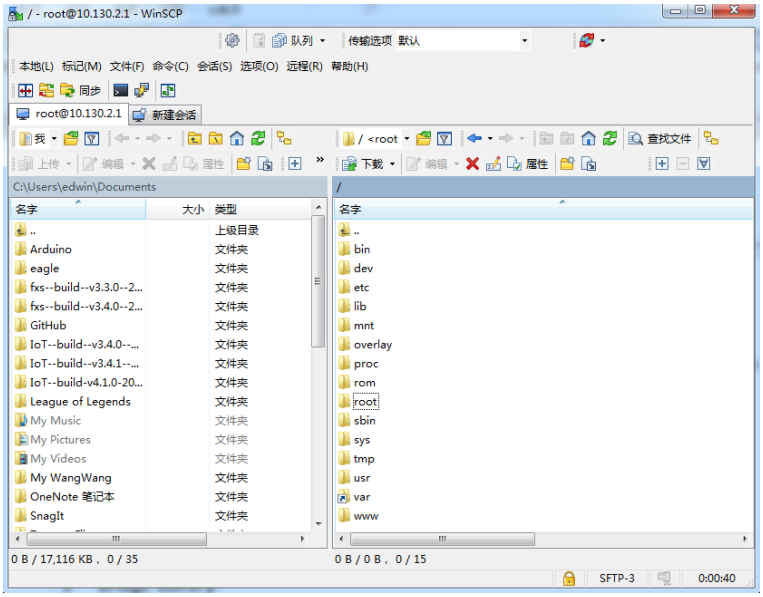


The “logread -f” command can be used to debug how system runs.



7.2 Edit and Transfer files

The LIG16 support **SCP protocol** and has a built **SFTP server**. There are many ways to edit and transfer files using these two protocols. One of the easiest is through WinSCP utility. After access via WinSCP to the device, use can use a FTP alike window to drag / drop files to the LIG16 or Edit the files directly in the windows. Screenshot is as below:



7.3 File System

The LIG16 has a 16MB flash and a 64MB RAM. The /var and /tmp directory are in the RAM, contents stored in /tmp and /var will be erased after reboot the device. Other directories are in the flash and will keep after reboot.

The Linux system use around 8MB ~10MB flash size which means there is not much room for user to store data in the LIG16 flash. User can use an external USB flash to extend the size for storage.

7.4 Package maintain system

LIG16 uses **OPKG package maintain system**. There are more than 3000+ packages available in our package server for user to install for their applications. For example, if user wants to add iperf tool, they can install the related packages and configure LIG16 to use iperf

Below is some examples opkgs command, more please refer **OPKG package maintain system**

In Linux Console run:

root@dragino-169d30:~# opkg update // to get the latest packages list

root@dragino-169d30:~# opkg list //shows the available packages

root@dragino-169d30:~# opkg install iperf // install iperf, it will auto install the required packages.

root@dragino-169d30:/etc/opkg# opkg install iperf

Installing iperf (2.0.12-1) to root...

Downloading http://downloads.openwrt.org/snapshots/packages/mips_24kc/base/iperf_2.0.12-1_mips_24kc.ipk

Installing uclibcxx (0.2.4-3) to root...

Downloading

http://downloads.openwrt.org/snapshots/packages/mips_24kc/base/uclibcxx_0.2.4-3_mips_24kc.ipk

Configuring uclibcxx.

Configuring iperf.

8. FAQ

8.1 How can I configure for a customized frequency band?

See below link for how to customize frequency band:
http://wiki.dragino.com/index.php?title=Customized_Frequency_Band_for_Gateway

8.2 Can I make my own firmware for the gateway, where can I find the source code?

Yes, you can make your own firmware for the LIG16 for branding purposes or to add customized applications.
The source code and compile instructions can be found at:
https://github.com/dragino/openwrt_lede-18.06

8.3 Can I use 868Mhz version for 915Mhz bands?

It is possible but the distance will be very short, you can select US915 frequency band in 868Mhz version hardware. It will work but you will see the performance is greatly decreased because the 868Mhz version has an RF filter for band 863~870Mhz, all other frequencies will have high attenuation.

8.4 Can I control the triangle LED?

First export the gpio22(triangle LED) and set to out
echo 22 > /sys/class/gpio/export
echo out > /sys/class/gpio/gpio22/direction
ON: echo 0 > /sys/class/gpio/gpio22/value
OFF: echo 1 > /sys/class/gpio/gpio22/value

9. Trouble Shooting

9.1 I get kernel error when install new package, how to fix?

In some case, when install package, it will generate kernel error such as below:

root@dragino-16c538:~# opkg install kmod-dragino2-si3217x_3.10.49+0.2-1_ar71xx.ipk
Installing kmod-dragino2-si3217x (3.10.49+0.2-1) to root...
Collected errors:
* satisfy_dependencies_for: Cannot satisfy the following dependencies for kmod-dragino2-si3217x:
* kernel (= 3.10.49-1-4917516478a753314254643facdf360a) *
 * opkg_install_cmd: Cannot install package kmod-dragino2-si3217x.

In this case, user can use the –force-depends option to install such package.

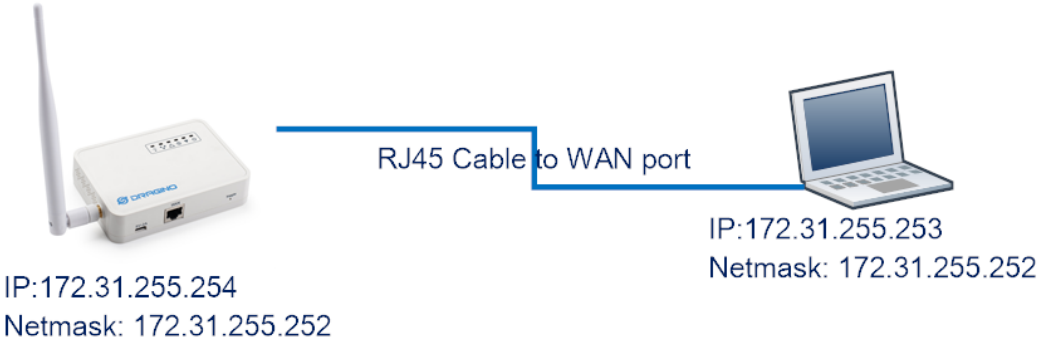
opkg install kmod-dragino2-si3217x_3.10.49+0.2-1_ar71xx.ipk --force-depends

9.2 How to recover the LIG16 if firmware crash

Please follow this instruction to recover your gateway:

http://wiki.dragino.com/index.php?title=Recover_Gateway

9.3 I configured LIG16 for WiFi access and lost its IP. What to do now?

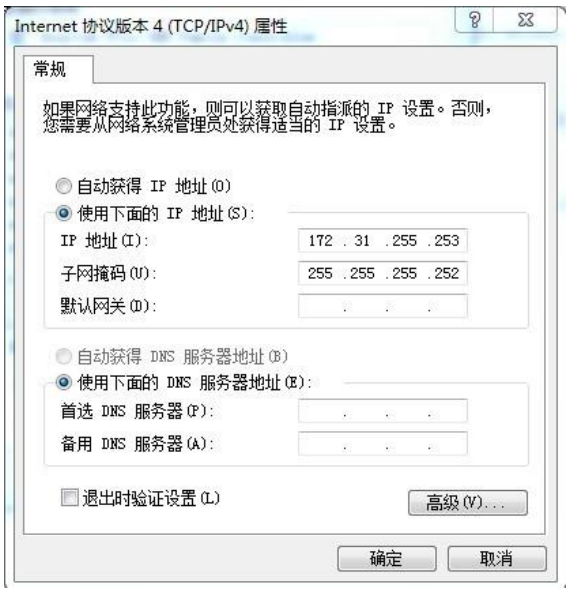


The LIG16 has a fallback ip in its WAN port. This IP is always enabled so user can use fall back ip to access LIG16 no matter what the WiFi IP is. The fall back ip is useful for connect and debug the unit.

(Note: fallback ip can be disabled in the LAN and DHCP page)

Steps to connect via fall back IP:

1. Connect PC's Ethernet port to LIG16's WAN port
2. Configure PC's Ethernet port has IP: 172.31.255.253 and netmask: 255.255.255.252
   As below photo:



3. In PC, use 172.31.255.254 to access LIG16 via Web or Console.

10. Order Info

***PART: LIG16-XXX*:**

XXX: Frequency Band

- **868**: valid frequency: 863Mhz ~ 870Mhz. for band EU868 or IN865.
- **915**: valid frequency: 902Mhz ~ 928Mhz. for bands US915, AU915, AS923 or KR920

11. Packing Info

Package Includes:

- ✓ LIG16 LoRaWAN Indoor Gateway x 1
- ✓ Stick Antenna for LoRa RF part. Frequency is one of 433 or 868 or 915Mhz depends the model ordered
- ✓ Power Adapter: EU/AU/US type power adapter depends on country to be used
- ✓ Packaging with environmental protection paper box

Dimension and weight:

- ✓ Device Size: 12 x 8.5 x 3 cm
- ✓ Device Weight: 150g
- ✓ Package Size / pcs : 21.5 x 10 x 5 cm
- ✓ Weight / pcs : 360g
- ✓ Carton dimension: 45 x 31 x 34 cm. 36pcs per carton
- ✓ Weight / carton : 12.5 kg

12. Support

- Try to see if your questions already answered in the wiki.
- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answered as soon as possible in the before-mentioned schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to

support@dragino.com